Melanophryniscus spectabilis Caramaschi and Cruz, 2002 (Amphibia, Anura, Bufonidae): Northern distribution extension of a rare microendemic species

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The genus Melanophryniscus Gallardo, 1961 is restricted to South America and currently comprises 29 species (Frost, 2017). It is a monophyletic genus with its species divided into three phenetic groups: (1) Melanophryniscus stelzneri (Weyenbergh, 1875), (2) M. moreirae (Miranda-Ribeiro, 1920) and (3) M. tumifrons (Boulenger, 1905) (Graybeal and Cannatella, 1995; Pyron and Wiens, 2011). Most species belonging to this taxon show small geographic ranges, being considered rare or little detectable (Zank et al., 2014).

Melanophryniscus spectabilis Caramaschi and Cruz, 2002, included in the group of M. tumifrons, was recently described (Caramaschi and Cruz, 2002) and until 2011 it was known only from its type locality: Nova Teutônia, municipality of Seara, Santa Catarina state, Southern Brazil (Giasson et al., 2011). Almost one decade after the description, its distribution was extended, but no more than 42 km in any direction from its type locality (Giasson et al., 2011). Until the present moment, the species’ known distributional range is very small, with records restricted to localities from 380 to 875 meters of altitude and only in the Deciduous Forests of the Atlantic Forest of Santa Catarina state (Giasson et al., 2011). The objective of the present work is to extend the geographic distribution of the microendemic Brazilian species M. spectabilis, describing the first record of this taxon in Paraná state.

The species was recorded in the Faxinal do Céu Botanical Garden (JBFC), Pinhão municipality, Paraná state, Southern Brazil (25.9091°S; 51.5941°E, 1,100 meters above sea level) (Fig. 1). The JBFC has 152 hectares of green areas kept by the Company of Electrical Energy of Paraná State (COPEL). The climate...
of the region, according to the Köppen classification, is mesothermical humid temperate (Maack, 2012). The area is composed by a central garden with native and exotic plants, surrounded by patches of natural Brazilian Atlantic Forest (Araucaria Pine Forest, Highland Marshes, streams and lakes). These records were obtained during an amphibian community survey of the JBFC, from August 2014 to September 2015, corresponding to 26 nights of fieldwork and almost 230 hours/man of active search. The precipitation on the day that *M. spectabilis* was collected, added to that of the previous day, was 83 mm in September 2014 and 50 mm in September 2015. Forty individuals were recorded in the field, among which eight males and five females were measured and three of them were collected. All individuals were easily observed on the ground due to their contrasting colour patterns. Voucher specimens were collected under the license number 44664-2, emitted by SISBIO-IBAMA and deposited in the Herpetological Collection of the Universidade Federal do Rio Grande do Sul (UFRGS) under the numbers 7334, 7335 and 7336.

The recorded specimens were identified as *Melanophryniscus spectabilis* (Fig. 2) by the following diagnostic characters: (1) presence of vivid colours, as the species name suggests, showing background dark brown to black, with a marbled pattern of sinuous yellow; (2) a large orange uniform spot in the ventral region and a few small ones in the chest region, three yellow or orange spots in the gular surface, one in the mental region and two on the subarticular regions, usually connected to each other (Baldo et al., 2012; Caramaschi and Cruz, 2002).

The specimens’ morphometric measurements are in accordance with those provided by Caramaschi and Cruz (2002) (Table 1). Contrary to most records of this species, which were made using pitfall traps (IUCN, 2010), in this study the individuals were found
exclusively through active search performed on days of heavy rains during the spring. Individuals were found vocalizing, in amplexus, inside or close to small streams in the forest or edges of the Araucaria Pine Forest, always after torrential rains.

Colour polymorphism and different frequencies of the dorsal colour patterns in the population can be seen in this species. Colour polymorphism was also observed in other species of the genus, such as *M. macrogranulosus* (Caorsi et al., 2014). Three patterns of dorsal colours were distinguished: (1) mostly dark dorsum with yellow spots (63.4% of individuals); (2) dark dorsum with small yellow spots (30% of individuals); and (3) yellow dorsum with dark spots (6.6% of individuals) (Fig. 3).

