

AMERICAN MUSEUM NOVITATES

Number 315

Published by
THE AMERICAN MUSEUM OF NATURAL HISTORY
New York City

May 18, 1928

59.78R (922)

RESULTS OF THE DOUGLAS BURDEN EXPEDITION TO THE ISLAND OF KOMODO

IV.—FROGS FROM THE EAST INDIES¹

BY EMMETT REID DUNN

The frogs which form the subject of the following notes were taken by the Douglas Burden Expedition to the Island of Komodo in the summer of 1926 and are from the islands of Pulo Weh (north of Sumatra), Java, Bali, Lombok, Sumbawa, Komodo, and Wetar. There are 26 species and 2 subspecies in the collection, which consists of 611 specimens of frogs and 690 tadpoles. There is one new species, and the tadpoles of two forms are herein described for what seems to be the first time. The two frogs from Komodo are new to the island.

***Megophrys monticola* Kuhl and v. Hasselt**

The name as here used is that of both genus and species, as chosen from two forms of each in the original description by the authors, acting as their own first revisers. Ten adults and twenty tadpoles were taken at Tjibodas, Java, alt. 4700 feet. The tadpoles were found in both still pools and swift brooks. One of these was taken in the same pool as a tadpole of *M. hasseltii*. Therefore there is not complete ecological segregation of the two, although they seem generally in two different places. Smith (1917, Journ. Nat. Hist. Soc. Siam, II, p. 271 and 1926, Proc. Zoöl. Soc. London, p. 983) has recorded careful observations of these peculiar tadpoles and has found that their strange mouthparts are definitely correlated with their equally strange feeding habits. The same was shown by him to be true of the tadpole of *Microhyla achatina*. Similar mouthparts are to be found in certain species of the American genera *Phyllobates* and *Phyllomedusa* (Dunn, 1924, Occ. Pap. Mus. Zoöl. U. of Michigan, CLI; Lutz, 1924, C. R. Soc. Biol., XV, p. 241). In the American cases no ecological segregation was observed, nor were the feeding habits of the *Phyllobates* seen. The two sorts of *Phyllobates* tadpoles, however, behaved very differently in the same pool, and the modified tadpole of *Phyllomedusa* fed at the surface, as do *M. monticola* and *M.*

¹Contributions from the Department of Zoölogy, Smith College, No. 146.

achatina. The two *Phyllobates* with modified tadpoles, although closely related to other species with normal tadpoles, nevertheless, form a natural group of two species, distinguished not only by a peculiar tadpole type, but also by a unique sexual dimorphism.

It is therefore somewhat strange to find Dr. G. K. Noble remarking (1925; Amer. Mus. Novitates, No. 165, p. 6, and 1927, Ann. New York Acad. Sci., XXX, p. 77): "They ('unusually produced lips') do not seem to have any phylogenetic or adaptational significance," and, "this sudden appearance of an expanded mouth seems the least adaptive of all . . . larval features."

His denial of adaptational value to the produced, funnel lips of these forms is somewhat qualified by his remark (1927, p. 102) that one species of *Phyllomedusa* "has its mouth produced into a funnel to assist it in surface feeding."

Megophrys hasseltii (Tschudi)

Thirty tadpoles from Tjibodas.

Bufo cruentatus Tschudi

Two specimens from Tjibodas.

Bufo melanostictus Schneider

Two from Pulo Weh and four from Buitenzorg. The note was heard in the latter place. It was a trill very like that of *B. americanus*. They were breeding on the nights of May 7 and May 24. On the latter day a male was taken in amplexus with a female of *Bufo asper*.

Bufo asper Gravenhorst

These toads were out and calling their loud explosive hoot on the night of May 24 in the nearly dry bed of the river through the gardens at Buitenzorg. Six were taken and many more could have been. The male has a horny callosity on the upper side of the thumb.

Bufo biporcatus biporcatus (Gravenhorst)

Eleven specimens of this toad were taken: two from Buitenzorg, where the soft trill was heard on the night of May 7; three from Tjibodas; and six from Bali.

Bufo biporcatus cavator (Barbour)

Eighteen specimens from Suela, near the east coast of Lombok, at about 1300 feet elevation. The note is the same as that of the Javanese

form and was heard on the night of July 26. This toad was described from near Ampenam on the west coast as a full species, on the basis of a single specimen. This series shows that many of the characters, "smaller tympanum . . . circular . . . upper boundary . . . not . . . formed by the orbito-tympanic ridge," are subject to variation. Some specimens are exactly like *biporcatus* from Java and Bali in these respects; others differ and are like the description of *cavator*; still others are intermediate. The whole series is much lighter in color than western specimens. Under these circumstances I deem it proper to regard the Lombok toad as a subspecies.

