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## Contribution to the Herpetology of Thailand

BY

EDWARD H. TAYLOR<sup>1</sup> and ROBERT E. ELBEL<sup>2</sup>

ABSTRACT. A collection of Amphibia and Reptiles from Thailand is reviewed. The following forms are regarded as new: *Micrixalus magnapustulosus*, *Mabuya macularia postuasalis*, *Mabuya macularia quadrifasciata*, *Mabuya macularia malcolmi*, *Leiopisma siamensis*, *Sibynophis collaris triangularis* and *Parahelicops boonsongi*.

The known herpetological fauna of Thailand is listed as follows: Salamanders 1, caecilians 2, frogs and toads 76, turtles 24, crocodiles 2, lizards 86, and snakes 130, with a grand total of 321 species and subspecies.

### CONTENTS

	PAGE
Introduction .....	1034
Acknowledgments .....	1035
Methods .....	1035
Historical review .....	1036
List of Thai Provinces .....	1038
A list of the Amphibia known from Thailand .....	1039
A list of the Reptilia known from Thailand .....	1040
Taxonomic treatment .....	1047
Class Amphibia .....	1047
Order Gymnophiona .....	1047
Family Caeciliidae .....	1047
Order Salientia .....	1048
Family Ranidae .....	1048
Family Rhacophoridae .....	1068
Family Microhylidae .....	1070
Family Bufonidae .....	1075
Family Pelobatidae .....	1077
Class Reptilia .....	1079
Order Testudines .....	1079
Family Platysternidae .....	1079
Order Crocodylia .....	1081
Family Crocodylidae .....	1081
Order Squamata .....	1081

1. Department of Zoology, University of Kansas, Lawrence, Kansas.

2. Department of Zoology, University of Oklahoma, Norman, Oklahoma.

	PAGE
Suborder Sauria . . . . .	1081
Family Gekkonidae . . . . .	1081
Family Agamidae . . . . .	1083
Family Varanidae . . . . .	1101
Family Scincidae . . . . .	1101
Suborder Serpentes . . . . .	1125
Family Typhlopidae . . . . .	1125
Family Dipsadidae . . . . .	1126
Family Colubridae . . . . .	1130
Subfamily Sibynophinae . . . . .	1130
Subfamily Acrochordinae . . . . .	1134
Subfamily Colubrinae . . . . .	1134
Subfamily Boiginae . . . . .	1142
Subfamily Natricinae . . . . .	1149
Subfamily Homalopsinae . . . . .	1159
Family Elapidae . . . . .	1161
Family Hydrophiidae . . . . .	1163
Family Crotalidae . . . . .	1168
Literature Cited . . . . .	1174
Index . . . . .	1180

## INTRODUCTION

In the years 1953 and 1954 the senior author identified the species in certain collections of reptiles and amphibia sent to him from Thailand through the U. S. State Department. With the exception of a few duplicate specimens the collections were returned to Thailand, the specimens retained being placed in the Museum of the University of Kansas. These collections, brought together largely through the efforts of Dr. Boonsong Lekagul and the junior author, will eventually become the basis of a national Thai collection. In 1955 the junior author, who had spent the preceding four years in Thailand with the United States Operations Mission to Thailand, returned to the United States with a number of specimens which are now incorporated in the EHT-HMS Collection, property of the senior author.

This latter collection also contains considerable studied material from Thailand. One part of this was collected by Baron de Schauensee and was reported by the senior author, in 1934.\* Another part was obtained by exchange with Dr. Malcolm Smith, long resident of Thailand and physician to his Majesty the King of Siam (now Thailand). Some of these are cotypes, paratypes or topotypes, all identified by Dr. Smith.† These have been of especial help in the study of our collections.

\* Proceedings of the Academy of Natural Sciences, Philadelphia, vol. 86, 1934, pp. 281-310, pls. 17, text figs., 1-4.

† In describing new forms Dr. Smith frequently designated a small series of numbers as the "type series" although he may have had numerous other specimens before him.

A third collection, from French Indo-China, obtained by exchange through the kindness of Dr. René Bourret of the Institut Océanographique de l'Indochine, has been indeed valuable for comparative study.

The country of Thailand is a strategic area in the study of the south Asian faunae since its southern peninsula represents the highway along which emigrants from the continent reached the territories of the East Indies and the Philippines; and at the same time species from the latter areas reached the peninsula and the mainland. While it is not always certain in which direction the movement took place, on the basis of the known distribution of a species, it is possible to postulate its place of origin and later movement. Thus it becomes evident that tracing the distribution of species throughout Thailand can yield information of broad interest. Moreover the mainland part of Thailand, especially the northern part, is in a measure the pathway of exchange between Burma and the Chinese—Indo-Chinese territories and thus the distributional data lends much to our understanding of the faunae of these territories.

#### ACKNOWLEDGMENTS

We wish to express our thanks to Dr. Boonsong Lekagul of Thailand who was instrumental in collecting or acquiring much of the material from Thailand; to Mr. John Legler, curator in charge of the herpetological collections of the University of Kansas, who has been most helpful in making available materials and specimens in his charge; to Mr. H. G. Deignan, U. S. National Museum for help in clarifying certain locality designations. We especially acknowledge use of the published works of Dr. Malcolm Smith treating of the faunae of Thailand and Southeastern Asia.

#### METHODS

In this paper we are listing Thai species in the University collections (designated by the letters KUMNH) and certain ones in the private collection of the senior author (designated EHT-HMS). No attempt has been made to give all literature references and synonyms, nor have we attempted to give all Thai localities in which specimens have been taken. The names Siam and Thailand are interchangeable. Siam appears in the older literature, Thailand in the more recent. However, on postage stamps of the country one or the other name appears at this time (1956).

Concerning the field numbers, the early RE and Y numbers were collected by Robert E. Elbel except for RE 1300 to RE 1556 and

RE 2000 to RE 2500 which were collected by Robert E. Elbel and H. G. Deignan; the numbers RE 3000 to RE 3975 were collected by Robert E. Elbel and Dr. Boonsong Lekagul; the numbers above RE 3975 were collected by Robert E. Elbel; all other field numbers were collected by Dr. Boonsong Lekagul.

As for the spelling of Thai names, we are using the scheme of transliteration from the Thai alphabet adopted by the Thai Government nearly two decades ago, and likewise used in the U. S. Army Gazetteer of 1944. This is often at variance with spellings encountered in European or older American maps, or in other reports. We feel that an effort should be made to stabilize the system of transliteration.

### HISTORICAL REVIEW

A considerable amount of collecting has already been done in Thailand and numerous reports have appeared as evidenced by the bibliography. No effort has been made to make the list complete. Many of the older works, in which references to specimens from Siam are made, are omitted.

Among the most important works on the herpetological fauna of Thailand are those of Dr. Malcolm Smith, especially his volumes on the Reptilia and Amphibia in "The Fauna of British India" and the "Reptilia and Amphibia of the Malay peninsula from the Isthmus of Kra to Singapore." Numerous shorter papers of his, dealing with the Thai reptiles and amphibians, have appeared in various journals.

The snake, lizard and batrachian catalogues of the British Museum by George A. Boulenger are indispensable in a study such as this.

Two papers by Major Stanley Flower are "Notes on a collection of Reptiles and Batrachians made in the Malay Peninsula in 1895-96", and "Notes on a second collection of reptiles made in the Malay Peninsula and Siam." These two with a similar paper on the Batrachians constitute a major contribution.

In the report at hand the locality records of many specimens collected by the junior author are pin-pointed by recording the name of the subvillage, village, district, and province, and where a particular mountain is involved this is given with the approximate elevation. Since most maps of Thailand fail to show the 71 provinces, a chart is presented showing the location of each. Often a village, a district, and province may have the same name and in older records it is not always possible to determine which is intended.

