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THREE NEW FROGS OF THE GENUS *Hyla*
FROM THE SIERRA MADRE DEL SUR OF MÉXICO

BY KRAIG ADLER

DURING the summer of 1964 I visited the highlands of southern and eastern México as a member of a small field party sponsored by the University of Michigan Museum of Zoology. In the moist oak-pine forests of the Sierra Madre del Sur in Guerrero and Oaxaca I collected three apparently new species of *Hyla* which are described below.

The first of these is evidently a member of the *Hyla bistincta* group. The name *Χρυσης* refers to Chryses, one of the priests of Apollo.

Hyla chryses, new species
(Figure 1; Plate I, A)

HOLOTYPE.—UMMZ 125374, between "Puerto Chico" and "Asoleadero" [about 45 km airline WNW of Chilpancingo], Guerrero, 2540–2600 m; 13–14 June 1964; Kraig Adler, collector; field no. GH 9274.

PARATYPES.—UMMZ 125372, 125373, 125375, three specimens, same data as the holotype.

RANGE.—Known only from the type locality.

DIAGNOSIS.—A slender, medium-sized member of the *Hyla bistincta* group (♂♂ to 38 mm snout-vent length; ♀, 43.2 mm) possessing long fingers with little webbing, and a prominent non-projecting prepollex; no quadratojugal; a large tympanum (its greatest diameter contained 0.53–0.61 times in length of eye); an axillary membrane; probably no nuptial spines on the prepollex of males; a moderately pointed snout; and a golden-yellow to dark greenish-brown dorsum in life.

DESCRIPTION OF HOLOTYPE.—An adult male with a snout-vent length of 38.0 mm. Head broad and moderately flat, 11.5 mm long, 12.3 mm wide; nostrils slightly protuberant, oval horizontally; internarial distance 3.0 mm; canthus distinct, slightly concave; loreal region concave; snout from above long, moderately pointed, with a trace of rostral keel; snout in profile rounded; eye length, 3.8 mm; eyelid width, 3.6 mm;

interorbital distance, 3.4 mm; tympanum large, distinct, slightly higher than wide, 2.3 mm in greatest diameter; strong supratympanic fold extending from posterior border of eye to above arm insertion and barely covering upper edge of tympanum. Hand length, 12.3 mm; fingers long, $1 < 4 < 2 < 3$, with trace of webbing between all; discs large, that of third finger twice the narrowest width of finger and equal to size of tympanum; prepollex moderately enlarged, non-projecting, without spines or horny nuptial excrescence; subarticular tubercles round, none bifid; indistinct supernumerary pustules on proximal segments of fingers; transverse dermal fold on palms; indistinct pustules on under-surface of arm; fold on wrist. Foot length, 19.0 mm; toes long, $1 < 2 < 5 < 3 < 4$, about one-half webbed, the fourth toe and inner side of third toe webbed to base of antepenultimate phalanx, fifth toe to middle of penultimate phalanx, others to base of penultimate phalanx; inner metatarsal tubercle distinct, elliptical; no outer metatarsal tubercle; weak tarsal fold; subarticular tubercles round, none bifid; indistinct supernumerary pustules on soles of feet and proximal segments of toes; discs large, that of fourth toe twice the narrowest width of toe and equal to size of tympanum. Length of tibia, 18.7 mm; tibio-tarsal articulation extends to middle of eye; heels overlap 1.5 mm. Anal opening with a large, transverse, supra-anal flap, not grooved medially; a distinct, transverse dermal fold above supra-anal flap; four large, round, indistinct pustules in transverse row across supra-anal flap; numerous indistinct pustules below anus. Skin of dorsum smooth, venter granular. A distinct axillary membrane extends one-fourth length of upper arm. Vomerine tooth patches small, oval transversely, situated between choanae and separated from each other and from nearest choana by the length of a choana; vomerine teeth, 2-1. Choanae oval, 0.8 mm long. No vocal slits. Tongue cordiform, slightly free at posterior edge. No quadratojugal.

Color in life.—When cold and sluggish: dorsum of body, head, and limbs, and sides of body dark greenish chocolate brown mottled with dark gray; some metallic green flecking on back, especially evident on dorsal surface of thigh; small metallic green spots along sides of body; venter mottled with dark brown and gray. When warmer and more active: dorsum of body, head, and limbs, and sides of body metallic golden yellow overlaid with small brown flecks and less numerous, indistinct green flecks; area below eye from nostril to and including tympanum golden; golden pigment below eye with some brown flecking; canthus and supratympanic fold edged with blackish brown; iris chocolate brown overlaid with gold flecking towards center; venter

