

## AMPHIBIANS AND REPTILES FROM SIMBAI, BISMARCK-SCHRADER RANGE, NEW GUINEA

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### Abstract

Frogs: *Litoria angiana*, *L. arfakiana*, *L. micromembrana*, *Nyctimystes disrupta*, *N. foricula*, *N. kubori*; skinks: *Sphenomorphus flavipes*, *Emoia pallidiceps*, *Scincella stanleyana*, *S. prehensicauda*; and the snake *Natrix montana* are reported from Simbai (altitude 1770 m) in the Bismarck-Schrader mountains of New Guinea. Taxonomic problems associated with *N. disrupta* and the lygosomines are discussed but not resolved. *N. disrupta* is added to the list of montane, riparian anurans known to be host to endoparasitic leeches. Marked sexual dichromatism in *S. prehensicauda* is described and illustrated. The Simbai anuran fauna appears to be similar to that of the adjacent Kaironk Valley and to that of the Wahgi-Sepik Divide 40 km further S. Finally, Rappaport's study of the regulation of the consumption of small animals by natives, and Bulmer and Tyler's comparison of modern and native classifications of frogs in this area are discussed.

### Introduction

This contribution to the herpetology of New Guinea concerns a small collection of six species of hylid frogs and five species of reptiles constituting the first collection reported from the Simbai Valley.

Simbai Patrol Post is located about 113 km W. of Madang on the NE. side of the Bismarck-Schrader mountain range (Fig. 1). The settlement lies in the upper valley of the Simbai River at an altitude of about 1740 m. The Schrader Range lies to the N. and W. of Simbai, the Bismarck Range to the S. and E. The SW. side of the ranges are drained at this point by the Kaironk River. The Simbai-Kaironk divide is about 2000 m above sea level, while in this region the ridges of the ranges vary from 2225 m to 2625 m. The lowlands on either side of the ranges are less than 600 m above sea level.

The climate and ecology of the neighbouring Kaironk Valley have been described by Bulmer and Tyler (1968). Conditions near the summit of Mt. Kominjim just north of Simbai have been described by Gilliard and Le Croy (1968), and Rappaport (1967) provides a detailed account of environmental conditions in the Bismarck Range a few miles S. of Simbai. The climate of this region is subtropical; annual rainfall varies between

2540-3810 mm. Originally the bases of the ranges were covered with lowland rainforest, the flanks of the ranges up to about 1825 m with lower montane rainforest, and the top of the ridge with montane or cloud forest. Today the valleys of the Simbai and Kaironk are populated by Karam and Maring horticulturalists and much of the lower montane forest has been cleared or disturbed (Pl. 8, fig. 2). Except in the main valleys where settlement occurs at higher altitudes, only remnants of virgin forest occur below about 1600 m. Above that level the forests are still relatively undisturbed along much of the Bismarck-Schrader Range (Pl. 8, fig. 3). At Simbai, however, the grasslands and cultivated areas are continuous from the Simbai to the Kaironk, so separating and effectively isolating the forests of the Schrader Range from those of the Bismarck and other ranges in the central highlands.

Although the Bismarck-Schrader Ranges are still relatively remote they have been visited by several biologists and anthropologists. Three parties collected amphibians and reptiles in the Simbai-Kaironk area prior to the author's visit. Undescribed collections made by H. G. Cogger in the upper Kaironk Valley and by the late E. T. Gilliard on Mt. Kominjim are in the collections of the Australian Museum and the American Museum of Natural History

