Sexual dimorphism in two species of *Sibynomorphus* (Squamata, Dipsadidae) from Brazil

Tatiane Parnazio1 and Davor Vrcibradic1,*

**Abstract.** Snakes are usually sexually dimorphic in both morphology and pholidosis. Members of the Neotropical tribe Dipsadini (Dipsadidae) commonly have unusual patterns of sexual dimorphism regarding the numbers of ventral scales (higher in males or non-dimorphic). The northern (trans-Andean) species of *Sibynomorphus* apparently deviate from the typical dipsadine pattern, but there is little data currently available on the southern (cis-Andean) members of the genus. We tested for differences in some morphological and meristic characters between males and females of two cis-Andean species of *Sibynomorphus* [*S. mikanii* (Schlegel, 1837) and *S. neuwiedi* (Ihering, 1911)]. Preserved specimens from Brazilian institutional collections were analysed with respect to snout-vent length (SVL), relative length of the tail, and ventral and subcaudal scale counts. Both species had patterns of sexual dimorphism typical of most snakes with regard to SVL (larger in females), relative length of the tail and subcaudal scale counts (both greater in males). Regarding ventral counts, however, *S. neuwiedi* showed no sexual dimorphism (as is common among Dipsadini), whereas in *S. mikanii* females had a significantly greater number of ventrals than males (as in most snakes, including trans-Andean *Sibynomorphus*).

**Keywords:** Dipsadini, Dipsadinidae, morphology, pholidosis, scalation, snake

**Introduction**

Snakes can be sexually dimorphic in various phenotypic traits, such as the size of certain organs and/or glands (Bonnet et al., 1998; Kissner et al., 1998), degree of keeling of some scales (Layne and Steiner, 1984; Maritz and Alexander, 2011), colour pattern (Shine and Madsen, 1994; Marques and Sazima, 2003), head shape and dimensions (Camilleri and Shine, 1990; Shine, 1991) and, especially, body size and relative tail size, with females usually growing longer and/or bulkier and having proportionally shorter tails than males (e.g., Klauber, 1943; Fitch, 1981; Pearson et al., 2002; Pizzatto et al., 2008).

Sexual dimorphism in body size in snakes could be explained by differences between the sexes in the costs involved with reproduction (Shine, 1978; Madsen and Shine, 1994; Rivas and Burghardt, 2001), though in some cases it may also be related to ecological segregation between the sexes (Shine, 1993; Branch et al., 1997). The larger size of females in most snake species is commonly attributed to an adaptive advantage of large size in enhancing reproductive success (e.g., Semlitsch and Gibbons, 1982; Shine, 1994), as fertility and/or production of larger-bodied offspring is generally positively related to female body size in squamate reptiles (Fitch, 1985). On the other hand, the greater relative length of the tail in males is due to the “extra space” at the tail base for accommodating the hemipenes and their retractor muscles (Klauber, 1943; King, 1989), though it may also have an adaptive function, such as aiding in the removal of other males during reproductive aggregations (King, 1989; Shine et al., 1999). Such morphological differences between sexes are usually paralleled by pholidosis, with females normally having higher numbers of ventral scales (reflecting their longer bodies) and males usually having more subcaudal scales (reflecting their longer tails; Shine, 1993).

