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TAXONOMIC STATUS OF *GOMPHOBATES MARMORATUS* REINHARDT AND LÜTKEN, 1862 "1861" AND *EUPEMPHIX FUSCOMACULATUS* STEINDACHNER, 1864 (AMPHIBIA, ANURA, LEPTODACTYLIDAE)

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ABSTRACT: An analysis of specimens deposited in herpetological collections and identified as *Physalaemus fuscomaculatus* demonstrated that these differ from the types of this taxon, *Eupemphix fuscomaculatus.* Consequently, the taxonomic status of *Gomphobates marmoratus* and *Eupemphix fuscomaculatus* was revised based on the types and on data in the literature. *Gomphobates marmoratus* is associated to the genus *Physalaemus,* as *Physalaemus marmoratus,* and refers to specimens previously identified as *Physalaemus fuscomaculatus.* Additionally, *Eupemphix fuscomaculatus* is associated to the genus *Pleurodema* in the combination *Pleurodema fuscomaculata.*

KEYWORDS: Amphibia, Anura, Taxonomy, *Physalaemus, Pleurodema.*

INTRODUCTION

Reinhardt and Lütken (1862 "1861") described *Gomphobates marmoratus* based on three syntypes collected in Lagoa Santa (19°37'S, 43°53'W), State of Minas Gerais, Brazil. Currently, *G. marmoratus* is a junior synonym of *Physalaemus fuscomaculatus* (Steindachner, 1864) (Frost, 2006).

Steindachner (1864) described *Eupemphix fuscomaculatus* from one female from "Caiçará" [17°15'S, 57°10'W, according to Cei (1990)], State of Mato Grosso, Brazil. Currently, *E. fuscomaculatus* is a junior synonym of *Physalaemus fuscomaculatus* (Steindachner, 1863) (Frost, 2006). This taxon was better defined and illustrated by Cei (1990) based on the holotype and on additional specimens from Rio Apa (22°30'S, 57°00'W), a tributary of Rio Paraguay. He considered this species "a relatively uncommon leptodactylid", ranging from the type locality to the lower basin of Rio Paraguay, probably reaching the marginal area of northern Argentinean provinces southwards.

Physalaemus fuscomaculatus is presently allocated in the *P. albifrons* group (Nascimento *et al.,* 2005) based on several morphological characters, such as dorsal and ventral color patterns, rounded snout, large inguinal glands not associated with a dark ocellus, and shovel-like external and internal metatarsal tubercles with horned distal margins.

Several specimens identified as *Physalaemus fuscomaculatus* collected in localities outside the distribution range given by Cei (1990) are deposited in herpetological collections (Nascimento *et al.,* 2005). Analysis of this material demonstrated that such specimens differ from the taxon studied by Cei (1990), but agree perfectly with the types of *Gomphobates marmoratus* Reinhardt and Lütken, 1862 "1861".

Based on the examination of the types, we propose the revalidation of *G. marmoratus,* under a new combination, and designate a lectotype and paralectotypes. We also assess the taxonomic status of *E. fuscomaculatus* Steindachner, 1863 and propose the allocation of this species in the genus *Pleurodema* Tschudi, 1838.

Historical background

Reinhardt and Lütken (1862 "1861") erected the genus *Gomphobates* and described the species *G. marmoratus* from Lagoa Santa, State of Minas Gerais, Brazil.

Steindachner (1864) described *Eupemphix fuscomaculatus* from "Caiçará in Brasilien" and pointed the presence of maxillary and vomerine teeth. He associated *Hiobates fuscomaculatus* Fitz. Tschudi as a synonym of this species.

Steindachner (1867) established part of *Eupemphix nattereri* Steindachner, 1863 as a junior synonym of *Gomphobates marmoratus,* associated *Eupemphix fuscomaculatus* to this genus, under the new combination *Gomphobates fuscomaculatus,* and indicated *Iliobates fuscomaculatus* (assigning it to "Fitz. Tschudi") as a synonym of the latter.

Cope (1869 "1868") described *Lystris brachyops* (= *Pleurodema brachyops*) and distinguished this genus from *Gomphobates* by the presence of fontanela and vomerine teeth, and from *Eupemphix,* by the presence of well-developed teeth on young and adults. *Eupemphix fuscomaculatus* Steindachner was then included in the genus *Lystris,* under the combination *Lystris fuscomaculatus* (Steindachner).

Peters (1872) included *Gomphobates marmoratus* Reinhardt and Lütken, *Liuperus marmoratus* Burmeister, 1861, and part of *Eupemphix nattereri* Steindachner in the synonymy of *Bufo albifrons* Spix, 1824.