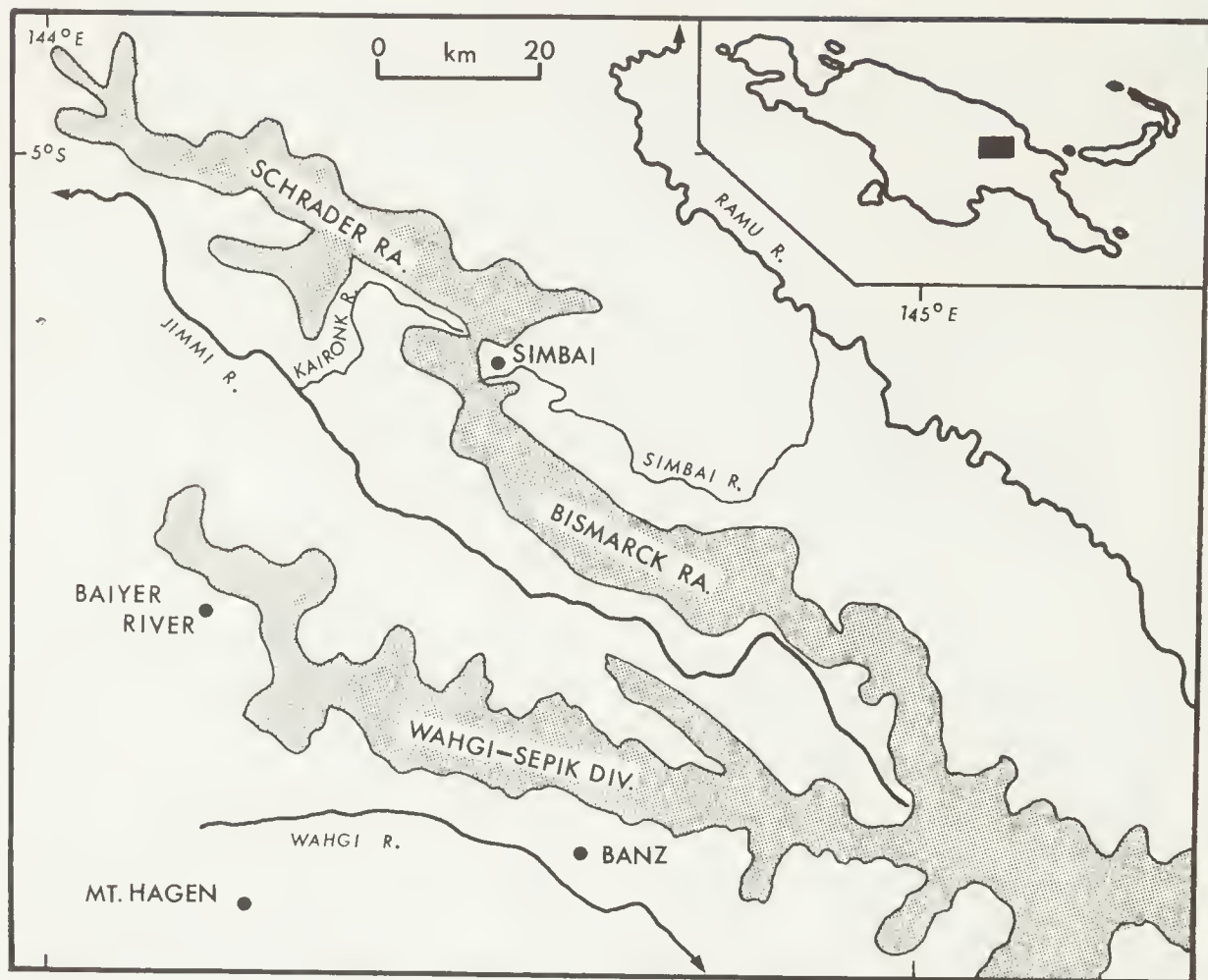


Fig. 1—Area of the central highlands of New Guinea discussed in the text showing the relationships of the main mountain ranges. Inset shows the location of the larger map.

respectively. R. N. H. Bulmer collected nearly 500 frogs in connection with a detailed study of the ecology of the Karam in the upper Kaironk. This collection, which contains at least 19 species, has been reported by Bulmer and Tyler (1968). The present collection was made at the Anglican Mission, Simbai, on 1 Jan., 1966. All specimens were collected during the day in nearby native gardens and along the banks of the swiftly flowing Simbai River, at an altitude of about 1770 m. The specimens have been deposited in the National Museum of Victoria; their registration numbers are indicated below.

### Species Represented

#### ANURA

##### *Litoria angiana* (Boulenger)

Specimens: Two adult males (D 14472, 14478).

Discussion: These specimens agree with Tyler's (1968) description of this morphologically variable species. Both specimens have a continuous fold on the posterior surface of the forearms and nuptial pads a little larger but of the same shape of those illustrated by Tyler (1963, Fig. 3B). This species is now known throughout the mountains of New

Guinea, occurring near streams at altitudes of 1225-2750 m.

The Australian hylid frogs previously placed in the genus *Hyla* are here referred to the genus *Litoria* Tschudi on the authority of Tyler (1971).

*Litoria arfakiana* Peters and Doria.

Specimens: Three adult males (D14473, 14480-1).

Discussion: These males agree with those described by Tyler (1968). The long unwebbed fingers, tubercles on the upper eyelid, heel, and vent (absent from the tarsi), and the prominent pointed snout, appear to characterize this species. In life two of the males were brown dorsally, the other was olive green. *L. arfakiana* has been collected throughout the mountains of New Guinea at altitudes of 775-1825 m.