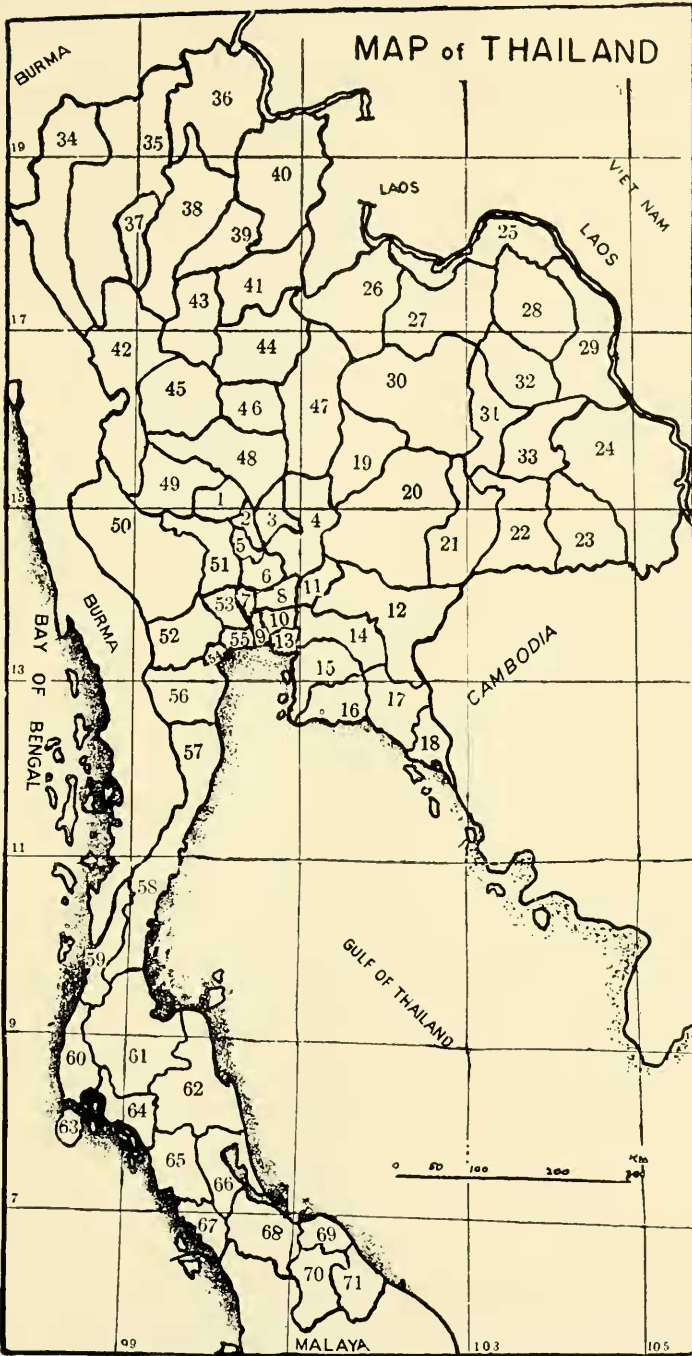


FIG. 1. Map of Thailand. (The numbers refer to names of provinces and in themselves have no significance.)

## LIST OF THAI PROVINCES

Corrected spellings as used by the U. S. Army Gazetteer, 1944.

- |                                |                         |
|--------------------------------|-------------------------|
| 1. Chainat                     | 37. Lamphun             |
| 2. Sing Buri                   | 38. Lampang             |
| 3. Lop Buri                    | 39. Phrae               |
| 4. Sara Buri                   | 40. Nan                 |
| 5. Ang Thong                   | 41. Uttaradit           |
| 6. Ayutthaya                   | 42. Tak                 |
| 7. Nonthaburi                  | 43. Sukhothai           |
| 8. Pathum Thani                | 44. Phitsanulok         |
| 9. Thon Buri                   | 45. Kamphaeng Phet      |
| 10. Phra Nakhon (Bangkok)      | 46. Phichit             |
| 11. Nakhon Nayok               | 47. Phetchabun          |
| 12. Prachin Buri               | 48. Nakhon Sawan        |
| 13. Samut Prakan               | 49. Uthai Thani         |
| 14. Chachoengsao               | 50. Kanchanaburi        |
| 15. Chon Buri                  | 51. Suphan Buri         |
| 16. Rayong                     | 52. Rat Buri            |
| 17. Chanthaburi                | 53. Nakhon Pathom       |
| 18. Trat                       | 54. Samut Songkhram     |
| 19. Chaiyaphum                 | 55. Samut Sakhon        |
| 20. Nakhon Ratchasima (Khorat) | 56. Phet Buri           |
| 21. Buriram                    | 57. Prachuap Khiri Khan |
| 22. Surin                      | 58. Chumphon            |
| 23. Khu Khan (Sisaket)         | 59. Ranong              |
| 24. Ubon                       | 60. Phangnga            |
| 25. Nong Khai                  | 61. Surat Thani         |
| 26. Loei                       | 62. Nakhon Si Thammarat |
| 27. Udon Thani                 | 63. Phuket              |
| 28. Sakon Nakhon               | 64. Krabi               |
| 29. Nakhon Phanom              | 65. Trang               |
| 30. Khon Kaen                  | 66. Phatthalung         |
| 31. Maha Sarakham              | 67. Satun               |
| 32. Kalasin                    | 68. Songkhla            |
| 33. Roi Et                     | 69. Pattani             |
| 34. Mae Hong Son               | 70. Yala                |
| 35. Chiang Mai                 | 71. Narathiwat          |
| 36. Chiang Rai                 |                         |

## A LIST OF THE AMPHIBIANS KNOWN FROM THAILAND \*

## CAUDATA

## SALAMANDRIDAE

*Tylototriton verrucosus* Anderson

## GYMNOPHIONA

## CAECILIIDAE

\**Ichthyophis glutinosus* (Linnaeus)*Ichthyophis monochrous* (Bleeker)

\* The asterisk in front of a name indicates that the species is treated herein.

## SALIENTIA

## PELOBATIDAE

- Megophrys nasuta (Schlegel)
- Megophrys longipes (Boulenger)
- \*Megophrys aceras (Boulenger)
- Megophrys feae (Boulenger)
- Megophrys monticola (Günther)
- Megophrys pelodytoides (Boulenger)
- \*Megophrys hasselti hasselti (Tschudi)

## BUFONIDAE

- \*Bufo asper Gravenhorst
- Bufo borbonica (Kuhl and van Hasselt)
- Bufo macrotis Boulenger
- \*Bufo melanostictus Schneider
- Bufo parvus Boulenger
- Bufo penangensis Stoliczka
- Nectophryne hosii Boulenger

## HYLIDAE

- Hyla annectens (Jerdon)

## RANIDAE

- \*Ooecidozyga lima Kuhl and van Hasselt
- \*Phrynoglossus laevis martensi (Peters)
- Elachyglossa gyldenstolpi Andersson
- Rana cyanophlyctis Schneider
- \*Rana tigerina pantherina Fitzinger [= Rana rugulosa Wiegmann]
- Rana cancrivora cancrivora Gravenhorst
- Rana cancrivora raja M. Smith
- \*Rana limnocharis limnocharis Boie in Wiegmann
- Rana macrodon Kuhl
- Rana kochangae M. Smith
- Rana doriae Boulenger
- Rana pileata Boulenger
- \*Rana macrogynatha macrogynatha Boulenger
- Rana hascheana (Stoliczka) [= Rana limborgi Sclater *vide* M. Smith]
- Rana aenea M. Smith
- \*Rana kuhlii Schlegel in Duméril and Bibron
- Rana laticeps Boulenger
- Rana mortenseni Boulenger
- \*Rana cubitalis M. Smith
- \*Rana nigrovittata (Blyth)
- Rana humeralis Boulenger
- Rana niopus Boulenger
- Rana macrodactyla (Günther)
- Rana nicobariensis (Stoliczka)
- Rana alticola Boulenger
- \*Rana erythraea (Schlegel)
- Rana scutigera Andersson
- Rana signata (Günther)
- Rana tasanuae M. Smith

- Rana glandulosa* Boulenger  
*Rana luctuosa* (Peters)  
*Rana haasei* M. Smith  
 \**Rana chalconota* (Schlegel)  
 \**Micrixalus magnapustulosus* sp. nov.  
*Micrixalus tenasserimensis* (Sclater)

