

No. 5. — *Scientific Results of a Fourth
Expedition to Forested Areas in East and Central Africa*

V

Amphibians

BY ARTHUR LOVERIDGE

CONTENTS

	Page
Introduction.....	377
Acknowledgements.....	378
Summary of Taxonomic Alterations.....	379
Index to List of Species collected.....	380
Systematic Discussion.....	382
Bibliography.....	436

INTRODUCTION

The collection on which the following report is based, was made by the author while investigating the fauna of certain forested regions of East and Central Africa. The enquiry was carried out on behalf of the Museum of Comparative Zoölogy with a fellowship granted by the John Simon Guggenheim Memorial Foundation of New York.

A synopsis of the itinerary is given in the caption accompanying Plate 1—a map showing the principal position of the collecting localities. Altitudes and detailed information regarding the various camps will be furnished in the final report of this series which will deal with the general conclusions arrived at.

The period of collecting amphibians was from October 27, 1938, to July 25, 1939, during which time 1,681 amphibians, representing 77 forms, were secured. Ten of these were new to the Museum of Comparative Zoölogy, exclusive of certain others not previously recognized, but now considered valid as a result of this study of additional material.

Three forms are here described as new, one (in parenthesis) is based on material taken during an earlier expedition. The new forms are:

<i>Bufo micranotis rondoensis</i>	Nchingidi, Rondo Plateau, T.T.
<i>Hyperolius parkeri rovumae</i>	Kitaya, Rovuma River, T.T.
(<i>Arthroleptis xenodactyloides nkukae</i>)	Nkuka Forest, Rungwe Mtn., T.T.

In addition to these new forms, the undermentioned races or species are recorded for the first time for certain countries.

New for Uganda

Bufo funereus Bocage
Chiromantis rufescens (Günther)
Hyperolius alticola Ahl
Rana fuscigula angolensis Bocage
Rana christyi Boulenger
Phrynobatrachus plicatus (Günther)
Phrynobatrachus versicolor Ahl

Four of these, taken in the Budongo Forest, were already known from the Ituri Forest of the eastern Belgian Congo.

New for Tanganyika Territory

Leptopelis concolor Ahl
Hyperolius kivuensis Ahl
Rana mascareniensis venusta Werner

New for Belgian Congo

Xenopus laevis bunyoniensis Loveridge
Arthroleptis xenochirus Boulenger

New for Belgian Ruanda

Rana mascareniensis venusta Werner

Several species, most of which may be regarded as rareties, might be singled out for special mention, among them: *Leptopelis n. christyi*, *Megalixalus uluguruensis*, *Hyperolius schubotzi*, *H. flavomaculatus*, *Arthroleptis xenochirus*, *Spelaeophryne methneri*, and *Hoplophryne rogersi*.

ACKNOWLEDGEMENTS

The opportunity is taken of thanking Dr. Thomas Barbour, Director of the Museum of Comparative Zoölogy, for the support and encouragement which he has given to the prosecution of this undertaking,

and to the John Simon Guggenheim Memorial Foundation without whose generous aid this expedition would not have been possible.

In appreciation of the action of His Excellency the Governor of the Congo Belge in granting permission to collect on Idjwi Island, a selection of duplicates of such species as were collected in Belgian territory are being set aside for dispatch to the Congo Museum, Tervueren, after the German evacuation of Belgium.

The photographs illustrating this report were taken by my son, Brian A. Loveridge, and for permission to use the blocks for plate 4 we are indebted to the Editor of the Scientific Monthly, in which journal (June and July, 1940) they appeared as illustrations to a popular account of the safari.

The colored plates 2 and 3 showing age and sex dichromatism in the RHACOPHORIDAE are furnished through the generosity of Dr. Barbour. They represent the skillful work of Mr. Eugene N. Fischer, being based on color notes made in the field.

SUMMARY OF TAXONOMIC ALTERATIONS

The following forms are accorded subspecific rank:

Hylambates christyi Boulenger as *Leptopelis notatus christyi* (Boulenger).
Rappia sansibarica Pfeffer as *Hyperolius citrinus sansibaricus* (Pfeffer).

Topotypes of numerous doubtful species were collected and result in my considering the following as synonyms:

* <i>Bufo r. kisolensis</i> Loveridge	= * <i>B. regularis regularis</i> Reuss
<i>Leptopelis budduensis</i> Ahl	= *? <i>Leptopelis n. christyi</i> Boulenger
* <i>Hyperolius macrodactylus</i> Ahl	= <i>Hyperolius schubotzi</i> Ahl
<i>Hyperolius ornatus</i> Laurent	= <i>Hyperolius schubotzi</i> Ahl
* <i>Hyperolius kwidjwiensis</i> Ahl	= * <i>Hyperolius kivuensis</i> Ahl
* <i>Hyperolius kandti</i> Ahl	= * <i>Hyperolius kivuensis</i> Ahl
* <i>Hyperolius koehli</i> Ahl	= * <i>Hyperolius kivuensis</i> Ahl
* <i>Hyperolius substriatus</i> Ahl	= * <i>Hyperolius puncticulatus</i> (Pfeffer)
* <i>Hyperolius microps</i> Günther	= * <i>Hyperolius pusillus</i> (Cope)
* <i>Hyperolius milnei</i> Loveridge	= * <i>Hyperolius pusillus</i> (Cope)
<i>Arthroleptis schubotzi</i> Nieden	= * <i>Arthroleptis xenodactylus</i> Boulenger
* <i>Arthroleptis affinis</i> Ahl	= <i>Arthroleptis adolfifriederici</i> Nieden
* <i>Arthroleptis schoenebecki</i> Ahl	= <i>Arthroleptis adolfifriederici</i> Nieden
* <i>Arthroleptis vagus</i> Ahl	= * <i>Arthroleptis s. lonnbergi</i> Nieden
* <i>Arthroleptis ukamiensis</i> Ahl	= * <i>Arthroleptis s. lonnbergi</i> Nieden

*Topotypes or paratypes compared.

LIST OF SPECIES COLLECTED

	Page
CAECILIIDAE	
<i>Boulengerula boulengeri</i> Tornier	382
<i>Scolecomorphus vittatus</i> (Boulenger)	383
PIPIDAE	
<i>Xenopus laevis victorianus</i> Ahl	383
<i>Xenopus laevis bunyoniensis</i> Loveridge	383
<i>Xenopus muelleri</i> (Peters)	384
BUFONIDAE	
<i>Bufo brauni</i> Nieden	384
<i>Bufo regularis regularis</i> Reuss	385
<i>Bufo funereus</i> Bocage	386
<i>Bufo lönnbergi nairobiensis</i> Loveridge	387
<i>Bufo micranotis rondoensis subsp. nov.</i>	387
<i>Nectophrynoides tornieri</i> (Roux)	388
RHACOPHORIDAE	
<i>Chiromantis ? rufescens</i> (Günther)	389
<i>Chiromantis xerampelina</i> Peters	389
<i>Leptopelis concolor</i> Ahl	390
<i>Leptopelis johnstoni</i> (Boulenger)	391
<i>Leptopelis notatus christyi</i> (Boulenger)	392
<i>Leptopelis vermiculatus</i> (Boulenger)	394
<i>Hylambates maculatus</i> Duméril	394
<i>Kassina senegalensis</i> (Duméril & Bibron)	395
<i>Megalixalus fornasinii fornasinii</i> (Bianconi)	395
<i>Megalixalus leptosomus</i> (Peters)	396
<i>Megalixalus uluguruensis</i> Barbour & Loveridge	397
<i>Megalixalus brachynemis</i> Boulenger	398
<i>Hyperolius schubotzi</i> Ahl	399
<i>Hyperolius kivuensis</i> Ahl	400
<i>Hyperolius</i> sp.	401
<i>Hyperolius alticola</i> Ahl	401
<i>Hyperolius montanus</i> (Angel)	402
<i>Hyperolius undulatus</i> (Boulenger)	402
<i>Hyperolius udjijiensis</i> Ahl	402

	Page
<i>Hyperolius flavomaculatus</i> Günther	403
<i>Hyperolius argentovittis</i> Ahl	404
<i>Hyperolius ahli</i> Loveridge	404
<i>Hyperolius puncticulatus</i> (Pfeffer)	405
<i>Hyperolius mariae</i> Barbour & Loveridge	406
<i>Hyperolius citrinus sansibaricus</i> (Pfeffer)	407
<i>Hyperolius citrinus citrinus</i> Günther	407
<i>Hyperolius parkeri parkeri</i> Loveridge	409
<i>Hyperolius parkeri rosumae</i> subsp. nov.	410
<i>Hyperolius nasutus</i> Günther	411
<i>Hyperolius pusillus</i> (Cope)	412

RANIDAE

<i>Arthroleptides martiensseni</i> Nieden	413
<i>Rana albolabris albolabris</i> Hallowell	413
<i>Rana galamensis bravana</i> (Peters)	413
<i>Rana fuscigula fuscigula</i> Duméril & Bibron	414
<i>Rana fuscigula chapini</i> Noble	414
<i>Rana fuscigula angolensis</i> Bocage	415
<i>Rana christyi</i> Boulenger	415
<i>Rana oxyrhynchus oxyrhynchus</i> Smith	416
<i>Rana oxyrhynchus gribinguiensis</i> Angel	417
<i>Rana mascareniensis mascareniensis</i> Duméril & Bibron	417
<i>Rana mascareniensis venusta</i> Werner	418
<i>Rana occipitalis</i> Günther	419
<i>Rana edulis</i> (Peters)	419
<i>Phrynobatrachus</i> spp.	420
<i>Phrynobatrachus natalensis</i> (Smith)	421
<i>Phrynobatrachus perpalmatus</i> Boulenger	421
<i>Phrynobatrachus acridoides</i> (Cope)	421
<i>Phrynobatrachus kinangopensis</i> Angel	422
<i>Phrynobatrachus plicatus</i> (Günther)	422
<i>Phrynobatrachus krefftii</i> Boulenger	422
<i>Phrynobatrachus dendrobates</i> (Boulenger)	423
<i>Phrynobatrachus versicolor</i> Ahl	423
<i>Phrynobatrachus graueri</i> (Nieden)	424
<i>Arthroleptis minutus</i> Boulenger	425
<i>Arthroleptis xenodactylus</i> Boulenger	426
<i>Arthroleptis xenodactyloides nkukae</i> subsp. nov.	427

	Page
<i>Arthroleptis xenochirus</i> Boulenger	428
<i>Arthroleptis</i> near <i>poecilonotus</i> Peters	429
<i>Arthroleptis adolfifriederici</i> Nieden	429
<i>Arthroleptis stenodactylus lönnbergi</i> Nieden	430
<i>Arthroleptis stenodactylus stenodactylus</i> Pfeffer	431
<i>Cacosternum boettgeri boettgeri</i> (Boulenger)	432
<i>Hemisis marmoratum marmoratum</i> (Peters)	432
 BREVICIPITIDAE	
<i>Callulina krefftii</i> Nieden	432
<i>Spelaeophryne methneri</i> Ahl	434
<i>Probreviceps macrodactylus macrodactylus</i> (Nieden)	434
<i>Breviceps mossambicus</i> Peters	434
<i>Hoplophryne rogersi</i> Barbour & Loveridge	435
 PHRYNOMERIDAE	
<i>Phrynomerus bifasciatus</i> (Smith)	435

CAECILIIDAE

BOULENGERULA BOULENGERI Tornier

Boulengerula boulengeri Tornier, 1896, Kriechthiere Deutsch-Ost-Afrikas, p. 164: Usambara Mountains, Tanganyika Territory.

10 (M. C. Z. 25001-9) Magrotto Mtn., T. T. 29. vi-10. vii. 39.

Distribution. These constitute the first record of its occurrence on this mountain which, however, is only twenty miles from the type locality. *S. vittatus* has already been recorded from Magrotto by Nieden (1912b).

Native name. Mango (Kisambara for caecilians).

Variation. Annuli 129-133, i.e. well within the range.

Size. Total lengths 112-250 mm.

Enemies. The largest specimen was recovered from the stomach of an elapine snake (*Elapsoidea güntherii*).

Habitat. Two juveniles were taken beneath logs; a 230 mm. adult in soggy wood of a rotten stump near clump of bamboos growing by stream.

SCOLECOMORPHUS VITTATUS (Boulenger)

Bdellophis vittatus Boulenger, 1895, Proc. Zool. Soc. London, p. 412, pl. xxiv, fig. 4: Usambara Mountains, Tanganyika Territory.

4 (M. C. Z. 25010-3) Magrotto Mtn., T. T. 1-10. vii. 39.

Native name. As last.

Variation. Annuli 132-149.

Size. Total lengths 132-145 mm.; diameter into length 29.5 to 36.6 times.

PIPIDAE

XENOPUS LAEVIS VICTORIANUS Ahl

Xenopus victorianus Ahl, 1924, Zool. Anz., 60, p. 370: Busisi, Lake Victoria, Tanganyika Territory.

5 (M. C. Z. 25014-7) Mabira Forest, U. 8. xi. 38.

50 (M. C. Z. 25018-27) Fort Portal, U. 12. xii. 38.

Native name. *Kikere* (Luganda).

Color. All are typical in having the bellies heavily spotted, those from Fort Portal against a background of rich yellow.

Size. Lengths from 43-64 mm.

Habitat. The Mabira frogs were taken from a cement tank at the Mubango coffee factory, the Toro series were brought in by two men.

XENOPUS LAEVIS BUNYONIENSIS Loveridge

Xenopus laevis bunyoniensis Loveridge, 1932, Proc. Biol. Soc. Washington, 45, p. 114: Bufundi, Lake Bunyonyi, Uganda.

1 (M. C. Z. 25029) Nyakabande, U. 28. i. 39.

81 (M. C. Z. 25030-9) Mushongero, U. 1. ii. 39.

2 (M. C. Z. 25040-1) Mamvu, B. C. 22. ii. 39.

Native names. *Magulumberi* (Lukiga); *derima* (Lulega).

Color. Bright yellow below, at least posteriorly, only one light yellow one noted in the entire Mushongero series. My earlier assertion, based on an even larger series, that the belly is usually spotted, does not hold for the Mushongero series in which it is unspotted in 43 (lengths 25-48 mm.), and spotted only in 38 (lengths 28-68 mm.).

Size. This dwarf form from the cold waters of the Central African Highlands, commonly breeding at 35 mm., furnished six examples over 45 mm. of which the giant 68 mm. was a female, thus actually ex-

ceeding *victorinus*! These half-dozen larger frogs, however, possess the slender habitus of *bunyonensis*, their greatest body width being but slightly broader than the head.

Enemies. The feet of one frog were recovered from the stomach of an otter (*Lutra m. tenuis*).

Habitat. These little frogs were extremely abundant in the waters of Lake Mutanda, on whose shore Mushongero is situated. At times we would see individuals which were unable to submerge, swimming desperately on the surface with something of the appearance of half-drowned shrews. My boatmen said that they were ill so I captured one and found that it was inflated almost to the roundness of a ping-pong ball. As already pointed out by Parker, the majority are afflicted with helminths.

XENOPUS MUELLERI (Peters)

Dactylethra Muelleri Peters, 1844, Ber. Akad. Wiss. Berlin, p. 37: Mozambique.

14 (M. C. Z. 25042-50) Ujiji, T. T. 11. iii. 39.

Color. Bellies uniform, or only slightly spotted.

Size. Lengths 37-61 mm.

BUFONIDAE

BUFO BRAUNI Nieden

Bufo brauni Nieden, 1910, Sitz. Ges. naturf. Freunde Berlin, p. 450: Amani, Usambara Mountains, Tanganyika Territory.

2 (M. C. Z. 25051-2) Magrotto Mtn., T. T. 11. vii. 39.

Native name. *Jula* (Kisambara corruption of *chura* and applied to most toads and frogs).

Color. Above, rich reddish leaf-brown paling towards the periphery; from snout to anus a hair-like, yellow, vertebral line; an interorbital marking which is rich black finely edged with yellow; pairs of similar markings on the scapular, lumbar, and supra-anal regions, between these larger blotches there are several pairs of smaller spots; sides of face, and flanks, black, sharply demarcated from the dorsal coloring; limbs grayish or cream-colored, distinctly barred and spotted with black. Below, whitish, the limbs showing some black spotting; palms and soles black, but some of the tubercles white.

BUFO REGULARIS REGULARIS Reuss

Bufo regularis Reuss, 1834, Mus. Senckenberg., 1, p. 80: Egypt.

Bufo regularis kisolensis Loveridge, 1932, Occ. Papers Boston Soc. Nat. Hist., 8, p. 52: Kisolo, Kigezi District, Uganda.

