Observations on the biology of *Scinax flavoguttatus* (Lutz et Lutz) and description of its tadpoles (Amphibia: Anura: Hylidae)

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Abstract

*Scinax flavoguttatus* (1) is a small size species, from the family Hylidae, commonly found in the Atlantic Forest. Adults are easily identified by their small size, pattern of dorsal spots (shaped as a sand-glass) and bright yellowish spots on the hidden regions of the thighs. They can be found by day at stream banks in Teresópolis, Rio de Janeiro, and breed preferably at cold rainy nights. During dry seasons, adults are found inside tufts of moss hanging from tree trunks. In this paper, some observations are reported on their habits, breeding sites and time of reproduction. Also are given the descriptions of its clutches and tadpoles along with data about their development. The described tadpoles are compared with the observations of Lutz and Lutz (1939) and Heyer et al. (1990).

**Keywords:** Amphibia, Hylidae, *Scinax flavoguttatus*, Larvae.

Introduction

*Scinax flavoguttatus* is an Atlantic Forest species commonly found in altitudes higher than 700 m in the forests of Serra do Mar and Serra da Mantiqueira, in the states of São Paulo, Rio de Janeiro and Minas Gerais, Brazil. The adults are identified by their small size - males usually reach an average snout-vent length of 26.0 mm and females are about 40.1 mm long and by the brown, gray or olivaceous color of the back, with a neat and contrasted pattern of dark spots with white lining which generally produce a sand-glass shaped design. The hidden regions of the anterior portion of the thigh and adjacencies show bright yellowish-orange spots with the shape of a drop (Fig. 1), from where comes the name *flavoguttatus* (from the Latin *flavus*, yellow; *gutta*, drop).

![Figure 1](image_url)

**Fig. 1** - *Scinax flavoguttatus*, female from Teresópolis (RJ) showing yellowish-orange spots on the thigh and adjacencies (SPCS 6978).

*Scinax flavoguttatus*, femelle de Teresópolis (RJ) montrant les taches orange jaunâtres sur la cuisse et les régions voisines (SPCS 6978).

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The tadpoles of *Hyla flavoguttata* were described in 1939 by Adolpho and Bertha Lutz, on adult individuals collected at Serra da Bocaina, between the states of Rio de Janeiro and São Paulo. At that time, the authors considered it very similar to *H. catarinanae* Boulenger, describing a possible tadpole of that species.

In 1977, Fouquettet and Delahoussaye transferred *H. flavoguttata* and all the other species belonging to the *rubra* group, *lato sensu*, from the genus *Hyla* to the genus *Ololygon* Fitzinger, 1843.

Heyer *et al.*, in 1990, redescribed the adults of *O. flavoguttata* presenting a brief description of the species tadpole.

In 1992, Duellman and Wiens redefined the genus *Scinax* Wagler, 1830, to which the species of the old genus *Ololygon* were transferred.

**Materials and methods**

Adult individuals were observed in the field during the day and by night with the help of flashlights. After manual collect they were placed in plastic bags and transported to the laboratory in order to be described, photographed, fixed and included in the herpetological collection.

Tadpoles were observed in the field during days and nights, and also in aquariums in the laboratory. After collecting with the help of sieves, one part of the material was placed in plastic bags and the other was immediately fixed, thus avoiding alterations caused by the transport to the laboratory. Field observations included data on color, morphology, habits and behavior.

Water solutions of clorethone were used as anesthetic (0.1% concentration for tadpoles and 0.25% for adults). Fixation was made with 5% formalin for eggs and tadpoles and 10% for adults. In order to render the study of the oral region easier, some tadpoles were fixed according to the technique described by Carvalho e Silva and Carvalho e Silva (1994). Tadpoles were preserved in 5% formalin and adults, in alcohol 70° GL after one week of fixation.

Specimen descriptions were based on Duellman (1970) and Heyer *et al.* (1990). Tadpoles stage determination was made according to Gosner (1960) and the dental formula is based on the fractional system proposed by Altig (1970).

Adult measures and tadpoles’ total length were taken with a precision dial caliper of 0.1 mm. The remaining measures were obtained with the help of a stereoscopic microscope and a micrometric ocular lens. The number of measured individuals (N) is provided within the dimensions of the tadpoles, followed by the average plus or minus the average deviation. The biggest and smallest measures are given in parentheses.

Fig. 3 - *Scinax flavoguttatus*, natural habitat at Teresópolis (RJ). *Scinax flavoguttatus*, biotope à Teresópolis (RJ).

Drawings were made with a stereoscopic microscope Wild M5 using a camera lucida.

The examined material can be found in the following collections: AL - Adolpho Lutz, at Museu Nacional do Rio de Janeiro; El - Eugenio Izecksohn, at Universidade Federal Rural do Rio de Janeiro; MNRJ - Museu Nacional do Rio de Janeiro; ZUFJ - Departamento de Zoologia da Universidade Federal do Rio de Janeiro and MZUSP - Museu de Zoologia da Universidade de São Paulo.