Oreophryne monticola (Boulenger)

Nine specimens, taken at altitudes of from 6000 to 9000 feet on Rinjani, Island of Lombok. Since it was the dry season (July 23-26) the specimens seemed to be aestivating. Nevertheless, at Tanganea (9000 feet) I heard a faint "ticky ticky ticky" the night of July 23, which may have been the note. A female 30 mm. long had ovarian eggs 3 mm. in diameter, which perhaps indicates a direct development. The smallest specimen was 14 mm. in length and the digital disks were rather undeveloped. A male has a dark throat. This is a true *Oreophryne*, as a specimen kindly cleared for me by Dr. G. K. Noble shows, and the girdle does not differ from that of *O. celebensis*, as figured by Mehely (1901, Termész. Füzetek, Pl. x, fig. 1). The procoracoid reaches the scapula.

Oreophryne jeffersoniana, new species

TYPE.—A. M. N. H. No. 24530. PARATYPES.—A. M. N. H. Nos. 24531-4. Collected July 4, 1926.

TYPE LOCALITY.—Komodo, 2500 feet altitude.

RANGE.—Known only from type locality.

DIAGNOSIS.—Very close to *O. monticola*; shoulder girdle similar; differing in smaller size (max. 18.5 mm.); feebly developed digital disks; a dark lateral band; slightly longer legs, heel reaching hind border of eye; a dorso-lateral line of warts.

DESCRIPTION.—A. M. N. H. No. 24530; tongue large, oval entire; snout short; rounded; canthus rostralis rounded; interorbital space broader than upper eyelid; tympanum feebly distinct, two-thirds the diameter of the eye; disks of fingers and toes very feebly developed; first finger much shorter than second; toes free; no subarticular tubercles; a very feebly developed inner metatarsal tubercle; the heel reaches the hind border of the eye; skin above with a few small warts; a line of elongate warts from eye more than halfway to groin; belly finely granular; above tan; warts marked or outlined with black; a fine dark mid-dorsal line and X-mark on the scapular region; sides below dorso-lateral glandular line darker; thighs indistinctly barred; length 16.5 mm. There is a cartilaginous procoracoid running from the base of the clavicle to the scapula.

The largest specimen, No. 14531, measured 18.5 mm.; the smallest, No. 24534, 12 mm.

These tiny frogs add a third species of *Oreophryne* to the Lesser Sunda fauna, and, together with the fact that the young of *O. monticola* have feeble disks, make the 7 mm. long *Microbatrachus pusillus* from the Aru Islands seem almost certainly the young of an *Oreophryne*.

The range on Komodo was the extreme peaks of the island, where there was a small region of cloud forest, probably not more than three acres in extent. If the frog should prove not to occur on peaks in Sumbawa or Flores, this would be one of the most restricted ranges known. They were hopping about on the floor of the forest, among the débris and the great rock-masses which gave this part of Komodo such an uncanny aspect, and which appearance was here heightened by the heavy coating of moss on everything.

I have named this frog in honor of Thomas Jefferson, author of the Declaration of Independence of the United States of America, which was signed on July 4.

Kaloula baleata (Müller)

Two specimens from Komodo at 2000 feet. The first indication of the presence of frogs on Komodo was the finding of fragments of this animal in the stomachs of two tree-vipers, which were taken at night near the rock pools of the rapidly drying stream. Two specimens were finally found the night of July 2. The distribution of *K. baleata* and *K. pulchra* is extremely puzzling. Both seem to occur in Sumatra, Borneo, and Celebes, but in Java *baleata* is the only species, and it is likewise found on Komodo and on Sumba, while *pulchra* is found on Flores.

Microhyla achatina Boie

Six adults and forty larvæ from Tjibodas. They were calling at night all the time (May 8-16) I was at Tjibodas. The call was a rattling note very like that of *Acris*.

Microhyla annectens Boulenger

One hundred and fourteen adults and young from Tjibodas. I did not hear the call, and the breeding season was apparently over, for nearly half my specimens were tiny young, the smallest 8 mm. in length.

Rana limnocharis Boie

Fifteen specimens: six from Buitenzorg, eight from Bali, and one from Suela on Lombok. The call, heard at Buitenzorg on the night of May 6, is a guttural croak.

