Two Unknown Arboreal Frogs (genus *Platypelis*) Described from the Rainforests of Northeastern Madagascar (Microhylidae: Cophylinae)

FRANCO ANDREONE1*, DANTÉ B. FENOLIO2, AND MARK E. WALVOORD2

1 Museo Regionale di Scienze Naturali, Sezione di Zoologia, Via G. Giolitti, 36, I–10123
Torino, ITALY

2 University of Oklahoma, Department of Zoology, 730 Van Vleet Oval, Richards Hall,
Norman, Oklahoma, USA

Abstract: Two new arboreal microhylid frogs are described from the rainforests of northeastern Madagascar. *Platypelis tetra* is a very small frog, reaching about 20 mm SVL, and inhabits phytotelm in screw *Pandanus* pines. It was found in some low and mid-altitude rainforests, such as Anjanaharibe-Sud, Besera, Tsararano, and Masoala Peninsula. This species diverges from the other *Platypelis* by its small size and colouration, with a series of whitish spots on the back, of which four are more evident. Furthermore, its advertisement call is composed by a long series of discrete notes at about 3.5–4 KHz of frequency, and a repetition rate of about 3.6 notes/s. The second species, *Platypelis mavomavo*, reaches a larger size (about 30 mm SVL), and is characterized by a yellowish colouration of the ventral surface, and a dorsal surface with a network of dark spots on a beige-yellow background. It is currently known from Anjanaharibe-Sud and Ambolokopatrika, around the Andapa water-basin, but is expected to have a wider distribution.

Key words: Amphibia; Anura; Microhylidae; *Platypelis*; New species; Madagascar

INTRODUCTION

Madagascar is well known for its biodiversity and high endemism (Glaw and Vences, 1994). Amphibians are no exception with more than 210 endemic species (Andreone and Luiselli, 2003) and many others still in wait for description. Like other vertebrates of Madagascar (e.g., fish and mammals, see Benstead et al., 2000; Yoder et al., 2003), the frogs of this landmass belong to a few families, of which they represent an offshoot radiation. According to recent studies (Vences and Glaw, 2001) they are included in four families: Ranidae, Mantellidae, Microhylidae, and Hylidae. Of these, the microhylids are still the most enigmatic clade, and their phylogenetic and taxonomic relations are largely unstudied. Of the three recognized Malagasy subfamilies (Dyscophinae, Scaphiophryninae, and Cophylineae), the cophylines account for a high number of species inhabiting rainforests and secondary altitude savannas (Andreone, 1999). Indeed, little is known of their ecology and distribution

* Corresponding author. Tel: +39-011-4320-7310; Fax: +39-011-4323-331.
E-mail address: f.andreone@libero.it
except that they are specialized to a variety of microhabitats: e.g., the enigmatic Rhombophryne testudo and some Plethodontohyla species (such as P. ocellata, P. altaudii, and P. serratopalpebrosa) are fossorial or terrestrial, the small Stumpfia are adapted to leaf-litter, and most of the Anodontyla, Platypelis, Cophyla, and some Plethodontohyla are arboreal or semiarboreal. The conditions and evolutionary pressures that led to such a dramatic ecological radiation in these frogs are unknown. Further, whether an ecologically specialised group is indeed monophyletic is the subject of a separate work (Andreone et al., in press).

One reason for the lack of knowledge about cophyline microhylids is that they often lead a cryptic life, which makes their study difficult. In fact, many taxa are known from a few specimens and are only occasionally re-discovered (e.g., Plethodontohyla coulreaui; Andreone, in press a). This was confirmed by our own experience: during field surveys we often found specimens that could be grouped with one another representing the same ecological and morphological cluster, but were difficult to assign to any known taxon. This leads us to the idea that, especially in microhylids, many more species await description, and it is not an exaggeration to affirm that most likely the final number of species will stabilise around the double that currently known. Many of these specimens still await description and will be the object of further contributions, using both traditional (e.g., morphological analysis and comparisons of museum samples), and other methods (e.g., acoustics, karyology, DNA). While it is important to collect ecological and natural history information on unknown species, the discovery and rapid description of new frogs from Madagascar is important for two reasons: (1) it accelerates the cataloguing of the whole Malagasy batrachofauna, providing powerful tools to draw biogeographic relationships for conservation actions (see Andreone and Luiselli, 2003), and (2) it helps clarify the taxonomy and phylogeny of this subfamily in a region where deforestation outpaces description. Written records and museum specimens might become all we have for future studies of the most sensitive species, which are rapidly vanishing.