**Specimens examined.** Adults: São José do Barreiro (SP): MNRJ 2090/1, 2.1.30, holotype and paratype. Petrópolis: AL 1360, 1936; SPCS 2458/9, 8.08.84; AL 3692/3695, 5.39. Resende: EI 3260, 6.10.64; MZUSP 10825/6, .09.52. Teresópolis (RJ): MZUSP 53335/53343, 3-6.12.73; ZUFJ 1168, 5.06.80; ZUFJ 1716/9, 11.07.82; ZUFJ 1725 / 1729, .09.82; ZUFJ 1899, .01.83; ZUFJ 1946, .02.83; ZUFJ 1998/2006, 21.05.83; ZUFJ 2314, .83; ZUFJ 3937, 2.09.89; ZUFJ 4176, .02.90; ZUFJ 4272/5; ZUFJ 5000,
nia sp. or trees. During drier seasons, in Teresópolis, we have found some individuals, mainly females, inside tufts of moss hanging from tree trunks during the day, suggesting some association (Figs 4-5).

Breeding sites and time of reproduction. Males use to call in vertical position at approximately 30 cm above water surface, with the head horizontally placed (Fig. 6). They generally stay at rocks or branches in places covered by vegetation. *Scinax flavoguttatus* breeds mostly during cold and rainy nights in the months of April through November. In these occasions, many individuals can be found calling together, and in the following day many clutches are found on the place.

Clutches. When clutches are placed in a part of the stream where the current is not too strong, they open in one layer at the water surface, sticking to some root or branch. But due to its viscosity and to the movement of the water, the eggs sometimes partially submerge, becoming the clutch an oval mass with some layers of eggs at about 10 cm below the surface. Its high viscosity avoids eggs total submersion.

The clutches present, in the average, 4.0 cm of diameter, containing about 900 eggs. They are frequently covered by a thin layer of dust brought by the flow. Each egg has approximately a 1.7 mm diameter and it is involved by two gelatinous capsules: the inner capsule with a 2.7 mm diameter and the outer one, 7 mm. One of the hemispheres of the egg is light brown, whereas the other one is white.

Tadpoles development. In the clutches transferred to still water aquarium for laboratory observation, the embryos placed in the inner part of the clutches are not able to break through the thick gelatinous mass, dying soon after.

The remaining tadpoles hatch at stage 20, heading to water surface. When frightened, they dive and return soon afterwards. At stage 24 they measure 8.0 mm on the average and all tadpoles present a yellowish color and golden lunules in front of the eyes. At stage 40 they are in the average 37.0 mm long (which is their biggest size) and show heavily pigmented caudal fins. At this stage the adult color pattern begins to appear. At stage 42 they leave the water, climbing at the nearest branches and trees. At stage 46 they measure an average of 12.0 mm.
**Tadpoles description.** The tadpoles of *Scinax flavoguttatus* present a globe-shaped, slightly depressed body; snout a little truncate in dorsal view; dorsolateral eyes, apart from one another 2.7 times the diameter of their orbits and twice this diameter apart from the snout; round, dorsal nostrils with a relatively minor opening, two times further from the snout than from the eyes; short, sinalinar spiracule tube facing up and backwards, with a relatively narrow opening, placed below the median body line, approximately two times further from the snout than from the vent; short anal tube, attached to the ventral fin right side, with an opening at the same side; tail representing 66% of the total length, with its height corresponding to one and a half times the height of the body; the dorsal fin a little more developed than the ventral fin, emerging from the second third of the body; both fins having an arched contour, reaching their biggest height at approximately half of the total length, ending the tail in a thin and round tip; ventral mouth corresponding to a little more than half the width of the body, presenting a well developed triangular dermic fringe surrounded by two rows of conic papillae and many lateral papillae; dental formula 2 (2/3); black, hard corneous beak with a knurled edge; round jaw with a median downwards projection; mandible “V” shaped (Fig. 7).

**Dimensions of the tadpoles:** (mean given in millimeters of N=8 tadpoles at stage 36, from Teresópolis): Total length: 30.3 ± 0.7 (28.0-34.0); body length: 11.0 ± 0.2 (10.1-12.0); body width: 7.8 ± 0.1 (7.4-8.3); body depth: 6.8 ± 0.1 (6.3-7.4); spiracle-snout distance: 7.9 ± 0.1 (7.7-8.4); interorbital distance: 3.5 ± 0.1 (3.1-4.2); eye diameter: 1.3 ± 0.0 (1.2-1.3); eye-snout distance: 3.0 ± 0.1 (2.8-3.3); internarial distance: 3.1 ± 0.1 (2.8-3.4); nostrils diameter: 0.3 ± 0.0 (0.2-0.4); tail height: 8.1 ± 0.2 (7.1-9.2); mouth width: 3.5 ± 0.3 (1.2-4.0).