The record provided in this study extends the geographic distribution of *M. spectabilis* about 100 km north from the previously known distributional range of the species (Giasson et al., 2011; IUCN, 2016). Previously, it was known only from Seasonal Forests in the Uruguai River basin (Giasson et al., 2011). However, Garcia et al. (2007) cited the species as endemic of the Araucaria Pine Forest. This work recorded the species in the Araucaria Pine Forest occurring in the Iguaçu River basin. Besides the occurrence in another state and another formation of the Brazilian Atlantic Forest, an increase in the altitude for this species’ occurrence, which was known to occur between 380 and 875 meters (Giasson et al., 2011), is also noticeable. This new record elevates to 1,100 meters the potential altitude for the occurrence of the species.

Table 1. Comparison between the minimum and maximum morphometric measurements (in mm) obtained by Caramaschi and Cruz (2002) and the present study. Acronyms: SVL (snout-vent length); HL (head length); HW (head width); IND (internarial distance); END (eye to nostril distance); ED (eye diameter); UEW (upper eyelid width); IOD (interorbital distance); THL (tibia length); TL (tibia length); FL (foot length) and n = number of specimens.

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Caramaschi and Cruz (2002)</th>
<th>Present study</th>
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<tbody>
<tr>
<td></td>
<td>Males (n=15)</td>
<td>Females (n=10)</td>
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<tr>
<td>SVL</td>
<td>26.5-31.1</td>
<td>31.9-35.5</td>
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<tr>
<td>HL</td>
<td>7.6-9.4</td>
<td>8.1-10.0</td>
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<tr>
<td>HW</td>
<td>8.9-10.2</td>
<td>9.9-11.0</td>
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<tr>
<td>IND</td>
<td>1.9-2.4</td>
<td>2.2-2.5</td>
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<tr>
<td>END</td>
<td>2.1-2.7</td>
<td>2.4-3.0</td>
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<tr>
<td>ED</td>
<td>2.4-2.9</td>
<td>2.7-3.0</td>
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<tr>
<td>UEW</td>
<td>2.2-2.6</td>
<td>2.5-2.9</td>
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<tr>
<td>IOD</td>
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<td>3.2-4.2</td>
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<tr>
<td>THL</td>
<td>10.0-11.7</td>
<td>11.0-13.0</td>
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<tr>
<td>TL</td>
<td>9.6-11.8</td>
<td>10.8-12.5</td>
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<tr>
<td>FL</td>
<td>15.1-18.2</td>
<td>17.1-20.1</td>
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Figure 3. Colour patterns found in individuals of *Melanophryniscus spectabilis* captured in the Faxinal do Céu Botanical Garden, Pinhão, Paraná, between September 2014 and September 2015: (A) Dark dorsum with small yellow spots; (B) Equally proportioned dark and yellow spots; (C) Yellow dorsum with dark spots.
The records of *Melanophryniscus spectabilis* were in the transition between the formations of Araucaria Pine Forest and Seasonal Forest (Maack, 2012). This raises the hypothesis that this species inhabits ecotone sites between these two vegetation formations. However, the patterns of occurrence of this species, as well as its habitat requirements and tolerances, are not yet well known, making it difficult to determine whether *Melanophryniscus spectabilis* is a rare species or just hard to record.

The species is classified as Data Deficient by the International Union for Conservation of Nature (IUCN) (Angulo et al., 2010) and Near Threatened by the Brazilian Environmental Agency (Haddad et al., 2016). However, Giasson et al. (2011) suggested that *Melanophryniscus spectabilis* should be classified as more endangered because of its restricted geographic distribution, which was limited to 1,000 km² in Santa Catarina state. Zank et al. (2014) suggest that the species should be classified between high and intermediate conservation priority because of a projection of loss of climatic niche in over 60% of its area of occurrence until 2080.

This is the first record of *Melanophryniscus spectabilis* in Paraná state, raising the number of amphibians registered in the state and in the Araucaria Forest formation. From this record, a larger geographic and ecological distribution of the species is observed, possibly mitigating its threat level, as well as generating more data to new models that aim to evaluate the conservation status of this species. On the other hand, it is noticeable that Brazilian Atlantic Forest has lost about 90% of its original area and continues to suffer degradation and fragmentation processes, which would aggravate the endemic species’ conservation status (SOS Mata Atlântica, 2015). New active search samples on days of heavy rains in ecotone areas between Araucaria Pine Forests and Semidecidual Seasonal Forests could provide more information about the ecology of the species, since the current records come from two different vegetation types, but close to the transition between them.

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References


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