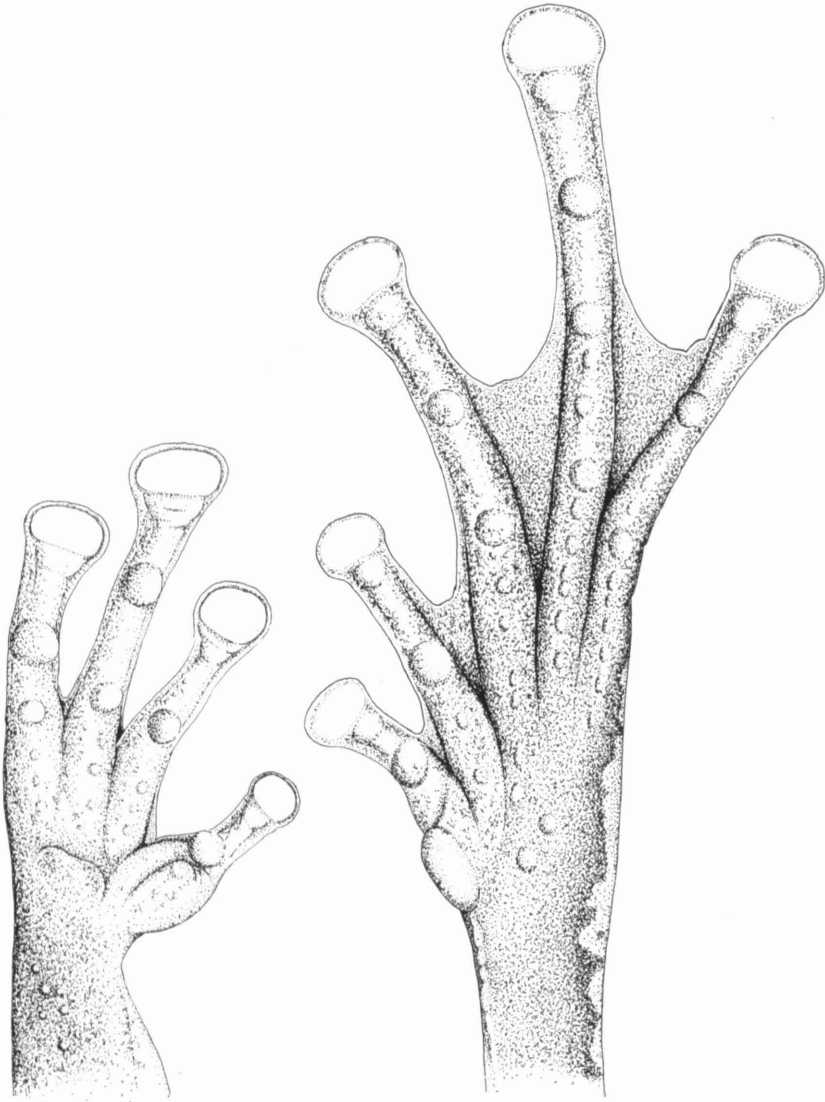


FIG. 1. Hand and foot of *Hyla chryses* (UMMZ 125374, male)

whitish overlaid with brassy flecking and some brown flecks, the brassy pigment most concentrated on throat; undersurfaces of legs with pale yellow wash; pale whitish pustules on supra-anal flap.

Color in alcohol.—Dorsum of body, head, and limbs gray with much black flecking; fingers and toes with less flecking, paler; top of head

and loreal region dark gray; supratympanic fold edged with black; sides of body pale gray mottled with dark brown; tympanum brown; pustules around anus pale gray; posterior surfaces of thighs pale gray with faint brown mottling; venter pigmentless except for brown flecking, especially evident on throat, arms, and legs.

VARIATION.—Development of pustules on the undersurface of the arm varies and is most conspicuous in the female. From 2 to 4 pustules on supra-anal flap; tongue of female more heavily notched and more loosely attached posteriorly than in any male. Variation in other morphological features is given in Table 1; sexual dimorphism is suggested in body length and in number of vomerine teeth. It is conceivable that males of *H. chryses* possess nuptial spines at certain times of the year since these structures undergo seasonal development in some other hylids.

As described above for the holotype, there is considerable metachrosis in this species. The golden-yellow dorsum has a slight greenish cast in some specimens and in one male there is some black flecking on the back. The pale yellow wash on the undersurface of the legs is absent in one male.

HABITAT AND HABITS.—These frogs were taken in cold, moist, oak-pine-fir cloud forest along the logging road between "Puerto Chico," a local landmark, and "Asoleadero," an abandoned logging camp and sawmill, 63 and 65 km, respectively, SW (via the "Casa Verde"-Xochipala-Cerro Teotepec road) of "Casa Verde," at elevations from 2540 to 2600 m. "Casa Verde" is on the Acapulco-México City road, about 33 km N of Chilpancingo. The forest is dominated by large oaks which are covered with bromeliads and other epiphytes; ground cover is dense. Musser (1964: 2, 13) gives a more detailed description of the habitat; it is to be noted, however, that "Puerto Chico" is at the lower limit of the cloud forest.

Light rain fell almost continuously during a three-day stay at this locality; temperatures at night were near freezing. The frogs were found during the day, most often beneath the loose bark of fallen oak and pine logs in the forest; one male was found in the center of a fairly dry pine log from which several *Sceloporus* sp. were taken. *Eleutherodactylus saltator*, *Hyla bistincta*, and *Thorius* sp. were also taken beneath pine bark in the same forest. The frogs were sluggish and dark-colored when first caught, but became golden yellow when handled. The nearest stream was 50 to 100 meters away.

The stomachs of a male and female *H. chryses* contained remains of these insects: Coleoptera (Elateridae?), Diptera (Mycetophilidae, Tipu-

lidae), Hemiptera (Miridae), and Orthoptera (Gryllacrididae: *Anabropsis* sp.). A female *H. bistincta* contained Coleoptera (Alleculidae?, Tenebrionidae) and Thysanura. A few small white nematodes, 2–3 mm long, were found in the mouths of several of the *H. chryses*.

REMARKS.—A combination of long fingers with little webbing, a prominent non-projecting prepollex, and the absence of a quadratojugal place *H. chryses* as a member of the *Hyla bistincta* group (Duellman, 1964). Within this group, *H. chryses* appears to be most closely related to *H. charadricola* of the high oak-pine forests of eastern Hidalgo and northern Puebla. Each of these two species possesses an axillary membrane, which separates them from the other members of the group, including *H. bistincta*, the only other member of the genus found sympatrically with *H. chryses*. Breeding males of *H. chryses* and *H. charadricola* probably have no nuptial spines on the prepollex. *H. chryses* differs from *H. charadricola*, however, in having a pointed snout, a larger tympanum, and a golden-yellow dorsum in life. A discussion of these and other members of the *H. bistincta* group is presented below.