The present paper is just a step in this direction and deals with the description of two new Platypelis that we found in northeastern Madagascar. One of these frogs is a Pandanus-specialized Platypelis, while the second is an arboreal generalist. They are sufficiently divergent from all known Platypelis, in both morphology and bioacoustics, to warrant description here.

**MATERIALS AND METHODS**

We searched for frogs during the night with the help of flashlights. Vocalizing males were located by following calls at sunset or during rainfall. One species described here is a microhabitat specialist, living within phytotelma of screw-pines, Pandanus sp., and we spent daytime hours searching the leaf axils of these plants. After capture and photography of live colouration, specimens were sacrificed after anaesthesia in chlorobutanol, fixed in 4% formalin or 90% ethanol, and preserved in 70% ethanol. They are currently deposited in the Museo Regionale di Scienze Naturali, Torino (MRSN).

Measurements follow standard methods, using digital callipers or the dissecting microscope’s micrometer (to the nearest 0.1 mm): SVL (snout-vent length), HW (head width), HL (head length, from the maxillary commissure to the snout tip), ED (horizontal eye diameter), END (eye-nostril distance), NSD (nostril-snout tip distance), NND (inter-narial distance), TD (horizontal tympanum diameter), HAL (hand length, from the carpal-metacarpal articulations to the tip of the longest finger), FORL (forelimb length, from the axilla to the tip of the longest finger), HIL (hindlimb length, from the cloaca to the tip of the longest toe), FOL (foot length, from the tarsal-metatarsal articulations to the tip of the longest toe), FOTL (foot length including tarsus, from the tibiotarsal articulation to the
tip of the longest toe), TIBL (tibia length).

When available, type specimens and/or other representative specimens of presumably related taxa from zoological collections were examined, as well as the original descriptions and subsequent works (e.g., Blommers-Schlösser and Blanc, 1991; Glaw and Vences, 1994). The advertisement calls were recorded with a SONY TC-D3 tape recorder with external microphone and analyzed with a VOXYS 3.1 sound system (Andreone et al., 2003). The proposed common names for the new species are provided in the authors’ original languages (Italian and English) and in Malagasy.

**Platypleis tetra** sp. nov.

Four-spotted tree cophyline frog (English), cofillino degli alberi dalle quattro macchie (Italian), sahonkely anathi hazo misy tebok’efatra (Malagasy).

Figs. 1–3

**Type series**

Holotype: MRSN A2174, adult male, Campsite W2, Anjanaharibe-Sud Massif, Analabe Valley, Befandriana Fivondronana, Mahajanga Faritany (Majunga Province), 14°46'S, 49°26'E, 1,250 m asl, collected by F. Andreone, H. Randriamahazo, and J. E. Randrianirina, 5 February 1996. Paratypes: MRSN A2171–2173, three adult females, same data as the holotype; MRSN A1952–1953, an adult male and an adult female, Tsararano Forest, Andony Anivo, Andapa Fivondronana, Antsiranana Faritany (Diégo Suarez Province), 14°54.8'S, 49°42.6'E, 600 m asl, collected by F. Andreone and J. E. Randrianirina, 5 and 10 December 1996; MRSN A2175, one juvenile, Besariaka Forest, Andapa Fivondronana, Antsiranana Faritany (Diégo Suarez Province), between 14°49'S–14°50'S, 49°35'E–49°36'E, about 700 m asl, collected by J. E. Randrianirina, 1 May 1996; MRSN A646.1–4, three adult males and one juvenile, Masomiyenjina Forest, Masoala Peninsula, Maroantsetra Fivondronana, Toamasina Faritany (Tamatave Province), 15°25'S, 49°46'E, collected by R. Nincheri, 24 July 1993; MRSN A2161, A2164–2165, one juvenile and two adult males, Anbohidoirina Forest, Masoala Peninsula, Mahalevona Fivondronana, Toamasina Faritany (Tamatave Province), 15°26.00'S, 49°57.56'E, 840 m asl, collected by J. E. Randrianirina, 26 January 2002; MRSN A2166, one juvenile, same date and collector, 28 January 2002; MRSN A2167, an adult male, same date and collector, 29 January 2002; MRSN A2169, one juvenile, same date and collector, 30 January 2002; MRSN A2170.