The tribe Dipsadini (sensu Harvey et al., 2008; family Dipsadidae, subfamily Dipsadinae) consists of the Neotropical genera *Dipsas*, *Plesiodipsas*, *Sibon*, *Sibynomorphus* and *Tropidodipsas*. It is a speciose group of nocturnal, predominantly arboreal molluscivorous snakes distributed from Mexico to northern Argentina (Peters, 1960; Wallach et al., 2014). Among the Dipsadini, sexual dimorphism in various traits has been reported for a number of species (e.g., Cadle, 2007; McCranie, 1997).
2007; Harvey and Embert, 2008; Pizzatto et al., 2008). Notably, some studies have reported unusual patterns of sexual dimorphism in the number of ventral scales for species in the genus Dipsas, with males having ventral counts either higher than or equal to those of females (Cadle, 2005; Harvey and Embert, 2008; Barros et al., 2012). Based on data from Kofron (1988, 1990), Cadle (2007) speculated that the same phenomenon might also occur in species of Sibon and Tropidodipsas (=Sibon sensu Kofron, 1985), and data from McCrane (2007) seem to corroborate that hypothesis. Thus, a relatively high number of ventrals in males (compared to females) may be a widespread trait among the Dipsadini. The genus Sibynomorphus Fitzinger, 1843, however, does not appear to follow this trend. This genus currently consists of twelve recognized species and has a disjunct distribution: six species are distributed east of the Andes and south of the Amazonian domain in Argentina, Brazil, Paraguay, Uruguay and Bolivia and the other six occur west of the northern Andes in Ecuador and Peru (Cadle, 2007; Wallach et al., 2014). For the six trans-Andean species, patterns of sexual dimorphism in pholidosis are not different from those presented by most Dipsadidae and for snakes in general, with females tending to have more ventrals and less subcaudals in comparison to males (Cadle, 2007). As for the species occurring east of the Andes, however, the little information available does not show a clear pattern regarding sexual dimorphism. Cunha et al. (1980) reported sexual dimorphism in the number of ventrals for S. mikanii septentrionalis Cunha, Nascimento and Hoge, 1980, with females tending to have higher counts. On the other hand, data from Scrocchi et al. (1993) for S. lavillai Scrocchi, Porto and Rey, 1993 suggest that males and females of that species do not differ in ventral counts (see Cadle, 2007).

In the present study we analyse the differences in certain morphological (SVL and relative tail length) and meristic (numbers of ventral and subcaudal scales) characters between males and females of two common species of Sibynomorphus occurring east of the Andes and south of the Amazon: S. mikanii and S. neuwiedii. Our aim is to check whether those species have patterns of sexual dimorphism typical or atypical compared to those observed in other snakes of the tribe Dipsadini. We discuss our results in light of what is currently known of the phylogenetic relationships of dipsadine snakes.

Materials and Methods

For the present study we analysed preserved specimens of Sibynomorphus mikanii and S. neuwiedii from reptile collections of several institutions in Brazil, including the Museu Nacional (MNRJ), the Universidade Federal do Rio de Janeiro (ZUFJR), and the Universidade Federal do Estado do Rio de Janeiro (UNIRIO; all in the city of Rio de Janeiro), the Instituto Vital Brazil (IVB; in Niterói, state of Rio de Janeiro), the Instituto Butantan (IBSP) and the Museu de Zoologia da Universidade de São Paulo (MZUSP; both in the city of São Paulo, state of São Paulo), and the Museu Paraense Emílio Goeldi (MPEG; in Belém, state of Pará). Specimens identified in collections as S. mikanii septentrionalis or whose provenance was from the general area of occurrence of that taxon in the states of Maranhão and Pará (see Freitas et al., 2014) and other adjacent states in northern and northeastern Brazil were not included in the present study, as the taxonomic status of that subspecies has not been assessed since its original description by Cunha et al. (1980) and there is the possibility that it could be specifically distinct from the nominal form; thus, in order to prevent the risk of analysing data from a heterogeneous sample we only included specimens assignable to S. m. mikanii as representatives of the species in our analyses.

Sexing of individuals was performed by making a small incision at the base of the tail to check for the presence of hemipenial muscles, except when males had the hemipenes everted or in cases when animals had been previously opened (in which case sexing was done by direct observation of the gonads). For each individual, the measurements of snout-vent length (SVL) and tail length (TL) were taken with the aid of a measuring tape with 1 mm precision, and counts of ventral and subcaudal scales were performed under a stereomicroscope, following Dowling (1951). In some specimens of S. mikanii the occurrence of “half-split” ventrals was observed, but those were not included in the counts; according to King (1959), these scales correspond to anomalous vertebral duplication and thus should not be counted. Since the subcaudal scales of the species analysed are divided, the counts were performed following the trend of counting only the scales on one side (in this case the right side) and including the single terminal scale (Schmidt and Davis, 1941).

Data normality was verified using the Kolmogorov-Smirnov test. Differences between sexes in SVL and scale counts were tested by One-Way Analysis of Variance (ANOVA), and inter-sexual differences in relative tail length were tested by Analysis of Covariance (ANCOVA) using SVL as the covariate. The degree of sexual size dimorphism (SSD) was estimated for each species by dividing the mean SVL of the larger
Results

A total of 202 individuals of *S. mikanii* and 148 of *S. neuwiedi* were analysed in the present study. Females had significantly greater mean SVLs than males in both species (*S. mikanii*: $F_{1,139} = 77.70; P < 0.001$; *S. neuwiedi*: $F_{1,104} = 56.98; P < 0.001$; Table 1). The SSD ratio was higher for *S. neuwiedi* (0.233) than for *S. mikanii* (0.213).