A second new form, also a member of the *Hyla bistincta* group, is, when viewed from above, encircled by a broad chocolate-brown to black band, interrupted only between the nostrils. The Greek πένθητηρ, a mourner, is given in allusion to this black border, a symbol of mourning.

***Hyla pentheter*, new species**
(Figure 2; Plate I, D–E)

HOLOTYPE.—UMMZ 125381, about 37 km N of San Gabriel Mixtepec [about 100 km airline SSW of Oaxaca de Juárez], Oaxaca, 1700 m; 23 June 1964; Kraig Adler, collector; field no. GH 9332.

PARATYPES.—UMMZ 125377–125380, four specimens, same data as the holotype.

RANGE.—Known only from the type locality.

DIAGNOSIS.—A large, robust member of the *Hyla bistincta* group (♂♂ to 46 mm snout-vent length; ♀, 57.8 mm) possessing long fingers with little webbing, a prominent non-projecting prepollex, a small spine-shaped quadratojugal that fails to meet maxilla, and a large tympanum (its greatest diameter contained 0.56–0.64 times in length of eye); no axillary membrane; nuptial spines present on prepollex and inner edge of second finger in males; snout blunt; a yellow-brown to light tan dorsum with a broad chocolate-brown band on side of face from edge of upper lip through nostril and eye, along supratympanic fold and sides

of body; and chocolate-brown bands along inner and outer edges of limbs.

DESCRIPTION OF HOLOTYPE.—An adult male with a snout-vent length of 46.0 mm. Head broad and deep, 15.2 mm long, 17.8 mm wide; nostrils slightly protuberant, oval horizontally, internarial distance 4.0 mm; canthus rounded, slightly concave; loreal region slightly concave; snout from above short, bluntly rounded, with no rostral keel; snout in profile rounded; eye length, 5.4 mm; eyelid width, 4.6 mm; interorbital distance, 4.2 mm; tympanum large, distinct, slightly higher than wide, 3.0 mm in greatest diameter; strong supratympanic fold extends from posterior border of eye to above arm insertion and barely covers upper edge of tympanum. Hand length, 15.3 mm; fingers long, $1 < 4 < 2 < 3$, a trace of webbing between all fingers; discs large, that of third finger $2\frac{1}{4}$ times the narrowest width of finger and equal to size of tympanum; prepollex moderately enlarged, non-projecting, covered with small, horny, nuptial spines along inner edge of first finger to disc and on inner edge of penultimate phalanx of second finger; subarticular tubercles round, none bifid; indistinct supernumerary pustules on palms and proximal segments of fingers; longitudinal row of 5 or 6 pustules along ventrolateral edge of lower arm; fold on wrist. Foot length, 21.4 mm; toes moderately long, $1 < 2 < 5 < 3 < 4$, about one-half webbed, the fourth toe webbed to middle of antepenultimate phalanx, the inner side of third to base of antepenultimate phalanx, the inner side of second to base of penultimate phalanx, and the rest to the middle of the penultimate phalanx; inner metatarsal tubercle distinct, elliptical; no outer metatarsal tubercle; tarsal fold distinct; subarticular tubercles round, none bifid; indistinct supernumerary tubercles on soles of feet and proximal segments of toes; discs large, that of fourth toe $1\frac{1}{2}$ times the narrowest width of toe and $\frac{3}{4}$ the size of tympanum. Length of tibia, 23.3 mm; tibiotarsal articulation extends to middle of eye; heels overlap 2.0 mm. Anal sheath long, grooved medially, with an indistinct transverse dermal fold above. Skin of dorsum and undersurfaces of limbs smooth; throat, chest, belly, and ventromedial surface of thighs granular. No axillary membrane. Vomerine tooth patches about the size of a choana, oval transversely, situated between choanae, closer to one another than to nearest choana; vomerine teeth, 5–2. Choanae oval, 1.2 mm long. No vocal slits. Tongue cordiform, one-fourth free posteriorly. Quadratojugal a small spine-shaped bone projecting anteriorly from the quadrate, failing to contact maxilla.

Color in life.—Dorsum of head, body, limbs, hands, and feet light yellow brown with slight greenish cast; broad, dark, chocolate-brown