**Fig. 1.** *Platypleis tetra*. Holotype (male, MRSN A2174) from Analabe Valley, Anjanaharibe-Sud, western slope, NE Madagascar.

**Fig. 2.** Particular of the head (A), hand (B), and foot (C) of the holotype of *Platypleis tetra* (male, MRSN A2174).
same date and collector, 9 February 2002.

**Diagnosis**

An arboreal *Platypelis* characterized by the following combination of characters: small adult body size, canthus rostralis indistinct, toe and finger pads more circular than ovoid and moderate in size; hands and feet without webbing, tarso-metatarsal articulation reaching the eye, dorsal surface smooth, dorsal color shading from brown to tan, sometimes with irregular markings and at least four oblong white spots on the dorsal surface.

**Description**

The SVL in the examined males ranged from 15.7 to 18.2 mm. In the females from 17.5 to 19.4 mm. Other measurements of the type series are given in Table I. Head as long as wide; HW 32–41% of SVL; HL 31–41% SVL; snout short, slightly protruding beyond margin of lip; rounded and blunt in dorsal view and in profile; END less than ED; END 20–26% of HL; eye moderate in size; ED 28–36% of HL. Top of head flat; cranial crests absent; canthus rostralis indistinct; internarial area not depressed; nostril more circular than ovoid; protruding laterally. Weak supratympanic fold usually visible, tympanum round, TD 34–67% of ED. Choanae small, round, separated, partially obscured by palatal shelf of maxillary arch. Vomerine teeth present and posterior to choanae. Tongue trapezoid in shape with rounded edges, widest at the free margin, no groove or notch, free behind for about two thirds of its length. Pupil horizontal. Vocal sac moderate in size, single, and in gular position. Skin on dorsum of head, body, belly, and limbs smooth. Fingers moderate in length bearing circular, moderately sized discs compared with phalanges; disc on first digit smaller than others: 1 < 2 < 4 < 3; subarticular tubercles faint, circular, not elevated; supernumerary tubercles absent; palmar tubercle semi-distinct, not elevated. No webbing between fingers. Feet with semi-distinct supernumerary tubercles; vestiges of metatarsal tubercle; no other distinct tubercles. Small pads on toes, circular in shape. No webbing between toes. Toc length: 1 < 2 < 5 < 3 < 4.

**Coloration**

After five-seven years of preservation in ethanol, all the specimens still show contrasting colouration. Dorsum of head, body, and limbs are brown or tan with vague darker markings, and legs have irregular tan spots. Four bigger dorsal whitish spots are present on the back (two just behind the head, and two other on the sacral bone). Other smaller scattered light points are also present of the back and superior parts of legs in some individuals. In some cases the four main spots form a sort of hourglass figure on the dorsum. Flanks with a brown dorsolateral band beginning posterior to the eye, passing through the union of the arms with the body and down each flank, ending at the groin; brown bar is edged above and below by a thin cream line. The anterior surface of the arm with a brown line extending from the union of the arms with the body and terminating at or before the elbow. Iris brownish shading to copper, with peripheral fine spots and dark shadings. Ventral surface grey to creamish with a few brown flecks, sometimes forming dark spots.

**Variation**

The paratypes come from Anjanaharibe, Besariaka, Tsararano, and Masoala, spanning therefore about 200 km. These specimens agree with the holotype in colouration. The
Table 1. Morphometric measurements (in mm) of type specimens of *Platypleis tetra* sp. nov. and *P. mavomavo* sp. nov. M = male, F = female, J = juvenile, holotype marked with an asterisk. For abbreviations see the text.

