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Two New Frogs of the Genus *Platymantis* (Ranidae) from New Britain

RICHARD G. ZWEIFEL¹

ABSTRACT

Platymantis macrosceles and *Platymantis nexipus* are described from single specimens in the Bernice P. Bishop Museum. Neither appears to have a close relative among the other six species of *Platymantis* known from New Britain, but

P. nexipus may be closely related to *P. neckeri* of Bougainville, Solomon Islands. The relationships of *P. macrosceles* are obscure, but both new species belong among those *Platymantis* in which the finger and toe discs are markedly enlarged.

INTRODUCTION

The islands to the east of New Guinea comprising the Bismarck Archipelago and the Solomon Islands have an anuran fauna composed largely of ranid frogs. Furthermore, most of the species and several genera are endemic to the area, in some instances to a single island. Ranids heretofore known from New Britain include a single, widespread species of *Rana* and six species of *Platymantis*, all but one endemic to the island (Brown and Tyler, 1968).

Among frog specimens lent for my study by the Bernice P. Bishop Museum several years ago are two specimens of *Platymantis* from New Britain, each representing a species not previously known. I set these specimens aside hoping that additional ones would be forthcoming. This hope has not been realized, but because I consider that the species can adequately be diagnosed from the limited material

available, I present descriptions herein. For use of the name *Platymantis* rather than *Cornufer*, see Zweifel (1967).

ACKNOWLEDGMENTS

I am grateful to the authorities of the Bernice P. Bishop Museum, Honolulu, Hawaii, and in particular to Dr. Alan C. Ziegler, Vertebrate Zoologist, for making the specimens available to me. I thank Dr. Walter Brown and Mr. Michael Tyler for constructive criticism of the manuscript, and Frances W. Zweifel for her careful rendition of the figures.

MATERIALS AND METHODS

The holotypes (the only specimens) of the two new species are in the collection of the Bernice P. Bishop Museum. Comparative material

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utilized in this study is in the American Museum of Natural History.

Measurements (in millimeters) and abbreviations are as follows:

- SV, length from snout to vent
 HW, head width at angles of jaws
 HL, head length, snout tip to posterior edge of tympanic annulus
 IN, internarial distance between dorsal margins of the nostrils
 E-N, distance from eye to naris, anterior corner of eye to posterior margin of naris
 Eye, eye diameter, anterior to posterior corners of eye opening
 Ear, tympanum diameter measured horizontally, including the tympanic ring
 TL, tibia length, heel to outside of knee

Spans of 10 mm. or less were measured by ocular micrometer, larger distances with Vernier calipers.

Ratios of the measurements of various body parts are used to compare relative proportions among the species. Comparative samples were chosen from within a restricted size range (see table 1) in order to minimize the possible effect of ontogenetic change in proportions.

Platymantis macrosceles, new species

Holotype. Bernice P. Bishop Museum 1005, an adult female collected at Ti, Nakanai Mountains, New Britain, on July 29, 1956, by E. J. Ford, Jr. The Nakanai Mountains are in central New Britain west of Jacquinot Bay. I have not been able to pinpoint the type locality.

Diagnosis. A species of *Platymantis* with greatly enlarged finger discs that differs from other species of the Solomon Islands-Bismarck Archipelago region that have this characteristic [*P. guppyi* (Boulenger), *P. neckeri* (Brown and Myers), and *P. nexipus*, new species] in the following combination of characters: relatively small adult size (SV, 30 mm.); unwebbed toes; prominent tubercles on eyelids; long hind limbs (TL/SV, 0.589); internarial distance much less than distance from eye to naris (E-N/IN, 1.68); and head narrow (HW/SV, 0.321).

Platymantis guppyi is a much larger species (females attain a length of 98 mm. and are still immature at 60 mm. SV; Brown, 1952) with a broader head (minimum HW/SV, 0.388), shorter

hind limbs (maximum TL/SV, 0.521), non-tuberculate eyelids, and partly webbed hind feet. *Platymantis neckeri* is larger than *P. macrosceles* (females to 56 mm. SV; Brown, 1952), has shorter hind limbs (maximum TL/SV, 0.518), a broader head (minimum HW/SV, 0.364), internarial distance only slightly less than eye-naris distance (maximum E-N/IN, 1.13), and non-tuberculate eyelids. *Platymantis nexipus* (see description below) is a larger species (adult female, 47 mm. SV) with a broader head (HW/SV, 0.448), shorter hind legs (TL/SV, 0.512), more closely spaced nostrils (E-N/IN, 1.19), and less conspicuously tuberculate eyelids.