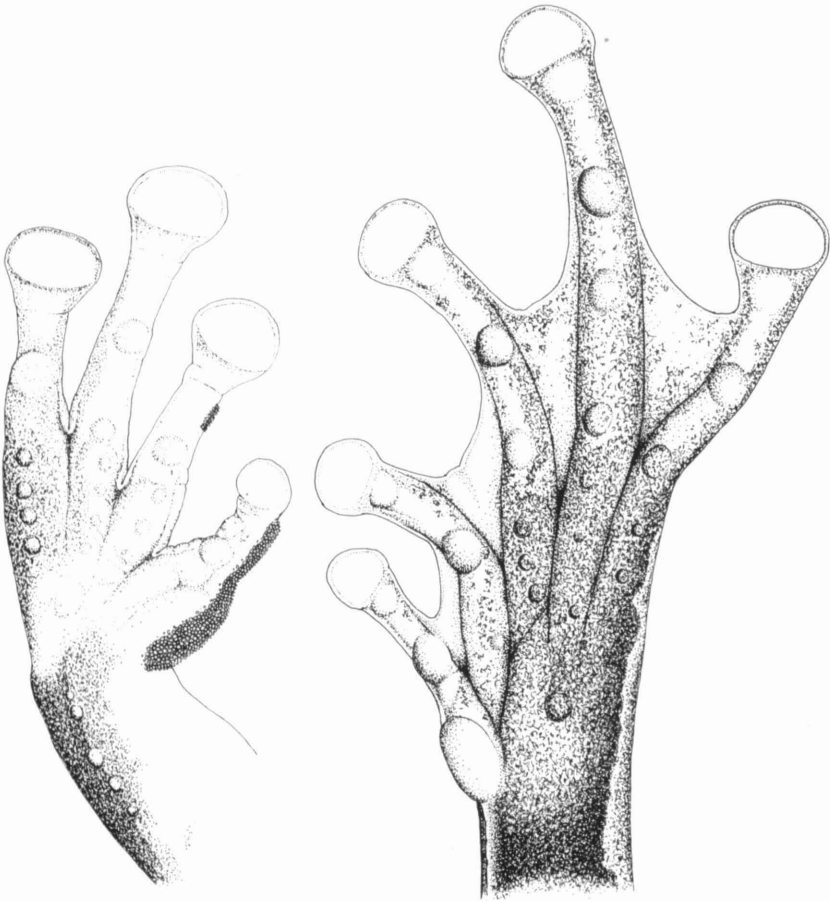


FIG. 2. Hand and foot of *Hyla pentheter* (UMMZ 125381, male)

(almost black) band from edge of upper lip below nostril to nostril, from there to eye, along supratympanic fold and side of body, bordered above by a thin light yellow-tan line; brown band on side becomes lobate on both edges for its entire length, with a few small disconnected spots nearby; a similar band along inner and outer edges of limbs; a thin line of chocolate-brown pigment along edge of entire upper lip, broadened below anterior edge of eye; a similar but paler line along edge of lower lip; tympanum brown; wrist fold edged in chocolate brown; iris reddish brown, overlaid with some brassy reticulations; venter of head, body, and limbs pale yellow; pustules on ventrolateral

edge of lower arm pale yellow; pustules around anal sheath cream-white; nuptial spines brown.

Color in alcohol.—Dorsum dark brownish gray; band from lip through nostril and eye, above tympanum and along side black anteriorly, becoming blackish brown posteriorly, bordered above by a thin cream-white line; band of pigment along edge of upper lip and on edges of limbs blackish brown; venter white with pale yellow wash on throat and chest; pustules around anal sheath cream-white; nuptial spines brown.

VARIATION.—The female has slightly more webbing between fingers 2, 3, and 4 than the males. The nuptial spines on the second finger are absent in one male and in another extend to include the inner edge of the antepenultimate phalanx. In two males the penultimate subarticular tubercle of the fourth finger is wider than long and grooved medially. The pustules along the ventrolateral margin of the lower arm are much reduced in one male. In some specimens there is a small chocolate-brown blotch below the eye which may connect with the thin line of brown pigment along the edge of the upper lip. Variation in some other morphological features is listed in Table 1; sexual dimorphism in body length and in number of vomerine teeth is suggested.

Metachrosis is moderate. When the dorsum is a light grayish tan (Pl. I, E) the brown band along the side of the body is bordered above by a thin whitish-tan line.

HABITAT AND HABITS.—These frogs were taken in a small remnant of cool, moist, oak-pine forest about 37 km N of San Gabriel Mixtepec (via the Oaxaca de Juárez-Puerto Escondido road), Oaxaca, at an elevation of 1700 m. Two small, cascading, rocky streams cross the road at this point, flowing southwest. Most of the surrounding countryside has been cleared and is under cultivation, except for the steep, wooded slopes along these streams. The forest is a mixture of tropical deciduous and oak-pine elements and is in large part virgin. Deciduous trees predominate; some large pines are scattered throughout. Some epiphytes and bromeliads are present. Ground shrubbery is dense, especially at the base and on the top of the extensive rock outcrops that line the streams.

The specimens were taken during the afternoon and evening of June 23. It rained lightly that evening from 7:30 to 9:00, the only night during a three-day stay that it rained at all; it also rained lightly each afternoon from 3:00 to 4:00. The female was taken late in the afternoon on the forest floor near the base of a cliff, a dozen meters from the nearest stream. The males were found early in the evening as they

perched on vines and twigs or on moss-covered boulders near or over the streams. None were heard calling. The only other frogs found here were *Microbatrachylus* sp. and *Hyla thorectes*.

REMARKS.—Superficially, *H. pentheter* resembles certain members of the genus *Smilisca*, but it has no postorbital process of the fronto-parietal bone or *adductor mandibulae externus superficialis*, which are characteristic of that genus (Starrett, 1960). As in *Smilisca* and a few hylas, the *depressor mandibulae* has two distinct heads, one originating from the posterior edge of the posterior squamosal arm, the other and larger from the dorsal fascia of the shoulder.

H. pentheter appears to belong to the *Hyla bistincta* group (Duellman, 1964) in possessing a prominent non-projecting prepollex and long fingers with little webbing, and in the virtual absence of a quadra-tojugal. It seems more closely related to those members of the group in which there is no axillary membrane but which possess nuptial spines on the first and second fingers of breeding males. In coloration, *H. pentheter* most resembles *H. bistincta*, but may be distinguished from that form by its wider head, larger tympanum, absence of mottling on the rear side of the thigh, and in the absence of vocal slits. These two species possess the most elongate anal sheaths in the group.

The addition of *H. chryses* and *H. pentheter* necessitates no change in the definition of the *Hyla bistincta* group (Duellman, 1964), and two subgroups can now be recognized. The first (*charadricola* and *chryses*) is composed of medium-sized, rather slender, thin-skinned frogs, probably without nuptial spines in breeding males but with a distinct axillary membrane. They are found at intermediate elevations (2000–2600 m) in oak-pine forests of eastern Hidalgo and northern Puebla (*charadricola*), and in central Guerrero (*chryses*). The members of the second subgroup (*bistincta*, *crassa*, *pachyderma*, *pentheter*, and *robertorum*) are medium to large, robust, thick-skinned frogs possessing nuptial spines on the first and second fingers of males but having no axillary membrane. Members of this subgroup are found at intermediate to high elevations (1600–3050 m) from Jalisco to Oaxaca and from there north into eastern Hidalgo. *H. bistincta* has the largest range of any species in either subgroup, both geographically and altitudinally, and is the only one with vocal slits. *H. bistincta* and *H. chryses* have been found sympatrically in Guerrero, and the former probably occurs with *H. crassa* on Cerro San Felipe in Oaxaca; no other members of the group have been taken together.