<table>
<thead>
<tr>
<th>Museum number</th>
<th>Provenience</th>
<th>Sex</th>
<th>SVL</th>
<th>HW</th>
<th>HL</th>
<th>ED</th>
<th>ND</th>
<th>NND</th>
<th>TD</th>
<th>HAL</th>
<th>FORL</th>
<th>FOL</th>
<th>TIBL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platypleis tetra</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MRSN A2174*</td>
<td>Anjanaharibe-Sud</td>
<td>M</td>
<td>17.5</td>
<td>6.4</td>
<td>6.2</td>
<td>2.0</td>
<td>1.3</td>
<td>1.6</td>
<td>2.0</td>
<td>0.8</td>
<td>3.2</td>
<td>5.9</td>
<td>6.0</td>
</tr>
<tr>
<td>MRSN A2172</td>
<td>Anjanaharibe-Sud</td>
<td>M</td>
<td>18.2</td>
<td>6.5</td>
<td>6.3</td>
<td>2.2</td>
<td>1.4</td>
<td>1.6</td>
<td>2.1</td>
<td>1.2</td>
<td>3.4</td>
<td>6.5</td>
<td>5.4</td>
</tr>
<tr>
<td>MRSN A1952</td>
<td>Tsararano</td>
<td>M</td>
<td>16.5</td>
<td>5.9</td>
<td>5.8</td>
<td>1.9</td>
<td>1.3</td>
<td>1.5</td>
<td>2.0</td>
<td>0.9</td>
<td>2.8</td>
<td>6.6</td>
<td>4.5</td>
</tr>
<tr>
<td>MRSN A646.1</td>
<td>Masomihenjina</td>
<td>M</td>
<td>15.8</td>
<td>5.5</td>
<td>5.7</td>
<td>1.9</td>
<td>1.4</td>
<td>1.4</td>
<td>2.0</td>
<td>0.9</td>
<td>3.1</td>
<td>6.4</td>
<td>5.3</td>
</tr>
<tr>
<td>MRSN A646.2</td>
<td>Masomihenjina</td>
<td>M</td>
<td>15.7</td>
<td>6.2</td>
<td>6.1</td>
<td>2.1</td>
<td>1.2</td>
<td>1.4</td>
<td>2.0</td>
<td>1.0</td>
<td>3.4</td>
<td>6.4</td>
<td>5.2</td>
</tr>
<tr>
<td>MRSN A646.3</td>
<td>Masomihenjina</td>
<td>M</td>
<td>16.2</td>
<td>5.2</td>
<td>5.8</td>
<td>1.8</td>
<td>1.5</td>
<td>1.5</td>
<td>2.1</td>
<td>1.1</td>
<td>2.8</td>
<td>5.9</td>
<td>4.6</td>
</tr>
<tr>
<td>MRSN A2164</td>
<td>Ambolohidrinoia</td>
<td>M</td>
<td>18.2</td>
<td>6.2</td>
<td>6.3</td>
<td>2.2</td>
<td>1.5</td>
<td>1.7</td>
<td>2.0</td>
<td>0.9</td>
<td>3.4</td>
<td>6.6</td>
<td>5.4</td>
</tr>
<tr>
<td>MRSN A2165</td>
<td>Ambolohidrinoia</td>
<td>M</td>
<td>18.2</td>
<td>6.8</td>
<td>6.3</td>
<td>1.8</td>
<td>1.4</td>
<td>1.9</td>
<td>2.2</td>
<td>1.2</td>
<td>3.7</td>
<td>7.3</td>
<td>5.7</td>
</tr>
<tr>
<td>MRSN A2167</td>
<td>Ambolohidrinoia</td>
