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Results of the Archbold Expeditions. No. 85 A New Hylid Frog from the Eastern Highlands of New Guinea

By Michael J. Tyler[1]

The herpetological material obtained by the Sixth Archbold Expedition to New Guinea in 1959 included a particularly fine collection of frogs of the genus *Hyla*. Many of these were taken in the Eastern Highlands of the Australian Trusteeship Territory, in an area where the herpetofauna has not been thoroughly sampled.

In the vicinity of Kassam in the Kratke Mountains of the Eastern Highlands, Hobart M. Van Deusen obtained eight representatives of a species of *Hyla* that is readily distinguished from any previously reported from the Papuan zoogeographical region. The description and diagnosis of this new species, which is compared with its Papuan congeners, are the subjects of the present report.

DESCRIPTIVE METHODS

With the exception of the "tibia length" the descriptive terms used and the methods employed to obtain measurements are similar to those of Hosmer (1962) for *Notaden;* the reader is referred to that publication for details. In this report "tibia length" is the distance from the convex surface of the knee to the heel, measured with the knee in the flexed position.

[1] Honorary Associate in Herpetology, South Australian Museum, North Terrace, Adelaide, South Australia, Australia.

Hyla multiplica, new species

HOLOTYPE: A.M.N.H. No. 66854, a male from Kassam, elevation 4500 feet, Kratke Mountains, Eastern Highlands, Australian Trusteeship Territory of New Guinea, obtained by Hobart M. Van Deusen on November 8, 1959.

DEFINITION AND DIAGNOSIS: *Hyla multiplica* appears to be distantly related to the species thus far described from the Papuan region, and is characterized by fully webbed outer fingers, skin folds on the outer surfaces of the forearm, tarsus, and foot, prominent dermal ridges on the knee and below the anus, a hidden tympanum, and a blue dorsal color. It can be distinguished from those species that possess fully webbed fingers and skin folds (*H. eucnemis*, *H. rhacophorus*, and *H. papuensis*) by the condition of the tympanum and the blue color.

DESCRIPTION OF HOLOTYPE: The vomerine teeth are in two short, rather rounded, transverse series situated directly between the small rounded choanae. The tongue is half as wide as the mouth opening, cordiform in shape, its posterior border free and slightly indented. The head is large, broader than long, and evenly rounded. The breadth of the head is 13.8 mm.; length, 11.2 mm. The snout is very high and rounded when viewed from above, truncate in profile, so that the upper jaw does not extend noticeably beyond the lower; the canthus rostralis is rounded and does not protrude, and the loreal region is almost vertical. The nostrils are narrow slits (more visible from the lateral than the superior aspect), not projecting, their distance from the end of the snout about half of that from the eye, which is depressed and so poorly defined that the eyelid cannot be accurately measured. The distance from the eye to the naris (E-N) is 3.7 mm., and that from the naris to the tip of the snout is 3.0 mm. The internarial span (IN) is 4.2 mm., and the E-N/IN ratio is 0.881. The diameter of the eye is approximately 4 mm. The tympanum is completely covered by skin and not visible externally, though its site is indicated by a depression that is approximately three-fifths of the diameter of the eye, and separated from it by a distance nearly equal to its own diameter. The length from snout to vent is 39 mm.

The outer and second fingers are webbed to the disks, whereas the remainder are approximately half-webbed. The fourth finger is slightly longer than the second, but does not quite reach the disk of the third. The diameter of the disk on the third finger is 2.5 mm.