## RHACOPHORIDAE

- \**Rhacophorus leucomystax leucomystax* (Gravenhorst)  
*Rhacophorus nigropalmatus* Boulenger  
*Rhacophorus prominans* M. Smith  
*Rhacophorus colletti* Boulenger  
*Rhacophorus bimaculatus* Boulenger  
*Philautus asper* (Boulenger)  
*Philautus horridus* (Boulenger)  
*Philautus vittatus* (Boulenger)  
*Philautus petersi* (Boulenger)  
*Philautus pictus* (Boulenger)  
*Philautus bimaculatus* (Peters)  
*Chirixalus doriae* Boulenger

## MICROHYLIDAE

- Microhyla pulchra* (Hallowell)  
*Microhyla inornata* Boulenger  
*Microhyla ornata* (Duméril and Bibron)  
*Microhyla annamensis* M. Smith  
*Microhyla butleri* Boulenger  
*Microhyla heymonsi* Vogt  
*Microhyla annectens* Boulenger  
 \**Microhyla berdmorei* (Blyth)  
*Kalophrynus pleurostigma* (Müller)  
*Kaloula mediolineata* M. Smith  
 \**Kaloula pulchra pulchra* Gray  
 \**Glyphoglossus molossus* Günther  
*Calluella guttulata* (Blyth)

## A LIST OF THE REPTILIA KNOWN FROM THAILAND

## TESTUDINES

## DERMOCHELIDAE

- Dermodochelys coriacea* (Linnaeus)

## CHELONIIDAE

- Eretmodochelys imbricata* (Linnaeus)  
*Chelonia mydas* (Linnaeus)  
*Lepidochelys olivacea* (Eschscholtz)

## PLATYSTERNIDAE

- \**Platysternon megacephalum* Gray

## EMYDIDAE

- ?*Cyclemys mouhotii* Gray  
*Cyclemys dentata* (Gray)  
*Cuora amboinensis* (Daudin)  
 ?*Geoemyda spengleri* (Gmelin)  
*Geoemyda spinosa* (Bell in Gray)



*Geoemyda trijuga edeniana* (Theobald)  
*Geoemyda grandis* Gray  
*Damonia* \*\* *subtrijuga* (Schlegel and S. Müller)  
*Hieremys annandalii* (Boulenger)  
*Notochelys platynota* (Gray)  
*Siebenrockiella crassicolis* (Gray)  
*Batagur baska* (Gray)

## TESTUDINIDAE

*Testudo elongata* Blyth  
*Testudo emys* Schlegel and S. Müller  
*Testudo impressa* (Günther)

## TRIONYCHIDAE

*Pelochelys bibroni* (Owen)  
*Chitra indica* (Gray)  
*Dogania subplana* (Geoffroy-St. Hilaire)  
*Amyda cartilaginea* (Boddaert)

## CROCODYLIA

## CROCODYLIDAE

\**Crocodylus siamensis* Schneider  
*Crocodylus porosus* Schneider

## A LIST OF THE REPTILES KNOWN FROM THAILAND

## SAURIA

## GEKKONIDAE

\**Cyrtodactylus intermedius* (Smith)  
*Cyrtodactylus consobrinoides* (Annandale)  
*Cyrtodactylus oldhami* (Theobald)  
*Cyrtodactylus peguensis* (Boulenger)  
*Cyrtodactylus angularis* (Smith)  
*Cyrtodactylus brevipalmatus* (Smith)  
*Cnemaspis siamensis* (Smith)  
*Cnemaspis affinis* (Stoliczka)  
*Aleuroscalabotes felinus* (Günther)  
*Phyllodactylus siamensis* Boulenger  
\**Hemidactylus frenatus* Schlegel (in Duméril and Bibron)  
*Hemidactylus garnoti* Duméril and Bibron  
\**Cosymbotus platyurus* (Schneider)  
*Cosymbotus craspedotus* (Mocquard)?  
\**Peropus mutilatus* Wiegmann  
*Hemiphyllodactylus typus typus* Bleeker  
\**Gekko gekko* (Linnaeus)  
*Gekko smithii* Gray  
*Ptychozoon lionatum* Annandale  
*Ptychozoon kuhli* Stejneger

## ACAMIDAE

\**Draco whiteheadi* Boulenger  
\**Draco maculatus* (Gray)  
\**Draco haasei* Boettger

\*\* Mertens and Wermuth (Zool. Jahrb., Band 85, Heft 5, 1955) use the name *Malayemys* Lindholm, 1931.

- \**Draco blanfordi* Boulenger
- Draco divergens* Taylor
- Draco volans* Linnaeus
- Draco fimbriatus* Kuhl
- Draco punctatus* Boulenger
- Draco cyanolaemus* Boulenger
- Draco taeniopterus* Günther
- Draco formosus* Boulenger
- \**Draco melanopogon* Boulenger
- Draco microlepis* Boulenger
- Draco quinquefasciatus* Gray
- \**Goniocephalus armatus armatus* (Gray)
- \**Goniocephalus armatus crucigerus* (Boulenger)
- Goniocephalus lepidogaster* (Cuvier)
- Goniocephalus doriae* Peters
- Goniocephalus abbotti* Cochran
- Calotes cristatellus* (Kuhl)
- \**Calotes floweri* Boulenger
- \**Calotes versicolor*. (Daudin)
- \**Calotes emma* Gray
- \**Calotes mystaceus* Duméril and Bibron
- \**Liolepis belliana belliana* (Gray)
- \**Physignathus cocincinus* Cuvier

## VARANIDAE

- \**Varanus bengalensis nebulosus* (Gray)
- Varanus rudicollis* (Gray)
- Varanus s. salvator* (Laurenti)
- Varanus d. dumerilii* (S. Müller *in* Schlegel)

## LACERTIDAE

- Takydromus sexlineatus* Daudin

## SCINCIDAE

- \**Mabuya macularia postnasalis* subsp. nov.
- \**Mabuya macularia quadrifasciata* subsp. nov.
- \**Mabuya macularia malcolmi* subsp. nov.
- \**Mabuya m. multifasciata* (Kuhl)
- \**Mabuya longicaudata* (Hallowell)
- Mabuya praesigne* (Boulenger)
- Mabuya rugifera* (Stoliczka)
- \**Eumeces quadrilineatus* (Blyth)
- \**Dasia olivacea* Gray
- \**Sphenomorphus indicus indicus* (Gray)
- Sphenomorphus tersus* (Smith)
- \**Sphenomorphus maculatus* (Blyth)
- Lygosoma quadrupes* (Linnaeus)
- Siaphos quadrivittatum* (Peters)
- \**Leiolopisma rupicola* (Smith)
- \**Leiolopisma eunice* Cochran
- Leiolopisma reevesii reevesii* (Gray)
- Leiolopisma reevesi melanostictum* (Boulenger)
- Leiolopisma tavesae* Smith

- Leiopisma kohtaoensis* Cochran  
 ?*Leiopisma doriae* (Boulenger)  
*Leiopisma vittigerum vittigerum* (Boulenger)  
 \**Leiopisma siamensis* sp. nov.  
*Riopa koratense* (Smith)  
*Riopa bowringii* (Günther)  
*Riopa isodactyla* (Günther)  
*Riopa herberti* (Smith)  
*Tropidophorus berdmorei* (Blyth)  
*Tropidophorus robinsoni* Smith  
*Tropidophorus thai* Smith  
*Tropidophorus microlepis* Günther  
*Ophioscincus anguinoides* (Boulenger)  
*Ophioscincus roulei* (Angel)  
*Ophioscincus gyldenstolpei* (Lönnberg)

## DIBAMIDAE

- Dibamus novae-guineae* Duméril and Bibron

## SERPENTES

## TYPHLOPIDAE

- Typhlops braminus* (Daudin)  
*Typhlops floweri* Boulenger  
*Typhlops lineatus* Boie  
*Typhlops albiceps* Boulenger  
 \**Typhlops diardi muelleri* Schlegel

## ANILIIDAE

- Cylindrophis rufus rufus* (Laurenti)

## XENOPELTIDAE

- Xenopeltis unicolor* Reinwardt *in* Boie

## BOIDAE

- Python reticulatus* (Schneider)  
*Python molurus bivittatus* Schlegel

## DIPSADIDAE

- Pareas laevis* (Boie)  
*Pareas malaccanus* (Peters)  
*Pareas margaritophorus* (Jan)  
 \**Pareas carinatus* (Boie)  
*Pareas hamptoni* (Boulenger)  
 \**Pareas macularius* Theobald  
*Haplopeltura boa* (Boie)

## COLUBRIDAE

## Xenoderminae

- Xenodermus javanicus* Reinhardt

## Sibynophiinae

- Sibynophis geminatus* (Boie)  
 \**Sibynophis collaris triangularis* subsp. nov.