Although females of both species had higher mean absolute values of TL than males (Table 1), the analyses of covariance showed that the length of the tail relative to SVL was greater in males for both *S. mikanii* ($F_{1,138} = 62.31; P < 0.001$) and *S. neuwiedi* ($F_{1,1,104} = 45.13; P < 0.001$). This is also shown by the greater proportion of tail length relative to body length (mean TL/SVL ratio) in males of both *S. mikanii* (males: 25.3%; females: 21.8%) and *S. neuwiedi* (males: 31.0%; females: 27.0%).

In *S. mikanii*, females had significantly higher numbers of ventral scales than males ($F_{1,198} = 36.10; P < 0.001$), but in *S. neuwiedi* there was no significant inter-sexual difference in the number of ventrals ($F_{1,142} = 0.50; P = 0.478$; Table 1). Males had a higher mean number of subcaudals compared to females in both *S. mikanii* ($F_{1,192} = 125.06; P < 0.001$) and *S. neuwiedi* ($F_{1,142} = 94.85; P < 0.001$) (Table 1).

**Table 1**. Mean values (± 1 SD, with ranges and sample sizes in parentheses) of snout-vent length (SVL), tail length (TL), and numbers of ventral and subcaudal scales for *Sibynomorphus mikanii* and *S. neuwiedi*. Measurements of SVL and TL are given only for sexually mature individuals. Whenever there are statistically significant ($P < 0.05$) differences between sexes in relative (for TL) or absolute values (for the other variables) the sex with the larger value is shown in bold.

<table>
<thead>
<tr>
<th>Species</th>
<th>Sex</th>
<th>SVL (mm)</th>
<th>TL (mm)</th>
<th>Ventrals</th>
<th>Subcaudals</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>S. mikanii</em></td>
<td>♂♂</td>
<td>348.1 ± 36.7 (280–445, N = 61)</td>
<td>88.1 ± 10.2 (65–115, N = 61)</td>
<td>162.8 ± 4.4 (154–176, N = 87)</td>
<td>52.9 ± 3.0 (42–59, N = 38)</td>
</tr>
<tr>
<td></td>
<td>♀♀</td>
<td>422.3 ± 57.3 (339–571, N = 80)</td>
<td>92.0 ± 16.4 (64–150, N = 60)</td>
<td>166.9 ± 5.0 (157–181, N = 113)</td>
<td>47.4 ± 3.6 (39–59, N = 111)</td>
</tr>
<tr>
<td><em>S. neuwiedi</em></td>
<td>♂♂</td>
<td>406.1 ± 67.9 (255–565, N = 45)</td>
<td>126.1 ± 25.2 (72–195, N = 45)</td>
<td>171.7 ± 6.0 (159–185, N = 54)</td>
<td>73.0 ± 4.2 (61–85, N = 54)</td>
</tr>
<tr>
<td></td>
<td>♀♀</td>
<td>500.7 ± 61.1 (415–688, N = 62)</td>
<td>134.9 ± 14.0 (101–170, N = 62)</td>
<td>171.1 ± 5.2 (159–183, N = 90)</td>
<td>65.0 ± 4.4 (56–76, N = 90)</td>
</tr>
</tbody>
</table>

**Discussion**

Our results confirm that females of both *S. mikanii* and *S. neuwiedi* grow larger than conspecific males. This trend has been previously observed by Pizzatto et al. (2008) for these two species and for other species of the tribe Dipsadini (including another congener, *S. ventrimaculatus*). Cadle (2007) also observed a general trend of females growing larger than males in the trans-Andean species of *Sibynomorphus* [except for *S. vagus* (Jan, 1863), in which no pattern was evident due to the small sample size]. Males growing larger than females or a lack of sexual dimorphism are often observed in species in which fighting behaviour occurs between males during the breeding season (Shine, 1994). Male-male combat is not known to occur in dipsadines, except for *Imantodes cenchoa* (Linnaeus, 1758) (see Pizzatto et al., 2008). Thus, it is not surprising that females are the larger sex in *Sibynomorphus* spp. The indices of SSD estimated in our study (0.21 for *S. mikanii* and 0.23 for *S. neuwiedi*) were comparable to those (0.24 – 0.27) reported for three species of *Sibynomorphus* (including the two studied herein) by Pizzatto et al. (2008), and higher than those calculated for other species of Dipsadini by those authors. These data suggest that *Sibynomorphus* spp. (or at least the cis-Andean species in this genus) are the most sexually dimorphic of the dipsadines.