Boulenger (1882) allocated *Pleurodema* Tschudi, *Cystignathus* Duméril and Bibron, *Leiuperus* Duméril and Bibron, *Pleurodema* Günther, *Gomphobates* Reinhardt and Lütken, *Eupemphix* Steindachner, and *Lystris* Cope in the genus *Paludicola* Wagler, based on the presence of maxillary teeth. Consequently, the new combinations *Paludicola fuscomaculata* (Steindachner) and *Paludicola albifrons* (Spix) were established for *Lystris fuscomaculatus* and *Bufo albifrons,* respectively. Boulenger cited the absence of vomerine teeth in *P. fuscomaculata* (Steindachner) and established its distribution range to Brazil, Uruguay, and Buenos Aires (Argentina). *Paludicola biligonigera* (Cope) was associated to Reinhardt's specimens from Lagoa Santa (State of Minas Gerais), and from the States of Bahia and Pará, Brazil.

Boulenger (1886) indicated the occurrence of *Paludicola fuscomaculata* (Steindachner) and *Paludicola albifrons* (Spix) in the State of Rio Grande do Sul, Brazil. Boulenger (1887) presented a diagnosis of *Paludicola albifrons* from Porto Alegre, Rio Grande do Sul, Brazil. He indicated that *Leiuperus marmoratus* Burmeister was not identical to *Paludicola albifrons* (Spix) as stated by Peters (1872), but was a junior synonym of *P. fuscomaculata* (Steindachner). In reality, *Leiuperus marmoratus* D'Orbigny, 1847 (referred by Burmeister, 1861), *Leiuperus marmoratus* Burmeister, 1861, and *Paludicola fuscomaculata* Boulenger, 1886, 1887 refers to the currently recognized *Physalaemus biligonigerus* (Cope, 1861).

Méhely (1904), after examining the type designated by Spix, distinguished *Paludicola albifrons* (Spix) from *P. fuscomaculata* (Steindachner) by the presence of a second tarsal tubercle in the articulation between tibia and tarsus on the former, larger than the distal tarsal tubercle, and by the absence of externally visible lumbar glands. He also indicated that *P. fuscomaculata* (Steindachner) presents no vomerine teeth.

Miranda-Ribeiro (1926) included *Eupemphix, Engystomops, Pleurodema,* and *Paludicola* in the family Paludicolidae. *Paludicola* was characterized by the presence of "more or less indistinct vomerine teeth". He compared specimens of *Paludicola albifrons* (Spix) and *P. fuscomaculata* (Steindachner) to the type of *Eupemphix fuscomaculatus* Steindachner and agreed with Méhely (1904) on the difference among these species. He also mentioned that *P. fuscomaculata* (Steindachner) presents "vomerine teeth indistinct, but present on a line anterior to the choanae". He indicated the distribution of *P. albifrons* (Spix) for the State of Bahia, Brazil, and that of *P. fuscomaculata* (Steindachner) for the states of Mato Grosso, São Paulo, Paraná, and Rio Grande do Sul in Brazil, and also in Argentina and Uruguay.

The first revision of the genus *Paludicola* was presented by Parker (1927), who distributed its species among the genera *Physalaemus* Fitzinger, 1826, *Pseudopaludicola* Miranda-Ribeiro, 1926, and *Pleurodema*. *Paludicola biligonigera* (Cope), *P. fuscomaculata* (Steindachner), and *P. albifrons* (Spix) were included in the genus *Physalaemus.* He also discussed the differences indicated by Mehély (1904) between *Physalaemus albifrons* (Spix) and *P. fuscomaculatus* (Steindachner). Parker (1927) removed *Gomphobates marmoratus* Reinhardt and Lütken from the synonymy with *P. albifrons* (Spix) and considered it a junior synonym of *P. fuscomaculatus* (Steindachner), after requesting the analysis of the type-specimens of *P. albifrons* (Spix).

Cochran (1955) mentioned the absence of vomerine teeth in *Physalaemus fuscomaculatus* (Steindachner), "although the bony projection on which they would have arisen can be felt and in a few cases seen between the choanae". The description presented was based on specimens from the States of Minas Gerais, Rio Grande do Sul, and São Paulo (Brazil), Argentina, Bolivia, and Paraguay.

Milstead (1960) characterized *Physalaemus biligonigerus* (Cope) and *P. fuscomaculatus* (Steindachner), species occurring in the State of Rio Grande do Sul, Brazil, and pointed that the first differs from all congeneric species by the presence of vomerine teeth. He observed differences on snout-vent length between specimens of *P. fuscomaculatus* (Steindachner) from the States of São Paulo and Rio Grande do Sul, suggesting that this taxon might include two distinct species or geographic races.