- 8 (M. C. Z. 25053-8) S. Kinangop Plateau, K. C. 29. x. 38.
- 1 (M. C. Z. 25059) Budongo Forest, U. 29. xi. 38.
- 7 (M. C. Z. 25060-1) Kibale Forest, U. 9. xii. 38.
- 1 (M. C. Z. 25062) Bundibugyo, U. 20. xii. 38.
- 2 (M. C. Z. 25063) Mubuku Valley, U. 31. xii. 38.
- 3 (M. C. Z. 25064) Mihunga Ridge, U. 9. i. 39.
- 1 (M. C. Z. 25065) Nyakabande, U. 28. i. 39.
- 16 (M. C. Z. 25066-9) Mushongero, U. 1. ii. 39.
- 9 (M. C. Z. 25070-1) Kisenyi, B. R. 9. ii. 39.
- 2 (M. C. Z. 25072) Idjwi Id., B. C. 17. ii. 39.
- 1 (M. C. Z. 25073) Ujiji, T. T. 11. iii. 39.
- 1 (M. C. Z. 25074) Kitaya, T. T. 30. iii. 39.
- 1 (M. C. Z. 25075) Mikindani, T. T. 14. iv. 39.
- 2 (M. C. Z. 25076-7) Lindi, T. T. 1. vi. 39.

Native names. *Kikere* (Luganda; Lutoro; Lukonjo; Lulega); *mtuvu* ♂ and *ichcheri* ♀ (Lukiga); *kuvifata* (Luruanda); *ligumi* (Kiyao); *liumi* (Kimakonde; Kimawiha).

Variation. It is with some misgivings that I refer all these toads to the typical form: those from the Kinangop Plateau at 10,000 feet certainly appeared very different in life from those taken at the coast at altitudes of about 50 feet.

The numerous spinose warts on the interorbital space of the former may, and probably are, only conspicuous during the breeding season, which had just begun; nevertheless, breeding toads from elsewhere exhibit noticeably smoother crowns.

One might reasonably have supposed, as I did in 1932 when describing *kisolensis*, that toads from the wet highlands (circa 6000-8000 feet) of the Kigezi District in the vicinity of the Kivu Volcanoes, would differ from typical Egyptian specimens, but though the type series from Kisolo (or Kisoro) exhibited a greater degree of webbing on their hind feet, the series now obtained from Nyakabande and Mushongero (about six and twenty miles from Kisolo respectively) do not differ sufficiently to justify the retention of this race.

Color. In life. The following notes were made in the field. Kinangop. Above, adults (3 ♂♂, 3 ♀♀) bright green, their dorsal spots exceptionally elongate, thus presenting a different appearance from those seen at lower altitudes. The youngest differed from the adults only in possessing unusually rufous parotids.

Kibale Forest. Above, backs flecked with cream color, giving them an unfamiliar appearance.

Mushongero. Above, much cream color; a creamy white interorbital band and a pair of interorbital markings which are velvety black finely edged with cream; pairs of similar markings on the scapular and lumbar regions; a fine, cream, vertebral line and a creamy patch in centre of dorsum; a broad, cream, dorso-lateral band; from parotids to groin a black lateral band; limbs barred with black. Below, dirty white covered with a blackish network which laterally spreads up on to flanks; soles grayish black.

Kisenyi. Here the ♂♂ are bright yellow-ochre or yellowish green, but one, with a more rounded snout, has the markings of a ♀.

Lindi. The larger of two very young toads exhibits red on groin and on back of thighs, the younger on back of thighs only.

Size. Length of largest ♂♂, 87 (Kisenyi), 75 (Mushongero), 71 (Ujiji), 67 (Mubuku), 65 (Kinangop), 59 (Kibale); length of largest ♀♀, all of which, with the exception of Mihunga, *are gravid*, 100 (Budongo), 100 (Bundibugyo), 95 (Kisenyi), 90 (Mushongero), 80 (Kinangop), 80 (Nyakabande), 73 (Mihunga), 65 (Kibale), 60 (Kitaya). Measurements are in millimetres.

Breeding. As indicated above, females were gravid in most localities on the dates shown. Our arrival at Kinangop synchronized with that of the rains so that amphibians were assembling in every pool, the three males captured were all attempting to clasp the largest female with the result that they kept rolling over and over in the water to the accompaniment of curious little noises. Apparently assembling at Kisenyi, for males predominated in the proportion of 3 to 1 of those brought in by natives. Calling at Kitaya.

Parasites. Acarine parasites on Kinangop toads. See *Arthroleptis minutus* also.

Enemies. Two young recovered from the stomach of a green snake (*Chlorophis irregularis*) on Idjwi, one from a white-lipped snake (*Crotaphopeltis h. hotamboeia*) at Ujiji.

BUFO FUNEREUS Bocage

Bufo funereus Bocage, 1866, Journ. Sci. Lisboa, 1, p. 77: Duque de Bragança, Angola.

2 (M. C. Z. 25078-9) Mabira Forest, U. 9. xi. 38.

2 (M. C. Z. 25080-1) Budongo Forest, U. 30. xi. 38.

2 (M. C. Z. 25082-3) Kibale Forest, U. 9. xii. 38.

Distribution. Though widespread, and frequently recorded from Angola and the Congo, this species is new for Uganda, doubtless having been confused at times with *r. regularis* alongside which it occurs in at least two of the foregoing localities, and which it so closely resembles.

Variation. Differs from *B. r. regularis* in the complete absence of a tarsal fold, and the usually more extensive webbing of the toes.

Size. Length of only ♂, 57 mm., of ♀ ♀, 60–66 mm.

Breeding. Apparently about to spawn in all three localities.

BUFO LÖNNBERGI NAIROBIENSIS Loveridge

Bufo lönnbergi nairobiensis Loveridge, 1932, Occ. Papers Boston Soc. Nat. Hist., 8, p. 48: Nairobi, Kenya Colony.

16 (M. C. Z. 25084–9) S. Kinangop Plateau, K. C. 29. x. 38.

Variation. Entire series measured with following results. Third finger included 7.2–8.7 times in the length from snout to anus; fourth toe 4.6–5.5 times; tibia 2.5–3 times. Thus they are quite clearly referable to this form rather than to the typical one from Mt. Kenya as defined in my key on p. 50 of the above citation.

Size. Lengths of 13 ♂♂, 28–38 mm., of 3 ♀♀, 33–39 mm.

Breeding. The males were calling from large pools formed in cart tracks crossing the plateau at 10,000 feet. In such pools as had grassy bottoms these little toads might be seen walking about on the grass as if on land.

BUFO MICRANOTIS RONDOENSIS subsp. nov.

11 (M. C. Z. 25090–100) Nchingidi, T. T. 11–19. v. 39.

Type. Museum of Comparative Zoölogy, No. 25090, a non-breeding adult from Nchingidi, 3000 feet, Rondo Plateau, Lindi Province, southeastern Tanganyika Territory. Collected by Arthur Loveridge, May 11–19, 1939.

Paratypes. Museum of Comparative Zoölogy, Nos. 35091–35100, being 10 specimens with same data as type.

Diagnosis. Differs from *micranotis* Loveridge (1925, Proc. Zool. Soc. London, p. 770, pl. i, fig. 1) of Kilosa and the Uluguru Mountains, only in the throat being almost entirely white in the entire series, whereas in both sexes of *micranotis* (taken in amplexus) the throat is so heavily overlaid with black as to appear black.

Color. In life. Above, brown marbled with black; from nape to anus a hair-like, light, vertebral line (absent in some paratypes); warts slightly rufous encircled with black; sides of head white, streaked and spotted with black. Below, throat white very sparsely spotted or vermiculated with brown; chest, belly, and limbs faintly bluish white heavily overlaid with black.

The color often harmonized remarkably with the sandy soil on which this tiny species is found.

Size. Length of type from snout to anus, 19 mm., of paratypes 19 (2 ex.), 18 (2 ex.), 17 (2 ex.), 14 (2 ex.), 12 (2 ex.) mm.

Remarks. In view of the fact that none of the above attain to the size of typical *micranotis* (♂♂ 20–22 mm., ♀ 23 mm.), the possibility of the white throats being a subadult character should not be overlooked. Nchingidi is about 300 miles southeast of Kilosa, type locality of *micranotis*.

Diet. Stomachs held: chrysomelid larva; phalacrid beetle; fly (Cecidomyiidae); springtail (*Collembola*); a true bug; five termite workers; two land snails whose shells had been dissolved away.

Habitat. Following a night and morning of very heavy rain, the first of these toads was seen at 11 a.m. as it sought shelter under the awning of my tent which was pitched on sandy ground in a clearing on the outskirts of the forest. The rest were taken beneath logs lying at the forest-edge.

NECTOPHRYNOIDES TORNIERI (Roux)

Nectophryne tornieri Roux, 1906, Proc. Zool. Soc. London, **1**, p. 63, pl. ii, fig. 4: Ukami, Tanganyika Territory.

68 (M. C. Z. 25101–5) Magrotto Mtn., T. T. 1–6. vii. 39.

Color. In life. Adults. Above, ranging from pale gray through shades of olive and dusky brown to reddish brown with, or without, mottlings, scarcely two alike; bright yellow spots—one in front of each eye and three on either flank—present only in one female, which was gravid with tadpoles; a light vertebral line present on seven specimens only. Young. For the most part, very young toads presented a rather *Arthroleptis*-like appearance, being pale gray with dark sepia marblings.

Size. Lengths from 10–34 mm., the largest a gravid female.

Breeding. Most females from 26–34 mm. long, were gravid with eggs, a few with tadpoles.

Habitat. Apparently rare in the deforested area now occupied by the oil-palm plantation, though I took one on an oil palm at a height

of four feet and another on the floor of an adjacent patch of forest. Hearing that the sole surviving stand of wild bananas on the mountain were to be found on some rocky heights at Kitulwe, we made two journeys to the spot and there obtained 56 frogs of which about half were young.

RHACOPHORIDAE

CHIROMANTIS ? RUFESCENS (Günther)

Polypedates rufescens Günther, 1868, Proc. Zool. Soc. London, p. 486: West Africa.

2 Nests (M. C. Z. 25106) Budongo Forest, U. 5. xii. 38.

Distribution. The only record of the occurrence of a *Chiromantis* in Uganda known to me, is the inclusion of *C. xerampelina* in Boulenger's (1902a) list in Johnston's "Uganda Protectorate." As however, *C. xerampelina* in East Africa is chiefly a species of the coastal belt, though penetrating into the interior further south, it seems more probable that the species occurring in northwest Uganda is *rufescens*; unfortunately no frogs were collected.

Breeding. The eggs when fresh, were pale greenish, but turned bright orange on being dried, possible through exposure to formalin fumes. According to the native collector, the shrub, to whose leaves the nests are attached, was overhanging a stagnant stream at the forest edge.

CHIROMANTIS XERAMPELINA Peters

Chiromantis xerampelina Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 627: Tete and Sena, Mozambique.

Nest & 8 (M. C. Z. 25107-9) Kitaya, T. T. 25-31. iii. 39.

2 (M. C. Z. 25110-1) Mikindani, T. T. 12. iv. 39.

Native names. *Chitowa* (Kiyao); *kitowa* (Kimakonde), but applied to *Megalixalus*, *Hyperolius*, and *Rana edulis* as well.

Color. In life. ♀. Hind legs and groin of breeding frog tinged with yellow.

Size. Lengths of ♂♂ 48-50 mm., of ♀♀ 67-72 (M. C. Z. 25110).

Breeding. On March 25, nests, which appeared to be about two weeks old, were found on a fence in a rice swamp. On the 30th a freshly deposited nest was found in grass, no higher objects being in

the vicinity, six inches above the surface of a recently-formed pool, a female frog was found resting on the bank within a yard of the nest.

Habitat. Two other females and three males were taken one night as they rested on grass stems projecting from a pool and palm fronds overhanging it. The Mikindani females were taken at a height of nine feet while resting in a bush and tree respectively.

LEPTOPELIS CONCOLOR Ahl

Plate 2, figs. 5-6.

Leptopelis concolor Ahl, 1929, Sitz. Ges. naturf. Freunde Berlin, p. 192: Witu, Kenya Colony.

2 juv. (M. C. Z. 25112, 25300) Mikindani, T. T. 12. iv. 39.

1 juv. (M. C. Z. 25113) Siga Caves, T. T. 14. vi. 39.

1 hgr. (M. C. Z. 25114) Tanga town, T. T. 22. vii. 39.

Distribution. The above constitute the first records of the occurrence of this species in Tanganyika Territory.

Variation. The subadult frog has been compared with a series of topotypes from Witu. Identification of the juveniles, however, should be accepted with reserve as the characters are not too well defined in such very young frogs. The one from Siga Caves, near Tanga, appears to have a slightly longer hind limb, a condition possibly resulting from its subjection to the action of gastric juices and consequently slightly macerated state.

Color. This Siga froglet should possibly be referred to *johnstoni* for its back is green spotted with yellow as is the case with the young of that species, its digital characters, however, seem to be those of *concolor*. The Mikindani froglets, which are 2-3 mm. smaller, have uniformly green backs. The Tanga frog had assumed the brown livery of the adult as depicted in the accompanying plate.

Size. Lengths (M. C. Z. 25300) 16 + 10 mm., (25112) 15 mm., (25113) 18 mm., (25114) 30 mm.

Breeding. On April 12, at Mikindani, one froglet with the stump of a tail, another of same length but with tail already absorbed.

Enemies. Three juveniles, two partly digested and so discarded, recovered from the stomach of a spotted wood snake (*Philothamnus s. semivariegatus*) near Siga Caves.

Habitat. At Mikindani taken in rice swamp and on sandy soil in camp; at Tanga beneath rubbish on the outskirts of the township.

LEPTOPELIS JOHNSTONI (Boulenger)

Plate 2, figs. 3-4.

Hylambates johnstoni Boulenger, 1897, Proc. Zool. Soc. London, p. 803, pl. xlv, fig. 4: Kondowe; Karonga; and Nyika Plateau, Nyasaland.

13 (M. C. Z. 25125-35) Magrotto Mtn., T. T. 7. vii. 39.

Native name. *Nkewe* (Kisambara).

Variation. The series consists of a typically colored brown ♀, adult of 68 mm., and twelve frogs ranging from 18-48 mm. which I assume to be the young as they agree in all physical characters such as outer finger with one and a half joints free of web; outer toe with a narrow margin of web on the last joint; fourth toe with the last two joints free of web.

In coloration, however, they are amazingly different from the adult. In the field I thought they represented some distinct species but dissection of the 35 and 48 mm. frogs leads me to think that all are immature. See also remarks (Loveridge, 1936k, p. 387) on *johnstoni* from Ngatana.

Color. In life. 48 mm. Above, rich light green as if enameled, flecked with yellow; a conspicuous cream spot on each elbow, knee, and heel.

In life. 35 mm. As last, but lips, as well as spots white. In alcohol there is now no difference in the appearance of the lips of these two frogs, and the entire series, with two exceptions, exhibit a white line on the outer aspect of forearm and finger, and another on the outer aspect of foot and toe. No mention of such a mark was made in the field, however, yet they are too conspicuous to have escaped notice.

In life. Tailed froglet 18 + 25 mm. Above, as larger with back flecked with yellow, and white spots on elbow, knee, and heel, but no white on lips.

Size. Lengths 18-68 mm.

Breeding. On July 7, the largest female was distended with numerous white ova.

Diet. Orthoptera including some quite large grasshoppers.

Parasites. Large nematodes (*Amplicaecum involutum*) in intestines.

Habitat. I found the 48 mm. frog seated on my arm after I had brushed past some ferns projecting from the stem of an oil palm growing at the edge of the swamp—in which the tadpole was taken—immediately below my camp. The 35 mm. frog was in one of the fifty

wild bananas searched at Kitulwe. Most of the other young were taken one morning after heavy rain as they were squatting on broad-leaved plants in a little dell or clearing in the forest.

LEPTOPELIS NOTATUS CHRISTYI (Boulenger)

Plate 2, figs. 5-6. Plate 4, fig. 1.

Hylambates christyi Boulenger, 1912, Ann. Mag. Nat. Hist. (7), 12, p. 556:

Mabira Forest, Kyagwe, Uganda.

? *Leptopelis budduensis* Ahl, 1929, Sitz. Ges. naturf. Freunde Berlin, p. 199:

Northwest Buddu Forest, Tanganyika Territory.

♀ (M. C. Z. 25114) Mabira Forest, U. 7. xi. 38.

6 yng. (M. C. Z. 25115-9) Kibale Forest, U. 12. xii. 38.

2 ♀ ♀, 2 yng. (M. C. Z. 25120-3) Mihunga Swamp, U. 18. i. 39.

Native name. *Lulenga ya miti* (Luganda + Kiswahili = frog of the tree).

Variation. The series consists of three gravid females (43-50 mm.)? and 8 young (18-26 mm.) which bear little resemblance to the adults! These young, however, agree closely with the brief description of the 23 mm. Cameroon frog called *notatus* by Buchholz and Peters, 1875, and later figured by Nieden. Subsequently two 33 mm. frogs from Zima, Cameroon, formed the basis of the description of *Hylambates cubitoalbus* Boulenger, 1906, which Parker considers synonymous with *notatus*, but the two additional frogs from Bunyoro, Uganda, mentioned by Boulenger, Parker refers to *christyi*, which may, or may not, be subspecifically distinct. Trinomials are employed to show this close relationship and avoid further confusion.

The 50 mm. topotypic ♀ agrees with the Ruwenzori ♀ ♀ in differing from Boulenger's description of the 53 mm. holotype ♀ in the vomerine teeth being directly between (not behind the level of the hinder edge) the choanae; the snout is longer than (not as long as) the orbital diameter; the inner metatarsal tubercle is relatively small (not large) in the Mabira frog, but is large in the two Mihunga ♀ ♀.