The last species to be described is a small, broad-headed frog with a

boldly mottled throat and breast, bearing a superficial resemblance to certain members of the genus *Ptychohyla*. The specific name is from the Greek θωρηκτής, a warrior armed with a breastplate.

Hyla thorectes, new species
(Figures 3-4; Plate I, B-C)

HOLOTYPE.—UMMZ 125390, about 37 km N of San Gabriel Mixtepec [about 100 km airline SSW of Oaxaca de Juárez], Oaxaca, 1700 m; 23 June 1964; Kraig Adler, collector; field no. GH 9341.

PARATYPES.—UMMZ 125382-125389, eight specimens, same data as holotype.

RANGE.—Known only from the type locality.

DIAGNOSIS.—A small, broad-headed *Hyla* (♂♂ to 34.2 mm snout-vent length) with throat and chest boldly mottled with large, irregular, anastomosing blotches of dark chocolate brown interspersed with brassy-flecked white; dorsum various shades of mottled brown overlaid with small light green blotches; quadratojugal (rarely absent) a tiny spine-shaped bone failing to meet maxilla; vocal slits present; a prominent prepollex with nuptial spines in males; and a small, distinct tympanum.

DESCRIPTION OF HOLOTYPE.—An adult male with a snout-vent length of 31.3 mm. Head broad and moderately flat, 10.2 mm long, 11.2 mm wide; nostrils slightly protuberant, oval horizontally; internarial distance, 2.5 mm; canthus distinct, concave; loreal region flat; snout from above short, bluntly rounded, with distinct rostral keel; snout in profile rounded; eye length, 3.6 mm; eyelid width, 3.2 mm; interorbital distance, 3.5 mm; tympanum small, round, distinct, 1.6 mm in greatest diameter; strong supratympanic fold extends from posterior border of eye to above arm insertion, barely covers upper edge of tympanum. Hand length, 9.8 mm; fingers moderately long, $1 < 4 < 2 < 3$, about one-third webbed, third finger webbed to base of antepenultimate phalanx, second and fourth to base of penultimate phalanx, with only a trace of webbing between first and second fingers; discs moderately large, that of third finger twice as wide as narrowest width of finger and $1\frac{1}{3}$ times the size of tympanum; prepollex moderately enlarged, non-projecting, covered with small, horny, nuptial spines along inner edge of first finger to disc; subarticular tubercles round, none bifid; indistinct supernumerary pustules on palms and proximal segments of fingers; longitudinal row of 3 or 4 pustules along ventrolateral edge of lower arm; fold on wrist. Foot length, 14.5 mm; toes moderately long, $1 < 2 < 5 < 3 < 4$, about one-half webbed, the fourth toe webbed to base of antepenultimate phalanx, inner side of third to middle of antepen-

ultimate phalanx, inner side of second to base of antepenultimate phalanx, fifth and outer side of third to base of penultimate phalanx, first and outer side of second to middle of penultimate phalanx; inner metatarsal tubercle distinct, elliptical; no outer metatarsal tubercle; tarsal fold moderately distinct, with a row of 5 or 6 small pustules superimposed upon it; subarticular tubercles round, none bifid; indistinct supernumerary tubercles on soles of feet and proximal segments of toes; discs moderately large, that of fourth toe $1\frac{1}{2}$ times as wide as