Milstead (1963), after analyzing the holotype of *P. biligonigerus* (Cope), verified the absence of vomerine teeth, stating that it was a "typical specimen of what is now called *P. fuscomaculatus*" (Steindachner). Therefore, he considered that the species treated by Parker (1927), Cochran (1955), and Milstead (1960) as *P. fuscomaculatus* (Steindachner) should be in fact called *P. biligonigerus* (Cope), based on the precedence of this name. He suggested the aplication of the name "*biligonigerus*" to the smaller specimens from the south, whereas "*fuscomaculatus*" should be applied to the more widespread northern form.

Barrio (1965) agreed with Milstead (1963) that the forms previously identified as *Physalaemus fuscomaculatus* (Steindachner) in Argentina corresponded to *P. biligonigerus* (Cope), but disagreed with the distinction between *P. biligonigerus* (Cope), related to the southern smaller specimens, and *P. fuscomaculatus* (Steindachner), associated to the northern larger specimens.

Lynch (1970) indicated the absence of vomerine teeth (referred as prevomerine teeth) for all species of paludicoline leptodactylids, except for *Physalaemus biligonigerus* (Cope), which sometimes has them.

Frost (1985) mentioned the occurrence of *Physalaemus fuscomaculatus* (Steindachner) in Argentina. Cei (1987) considered it "quite improbable" and presented a summarized account on the differences between *P. biligonigerus* (Cope) and *P. fuscomaculatus* (Steindachner). He also indicated the absence of vomerine teeth on both forms.

Cei (1990) defined and illustrated the taxon *Physalaemus fuscomaculatus,* considering that "Caiçará" has been misspelled and should be written "Caissará". He stated that *P. fuscomaculatus* (Steindachner) and *P. biligonigerus* (Cope) were considered as a large complex of species of *Physalaemus biligonigerus* (Cope) since the arrangement of Boulenger (1882). He pointed out that the morphology of the former species is inaccurately determined, because Steindachner's description of the type clearly indicated the presence of maxillary and vomerine teeth. *Physalaemus fuscomaculatus* (Steindachner) was characterized morphologically based on the holotype and on specimens collected at Rio Apa, a tributary of Rio Paraguay, not far from the type-locality, adding information to Steindachner's (1863) diagnosis. The presence of vomerine teeth is emphasized, as well as the rarity of this species in herpetological collections.

Nascimento *et al.* (2005) diagnosed the genus *Physalaemus* by the presence of quadratojugal bones and absence of vomerine teeth, among other characteristics. These characters distinguish *Physalaemus* from *Pleurodema*. They also associated *P. fuscomaculatus* (Steindachner) to the *P. albifrons* species group.

Material and Methods

Acronyms used in the text are as follow: MCNAM (Museu de Ciências Naturais, Pontifícia Universidade Católica de Minas Gerais, Belo Horizonte, Brazil), MNRJ (Museu Nacional, Rio de Janeiro, Brazil), MZUSP (Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil), NHMW (Naturhistorisches Museum of Wien, Vienna, Austria), UFRGS (Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil), R and ZMUC (Zoological Museum, University of Copenhagen, Denmark)

Morphometric data follow Cei (1980) and the abreviations used for are: SVL (snout-vent length), HL (head length), HW (head width), ED (eye diameter), IOD (interorbital distance), UEW (upper eyelid width), END (eye-nostril distance), NSD (nostril-snout distance), IND (internarial distance), UL (upper arm length), AL (arm length), HAL (hand length), TL (thigh length), SL (shank length), FL (foot length, from the inner metatarsal tubercle to the distal point of fourth toe).

Results and Discussion

We examined two of the three syntypes of *Gomphobates marmoratus* Reinhardt and Lütken. R 1193 (formerly ZMUC 22) is in very good conditions; all the distinctive characters of the species are easily observed. The coloration is quite faded, due to the time it has been preserved. Skin on flanks is extensively fold-

ed, a feature not observed on living and recently preserved specimens. An incision has been made in the pectoral girdle region, but it did not cause too much damage. Fingers and toes are slightly curved. A small label written "Type 22" is tied on the right leg. R 1194 (formerly ZMUC 23) is not well preserved as R 1193. It is flaccid and because of that it is not possible to observe the glands, and the coloration is more faded. The third syntype, R 11125 (formerly ZMUC 26) is a cleaned skeleton and was not analyzed.