Both species were also sexually dimorphic in relative tail length, with males having proportionally longer tails than females. Unsurprisingly, this was also reflected in the subcaudal counts, which were also significantly higher for males. These results are also in agreement with what has been reported by other authors for various species of Dipsadini (Cadle 2007, Pizzatto et. al., 2008, Harvey and Embert, 2008), indicating that members of
that tribe do not differ from the majority of snakes with regard to sexual dimorphism in tail length and number of subcaudal scales.

Unlike the other traits mentioned above, the pattern of sexual dimorphism in number of ventral scales differed between the two species tested in our study: females of *S. mikanii* had a significantly higher mean number of ventrals than males, whereas in *S. neuwiedi* the sexes did not differ with respect to that trait (even though females had a significantly greater mean SVL than males). Data from Peters (1960) also show largely overlapping ranges of ventral counts for males (165-182) and females (167-181) of *S. neuwiedi* (at that time still regarded as a subspecies of *S. mikanii*), although mean values were not given in that work. Our analyses thus confirm that there is no relevant difference in the number of ventral scales between males and females of this species. However, Peters (1960) also gave overlapping ranges of ventrals for males and females of *S. mikanii*, with the range for females (153-177) totally encompassing the range for males (155-171), whereas our data revealed female-biased sexual dimorphism in that trait for this species. Thus, considering only the ranges of values as evidence for absence of sexual dimorphism can be misleading. Peters (1960), however, included in his sample some specimens from the southern Brazilian state of Rio Grande do Sul which he considered “intermediate” between typical *mikanii* and *neuwiedi* and for which he suggested that the epithet *garmani* could be used to designate this population as a distinct subspecies (although he considered his data insufficient to propose such an action). Nevertheless, it has been since proposed in an unpublished thesis (see Cadle, 2007, p. 185) that *S. garmani* (Cope, 1887) should be regarded as a valid species (though it is still officially maintained in the synonymy of *S. mikanii*; Wallach et al., 2014). Thus, Peters’s (1960) sample of *S. mikanii mikanii* may have been a composite of more than one taxon (F. L. Franco, pers. comm.), which limits the utility of comparisons with our data. It is also noteworthy that Cunha et al. (1980) found female-biased sexual dimorphism in ventral scale counts for *S. m. septentrionalis*, as we did for the nominal subspecies. This suggests that the taxon *septentrionalis* may be related to *mikanii* rather than to *neuwiedi* (which was also considered a subspecies of *mikanii* by Cunha et al., 1980).

The results above are interesting if we consider the current (and still very limited) knowledge about phylogenetic relationships within the Dipsadini. Although only two to five species of *Sibynomorphus* have so far been included in phylogenetic studies based on molecular data, the paraphyly of *Dipsas* relative to *Sibynomorphus* and the polyphyly of *Sibynomorphus* have been recovered in all of them (Zaher et al., 2009, 2014; Vidal et al., 2010; Grazziotin et al., 2012; Pyron et al., 2015; Figueroa et al., 2016). Studies that included four to five species of this genus (Grazziotin et al., 2012; Zaher et al., 2014; Pyron et al., 2015, Figueroa et al. 2016) have consistently recovered them in two clades, each having closer relationships with species in other dipsadine genera than with each other (albeit usually with weak support). Interestingly, *S. neuwiedi* and *S. mikanii* were never recovered within the same clade, even though the former was considered a subspecies of the latter until relatively recently (Hoge et al., 1981). Considering that in the genera *Dipsas*, *Sibon* and *Tropidodipsas* males tend to have either equal or greater ventral scale counts than females (which is unusual among snakes), this characteristic may possibly represent a synapomorphy of the Dipsadini. In this case, the condition observed in *S. mikanii* (and, presumably, other species closely related to it) could represent a secondary reversal to the “normal” pattern (i.e. females tending to have higher ventral counts), since this species is deeply embedded within the dipsadine clade (Zaher et al., 2009, 2014; Grazziotin et al., 2012). The only trans-Andean species of *Sibynomorphus* that has so far been included in a molecular phylogeny is *S. vagus*, which was not recovered as closely related to either *S. neuwiedi* or *S. mikanii* (Figueroa et al., 2016). This would imply at least two independent occurrences of reversal to the “normal” pattern of sexual dimorphism in number of ventral scales in the Dipsadini. However, it is premature to make such inferences, since the knowledge of relationships among dipsadine taxa is still in a very incipient state, with the few phylogenies available presenting conflicting results, low support for many clades, and low taxon coverage (Zaher et al., 2009, 2014; Vidal et al., 2010; Grazziotin et al., 2012; Pyron et al., 2015; Figueroa et al., 2016). Inclusion of more *Sibynomorphus* species (especially trans-Andean ones) in future phylogenetic studies may shed more light on the evolution of sexual dimorphism patterns in the Dipsadini.