<td>M</td>
<td>15.9</td>
<td>5.7</td>
<td>5.5</td>
<td>1.7</td>
<td>1.4</td>
<td>1.5</td>
<td>2.2</td>
<td>1.1</td>
<td>2.9</td>
<td>6.5</td>
<td>4.5</td>
</tr>
<tr>
<td>MRSN A2170</td>
<td>Ambolohidrinoia</td>
<td>M</td>
<td>16.6</td>
<td>5.9</td>
<td>5.7</td>
<td>2.0</td>
<td>1.4</td>
<td>1.7</td>
<td>2.1</td>
<td>1.0</td>
<td>2.8</td>
<td>6.7</td>
<td>5.5</td>
</tr>
<tr>
<td>MRSN A2173</td>
<td>Anjanaharibe-Sud</td>
<td>F</td>
<td>19.4</td>
<td>6.8</td>
<td>7.1</td>
<td>2.3</td>
<td>1.5</td>
<td>1.6</td>
<td>2.1</td>
<td>0.8</td>
<td>3.8</td>
<td>6.3</td>
<td>5.9</td>
</tr>
<tr>
<td>MRSN A2171</td>
<td>Anjanaharibe-Sud</td>
<td>F</td>
<td>18.9</td>
<td>6.9</td>
<td>6.4</td>
<td>2.3</td>
<td>1.5</td>
<td>1.9</td>
<td>2.2</td>
<td>1.2</td>
<td>4.1</td>
<td>7.6</td>
<td>5.7</td>
</tr>
<tr>
<td>MRSN A1953</td>
<td>Tsararano</td>
<td>F</td>
<td>17.5</td>
<td>5.8</td>
<td>6.3</td>
<td>2.0</td>
<td>1.3</td>
<td>1.8</td>
<td>2.1</td>
<td>1.0</td>
<td>2.8</td>
<td>6.8</td>
<td>5.1</td>
</tr>
<tr>
<td>MRSN A2175</td>
<td>Besariaka</td>
<td>J</td>
<td>13.1</td>
<td>5.3</td>
<td>5.3</td>
<td>1.9</td>
<td>1.1</td>
<td>1.3</td>
<td>1.8</td>
<td>1.0</td>
<td>2.9</td>
<td>6.5</td>
<td>4.9</td>
</tr>
<tr>
<td>MRSN A646.4</td>
<td>Masomihenjina</td>
<td>J</td>
<td>11.5</td>
<td>4.5</td>
<td>4.7</td>
<td>1.5</td>
<td>1.1</td>
<td>1.3</td>
<td>1.7</td>
<td>0.7</td>
<td>2.1</td>
<td>4.1</td>
<td>3.9</td>
</tr>
<tr>
<td>MRSN A2161</td>
<td>Ambolohidrinoia</td>
<td>J</td>
<td>14.3</td>
<td>5.2</td>
<td>5.4</td>
<td>1.9</td>
<td>1.3</td>
<td>1.3</td>
<td>1.7</td>
<td>0.7</td>
<td>3.1</td>
<td>6.5</td>
<td>4.3</td>
</tr>
<tr>
<td>MRSN A2166</td>
<td>Ambolohidrinoia</td>
<td>J</td>
<td>14.9</td>
<td>5.3</td>
<td>5.5</td>
<td>2.0</td>
<td>1.4</td>
<td>1.3</td>
<td>1.8</td>
<td>0.7</td>
<td>3.2</td>
<td>6.4</td>
<td>4.3</td>
</tr>
<tr>
<td>MRSN A2169</td>
<td>Ambolohidrinoia</td>
<td>J</td>
<td>14.9</td>
<td>5.2</td>
<td>6.1</td>
<td>1.8</td>
<td>1.2</td>
<td>1.5</td>
<td>1.8</td>
<td>0.8</td>
<td>3.2</td>
<td>6.0</td>
<td>4.2</td>
</tr>
</tbody>
</table>