Description of holotype (FIG. 1). The specimen is an adult female, somewhat contorted and slightly desiccated, with large, pale ova, 2.5 mm. in diameter.

The head is narrow with the nostrils set close together, much nearer to the tip of the snout than to the eye. The canthus rostralis is nearly straight over much of its length, but curves somewhat abruptly as it approaches the eye. The loreal region is deeply concave and nearly ver-

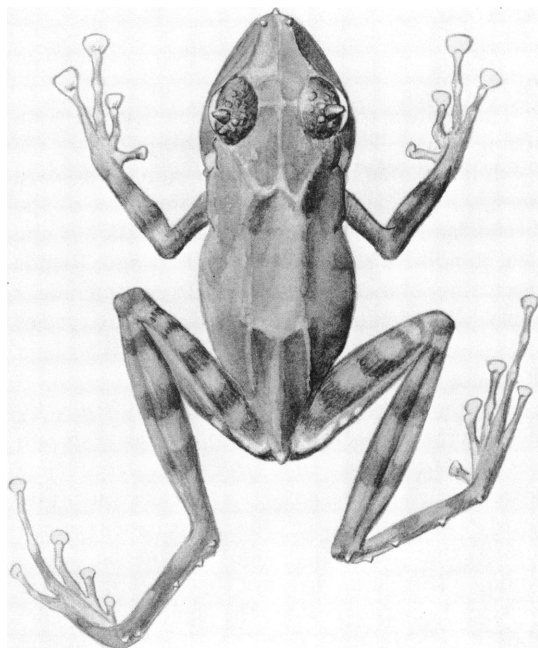


FIG. 1. *Platymantis macrosceles*, holotype, Bernice P. Bishop Museum 1005, dorsal view. $\times 2$.

tical. The snout is truncate in lateral view. There is a low, pointed projection on the tip of the snout and another slightly anterior and medial to each nostril. Each eyelid bears two soft, pointed tubercles—the first conspicuous and arising midway along the lid slightly medial to the rim, and the second a lower projection lying posterior to the first. The tympanum is vertically oval and distinct but small, its horizontal diameter less than half that of the eye. The eye is moderate in size (Eye/SV, 0.122).

A W-shaped scapular fold is present, and there are white-tipped tubercles along the outer edge of the tarsus. Aside from these and the snout and eyelid tubercles, the skin is smooth.

The relative lengths of the fingers (fig. 2) are $3 > 4 > 2 > 1$; the second finger is almost twice the length of the first. All fingers bear enlarged terminal discs with marginal grooves: The discs of the second, third, and fourth fingers are about four times the width of the penultimate phalanges, whereas that on the first finger is only slightly wider. Low, rounded subarticular tubercles are present; the palm is smooth. There is no webbing.

The relative lengths of the toes are $4 > 3 > 5 > 2 > 1$. All bear terminal discs with marginal grooves, but the discs are smaller than those on the fingers. The discs of the first and fifth toes are about one and one-half times the width of the penultimate phalanges, and those of the other toes about twice as wide. Low, rounded subarticular tubercles are present; the sole is smooth. There is no webbing. There is a low, rounded outer metatarsal tubercle and only the faintest trace of an inner tubercle.

Premaxillary, maxillary, and vomerine teeth are present. The vomerine teeth are in two groups medial and posterior to the internal nares. The pectoral girdle is much as illustrated by Brown (1952, pl. 1) for *Platymantis papuensis weberi*, *P. solomonis*, and *P. ("Cornufer") guppyi*, with deeply forked omosternum, strong clavicles and long, narrow xiphisternum.

Measurements. SV, 30.2; TL, 17.8; HW, 9.7; HL, 11.0; E-N, 3.9; IN, 2.3; Eye, 3.7; Ear, 1.6; width of third finger disc, 2.0 (penultimate phalanx, 0.5); width of fourth toe disc, 1.2 (penultimate phalanx, 0.6).

The dorsal color of the preserved specimen is dark blue (presumably green in life) and brown.