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References


Appendix 1. Specimens examined.

Sibynomorphus mikani

**BRASIL: GOIÁS:** MNRJ 9352 (Alto Paraiso de Goiás); MNRJ 7813 (Amaro Leite); MZUSP 17788 (Buritínopolis); MZUSP 16900, 16903, 16905, 16909–10 (Cavalcante); MPEG 24945, 24948–50, 24952–53 (Goiânia); MNRJ 7996–98 (Ipameri); MZUSP 3778 (Jataí); MZUSP 17690 (Luziânia); MZUSP 16728 (Mambai); MNRJ 4882, MZUSP 11006, 16913, 16915, 20454–58, 20461–62, 20464–66 (Minaçu); MZUSP 9046 (Nova Olinda); MNRJ 19217, 21183 (Ouvidor); MZUSP 12495 (Petrolina de Goiás); MNRJ 23607 (Pirenópolis).

MATO GROSSO: ZUFJR 780 (Diamantino); MZUSP 3753 (Luciara); IBSP 50224 (Paranatinga); MPEG 21967 (Querência); IBSP 70729 (Sinop).

MATO GROSSO DO SUL: MZUSP 10140–42 (Campo Grande); MZUSP 10143 (Corumbá).

MINAS GERAIS: IVB 1627 (Albertina); MNRJ 18934, 19407, 21104 (Catas Altas); IBSP 79495 (Consolação); MNRJ 23717–18 (Contagem); MZUSP 14963 (Cristina); MZUSP 1631 (Delfinópolis); IBSP 81175 (Extrema); MNRJ 15228, 15267, 15294–96, 15455, 15397, 17162, 17191–92, 17260, 17772, 20230 (João Pinheiro); MNRJ 1329–34, 1986 (Lagoa Santa); MNRJ 24523 (Matias Barbosa); IBSP 84197 (Passos); MNRJ 18727, 18729 (Patos de Minas); ZUFJR 1747 (Pedralva); ZUFJR 1214, 1237 (Porteirinha); IBSP 85496 (Pouso Alegre); MNRJ 9026 (Três Marias). PARANÁ: IBSP 78504 (Foz do Iguacu); MNRJ 9087 (Nova Concórdia); IBSP 16354–55 (Urai).

SÃO PAULO: MNRJ 14027 (Alumínio); MNRJ 19198 (Anhembi); MNRJ 19188 (Araraquara); MNRJ 14025 (Atibaia); MNRJ 19927, 20477 (Bofete); MNRJ 18549, 19184–86, 19189–93, 19197, 19199–202, 19204–05, 19295, 19318, 20469, 20476, 20502, 20510, 20736–37, 20800, 20864, 20876, 21605, 21614, 21737, 21749, 21752, 21771, 21808, 21871, 21874, 21891, 21912, 21935, 21977, 21983, 21989, 21990, 22033, 22078, 22084, 22114, 22182, 22232, 22238, 22653–55, 22878–83, 23026 (Botucatu); IBSP 80744, 85202, 85412, 85552, MNRJ 17452 (Bragança Paulista); MNRJ 12734–35 (Carapicuíba); ZUFJR 179, 247, 779 (Catanduva); MNRJ 14028 (Embu das Artes); MZUSP 11535 (Itanhaém); MNRJ 12738–39 (Itapevi); MZUSP 12350 (Itu); MNRJ 14026 (Jandira); MZUSP 10764 (Leme); MNRJ 17451 (Osasco); MNRJ 12736 (Porto Feliz); MZUSP 8629 (Piracicaba); MNRJ 19195 (Registro); MNRJ 21996, MZUSP 8285, 8288 (Ribeirão Preto); IBSP 78408, 81179, MNRJ 12737 (Santana de Parnaiba); IBSP 85032 (São Caetano do Sul).
10749 (Cristalândia); IBSP 78452 (Figueirópolis); MZUSP 12700–01 (Guaraí); MZUSP 14604, 15763 (Lajeado); MZUSP 10743–44, 10746, 10748, 10750 (Porto Nacional); MZUSP 17670, 17872 (São Salvador do Tocantins).