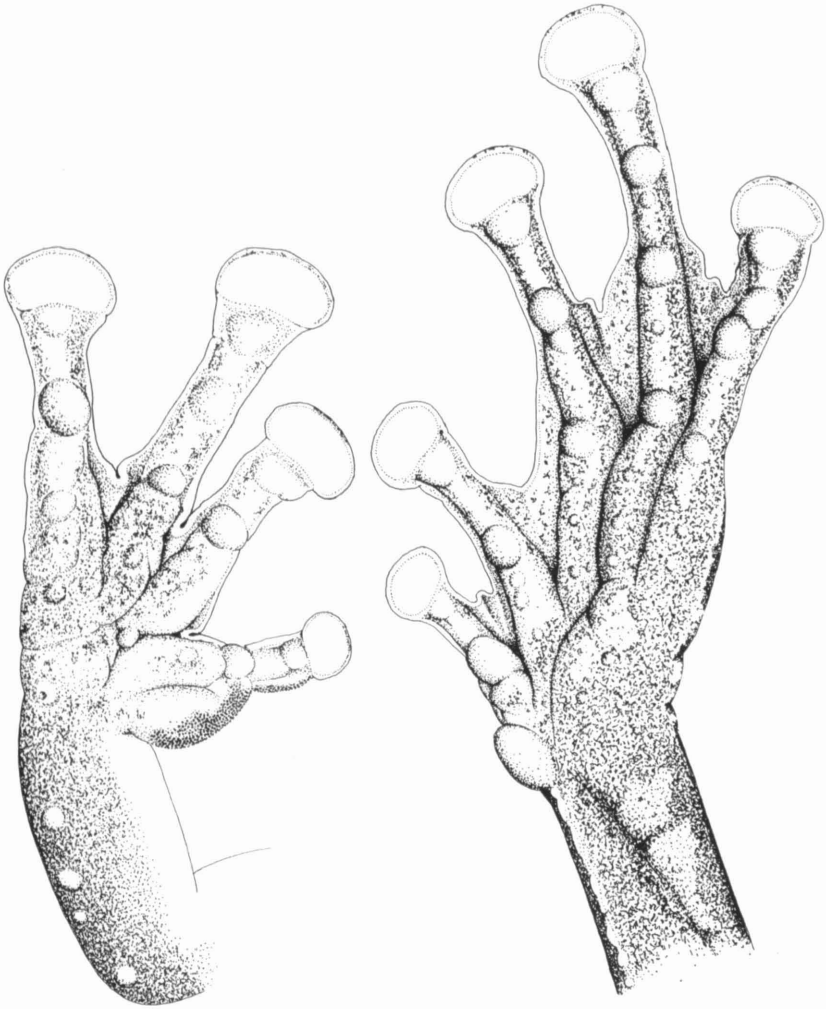


FIG. 3. Hand and foot of *Hyla thorectes* (UMMZ 125390, male)

narrowest width of toe and $1\frac{1}{2}$ times the size of tympanum. Length of tibia, 14.8 mm; tibiotarsal articulation extends to posterior margin of eye; heels overlap 2.0 mm. Anal sheath moderately long, grooved medially; no transverse dermal fold above anus; anal pustules restricted to area along posterior surface of thigh near and below level of anal sheath opening. Skin of dorsum and undersurfaces of arms and lower legs smooth; venter of head, body, and thighs granular. No axillary membrane. Vomerine tooth patches twice the size of a choana, oval, situated between choanae, closer to one another than to nearest choana; vomerine teeth 5-5. Choanae oval, 0.6 mm long. Vocal slits large, extending from the middle of tongue to angle of jaw. Tongue cordiform, one-fourth free posteriorly. Quadratojugal a tiny spine-shaped projection extending anteriorly from the quadrate, not connecting with maxillary.

Color in life.—Dorsum of head, body, and limbs mottled with various shades of light and dark brown, overlaid with small light green blotches; thin line of dark brown pigment from nostril to eye, along supratympanic fold and onto sides of body where it breaks up into blotches interspersed with tannish white and, in the groin, pale yellow; some yellow flecks on anterior side of thigh; throat and chest with large, bold, irregular, anastomosing blotches of dark chocolate brown interspersed with brassy-flecked white; rest of venter, including upper arms and legs, with occasional flecks of brown pigment; pustules below anus cream white; some white flecks on dorsum of thigh near insertion; iris golden brown; tympanum dark brown; nuptial spines dark brown.

Color in alcohol.—Dorsum of head, body, and limbs blackish brown mottled with brown and small blue blotches, the latter being the remnants of the light green blotches; venter of throat and chest with bold blotches of dark brown and white; some brown flecks scattered on rest of venter; sub-anal pustules white; flecks on dorsum of thigh near insertion cream-white; tympanum dark brown; nuptial spines dark brown.

VARIATION.—The pustules along the ventrolateral surface of the lower arm are occasionally reduced, rarely absent. The nuptial spines in one specimen (UMMZ 125389) are lightly colored and cannot be seen without magnification. The penultimate subarticular tubercle of the fourth finger is wider than long and grooved medially in several specimens. The tiny, spine-shaped quadratojugal appears to be absent on both sides in one individual and in another is absent on the right side. Morphological variation in some mensural characters is listed in Table 1.

Configuration of the chocolate-brown blotches on the throat and chest is subject to some variation (Fig. 4). In one specimen (UMMZ 125383) the blotches are much reduced in size and intensity. In some others the belly is virtually free of pigment, but in one (UMMZ 125389) the belly and lower surfaces of the legs are covered with flecks of brown pigment.

There is considerable metachrosis in this species (Pl. I, B-C). The dorsal ground color can change to a light tan, mottled with flecks of dark chocolate brown, and overlaid with the small light green blotches. If preserved in this state, the dorsum becomes grayish tan, speckled with blackish brown and small blue blotches; the brown blotches on the throat and chest are also considerably lighter.

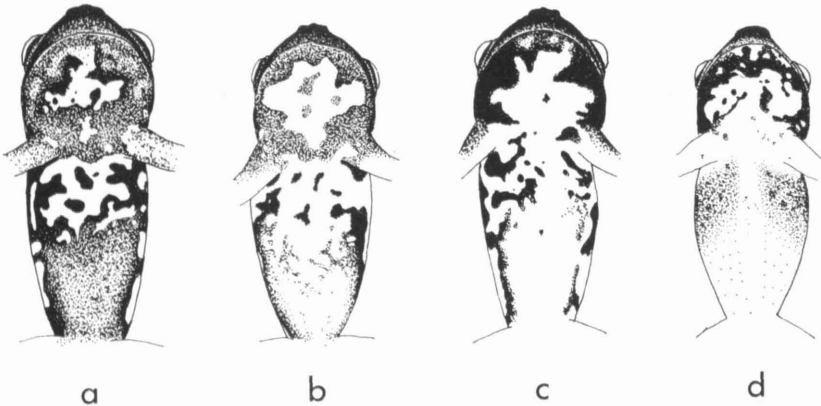


FIG. 4. Variation in ventral coloration of *Hyla thorectes* and an extreme condition in *Ptychohyla schmidtorum chamulae*: a-c, *H. thorectes*, UMMZ 125389, 125390, and 125385, respectively; d, *P. s. chamulae*, UMMZ 123322 (DLH 985). All are males.

HABITAT AND HABITS.—These frogs were taken the evening of June 23, along with the *H. pentheter* discussed above. They were seen and heard calling from about dusk (8:00) until 10:00 P.M.; none were seen or heard at any other time. The call consists of a low-pitched, short, guttural “rreh,” each one lasting somewhat less than a second. These were produced in groups of about six, the interval between calls varying from five to twenty seconds or more, followed by a long pause of several minutes, then another group of calls, and so on. Individuals perched on vines and plant leaves, almost always over the stream.