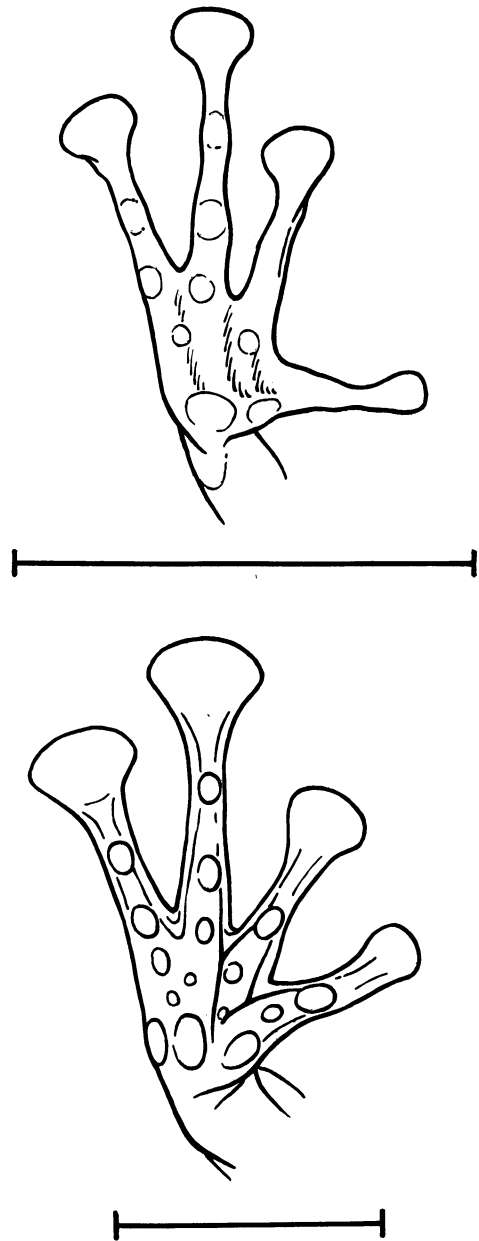


FIG. 2. Right hands of *Platymantis macrosceles* (upper) and *Platymantis nexipus* (lower), shown semi-diagrammatically in palmar view. Scale lines represent 1 cm.

The top of the snout is brown, but the middorsal area posterior to this is blue. The loreal region and the side of the head to behind the ear are

blue. A mottled brown pattern occupies the side of the body, above an indistinct blue, lower lateral streak. The upper lip is narrowly edged in yellowish white. The upper surfaces of the forelimbs are blue with faint traces of darker crossbands. The dorsal surfaces of the hind limbs are similar but with crossbanding more distinct. There is more brown than blue ground color on the thigh. The posterior surface of the thigh is brown with some white spotting near the vent; the anterior surface is paler and unspotted.

The chin is brown with white mottling. The chest and abdomen bear numerous coalescing white blotches that nearly obscure the brown ground color. The undersides of the limbs are brown, with white spots prominent on the hind legs. The lower surfaces of the hands and feet are brown with conspicuously paler subarticular tubercles.

Etymology. From the Greek *macros* (long) and *scelos* (leg), combined for the name of this species as a noun in apposition.

Platymantis nexipus, new species

Holotype. Bernice P. Bishop Museum 1009, an adult female collected at St. Paul's, Baining Mountains, New Britain, between September 5-10, 1955, by J. L. Gressitt. The collector (*in litt.*) described the type locality as "a small village above a mission, a short drive and short climb from the coast SE of Kerevat, on the approach to the Baining Mts. Altitude was 100-400 meters, mostly long-disturbed forest and 2nd growth."

Diagnosis. A species of *Platymantis* with greatly enlarged finger discs that differs from other species of the Solomon Islands-Bismarck Archipelago region that have this characteristic (*P. guppyi*, *P. neckeri*, and *P. macrosceles*) in the following combination of characters: moderate size (SV, 47 mm.), internarial distance slightly less than distance from eye to naris (E-N/IN, 1.19), head broad (HW/SV, 0.448), toes partly webbed, and eyelids with small tubercles.

Platymantis guppyi is a much larger species (females immature at 60 mm. SV, maximum of 98 mm.) with the nostrils set relatively much closer together (E-N/IN minimum in *guppyi*, 1.49, compared with 1.19 in *nexipus*). *Platy-*