*Litoria micromembrana* (Tyler).

Specimens: 13 adults (D14462-71, 14475, 14477, 14479).

Discussion: These specimens agree closely with Tyler's (1968) description of this species. All of the specimens were collected in vegetation along the side of the river. This species is now known from a number of localities in the highlands of central New Guinea at altitudes of 1225-2450 m.

*Nyctimystes disrupta* Tyler.

Specimen: One adult male (D14218).

Discussion: Tyler (1963c) distinguished this species from the morphologically similar *N. papua* on the basis of differences in palpebral venation, the degree of webbing on the fourth finger, and the ratio of the eye-nostril to internarial distance. While the above specimen agrees closely with the description of Tyler's holotype it is intermediate between these two taxa in all three diagnostic characters. Specimens collected by H. G. Cogger (pers. comm. 1966) were also morphologically intermediate between *N. disrupta* and *N. papua* as presently defined.

*N. disrupta* was previously known from the Kaironk Valley and from near Baiyer River, about 50 km to the SW. (Tyler 1963c). *N. papua* was described from specimens collected

on Mt. Victoria in the Owen Stanley Range (Boulenger 1897) and is widespread in the highlands between 1525 and 2275 m (Zweifel 1958, Tyler 1963b). One of the five syntypes of *N. papua* in the British Museum has subsequently been referred to *N. semipalmata* (Parker 1936). More recently Tyler (1963b) has suggested that the type series may still not be conspecific. The validity of *N. disrupta* may therefore depend, in part, on the selection of a lectotype from among the four remaining syntypes in the British Museum and a single syntype in the Museum of Comparative Zoology. As Boulenger's original description of *N. papua* includes an illustration of one individual (1897, Pl. 1, fig. 5) the specimen represented should become the lectotype. Until such a lectotype is designated *N. disrupta* must be regarded as a species of doubtful validity possibly synonymous, in part, with *N. papua*.

When captured this frog exuded a slimy secretion with a sickly odour. A large endoparasitic leech was found in the dorsal lymph sac. Although such parasitism has not been reported previously in this species, these unusual infestations are now known to occur in most of the common riparian anura in the New Guinea highlands: *Rana grisea*, *Litoria angiana*, *L. arfakiana*, *L. micromembrana*, *N. kubori*, and *N. papua* (Mann and Tyler 1963, Tyler, Parker and Bulmer 1966, Tyler 1968).

*Nyctimystes foricula* Tyler.

Specimens: One adult male and one juvenile (D14030-1).

Discussion: The specimens agree closely with Tyler's (1963c) original description, being green above and yellow below in life. The palpebral venation differs from that of the sympatric *N. kubori* in that the veins are broad, parallel, and oblique. This species has been reported previously only from the Kaironk Valley.

*Nyctimystes kubori* Zweifel.

Specimens: Four adult males (D14214-7).

Discussion: This species was described by Zweifel (1958) and subsequently by Tyler (1963b, c). The present series conform closely to the males described by Tyler (1963b). This



species is now known from a number of localities in the central highlands of New Guinea at altitudes between 1525 and 1975 m.

#### REPTILIA: SQUAMATA

##### *Scincella stanleyana* (Boulenger).

Specimens: Seven adults and four juveniles from Simbai (D14018-28). An additional individual was collected in montane forest at about 2130 m on the trail between Simbai and Kundan (D14029).

Discussion: This small, ground dwelling skink was common beneath rotting vegetation in the gardens around Simbai. Adults have snout-vent lengths of 48-59 mm. All specimens have a dark brown lateral line separating the copper coloured back from the cream under-surface. In immature individuals there is also a broken, white, dorso-lateral line extending from the upper eyelid onto the flanks. This species is widespread in the mountains of New Guinea (Loveridge 1948, and undescribed collections in the Museum of Comparative Zoology).

##### *Scincella prehensicauda* (Loveridge).

Specimens: Six females (D14012-7) and four males (D14008-11).

Discussion: This small arboreal skink with striking white eyelids is unusual in possessing marked sexual dichromatism (Pl. 8, fig. 1). In life, females are brown dorsally with darker brown crossbars and small paler patches, particularly on the sides. There are conspicuous dark stripes on the sides of the neck. This colouration is little changed on preservation. In contrast the males, which are uniformly green in life, are a pale golden brown colour in alcohol. The females are also slightly larger than the males, as indicated by the following measurements of individuals with undamaged tails (data in mm).

|         | No. | Total-length | Tail length |
|---------|-----|--------------|-------------|
| Females | 4   | 135-151      | 70-76       |
| Males   | 3   | 121-125      | 63-68       |

The Karam natives are well aware of this dimorphism, pointing out to the author in pidgin English that: 'dispela man bilong dispela mari' and *vice versa*.