## Acrochordinae

- Acrochordus javanicus* Hornstedt  
 \**Acrochordus granulatus* (Schneider)

## Colubrinae

- Gonyosoma oxycephalum (Boie)
- Elaphe flavolineata (Schlegel)
- Elaphe taeniura (Cope)
- \*Elaphe radiata (Schlegel)
- Elaphe porphyracea porphyracea (Cantor)
- \*Ptyas mucosus (Linnaeus)
- \*Ptyas korros (Schlegel)
- Zaocys carinatus (Günther)
- \*Lycodon capucinus Boie
- Lycodon laoensis Günther
- Lycodon fasciatus (Anderson)
- Lycodon subcinctus Boie
- \*Oligodon cyclurus (Cantor)
- Oligodon purpurascens (Schlegel)
- Oligodon taeniatus (Günther)
- \*Oligodon cinereus (Günther)
- \*Oligodon quadrilineatus (Jan)
- Oligodon barroni (Smith)
- Oligodon joynsoni (Smith)
- Liopeltis scriptus (Theobald)
- Dryocalamus davidsonii (Blandford)
- Calamaria vermiformis Duméril, Bibron, and Duméril
- Calamaria pavementata Duméril, Bibron, and Duméril
- Plagiopholis nuchalis (Boulenger)
- Pseudorhabdion longiceps (Cantor)
- Ahaetulla formosa Boie
- Ahaetulla caudolineata Gray
- Ahaetulla subocularis (Boulenger)
- Ahaetulla cyanochloris (Wall)
- \*Ahaetulla ahaetulla ahaetulla (Linnaeus)

## Boiginae

- \*Boiga multimaculata (Boie)
- \*Boiga cyanea (Duméril, Bibron, and Duméril)
- \*Boiga cynodon (Boie)
- Boiga dendrophila dendrophila (Boie)
- \*Dryophiops rubescens (Gray)
- \*Psammodynastes pulverulentus (Boie)
- Psammophis condanarus indochinensis Smith
- Chrysopelea paradisi Boie
- \*Chrysopelea ornata (Shaw)
- \*Dryophis prasinus Boie
- Dryophis mycterizans (Linnaeus)
- \*Dryophis nasutus (Lacépède)

## Natricinae

- \*Pseudoxenodon macrops macrops (Blyth)
- Natrix piscator piscator (Schneider)
- \*Natrix piscator flavipunctata (Hallowell)
- Natrix trianguligera (Boie)

- Natrix percarinata* (Boulenger)  
*Natrix inas* (Boulenger)  
*Natrix groundwateri* Smith  
*Natrix deschauenseei* Taylor  
*Natrix modesta* (Günther)  
*Rhabdophis s. subminiata* (Schlegel)  
 \**Rhabdophis subminiata helleri* (Schmidt)  
 \**Rhabdophis stolata* (Linnaeus)  
 \**Rhabdophis nigrocincta* (Blyth)  
 \**Rhabdophis chrysarga* (Boie)  
*Macropisthodon rhodomelas* (Boie)  
*Macropisthodon flaviceps* (Duméril and Bibron)  
 \**Parahelicops boonsongi* sp. nov.  
*Opisthotropis spenceri* Smith

## Homalopsinae

- \**Enhydris plumbea* (Boie)  
*Enhydris jagorii* (Peters)  
*Enhydris smithi* (Boulenger)  
 \**Enhydris enhydris* (Schneider)  
*Enhydris bocourti* (Jan)  
 [*Enhydris chinensis* (Gray)]  
 \**Homalopsis buccata* (Linnaeus)  
*Cerberus rhynchops* (Schneider)  
*Bitia hydroides* Gray  
*Herpeton tentaculatum* Lacépède

## ELAPIDAE

- Bungarus flaviceps* Reinhardt  
*Bungarus fasciatus* (Schneider)  
 \**Bungarus candidus* (Linnaeus)  
*Callophis maculiceps* (Günther)  
*Callophis gracilis hughii* Cochran  
*Maticora bivirgata* (Boie)  
*Maticora intestinalis* (Laurenti)  
 \**Naja naja kaouthia* Lesson *in* Ferussac  
*Hamadryas hannah* Cantor

## HYDROPHIDAE

- Laticauda colubrina* (Schneider)  
*Laticauda laticaudata* (Linnaeus)  
*Aepyurus eydouxi* (Gray)  
*Kerilia jerdoni siamensis* Smith  
 \**Enhydrina schistosa* (Daudin)  
 \**Praescutata viperina* (Schmidt)  
*Thalassophis anomalus* Schmidt  
*Kolpophis annandalei* (Laidlaw)  
 \**Lapemis hardwickii* Gray  
*Microcephalophis g. gracilis* (Shaw)  
*Pelamis platurus* (Linnaeus)  
*Thalassophina viperina* (Schmidt)  
 \**Hydrophis mamillaris* (Daudin)  
 \**Hydrophis caeruleus* (Shaw)

*Hydrophis klossi* Boulenger  
*Hydrophis cyanocinctus* Daudin  
*Hydrophis torquatus diadema* Günther  
*Hydrophis torquatus agaardi* Smith  
*Hydrophis ornatus ornatus* (Gray)  
*Hydrophis brookei* Günther  
*Hydrophis fasciatus atriceps* Günther

## VIPERIDAE

*Vipera russellii siamensis* Smith

## CROTALIDAE

\**Agkistrodon rhodostoma* (Boie)  
*Trimeresurus monticola* Günther  
*Trimeresurus puniceus* (Boie)  
\**Trimeresurus albolabris* Gray  
\**Trimeresurus popeorum* Smith  
*Trimeresurus kanburiensis* Smith  
*Trimeresurus purpureomaculatus andersoni* Theobald  
*Trimeresurus wagleri wagleri* (Boie)

## TAXONOMIC TREATMENT

## CLASS AMPHIBIA

## FAMILY CAECILIIDAE

*Ichthyophis glutinosus* (Linnaeus)

*Caecilia glutinosa* Linnaeus, Systema Naturae, vol. 1, 1758, p. 393 (type locality is here designated by us as Colombo, Ceylon. Linnaeus first described the species in Mus. Adolph Frid., p. 19, tab. 4, fig. 1. The figure probably represents the type).

Two adults, EHT-HMS No. 31729 (RE 4248), 31730 (RE 4263) and seven young, 31731-31737 (RE 4291 young) from Ban Nong Wai (subvillage), Na Phung (village) Dan Sai (district), Loei (province) Thailand on Phu Nam Lang (mt.) elev. approx. 1780 m., Nov. 14-17, 1954, R. E. Elbel coll.

Published data on *Ichthyophis glutinosus* (as well as *I. monochrus*) show a very great range of variation in the number of primary and secondary grooves about the body. We very strongly suspect that more than one form is involved in each species. Boulenger states that the range in number of folds or grooves in *glutinosus* is from 240 to 400, a variation of 160 folds, while in *monochrus* the range is 235 to 360, a variation of 125.

The geographic range is large and an examination of series from various localities will probably demonstrate that the variation mentioned above is geographical. A study of the dentition of individuals of equal age will doubtless prove of much importance in delineating other forms.

The type locality for *I. monochrus* is Sinkawang, Western Borneo. It was collected by Dr. Bleeker and later sent to the British Museum. The type locality for *I. glutinosus* is uncertain. Presumably the origin of the specimen described by Linnaeus is unknown.