Rana cancrivora cancrivora (Gravenhorst)

Eighteen specimens: one from Buitenzorg, thirteen from Suela, and four from Bima on Sumbawa. The call is a trill, and was heard at Buitenzorg the night of May 7.

After careful consideration of Malcolm Smith's remarks (1927, Proc. Zoöl. Soc. London, p. 205, *et seq.*), I cannot find that my specimens from Lombok, Sumbawa or Wetar represent more than one form. I do find that Wetar specimens show the fold of skin along the outer toe in a rudimentary condition, and exhibit elongated warts rather than longitudinal ridges. The Bima specimens are transitional between the Javanese and Lombok ones and those from Wetar. I am therefore inclined, on the basis of my material, to regard *cancrivora* and *verruculosa* as vicarious races rather than as full species which may occur together.

Rana cancrivora verruculosa (Roux)

Seven specimens from Uhak on the north coast of Wetar.

Rana macrodon Kuhl

One specimen from Buitenzorg: we saw several which appeared to us remarkable on account of their ability to cross over the surface of a pond by a succession of leaps without ever sinking below the surface. They reminded both Mr. Burden and myself of the lizard *Basiliscus* of the American tropics, by this water-walking.

Rana modesta Boulenger

A very large series of 268 transformed specimens and 35 tadpoles from Sembalun on Lombok at 3900 feet, and twenty-five tadpoles from near Suela on Lombok at 1300 feet. The largest frog in this series measured 63 mm. from snout to vent: The call was heard the last week of July, and may be rendered as "awk ek ek ek." The tadpoles of this species from Lombok differ from those described by Van Kampen (1923, Amphibia Indo-Australian Arch., p. 177) from an unstated locality, in having invariably three rows of horny teeth on the lower lip, and in both the muscular portion of the tail and the crests spotted with black.

***Rana kuhlii* Schlegel**

Seven adults and 72 tadpoles from Tjibodas. The tadpoles differ from those described by Smith (1917, Journ. Nat. Hist. Soc. Siam, (2) IV, p. 262) from Siam, in that his specimens had the inner upper row of horny teeth broadly interrupted while in mine this row is continuous; his had the outer row of lower teeth half the length of the inner, and the middle row nearly as long as the inner, while mine have the middle row half as long and the outer row one-fourth as long as the inner. In mine the markings on the tail are much more in the form of definite cross-bars than in his. Differences such as these in tadpoles of what are commonly considered the same species of frogs from different places in the East have been frequently noted in the papers of Smith, Annandale and Van Kampen, and probably the adults from different localities may well be scarcely different while the tadpoles are unlike. In these cases it is perhaps unwise to discriminate systematically between them; but there is little logical difference between these cases and those others in which the tadpoles are alike and the adults different, and in the latter there is general sanction for systematic discrimination.

***Rana microdisca* Bøettger**

Thirteen transformed specimens and 49 tadpoles from Tjibodas. The tadpole of this species has not apparently been described.

Length of body about one and two-thirds times its width; tail 5 times as long as deep; nostril nearer eye than snout; eyes latero-superior, same distance apart as nostrils; spiracle nearer eye than vent; tail obtusely pointed, crests low, upper to base of tail; papillæ at sides of mouth and below; labial teeth $\frac{2}{3}$; inner upper row broadly interrupted, one-fourth width of outer; two inner lower rows equal, innermost narrowly interrupted; outer one-third length of the other two; brown, paler below; tail with black dots on muscular portion and on upper crest, lower crest colorless; length 29 mm.

***Rana elberti* Roux**

A small specimen (length 22 mm.) from Uhak on the north coast of Wetar seems to be the second known specimen of this species, described from a 48 mm. specimen from Iliwaki on the south coast of the same island.

***Rana florensis* Boulenger**

Eleven transformed specimens and seventy-two tadpoles from Sembalun (alt. 3900 ft.) on Lombok are considered to represent this species, described from Flores at an altitude of above 3000 feet. These speci-

mens were collected by Everett who also collected at high altitudes on Lombok and took there the types of *Oreophryne monticola*. It is of course quite possible that this frog occurs on both islands, but it is also possible that some mistake occurred and that the types of *florensis* were actually taken on Lombok. This seems to be the second time the species has been caught.

The tadpole has not been described, and in view of the fact that Van Kampen (*op. cit.*, p. 201) unites the species with *R. papua*, it may be emphasized that these tadpoles differ from his description of the tadpoles of *papua* from New Guinea and the Aru Islands in having the labial teeth $\frac{1}{2}$ instead of $2-\frac{1}{2}$.

