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NOTES ON THE GENUS *PLECTROHYLA*, WITH  
DESCRIPTIONS OF NEW SPECIES

BY NORMAN HARTWEG

THE generic and specific descriptions of *Plectrohyla guatemalensis*, a batrachian from Patzizia,<sup>1</sup> Guatemala, were formulated by Brocchi (1877: 92). In the course of his study he discovered another new species which he believed to be closely related to *guatemalensis*. Deciding that the original description of *Plectrohyla* was not satisfactory for the inclusion of both species (*guatemalensis* and the new one), he described a new genus, *Cauphias*, and synonymized *Plectrohyla* with it (1877: 129). In the same article (p. 130) he also described his new species, *crassus*. The species *guatemalensis* is the haplotype of *Plectrohyla* (Brocchi, 1877: 92); Barbour (1927: 96) designated *Plectrohyla guatemalensis* as the genotype of *Cauphias*. Although it cannot be definitely shown that the actual publication date of the description of *Plectrohyla* preceded that of *Cauphias*, it seems best to assume so; I therefore regard the names *Cauphias* and *Plectrohyla* as synonymous and select *Plectrohyla* as the proper name to be used. Should future researches show that *crassus* (*crassum*) is generically distinct, the name *Cauphias* may not be resurrected, since it is a synonym of *Plectrohyla*.

<sup>1</sup> Spelled "Pacicilla" by Brocchi.

In the summer of 1937, I made a collection of amphibians and reptiles on the Pacific slope of the state of Chiapas, Mexico. On Mount Ovando, in the cloud forest above 1700 meters, a series of twenty frogs, all bearing a fleshy accessory containing a spiny rudiment of prepollex, was secured. In this series are represented two species apparently new to science, and in memory of the few witchcraft-practicing Indians who inhabit that eerie mountain, the first species may be called:

*Plectrohyla sagorum*, new species

HOLOTYPE.—U.M.M.Z.<sup>2</sup> No. 88862; male, collected by Norman Hartweg at an elevation of 1800 meters in the cloud forest on Mount Ovando, District of Soconusco, Chiapas, August 30, 1937.

PARATYPES.—U.M.M.Z. Nos. 87868, 87871-74, S-836 (14). All collected on Mount Ovando in the cloud forest at an altitude of between 1775 and 1800 meters.

DIAGNOSIS.—A medium-sized hyloid with a maximum body length (snout to distal end of coccyx) of 41.0 mm.; males with a vocal sac; tympanum usually obscure in males; fingers with a rudiment of web, toes nearly completely webbed; vomerine teeth in small rounded clusters on a level with or slightly behind the choanae; 36 to 45 teeth on the premaxilla and maxilla; no quadratojugal; terminal phalanges claw-shaped; a fleshy protuberance arising from base of thumb, bearing within a simple clawlike rudiment of prepollex.

DESCRIPTION OF HOLOTYPE.—Teeth large, 36 on maxilla and premaxilla; vomerine teeth in two rounded clusters between the choanae; mucous membrane of roof of mouth not plicate behind vomerine teeth; tongue large, subcircular, slightly emarginate posteriorly; vocal sac openings present; a vocal sac.

Head short and thick; canthus prominent; snout obtusely pointed; upper jaw semicircular in outline; loreal region very slightly concave; a heavy fold from posterior border of eye

<sup>2</sup> U.M.M.Z. indicates the University of Michigan Museum of Zoology; M.C.Z., the Museum of Comparative Zoology.

extends backward, curving downward to the region above the arm; tympanum indistinct. Skin of upper eyelids tubercular; a few scattered, smaller tubercles between eyelids; dorsal and lateral surfaces of body smooth; granular beneath, except chest and throat, which are smooth; a fold across chest; upper surface of arm with a few scattered tubercles, lower surface with a single row of tubercles from elbow to palm; legs smooth except for posterior and ventral surfaces of thigh, which are granular; a supra-anal and paired, thickened, postanal flaps.

Arms thick; fingers slightly but distinctly webbed; terminal disks large; a fleshy accessory from which protrudes the spiny tip of the vestigial prepollex (Pl. I, Fig. 2); nodular, horny tubercles on the thumb and on the inner side of the second finger; subarticular tubercle of fourth finger bifid; an elongate tubercle beneath the fleshy accessory on the hand; palmar tubercle large, more or less tripartite.