REMARKS.—This distinctive little frog does not seem to be closely related to any North or Central American *Hyla* and may be distin-

guished from them by its bold ventral pattern. It does resemble certain members of the genus *Ptychohyla* in possessing a broad, flat skull with a large frontoparietal fontanelle, a blunt snout with slightly protuberant nostrils, a well defined canthus, a distinct tympanum, a row of white pustules along the ventrolateral edge of the lower arm, and in habitus, but it does not have the ventrolateral glands characteristic of breeding males in that genus. The quadratojugal of *H. thorectes*, although apparently absent in a few instances, is present as a tiny spine-shaped bone extending anteriorly from the quadrate, similar to but somewhat smaller than that found in most *Ptychohyla*. In some other features, *H. thorectes* is similar to one or more species of *Ptychohyla*, including forms in both species groups (Duellman, 1963). The presence of nuptial spines in males, a well-defined tarsal fold, and possibly the call, would place it with the *P. euthysanota* group. The webbing of the hands is similar to that in the *P. schmidtorum* group. *H. thorectes*, *P. leonhardschultzei*, and *P. spinipollex* each possesses a rostral keel and a similar pattern on the sides of the body. The bold throat pattern is approached as an extreme condition in some specimens of *P. schmidtorum chamulae* (Fig. 4d). Occasional specimens of *P. leonhardschultzei*, *P. ignicolor*, and *P. spinipollex* also possess considerable ventral pigmentation, but it mainly consists of numerous small brown flecks instead of the large interconnected brown blotches present in *H. thorectes* and some *P. s. chamulae*. *H. thorectes* has no white stripe on the upper lip and the side of the body, as is present in *P. leonhardschultzei*, *P. spinipollex* and *P. ignicolor*.

In addition to the absence of ventrolateral glands in males, there are other characteristics by which *H. thorectes* differs from most or all *Ptychohyla*. The heel pustule and the white line above the anus, which occur in most *Ptychohyla*, are absent in *H. thorectes*. The head and digital pads are larger, the tarsal fold stronger, and the hind feet less extensively webbed than in any *Ptychohyla*.

In view of these differences, and despite the similarity to certain *Ptychohyla*, I am considering this new form a *Hyla*. Nothing would be gained at the present time by including *thorectes* in *Ptychohyla*. To do so would not only weaken the concept of that genus, but make it, as presently characterized, undefinable. More significantly, data on certain important aspects of the frog's biology, particularly tadpole morphology, call structure, and osteology, are almost completely lacking, data which could have a decisive bearing upon its classification.

TABLE I
MORPHOLOGICAL VARIATION IN THE TYPE SERIES OF THREE MEXICAN *Hyla*
All measurements are in millimeters; means are in parentheses below ranges

Species	Sex	Number of specimens	Snout-vent length	Tibia Snout-vent length	Foot Snout-vent length	Hand Snout-vent length	Head width Snout-vent length	Head length Snout-vent length	Snout-vent length	Tympanum Eye length	Vomerine teeth (total)
<i>Hyla chryses</i>	♂	3	36.7-38.0 (37.5)	49.2-50.0 (49.6)	50.0-51.6 (50.6)	32.3-33.2 (32.6)	32.4-33.5 (33.1)	29.8-30.5 (30.2)	53.1-60.6 (57.2)		3-5 (4.3)
	♀	1	43.2	51.4	50.0	33.1	34.0	31.0	56.8		7
<i>Hyla pentheter</i>	♂	4	44.2-46.0 (45.3)	50.1-51.0 (50.6)	45.7-46.6 (46.2)	32.2-33.3 (33.0)	37.8-39.2 (38.5)	32.2-33.0 (32.6)	55.5-63.6 (60.0)		7-11 (8.5)
	♀	1	57.8	50.5	46.2	32.4	37.2	33.0	57.5		15
<i>Hyla thorectes</i>	♂	9	31.3-34.2 (32.1)	44.9-48.7 (46.9)	45.8-48.1 (46.6)	30.4-32.5 (31.4)	33.4-35.7 (34.4)	30.9-33.0 (32.1)	40.4-47.7 (43.0)		4-10 (7.2)

METHODS

Distances are by road unless otherwise indicated. Airline distances were determined from the topographic maps issued by the Dirección General de Geografía y Meteorología (Carta General de la República Mexicana, 1958 edition; scale 1:500,000); localities placed in quotes are not indicated on these maps. Altitude was measured with an altimeter; discrepancies may be as much as 25 meters.

The condition of the maxillary arch was determined by radiographs; other osteological and myological characteristics of the head were determined by dissection. Measurements were taken as follows: head length, angle of jaw diagonally to tip of snout; head width, greatest width of head between snout and angle of jaw; heel overlap, distance between heels when legs are flexed and held at right angles to body axis; hand length, proximal end of prepollex to tip of longest finger; foot length, proximal end of inner metatarsal tubercle to tip of longest toe; eye length, distance between anterior and posterior angles of eyelids; tympanum diameter, greatest exposed diameter, to outer edge of *annulus tympanicus*. All of these measurements were taken with vernier calipers except the last two, which were measured with an ocular micrometer.