Body length one and two-thirds times its width; tail twice as long as body and four times as long as deep; nostril equidistant between eye and snout; eyes superior, interocular width equals internasal width; spiracle nearer posterior end of body than tip of snout; papillæ on sides of mouth and below; teeth $\frac{5}{2}$; all upper rows except outer interrupted, the second only narrowly so; lower rows nearly equal, the inner slightly interrupted; brown above, black below; tail lighter with a few dark spots; length 57 mm.

***Rana jerboa* (Günther)**

A small specimen from Tjibodas.

***Rana chalconota* (Schlegel)**

Three transformed specimens from Buitenzorg and 21 from Tjibodas, and 41 tadpoles from Tjibodas. The notes were heard at Tjibodas May 8-13. The call is a mewing or squeaking sound, rather cat-like or bird-like. While it was usually delivered from the water's edge, on at least one occasion a calling male was taken from a tree over six feet up, and a large female was on the same tree. On the night of May 12 a great many of them were congregated on the branches of an *Araucaria* tree where the branches dipped into the water of the lake. Next morning there was a floating film of eggs on the water at this spot. These observations do not corroborate nor wholly contradict those of the Sarasins in Ceylon, but at least show that if *chalconota* DOES lay its eggs out of water, they do not long remain there, and that the approximation to the habits of *Rhacophorus* is not exact.

***Rana erythræa* (Schlegel)**

Seven from Buitenzorg. I heard the call on the night of May 24. It was much like that of *chalconota*, but shorter and more bird-like.

Rhacophorus leucomystax (Kuhl)

One specimen of the striped variety and two tadpoles from Tjibodas; eleven specimens of the unstriped variety from Sembalun on Lombok.

Rhacophorus javanus Böttger

Fourteen specimens from Tjibodas, and twenty-nine tadpoles. The note is a croak, and was heard May 11–12. In life the colors are brown, with dark gray mottling; the concealed surfaces of the legs and the webs are bright orange; the dermal ridges are white. On one occasion three of these frogs were on a small dead branch above the water, and I watched them for some time, during which they were silent and immobile. Finally I caught them, to discover that one had not moved for so long that a spider had used him as part of the attachment for a web!

Rhacophorus reinwardtii (Boie)

One specimen from Tjibodas. A faded specimen of this species is probably the basis for Ahl's new *R. barbouri* (1927, Sitz. Ges. nat. Fr., p. 45).

Philautus aurifasciatus (Schlegel)

Twenty-two specimens from Tjibodas. Some of these are very small and recently transformed. The smallest measures only 6 mm. They were calling from trees and bushes in the woods, well away from water. The call was "ek ik," and the whole belly was involved in the vocal sac. I am inclined to consider that some *Philautus* at any rate may well represent a natural group, derived no doubt from *Rhacophorus*, but not necessarily to be merged with it. The character of the vomerines being edentulous may be variable and of little weight in some groups, but certainly the single species of *Philautus* I saw was quite different in facies from the three *Rhacophorus*, and it is more practical to keep any distinction which possibly separates natural groups until actual generic revision, species by species, is done. Then, and not until then, will the true generic characters become apparent; and until then there is no assurance that internal features are of any greater significance than external features.

DISCUSSION

The Amphibian fauna of the Lesser Sundas east of Wallace's Line now numbers 17 species, 7 of them restricted to the region. This is a higher percentage of endemism than is found in the lizards or the snakes and is obviously correlated with the lesser powers of dispersal of the

frogs. Of the endemics one is eastern (*Hyla everetti*), two is western, and four belong apparently to an older fauna, derived from the West, but now found chiefly in the Lesser Sundas, Celebes, and the Moluccas. Of the non-endemics one is eastern (*Hyla infrafrenata*), one (*Rana modesta*) belongs to the older western fauna, and seven are modern western forms. Compared to the reptiles, the relative absence of eastern forms is very noticeable, as is the large element formed by the older western fauna. Within each of these faunal groupings the percentage of endemism is nearly the same as in each of the similar groups of snakes and lizards, and the higher total endemism among the frogs may be accounted for by the higher percentage of the middle fauna. The difficulty of migration into these islands from the East, seen in the snakes more than in the lizards, is still more marked in the frogs.

Of the total fauna of 17, 11 were taken, a slightly better showing than in the lizards, and much better success than we had with the snakes.

Twenty species were taken on Java, fourteen of them at Tjibodas.

The total herpetological collections of the Douglas Burden Expedition to the Island of Komodo number 1616 specimens, 73 species, and 6 subspecies.