Legs not conspicuously thickened; toes nearly fully webbed (Pl. I, Fig. 1); a conspicuous ovoid inner metatarsal tubercle, outer indistinct; supernumerary tubercles on sole; a tarsal fold extends from inner metatarsal tubercle to heel.

Dorsal surface of body and head a brownish gray, mottled with black; sides somewhat lighter; a black streak follows fold from eye to arm insertion, breaking up into a row of spots along side; entire undersurface grayish white with no markings; upper surface of arms and legs brownish gray mottled with black; a black stripe passes across posterior surface of the thighs from knee through anal flap; undersurfaces of legs and arms gray. Body length, 36.8 mm.

VARIATION.—The male paratypes (twelve) show no marked deviations from the characteristics of the holotype. The number of teeth on the maxilla and premaxilla varies from 36 to 45. The vomerine teeth may be entirely within the level of the choanae, or project slightly behind them. The tympanum, always covered with thickened skin, is fairly distinct in some, invisible in others. The lower surface of the arm from elbow to palm may have a row of tubercles more or less prominent, or the row may be represented by a low ridge of skin. The

arm is thick in all. A fleshy prominence bearing within a protrusible bony rudiment of prepollex is consistently present. The outer metatarsal tubercle may be occasionally lacking. The color patterns are essentially similar, with varying intensities of color tone. Body length, 34.5 to 41.0 mm.

The female paratype (U.M.M.Z. No. 87874B) has 42 teeth on the maxilla and premaxilla. Tympanum distinct, membranous. Upper eyelids tuberculate; belly granular, chest and throat smooth; a fold across chest. Arm not thick; the row of tubercles under forearm more conspicuous than in males. The fleshy protuberance contains a nonprotrusible cartilaginous rudiment of prepollex. Postanal flaps very well developed. Snout slightly more obtuse than in males. Color pattern on dorsum similar to that of males, although the ground color is darker. Throat, median region of chest, anterior part of belly, and lower sides mottled with brownish black. Body length, 41.0 mm.

The smallest specimen, U.M.M.Z. No. 87868, sexually immature, has 43 teeth on the maxilla and premaxilla. Outline of tympanum faintly indicated; belly granular, chest and throat smooth; a prominent fold across chest; tubercular row under forearm faint. The fleshy protuberance along side of thumb well developed. Snout obtusely pointed. A prominent fold from eye to arm insertion. Uniform dark brown above, grayish white with dark mottling on sides; a black streak follows the fold from eye to arm insertion; ventral color grayish white with faint brown mottling on chin. Body length, 20.5 mm.

The following notes were made on the skeleton, U.M.M.Z. No. S-836 (♂). Body length to distal end of coccyx, 37.0 mm.; head length, 11.8 mm.; coccyx length, 11.4 mm.; head width across quadrates 13.2 mm.; distance across sacral diapophyses, 6.9 mm.; a frontoparietal fontanelle; no quadratojugal; teeth large, 44 on premaxilla and maxilla of left side; pectoral girdle fully arciferal; sacral diapophyses moderately expanded; an intercalary cartilage between ultimate and penultimate phalanges; terminal phalanges simple, pointed dis-

tally; a well-developed but simple rudiment of prepollex (Pl. I, Fig. 3).

REMARKS.—To judge from the description of the type of *Plectrohyla guatemalensis* and from a specimen in the Museum of Comparative Zoology, *P. sagorum* differs notably from *P. guatemalensis* in the following respects: it is smaller; the skin is smoother; the snout is pointed; and, above all, the vestigial prepollex is simple, not bifid. The redescription of *guatemalensis* (Brocchi, 1882: 63), but not the figure (*ibid.*: Pl. XII, Fig. 3), indicates the bifurcate prepollex. The specimen (M.C.Z. No. 11150) from Panajachel, Guatemala, near the type locality, Patzizia, fits the description of *Plectrohyla guatemalensis* very well (Barbour, 1927: 96–98); the peculiar bifurcate prepollex is shown in Plate I, Figure 4. A comparison of some of the characters of *guatemalensis* and *sagorum* is given in Table I.