One of the earliest descriptions of this species is that of Albertus Seba, Thesaurus, vol. II, 1734, p. 26, pl. 25, fig. 2. The type locality given is Ceylon. The description follows:

Num. 2. Serpens, Caecilia, Ceilonica. Squamis caret: at harum loco tenuibus tegitur annulis, arcte sibi mutuo conjunctis, spadiceo colore tinclis. Alba quasi fascia per ventrem protenditur. Caput peculiare nihil sibi vendicat, praeterquam quod late tumens, binisque amplis naribus, in antica parte, prope os, sit pervium. Linguam in eo reperire non datur, at trachae tamen hiatum. Non

admodum flexilibus est articulis; sed in se ipsam coacta riget. Vide prolegomena.

Since it would appear that no conclusion as to the type locality can now be drawn, we propose to designate Colombo, Ceylon as the type locality. Thus, a study of comparative geographic variation can be made.

The Siamese specimens have the folds numbering 431-438, the primaries and secondaries being of nearly the same length.

The specimens, Nos. 31730 and 31729 yield the following data respectively: Grooves, 431, 438; complete grooves, 64, 66; maxillary teeth, 18-20, 19-?; vomerine teeth, 17-20, 15-?; outer mandibular teeth, 19-20, 19-?; splenial teeth (inner mandibular), 14-14, 15-13; premaxillaries, 5, 5.

It will be noted that the groove-counts of these specimens are considerably higher than the "400" mentioned by Boulenger.

## ORDER SALIENTIA

### FAMILY RANIDAE

#### *Ooeidozyga lima* Kuhl and van Hasselt

*Ooeidozyga lima* Kuhl and van Hasselt, Isis, 1822, p. 475 (type locality, Java).  
*Oxyglossis* \* *lima* Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, no. 2, Dec. 1916, p. 164 (Klong Wang Hip, Nakon, Sritamarat); *ibid.*, pp. 172-175, pl. (tadpole); Flower, Proc. Zool. Soc. London, Nov. 14, 1899, p. 886.  
*Ooeidozyga lima* Smith, Proc. Zool. Soc. London, 1927, pp. 202-203; Bull. Raffles Mus., no. 5, 1931, pp. 3-32.

This diminutive aquatic frog is rarely seen out of water. Its habit of resting near the top of the water with only the eyes and nostrils exposed, allows it to become aware of the approach of danger and disappear below the surface with dispatch.

The nostrils are dorsal, nearer the eye than the tip of the snout and surrounded by a slight ridge which develops a papilla on its outer edge. The tympanum, relatively very large, is completely covered by skin so that its outline is not visible without dissection. The inner edge of mandible has a slight shelf which unites anteriorly with one from the opposite side, forming a "second palate" anteriorly which, seen directly from below, entirely or partially conceals the choanae. No vomerine teeth are present. The tongue is pointed posteriorly and free for much of its length.

Externally the body is covered with rough tubercles which on the sides and ventral surface tend to form rows, some bearing a

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\* Long known under the genus *Oxyglossus* Tschudi (1838) (*non* Swainson); this was replaced by *Oxydozyga* Tschudi (1838) by Stejneger, Proc. U. S. N. M., vol. 66, 1925, p. 33. Later, Malcolm Smith (1927) replaced the latter by the older *Ooeidozyga* Kuhl and van Hasselt, 1822.



series of pores perhaps derived from the neuromast system of the tadpole.

The fingers are pointed, lacking all but a remnant of web, the second longer than the first. The toes are almost completely webbed, the tips of the digits slightly less pointed than the fingers. A prominent tubercle that occurs below the tibiotarsal articulation, that is itself covered with tiny tubercles, will identify the species. The broad median dorsal cream stripe is usually present, as well as the elongate brown stripes on the back of the thighs.

The younger specimens have the upper eyelids heavily tuberculate. The venter is slightly dark with longitudinal rows of silvery-white spots marking the site of low tubercles. As they grow older the dark pigment forms indefinite lines on the chin and on the underside of the thighs, while the dorsum becomes variously lineated. There are however usually two lateral stripes and a pair of dorsal stripes. The latter may be broken leaving short lines and spots. The tuberculation is intensified and practically no area lacks the closely set spiny or rounded tubercles.

The largest specimen, 31720, measures 31 mm. snout to vent. EHT-HMS Nos. 31720-23 (RE 3954) are from Ban Na Phua (sub-village), Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand, approx. 200 m. elev., July 28, 1954, Robert E. Elbel and Dr. Boonsong Lekagul, colls. Three specimens, EHT-HMS Nos. 31751-53, That Phanon (city), That Phanon (district) Nakhon Phanom (province), Nov. 20, 1954, Robert E. Elbel, coll.

#### *Phrynoglossus laevis martensii* (Peters)

*Phrynoglossus martensii* Peters, Monatsb. Akad. Wiss. Berlin, 1867, p. 29 (type locality, Bangkok, Siam).

*Oxyglossus laevis martensi* Smith, Jour. Nat. Hist. Soc. Siam, vol. 2, no. 2, pp. 172-175, pl.; *idem*, vol. 2, no. 2, p. 227 (commonly and widely distributed); *idem*, *ibid.*, pp. 885-916, pls. 59-60.

*Phrynoglossus laevis martensi* Smith, Bull. Raffles Museum, no. 5, 1931, pp. 3-32.

A very young example of *P. l. martensii* (KUMNH No. 40195) is from Pakchong (village), Sikiu (district), Khorat (province), Thailand, taken Aug. 23, 1952 and a second, older specimen (EHT-HMS No. 31837) is from Udon Thani (city), Udon Thani (province), Thailand, both specimens obtained by the junior author.

In No. 31837 the following characters may be discerned. The snout is very flat, bluntly rounded when seen from above, without trace of a canthus rostralis. The nostrils are widely separated, the distance between them slightly greater than the interorbital distance. The nostril is nearer the eye than the median point on the upper lip. The tympanum is large, covered with skin but its outline can

be seen, its diameter a little more than half of the length of the eye. A fold of skin from the eye runs over and behind the tympanum and on to the side of the neck.

The tongue is elongate oval, rounded behind, free on the sides, not or but slightly free behind. The vocal sac is present, the two slits being at the level of the back of the tongue. The two palatal shelves meet anteriorly forming a platform which does not conceal the choanae when seen from below. Eustachian tube openings larger than choanae. There are no vomerine teeth, but lying back of choanae, and between their inner levels, there are two heavily pigmented areas. The first finger is longer and larger than the second, the inner digits with a lateral fringe or ridge extending to the tips, no web or only a remnant of a web. The toes are three-fourths to four-fifths webbed, the tips feebly dilated. An enlarged compressed inner metatarsal tubercle about three-fifths as long as the first toe. There is no tarsal fold or tubercle. The metatarsals are united.

The skin on the head and dorsum is smooth but on the sides there is a series of five or more pustules, some other indefinite granules, and often small granules about the vent. The chin is smooth but the venter is traversed by numerous fine well-marked wrinkles. The thigh is smooth on the underside.

The color is brown lavender with a median cream stripe. Four very indefinite darker stripes can be discerned when the specimen is submerged in a clear liquid. The tibia and tarsus have one or more indistinct darker bands. The chin and throat are brown, heavily stippled with cream.

*Measurements in mm.*: Snout to vent, 21; width of head, 8; length of head, 7.7; arm, 11.2; leg, 31.7.

We follow Malcolm Smith in regarding the genus *Phrynoglossus* valid, and not a synonym of *Ooeidozyga*.

### *Rana tigerina* \* *pantherina* (Fitzinger)

*Hydrostentor pantherinus* Fitzinger, *Ausb. österr. Naturf., Sitz. kais. Akad.* Band 42, p. 414 (type locality, Hong Kong).