Greer and Raizes (1969) have shown how the green colour of the males of this species is

due to the presence of a pigment in the blood plasma, which gives the muscles, bones, and other tissues a striking green colour. They report that females are similarly coloured internally but do not appear green externally because of the presence of brown pigment in the scales.

This species is now known from several localities in the central highlands of New Guinea.

##### *Sphenomorphus flavipes* (Parker).

Specimen: One adult (D14005).

Discussion: This handsome arboreal skink has a body length of 90 mm and a total length of 180 mm. Dorsal surfaces are dark brown with cream spots while the belly is a fine mosaic of cream, yellow, and brown. The tail is marked with 6-7 longitudinal brown stripes. The specimen was collected 4 m above the ground in a small *Casuarina* tree.

Greer and Raizes (1969) note that the predominant ground colour of both sexes of this species is brown, and that there are three distinct colour morphs: crossbanded, striped, and plain. The present specimen belongs in the last group. Loveridge (1948, p. 354) was therefore mistaken in describing the variation in his three specimens (referred to *Lygosoma* (*Leiolopisma*) *flavipes*) as a case of sexual dichromatism.

As in *Scincella prehensicauda* this species also possesses a green blood pigment (Greer and Raizes 1969). According to these authors this phenomenon is known in only one other amniote: *Leiolopisma virens anolis*, an arboreal skink from New Guinea and the Solomon Is. The apparent uniqueness of the green blood pigment, coupled with certain morphological features and similarity of distribution patterns, indicate that these three species should probably be placed in a single genus (Greer, in preparation).

##### *Emoia pallidiceps* De Vis.

Specimens: One adult and one juvenile (D14006-7).

Discussion: Loveridge (1948) treated this species as a race of *E. baudini*. Brown (1953), in a subsequent revision of the *baudini* com-

plex resurrected *E. pallidiceps* as a distinct species. The specimens from Simbai agree closely with Brown's description. The adult measures 53 mm from snout to vent and is 128 mm in total length. It is dark brown dorsally with black sides and there is a white lateral line running from the ear to the shoulder, continuing as a series of spots to the hind limb.

*Natrix montana* Jeude.

Specimen: One juvenile (D14004).

Discussion: The specimen has a total length of 190 mm, a tail length of 43 mm, divided anal and subcaudal scales, and 15 rows of scales at the mid-body. It was collected beneath a log on the river bank.

### Discussion

#### ANURANS OF THE BISMARCK-SCHRADER RANGE

Collecting over a period of several years, Bulmer and Tyler (1968) were able to report 19 species of anurans from the upper Kaironk Valley and the adjacent forests of the Schrader Range. Ten species of hylids, eight microhylids, and one ranid occur in that area:

*Litoria angiana*, *L. arfakiana*, *L. bulmeri*, *L. micromembrana*, *L. modica*, *Nyctimystes disrupta*, *N. foricula*, *N. kubori*, *N. narinosa*, *N. sp. indet.*, *Sphenophryne brevicrus*, *Cophixalus parkeri*, *C. riparius*, *C. shellyi*, *C. variegatus*, *Asterophrys wilhelmana*, *Xenobatrachus rostratus*, *Barygenys sp.*, and *Rana grisea*.

This is essentially a montane fauna: most of these species are not known from below 1200 m and all are restricted to altitudes of more than 600 m. Generally speaking the hylids are the dominant group in the cleared areas along the valley floor while the microhylids are restricted to the forests.

On the basis of present knowledge, the adjacent Simbai Valley contains the six hylids reported above and *Litoria bulmeri* which Gilliard collected at 2530 m on Mt. Kominjim (Tyler 1968). All species reported from the Simbai watershed are represented in the larger Kaironk collection. The absence of microhylids in the Simbai collection is probably due

to the fact that the collection was made in native gardens near the river, rather than in the lower montane or montane forest. At this time, therefore, the data suggest that the anuran fauna of these two areas on either side of the mountain range are probably very similar.