The young differ from the adults, not only in coloration as described below, in their less extensive webbing which might fairly be described as "a rudiment" for the fingers, while the fourth toe has two joints free of web, and the fifth only one joint free. In the adults, on the other hand, the outer finger has only 1 joint free of web; the fourth toe also has only one joint free though there is a narrow, or moderately broad,

margin of web on the penultimate joint; the fifth toe is fully, though somewhat narrowly, webbed.

Color. In life. Kibale Forest. Young 18–20 mm. Above, rich, light green as if enameled; a conspicuous white spot on each elbow, knee, and heel. Below, pure white.

In life. Mihunga Swamp. Young 23–26 mm. Both bearing permanent spots like the foregoing, but those of the smaller are yellow.

In life. Mihunga Swamp. Gravid ♀ 46 mm., taken within 100 feet of the last, had, on its elbows only, fugitive light spots that disappeared on preservation. Above, bright green grass, on end of snout a cream-colored vertical spot, two more on lip; a dark brown canthal streak from nostril through eye to a short distance behind tympanum; an interorbital bar and vertebral markings of genus in darker green more or less edged with brown; a dark brown circum-anal spot edged with cream and flanked on thighs by creamy flecks; flanks with brown and creamy vermiculations; fore and hind limbs with very indistinct transverse dark bars. Below, white, except for brown infuscations on throat and outer side of hind feet.

In life. Mihunga Swamp. Gravid ♀ 48 mm. Above, pale brown; a broad, black, canthal streak from end of snout through eye to above tympanum; dorsum devoid of markings; a dark circum-anal spot; flanks and groin irregularly flecked with brown, the lower flanks with a number of fine yellow spots; limbs and feet indistinctly barred with broad brown bands. Below, creamy white, except for brown infuscations on throat, breast and from elbow to wrist of fore limb, hind limb and underside of feet, while the belly is tinged with yellow from the spawn within.

In life. Mabira Forest. Gravid ♀ 50 mm. Above, pale brown with darker flecks indicating vertebral markings of genus; flanks spotted with brown; limbs and feet barred with broad brown bands; axilla and groin slightly bluish; Below, throat a faintly greenish, dirty white; breast and belly anteriorly sparsely spotted with brown, and belly stained with rust color; limbs obscurely yellow-buff, unspotted; soles slightly darker. Inside of mouth green, dilated pupil milky blue surrounded by golden-brown iris.

The differences in coloration are reflected by habitats as recorded below.

Size. See above.

Breeding. On November 7 and January 18 females were gravid, while on December 12 very young frogs were found, slightly larger ones on January 18.

Diet. Two stomachs held small grasshoppers in addition to indeterminate insect remains.

Habitat. The Kibale series were found on a shrub by a stream, a couple on a felled tree, others on a forest trail after a heavy downpour which had apparently dislodged them from the forest canopy. The three green Ruwenzori frogs were taken on rich green sedges within twenty feet of a stream, the brown one was clambering over felled sedges that had been cut earlier in the day. The brown Mabira female was beneath loose bark on the trunk of a tree at a height of only two feet from the ground, a second brown frog was seen calling at midday, as is their custom, from a yellow-brown shrub growing among straw-like dry grass in the garden.

LEPTOPELIS VERMICULATUS (Boulenger)

Hylambates vermiculatus Boulenger, 1909, Ann. Mag. Nat. Hist. (8), 4, p. 497: Amani, Usambara Mountains, Tanganyika Territory.

juv. (M. C. Z. 25136) Magrotto Mtn., T. T. 8. vii. 39.

Variation. This emergent frog possesses all the key characters except that the webbing on the hind feet is a little less full, it has been compared with a slightly larger topotype.

Color. In life. Tailed froglet. Above, pale, slightly yellowish, green finely vermiculated with black; a conspicuous white spot on each elbow, knee, and heel; limbs white, heavily crossbarred with black; elbow region of forearm and tibia of hind limb green and vermiculate like back; digital disks of fingers white, of toes dusky grayish. Below, whitish with dusky speckling on throat and sides of belly.

Size. Length 18 + 10 mm., the stump of tail being in process of absorption.

Habitat. Taken in swamp immediately below my camp.

HYLAMBATES MACULATUS Duméril

Hylambates maculatus A. Duméril, 1853, Ann. Sci. Nat. (3), 19, p. 165, pl. vii, figs. 1-1b and 4: Zanzibar.

1 ♂ 3 ♀ ♀ (M. C. Z. 25137-9) Kitaya, T. T. 28. iii. 39.

13 ♂ ♂ 1 ♀ (M. C. Z. 25140-9) Amboni, T. T. 17. vi. 39.

Native name. Nanhengo (Kimakonde, for *Kassina* also).

Size. Length of ♂ ♂ 63-68 mm., of ♀ ♀ 58-71 mm.

Breeding. Great numbers were calling in a pond close to Amboni Village, near Tanga, though the rains were nearly over in this dis-

trict. The cry is *quek-quek*, with an explosive pop in it, hence more resonant than that of *Rana m. mascareniensis*.

Habitat. At Kitaya beneath damp weeds recently uprooted and piled at the edge of a rice swamp, one on a grass stem a foot above the water. At Amboni the majority were immersed in the pond with only their heads showing.

KASSINA SENEGALENSIS (Duméril & Bibron)

Plate 4, fig. 2.

Cystiganthus Senegalensis Duméril & Bibron, 1841, Erpet. Gén., 8, p. 418: Galam, Senegal.

♀ (M. C. Z. 25150) Idjwi Id., B. C. 23. ii. 39.

juv. & ♂ (M. C. Z. 25151-2) Kitaya, T. T. 25. iii. 39.

Native name. *Kabunda* (Lulega); *nanhengo* (Kimakonde, for *Hylambates* also).

Remarks. The generic definition of *Kassina* appears badly in need of revision for not only do young *Kassina* often lack vomerine teeth but on occasion the adults also. It was the absence of such teeth that, in part, led Hoffman (1939) to describe *Semnodactylus thabanchuensis* from the Transvaal, and Laurent (1940) the genus *Kassinula wittei* from the extreme southern Belgian Congo, the latter based on juveniles of 12.5-14 mm. in length. That they are not the young of *senegalensis* seems clear from the fact that our tailed froglet listed above measures 23 mm. from snout to anus and all the smallest of our completely metamorphosed young are 20 mm. in length. Both *thabanchuensis* and *wittei* bear a striking resemblance to *wealii* with which they should be compared.

Size. Length of ♂ 45 mm., of ♀ 44 mm., of tailed froglet 23 + 10 mm.

Breeding. On February 23 the ♀ was gravid, and in that condition led to the description of *angeli* Witte.

MEGALIXALUS FORNASINII FORNASINII (Bianconi)

Euchnemis Fornasinii Bianconi, 1848 (not 1850), Spec. Zoöl. Mosamb., Rept., pl. v, fig. 1: Mozambique.

3 ♂ 2 ♀ (M. C. Z. 25153-4) Kitaya, T. T. i. iv. 39.

3 ♀ (M. C. Z. 25155-6) Siga Caves, T. T. 9. vi. 39.

4 ♂ 4 ♀ (M. C. Z. 25157-8) Amboni Est., T. T. 17. vi. 39.

1 ♀ (M. C. Z. 25159) Magrotto Mtn., T. T. 1. vii. 39.

Native names. *Chitowa* (Kiyas); *kitowa* (Kimakonde), but applied to *Chiromantis* and *Hyperolius* also.

Remarks. Trinomials are employed on account of the recently described *M. f. gongicus* Laurent (1941) which, to judge by our four Congo specimens may be differentiated in pattern from *M. f. dorsalis* (Peters) of Cameroon. The differences are slight, however, and occasionally complicated by the occurrence of uniformly colored examples in both races. The typical form has physical distinctions.

Color. Uniform or with a vertebral streak, normally dark, but in M. C. Z. 25155 the normal arrangement is reversed and the streak is light, flanked by darker.

Size. Length of ♂♂ 31–37 mm., of ♀♀ 31–38 mm.

MEGALIXALUS LEPTOSOMUS (Peters)

Hyperolius leptosomus Peters, 1877, Monatsb. Akad. Wiss. Berlin, p. 619, pl. —, fig. 5: Chinchoxo, Portuguese Congo.

Remarks. In a recent paper on the *Megalixalus* of the Congo Belge, Laurent (1941c, p. 127) suggests that the Kabengere from which I (1936h, p. 103) recorded *leptosomus*, is not on the Luapula River, but lies farther north in the neighbourhood of Nyonga. In this he is undoubtedly correct for Mr. J. T. Zimmer, who collected the frogs in 1926, writes:

“my locality Kabengere is not on the Luapula River but is in another part of the ‘Haut Luapula’ District, at least it was so called when I was there although I believe they call it now Haut Katanga. In this District my collections were all made at Bukama, Katobwe and Kabengere. At Kabengere we were on the edge of true forest and found some things that showed this ecological association, but in the main the area was exactly the same as that at Katobwe. We were only two days’ walk southeast from Katobwe and it was two days’ walk southwest from Kabengere to Bukama, so the exact locality is about 9° 15′ x 26° 15′. If you look up Reichenow’s ‘Vog. Afr. Atlas,’ page 22, you will find a Katapäna which is our Kabengere. For some reason which I have forgotten Katapena is an alternative name for Kabengere; at least I have the alternative name in my journal without comment.”

I quote Mr. Zimmer at length as he collected a great many species of frogs at both Kabengere and Katobwe, which are *not* on the Luapula River.

Dr. Laurent then breaks up *leptosomus* into three forms and suggests that the Kabengere frogs should probably be referred to one of his new forms, viz. *M. l. upembae* (p. 125). Of the original series of 19 frogs which I listed, 9 are now in the Museum of Comparative Zoölogy. Using the key (p. 132) furnished by Dr. Laurent, I should say that two of these might be referred with equal justification to either *l. leptosomus* or *l. upembae* as they combine the key characters; one (M. C. Z. 19176) has broad, the other (M. C. Z. 19177) narrow, dorsal lines; in the former the tibio-tarsal articulation reaches the shoulder, in the latter it fails to do so; in both the length of the tibia is about $2\frac{1}{4}$ times in the length from snout to anus, in which respect they do not appear to differ from our Cameroon and French Congo material, so I fail to see how *upembae* can be recognized.

In the remaining 7 specimens (M. C. Z. 19178-84) the dorsal bands unite in a point in the interocular region and are therefore referable to *M. wittei* Laurent (p. 127), an apparently valid species differing only from *leptosomus* in this marking and in averaging a trifle larger. In answer to my enquiries, Mr. K. P. Schmidt has kindly informed me that the rest of the series in the Field Museum is divided equally as between *leptosomus* and *wittei*.

MEGALIXALUS ULUGURUENSIS Barbour & Loveridge

Megalixalus uluguruensis Barbour & Loveridge, 1928, Mem. Mus. Comp. Zoöl., 50, p. 231, pl. iii, fig. 2: Vituri, Uluguru Mountains, Tanganyika Territory.

♀ (M. C. Z. 25160) Magrotto Mtn., T. T. 12. vii. 39.

Color. In life. ♀. Above, enamel white; from nostril through eye to halfway along flank a brownish band; back with a few irregularly scattered brown flecks; upper arms and thighs translucent; forearm, tibia, foot, and to a lesser extent the thigh also, with minute, black-centered, enamel-white spots (under high magnification these black centers are seen to be irregular, 5-pointed, black stars); hands and feet translucent yellow; disks of digits and toes almost orange. Below, chest pure white, remaining under surfaces transparent.

Size. Length 28 mm.

Breeding. On July 12, three large cream-colored eggs were (and still are) visible through the transparent abdominal skin.

Habitat. I captured this frog among leaves between the mighty buttress roots of a tree in a patch of forest remote from my camp. It

was taken at 10 a.m. immediately following several hours of very heavy rain and constitutes the first record of this very *Hyperolius*-like species on Magrotto Mountain. Recognizing it, I immediately checked its pupil which was plainly vertical.

MEGALIXALUS BRACHYCNEMIS Boulenger

Megalixalus brachycnemis Boulenger, 1896, Ann. Mag. Nat. Hist. (6), 18, p. 403, pl. xvii, fig. 2: Chiradzulu, Nyasaland.

- 60 ♂ 17 ♀ (M. C. Z. 25161-2) Kitaya, T. T. 25-31. iii. 39.
 4 ♂ (M. C. Z. 25163-4) Mikindani, T. T. 8. iv. 39.
 1 ♂ 1 ♀ (M. C. Z. 25165-6) Siga Caves, T. T. 16. vi. 39.
 36 ♂ 2 ♀ (M. C. Z. 25167-8) Amboni Est., T. T. 17. vi. 39.
 2 ♂ 3 ♀ (M. C. Z. 25169-70) Magrotto Mtn., T. T. 1. vii. 39.

Variation. Of this species, which has on four occasions been described as a *Hyperolius* by Ahl, I noted at Kitaya: "Pupil definitely vertical," and on Magrotto: "After anaesthetization the pupil was indistinctly vertical in a young frog and almost round in an adult, the latter retaining only a slight v at base."

Color. In life. Kitaya. ♂. Above, dusky yellow minutely punctate with black; from nostril through eye to groin extends a broad, dusky, irregular, lateral band which is punctate with white; back with a dusky gray M-shaped marking. Below, sac chrome; breast and belly pure white; throat between sac and breast like all remaining underparts a semitransparent flesh color with the digits slightly yellow.

Thus below it is very similar to *Hyperolius c. citrinus* though above quite dissimilar.

In life. Kitaya. ♀. Above, substantially like the male but with the dorsal markings more frequently absent. Below, throat, breast, and belly uniformly pure white.

In life. Magrotto. Adult and young of 17 mm. Above, both were golden bronze with mottlings of greenish bronze on which were superimposed white specks or dots.

Size. Length of ♂♂ 18-23 mm., of ♀♀ 21-25 mm. A slight, but definite increase in size is noted as one proceeds southwards, viz. ♂♂ 20-21-19-22-23 mm., ♀♀ 22-21-22-25 mm. About March 31, the largest of six tailed froglets measured 11 + 14 mm.

Breeding. Our arrival at Kitaya almost synchronized with the breaking of the big rains. On March 25 males were calling from a rice swamp at the edge of the Rovuma River and one clasping pair were taken on

a horizontal blade of rice. On each of four succeeding days the number of males taken decreased, the number of females increased. On June 17, though the rains were almost over, a few males might still be heard calling at Amboni in a swamp near the village. Females, of course, were gravid when taken.

Enemies. One recovered from the stomach of a spotted wood snake (*Philothamnus s. semivariatus*).

Habitat. The great majority, having assembled, were taken in recently-formed rice and sedge swamps, but a couple were taken beneath rubbish a good way from water on March 29. A search of fifty wild bananas at Kitulwe, on Magrotto, resulted in the capture of two whose unusual coloring, noted above, may be attributed to habitat.

HYPEROLIUS SCHUBOTZI Ahl

Hyperolius schubotzi Ahl, 1931, Das Tierreich, no. 55, p. 329, fig. 202: Kissenji, i.e. Kisenyi, Lake Kivu, Belgian Ruanda-Urundi. (♀. 33 mm. Schubotz coll.).

Hyperolius macrodactylus Ahl, 1931, Das Tierreich, no. 55, p. 368: Lake Kivu, Belgian Congo. (♀. 37 mm. Kandt coll.).

Hyperolius ornatus Laurent, 1940, Revue Zool. Bot. Africaine, **34**, p. 4, pl. ix, figs. A. C. D.: Ruchuru, Belgian Congo. (Type 32 mm.).

11 ♂ 28 ♀ (M. C. Z. 25174-89) Mamvu Bay, B. C. 15. ii & 6. iii. 39.

Native names. *Kashembero* (Lulega); *neosa* was also used on Idjwi.

Synonymy. I personally captured the entire series listed above in a small patch of sedges growing in Mamvu Bay, Idjwi Island (where Kandt lived), Lake Kivu, and concluded that the two types—the finely vermiculate ♀ *schubotzi* and largely marmorate ♀ *ornatus* were one species for they appear to grade from one to the other. In size there was no difference for the *schubotzi* ranged from 37-41 mm. and the *ornatus* type from 36-41 mm. By its dimensions and pattern I judge that *macrodactylus* is yet another synonym. One of Ahl's paratypes of *variabilis*, that from Idjwi Island, should doubtless be included though the Bukoba cotypes of *variabilis*, sent me by Ahl, appear to represent a smaller species.

Variation. Outer finger with 1 joint free, fourth toe with 1 joint free, outer toe webbed to disk; tibio-tarsal articulation reaches eye rather fully in all but one frog where it just falls short.

Color. In life. ♀. Above, black with well separated wavy yellow lines and a few spots; around anus silvery with black vermiculations; thighs whitish with blood red vermiculations; tibia and foot like back.

Below, throat silvery blotched with black; chest and belly immaculate white; lower side of thighs with red vermiculations. (This is the *ornatus* phase).

♀. Similar to the last except that it is the ground color which is yellowish green with very numerous black vermiculations. (This is the *schubotzi* phase).