*Rana tigrina pantherina* Steindachner, *Reise der Österreichischen Fregatte, Novara, um die Erde im 1857, 1858, 1859. Amphibien, Zool. Theil, Bd. 1, 1867, p. 17, pl. 1, figs. 14-17; Boulenger, Rec. Ind. Mus., vol. 20, June 1920, p. 17.*

Three specimens of *Rana tigerina pantherina* are in the collection. These are: EHT-HMS Nos. 31820 (RE 3674), Phu Phan (mt.),

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\* Daudin spells the specific name of this species *tigerina* (*Histoire naturelle des rainettes des grenouilles des crapauds. An. XI (1803), p. 64, pl. 20*). This can scarcely be regarded as a typographical error since it is so spelled by Daudin in *Histoire naturelle générale et particulière des reptiles, tome 8, An. XI (1803), p. 125-126*.

550 m., Sakon Nakhon (district), Sakon Nakhon (province), June 12, 1954, Dr. Boonsong Lekagul and Robert E. Elbel colls.; No. 31692 (RE 4018), Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), approx. 1780 m. "same range as Phu Nam Lang (mt.) but north." September 29, 1954, Robert E. Elbel coll.; and No. 31821 (RE 4255), Ban Nong Wai (subvillage), Na Phung (village), Dan Sai (district), Loei (province), approx. 1780 m. "range of Phu Nam Lang (mt.)", Nov. 15, 1954, Robert E. Elbel coll.

The largest specimen, 31692, measures 104 mm. from snout to vent. The femora have been broken by the collector so that accurate measurements of the legs cannot be made. The toes are about four-fifths webbed, the tips rounded into tiny discs. There is a free skin-flap on the outer edge of the fifth toe, and a slight ridge or fringe on the inner side of the first toe. The skin-fold above the tympanum curves down closely behind the tympanum. The dorsal folds are discontinuous on each side forming five to seven irregular lines of short glandular ridges, which reach to the groin or onto the rump. There is a pointed median denticulation on the lower jaw with two shorter ones on each side.

On the body there are numerous scattered black or dark brown spots, many associated with glandular ridges. The back part of the thigh is dark brown reticulated with cream, as is the front side of the femur, tibia and the lower part of the sides. The chin and throat are cream with a series of more or less symmetrical lines and spots. The upper lip bears cream spots surrounded by brown. The top of the head is nearly uniform brown and the venter nearly uniform cream.

The other two specimens are marked in much the same manner. The ridges on No. 31820 are somewhat more elongate. The tibiotarsal joint reaches the nostril. In No. 31821 the joint reaches the eye. In all, the first finger is longer than the second. Its tip may be somewhat better developed into a rounded disc than those on the other fingers. The inner side of the second and third fingers have a distinct lateral fringe.

*Rana limnocharis limnocharis* Gravenhorst

(Fig. 2)

*Rana limnocharis* Gravenhorst, *Deliciae Musei Zoologici Vratslaviensis continens Chelonias et Batrachia*, Fasc. 1, Lipsiae, 1829, p. 42 (type locality, Java).

Specimens of *Rana limnocharis* in the collection are from the following localities: EHT-HMS No. 31778 (RE 3674), Phu Phan

(mt.), 550 m., Sakon Nakhon (district), Sakon Nakhon (province), June 12, 1954, "large gravid female 59 mm. snout to vent"; Dr. B. Lekagul and R. E. Elbel colls. No. 31750 (RE 3954) (lot of two, one very young) from Ban Na Phua (subvillage), Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand,



FIG. 2. *Rana l. limnocharis* Gravenhorst. EHT-HMS No. 31778 ♀ Phu Phan (mt.), Sakon Nakhon (district and province), Thailand. Actual snout-vent length, 41.

"on the edge of the range of Phu Phan (mt.), 200 m. elevation"; Sept. 29, 1954. Nos. 31776-77 (RE 4018), from Ban Na Muang (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand; Sept. 29, 1954, R. E. Elbel coll. KUMNH Nos. 40186, 40188 (both RE 3259), Phu Kading (mt.), 1045 m., Si Than (village), Wang Saphung (district), Loei (province), Thailand,

Jan. 4, 1954; Dr. B. Lekagul and R. E. Elbel colls. Nos. 40008-40009, Thailand, Feb. 1955 (no locality data); 40012, Phathalung, Thailand, Feb. 1955; 40013, Mae Hong Son, Thailand, Feb. 1955, Dr. Boonsong Lekagul coll.

One peculiar character\* evident in these specimens is the presence of a ventral area outlined by a slight groove or fold that crosses the breast, passes to a point on side behind the axilla, then runs back to the median point between thighs. This line represents the line of attachment between the skin and the muscles below. In males at least the entire area is glandular and at certain times produces a covering of minute granulations most conspicuous on the area following the breast. There is also a slight fold running from the breast to the angle of the mouth. These are always evident but are very conspicuous in the gravid female.

The male usually may be distinguished by its smaller size and the deep black coloring of the vocal-sac area on the chin and throat. A median cream line may be present or absent in either sex. This species is common everywhere in Thailand except in high mountains.

#### *Rana macrodon* Kuhl

*Rana macrodon* † Kuhl, in Tschudi, Classification der Batrachier, 1838, and in Mém. Soc. Sci. Nat. Neuchâtel, vol. 2, 1839, p. 80 (attributes the name to Kuhl), (type locality, Java).

*Rana macrodon* var *blythi*\* Boulenger, Rec. Ind. Mus., vol. 20, pp. 40-45, part. Nakon Sritamarat (=Nakon Si Thammarat) type locality.

The following specimens are in the collection: KUMNH No. 40014 ♀ Nakon Si Thammarat, "Thailand"; 40015 yg. "Thailand"; 40016 "Thailand" collected by Dr. Boonsong Lekagul.

The first two specimens have been eviscerated. The third (No. 40016) is a male approximately 120 mm. snout-vent length; head width, 46 mm.; length of head, 52 mm. In this specimen the diameter of the tympanum (8 mm.) is less than the length of eye (11 mm.). The elongate toothlike projections from the anterior part of the lower jaws reach an elevation of almost four millimeters. The vomerine teeth are in two compressed elevated ridges, diagonally placed, reaching from a point a little distance in front of choanal level to a point considerably behind posterior choanal level; palatal glands open in an irregular curved series of thirteen pores nearly midway between the anterior choanal level and the anterior

\* This character is present in certain other species of *Rana* but is never conspicuous.

† Malcolm Smith (1930) regards *blythi* as a form not easily differentiated from *macrodon*, and Boulenger later states that the name in "a racial sense cannot be used." The association of *Rana magna* and *Rana acanthi* with *macrodon* as subspecies, as recently proposed, we believe should be disregarded.

part of palate; the jaw denticulations fit into deep depressions in the upper jaw.

In No. 40014 ♀ the tympanum is a little less than 5 mm. in diameter and its shape is oval rather than round. The snout-to-vent length is 102 mm.

*Rana macrognatha macrognatha* Boulenger

(Fig. 3)

*Rana macrognatha* Boulenger, Ann. Mag. Nat. Hist., ser. 8, vol. 20, p. 414; Rec. Ind. Mus., vol. 20, p. 51 (type locality, Karin Hills, Burma).

*Rana macrognatha macrognatha* M. Smith, Jour. Nat. Hist., Soc. Siam, vol. IV, no. 4, July 25, 1923, pp. 218-219, pl. 9, fig. 2 (adult male head; Nakon Sritamarat Mts., Siam).

Two specimens, EHT-HMS Nos. 31724 ♀, 31725 ♂ (Lot RE 3820), were taken at Phu Phan (mt.), Sakon Nakhon (district), Sakon Nakhon (province), Thailand, at an elevation of 550 m., June 29, 1954, by Dr. Boonsong Lekagul and Robert E. Elbel.

*Diagnosis:* Head of male broad (25.5 mm.) equally as broad as long, more than half the length of head and body; leg short, the tibiotarsal articulation reaching to anterior part of eye; first finger slightly longer than second; a free-edged flap or swelling beginning between orbits extends some distance behind them; a slight swelling on sides of occiput behind eyes; no dorsolateral glandular fold. Diameter of tympanum equals length of eye in male; no glands below tympanum or on humerus; skin covered with minute granules intermixed with larger, often pearly-tipped pustules.