We found verified that vomerine teeth and dark ocellus on lumbar glands are not present on the types of *Gomphobates marmoratus* Reinhardt and Lütken. Steindachner (1864) diagnosed and Cei (1990) verified the presence of these characters in the holotype of *Eupemphix fuscomaculatus* and in additional specimens from Rio Apa, Paraguay. Additionally, the presence of vomerine teeth distinguishes *Pleurodema* from *Physalaemus* (Nascimento *et al.,* 2005). We therefore conclude that *Gomphobates marmoratus* Reinhardt and Lütken should be removed from the synonymy with *Physalaemus fuscomaculatus* (Steindachner) and recognized as a full species, under a new combination. Moreover, due to the presence of vomerine teeth, *Eupemphix fuscomaculatus* Steindachner should be allocated to the genus *Pleurodema.*

Species Accounts

Physalaemus marmoratus (Reinhardt and Lütken 1862 "1861") n. comb.

Gomphobates marmoratus Reinhardt and Lütken 1862 "1861"
Eupemphix nattereri Steindachner, 1863 (part)
Paludicola albifrons – (not of Spix, 1824) Peters, 1872 (part)
Paludicola biligonigera – Boulenger, 1882 (part)
Paludicola fuscomaculata – Mehély, 1904
Physalaemus fuscomaculatus – Parker, 1927 (part)

Lectotype – R 1193 (formerly ZMUC 22), male, collected in Lagoa Santa, State of Minas Gerais, Brazil, in November 1854 by J. B. Reinhardt.

Paralectotype – R 1194 (formerly ZMUC 23), male, collected in Lagoa Santa, State of Minas Gerais, Brazil, in 04 August 1841 by P.W. Lund; R 11125 (formerly ZMUC 26), cleaned skeleton, collected in Lagoa Santa, State of Minas Gerais, Brazil, no date, by P.W. Lund.

Original description of *Gomphobates marmoratus* – "This species seems not only to be much larger than the preceding (*G. notatus*), but is plumper, about like the plumper of the Cystignathi. The body is thicker and wider, the head rounded. Although the skin is loose and has many irregular folds, the preceding lateral fold does not seem to be missing; besides there are the fold around the belly, the crossfold between the arms and the inflated throat skin as in the preceding; the three available specimens also have openings next to the tongue which lead down to the vocal sacs. What contributes to giving the species a different make-up is that there are not so few large warts on the back (one of them shows that these can disappear almost completely on soft specimens). The differences are reduced to the following: the small points on the outer posterior border of the tarsus are missing; the blade of the foot is wider, and there is a trace of a fringe around the larger toes. The markings are really to a great extent the same as on *G. notatus,* but much stronger and more distinct; the warts on the back are bordered by dark rings. The dark lines characteristic of *G. notatus* and the 2 round spots on the hind part of the back are missing here. A white line which occupies the middle of the hind part of the back is more distinct than the preceding species. In all other important respects they correspond, despite the difference in their make-up." (Translation from old Danish by Astrid Schmidt-Nielsen).

Diagnosis – A species belonging to the *P. albifrons* species group diagnosed by the following combination of characters: (1) size large for the group (SVL for males 33.3-42.1 mm; females 33.0-47.5 mm); (2) body robust; (3) head slightly wider than long; (4) snout rounded in dorsal and lateral views; (5) canthus rostralis rounded; (6) vocal sac subgular, well developed, extending to the border of chest with belly; (7) fingers and toes robust, fringed, with horned tips; (8) tarsal tubercle present; (9) metatarsal tubercles compressed, protruding, with horned distal margins; (10) toes webbed on base; (11) large inguinal glands with the same color pattern of dorsum; (12) dorsal color pattern presenting an "omega"-shaped mark and stripes extending to flanks and inguinal region; and (13) presence of a dark brown interorbital bar. *Physalaemus marmoratus* can be distinguished from all the other members of the

P. albifrons group due to its larger size (SVL combined for males of the other species 28.2-32.6 mm, females 28.4-34.1 mm), robust fingers (slender, longer fingers in the other species), and dorsal color pattern. *Physalaemus marmoratus* differs from *P. albifrons* and *P. biligonigerus* by the fringed fingers (fringes absent or poorly marked in *P. albifrons* and *P. biligonigerus*); from *P. albifrons* and *P. santafecinus* by the presence of long, rounded or irregular glandular ridges on dorsum (dorsal skin smooth in *P. albifrons* and granulated in *P. santafecinus*); from *P. albifrons* by the presence of one tarsal tubercle (two in *P. albifrons*) and large inguinal glands (indistinct in *P. albifrons*); from *P. biligonigerus* by inguinal glands with same color pattern of dorsum (inguinal glands with color pattern darker than dorsum in *P. biligonigerus*); from *P. santafecinus* by the absence of granules on forearms (presence of a line of granules on the outer margins of forearms in *P. santafecinus*), and absence of a white longitudinal line on sacral region (evident vertebral line in *P. santafecinus*).