**Platypleis mavomavo**

<table>
<thead>
<tr>
<th>Museum number</th>
<th>Provenience</th>
<th>Sex</th>
<th>SVL</th>
<th>HW</th>
<th>HL</th>
<th>ED</th>
<th>ND</th>
<th>NND</th>
<th>TD</th>
<th>HAL</th>
<th>FORL</th>
<th>FOL</th>
<th>TIBL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRSN A2435*</td>
<td>Ambolokopatrika</td>
<td>M</td>
<td>26.5</td>
<td>9.3</td>
<td>9.7</td>
<td>4.1</td>
<td>2.5</td>
<td>2.1</td>
<td>3.0</td>
<td>1.7</td>
<td>8.1</td>
<td>18.8</td>
<td>12.4</td>
</tr>
<tr>
<td>MRSN A2432</td>
<td>Ambolokopatrika</td>
<td>M</td>
<td>28.6</td>
<td>11.3</td>
<td>9.6</td>
<td>3.6</td>
<td>2.5</td>
<td>2.4</td>
<td>2.7</td>
<td>1.7</td>
<td>8.6</td>
<td>20.7</td>
<td>12.6</td>
</tr>
<tr>
<td>MRSN A2434</td>
<td>Ambolokopatrika</td>
<td>M</td>
<td>24.4</td>
<td>8.4</td>
<td>8.5</td>
<td>2.9</td>
<td>2.5</td>
<td>2.1</td>
<td>2.6</td>
<td>2.1</td>
<td>8.8</td>
<td>17.5</td>
<td>10.7</td>
</tr>
<tr>
<td>MRSN A2431</td>
<td>Ambolokopatrika</td>
<td>F</td>
<td>27.9</td>
<td>9.9</td>
<td>9.7</td>
<td>4.0</td>
<td>2.4</td>
<td>2.6</td>
<td>3.2</td>
<td>1.8</td>
<td>8.5</td>
<td>18.3</td>
<td>12.8</td>
</tr>
<tr>
<td>MRSN A2433</td>
<td>Ambolokopatrika</td>
<td>F</td>
<td>26.8</td>
<td>9.4</td>
<td>8.8</td>
<td>3.4</td>
<td>2.0</td>
<td>2.4</td>
<td>3.6</td>
<td>1.6</td>
<td>8.1</td>
<td>19.4</td>
<td>11.7</td>
</tr>
</tbody>
</table>

Individuals from Masomihenjina (Masoala) show a paler dorsal colouration, and a contrasted lateral band. Colouration in life was basically similar to that described for preserved animals, although much more vivid.

**Etymology**

The word “tetra” is derived from the Greek “tetrás” means “four” and is attributed to the fact that most specimens show four lighter spots on the back. This name is used as a noun with the same meaning.

**Natural history and distribution**

The holotype and some of the paratypes were collected at Anjanaharibe-Sud, western slope (Analabe Forest), Campsite W2 (around 1200 m asl), where the habitat is comprised of a mid-high altitude transitional rainforest with tall trees and abundant lichens, mosses, and ferns (Raxworthy et al., 1998; Andreone et al., 2000). The specimens were found within a plant of the genus *Pandanus*. A single specimen was found at Besariaka Forest. This forest at about 60 km south of Andapa is rather degraded, especially in areas far from streams, due to cattle, cutting of trees by
villagers, and use of path systems. The specimen was found within a Pandanus, and did not call. Other paratypes came from Tsararano. The mountain chain and forest of the same name lie midway between the Anjanaharibe-Sud Massif and the Masoala Peninsula, and is formed by several hills. The forest was at that time (1996) mostly intact, perhaps due to its distance from large-sized villages. The remainder of specimens were found at Masoala at two low altitude sites (Masomiheniina and Ambohidroina), always within Pandanus. This species is evidently specialized to this plant, and is a phytotelm frequenter (Lehtinen, 2003). Concerning the distribution, P. tetra was until now found only in the northeastern sector of Madagascar, an area which is interesting in terms of endem-icity and species diversity (Andreone, in press b). We do not have evidence of a wider distribution, although we strongly suspect that its presence runs southward, and possibly, northwards.

**Advertise calls**

Calls were recorded on 5 February 1996 between 1830 and 1900 h, at an air temperature of 18.0–18.5°C. They consisted of an almost endless series of chirping metallic notes. Temporal call parameters were: note duration 171–318 ms (x±SD=266±41 ms, N=17), duration of inter-note intervals 148–398 ms (226±59 ms, N=13), note repetition rate 3.0/s. The frequency showed a simple pattern, with a dominant frequency between 3500–4000 Hz.