Twelve females (M. C. Z. 25174-7), 37-41 mm., are light, finely vermiculate with darker as figured for *schubotzi*, which species they undoubtedly represent. Fourteen females (M. C. Z. 25178-82), 36-41 mm., are so heavily overlaid as to appear black with lighter, and very varied, vermiculations (*ornatus*) some even forming longitudinal lines (*macroductylus*). Two apparently young females (M. C. Z. 25183-4), 34 mm., resemble the males.

The eleven males (M. C. Z. 25185-9), 35-39 mm., now an almost uniform putty color, were, as I recollect, yellowish in life; one or two show faint traces of a dark canthal and/or postocular band.

Size. Length of ♂♂ 35-39 mm., average 36.3 mm.; of ♀♀ 34-41 mm., average 34.6 mm.

Breeding. On February 15, four males were taken when calling.

Enemies. Three in the stomach of a green snake (*Chlorophis irregularis*) up the mountain.

Habitat. On reeds and sedges in knee-deep water in Mamvu Bay.

HYPEROLIUS KIVUENSIS Ahl

Hyperolius kivuensis Ahl, 1931, Das Tierreich, no. 55, p. 280, fig. 151: Lake Kivu, Belgian Congo. (♀. 34 mm. Kandt coll.).

Hyperolius kwidjwiensis Ahl, 1931, Das Tierreich, no. 55, p. 296, fig. 172: Idjwi Island, Lake Kivu, Belgian Congo. (♂. 32 mm. Schubotz coll.).

Hyperolius kandti Ahl, 1931, Das Tierreich, no. 55, p. 327: Lake Kivu, Belgian Congo. (♂. 33 mm. Kandt coll.).

Hyperolius koehli Ahl, 1931, Das Tierreich, no. 55, p. 405: Kisenyi, Lake Kivu, Belgian Ruanda-Urundi. (♂. 33 mm. Koehl coll.).

1 ♂ 1 ♀ (M. C. Z. 25190-1) Mamvu Bay, Idjwi Id., B. C. 6. iii. 39.

2 ♂ 1 ♀ (M. C. Z. 25192-4) Ujiji, L. Tanganyika, T. T. 11. iii. 39.

Synonymy. Idjwi Island, long the home of Kandt, is in Lake Kivu, and I see no reason to regard Ahl's four 'species' as distinct. Laurent has recently (1941a, p. 152, pl. ix, figs. B. E. F. G.) figured the striking changes in pattern encountered in a developmental series of this species. He remarks that *kivuensis* is an extremely common frog in Kivu,

Urundi, Tanganyika, and the Katanga districts. The Ujiji record, however, is actually the first for its occurrence on the Tanganyika Territory side of the lake.

Variation. Outer finger with 1 joint free but webbing narrow on second; fourth toe with 1 joint free, outer toe feebly webbed to disk; tibio-tarsal articulation reaches eye.

Color. In life the Ujiji series were noted as being green, both series are now discolored by formalin but the dark canthal streak and lateral band may be more or less present in both sexes.

Size. Length of ♂♂ 30 mm., of ♀♀ 30–33 mm.

HYPEROLIUS sp.

♂ (M. C. Z. 25171) Mushongero, U. 3. ii. 39.

Native name. *Kitembi* (Luganda).

Variation. Outer finger with 1 joint free except for a narrow seam, fourth toe with 1 joint free except for a narrow seam, outer toe webbed to disk; tibio-tarsal articulation reaches eye.

In the absence of females, this nondescript putty colored frog may, or may not, be referable to the foregoing or following species.

Size. Length of ♂ 34 mm.

Habitat. I captured this frog on a papyrus stem six feet above the surface of Lake Mutanda, the only one secured in two hours of paddling a dugout and using a flashlight, yet, to judge by their calls, these frogs were not uncommon.

HYPEROLIUS ALTICOLA Ahl

Hyperolius alticola Ahl, 1931, Das Tierreich, no. 55, p. 379, fig. 255: Ruwenzori Mountains, 1800 metres, Belgian Congo.

♀ (M. C. Z. 25172) Mubuku Valley, Ruwenzori Mtns., U. 4. xii. 38.

Variation. Outer finger with 1 joint free except for a narrow seam, fourth toe with 1 joint free except for a narrow seam, outer toe webbed to disk; tibio-tarsal articulation reaches eye.

Color. In life. ♀. When caught, putty colored, but changed to: Above, head, back, and limbs, a dead-leaf rufous brown sparsely speckled with black; from nostril through eye a dark line which is continued on flank only as a series of dark spots; back anteriorly sparsely flecked with yellow; exposed portions of fore and hind limbs similarly

speckled. Below, throat and belly yellow, the latter on white; remaining under surfaces flesh-colored; palms and soles pink.

Size. Length of ♀ 37 mm., as was ♀ holotype.

Habitat. On leaf of a tall swamp plant at a height of seven feet. The altitude was about 1000 feet higher than that at which Schubotz took the type.

HYPEROLIUS MONTANUS (Angel)

Rappia montana Angel, 1924, Bull. Mus. Hist. Nat. Paris, **30**, p. 269: Mount Kinangop, Aberdare Mountains, Kenya Colony.

juv. (M. C. Z. 25173) S. Kinangop Plateau, K. C. 27. x. 38.

Variation. Outer finger with 1 joint free, fourth toe with 1 joint free, outer toe webbed to disk; tibio-tarsal articulation barely reaches eye. Compared with adult cotype and juvenile topotypes.

Size. Length 8 mm., tail recently absorbed.

HYPEROLIUS UNDULATUS (Boulenger)

Rappia undulata Boulenger, 1901, Ann. Mus. Congo (1), **2**, fasc. 1, p. 4, pl. ii, fig. 2: Pweto & Lofoi, Lake Mweru, Belgian Congo.

♂ (M. C. Z. 25299) Kitaya, T. T. iv. 39.

Native names. *Chitowa* (Kiyao); *kitowa* (Kimakonde), but applied to all species and *Chiromantis* and *Megalixalus* also.

Variation. Outer finger with 1 joint free, fourth toe with 1 joint free, outer toe webbed to disk; tibio-tarsal articulation reaches eye. Compared with adult cotype.

Size. Length 25 mm.

HYPEROLIUS UDJIJENSIS Ahl

Hyperolius udjijiensis Ahl, 1931, Das Tierreich, no. 55, p. 370, fig. 246: Ujiji, Tanganyika Territory (restricted).

1 ♂ 7 ♀ (M. C. Z. 25195-200) Ujiji, T. T. 11. iii. 39.

Remarks. Some years ago I (1933h, pp. 401-2) placed the cotype of *udjijiensis* from Kibwezi, Kenya Colony, in the synonymy of *striolatus* Peters, but pointed out that the Ujiji specimen, to which the name is now restricted, might prove to be distinct. The topotypic series now

obtained proves clearly that this is the case, in fact the relationship to the *callichromus* form of *argentovittis* is so close that in the field I was inclined to doubt their distinctness, thinking that *udjijiensis* might be a subadult phase, at least one female, however, is gravid.

If not an actual synonym of *H. vermiculatus* Peters, 1882 (not *vermiculatus* Pfeffer, 1893), of Mlange, Angola, the relationship would appear to be subspecific, to judge by comparing a 36 mm. gravid ♀ from Bella Vista, Angola, with a 34 mm. gravid ♀ from the Ujiji series.

Variation. Outer finger with 1 joint free, fourth toe with last joint narrowly webbed, outer toe fully webbed to disk; tibio-tarsal articulation reaches eye, or to between eye and nostril.

Size. Length of ♂ 32 mm., of ♀ ♀ 30–34 mm.

HYPEROLIUS FLAVOMACULATUS Günther

Hyperolius flavomaculatus Günther, 1864, Proc. Zool. Soc. London, p. 310, pl. xxvii, fig. 1: Rovuma Bay, Tanganyika Territory.

♂ 3 ♀ 1 (M. C. Z. 25201–4) Kitaya, T. T. 25–31. ii. 39.

Remarks. The above series are practically topotypes for my camp on the banks of the Rovuma River was scarcely twenty miles from the Bay where Kirk collected the type. Boulenger (1882 b, p. 128) transferred the species to *Megalixalus* and Parker wrote me that, after examining the type which until now has remained the only known specimen, he saw no reason to reverse Boulenger's action. The pigmentation, however, was so wholly like that of a *Hyperolius* that I felt sure the pupil must be horizontal, and visited Kitaya with the object of securing fresh material. The series obtained have horizontal pupils, as I noted in the field, and so I restore the species to its original allocation.

The Mt. Kenya and Mt. Mbololo frogs which I identified as *H. flavoguttatus* Ahl, have some webbing on the terminal joint of the fourth toe and represent a slightly larger (34 mm.) species.

Variation. Outer finger with 1 joint free, fourth toe with 1 joint free, outer toe webbed to disk; tibio-tarsal articulation reaches the eye.

Color. In life. ♂. Above, dusky yellow, heavily blotched or vermiculated with black; thighs and concealed portions of feet dull reddish; tibia dusky yellow with, or without, black vermiculations. Below, throat cream-colored (not yellow); interspace between disk and breast colorless like the lower flanks; median portion of breast and belly creamy white; limbs dull opaque red.

Size. Length of ♂♂ 28–29 mm., of ♀ 29 mm.

Habitat. Apparently a rare species as compared with *H. c. citrinus* with which it occurred in the same rice swamp, as also in another pond (B) where a pair were taken on grasses (*Setaria palmifolia*) much beloved by all the species of *Hyperolius* taken at Kitaya. I am indebted to the Gray Herbarium for identifying the specimens of this sedge which I brought back.

HYPEROLIUS ARGENTOVITTIS Ahl

Hyperolius argentovittis A 1, 1931, Das Tierreich, no. 55, p. 345, fig. 220: Ujiji, Tanganyika Territory.

5 ♂ 15 ♀ (M. C. Z. 25205–9) Ujiji, T. T. 11. iii. 39.

Variation. Outer finger with 1 joint free, fourth toe with 1 joint free, outer toe webbed to, or almost to, disk; tibio-tarsal articulation reaches eye, or to between eye and nostril.

Color. In life. Above, maroon, a black-edged, pure white, vertebral line (*argentovittis*) in some, irregular or incomplete or broken up into spots (*callichromus* Ahl, 1931c, fig. 248) in others, from snout to anus.

Size. Length of ♂♂ 21–32 mm., of ♀♀ 30–36 mm., average 32 mm.

Breeding. On March 11 a male was taken calling from a tree in our camp beneath the mangoes and far from any water. The larger females were gravid, but the majority were not.

Enemies. One in stomach of a white-lipped snake (*Crotaphopeltis h. hotamboeia*) at Ujiji.

HYPEROLIUS AHLI Loveridge

Plate 3, figs. 1–2.

Hyperolius ahli Loveridge, 1936, Bull. Mus. Comp. Zoöl., 79, p. 402: Lake Peccatoni, northeast of Witu, Kenya Colony.

2 ♂ 7 ♀ (M. C. Z. 25210–3) Kitaya, T. T. 1–4. iv. 39.

1 ♀ (M. C. Z. 25214) Lake Rutamba, T. T. 8. v. 39.

Variation. Outer finger with 1 joint free, fourth toe with last joint narrowly webbed, outer toe fully webbed to disk; tibio-tarsal articulation reaches to between eye and nostril, or nostril.

Color. The sexual dichromatism of this species was noted in the original description. In life these males rather resembled the straw-

colored *c. citrinus*, but the lateral streaks were clearer and the size larger. In the females the large spots were pale red broadly edged with black; limb surfaces which would be exposed when at rest were pale dusky brown; thighs and digits brick red.

Size. Length of ♂♂ 30–32 mm., of ♀♀ 30–33 mm.

Habitat. Taken at night on sedges in three different ponds, all Kitaya females were taken in one pond on April 4.

HYPEROLIUS PUNCTICULATUS (Pfeffer)

Rappia puncticulata Pfeffer, 1893 (1892), Jahrb. Hamburg, Wiss. Anst., **10**, p. 31, pl. ii, fig. 2: Zanzibar.

Hyperolius substriatus Ahl, 1931, Das Tierreich, no. 55, p. 358, fig. 234: Magrotto Mountain, near Tanga, Tanganyika Territory.

1 ♂ (M. C. Z. 25215) Amboni Estate, T. T. 17. vi. 39.

27 ♂ 8 ♀ 20 yng. (M. C. Z. 25216–29) Magrotto Mtn., T. T. 1–17. vii. 39.

Synonymy. The Museum of Comparative Zoölogy possesses a co-type of *substriatus* Ahl in addition to the long series of topotypes now secured; there seems to have been no reason for its having been described.

Variation. Outer finger with 1 joint free, fourth toe with 1 joint free or narrowly margined with web, outer toe webbed to disk; tibio-tarsal articulation reaches eye (at all ages).

Color. In life. ♂ (M. C. Z. 25216). Above, orange yellow or yellowish green; from nostril over eye to above axilla a broad, mustard-colored band which is broadly edged with black above and below, posteriorly it breaks up into one (on right) or two (on left) black-edged, mustard-colored spots (but such spots are not only variable in number but may be entirely lacking or the dorso-lateral band may be continuous); an azygous, black-centred spot in lumbar region; thighs, except for a narrow band of orange yellow or yellowish green, like other concealed parts of hind limb when at rest, blood red. Below, gular disk and belly lemon yellow; remaining underparts greenish, more or less transparent and tinged with red.

Another Magrotto specimen, though taken with typical examples in sedges bordering a stream where it passed through a swamp, appeared so strikingly different in the field that I concluded it might be distinct. Its color was noted as follows: ♂ (M. C. Z. 25229). Above, pinkish brown, from nostril over eye almost to groin a broad, enamel-white band narrowly edged with light yellow and broadly with jet black

above and below; on either side of anus and on either heel are white spots similarly ringed with yellow and black; forearm, tibia, and feet speckled with black; thighs with dusky patches formed by minute speckling. Below, bright lemon yellow, gular disk sparsely flecked with brown; limbs, fingers, and toes show some transparent red.

♂ (M. C. Z. 25215). This 29 mm. variant is of the spotted type of which an example (M. C. Z. 9531) from Morogoro, where it occurs with more typically colored specimens, has been figured by Proctor (1920, p. 415, fig. 2). This condition comes about by persistence *as spots* (see also 26 mm. ♂ M. C. Z. 2521) of some of the faint lines which are to be observed in the young.

Five young, taken on July 6 during a search of fifty wild bananas at Kitulwe, were so variable that it was difficult to believe that all were of one species. Below, their throats were whitish, bluish, or rich emerald green; bellies white or bright yellow; hind limbs and feet showing much red.

Nine young, taken with five adults in sedges and on leaves of trees in a forest clearing, all possessed the U-shaped yellow canthal band, but the young had dusky lines on the dorsum; a dark-edged, light, vertebral line from snout to anus was present in some, and there was no red on the limbs of these juveniles.

Size. Length of ♂♂ 21–29 mm., average 26.7 mm., of ♀♀ 30–33 mm., average 32 mm., of young 11–24 mm.

Breeding. All females gravid.

Habitat. In sedges, domestic and wild bananas, and on trees in a forest clearing.

HYPEROLIUS MARIAE Barbour & Loveridge

Hyperolius mariae Barbour & Loveridge, 1928, Mem. Mus. Comp. Zoöl., **50**, p. 217, pl. iii, fig. 1: Derema, Usambara Mountains, Tanganyika Territory.

12 ♂ 1 ♀ (M. C. Z. 25230–4) Siga Caves, T. T. 16. vi. 39.

20 ♂ 7 ♀ (M. C. Z. 25235–9) Amboni Estate, T. T. 17. vi. 39.

Variation. Outer finger with 1 joint free, fourth toe with 1 joint free, outer toe webbed to disk; tibio-tarsal articulation reaches eye or just beyond.

Color. In life. Below, hinder part of gular disk bright lemon yellow; belly usually white though sometimes red in either sex; limbs red.

The characteristic subdermal, black, lateral streak of *mariae* is present in all, but the dark canthal streak or circum-nasal spot is

very rarely present; this, in conjunction with the fact that these frogs average about 2 mm. shorter than the montane (3000 feet) *mariae* might cause some to regard *melanophthalmus* Ahl, 1931, as a recognizable lowland form. I doubt if Siga Caves and Amboni are much more than thirty-five miles from Derema as the crow flies.

Size. Length of ♂♂ 22–25 mm., average 23.5 mm., of ♀♀ 22–25 mm., average 23.1 mm.

Breeding. Calling in swamps near my camp at Siga and in one close to Amboni village; the females, taken June 16–17, are distended with eggs.

HYPEROLIUS CITRINUS SANSIBARICUS (Pfeffer)

Rappia sansibarica Pfeffer, 1893 (1892), Jahrb. Hamburg. Wiss. Anst., 10, p. 97, pl. ii, fig. 4: Zanzibar.

30 ♂ 5 ♀ (M. C. Z. 25251–6) Siga Caves, T. T. 14–16. vi. 39.

28 ♂ (M. C. Z. 25257–9) Amboni Estate, T. T. 17. vi. 39.

Remarks. When Pfeffer described *sansibaricus* he remarked on its similarity to *citrinus*, and as I can distinguish them only by size it seems advisable to regard the former (1893) as a smaller northern form of the latter (1864).

Variation. Outer finger, etc. as in typical form.

Color. In life. ♂. Below, throat bright lemon yellow. ♀. Below, throat whitish but tinged with yellow like the belly. In both sexes the thighs, back of knees, and such parts of the feet as would be concealed when at rest, blood red (*rubripes* Ahl).