Description of lectotype – Body robust; head slightly wider than long; snout rounded in dorsal (Fig. 1) and lateral views (Fig. 2); nostrils elliptical, not protuberant, located near the tip of snout, oriented dorsolaterally; canthus rostralis rounded; loreal region slightly concave; eyes protuberant, eye diameter larger than interorbital distance; tympanum indistinct; supratympanic fold short, slightly marked; dorsolateral fold absent; vocal sac subgular, well developed, extending to the border of chest with belly; choanae small, oval; tongue small, narrow, rounded on posterior border, which is not indented; maxillary and premaxillary teeth present; vomerine teeth absent. Arms short, robust; upper arms shorter than forearms; outer margin of forearms without ridges or granules; fingers robust, fringed; finger tips not expanded, horned; finger lengths I<IV<II<III (Fig. 3); nuptial asperities on thumbs and on the medial border of the inner carpal tubercle, but not continuous; carpal tubercles large, elliptical, with the same size; supernumerary tubercles protruding, conical; subarticular tubercles single, large, protruding, conical. Legs moderately robust; tibia slightly longer than thigh; tarsal fold absent; toes slender, long, slightly fringed (fringe absent on toe I); toes webbed on base; tips not expanded, horned; toe lengths I<II<V<III<IV (Fig. 4); tarsal tubercle present; metatarsal tubercles large, shovel-shaped, protruding, with distal margins horned; distance between inner and outer metatarsal tubercles shorter than that between the former and tarsal tubercles; supernumerary tubercles absent; subarticular tubercles single, large, protruding, conical; outer margin of subarticular tubercle of toe I weakly horned; dorsal pattern presenting an "omega"-shaped mark and stripes

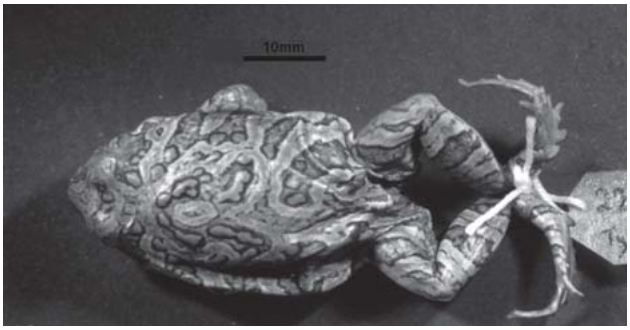

Figure 1: Dorsal view of the lectotype of *Gomphobates marmoratus* Reinhardt and Lütken, 1862 "1861".

Figure 2: Lateral view of the lectotype of *Gomphobates marmoratus* Reinhardt and Lütken, 1862 "1861".

Figure 3: Ventral view of the hand of the lectotype of *Gomphobates marmoratus* Reinhardt and Lütken, 1862 "1861".

Figure 4: Ventral view of the foot of the lectotype of *Gomphobates marmoratus* Reinhardt and Lütken, 1862 "1861".

extending to flanks and inguinal region; dorsum and flanks with long, rounded or irregular glandular ridges; upper eyelids finely rugose; ventral surfaces smooth, except on cloacal region and thighs, which are covered by large granules; ventral disc distinct; inguinal gland large, ovoid. General color pattern in preservative cream; light brown blotches and sinuous stripes, irregular, generally wide, bordered by brown lines; light brown stripes continuous or interrupted, tending to form an "omega"-shaped mark under scapular region; interorbital bar dark brown; white longitudinal line on sacral region; vertical bars dark brown and cream alternated from the snout to posterior corner of mouth; transversal bars dark brown and cream alternated on dorsum of arms and legs; gular region grayish; chest, belly, ventral surfaces of arms and legs cream; palmar and plantar surfaces grayish over cream background; nuptial asperities light brown; horned margins of fingers, toes, and metatarsal tubercles dark brown; inguinal gland with the same color pattern of dorsum.

Measurements – SVL 40.6; HW 12.4; HL 11.2; THL 16.2; TL 17.3; FL 19.0; ED 5.1; ID 3.6; END 2.4; UEW 3.9; IND 2.6.

Variation – Paralectotype R 1194 shows finger tips less horned, inner border of toe I with a small fringe, and subarticular tubercles on toes II, III, IV, and V horned. Granular ridges, granules, and inguinal glands are less evident, probably due to preservation. The general color pattern follows that of the lectotype, but colors are more faded. Measurements of paralectotype: SVL 38.5; HW 9.8; HL 10.6; THL 15.0; TL 15.7; FL 17.0; ED 4.4; ID 4.3; END 2.9; UEW 3.7; IND 2.6. Some of the additional specimens examined showed a narrower head and more rugose dorsum. Palmar and plantar tubercles may be less or more horned. This variation is also observed among tips of fingers and toes on a single specimen. General color pattern on dorsum and nuptial asperities of recently preserved specimens vary from gray to dark brown; the white longitudinal line on sacral region may be faded. Gular region of females follows the color pattern of chest and belly. Morphometric variation is presented in Table 1.