Although herpetological exploration of the New Guinea highlands is still in its infancy the anurans of the Wahgi-Sepik Divide, about 40 km south of Simbai, have been the subject of a number of recent papers by Tyler (1963a, b, c, 1968) and Zweifel (1956a, b, 1958, 1962). It can be seen in Fig. 1 that the Bismarck-Schrader Range and the Wahgi-Sepik Divide converge near Mt. Wilhelm in the E. The forested ridges of these ranges, which are still largely unsurveyed, vary in altitude between 2100-3100 m with summits rising up to 4510 m. As the lower montane and montane forests appear to be continuous along these mountain ranges, it might be expected that the fauna of the Bismarck-Schrader Range near Simbai would be similar in species composition to that of the Wahgi-Sepik Divide near Banz or Nondugl.

The comparison of the faunal lists of these two areas shows that in fact the two are remarkably similar. Sixteen of the 18 described species collected in the upper Kaironk Valley are known from elsewhere in the central highlands. All but one of these 16 (*Cophixalus variegatus*) have been collected on the Wahgi-Sepik Divide. Only two taxa (*Litoria bulmeri* and *Nyctimystes foricula*) have not yet been reported from outside the Kaironk-Simbai area. On the other hand, there are five species (*L. becki*, *L. darlingtoni*, *L. iris*, *Metopostira ocellata*, and *C. darlingtoni*) known from the Wahgi-Sepik Divide which so far have not been found on the Bismarck-Schrader Range. More detailed comparison of the two faunas will have to await the availability of data derived from additional field work, and the clarification of a number of distributional and taxonomic problems.

#### ANURANS AND MAN IN THE BISMARCK-SCHRADER RANGE

Finally attention is drawn to the work of two anthropologists who have studied the relations



between the natives of this area and the non-domestic fauna. Rappaport (1967) studied the role of ritual in the ecology of the Tsembaga group of the Maring people who live about 10 km south of Simbai. Rappaport (1967) and Bulmer (pers. comm. 1966) have drawn attention to the fact that frogs, lizards, and other small animals constitute a small but important part of the diet of the Maring and Karam people. On several occasions the author saw children carrying home frogs wrapped in leaves or secured by the legs. Although children in this area do not exhibit symptoms of severe protein deficiency, Rappaport presented evidence suggesting that their protein intake may be inadequate. It is very interesting, therefore, that in the Tsembaga he found that taboos operated to make most of the subsidiary sources of animal protein available to women and children but precluded them from adolescents and adult males. He concluded that such ritualistic regulation maximizes the value of such foods for the population as a whole.

It is partly because of the dietary importance of small animals like frogs to the natives of this area that their knowledge of the natural history of such animals is so remarkable. Bulmer, in his field study of the Karam in the upper Kaironk Valley, recorded the native names of all specimens he received. He was subsequently able to show that the Karam classification of frogs is very similar to that adopted by trained herpetologists (Bulmer and Tyler 1968). The exceptions to this generalization are particularly interesting as they involve *Litoria angiana* and *Nyctimystes disrupta*, taxa which have troubled museum workers. In the case of *L. angiana* the Karam, like the museum taxonomists, have attempted to describe the variation of this highly variable species by reference to a series of taxa. In the second case Bulmer and Tyler note that the Karam recognize two specimens as being equivalent to the taxon *N. disrupta*. It may well be that future studies will reveal the presence of sibling species presently confused under this name. Linguistic studies of the type carried out by Bulmer may guide biologists to a number of hitherto unrecognised species complexes.

### Acknowledgements

I am indebted to Dr. H. G. Cogger for his assistance in the comparison of the Simbai specimens with collections in the Australian Museum, to Professor R. N. H. Bulmer and Dr. A. E. Greer for useful discussions, to W. S. Kimpton for assistance in the field, to Turid Hölldobler for the preparation of the photographs, and to Michael J. Tyler for his help in checking my hylid identifications, reading, and helpfully criticizing the manuscript. I am especially indebted to Father John Cottier and his wife for their generous hospitality at the Anglican Mission, Simbai. Grateful acknowledgement is also made to the Trustees of the National Museum of Victoria for a contribution towards the cost of the author's field work in New Guinea.

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### Explanation of Plate 8

- Fig. 1—Sexual dichromatism in *Scincella prehnicauda*. The upper two specimens are females, the lower pair are males.
- Fig. 2—Simbai Patrol Post (altitude 1740 m) and 600 m airstrip near the headwaters of the Simbai River. Note that the forest has been cleared from the valley floor and lower ridges.
- Fig. 3—Montane or cloud forest 20-30 m high on the trail between Simbai and Kundan at an altitude of about 2100 m.