Size. Length of ♂♂ 22–29 mm., average 25.4 mm., of ♀♀ 26–32 mm., average 29 mm.

Breeding. Though the rains were drawing to a close, the swamps still resounded with the sharp “snap-snap” call of the males. All five females were distended with ova.

Enemies. One was entangled in the strong mesh of a spider’s web which had been woven between the sedges, another was recovered from the stomach of a larger frog (*Rana edulis*).

HYPEROLIUS CITRINUS CITRINUS Günther

Hyperolius citrinus Günther, 1864, Proc. Zool. Soc. London, p. 311, pl. xxvii, fig. 2: Senegal (rejected) and Zambezi Expedition (restricted). ?Possibly from Rovuma Bay, Tanganyika Territory (A. L.)

120 ♂ 13 ♀ (M. C. Z. 25240–5) Kitaya, T. T. 25–31. iii. 39.

11 ♂ 2 ♀ (M. C. Z. 25246–50) Mikindani, T. T. 8–20. iv. 39.

Remarks. In his report on the material received from Livingstone and Kirk's "Zambezi Expedition", Günther figured (1864, pl. xxvii) *H. flavomaculatus* and *microps* from Rovuma Bay and a third species, *citrinus*, based on two males, from Senegal and Zambezi Expedition. This does not necessarily imply that *citrinus* came from the Zambezi, and we know that Livingstone tramped over the low hills from Mikindani to some point on the Rovuma near to the site where the little village of Kitaya stands today.

Of the three frogs—*flavomaculatus*, *microps*, and *citrinus*—which I collected at Kitaya, the latter was by far the commonest and the males bore a striking resemblance to the male figured by Günther. Perhaps the original label of *citrinus* was illegible or lost, hence "Zambezi Expedition" only. However that may be, I propose to restrict the type to the Zambezi Expedition frog and reject the Senegal specimen as being unlikely to be conspecific. Unfortunately, owing to war conditions, it would be impossible to get further light on this subject from the British Museum.

Variation. Outer finger with almost 2 joints free, for second only narrowly margined with web, fourth toe with 1 joint free and second only narrowly margined with web on one side, outer toe with last joint half webbed or continued as a narrow seam to disk; tibio-tarsal articulation reaches eye or nostril.

Color. In life. ♂. Above, green, dusky yellow, or straw brown, paler on flanks, which are demarcated from the back by a rather indistinct (disappears on preservation) cream-colored, dorsolateral line commencing high above axilla and terminating high above groin; thighs largely colorless but tinged with red by blood vessels one of which is clearly visible as a fine red line. Below, gular disk chrome; breast and belly pure white; interspace between disk and breast semi-transparent like all remaining underparts.

To ascertain the proportion of the two dominant color phases in regard to sex, catches made in three separate ponds on three different days were sorted and noted down as follows:

19 straw ♂♂,	19 green ♂♂,	1 green ♀.
36 " ♂♂,	15 " ♂♂,	1 " ♀.
16 " ♂♂,	1 " ♂♂,	1 " ♀.

Size. Length of ♂♂ 28–34 mm., of ♀♀ 34–38 mm.

Thus *citrinus* is a larger frog but otherwise does not differ from *sansibaricus*; unfortunately no measurements were given for either type, and I failed to note that of the latter when examining the type some

years ago. I did, however, find it resembled our specimens from Bagamoyo, which is on the mainland exactly opposite Zanzibar. The position is best set forth by listing the measurements of all the material in the Museum of Comparative Zoölogy. All places are in the coastal belt—Kilosa being the furthest inland—and are arranged below from north to south.

Localities in Kenya and Tanganyika.		Length ♂♂.	Length ♀♀.
Kililani (Berlin ♂ and ♀ cotypes of <i>rubripes</i>).			32 mm.
Mkonumbi	6 ♂♂	26-30 mm.	
Peccatoni	6 ♂♂ 4 ♀♀	26-29 mm.	30-33 mm.
Witu	15 ♂♂ 1 ♀	23-28 mm.	29 mm.
Ngatana	1 ♀		30 mm.
Karawa			30 mm.
Malindi	1 ♂	31 mm.	
Amboni	28 ♂♂	22-28 mm.	
Siga Caves	30 ♂♂ 5 ♀	25-29 mm.	26-32 mm.
Bagamoyo	3 ♂♂	26-28 mm.	
Dar es Salaam	1 ♂	30 mm.	
Zanzibar (Hamburg type <i>sansibaricus</i>).			?

Summary of 90 ♂♂ 13 ♀♀ <i>c. sansibaricus</i>		22-31*mm.	26-33 mm.
Kilosa	1 ♀		38 mm.
Mikindani	11 ♂♂ 2 ♀♀	31-34 mm.	35-38 mm.
Kitaya	120 ♂♂ 13 ♀♀	28-34 mm.	34-36 mm.

Summary of 131 ♂♂ 16 ♀♀ *c. citrinus*** 28-34 mm. 34-38 mm.

Breeding. On March 25, on all sides, males might be heard calling vociferously; the call consisting of an explosive double click or snap. Most of the females taken were gravid, their scarcity, relative to the males, apparently indicating that the breeding season was largely over. One mass of eggs was found at the base of a rice plant just above water level, the latter having recently subsided.

HYPEROLIUS PARKERI PARKERI Loveridge

Plage 3, figs. 3-4.

Hyperolius parkeri Loveridge, 1933, Bull. Mus. Comp. Zoöl., **74**, p. 410: Bagamoyo, Tanganyika Territory.

1 ♂ (M. C. Z. 25270) Siga Caves, T. T. 16. vi. 39.

13 ♂ 4 ♀ (M. C. Z. 25271-9) Amboni Estate, T. T. 17. vi. 39.

*Only 1 frog of the 90 attains 31 mm.

**Only 7 frogs of 131 under 30 mm., average 31 mm.

Variation. Outer finger with almost 2 joints free for second only narrowly margined with web, fourth toe with 1 joint free the second being well webbed, outer toe webbed to, or almost to, disk; tibiotarsal articulation reaches eye or nostril (in both sexes).

Size. Length of ♂♂ 21–24 mm., average 23 mm., of ♀♀ 19–21 mm., average 19.7 mm.

Breeding. On June 17 males were observed emitting their trilling call; females, taken on the same date, were all gravid.

HYPEROLIUS PARKERI ROVUMAE subsp. nov.

Plate 3, figs. 5–6.

9 ♂ 5 ♀ (M. C. Z. 25260–9) Kitaya, T. T. 31. iii–4. iv. 39.

Type. Museum of Comparative Zoölogy, No, 25260, a gravid ♀ from Kitaya, Rovuma River, Lindi Province, southeastern Tanganyika Territory. Collected by Arthur Loveridge, March 31, 1939.

Paratypes. Museum of Comparative Zoölogy, Nos. 25261–25269, being 13 specimens as listed above.

Diagnosis. Principal differences from *H. p. parkeri* Loveridge are as follows:

Breeding spinosities of males confined to hind feet; sexes dichromatic; females without a well-defined, black-edged canthal and lateral band, at most indicated by an upper and lower series of black spots; size smaller, ♂♂ 21–24 mm., ♀♀ 19–21 mm.; range: From Witu, Kenya Colony, south along coast to Dar es Salaam, Tanganyika Territory.

p. parkeri

Breeding spinosities of males on belly, thighs, and soles of feet; females resemble males in possessing a well-defined, black-edged, cantho-lateral band; size larger, ♂♂ 24–27 mm., ♀♀ 21–23 mm.; range: Kitaya, Rovuma River, 275 miles south of Dar es Salaam.

p. rovumae

Description. Outer finger with 2 joints almost free for second only narrowly margined with web; fourth toe with 1 joint free or narrowly margined with web, outer toe webbed to disk; tibio-tarsal articulation reaches between eye and nostril, or to nostril.

Color. In life. ♂ Paratype. Above, dark brown, back minutely punctate with brown; from nostril through and above orbit along flanks to groin a broad white band, edged above and below by lines formed by a concentration of dusky spots; limbs clear, transparent brown stippled with black, such stippling forming large spots on fore-

arm and tibia; thigh tinged with pink from subcutaneous blood vessels. Below, pale buffy-white; buccal borders finely punctate with black; rest of undersurface translucent flesh color.

In life. ♀ Type. Above, dark green, back minutely punctate with black; from nostril through and above orbit along flanks to groin a broad white band, edged above and below by black; limbs a clear, but paler, green, immaculate on thigh and foot but stippled with brown on forearm and tibia. Below, throat verdigris green; belly largely transparent so that eggs are clearly discernible; limbs and feet transparent green.

Size. Length of ♂♂ 24–27 mm., average 25.3 mm., of ♀♀ 21–23 mm., average 21.8 mm. Length of type ♀ 23 mm.

HYPEROLIUS NASUTUS Günther

Hyperolius nasutus Günther, 1864, Proc. Zool. Soc. London, p. 482, pl. xxxiii, fig. 3: Duque de Bragança, Angola.

9 ♂ (M. C. Z. 25280–4) Kitaya, T. T. 25–30. iii. 39.

16 ♂ 5 ♀ (M. C. Z. 25285–9) Amboni Estate, T. T. 17. vi. 39.

Remarks. It might be pointed out that breeding males can be distinguished from those of *parkeri* by the absence of black spinosities, they are a brighter green and the dorso-lateral band is narrower and not edged above and below with black.

Variation. Outer finger with almost 2 joints free for second only narrowly margined with web, fourth toe with 1 joint free and second moderately webbed, outer toe with last joint half-webbed; tibio-tarsal articulation reaches eye or nostril (in both sexes).

Color. In life. ♂. Above, pale green, head alone minutely punctate with brown; from above eye (only rarely from nostril) along flanks to groin a white band; limbs a clear, pale green; thigh immaculate except for a subcutaneous blood vessel showing as a red line; forearm, tibia, and exposed surface of foot stippled with black. Below, gular disk yellow; throat dark green; belly pure white; limbs colorless except for a faint greenish tinge; feet colorless except for a slight yellowish tinge.

Size. Length of ♂♂ 20–24 mm., average 22.8 mm., of ♀♀ 21–23 mm., average 22 mm.; a tailed froglet measures 17+15 mm.

Breeding. The above-mentioned froglet was taken about March 30. On June 17 all five females were distended with ova which are clearly visible through the semitransparent abdominal wall.

HYPEROLIUS PUSILLUS (Cope)

Plate 3, figs. 7-8.

Crumenifera pusilla Cope, 1862, Proc. Acad. Nat. Sci. Philadelphia, p. 343: Umvoti, Natal. (♀).

Hyperolius microps Günther, 1864, Proc. Zool. Soc. London, p. 311, pl. xxvii, fig. 3: Rovuma Bay, Tanganyika Territory. (♂).

Hyperolius milnei Loveridge, 1935, Bull. Mus. Comp. Zoöl., **79**, p. 18: Witu, Coast Province, Kenya Colony. (♀).

12 ♀ ♀ (M. C. Z. 25290-8) Kitaya, Rovuma River, T. T. 4. iv. 39.

Synonymy. These are practically topotypes of *microps* Günther, with which *milnei*, from a locality 500 miles further north, appears conspecific as I (1941h, p. 291) have recently suggested. They would appear to differ from *pusillus* (inc. *translucens* Power) of which we have good topotypic series, in generally exhibiting a black spot on knee and heel. This, however, is by no means constant in the big series of *milnei* and is absent in a series from Golbanti, Tana River, as well as from the types of *usaramoae* Loveridge, from Dar es Salaam. I prefer, therefore, to regard all as representing one species which is very variable in the size of the dorsal spots which may be present or absent.

Variation. Outer finger with 1 joint free, fourth toe with last joint narrowly webbed, outer toe fully webbed to disk; tibio-tarsal articulation reaches eye or nostril.

Color. In life. ♀. Above, head and anterior part of back rich green; from nostril to orbit a line of relatively large black spots sometimes coalescing, others are scattered over head and anterior part of back, in addition the entire upper surface is peppered by minute black points (visible only with a lens); back posteriorly, as well as limbs, a paler green; fingers and toes bright orange. Below, pale bluish green, breast silvery white.

Size. Length of ♀ ♀ 20-23 mm., average 21 mm.

Habitat. Though especial search was made for this species in several small swamps we failed to find it until, almost at the end of our stay, I located them in the leech- and crocodile-infected lagoon some miles below our camp in the direction of Rovuma Bay.

RANIDAE

ARTHROLEPTIDES MARTIENSSENI Nieden

Arthroleptides martiensseni Nieden, 1910, Sitz. Ges. naturf. Freunde Berlin, p. 445: Amani, Usambara Mountains, Tanganyika Territory.

♂ ♀ & juv. (M. C. Z. 25380-2) Magrotto Mtn., T. T. 3. vii. 39.

Color. In life. ♂. Above, dark olive with a brown interorbital bar; from nostril to eye, and from eye over tympanum to axilla, a rather indistinct dark band; lips dark brown flecked with white; limbs, fingers and toes blotched with brown. Below, throat slightly brown flecked with white; belly, and remaining underparts, whitish tinged with yellow towards the sides; palms and soles dark brown.

Size. Length ♂ 57 mm., ♀ 67 mm., young 22 mm.

Habitat. The male was shot as he squatted on a sloping rock far in under an overhanging slab at the side of a torrent, the others were taken beneath vegetable debris or logs in the sodden rain forest.

RANA ALBOLABRIS ALBOLABRIS Hallowell

Plate 4, fig. 3.

Rana albolabris Hallowell, 1856, Proc. Acad. Nat. Sci. Philadelphia, p. 153: West Africa.

8 (M. C. Z. 25301-4) Idjwi Id., B. C. 20-28. ii. 39.

Native name. Mote (Lulega).

Variation. Snouts somewhat intermediate between topotypical Liberian *R. a. albolabris* and a paratype Angolan *R. a. parkeriana* Loveridge, 1941 (n.n. for *acutirostris* Parker, 1936, preoccupied by *acutirostris* Fatio, 1872).

Size. Length 44-61 mm., average 54.7 mm.

Breeding. Nonbreeding, possibly subadult.

Diet. Black crickets, ant, ? stone fly, spider, slug, snail.

RANA GALAMENSIS BRAVANA (Peters)

Limnodytes bravanus Peters, 1882, Sitz. Ges. naturf. Freunde Berlin, p. 3: Barawa, i.e. Brava, Italian Somaliland.

3 ♂ 3 ♀ (M. C. Z. 25305-6) Ujiji, T. T. 11. iii. 39.

Size. Length ♂♂ 64–74 mm., ♀♀ 63–74 mm.

Breeding. Not breeding.

Diet. In one stomach a cricket, caterpillars, and a large (15 mm. long) shield bug; nothing in stomachs of three emaciated frogs taken from deep water in an old sugar vat from which there was no way of escape.

RANA FUSCIGULA FUSCIGULA Duméril & Bibron

Rana fuscigula Duméril & Bibron, 1841, *Erpét. Gén.*, 8, p. 386: South Africa.

1 ♂ 16 ♀ (M. C. Z. 25315–9) Mushongero, U. l. ii. 39.

Native name. *Senyamiganda* (Lukiga for all ranids).

Variation. Characters of *fuscigula*, viz.: Length of tibia not more than half the length from snout to anus; fifth toe webbed to the very tip, but not so fully as in *R. f. chapini*.

Size. Length ♂ 55 mm., ♀♀ 60–75 mm., average 70 mm.

5 ♂ 15 ♀ 13 juv. 2 tad. (M. C. Z. 25320–5) Mushongero, U. l. ii. 39.

Variation. Characters of *fuscigula* and *chapini*, i. e. intermediates viz.: Length of tibia *more* than half the length from snout to anus; fifth toe webbed to the very tip (except for the two smallest young, M. C. Z. 25322–3, whose condition shows an approach to that of *f. angolensis*) but not so fully as in *R. f. chapini*; size that of *fuscigula* and not of *chapini*.

Size. Lengths ♂♂ 49–54 mm., ♀♀ 50–70 mm., average 62 mm., young 35–45 mm., average 39 mm. tadpoles 55–76 mm.

Enemies. One frog recovered from stomach of a green snake (*Chlorophis irregularis*).

RANA FUSCIGULA CHAPINI Noble

Rana chapini Noble, 1924, *Bull. Am. Mus. Nat. Hist.*, 49, p. 214, fig. 6a: Batama, Belgian Congo.

3 ♂ 1 ♀ 15 juv. (M. C. Z. 25326–9) Budongo Forest, U. 23. xi. 38.

2 ♀ 1 juv. (M. C. Z. 25330–2) Kibale Forest, U. 9. xii. 38.

4 ♂ 5 ♀ 4 juv. (M. C. Z. 25333–7) Magrotto Mtn., T. T. 5. vii. 39.

Variation. Length of tibia more than half the length from snout to anus; fifth toe webbed to the very tip though in some of the smallest Budongo and Kibale specimens rather less fully than in the adults, i. e. showing an approach to the (? ancestral) condition found in *R. f. angolensis*.

Size. Length ♂♂ 60–65 mm., ♀♀ 65–90 (75–76 at Kibale, 84 Budongo, 65–90 Magrotto) mm., young 27–59 mm., average 40 mm., tailed young 25 + 15, 26 + 12, and 27 + 16 mm.