Tadpole – External morphology and internal oral morphology were described by Nomura *et al.* (2003) as *Physalaemus fuscomaculatus.*

Distribution and ecology – Physalaemus marmoratus breeds in temporary shallow ponds of open habitats in the States of Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Minas Gerais, Goiás, Mato Grosso, and Mato Grosso do Sul (Brazil), and also in Paraguay. Males call floating on the water with the large vocal sac inflated. During the axillary amplexus a foam nest is constructed on the water surface where the unpigmented eggs are deposited.

Remarks – Reinhardt and Lütken (1862 "1861") designated three syntypes in the original description of *G. marmoratus:* one was collected by Reinhardt; the other two were sent by Dr. P.W. Lund, one to the University Museum of Copenhagen and the other to the "Royal Museum of Natural History", Denmark. Later on, all natural history collections in Denmark were united into one large collection, now "Zoological Mu-

Table 1: Mean ($\bar{x}$), standard deviation (SD), and range of measurements (in mm) of males and females of *Physalaemus marmoratus* (Reinhardt and Lütken, 1862 "1861").

	Males (N=19)			Females (N=13)		
	$\bar{x}$	SD	Range	$\bar{x}$	SD	Range
SVL	38.2	2.1	33.3-42.1	41.8	4.2	33.0-47.5
HL	10.2	0.6	9.2-11.2	10.6	0.7	9.0-11.7
HW	11.3	0.8	10-12.8	12.5	1.0	10.9-13.8
ED	4.5	0.3	4.0-5.1	4.6	0.5	3.7-5.3
END	2.6	0.2	2.3-2.8	2.7	0.2	2.4-3.1
IND	2.6	0.1	2.3-2.8	2.7	0.2	2.4-3.1
IOD	3.3	0.4	2.7-4.3	3.4	0.4	2.8-4.1
UEW	3.9	0.3	3.3-4.6	4.2	0.4	3.7-5.0
THL	15.7	1.1	13.8-17.6	16.2	1.5	13.9-19.0
TL	15.5	1.0	13.8-17.3	15.9	1.2	13.6-17.8
FL	17.4	1.1	15.9-19.0	17.7	1.2	15.6-19.3

seum of the University of Copenhagen" (ZMUC; M. Andersen, pers. comm.). When we consulted the ZMUC Curator about the loan of the syntypes he located two specimens, R 1193 (here designated as the lectotype) and R 1194 (here designated as one of the paralectotypes). When asked about the third syntype, the Assistant-Curator could not trace it with certainty, because none of the three other specimens of *G. marmoratus* deposited in the ZMUC collection carried a label indicating which was the third type. However, he provided all the information available in the jars labels. One specimen (R 1170, formerly ZMUC 24) was collected by E. Warming, which did not collect any of the types. Specimen R 1195 (formerly ZMUC 25) is just labeled "Minas Gerais", with no collector and date. The last specimen (R 11125, formerly ZMUC 26; a cleaned skeleton, loose bones and skin in alcohol) was collected by P.W. Lund, but the label does not indicate the locality and date, only a Lund's handwriting note saying "New genus of frogs (1)". We considered this latter as the third syntype because of the evidences shown in the label.

Pleurodema fuscomaculata (Steindachner, 1864) n. comb.

Eupemphix fuscomaculatus Steindachner, 1864
Hiobates fuscomaculatus Steindachner, 1864
Gomphobates fuscomaculatus – Steindachner, 1867
Iliobates fuscomaculatus – Steindachner, 1867
Lystris fuscomaculatus – Cope, 1869 "1868"
Paludicola fuscomaculata – Boulenger, 1882
Physalaemus fuscomaculatus – Parker, 1927 (part)

Holotype – NHMW 4316, female, collected by J. Natterer in Caiçara, Municipality of Cáceres, State of Mato Grosso, Brazil (Fig. 5 and Fig. 6).

A very good description of the holotype of *Eupemphix fuscomaculatus,* as well as comparisons with other coespecific specimens and notes on distribution, is provided by Cei (1990).

Remarks – The presence or absence of vomerine teeth seems to be variable among genera of the currently Leiuperidae (sensu Frost *et al.,* 2006). Consequently, it is not yet possible to determine with certainty for what taxon or group of taxa the presence or absence of vomerine teeth represent a synapomorphic state. This would require a complete sampling of all species and all genera involved, which is beyond the scope of this paper. Until this can be accomplished, we tentatively use the new combination *Pleurodema fuscomaculata.*

Figure 5: Dorsal view of the type of *Eupemphix fuscomaculatus* Steindachner, 1864.