The toes are fully webbed. The webbing on the fourth toe reaches the base of the penultimate phalanx, and continues to the disk as a fringe. The disks on the toes are smaller than those on the fingers; the diameter

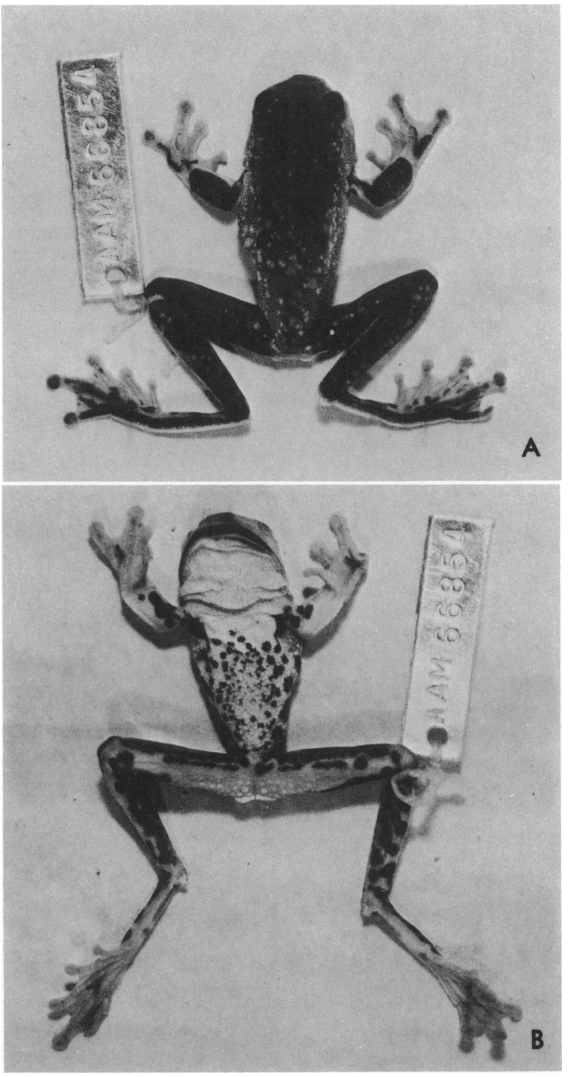

FIG. 1. A. Dorsal view of type specimen of *Hyla multiplica*, A.M.N.H. No. 66854. B. Ventral view of same specimen. Black lines on hands and feet are pins, not natural markings. Natural size.

of the disk on the fourth toe is 2.3 mm. The inner metatarsal tubercle is distinct and oval in shape, but there is no outer metatarsal. The legs are moderately long. The length of the tibia is 22.5 mm.; of the femur, 19

mm. The ratio of tibia length to snout-to-vent length is 0.577. When the hind leg is appressed, the heel reaches the tip of the snout. When the limbs are laid along the sides, the knee and elbow overlap considerably. When the hind legs are bent at right angles to the axis of the body, the heels overlap slightly.

The dorsal surfaces of the head and body are minutely glandular and rather etched in appearance. The lateral surfaces are slightly granular. There is a narrow, prominent dermal ridge on the outer surface of the forearm, and a similar and more prominent tarsal ridge continuing along the outer edge of the fifth toe. There is a well-developed, semicircular, dermal appendage on the heel, and a projecting dermal ridge beneath the anus. The skin of the throat and chest is minutely granular; the belly is more conspicuously granular. The under surfaces of the thighs are covered with large round tubercles that increase in density near the anus. The skin of the head is not co-ossified with the skull. There is a flattened supratympanic fold, but no trace of a skin fold across the chest.

The holotype possesses a vocal sac with long slit-like apertures in the floor of the mouth, but the first finger lacks a pigmented nuptial pad.

The dorsal surface of the head, body, and forelimbs is dark blue. There are small, faint, circular spots on the head and, to a greater extent, on the body. The ground color of the forelimbs terminates abruptly at the wrist. The hand is pale cream, but there are darker pigment cells scattered on the fourth finger and even more sparsely distributed on the third. The dark blue, lightly spotted ground color of the body occupies a longitudinal band on the dorsal surface of the thigh. The ground color of the anterior and posterior surfaces is maroon in contrast to the intense violet of numerous large, circular spots. The ventral surface of the thigh is pale and, except marginally, unmarked. The under side of the tibia, however, has prominent, irregular, dark violet spots on a pale background. The upper surface of the foot is cream colored, with a few violet spots. There is a blue streak along the third and fourth toes, and the webbing between these digits is lightly pigmented with pale blue.