*Description of No. 31725 ♂:* A median pointed denticulation on lower jaw flanked on each side by a broad-based, sharply pointed spine, which fits into a slight depression of the upper jaw; choanae partly concealed by shelf on maxillary when seen from below; vomerine teeth (three to five in number) on two converging diagonal ridges, largely behind posterior level of choanae, separated widely from choanae and from each other; openings to vocal sac are behind tongue, the openings small, puckered; posterior horns of tongue prominent, the tongue narrowly free behind (in female more than a third free). Palatal glands open through two canals each with a small opening that is closer to level of choanae than to front end of palate.

Distance between nostrils equal to their distance from eye and from the median point on upper lip; canthus rostralis not evident; width of an upper eyelid less than interorbital width; between orbits a tongue-like raised area extending from front of eyes back onto occiput, the posterior edge free, rounded; occipital area swollen



FIG. 3. *Rana macroglytha macroglytha* Boulenger. Upper figure EHT-HMS No. 31724 ♀. Actual snout-vent length 49 mm.; lower EHT-HMS No. 31725 ♂. Actual snout-vent length, 50 mm. Both from Phu Phan (mt.), Sakon Nakhon (district and province), Thailand.

on each side posterior to eye; tympanum distinct, its diameter equals eye length, covered with closely adherent skin, the surface with minute granules; no glands present at mouth angle or below tympanum and none on humerus; an inverted V-shaped fold back of occiput; two more or less distinct rows of elongated pustules behind tympanum extending to groin; dorsum and limbs with smaller pustules, those on limbs usually arranged in indefinite longitudinal rows, the pustules with pearly tips; chin with a few indistinct longitudinal wrinkles; venter with very numerous, moderately distinct transverse folds or wrinkles; a fold across breast reaches to near mouth angle; median and posterior ventral part of thigh with large granules. Arms short, the first finger slightly longer than the second; a narrow fringe along part of inner side of the second and third fingers; subarticular tubercles well developed; three palmar (metacarpal) tubercles, innermost elevated, outermost elongated.

Legs short, when folded at right angles the heels barely touch; the tibiotarsal articulation reaches front edge of eye. An elongate inner metatarsal tubercle in line with a distinct tarsal fold and a fold or fringe that extends along outer edge of inner toe; no outer metatarsal tubercle; a fringe along outer edge of fifth toe; outer metatarsals separated by a web; distinct discs on toes, with a groove on outer edge; toes about three-fourths webbed.

*Color:* In preservative the frontal and interorbital areas light brown; occiput darker brown, the color running forward on each side onto eyelids; sides a little darker than the light brown back; legs barred with dark brown; soles of feet brown. Venter and underside of limbs cream; brown spots on upper and lower jaws; tympanic area light tan.

*Measurements in mm.:* (♂ and ♀): Snout to vent, 50, 49; head length, 26, 21; axilla to groin, 19, 20; arm, 26, 27; leg, 67, 72; tibia, 24, 22; foot, 31.5, 31.

*Remarks:* The specimen from the same locality, identified as the female of the species, lacks the specialization of the head of the male. There is a strongly defined cream stripe on the head and body from lip to near vent; the fold across the breast and shoulders is more distinct. Toothlike projections on the jaws are only slightly indicated; and the upper eyelid is as wide as the interorbital distance. The diameter of the tympanum is about three-fourths of the length of the eye. Variation in the width of the head is indicated in the measurements.



*Rana kuhli* Schlegel

(Fig. 4)

*Rana kuhli* (Schlegel [Mus. Ludwig Batavia]) Duméril and Bibron, *Erpétologie Générale*. . . ., vol. 8, 1841, pp. 384-386 (type locality, Java); Smith, *Jour. Nat. Hist. Soc. Siam*, vol. 2, May 1917, p. 227 (peninsular, western, and northern Siam: common on many of the hills above 300 m.); *idem*, vol. 2, no. 4, Dec. 1917, pp. 262-263, pl. fig. 1 (tadpole), (Doi Nga Chang, March, 700-1000 m. elev.); Günther, *Reptiles of British India*, 1864, pp. 404-405, pl. XXVI, fig. A (but not fig. B) (*part*).

The following specimens are in the collection: KUMNH No. 40185 (RE 3156), Khao Sawan (mt.), approx. 600 m. elev., Sieo (village), Loei (district and province), Thailand, Nov. 23, 1953, Dr. Boonsong Lekagul and Robert E. Elbel, collectors. Nos. 40189-40190 (RE 3236), Ban Muang Khai (subvillage), Tha Li (village), Tha Li (district), Loei (province), Thailand, Dec. 10, 1953 (approx. 600 m. elev.) Dr. Boonsong Lekagul and Robert E. Elbel,

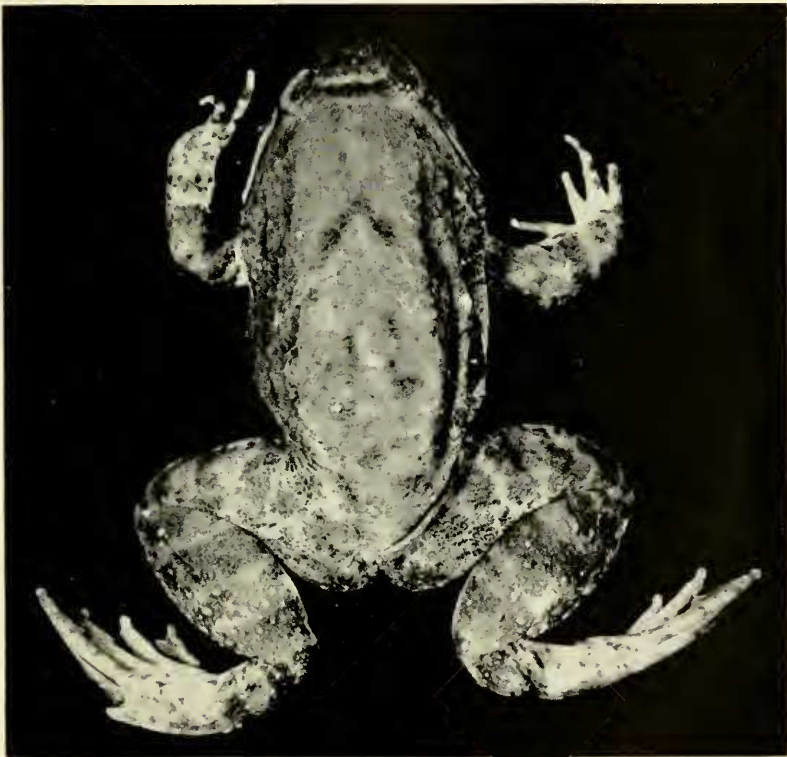


FIG. 4. *Rana kuhli* Schlegel. EHT-HMS No. 31738 Ban Na Muang, Na Haeo (village), Dan Sai (district), Loei (province), Thailand. Actual snout-vent length, 72 mm.

collectors. EHT-HMS Nos. 31738-31739 (RE 4018), Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand (approx. 1780 m. elev. and in the same range as Phu Nam Lang (mt.) but farther north), Sept. 29, 1954, Robert E. Elbel, collector.

This common form is characterized by a wide, rather depressed head crossed by a white or cream bar. Taylor (1934) has inadvertently recorded this frog from "Chiang Mai," Thailand, as *Rana corrugata*.

*Rana cubitalis* Smith

(Fig. 5)

*Rana cubitalis* M. Smith, Jour. Nat. Hist. Soc. Siam, vol. 2, 1917, p. 277 (type locality, Doi Nga Chang, Thailand); Rec. Ind. Mus., vol. 26, 1925, p. 138 (tadpole); Boulenger, Rec. Ind. Mus., vol. 20, June, 1920, p. 138, 139 (redescription of ♂ type from "Doi Nga Chang, Thailand, 1600 ft. elev."); M. Smith, Bull. Raffles Museum, no. 3, Apr. 1930, pp. 103-104, fig. 5 ([arm, showing gland] mountains of Nakon Sritamarat, Thailand; Karen Hills, Burma).