Figure 6: Ventral view of the type of *Eupemphix fuscomaculatus* Steindachner, 1864.

Resumo

A análise de exemplares depositados em coleções herpetológicas e identificados como *Physalaemus fuscomaculatus* demonstrou que estes diferem do tipo deste táxon, *Eupemphix fuscomaculatus.* Conseqüentemente, o status taxonômico de *Gomphobates marmoratus* e *Eupemphix fuscomaculatus* foi revisado com base nos tipos e na literatura. *Gomphobates marmoratus* é associado ao gênero *Physalaemus,*

como *Physalaemus marmoratus,* e se refere aos exemplares previamente identificados como *Physalaemus fuscomaculatus.* Adicionalmente, *Eupemphix fuscomaculatus* é associado ao gênero *Pleurodema,* com a combinação de *Pleurodema fuscomaculata.*

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Literature Cited

Barrio, A. 1965. El genero *Physalaemus* (Anura, Leptodactylidae) en la Argentina. Physis, 25(70):421-448.

Boulenger, G.A. 1882. Catalogue of Batrachia Salientia sive Ecaudata and Batrachia Apoda in the collection of the British Museum. 2nd Ed., London, British Museum: xxx + 503p.

Boulenger, G.A. 1886. A synopsis of the reptiles and batrachians of the Province Rio Grande do Sul, Brazil. Annals and Magazine of Natural History, 18(5):423-445.

Boulenger, G.A. 1887. Description of a new or little-known South American frogs of the genera *Paludicola* and *Hyla.* Annals and Magazine of Natural History, 2(5):295-300.

Cei, J.M. 1980. Amphibians of Argentina. Monitore Zoologico Italiano (N.S.), Firenze, Monografia, 2:609p.

Cei, J.M. 1987. Additional notes to "Amphibians of Argentina" an update, 1980-1986. Monitore Zoologico Italiano, 21:209-272.

Cei, J.M. 1990. On a paraguayan sample of a long time confused species: *Physalaemus fuscomaculatus* (Steindachner, 1864) (Anura, Leptodactylidae). Bolletin di Museo Regionale di Scienze Naturali di Torino, 8(1):215-231.

Cochran, D.M. 1955. Frogs of Southeastern Brazil. United States Natural Museum Bulletin, 206: xvi + 423p.

Cope, E.D. 1869 "1868". Sixth contribution to the herpetology of Tropical America. Proceedings of the Academy Natural Sciences of Philadelphia, 20:305-313.

Frost, D.R. (ed.). 1985. Amphibian species of the world. A taxonomic and geographical reference. Lawrence, Allen Press, Inc., and The Association of Systematics Collections: v + 732p.

Frost, D.R. 2006. Amphibian Species of the World: an Online Reference. Version 4.0 (17 August, 2006). Electronic Database accessible at http://research.amnh.org/herpetology/amphibia/index.html. American Museum of Natural History, New York, USA. [captured on 20 August 2006].

Lynch, J.D. 1970. Systematic status of the American leptodactylid frog genera *Engystomops, Eupemphix,* and *Physalaemus.* Copeia, 1970(3):488-496.

Méhely, L. von. 1904. Investigations on paraguayan batrachians. Annales Historico-Naturales Musei Nationalis Hungarici, 2:207-232.

Milstead, W.W. 1960. Frogs of the genus *Physalaemus* in Southern Brazil with description of a new species. Copeia, 1960(2):83-89.

Milstead, W.W. 1963. Notes on brazilian frogs of the genera *Pseudopaludicola* and *Physalaemus.* Copeia, 1963 (3):565-566.

Miranda-Ribeiro, A. 1926. Notas para servirem ao estudo dos gymnobatrachios (Anura) brasileiros. Arquivos do Museu Nacional, Rio de Janeiro, 27:1-227.

Nascimento, L.B., U. Caramaschi and C.A.G. Cruz. 2005. Taxonomic review of the species groups of the genus *Physalaemus* Fitzinger, 1826 with the revalidation of the genera *Engystomops* Jiménez-de-la-Espada, 1872 and *Eupemphix* Steindachner, 1863 (Amphibia, Anura, Leptodactylidae). Arquivos do Museu Nacional, Rio de Janeiro, 63(2):297-320.

Nomura, F., D.C. Rossa-Feres and V.H.M. Prado. 2003. The tadpole of *Physalaemus fuscomaculatus* (Anura: Leptodactylidae), with a description of internal oral morphology. Zootaxa, 370:1-8.

Parker, H.W. 1927. A revision of the frogs of the genera *Pseudopaludicola, Physalaemus,* and *Pleurodema.* Annals and Magazine of Natural History, ser. 9(20):450-478.