Habitat. In or beside streams in the forest in all three localities, of which Kibale appeared to be the driest.

RANA FUSCIGULA ANGOLENSIS Bocage

Rana angolensis Bocage, 1866, Journ. Sci. Lisboa, 1, p. 73: Duque de Bragança, Angola.

1 juv. (M. C. Z. 25307) Mabira Forest, U. ll. xi. 38.

6 ♂ 1 ♀ 5 juv. (M. C. Z. 25308–12) Mubuku Valley, U. 31. xii. 38.

1 ♀ 5 juv. (M. C. Z. 25313–4) Kisenyi, B. R. 9. ii. 39.

Native name. *Lulenga* (Luganda for all ranids).

Variation. Length of tibia very variable but always more than half the length from snout to anus; fifth toe with last phalange free of web.

Color. Very variable, the most striking variant being one from the Mubuku Valley which, in life, was: Above, rich reddish brown, a broad, dull golden, vertebral stripe, edged with black anteriorly, from snout to anus.

Size. Length ♂♂ 45–52 mm., ♀♀ 60–70 mm., young 25–47 mm., average 39.6 mm.

Habitat. Boulenger recorded and figured frogs from the Mubuku Valley, Ruwenzori Mountains, under the name of *Rana nutti*, which I regard as a synonym of *angolensis*. It might reasonably be expected that frogs from this forested region would have been referable to the sylvicoline race *chapini*, instead we must assume that the valley has been populated by frogs ascending the Mubuku River from the savanna surrounding the eastern foot of the mountain. In Mabira the hot savanna is everywhere encroaching on the forest though actually I captured our single specimen in a rain-filled rut of the track which passes through a stretch of forest.

RANA CHRISTYI Boulenger

Rana christyi Boulenger, 1919, Revue Zool. Africaine, 7, p. 5: Madié, i.e. Medje, Ituri Forest, Belgian Congo.

♀ (M. C. Z. 25369) Budongo Forest, U. 29. xi. 38.

Distribution. This constitutes the first record of the occurrence of this species in Uganda. In the Congo it has been confused with *aequip-*

licata Werner, (which is a synonym of *longirostris* Peters, *vide* Nieden (1908) who compared the types of both), first by Noble (1924) for two of his Boyulu "*christyi*" (now M. C. Z. 6612-3) are really *longirostris*, and later by Witte (1934, p. 171) for six of his Dika series of "*aequiplicata* (now M. C. Z. 17956-7, 21757-60) are really *christyi*, though at least two of his Djamba frogs (now M. C. Z. 17958-9), mentioned in the same paper, were correctly identified as *christyi*.

Variation. Toes of the hind limb, taken in order from first to fifth, exhibit the following phlanges free of web: $1\frac{1}{2}$, 1, 1, 2, 0.

Color. In life. ♀. Above, yellow leaf-brown, a short, transverse, interorbital, black bar; round snout to behind tympanum a rich black streak; back irregularly flecked with black, the dorso-lateral glandular fold carrying a series of black dashes; flanks with a few flecks of black; forelimbs and feet distinctly, hind limbs indistinctly, barred with black; thighs posteriorly bright mustard yellow marbled with black; hind feet yellowish faintly tinged with pink. Below, throat cream-colored; belly bright lemon yellow; limbs yellowish; soles of forefeet light with dusky markings, those of hind feet black.

Size. Length ♀ 51 mm.

Habitat. Captured while taking tremendous leaps over the sodden, leaf-strewn, forest floor.

RANA OXYRHYNCHUS OXYRHYNCHUS Smith

Rana oxyrhynchus A. Smith, 1849, Ill. Zool. S. Africa, Rept., pl. lxxvii, figs. 2-2c: Kaffirland & region of Port Natal, South Africa.

- ♂ (M. C. Z. 25338) Budongo Forest, U. 30. xi. 38.
- 4 ♂ 1 ♀ (M. C. Z. 25339-40) Kisenyi, B. R. 9. ii. 39.
- ♀ (M. C. Z. 25341) Mikindani, T. T. 8. iv. 39.
- 1 juv. (M. C. Z. 25342) Mbanja, T. T. 3. v. 39.
- 8 juv. (M. C. Z. 25343) Siga Caves, T. T. 9. vi. 39.
- ♀ (M. C. Z. 25344) Magrotto Mtn., T. T. 1. vii. 39.
- ♀ (M. C. Z. 25345) Tanga township, T. T. 23. vii. 39.

Native names. *Nanhengo* and *nanihengo* (Kimakonde at Kitaya and Mbanja respectively); *nanmiengo* (Kimawiha). But all applied to *R. m. mascareniensis* also.

Variation. Fourth toe with $1\frac{1}{2}$ -2 phlanges free of web, all other toes webbed to the tip except in very young frogs where the webbing is a little less extensive, the Mbanja froglet, for example, has the terminal phlange of the third toe apparently free.

Color. In life, of an unusually colored ♀ from Magrotto. Above, gray, but so heavily overlaid and mottled with black as to appear black; from nostril a line passes below eye to base of forearm; the dorsolateral glandular fold and a line on hinder side of thigh from anus to back of knee, whitish or greenish. Below, lips flecked with white; throat silvery white flecked with gray merging into the slightly yellowish belly coloring, distinctly yellowish on its periphery and on hind limbs.

Size. Length ♂♂ 41–45 mm., ♀♀ 41–54 mm., young 19–26 mm.

Breeding. From February 9 to June 20 all females were gravid, their abdomens distended with ova; the female taken on July 23, however, had finished spawning.

Habitat. It should be explained that the Magrotto frog was taken in a swamp in open country far down the mountain; had it been captured in the forest one would have expected the sylvicoline form which follows.

RANA OXYRHYNCHUS GRIBINGUIENSIS Angel

Rana (Ptychadena) Gribinguiensis Angel, 1922, Bull. Mus. Hist. Nat. Paris, 28, p. 399, fig. —: Fort Crampel, Lake Chad, French West Africa.

♀ (M. C. Z. 25346) Amboni Estate, T. T. 20. vi. 39.

Variation. Fourth toe with 1 phlange free as is characteristic of this large race.

Size. Length ♀ 58 mm.

Breeding. Gravid, distended with ova.

Habitat. Taken in the patch of forest, beside which I was camped, or on the nearby land which was being cleared by tractors. To find this large and unmistakable montane-forest form—so far as the east is concerned—almost at sea-level, was a considerable surprise.

RANA MASCARENIENSIS MASCARENIENSIS Duméril & Bibron

Rana Mascareniensis Duméril & Bibron, 1841, Erpét. Gén., 8, p. 350: Madagascar; Mauritius; Seychelles.

2 ♂ 2 ♀ (M. C. Z. 25347–50) Kinangop Plateau, K. C. 29. x. 38.

7 juv. (M. C. Z. 25351–2) Kitaya, Rovuma R., T. T. 28. iii. 39.

♀ (M. C. Z. 25353) Siga Caves, Tanga, T. T. 9. vi. 39.

♀ (M. C. Z. 25354) Tanga township, T. T. 22. vii. 39.

Native names. The same as for *R. o. oxyrhynchus*.

Variation. Toes of the hind limb, taken in order from first to fifth, exhibit the following phlanges free of web: 2, 1½, 2, 3, 1½ for the

series from Kinangop at 10,000 feet, and $1-1\frac{1}{2}$, $1-1\frac{1}{2}$, $1-1\frac{1}{2}$, $2\frac{1}{2}-3$, $1-1\frac{1}{2}$ on those from the coastal belt almost at sea-level. The allocation of the Kinangop series to the typical race, therefore, may be regarded as tentative. They are separated from the larger western, and eastern montane, race apparently only by size!

Size. Length ♂♂ 41-42 mm., ♀♀ 34-48 mm., young 13-33 mm.

Breeding. On October 29 males were calling "quek-quek" and females spawning in rain-filled pools along a cart track traversing the plateau. On March 28 and June 9 newly emerged young were numerous.

Enemies. Two young were recovered from the stomach of an egret (*Egretta g. dimorpha*) and one from a house snake (*Boaedon l. lineatus*) near the Siga Caves.

RANA MASCARENIENSIS VENUSTA Werner

Rana venusta Werner, 1907, Sitz. Akad. Wiss. Wien, **116**, **1**, pp. 1889 and 1892, pl. iv. fig. 11: Entebbe, Uganda; Mongalla, Belgian Congo; and Lagos, Nigeria.

- 1 ♀ 2 juv. (M. C. Z. 25355-6) Budongo Forest, U. 30. xi. 38.
- 1 juv. (M. C. Z. 25357) Kibale Forest, U. 16. xii. 38.
- 1 juv. (M. C. Z. 25358) Nyakabande, U. 28. i. 39.
- 3 ♂ (M. C. Z. 25359-60) Mushongero, U. 1. ii. 39.
- 6 ♂ 3 ♀ (M. C. Z. 25361-2) Kisenyi, B. R. 9. ii. 39.
- 1 ♂ 7 ♀ 6 juv. (M. C. Z. 25363-4) Idjwi Id., B. C. 25. ii. 39.
- 4 ♂ 2 ♀ (M. C. Z. 25365-6) Ujiji, T. T. 11. iii. 39.
- 3 ♂ 2 ♀ (M. C. Z. 25367-8) Magrotto Mtn., T. T. 1. vii. 39.

Native name. Marembere (Lulega).

Variation. Toes of the hind limb, taken in order from first to fifth, exhibit the following phlanges free of web: $1-2$, $1-1\frac{1}{2}$, $1-1\frac{1}{2}$, $2-3$, $1-1\frac{1}{2}$. The tibio-tarsal articulation of the adpressed hind limb, in both this and the typical form, reaches the end of the snout or beyond, both conditions being found in any locality from which an adequate series is available. This apparently reduces the recognition of *venusta* as a western, or forest, form to a matter of size.

Size. Length ♂♂ 40-53 mm., ♀♀ 52-65 mm., young 20-46 mm.

Breeding. On November 30, juvenile frogs measured 20-22 mm. and increased more or less progressively to February 25, when those of 30-46 mm. were encountered.

Habitat. The Budongo frogs were sitting on a grassy bank beside a ditch across which they leaped into sedges of a small swamp separat-

ing road from forest. The Kibale frog was in a swamp by palms without the forest. The Idjwi series were on the lake shore. Ujiji in a sugar vat. The Magrotto series in a swamp near, but outside, the forest.

RANA OCCIPITALIS Günther

Plate 4, fig. 4.

Rana occipitalis Günther, 1858, Cat. Batr. Sal. Brit. Mus., p. 130, pl. xi: West Africa; Africa; Gambia.

1 ♂ 2 ♀ (M. C. Z. 25370-1) Ujiji, T. T. 11. iii. 39.

Size. Length ♂ 97 mm., ♀ ♀ 125-125 mm.

Diet. Bones of a small frog and a large Dytiscid beetle (*Cybister* sp.) in one.

Breeding. Apparently not; spawn small in females.

RANA EDULIS (Peters)

Pyxicephalus edulis Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 626: Boror; Mozambique; and Tete, Mozambique.

1 juv. (M. C. Z. 25372) Kitaya, T. T. 31. iii. 39.

3 ♀ 3 juv. (M. C. Z. 25373-7) Mikindani, T. T. 10. iv. 39.

4 juv. (M. C. Z. 25378) Siga Caves, T. T. 15. vi. 39.

1 juv. (M. C. Z. 25379) Amboni Est., T. T. 17. vi. 39.

Native names. *Liola* (Kiyao); *kitowa* (Kimakonde, but also for *Chiromantis*!).

Size. Length ♀ ♀ 125-145 mm., young 29-115 mm.

Breeding. On June 15 the ground was literally a-hop with hundreds of emergent frogs which had come from a large swamp and were seeking shelter under bundles of grass and among the rubble of a collapsed hut.

Diet. These bullfrogs seem impervious to stings, for example, the stomach of one Mikindani frog held: 3 scorpions each measuring $1\frac{1}{4}$ " from head to end of sting, a centipede 4" long and $\frac{1}{3}$ " broad, a millipede $2\frac{3}{4}$ " long, a scutigera, a carabid beetle $1\frac{1}{2}$ " long of a species that ejects formic acid, 3 black "stink" ants $\frac{11}{16}$ " long, remains of a snail with shell $\frac{7}{16}$ " diameter.

From other stomachs a frog (*Hyperolius c. sansibaricus*), 2 scorpions, 4 millipedes, a tenebrionid beetle $1\frac{1}{2}$ " long, 3 hard-shelled tenebrionids

each about $\frac{3}{4}$ " long without their heads, a nymph, and a hard black tip of a sisal (aloe) leaf, the thorn measuring 1" in length.

Enemies. In their turn these big frogs are eaten by natives of the Mawiha tribe and two tailed tadpoles were recovered from the stomach of an egret (*Egretta g. dimorpha*). At Kitaya a frog was brought in which lacked a left hind leg, if it had ever had one, the place was completely healed over though the frog was 60 mm. long.

PHRYNOBATRACHUS spp.

Recently Dr. Laurent, (1941b, p. 192) has discussed the subgenera of *Phrynobatrachus*, his conclusions being based on his own anatomical investigations; the following list in which the species are arranged according to disks, webbing, and habitat, conforms very nearly with his views except that *graueri* is anatomically affiliated with the first five species listed, *i.e.* *Phrynobatrachus* (*sensu strictu*) and not with the last three, which he refers to *Natalobatrachus*.

As the digital disk, when present, occupies much of the terminal phlange, *a toe that is webbed to the disk is here considered to have one phlange free*, the necessity for such a rating is apparent when, as is not infrequently the case, the digital expansion dries or macerates, or when one has to compare the extent of webbing with such a species as *natalensis*.

The list refers only to the material in the present collection, every individual of which—except in the case of the long series from Idjwi Island—has been examined.

Species	Disks present	Phlanges on toes free of web					Habitat
		1st.	2nd.	3rd.	4th.	5th.	
<i>natalensis</i>	No	1	1	2	3	2	savanna swamp
<i>perpalmaris</i>	Yes	1	1	1	1-1½	1	"
<i>acridoides</i>	Yes	1	1	1	2	1	"
<i>kinangopensis</i>	Just	1	1	1	2	2	" ¹
<i>plicatus</i>	Yes	1	1	1	2	1	forest pool
<i>krefftii</i>	Yes	1	1	1	2	1	"
<i>dendrobates</i>	Yes	1	1	2	3	2	"
<i>versicolor</i>	Yes	1	1	2	3	2-2½	" ²
<i>graueri</i>	Yes	1-1½	1½-2	2-2½	3-3½	2-2½	forest & vic.

¹In alpine meadows at 10,000 feet.

²See remarks under *Habitat*.

PHRYNOBATRACHUS NATALENSIS (Smith)

Stenorhynchus natalensis A. Smith, 1849, Ill. Zool. S. Africa, Rept., App., p. 24: Natal, Union of South Africa.

- 2 ♂ (M. C. Z. 25432-3) Mabira Forest, U. 15. xi. 38.
 8 hgr. (M. C. Z. 25434-5) Budongo Forest, U. 23. xi. 38.
 1 ♂ 1 ♀ (M. C. Z. 25436-7) Ujiji, T. T. 11. iii. 39.

Native name. *Lulenga* (Luganda for all ranids).

Variation. Tibio-tarsal articulation reaches eye (♂ ♀) or nostril (♀). See also under *Phrynobatrachus*.

Color. A narrow, light, vertebral line in one Budongo frog only.

Size. Length ♂♂ 31-32 mm., ♀ 31 mm.; halfgrown 25-29 mm.

Breeding. On November 11, males calling from pool.

Enemies. One recovered from the stomach of a one-streaked hawk (*Kaupifalco monogrammicus*) at Kitaya.

Habitat. Both Mabira and Budongo series were taken *outside* the forest in a pool and stream respectively; the Ujiji pair were in an abandoned sugar vat from which there was no means of escape.

PHRYNOBATRACHUS PERPALMATUS Boulenger

Phrynobatrachus perpalmatus Boulenger, 1898, Proc. Zool. Soc. London, pl. xxxviii, fig. 1: Lake Mweru, Northern Rhodesia.

- 10 ad. 7 juv. (M. C. Z. 25414-8) Ujiji, T. T. 11. iii. 39.

Variation. Tibio-tarsal articulation reaches eye, sometimes only barely. See also under *Phrynobatrachus*.

Color. A broad, light, vertebral line in two frogs only; the longitudinal dusky lines on hinder and lower aspect of thighs are characteristic and an aid to identification.

Size. Length 19-24 mm., young 10-14 mm.*

Habitat. Calling from swamped grasslands near the lakeshore.

PHRYNOBATRACHUS ACRIDOIDES (Cope)

Staurois acridoides Cope, 1867, Journ. Acad. Nat. Sci. Philadelphia, 6, p. 198: Zanzibar.

- 2 (M. C. Z. 25426-7) Kitaya, T. T. 4. iv. 39.
 12 (M. C. Z. 25428-9) Mikindani, T. T. 11. iv. 39.
 3 (M. C. Z. 25430-1) Siga Caves, T. T. 8. vi. 39.

Variation. Tibio-tarsal articulation reaches eye or nostril, in young even to end of snout. See also under *Phrynobatrachus*.