The second species of *Plectrohyla* was found in the same general habitat as was *P. sagorum*. In honor of my host in Chiapas, Sr. Eizi Matuda, friend of science, who so carefully and thoughtfully arranged the details of the summer's expedition, this species may be known as

*Plectrohyla matudai*, new species

HOLOTYPE.—U.M.M.Z. No. 88863; male, collected by Norman Hartweg at an elevation of 1800 meters in the cloud forest on Mount Ovando, District of Soconusco, Chiapas, August 28, 1937.

PARATYPES.—U.M.M.Z. Nos. 87869–70, 87875, 88864. All from the same locality at approximately 1800 meters.

DIAGNOSIS.—A medium-sized hylid which differs from *P. sagorum* chiefly in the following respects: no external vocal sac in males; snout rounded or truncate; skin more tuberculate dorsally; throat and chest tubercular; 54 to 61 teeth on premaxilla and maxilla.

DESCRIPTION OF HOLOTYPE.—Teeth small, 57 on premaxilla and maxilla; vomerine teeth in two rounded clusters between

choanae; mucous membrane of roof of mouth not plicate behind vomerine teeth; tongue large, subcircular, slightly emarginate posteriorly; no external vocal sac.

Head short and thick; canthus sharp, snout truncate; upper jaw semicircular in outline; loreal region very slightly concave; a fold from border of eye extends posteriorly curving downward to region above the arm; no external indication of a tympanum. Skin strongly tubercular on head, sides of body, and upper surface of arms; back and upper surface of legs with scattered tubercles; undersurface of arms and tibia and anterior surface of femur smooth; throat, chest, belly, ventral and posterior surface of femur strongly tuberculate; a tubercular fold extends from axilla across two-fifths of chest; lower surface of arm with a single row of prominent tubercles from elbow to base of fourth finger; a supra-anal and paired, thickened, tuberclelike postanal flaps.

Arms not thick; fingers slightly webbed; terminal disks large; a fleshy process on hand, from which protrudes the spiny tip of the vestigial prepollex; no horny nodules on thumb nor second finger; subarticular tubercle of fourth finger bifid; an elongate tubercle beneath the fleshy accessory; palmar tubercle large, tripartite.

Legs not thick; toes nearly fully webbed; a conspicuous ovoid inner metatarsal tubercle, outer minute; supernumerary tubercles on sole; a tarsal fold.

Head and dorsal surface of body dark grayish brown; sides lighter, mottled with black posteriorly; entire undersurface gray, darker on throat; upper surface of arms dark brown, that of legs lighter with obscure markings; tubercles of undersurface of arm yellowish. Body length, 40.5 mm.

VARIATION.—One of the male paratypes (U.M.M.Z. No. 88864) scarcely differs from the type in general characteristics. The skin is rather more tuberculate. Number of teeth on premaxilla and maxilla, 58. Body length, 35.3 mm. The skin of the other male (U.M.M.Z. No. 87875) is less tuberculate. There are 54 teeth on maxilla and premaxilla. Body length, 35.5 mm. Obscure markings are present on the dark brown dorsum.

The female paratypes (U.M.M.Z. Nos. 87869-70) have a decidedly truncate snout and prominent raised nostrils. The anal and postanal flaps are very well developed. A tubercle is present on either side of the anal flap. There are scattered tubercles on the body, most concentrated on the upper eyelids, arms, and upper surface of the tibia. There is a row of prominent tubercles under the arm from elbow to palm. The surface of the throat, chest, and belly, and the ventral and posterior surface of the thighs are strongly granular. The tympanum is well marked, about one-half the diameter of the eye. Larger female, blackish brown above; a black streak from eye along side of belly; sides lighter with black reticulations; anal and postanal flaps cream; undersurface grayish white with faint brownish markings along edge of lower jaw; number of teeth on premaxilla and maxilla, 61; body length, 44.6 mm. Smaller female with similar characteristics, except that dorsum is somewhat lighter and shows black mottling; throat and chest speckled with brown; number of teeth on premaxilla and maxilla, 54; body length, 36.0 mm.