Peters, W. 1872. Über eine Sammlung von Batrachiern aus Neu-Freiburg in Brasilien. Monatsberichte der Akademie der Wissenschaften zu Berlin, 1872:680-684.

Reinhardt, J. and C.F. Lütken. 1862 "1861". Bidgrad til Kundskab om Brasiliens Padder og Krybdyr. Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn, 3(10-15):143-242.

Spix, J.B. 1824. Animalia nova sive species novae Testudinum et Ranarum, quas it itinere per Brazilian annis MDCCCXVIII-MDCCXX jussu et auspiciis Maximilliani Josephi I. Bavarrie Regis, Monachii, xxii + 53p.

Steindachner, F. 1863. Über einige neue Batrachier aus den Sammlungen des Wiener Museums. Sitzungsberichte der Akademie der Wissenschaften, 48:186-192.

Steindachner, F. 1864. Batrachologische Mitteilungen. Verhandelugen Zoologisch-Botanischen Gesellschaft in Wien, 14:239-288.

Steindachner, F. 1867. Amphibien. In: Reise der Oesterreichischen Fregatte Novara um die Erde, in den Jahren 1857, 1858, 1859, unter den Befehlen des Commodore B. von Wüllerstorf-Urbair. Zoologischer Theil., 70p.

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Appendix I

Specimens Examined

Physalaemus albifrons: BRAZIL: MARANHÃO: MNRJ 24216-24226, Barreirinha. CEARÁ: MNRJ 14940-14942, MNRJ 24059, MNRJ 24062-24072, Brejo Santo; MNRJ 6636-6674, Mucuripe, Fortaleza; MNRJ 1125, MNRJ 6636-6676, Fortaleza. SERGIPE: MNRJ 17976-17981, Santa Luzia do Itanhy. BAHIA: MNRJ 1094-1096, Barreiras; MNRJ 114-116, MNRJ 1094-1096, MNRJ 1113, MNRJ 1102-1104, MNRJ 1089-1091, Bom Jesus da Lapa; MNRJ 1105, Juazeiro; MZUSP 76521, MZUSP 82303. MINAS GERAIS: MNRJ 27180-27189, Lageado; MNRJ 27179, MNRJ 21743-21745, Manga; MCNAM 206-209, MCNAM 213-216, Porteirinha.

Physalaemus biligonigerus: BOLÍVIA: SANTA CRUZ: AMNH 144362-144370, AMNH 144371-144385, AMNH 144432-144433. BRAZIL: SANTA CATARINA: MNRJ 31128-31153. RIO GRANDE DO SUL: UFGRS 1924-1929, General Câmara; UFGRS 1776, Uruguaiana; UFGRS 1619, Tramandaí; UFGRS 1319-20, UFRGS 1342, Parque Estadual de Itapoã, Viamão. PARAGUAY: AMNH 23807, Paraguayan Chaco; AMNH 50669-50671, Colônia Nueva, Itália Villeta. URUGUAY: DEPARTAMENTO RIO NEGRO: MNRJ 28554.

Physalaemus marmoratus: BRAZIL: Bahia: MNRJ 28443, MNRJ 28489, Caravelas; DISTRITO FEDERAL: MNRJ 3415, Ribeirão do Torto; Goiás/Minas Gerais: MCNAM 3915-3918, MCNAM 3964-3965, MCNAM 4796, region of Queimados Hydroelectric Dam (AHE Queimados); Minas Gerais: MCNAM 1259, Bocaiúva; MCNAM 3155-3157, Conselheiro Mata; MNRJ 1020-1021, Lagoa Santa; MNRJ 40876-40877, Pirapora; MCNAM 2135-2138, MCNAM 2204-2209, MCNAM 2238, MCNAM 2604, MCNAM 2738, MCNAM 2740-2745, MCNAM 2748-2751, MCNAM 3147-3148, Santana do Riacho; ESPÍRITO SANTO: MNRJ 40878-40879, Piúma; RIO DE JANEIRO: MNRJ 1015-1019, Campos dos Goytacazes; MNRJ 3366, MNRJ 13872-13914, MNRJ 40587, MNRJ 40880, MNRJ 40881, São João da Barra; MATO GROSSO DO SUL: MNRJ 24875, Miranda; MNRJ 3070, MNRJ 13263, Salobra; SÃO PAULO: MNRJ 40882-40883, Botucatu; MNRJ 34666-34671, Campinas; MNRJ 37043-37045, Piraju; PARAGUAY: MNRJ 12710-12730, Asunción; MNRJ 12696-12709, Brejo de Ipuã;

Physalaemus santafecinus: ARGENTINA: CORRIENTES: UFGRS 1943-1947, MZUSP 83258-83259, Ituzaingó, Estância Santa Tecla.