**Comparisons with other species**

Of the other Platypelis species possibly sympatric and similarly sized, P. tetra differs: (1) from P. barbouri in lacking webbing between the toes and fingers, in lacking the red or green markings on the dorsal surface of the groin and thighs, in the presence of white dorsal spots, and of a brown dorsolateral bar bordered in cream; (2) from P. cowani in lacking webbing between the toes, in the absence of a beige triangular marking on the dorsal surface, in the possession of white dorsal spots, and brown dorsolateral bars; (3) from P. occultans in lacking webbing between the toes, a triangular marking on the back, in a tibio-tarsal articulation extending to the eye, in the possession of dorsal spots, and in the presence of the dorsolateral bands. Within the wealth of Platypelis species, P. tetra is morphologically similar to P. tuberifera, although the latter reaches a larger size (up to 40 mm). Platypelis tetra could be misidentified with juveniles of this species, from which it differs in lacking toe webbing, the absence of a dorsal median line, the possession of white dorsal spots, and in the possession of a brown dorsolateral bar bordered in cream.

**Platypelis mavomavo** sp. nov.

Yellowish tree cophylle frog (English), cofilino arboresco giallastrò (Italian), sahonkely mavomavo (Malagasy)

Figs. 4–6

**Type series**


**Other specimens**

Platypelis mavomavo was first discovered in January 1996 at Anjanaharibe-Sud, western
Fig. 4. *Platypelis mavomavo*. Holotype (male, MRSN A2435), dorsal view, from Ambolokopatrika, NE Madagascar.

Fig. 5. Particular of the head (A), hand (B), and foot (C) of the holotype of *Platypelis mavomavo* (male, MRSN A2435).

Slope. The specimen discovered was photographed but not captured.

**Diagnosis**

An arboreal species of *Platypelis* characterized by the following combination of characters: medium adult body size (SVL=35 mm), yellowish colouration, with extended brownish marblings, digital expansions triangular in the fingers and ovoid on toes, vestigial webbing between the toes, dorsal surface from smooth to slightly warty.

**Morphological description**

The three males ranged in size from 24.4 to 28.6 mm; the two females were respectively 26.8 and 27.9 mm long. Other measurements of the type series are given in Table I. Head as long as wide; HW 34–40% of SVL; HL 33–35% SVL; snout short, slightly protruding beyond margin of lip; rounded in dorsal view (in profile, slightly truncated); END less than ED; END 23–30% of HL; eye moderate in size; ED 34–42% of HL. Top of head flat; cranial crests absent; canthus rostralis indistinct; internarial area not depressed; nostrils protruding dorsally and laterally. Supratympanic fold visible, tympanum round. TD 41–47% of ED. Choanae small, round, and separated. Vomeronal teeth present and posterior to choanae. Tongue trapezoid in shape with rounded edges, widest at the free margin, with a slight frontal notch. Vocal sac moderate in size, single, and in gular position. Skin on dorsum of head, body, and limbs quite smooth, although in some specimens elongated warts are visible. Ventral surfaces smooth. Forearm broad, fingers moderate in length bearing subtriangular, large discs; disc on first digit smaller than others: 1<2<4<3; subarticular tubercles faint, circular; supernumerary tubercles absent; palmar tubercle semi-distinct, not elevated. No webbing between digits of hands. Feet with semi-distinct supernumerary tubercles. Small pads on digits of feet, ovoid in shape. Vestigial webbing between third and
fourth, and between fourth and fifth toes. Toe length: 1<2<3<4.

**Coloration**

After about six years in preservative solution, the dorsum of this new *Platypelis* has become light brownish, with scattered lighter spots and reticulations. The legs have approximately the same colouration as the back, with some pigmented transverse areas or spots. Most of the hands and feet are brown or black. Pupil horizontal, iris yellowish with dark spots. The ventral surface is cream/yellow with some faint dark marbling, more visible on the throat. In life, the colouration is similar in pattern, although more distinct. The yellow is conspicuous and bright in live animals (especially on the belly), but disappeared after preservation in formalin and/or ethanol.

**Variation**

The type series consists of four specimens from Ambolokopatrika, quite similar in morphology and size to the holotype.

**Advertisement calls**

Unknown.

**Etymology**

The specific name *mavomavo* (pronounce: “mow-woo mow-woo”) is a Malagasy term: “mavo” means yellow, and the duplicate “mavomavo” adjective yellowish. It makes obvious reference to the typical species’ colouration and is used as an invariable noun standing in apposition to the generic name.