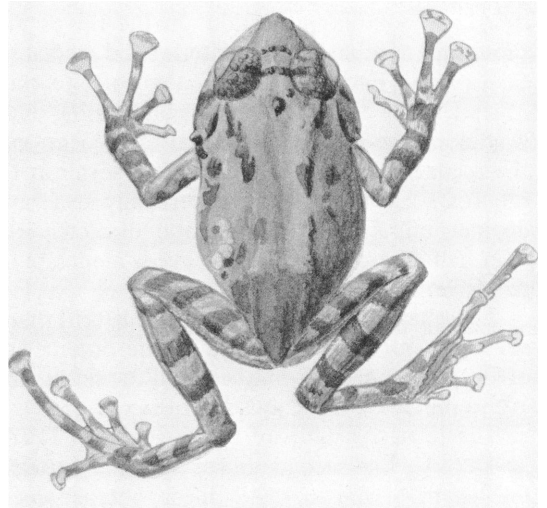


FIG. 3. *Platymantis nexipus*, holotype, Bernice P. Bishop Museum 1009, dorsal view. $\times 1$.

mantis neckeri is similar to *P. nexipus* in size and in most proportions, but has a much narrower head (HW/SV maximum, 0.404, compared with 0.448).¹ For differentiation from *P. macrosceles* see the foregoing diagnosis of that species.

Description of holotype (FIG. 3). The specimen is a well-preserved adult female containing large, pale ova about 3 mm. in diameter.

The head is broad, with the snout high and rather truncate in lateral aspect, but bluntly pointed as seen from above. The nostrils are much nearer the tip of the snout than they are to the eyes. The canthus rostralis is gently curved inward. The loreal region is concave and nearly vertical. The eyes are relatively large (Eye/SV, 0.138) and prominent, with the distance from corner to corner of the orbit greater than the distance from eye to naris. The interorbital space

¹ Brown (1965, p. 12) distinguished *P. guppyi* from *P. neckeri* by "breadth [of head] usually less than 40 per cent snout-vent length" (*neckeri*) compared with "usually greater than 40 per cent" (*guppyi*). In my samples (table 1) the ranges for the two species differ slightly but the means are virtually the same. I purposely used relatively small *guppyi*, and it may be that relative head width is greater in larger frogs. In any event, these species are more readily differentiated by their E-N/IN values, for in this proportion there is no overlap in ranges.

is equal to the width of an upper eyelid. Low tubercles are present on the eyelids. The tympanum is distinct and vertically oval, with a horizontal diameter less than one-half that of the eye.

The skin is generally smooth, but there are small tubercles between the eyelids as well as on the eyelids, and there is an indistinct row of tubercles on each side of the body along the line that in many frogs bears a dorsolateral fold.

The relative lengths of the fingers (fig. 2) are $3 > 4 > 2 > 1$; the relatively long first finger reaches almost to the disc of the adpressed second finger. All fingers bear enlarged terminal discs. Those on the second and third fingers are slightly more than three times the width of the penultimate phalanges, whereas that on the second is about 2.3 times and that on the first 1.4 times. Webbing is virtually absent. There are prominent, rounded subarticular tubercles and a smaller tubercle at the base of each finger. There is a low inner metacarpal tubercle and there are low, rounded middle and outer metacarpal elevations.

The relative lengths of the toes are $4 > 3 > 5 > 2 > 1$. Terminal discs are present, but are smaller than those on the fingers. The widths of the discs relative to the penultimate phalanges are as follows: fifth toe, 1.9; fourth, 2.3; third, 1.8; second, 1.4; first, 1.2. The toes are partly webbed; the deepest indentation of the webbing reaches almost to the distal subarticular tubercles of toes 3 and 5 (just past the proximal tubercle of toe 4), and slightly past the only subarticular tubercles of toes 1 and 2. There is a low, oval inner metatarsal tubercle and a small, round outer one.

Premaxillary, maxillary, and vomerine teeth are present. The vomerine teeth are in two diagonally oriented groups medial and posterior to the internal nares. The pectoral girdle is typical of *Platymantis* (Brown, 1952, pl. 1): the clavicles are strong, omosternum deeply forked, and xiphisternum long and slender.

Measurements. SV, 47.1; TL, 24.1; HW, 21.1; HL, 18.6; E-N, 5.1; IN, 4.3; Eye, 6.5; Ear, 3.0; width of third finger disc, 4.3 (penultimate phalanx, 1.3); width of fourth toe disc, 3.1 (penultimate phalanx, 1.5).

The dorsal color is light brown. Principal darker brown markings include two narrow,

ragged interorbital lines, and a line of irregular spots on the dorsolateral boundary. There are brown spots on the sides of the body and three broad, dark lines radiate from eye to lip. The limbs and digits are light brown with darker crossbars. The undersides of the body and limbs are pale tan with darker mottling. The soles and palms are dark brown with the tubercles conspicuously lighter.

Etymology. From the Greek *nexipus*, webbed-foot, used as a noun in apposition.