**Color of the living tadpoles**

**Dorsal face:** yellowish-light brown body (Fig. 8), covered with few golden spots, concentrated mainly at the region between the eyes and the nostrils, forming two golden lunules touching one another on their tips, with the concave portion headed forward. The lunules are not clearly seen due to the light color of the tadpoles. Pale yellow transparent snout.

**Ventral face:** in ventral view the body is transparent, allowing the intestines, heart and gills to be identified. The lateral region to the branchial chambers shows a certain dark pigmentation.

**Lateral face:** the tail is transparent with yellowish, greenish or reddish reflexes, covered by a dark punctuation forming characteristic spots which become neater as the metamorphosis period approaches. Golden iris with black vermiculation.

**Variation in the color of the tadpoles:** the body may present a brown color. The spots of the tail may become very dense, providing a darker aspect. A pattern of transversal bands is more rarely formed. The golden lunules may not exist.

At night the tadpoles assume a much lighter color, looking more grayish or yellowish and transparent. The lunules lose their brightness, although remaining visible.

**Tadpoles habits.** The tadpoles of *S. flavoguttatus* seem to be more active during the night. They are frequently found among submerged roots (Figs 9 and 10) or old leaves, mainly of *Hedichium* sp. or *Heliconia* sp., as if they were between the leaves of a semi-open book. The leaves are partially under water, linked to the margins by the roots, in places of small flow (Figs 11 and 12). The tadpoles stick to the vegetation through the suckers formed by their lips, leaning only the body and the margin of the ventral fin over the leaves or submerged roots, forming an angle of approximately 45° with the horizontal plane.

In few occasions we found tadpoles of *S. flavoguttatus* in a different situation but never in places of totally still water. Even in aquariums they exhibit the same behavior described above, once the necessary conditions are provided.
Discussion

Our observations regarding the tadpoles of *S. flavoguttatus* are not in accordance with the description by Lutz and Lutz (1939) in the following aspects: the snout of *S. flavoguttatus* is not so truncate as the one described by the authors; the sucker formed by their lips is not so well developed, the mouth does not have so many papillae rows around it and the second labial teeth row is not complete; *S. flavoguttatus* does not possess a light transversal band in the middle of the body and does not have the habit of sticking to the finger when collected.

We believe those authors have made a composed description, once the information about the shape, habits and origin correspond to the tadpoles of *S. ariadne*, described by Bokermann in 1967. However, in what concerns color, the data may be in accordance with the tadpoles of *S. flavoguttatus*, which are also found in the region. The light band mentioned in the dorsal part of the body may refer to the golden lunules.

The information on Heyer et al. (1990) about the tadpoles of *S. flavoguttatus* in Boracéia are not in accordance with ours, once they are described as having lower fins, presenting smaller number of oral papillae, with a large interruption of papillae in the anterior region of the mouth, not possessing lunules and being found even in puddles in the pastures, outside the forest. That description may refer to the tadpoles of *S. brient*, which the authors affirm they did not find at the place.

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Literature cited


Ouvrage reçu


Les chapitres suivants reprennent la classification évoquée plus haut, des phanères urticants aux mors. Les Arthropodes y sont particulièrement bien représentés (108 pp.), certaines catégories (Scorpions, Araignées) étant venimeuses à 100% ou presque, suivis par les Serpents, les Poissons et les rares Mammifères, Monotrèmes et Insectivores auct. (69 pp.). La dernière partie de l'ouvrage envisage plus brièvement les animaux venimeux passifs (26 pp.).

Les groupes sont traités à des niveaux assez divers pour le texte et l'illustration, mais ce sont les aléas de tous les ouvrages collectifs qui présentent, d'autre part, les plus grandes garanties. Il semble bien que les auteurs n'aient pas suivi « à la lettre » les recommandations de l'éditeur, ni celles des réunions préparatoires entre intervenants. Les Scorpions et les Poissons par exemple (13 et 7 pages respectivement, sans figures) auraient mérité mieux. Un certain nombre de groupes (Spingonaires, Bryozoaires, Ascidies, Pseudoscorpions etc.) ont du être sacrifiés.

Un glossaire abondant et un index (19 pp.) terminent le volume.

La conclusion de l'introduction me semble résumer au mieux la teneur exceptionnellement riche des exposés qui suivent : « L'objet de cet ouvrage est double : tout d'abord attirer l'attention sur les effets pathologiques des venins et le développement récent des recherches les concernant, ensuite permettre une rencontre avec la biodiversité exprimée dans ce domaine. La diversité des solutions requises à toutes les échelles de l'organisme est remarquable, tant dans la réalisation des appareils producteurs et vulnérants que dans le comportement des animaux, la composition et le mode d'action des venins ». 

Bruno CONDÉ