REMARKS.—*Plectrohyla matudai* differs from *P. sagorum* in the absence of vocal sacs in the males, more tuberculate skin, greater number of premaxillary and maxillary teeth. Both *P. sagorum* and *P. matudai* have a simple rudiment of prepollex; in *P. guatemalensis* the rudiment is bifurcate. The pectoral girdle is arciferous; the quadratojugal is lacking; intercalary cartilages and claw-shaped terminal phalanges are present in *sagorum*, in *matudai*, and in the single specimen of *guatemalensis* (M.C.Z. No. 11150) examined (Table I).

FAMILY ALLOCATION.—Brocchi (1882: 62) remarked: "Vertèbres sacrées fortes, mais non dilatées en palettes triangulaires." On the basis of this character he placed the genus *Cauphias* (*Plectrohyla*) in the family Hyloidae (Leptodactylidae). This is at best a relative character and may represent a stage of development within the genus. The sacral diapophyses of the specimen of *P. guatemalensis* from Panajachel, as well as the skeletal paratype of *P. sagorum*, are definitely triangulate.

TABLE I  
COMPARISON OF *Plectrohyla guatemalensis*, *P. matudai*, AND *P. sagorum*

Species	Body Length, in mm.	Premaxillary and Maxillary Teeth	Dorsum	Throat and Chest	Tympanum	Vocal Sac	Snout	Terminal Phalanges	Intercalary Cartilages	Preopercular Girdle	Quadratojugal
<i>P. guatemalensis</i> (type), ♂ (?) .....	59.0* 54.5†	?	Tubercular	?	Hidden	?	Rounded	“Tronquée” ‡	?	?	?
<i>P. guatemalensis</i> , M.C.Z. No. 11150 ♂ .....	49.5	35	Tubercular	Granular	Hidden	Absent	Rounded	Claw-shaped	Present	Bifurcate	Absent
<i>P. matudai</i> ♂ ♂	35.3–40.5	54–58	Tubercular	Granular	Hidden	Absent	Rounded	Claw-shaped	Present	Single	Absent
<i>P. sagorum</i> ♂ ♂ .....	34.6–41.0	36–45	Nearly smooth	Smooth	Generally indistinct	Present	Obtusely pointed	Claw-shaped	Present	Single	Absent

\* Brocchi, 1877: 92.

† Kellogg, 1932: 119.

‡ Brocchi, 1882: 63.



Brocchi does not mention intercalary disks between the ultimate and penultimate phalanges, but there is little reason to doubt their presence. They are present in *P. sagorum*, in *P. matudai*, and in the specimen of *P. guatemalensis* above mentioned. The description of the terminal phalanges possessed by the type of *P. guatemalensis* is somewhat confusing. Brocchi, referring to *guatemalensis*, stated (1877: 130) in his description of *crassus*, "Dernières phalanges obtuses comme d'ailleurs celles de l'espèce précédente." Later (1882: 63), redescribing *guatemalensis*, he wrote, "Les disques terminaux sont bien développés; la phalange qui les supporte est tronquée à son extrémité supérieure." He was acquainted with the T-shaped or cross-shaped terminal phalanges both from the writings of Cope and from his own researches. In the same paper (1877: 123) in which he described the terminal phalanges of *P. crassus*, he mentioned the very pointed, clawlike type, the rounded type, and "chez d'autres encore elle se termine par une espèce de croix osseus." Certainly, then, he would have described the terminal phalanges of *P. guatemalensis* as T-shaped or cross-shaped had he found them to be so.

The species *Plectrohyla guatemalensis*, both by inference in regard to the type and by examination of an undoubted example, possesses hylalike terminal phalanges. Since this character, as well as the intercalary disks, is found also in *P. sagorum* and in *P. matudai*, the genus *Plectrohyla* properly belongs in the family Hylidae.

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PLATE I

- FIG. 1. Hind foot of *Plectrohyla sagorum*, showing extent of webbing.  
Type, U.M.M.Z. No. 88862.
- FIG. 2. Arm of type, showing extent of webbing, horny digital nodules,  
and fleshy accessory with protruding tip of vestigial pre-  
pollex.
- FIG. 3. Vestigial prepollex of *P. sagorum*, U.M.M.Z. No. S-863.
- FIG. 4. Vestigial prepollex of *P. guatemalensis*, M.C.Z. No. 11150.