The side of the head is similar to its dorsal surface. The lateral surfaces of the body are bright cream in color, obscured by large circular spots of intense violet. The axillary region is black.

The lower jaw is pale blue, and the throat is pearl. The vocal sac and under surface of hand and foot, forearm, and tibia are dull cream colored. The abdomen is similar in color but paler and brighter, with small, irregular violet spots. The dermal ridges are white.

VARIATION: There is slight variation in the seven paratypes, which are all adult males and form a remarkably homogeneous group. The snout-to-

vent length ranges from 37.5 to 42.0 mm., with a mean of 39 mm.; the range of the ratio of the tibia length to the snout-to-vent length is 0.533–0.573, with a mean of 0.559.

The heads of most of the specimens are distorted, and the eyes are depressed. It is therefore impossible to obtain accurate measurements. The condition of the tympanum varies. In most specimens at least a portion of the annulus can be detected, but the tympanic membrane is hidden beneath the skin in the entire series. Reflexion of the skin reveals a circular membrane completely surrounded by a raised annulus.

The extent of the webbing between the fingers and toes is consistently similar to that of the holotype. The skin folds on the outer surfaces of the limbs, on the heel, and below the anus are prominent in all specimens.

The only variations in the color pattern of the paratypes are confined to the size and density of the distribution of violet spots on the abdomen, and the degree to which similarly colored or maroon spots extend onto the under surface of the thigh and tibia.

COMPARISON WITH OTHER SPECIES: The following combination of characters will distinguish *multiplica* from all other Papuan species: fully webbed outer fingers, prominent skin folds on the outer surface of the arm and tarsus and below the anus, and the blue dorsal color of the head, body, and limbs.

Hyla eucnemis Lonnberg, *H. rhacophorus* van Kampen, and *H. papuensis* Werner share with *multiplica* similarly webbed fingers and skin folds on the limbs, but are brown or gray in color, and can also be distinguished from *multiplica* by the condition of the tympanum, which is large, with a distinct membrane and annulus, in *eucnemis*, *rhacophorus*, and *papuensis*, but small and completely hidden beneath the skin in *multiplica*.

There are several species that possess a blue coloration on the dorsum, but none of these exhibits skin folds or has fully webbed outer fingers.

Very few Papuan hylids have any pigment on the abdomen. *Hyla arfakiana* Peters and Doria and *H. angularis* Loveridge are flecked with dark pigment, but they can be distinguished easily from *multiplica* by their elongated, acutely pointed snouts and the absence of webbing between the outer fingers. *Hyla albolabris* Wandolleck has large spots of dark color on the ventral surface, but it lacks webbing between the fingers and is extremely small in size (adult males have a snout-to-vent length of 20–22 mm.). There is no possibility of mistaking it for *multiplica*.

HABITAT: L. J. Brass and H. M. Van Deusen of the Sixth Archbold Expedition to New Guinea collected at Kassam during the period October 26 to November 9, 1959. In a preliminary description prepared prior to the publication of a complete report of the expedition's activities, Brass

stated that the Kassam collecting base was situated at an altitude of 4500 feet (1370 meters) above sea level in the Kratke Mountains, on the road that extends from the coastal town of Lae to the Western Highlands center of Goroka. The base camp was near the head of the Aindo Creek, where the road emerges from extensive forests onto grassy highlands.

DISTRIBUTION: *Hyla multiplica* is known only from the type locality, Kassam, Kratke Mountains, Eastern Highlands, Australian Trusteeship Territory of New Guinea. The type series consists of A.M.N.H. Nos. 66854 (holotype), and 66853, 66855–66860 (paratypes). One of the paratypes (A.M.N.H. No. 66857) has been deposited in the South Australian Museum, where it has been allotted the registration number R.4946. All the specimens were obtained by H. M. Van Deusen on November 8, 1959.

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