Color. A broad, or narrow, vertebral line in 3 Mikindani males and 2 Siga females only.

Size. Length ♂♂ 25–27 mm., ♀♀ 26–30 mm., young 17–23 mm.

Breeding. On April 11 males were numerous (7 to 3 females) and calling, a hind-limbed tadpole measuring 14 + 32 mm. is presumed to be this species. Males are recognizable by their dark throats which become roughened at this season by accentuation of the dermal granulations.

Habitat. At Mikindani in swamped grasslands beneath the coconuts, at Siga on a swampy path beside the Mkulumusi River.

PHRYNOBATRACHUS KINANGOPENSIS Angel

Phrynobatrachus Kinangopensis Angel, 1924, Bull. Mus. Hist. Nat. Paris, **30**, p. 130: Mount Kinangop, Aberdare Mountains, Kenya Colony.

2 (M. C. Z. 25424–5) S. Kinangop Plateau, K. C. 29. x. 38.

Variation. Tibio-tarsal articulation reaches tympanum. See also under *Phrynobatrachus*.

Size. Length ♂♂ 14–19 mm.

Habitat. In a rain-filled pool beside road at 10,000 feet.

PHRYNOBATRACHUS PLICATUS (Günther)

Hyperolius plicatus Günther, 1858, Cat. Batr. Sal. Brit. Mus., p. 88, pl. vii, fig. C: Coast of Guinea.

1 (M. C. Z. 25419) Budongo Forest, U. 29. xi. 38.

Distribution. New for Uganda, though long known from the Ituri Forest of the Belgian Congo.

Variation. Tibio-tarsal articulation reaches far beyond end of snout. See also under *Phrynobatrachus*.

Size. Length 25 mm.

Habitat. In ditch at forest edge.

PHRYNOBATRACHUS KREFFTII Boulenger

Phrynobatrachus krefftii Boulenger, 1909, Ann. Mag. Nat. Hist. (8), **4**, p. 496: Amani, Usambara Mountains, Tanganyika Territory.

5 (M. C. Z. 25420–3) Magrotto Mtn., T. T. 8. vii. 39.

Variation. Tibio-tarsal articulation reaches eye or end of snout. See also under *Phrynobatrachus*.

Color. In life. ♂. Above, olive mottled with black; limbs barred with black. Below, throat rich yellow, posteriorly crossed by a broad dusky band vermiculated with white; rest of undersurface whitish faintly tinged with yellow and spotted with pale brown, principally along outer part of limbs; palms and soles black.

♀. Above, as in male. Below, whitish with dusky markings as in male but the post-gular band is much less clearly defined.

Size. Length ♂♂ 31–36 mm., ♀♀ 33–41 mm.

Habitat. Some were taken in stony puddles formed by a spring issuing from the mountainside in deep forest, others were resting on the wet banks of, or stones in, a turbulent little torrent where it cascaded through the shady forest.

PHRYNOBATRACHUS DENDROBATES (Boulenger)

Arthroleptis dendrobates Boulenger, 1919, *Revue Zool. Afr.* **7**, p. 8: Madié, i.e. Medje, Belgian Congo.

♂ (M. C. Z. 25438) Kibale Forest, U. 12. xii. 38.

5 (M. C. Z. 25439–41) Idjwi Id., B. C. ii. 39.

Variation. Tibio-tarsal articulation reaches nostril or end of snout. See also under *Phrynobatrachus*.

Size. Length ♂ 31 mm., and of Idjwi series both sexes 23–33 mm.

Enemies. In stomach of a tree snake (*Hapsidophrys lineata*) taken in Budongo Forest.

Habitat. On damp leaves of forest floor in Kibale Forest.

PHRYNOBATRACHUS VERSICOLOR Ahl.

Phrynobatrachus versicolor Ahl, 1924, *Zool. Anz.*, **61**, p. 100: Rugege Forest, Belgian Ruanda-Urundi.

20 (M. C. Z. 25451–5) Nyakabande, U. 28. i. 39.

7 (M. C. Z. 25442–5) Mushongero, U. 1. ii. 39.

25 (M. C. Z. 25446–50) Idjwi Id., B. C. ii. 39.

Native name. *Miusi* (Lulega, but not specific).

Correction. Formerly I (1936h, p. 97) regarded this species as indistinguishable from *dendrobates*, with which I synonymized it. Now, after seeing them both in life, I believe them to be distinct though I

am at a loss to define *versicolor* except by stouter habit and pigmentation of lower surface, for in size, limb length, webbing, etc., they appear to be indistinguishable.

Variation. Tibio-tarsal articulation just fails to reach the eye in one frog, reaches eye or nostril in majority, end of snout in a very few instances. Minute spines are present on soles of hind feet in both sexes but are better developed in the males. See also under *Phrynobatrachus*.

Color. A narrow, light, vertebral band in two (Mushongero and Idjwi) frogs only, but flanks of three large females in the latter series are strikingly light, as if each side bore a broad, light band.

Size. Length of ♂♂ 25–28 mm., ♀♀ 25–34 mm., average for 52 frogs of both sexes 29.7 mm.

Habitat. This frog is doubtless associated with forest as is indicated by the type locality. I must state, however, that most of mine came from the deforested uplands in the Kigezi district.

PHRYNOBATRACHUS GRAUERI (Nieden)

Arthroleptis graueri Nieden, 1910, Sitz. Ges. naturf. Freunde Berlin, p. 441: Rugege Forest, Belgian Ruanda-Urundi.

4 ♂	2 ♀	7 juv.	(M. C. Z. 25456–8)	Budongo Forest, U.	23. xi. 38.
	2 ♀		(M. C. Z. 25459)	Kibale Forest, U.	13. xii. 38.
1 ♂	1 ♀		(M. C. Z. 25460–1)	Mubuku Valley, U.	31. xii. 38.
17 ♂	15 ♀	2 juv.	(M. C. Z. 25462–5)	Mihunga Swamp, U.	18. i. 39.
5 ♂			(M. C. Z. 25466–9)	Mushongero, U.	3. ii. 39.
11 ♂	4 ♀		(M. C. Z. 25470–3)	Kisenyi, B. R.	11. ii. 39.
69 ♂	25 ♀	2 juv.	(M. C. Z. 25474–7)	Idjwi Id., B. C.	16–28. ii. 39.

Native names. *Senyamiganda* (Lukiga for all ranids); *ntoli* (Lutoro); *etoli* (Lukonjo); *kashakara* (Lulega, but for *Arthroleptis* also).

Remarks. In the field, more especially at Mihunga and on Idjwi, I was under the impression that I was dealing with two species, in part owing to the fact that gravid females from 25–31 mm. seemed a large range. In the laboratory I have failed to find any means of separating two forms or species, for they occurred together.

Variation. Tibio-tarsal articulation reaches eye or nostril, rarely to end of snout; this range is covered by *both* sexes though in general females average a relatively shorter hind limb. See also under *Phrynobatrachus*.

Color. In life. ♂. Mihunga. Above, dark olive, from nostril to eye an indistinct brown streak, a broad and conspicuous one from eye, through tympanum, to forelimb; from snout to anus a very fine, yel-

low, vertebral line; a black circum-anal area is flanked by a pair of light lines; limbs barred with brown, thighs with light bars also, tibia with a fine light longitudinal line. Below, throat black, posteriorly minutely flecked with white; breast and limbs infuscated with brown; hind limbs, from the waist, often chrome colored.

In life. ♀. Mihunga. Above, brown or olive though sometimes quite green, snout paler; a dark interorbital band; a dark, light-edged, circum-anal area; limbs indistinctly barred with brown; digits barred with white and brown. Below, white, the throat infuscated with brown, the belly often bluish and almost spotted with brown; soles brown.

A broad, light, vertebral line in 1 ♂ from Mubuku, 1 ♂ from Mushongero, 1 ♂ and 1 ♀ from Mihunga, 16 ♂♂ and 8 ♀♀ from Idjwi; 1 Mushongero and 2 Mihunga males have the dorsal area between the glandular cordons light brown edged with black along the cordons, thus presenting a very distinctive appearance.

Size. Length of 108 ♂♂ 20–24 mm., average 21.8 mm., of 46 ♀♀ 24–31 mm., average 26.3 mm., of 11 young 9–14 mm.

Breeding. On January 18, males, recognizable by their dark and granular throats, were heard calling “tink-tink” in the swamp at the foot of the Weria Ravine; on February 3 they were noted as “clicking” in pools close to the papyrus fringing the edge of Lake Mutanda. Females were gravid during the entire three months of our stay in the Central Lake Region which coincided with heavy rains.

Enemies. In stomach of a tree snake (*Dipsodoboia unicolor*) in Mihunga Swamp.

Habitat. On damp leaves beside streams in the forests of Budongo, Kibale, and the Mubuku Valley, while at Mihunga they were calling from the water-filled footprints of elephants among the long grass of the swamp. At Mushongero and Kisenyi there was no real forest in the vicinity though much of this region has suffered from deforestation.

ARTHROLEPTIS MINUTUS Boulenger

Arthroleptis minutus Boulenger, 1895, Proc. Zool. Soc. London, p. 539, pl. xxx, fig. 4: Durro, Western Somaliland, *i.e.* Duro, Ethiopia.

25 (M. C. Z. 25408–9) S. Kinangop Plateau. K. C. 27. x. 38.

2 (M. C. Z. 25410–1) Mikindani, T. T. 12. iv. 39.

1 (M. C. Z. 25412) Lindi, T. T. 1. vi. 39.

Variation. Tips of fingers not dilated; metatarsal tubercles and a

tarsal tubercle present, small; tibio-tarsal articulation reaches eye or just beyond.

Color. The Mikindani males differ from the Kinangop breeding males by the possession of very black throats.

Size. Length (sexing questionable as based on external appearance) ♂♂ 18–20 mm., average 19 mm., ♀♀ 21–24 mm., average 21 mm., only one frog over 22 mm.

Breeding. On October 27 the Kinangop frogs were assembling for breeding, the small rains having just commenced. Probably the two Mikindani males also, the big rains being in full force. The only juvenile taken during the entire eight months was captured on June 1 under grass thatching, it measured 12.5 mm.

Parasites. The buttocks of the Mt. Kinangop series are infested with chigger mites (*Endotrombicula* sp.) possibly of the same species (*penetrans*) which I found in *minutus* from Mt. Sagalla.

Habitat. Many of those taken on the Plateau at 10,000 feet were clambering about in the long dew-drenched grass flanking the Chania River, it seems difficult to believe that they are specifically identical with those taken in the coastal belt under 100 feet alt.

ARTHROLEPTIS XENODACTYLUS Boulenger

Arthroleptis xenodactylus Boulenger, 1909, Ann. Mag. Nat. Hist. (8), 4, p. 496:

Amani, Usambara Mountains, Tanganyika Territory.

Arthroleptis schubotzi Nieden, 1910, Sitz. Ges. naturf. Freunde Berlin, p. 440:

Usumbura, Belgian Ruanda-Urundi.

1 (M. C. Z. 25403) Mikindani, T. T. 12. iv. 39.

2 (M. C. Z. 25404–5) Nchingidi, T. T. 12. v. 39.

5 (M. C. Z. 25406–7) Magrotto Mtn., T. T. 8–12. vii. 39.

Synonymy. Apart from our big series of topotypes, we have this species from right across Tanganyika Territory to the Lake itself, as well as from Buta, Bas Uele, Belgian Congo, determined by Dr. G. F. de Witte, with whose identification I concur. There seems, therefore, no reason to regard *schubotzi* as distinct, the frogs referred by me (1933h, p. 380) to that species are much smaller and therefore described below as new.

Variation. Tips of fingers more or less swollen, of toes distinctly dilated into little disks; metatarsal tubercle small, oval, no outer or tarsal tubercles; tibio-tarsal articulation reaches tympanum or eye (posteriorly in ♀, anteriorly in ♂♂).

Color. In life. ♂. Magrotto. Above, pale fawn; a few light flecks on buccal border and a larger, slightly pink, spot posterior to commissure of mouth; a dark brown interocular patch continuous with hour-glass pattern on back; from upper eyelid a light, dorsolateral, glandular line and immediately below it, on flanks, scattered dark brown patches; groin transparent red; limbs and feet pale fawn barred or mottled with dark brown. Below, whitish, chin and throat flecked with gray; center of belly pale yellow.

Another ♂. Magrotto. Above, back, upper arm and tibia vermilion red, remaining upper parts grayish olive; flanks flecked with white. Below, grayish, indistinctly flecked with white.

Size. Length ♂♂ 19–20 mm., ♀♀ 20–22 mm., young 14–15 mm.

Breeding. On April 12 female gravid, distended with ova; on May 12 two young.

Enemies. One in stomach of a snake (*Neusterophis o. uluguruensis*).

Habitat. The Nchingidi juveniles were taken on a forest path and beneath a log, the Magrotto adults in swamp by camp and near sawpit at forest edge, immediately after heavy rain.

ARTHROLEPTIS XENODACTYLOIDES NKUKAE subsp. nov.

Arthroleptis schubotzi Loveridge (not of Nieden), 1933, Bull. Mus. Comp. Zool., 74, p. 380.

Type. Museum of Comparative Zoölogy, No. 17029, an adult ♀ from Nkuka Forest, Rungwe Mountains, Tanganyika Territory, collected by Arthur Loveridge, March 1930.

Paratypes. Museum of Comparative Zoölogy, Nos. 17026–8 and 17030–53, being the entire series of material listed in the above citation taken in the Rungwe, Ukinga and Uzungwe Mountains of southwestern Tanganyika Territory.

Remarks. In 1933, though with serious misgivings, I referred these frogs to *schubotzi* Nieden rather than describe three new species of *Arthroleptis* from the Rungwe-Ukinga region at the northern end of Lake Nyasa. Subsequent information, however, has led me to conclude that *schubotzi*, whose type measured 21 mm., is a synonym of *xenodactylus* Boulenger, whereas the Nkuka material is but a form of the smaller *xenodactyloides* Hewitt, whose type was 19 mm.

Diagnosis. *A. xenodactyloides* Hewitt (1933) was described from Chirinda Forest, Mount Selinda, Southern Rhodesia, a thousand miles south of the Nkuka Forest. The new race differs from the typical

form, of which we have extensive topotypical material, in that the belly of adult *nkukae* is darkly marmorate whereas in *xenodactyloides* it is immaculate.

Color. In life. This, together with much information about breeding, diet, parasites, habitat, etc. will be found in the citation given above.

Size. Length of Type ♀ from snout to anus, 17 mm., but the largest of several hundred specimens from the Nkuka Forest, Kigogo, and Madehani, all measure 18 mm.

ARTHROLEPTIS XENOCHIRUS Boulenger

Arthroleptis xenochirus Boulenger, 1905, Ann. Mag. Nat. Hist. (7), 16, p. 108, pl. iv, figs. 2-2a: Marimba, northern Angola.

♂ (M. C. Z. 25413) Idjwi Id., B. C. ii. 1939.

Native name. *Kashakara* (Lulega). The Balega, when questioned, appeared not to have any special name for this peculiar little frog.

Remarks. *A. xenochirus* is known only from the ♂ holotype and Nieden's (1908) record of one from Jaunde, Cameroon, presuming that this is the same frog as that listed by Deckert (1938).

Idjwi Island, in Lake Kivu, lies just under a thousand miles northeast of Marimba, yet our frog differs in only one particular from the description; being formalin preserved, however, the color pattern description cannot be checked.

Boulenger states that the third finger of the type is three times the length of the second, this tallies with the proportions shown in his fig. 2, but in the enlargement of the hand, fig. 2a, it is three and two-third times. The length of the type was 19 mm.

In the 22 mm. holotype of *A. procterae* Witte (1921) from Beni, 200 miles northwest of Idjwi, the third finger is only 2 times as long as the second. This frog was said to differ from *xenochirus* in that the tibio-tarsal articulation reached the eye (instead of tympanum), the first finger was as long as (instead of shorter than) the second. The latter alleged difference, judging by the figures, is based on a difference of interpretation; the former is trifling and well within the range of variation displayed by most members of the genus.

In the Idjwi frog the third finger is *four times longer than the second*, but in the absence of comparative material I refrain from describing an eastern race based on a single specimen which is the same length as the type of *xenochirus*.

Size. Length 19 mm., length of third finger 9 mm.

ARTHROLEPTIS near POECILONOTUS Peters

Arthroleptis poecilonotus (Schlegel) Peters, 1863, Monatsb. Akad. Wiss. Berlin, p. 446: Boutry, Ashanti, Gold Coast.

1 (M. C. Z. 25402) Mabira Forest, U. 10. xi. 38.

Remarks. The state of preservation leaves much to be desired and a series is badly needed, I scarcely think that it is referable to *poecilonotus* which has never been recorded from Uganda.

Variation. Tips of digits slightly swollen or dilated (but no longer so), first finger slightly shorter than second; a metatarsal, but no tarsal, tubercle, small, rounded, shorter than inner toe, appears rather less prominent than in *poecilonotus*; toes with a rudiment of web; tibio-tarsal articulation reaches nostril.

Color. In alcohol. Above, grayish mottled with brown rather like *minutus* from which it differs in lacking a second tubercle, etc.

Size. Length 20 mm.