DISCUSSION

The genus *Platymantis*, as presently conceived, includes among its 31 species a broad spectrum of morphological types, ranging from *P. aculeodactylus* Brown, about 25 mm. in length with pointed finger tips, to *P. guppyi*, which reaches 98 mm. and has greatly enlarged digital discs on hands and feet (Brown, 1965). Earlier workers placed the broad-disced and narrow-disced (or discless) forms in different genera, but Inger (1954) considered that this difference alone, in the absence of evidence of ecological differentiation, was insufficient to justify recognition of more than a single genus. The relative development of digital discs differs greatly among the species, and I see no clear point where one could draw a line between broad- and narrow-disced forms. A similar situation exists in another ranid genus of the Solomon Islands, *Batrachylodes* (Brown and Parker, 1970). Thus, I too recognize only one genus for this group, although I think that a comprehensive review, with attention to other characters, might recommend a different course.

The new species described here are clearly at the broad-disced end of the spectrum, much more so than any of the six species previously known from New Britain (Brown and Tyler, 1968). The fauna of Bougainville Island, the closest of the Solomon Islands to New Britain, includes two broad-disced species, *P. guppyi* and *P. neckeri*, among nine *Platymantis* known there (Brown, 1965). There are no broad-disced forms among the four species known in New Guinea (Zweifel, 1969), and this, taken with the general dissimilarity of the frog faunas of New Guinea and New Britain, suggests that the closest known

TABLE 1
Selected Proportions of Four Species of *Platymantis*

Species	N	TL/SV		HW/SV		E-N/IN		SV Length	
		Mean \pm σ m	Range	Mean \pm σ m	Range	Mean \pm σ m	Range	Mean	Range
<i>P. suppyi</i>	10	0.494 \pm 0.005	(0.464-0.521)	0.396 \pm 0.003	(0.388-0.415)	1.57 \pm 0.015	(1.49-1.67)	56.1	(46.4-64.6)
<i>P. neckeri</i>	10	0.488 \pm 0.006	(0.461-0.518)	0.387 \pm 0.003	(0.364-0.404) ^a	1.06 \pm 0.020	(0.98-1.13)	47.3	(42.3-56.5)
<i>P. macroseles</i>	1	0.589	—	0.321	—	1.68	—	30.2	—
<i>P. nexipus</i>	1	0.512	—	0.448	—	1.19	—	47.1	—

^aFor this ratio only, N = 20; SV mean 45.8 (39.6-56.5).

relatives of the new species are each other and the two species of Bougainville Island. (The *Platymantis* fauna of New Ireland, to the north-east of New Britain, is virtually unknown.)

Platymantis macrosceles, with its unusually long legs, extremely narrow head, and prominent eyelid tubercles, is so different from the other broad-disked forms that I see no basis for considering it as evolutionally closer to any of the other three than to another. It might as easily be considered as independently derived from a narrow-disked ancestor (assuming that the narrow-disked condition is primitive).

Platymantis nexipus is morphologically much less similar to *P. guppyi* than to *P. neckeri*. Differences from *guppyi*, aside from the much greater size of that species, involve mainly the proportions of the snout. The difference between these species in the E-N/IN ratio is easily appreciated (table 1). The flatter snout of *guppyi*, with its more gently sloping and less concave loreal region, is difficult to describe quantitatively, but the difference is nonetheless real.

Platymantis neckeri and *P. nexipus* differ most notably in the relative width of the head. Among 20 specimens of *neckeri* similar in size to *nexipus* (mean SV, 45.8 mm.; table 1), none has so wide a head as the unique specimen of *nexipus*. Among 40 specimens of *neckeri* in the collection of the American Museum of Natural History, most have the eyelids smooth and in none are they as tuberculate as in *nexipus*. The evidence for specific distinctness of *P. nexipus* is less compelling than in the case of *P. macrosceles*, but I regard *nexipus* as lying too far outside the range of variation of *neckeri* to be accommodated within that species.

The other broad-disked species of *Platymantis* are widely separated geographically from the species here described. Five are in the Philippine Islands (Inger, 1954) and one in the Fiji Islands (Brown and Myers, 1949; Gorham, 1965). Whether these species together with those of the Solomon Islands and Bismarck Archipelago form a natural group within *Platymantis* remains to be demonstrated.

The presence of large, unpigmented eggs in the holotypes of the two new species suggests

that these species, as do other *Platymantis* whose breeding habits are known, have direct embryonic development, bypassing the free-living tadpole stage.

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