SPECIMENS EXAMINED

Hyla bistincta Cope. **Mexico:** GUERRERO: Omilteme (UIMNH 38023–25); between “Puerto Chico” and “Asoleadero” (UMMZ 125376). JALISCO: Sierra de Autlán, ca. 24.2 km SE Autlán (UMMZ 102076). MICHOACAN: Cerro San Andrés (west slope), ca. 17.7 km WNW Ciudad Hidalgo (UMMZ 102075); Los Conejos, 6.5 km WSW Uruapan (UMMZ 94238–40); Uruapan (UMMZ 85452–53, 115233 [12], 121515 [4]). MORELOS: 3.3 km N Cuernavaca (UIMNH 28168). OAXACA: Cerro San Felipe (UIMNH 28163). VERACRUZ: Cumbres, nr. Acultzingo (UIMNH 28164–66).

Hyla charadriicola Duellman. **Mexico:** HIDALGO: Lago de Tejocotal, 11.3 km E Acaxochitlán (UMMZ 118165). PUEBLA: 14.5 km W Huachinango (UMMZ 118166[5]); 11.8 km W Huachinango (UMMZ 121567[5]).

Hyla chryses, new species. **Mexico:** GUERRERO: Between “Puerto Chico” and “Asoleadero” (UMMZ 125372–75).

Hyla crassa Brocchi. **Mexico:** OAXACA: Cerro San Felipe (UIMNH 25050).

Hyla pentheter, new species. **Mexico:** OAXACA: ca. 37 km N San Gabriel Mixtepec (UMMZ 125377–81).

Hyla robertsorum Taylor. **Mexico:** HIDALGO: El Chico Parque Nacional (UMMZ 92462, 106401[5]); 16.1 km N Agua Blanca (UMMZ 106432[6]).

Hyla thorectes, new species. **Mexico:** OAXACA: ca. 37 km. N San Gabriel Mixtepec (UMMZ 125382–90).

Ptychohyla e. euthysanota Kellogg. **Mexico:** CHIAPAS: Cascarada, 30 km W Ciltepec (UMMZ 87851–52); Chicomuselo (UMMZ 94139–40); Dist. Soconusco, Cerro Ovando (UMMZ 87853–54).

Ptychohyla ignicolor Duellman. **Mexico:** OAXACA: 33.6 km S Valle Nacional (UMMZ 123327 [2]); 35.5 km S Valle Nacional (UMMZ 124842 [7]).

Ptychohyla leonhardschultzei Ahl. **Mexico:** GUERRERO: ca. 1.6 km SE San Andrés de la Cruz (UMMZ 125583-84[3]). OAXACA: 8.9 km S Valle Nacional (UMMZ 115514-15); 11.7 km S Valle Nacional (UMMZ 124840[5]); 32.5 km S Valle Nacional (UMMZ 124841); Vista Hermosa (UMMZ 119604).

Ptychohyla schmidtorum chamulae Duellman. **Mexico:** CHIAPAS: 15-18.6 km N Puebla Nuevo (UMMZ 123322-26[31]).

Ptychohyla s. schmidtorum Stuart. **Mexico:** CHIAPAS: Finca Irlanda (UMMZ 105429-30).

Ptychohyla spinipollex Schmidt. **Guatemala:** ALTA VERAPAZ: Finca Los Alpes (UMMZ 90873, 90874[3]). BAJA VERAPAZ: Santa Elena (UMMZ 98119). PROGRESO: Finca Bucaral (UMMZ 106783[3], S-1292).

Smilisca baudini Duméril & Bibron. **Mexico:** OAXACA: Tapanátepec (UMMZ 115183).

Smilisca phaeota cyanosticta Smith. **Mexico:** OAXACA: 10.4 km S Valle Nacional (UMMZ 124838[8]).

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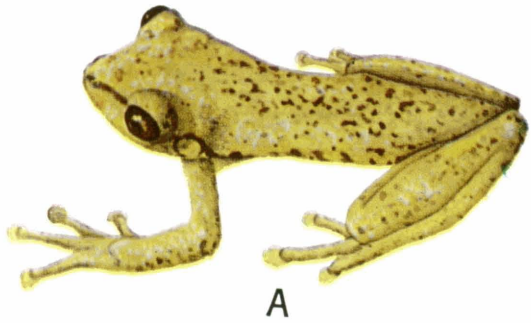
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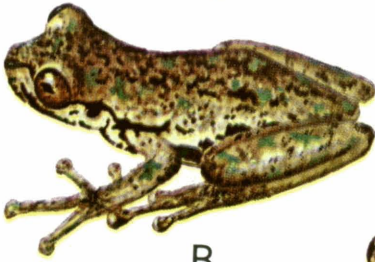
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PLATE I

- A: *Hyla chryses*, Guerrero, 37.8 mm snout-vent length
(UMMZ 125373, ♂)
- B: *Hyla thorectes*, Oaxaca, 31.7 mm (UMMZ 125384, ♂)
- C: *Hyla thorectes*, Oaxaca, 33.9 mm (UMMZ 125389, ♂)
- D: *Hyla pentheter*, Oaxaca, 45.1 mm (UMMZ 125378, ♂)
- E: *Hyla pentheter*, Oaxaca, 57.8 mm (UMMZ 125377, ♀)



A



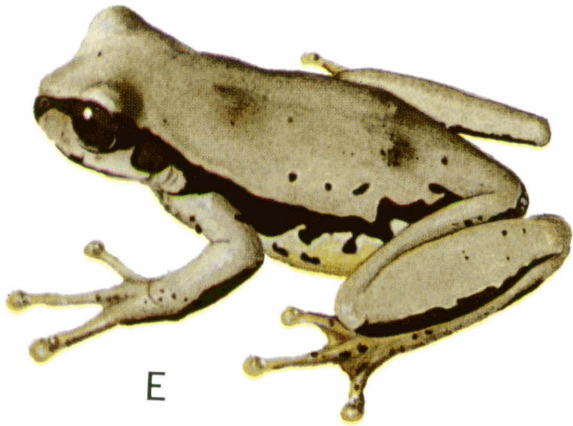
B



C



D



E