Habitat. At base of banana plant in a plantation across the ravine from the Mubango rubber-coffee factory.

ARTHROLEPTIS ADOLFIFRIEDERICI Nieden

Arthroleptis adolfi-friederici Nieden, 1910, Sitz. Ges. naturf. Freunde Berlin, p. 440: Rugege Forest, Belgian Ruanda-Urundi.

Arthroleptis affinis Ahl, 1939, Sitz. Ges. naturf. Freunde Berlin, p. 303, fig. 1: Amani, Tanganyika Territory (Type ♀ 39 mm.).

Arthroleptis schoenebecki Ahl, 1939, Sitz. Ges. naturf. Freunde Berlin, p. 305, fig. 2: Amani, Tanganyika Territory (Type ♂ 22 mm.).

3 (M. C. Z. 25400-1) Magrotto Mtn., T. T. 3. vii. 39.

Synonymy. Magrotto Mountain is but twenty miles distant from Amani, Usambara Mountains, type locality of *affinis* and *schoenebecki*. The Museum of Comparative Zoölogy possesses 190 Amani topotypes which were referred by Barbour & Loveridge (1928, p. 212) to *adol-friederici*. Though I have never examined the type of that species, I see no reason to question the identification for the M. C. Z. possesses an example (M. C. Z. 14696) from just north of Lake Kivu—and so nearly topotypical—as well as others from intermediate localities in the Poroto and Uluguru Mountains, as well as from Mt. Mbololo in Kenya.

Ahl compares *affinis* with *methneri* Ahl from near Kilwa, a species

I regard as synonymous with *A. s. stenodactylus* though comparison may show it to be a synonym of *A. s. lönnbergi* seeing that the latter has turned up on the Rondo Plateau to the south of Kilwa where it occurs alongside *Spelaeophryne methneri* Ahl.

Variation. Tips of toes, and of some fingers, distinctly dilated; metatarsal tubercle only moderately large, somewhat oval; tibiotarsal articulation reaches nostril or between eye and nostril.

Size. Lengths 34–39 mm.

Enemies. One in stomach of a young house snake (*Boaedon l. lineatus*).

Habitat. One beneath a log in the forest.

ARTHROLEPTIS STENODACTYLUS LÖNNBERGI Nieden

Arthroleptis lönnbergi Nieden, 1915, Mitt. Zool. Mus. Berlin, 7, p. 361: Mombo, foot of Usambara Mountains, Tanganyika Territory.

Arthroleptis vagus Ahl, 1939, Sitz. Ges. naturf. Freunde Berlin, p. 306: Usambara Mountains, Tanganyika Territory (♂ 31 mm., ♀ 38 mm.).

Arthroleptis ukamiensis Ahl, 1939, Sitz. Ges. naturf. Freunde Berlin, p. 308, fig. 3: Ukami, Tanganyika Territory (♀ 33 mm.).

1 (M. C. Z. 25399) Nchingidi, T. T. 12. v. 39.

Synonymy. Nchingidi, on the Rondo Plateau, lies close to the Makonde Plateau which, together with Tendaguru and Amani, are among the localities of Ahl's paratypes of *vagus*. It is fortunate that Ahl definitely designated certain specimens as ♂ and ♀ cotypes in case the paratype from Chifumbazi, Mozambique, might prove referable to the typical form. The Museum of Comparative Zoölogy possesses a good series of *lönnbergi* from Amani, therefore topotypes of *vagus*.

Ukami, *i.e.* country of the Kami tribe, is practically synonymous with the Uluguru Mountains where they dwell. When I first noticed the difference between the two forms of *stenodactylus*, I submitted an Uluguru specimen to Ahl for favour of comparison with the type of *lönnbergi* which I thought it to represent. On account of Ahl's statement that they differed, I (1932) described *A. s. uluguruensis* which later (1936), on obtaining a topotype of *lönnbergi* from the original series, referred to the synonymy of the latter. To that synonymy I now add both *vagus* and *ukamiensis*.

Variation. Tips of fingers slightly swollen, of second, third, and

fourth toes dilated; metatarsal tubercle large, shovel-shaped; tibio-tarsal articulation reaches tympanum.

Size. Length 30 mm.

Enemies. One recovered from stomach of a green snake (*Chlorophis macrops*) and three from white-lipped snakes (*Crotaphopeltis h. hotamboeia*) at Nchingidi.

ARTHROLEPTIS STENODACTYLUS STENODACTYLUS Pfeffer

Arthroleptis stenodactylus Pfeffer, 1893 (1892), Jahrb. Hamburg. Wiss. Anst., 10, p. 93, pl. i, fig. 11: Kihengo, Tanganyika Territory.

- 2 (M. C. Z. 25383-4) Kitaya, T. T. 30. iii. 39.
- 21 (M. C. Z. 25385-9) Mikindani, T. T. 11. iv. 39.
- 2 (M. C. Z. 25390-1) Mbanja, T. T. 27. iv. 39.
- 2 (M. C. Z. 25392-3) Lindi, T. T. 1. vi. 39.
- 3 (M. C. Z. 25394-5) Magrotto Mtn., T. T. 1. vii. 39.
- 3 (M. C. Z. 25396-8) Likoni, K. C. 25. vii. 39.

Variation. Tips of digits not dilated; metatarsal tubercle, large, shovel-shaped; tibio-tarsal articulation reaches, or just fails to reach, tympanum except in 3 Mikindani, 2 Magrotto, and 1 Likoni frog where it attains the eye. The Magrotto frogs are somewhat intermediate between *s. stenodactylus* and *s. lönnbergi*, one would have expected them to be the latter.

Color. In life. Kitaya. Above, buff, so thickly speckled with red as to appear rufous; a large blotch beneath orbit and an interorbital mark on crown; from end of snout a dark band passes upwards over nostril, through orbit, above tympanum to flank where it breaks up into spots; groin and thigh gray, the latter indistinctly barred; tibia with four dark cross-bars. Below, pure white; soles of feet dusky gray.

Mikindani. A most unusual variant is a 25 mm. frog (M. C. Z. 25385) which has a broad, black-edged, light, vertebral streak from snout to anus.

Size. Length 18-38 mm., average 28 mm.

Breeding. Apparently not; the only specimen under 20 mm. in length was taken on July 25.

Diet. Ants and beetles.

Enemies. In stomachs of many snakes, viz. *Boaedon l. lineatus*, *Chlorophis neglectus* (2), *Crotaphopeltis h. hotamboeia*, and *Psammophis s. sudanensis* (2).

Habitat. Under rubbish at Kitaya; beneath rotting palm trunks and piles of coconut husks, also in swamped grasslands under palms, at Mikindani; under piles of grass at both Kitaya and Lindi; beneath *mcuti* at Likoni.

CACOSTERNUM BOETTGERI BOETTGERI (Boulenger)

Arthroleptis boettgeri Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 118, pl. xi, fig. 8: Vleis, Kaffraria, Bechuanaland.

7 (M. C. Z. 25478-9) S. Kinangop Plateau, K. C. 29. x. 38.

Remarks. It is with some hesitation that trinomials are employed for the status of *C. b. albiventris* Hewitt, 1926, is not too clear. A pair (M. C. Z. 15807, 22260) received from Power, the first to recognise it, seem scarcely distinguishable. The only other writer to consider the form as valid is Hoffman, 1940, who obtained a single example at Broedershoek, near Greytown, Natal.

Variation. Tympanum concealed; tips of digits not dilated; a distinct inner, and a scarcely distinguishable outer, metatarsal tubercle; no tarsal tubercle; tibio-tarsal articulation reaches shoulder.

Size. Length ♂♂ 18-20 mm., ♀ 22 mm.

Breeding. These males, standing vertically in rain-formed pools with their forelimbs resting on grass blades beneath overhanging tussocks, were calling loudly, but difficult to locate on account of the concealed positions which they had selected.

HEMISUS MARMORATUM MARMORATUM (Peters)

Engystoma marmoratum Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 628: Cabageira, Mozambique.

4 (M. C. Z. 25480-2) Kitaya, T. T. 30. iii. 39.

9 (M. C. Z. 25483-5) Mikindani, T. T. 15. iv. 39.

5 (M. C. Z. 25486-7) Lindi, T. T. 1. vi. 39.

9 (M. C. Z. 25488-9) Siga Caves, T. T. 15. vi. 39.

Native names. *Kisianene* (Kiyao); *chihenene* (Kimakonde); *chenene* (Kimwika). These names being applied also to *Breviceps mossambicus*.

Color. In life. Kitaya. ♀. Above, gray, or greenish gray, vermiculated with black; sides paler. Below, white, uniform.

Size. Length 22-33 mm., those of 22-23 mm. still bearing stumpy rudiments of tails.

Breeding. On June 15 only, were young examples found, the entire Siga series ranging from 22–26 mm.

Enemies. Two tailed young recovered from the stomach of an egret (*Egretta g. dimorpha*) at Siga, an adult from a house snake (*Boaedon l. lineatus*) at Mikindani.

Habitat. Three beneath thatching of a collapsed hut at Kitaya; under rubbish or in damp sand beneath mango trees at Mikindani; beneath bundles of grass at Lindi; under palm fronds at Siga Caves. When uncovered these plump little frogs squat down, then run fast rather like a mouse.

BREVICIPITIDAE

CALLULINA KREFFTI Nieden

Callulina krefftii Nieden, 1910, Sitz. Ges. naturf. Freunde Berlin, **10**, p. 449: Amani, Usambara Mountains, and Tanga, Tanganyika Territory.

13 (M. C. Z. 25490–4) Magrotto Mtn., T. T. 6. vii. 39.

Native name. *Kikorowe* (Kisambara, but applied to *Probreviceps* also).

Color. In life. Above, pale brown mottled with sepia in adults, the young are often particolored the head and posterior half of back being dark brown edged with black, the anterior half of back from shoulder to about midbody, and a spot on the lumbar region, creamy white. Below, adults white, or pale chrome, minutely flecked with chinese white; young dark gray, almost black, minutely flecked with chinese white. The pupil of a toad with a bright pale chrome throat was horizontal, black with bright orange iris, in all the others it was pale bronze.

Size. Length 22–45 mm., average 32 mm., for only four were really young 22–24 mm. at this time.

Defence. On being removed from their retreats these toads immediately inflate tremendously and, rising stiffly on their ridiculously short little legs, present a very *Breviceps*-like appearance. Simultaneously their pores exude an extremely sticky substance which was very difficult to remove from one's fingers except with blue-wattle soap which has a high soda content.

To ascertain whether this exudation possessed the same poisonous properties as that of *Phrynomerus bifasciatus*, I purposely rubbed my sticky fingers together. Apart from a slight tingling or pulsating sensation, however, no serious ill-effects were noticeable.

Habitat. The entire series were taken at Kitulwe, nine resulted from the examination of fifty wild bananas which were systematically searched. It was observed that the toads were almost all in the basal portion of the outermost leaf-stalks, which are so often in a semi-withered condition.

SPELAEOPHRYNE METHNERI Ahl

Spelaeophryne methneri Ahl, 1924, Zool. Anz., **61**, p. 99: Nangoma Cave, Matumbi near Kilwa, Tanganyika Territory.

19 (M. C. Z. 25495-500) Nchingidi, T. T. 11-19. v. 39.

Range. The finding of this rare and interesting species on the Rondo Plateau, which lies just a hundred miles south of the type locality, is principally of interest as furnishing further proof of the similarity of the plateau forest fauna with that of the Uluguru Mountains, the only other place from which *methneri* has been recorded.

Size. Length 25-50 mm., average 37.9 mm.

Habitat. The entire series were collected by my boys and me from beneath logs in the forest or along the forest-edge, the ground being kept moist by frequent downpours. In some cases colonies of termites were located under the same logs as those sheltering these black and scarlet toads.

PROBREVICEPS MACRODACTYLUS MACRODACTYLUS (Nieden)

Breviceps macrodactylus Nieden, 1926, Das Tierreich, **49**, Anura, **2**, p. 6: Usambara Mountains, Tanganyika Territory.

4 (M. C. Z. 25501-4) Magrotto Mtn., T. T. 28. vi. 39.

Native name. *Kikorowe* (Kisambara, but applied also to *Callulina*).

Range. Magrotto is but twenty miles from the type locality.

Size. Length ♂♂ 40-40 mm., ♀ 58 mm.

BREVICEPS MOSSAMBICUS Peters

Breviceps mossambicus Peters, 1854, Monatsb. Akad. Wiss. Berlin, p. 628: Mozambique Island, and Sena, Mozambique.

9 (M. C. Z. 25505-9) Mikindani, T. T. 18. iv. 39.

7 (M. C. Z. 25510-4) Nchingidi, T. T. 11. v. 39.

Native names. Neither the Makonde nor Mawiha distinguish this species from *Hemisus m. marmoratum*, which see.

Size. Length 20–47 mm., average 29 mm.

Enemies. On two occasions recovered from the stomachs of bird snakes (*Thelotornis k. capensis*).

Habitat. The Mikindani series were obtained by turning over piles of rubbish, often gathered by rainstorms, in the red roadside ditches.

HOPLOPHRYNE ROGERSI Barbour & Loveridge

Hoplophryne rogersi Barbour & Loveridge, 1928, Mem. Mus. Comp. Zool., 50, p. 258, pl. ii, fig. 5: Mount Bomoli, near Amani, Usambara Mountains, Tanganyika Territory.

5 (M. C. Z. 25515–9) Magrotto Mtn., T. T. 3–6. vii. 39.

Range. Heretofore known only from the type locality which is about twenty miles from Magrotto.

Color. In life. Pupil black, roundish.

Size. Length ♂♂ 25–27 mm., ♀♀ 22–25 mm.

Habitat. The first pair, the male of which had lost a foot, were found beneath logs beside a sawpit in a section of forest where there were neither wild bananas nor bamboos in which they could breed! Two days later I searched through the bamboos growing beside the stream which one crosses on entering Magrotto Plantation from Muheza, but found only one pair and these beneath a rotted log lying among the bamboos. The only wild bananas said to be surviving on the mountain are those at Kitulwe which I visited on July 6, a search of fifty wild bananas, however, resulted only in the capture of a single male!

PHRYNOMERIDAE

PHRYNOMERUS BIFASCIATUS (Smith)

Brachymerus bifasciatus A. Smith, 1849, Ill. Zool. S. Africa, Rept., pl. lxiii:

“Country to the east and northeast of Cape Colony.”

35 (M. C. Z. 25520–5) Lindi, T. T. 31. v. 39.

Size. Length 25–49 mm., average 31.8 mm.

Habitat. The majority of these halfgrown toads were taken beneath the thatching of some collapsed huts on the edge of a swampy area in process of dessicating.

BIBLIOGRAPHY

AHL, ERNST

- 1931c. "Anura III," in *Das Tierreich*, No. 55, pp. i-xvi + 1-462, figs. 1-320. (This actually has a month's priority over the article in *Mitt. Zool. Mus. Berlin*, **17**, pp. 1-132).

BARBOUR, THOMAS & LOVERIDGE, ARTHUR

- 1928c. "A Comparative Study of the Herpetological Fauna of the Uluguru and Usambara Mountains, Tanganyika Territory, with Descriptions of new Species. *Mem. Mus. Comp. Zoöl.*, **50**, pp. 87-265, pls. i-iv.

BOULENGER, G. A.

- 1882b. "Catalogue of the Batrachia Salientia s. Ecaudata in the Collection of the British Museum." Ed. 2, London, pp. i-xvi + 1-305, figs., pls. i-xxx.

LAURENT, R.

- 1941b. "Contribution à l'Ostéologie et à la Systématique des Ranides africaines. IV-VII." *Revue Zool. Bot. Africaine*, **34**, pp. 192-230, figs. 1-7, pls. vi-vii.
- 1941c. "Les *Megalixalus* (Batraciens) du Musée du Congo." *Revue Zool. Bot. Africaine*, **35**, pp. 119-132.

LOVERIDGE, ARTHUR

- 1933h. "Reports on the Scientific Results of an Expedition to the South-western Highlands of Tanganyika Territory. VII. Herpetology." *Bull. Mus. Comp. Zoöl.*, **74**, pp. 197-416, pls. i-iii.
- 1936h. "African Reptiles and Amphibians in Field Museum of Natural History." *Field Mus. Nat. Hist. Zool. Series* **22**, pp. 1-111.
- 1936k. "Scientific Results of an Expedition to Rain Forest Regions in Eastern Africa. VII. Amphibians." *Bull. Mus. Comp. Zoöl.*, **79**, pp. 369-430, pls. i-iii.
- 1941h. "South African Frogs of the Genus *Hyperolius* in the Museum of Comparative Zoölogy, Cambridge, Massachusetts." *Ann. Transvaal Mus.*, **20**, pp. 283-291.

PROCTOR, J. B.

1920. "On a Collection of Tailless Batrachians from East Africa made by Mr. A. Loveridge in the years 1914-1919." *Proc. Zool. Soc. London*, pp. 411-420, figs. 1-4.



Loveridge, Arthur. 1942. "Amphibians." *Bulletin of the Museum of Comparative Zoology at Harvard College* 91, 377–436.

View This Item Online: <https://www.biodiversitylibrary.org/item/26752>

Permalink: <https://www.biodiversitylibrary.org/partpdf/33888>

Holding Institution

Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Sponsored by

Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.