**Natural history and distribution**

The type series was collected at Ambolokopatrika, where the habitat is a mid-high altitude transitional rainforest, with tall trees and an abundance of epiphytic plants. The specimens were found during rainy nights climbing well above the ground (about 2–4 m) on small tree trunks. A similar habitat was observed for one specimen (not captured) at Anjanaharibe-Sud. This species is apparently not a phytotelm specialist, although it is likely that, similarly to other species (e.g., *P. pollicaris*) it may hide during the day and dry periods in trunk-holes, under barks, and at the basis of epiphytic plants. Given its presence at Ambolokopatrika and Anjanaharibe-Sud, we expect the species’ distribution to include other areas of northeastern Madagascar.

**Comparisons with other species**

*Platypelis mavomavo* is most similar to *Platypelis cowani* and *P. pollicaris*. They are different from *P. mavomavo* especially in colouration. In particular, both have a brown dorsum, with light spots, and their belly is typically white. *Platypelis tsaratananaensis* (at least the specimens from Anjanaharibe-Sud) has a more slender body, and it hides in bamboo internodes.

**DISCUSSION**

The discovery of the new *Platypelis* species described herein, at some localities of northeastern Madagascar highlights the incomplete knowledge of the microhylid fauna of Madagascar. *Platypelis tetra* is likely the smallest arboreal frog of Madagascar, reaching a SVL of only 18 mm. It is smaller than *P. barbouri* (23 mm), *Anodonthyla boulengeri* (23 mm), and *A. nigrigularis* (24 mm) (records from Claw and Vences, 1994). This small size coupled with sticky skin and toe pad shape makes *Platypelis tetra* a good climber of the leaves beneath which it lives. At Anjanaharibe-Sud we found *Platypelis tetra* in syntopy with another *Platypelis* of small size (*P. occultans*), *P. tuberifera*, *Mantidactylus* cf. *bicalcaratus* and *M. pulcher*.

*Platypelis tetra* lives in close relationship with the *Pandanus* microhabitat, and, therefore, needs a pristine or mature secondary rainforest. *Platypelis mavomavo* was found only at some intact forest fragments of Anjanaharibe-Sud and Ambolokopatrika forests. In this sense, both these cophylines are both closely tied to the existence of an intact rainforest and to high humidity levels. For these reasons they are good candidates for being
ecologically sensitive species, as stressed by Vallan (2000) and Andreone and Luiselli (2003).

Given the increasing deforestation occurring in the Andapa water basin (Berner, 1995), the protection of the remnant forest fragments corresponds to the protection of the Pandanus screw pines where P. tetra and other frogs live. The sites where the new species were found are either partly included in a reserve network or are in places where logging is still conducted at a low rate. As outlined by Vallan et al. (in press) this kind of forest exploitation does not have an immediate negative effect on the batrachofauna. The long-term effects are still largely unknown, but it is obvious that the physical reduction of the rainforest will coincide with the disappearance of many frog species.

ACKNOWLEDGEMENTS

We thank G. Aprea, H. Randriamahazo and J. E. Randrianirina for field assistance, and the Malagasy authorities for collection and export permits. R. Nincheri helped with material, photographs and personal observations. P. Bergd and V. Mercurio assisted with the specimens’ setting. The research of FA was made in cooperation between the MRSN, and the Parc Botanique et Zoologique de Tsimbazaza, Antananarivo, and supported by WWF, MRSN, and WCS. Further support to DF and MEW was provided by “Radeau des Cimes”, the Oklahoma City Zoo and Zoological Society, P. Stout, the University of Oklahoma Department of Zoology, B. and H. Fenolio, G. and B. Walvoord, and K. Walvoord. Equipment and other support was provided by the Sam Noble Oklahoma Museum of Natural History, A. Estep, C. Leary, M. Mandica, M. Hoefnagels, V. Hutchison, and J. Caldwell. Special thanks to our climbing technician in Madagascar, N. Baiben. M. Matsui and an anonymous referee reviewed a first version of this paper.

LITERATURE CITED


Accepted: 11 December 2003