**Sibynomorphus neuwiedi**

**BRAZIL: ALAGOAS:** MNRJ 19285 (Murici).
**BAHIA:** MNRJ 23073 (Itagibá); MNRJ 19618 (Trancoso). **ESPÍRITO SANTO:** MNRJ 8140 (Cariacica); MNRJ 23363 (Guarapari); MNRJ 702, 23721 (Santa Tereza); MNRJ 8139, 23720, 23722–23 (Venda Nova do Imigrante); MZUSP 14404 (PARNAs do Caparaó). **MINAS GERAIS:** MNRJ 17855, 19969, 24241, 24561 (Catas Altas); MNRJ 11332, 11335, 14624 (Espera Feliz); MNRJ 14127–28, 14504 (Faria Lemos); IVB 1558 (São João do Manhuaçu). **PARANÁ:** MZUSP 8062 (Ipiranga). **RIO DE JANEIRO:** IVB 2317, MNRJ 7802, 7806, 8059, 9785, 23275–77, 24211, UNIRIO 55–59 (Angra dos Reis, Ilha Grande); IVB 2441, MNRJ 7791, 7800 (Bom Jardim); MNRJ 12346 (Cachoeiras de Macacu); MNRJ 7795–98 (Carmo); MNRJ 17842, 18596 (Casimiro de Abreu); MNRJ 15572, 15577 (Comendador Levy Gasparian); MNRJ 15592, 16538, 17489, 18277 (Duque de Caxias); MNRJ 4887 (Engenheiro Paulo de Frontin); MNRJ 24246 (Macaé); MNRJ 15943, UNIRIO 60 (Mangaratiba); MNRJ 19520 (Mendes); IVB 152, 154, 578–79, MNRJ 4873, 7519, 8283–84, 20873 (Nova Friburgo); MNRJ 22037, 23632 (Nova Iguaçu); MNRJ 21836 (Paracambi); IVB 3079 (Paraíba do Sul); IVB 410, 896, MNRJ 9044, 9343, MZUSP 5172 (Petrópolis); MNRJ 4890 (Pirai); MNRJ 14505 (Porciúncula); MNRJ 12444, 12646, 13181, 13119, 14054, 14100, 14433–34, 14674, 15333, 17112, 17868, 18399, 18425, 18478, 19095 (Resende); MNRJ 11336, 17172, 19171–72, 19489, 20773, 23300, 23303 (Rio Claro); MNRJ 7803, 15105, 15578 (Rio das Flores); IVB 2318, MNRJ 18086 (Rio de Janeiro); MNRJ 23218 (São Sebastião do Alto); IVB 608, 621, 644 (Três Rios); MNRJ 16495 (Valença); MNRJ 10038, 17317 (Volta Redonda). **SANTA CATARINA:** MNRJ 10635 (Blumenau); MNRJ 689–90, 692, 695 (Corupá); MZUSP 15700–01 (Guaramirim); MZUSP 13230, 17227 (Jaraguá do Sul); MNRJ 698 (Joinville); MNRJ 20209 (Paiolhoça). **SÃO PAULO:** MNRJ 14040, MZUSP 12892, 12934 (Arujá); MZUSP 15257 (Bertioga); MNRJ 19187, 20719, 21911 (Botucatu); MNRJ 10634 (Igaratá); MZUSP 21248 (Itanhaém); MNRJ 14039 (Jacupiranga); MZUSP 12833 (Mogi das Cruzes); MZUSP 12733 (Pariguera-Açu); MZUSP 20912 (Paraibuna); MNRJ 17459 (Salesópolis); MNRJ 10633, MZUSP 12405, 18067 (São Bernardo do Campo); MZUSP 15221 (São Miguel Arcanjo); MZUSP 12824 (Ubatuba).

Sexual dimorphism in two species of *Sibynomorphus* from Brazil

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