Three specimens of this handsome frog (EHT-HMS Nos. 31747-49 [RE 3986]) are in the collections. They are from Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, approx. 1780 m. elevation. Sept. 25, 1954, Robert E. Elbel, collector. One is a male, two are females.

The male seems to differ from the females not only in the presence in the glandular development of the first finger and the large gland on the forearm, but also in having the fine granulations of the back interspersed with numerous granules and larger pustules. The sides are covered with very numerous pustules each in turn covered with numerous fine spinous granules (ten to forty). The granules and pustules on the femora tend to form longitudinal rows while on the tibia they tend to unite into elongate glandular folds. There is no distinct tarsal fold but a slight rounding elevated ridge follows the inner edge of the tarsus and there is a very slight outer line of minute granules continued onto the edge of the fifth toe; two strong metatarsal tubercles are present. Four or five vomerine teeth are present on ridges lying between the choanae. The ridges are separated from each other by a distance equal to the length of one ridge, and from the choanae by an equal distance. The vocal openings are small and situated in the floor of the mouth behind level of tongue.

The color of the male is very light brownish-gray with a brown blotch indicated in the tympanic area and a brown stripe present

below the canthus rostralis. The anterior part of the narrow dorso-lateral glandular ridge has a blackish brown border. The limbs have only a suggestion of transverse markings. The venter is



FIG. 5. *Rana cubitalis* M. Smith. EHT-HMS No. 31748 ♀ Ban Na Muang, Na Haeo (village), Dan Sai (district), Loei (province), Thailand. Actual snout-vent length, 76 mm.

smooth or with only fine transverse wrinkles. On the posterior face of the thighs there are granules or areolae.

The females, much larger and gravid, have the dorsum fawn to buff-brown with a brown line strongly defined in the loreal region and on the tympanum. A brown line is present on the under-

side of the arm near its insertion. A few flecks of brown are on the lower jaw and a few scattered brown spots are present on the sides and along the dorsolateral glandular fold. They are pronounced on the anterior face of the thigh, tibia and tarsus. The foot and underside of tarsus are dark lavender-brown. The venter and the underside of the thighs are uniform light (cream<sup>?</sup>). The chin and throat have scattered dark pigment in one female, while in the other the entire ventral surfaces of the body and limbs are immaculate.

We do not find the openings of the palatal glands on the palate in front of the vomerine teeth in either sex.

Annandale (Mem. Asiat. Soc. Bengal, vol. 6, 1917, pp. 141-142, fig. 5 [head]) gives a brief description of frog specimens from Pegu, lower Burma, under the name of *Rana leptoglossa* Cope. From the figure given we would guess that it is actually a member of this species which was described in 1917.

*Rana nigrovittata* (Blyth)

(Figs. 6 and 7)

*Lymnodytes nigrovittata* Blyth, Jour. Asiat. Soc. Bengal, vol. 24, 1855, p. 718 (type locality, Mergui, Tenasserim).

The following specimens, collected by Robert E. Elbel and Boonsong Lekagul, are referred to *Rana nigrovittata*: KUMNH Nos. 40182-40184 (RE 3420), Ban Sang Kho, (subvillage), Khok Phu (village), Sakon Nakhon (district and province), Thailand, Feb. 9, 1954, elev. approx. 500 m.; No. 40188 (RE 3259), Phu Kading (mt.), elev. 1045 m., Si Than (village), Wang Saphung (district), Loei (province), Thailand, Jan. 4, 1954, EHT-HMS No. 31772 (RE 3820), Phu Phan (mt.), elev. 500 m., Sakon Nakhon (district), Sakon Nakhon (province), Thailand, June 29, 1954.

This last specimen, a male, differs from the descriptions of this species in having large moundlike areas, resembling paratoids, between the tympani, narrowly separated from the orbits, and caused seemingly by hypertrophy of muscles below the skin. We give it herewith a detailed description. However, it seems to agree reasonably well with *R. nigrovittata* Blyth.

*Diagnosis*: A pair of well-defined dorsolateral folds; interorbital space wider than upper eyelid; an internal vocal sac, the openings small, puckered, very far back in mouth; a well-defined gland on humerus near the insertion of the arm; skin minutely and uniformly granular except on posterior part of rump, where part of



FIG. 6. *Rana nigrovittata* (Blyth). KUMNH No. 40188, Phu Kading (mt.), 1045 m. elev., Si Than, Wang Saphung (district), Loei (province), Thailand. Actual snout-vent length, 57 mm.

the granules are larger; toes three-fourths to four-fifths webbed, the toes with moderately large discs.

*Description of species:* Head obtusely pointed the width of the head distinctly greater than its length; canthus rostralis indicated, rounded; loreal region concave; nostril about equidistant between eye and the median point on upper lip; interorbital area wider than the upper eyelid; tympanum large, distinct, superficial, not covered by skin, its greatest diameter (6.2 mm.) much less than

length of eye (9.1 mm.), separated from the eye by a distance of four millimeters; no distinct gland below tympanum (however, the skin on upper jaw is thickened somewhat and now softened).



FIG. 7. *Rana nigrovittata* (Blyth). EHT-HMS No. 31772, Phu Phan (mt.), 500 m. elev., Sakon Nakhon (district and province), Thailand. Actual snout-vent length, 70 mm.

Tongue elongate, notched, with two rounded processes behind, free for about one fourth of its length; choanae lateral; two bony ridges at anterior level of the choanae extending back of their posterior level, separated from choanae by a distance equal to their distance from each other, bearing two vomerine teeth on the posterior end of each ridge. A median denticulation on lower

jaws; no lateral denticulations but a thickening of the anterior part of the jaw is evident. First finger longer than second; subarticular tubercles large. Three large metacarpal tubercles, the two outer partially fused posteriorly; four supernumerary tubercles; leg elongate, the tibiotarsal articulation reaches the tip of the snout; no dorsal fold; two metatarsal tubercles the inner twice as long as wide, the outer distinct, rounded; no fringe on outer side of fifth and inner side of first digits; disks well-developed, edged by a groove; outer metatarsals separated by a web; toes from three-fourths (on inner) to four-fifths webbed on outer fingers; subarticular tubercles large.

Skin above on head and body with very small uniform granules but becoming a little larger on rump; a few larger tubercles on back part of upper eyelid; no distinguishable fold behind tympanum; sides indistinctly granular, the granules of variable size; chin and venter smooth; area on posterior face of thighs granular; most of ventral surface of thighs glassy smooth; upper surface of tibia and tarsus with fine spiny tubercles, often pearl-tipped. A pair of dorsolateral glandular folds.

*Color, in preservative:* Above uniform brown, the swollen areas on occiput distinctly lighter; sides of snout dark brown; a lateral brown stripe, lighter back of eye, darkest along outer edge of the dorsolateral fold; arms dark brown above with some brown spots with lighter background on posterior ventral surface; leg with irregular dark bars above composed of coalescing spots; back surface of femur brown reticulated with light brown; chin and throat, venter and underside of limbs with fine brown pigment; the spotting on the legs extends onto the undersides; palms light, soles blackish brown; upper jaw with a brownish-gray stripe extending to below tympanum.

*Measurements in mm.:* No. 31772: snout to vent, 70; width of head, 31; length of head, 27; arm, 42; leg from vent, 113; tibia, 38; foot, 51.

*Remarks:* The three additional specimens listed are females and lack the humeral gland. Below the tympanum are two distinct glandular areas. In these specimens, a groove, midway between the anterior level of the choanae and front of the palate, marks the outlets of the palatal glands. We cannot find this in the male specimen, and it may represent another significant difference in populations.

*Rana erythraea* (Schlegel)

(Fig. 8)

*Hyla erythraea* Schlegel, *Abbildungen neuer oder unvollständig bekannter Amphibien* . . ., 1837, p. 27, pl. 9, fig. 3.

Eleven *Rana erythraea* (EHT-HMS Nos. 31681-31691 [Lot RE 4292] were collected at Ban Nong Wai (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Nov. 17, 1954, by R. E. Elbel. All are of medium size, 35 to 42 mm. in snout-vent length. The green dorsal color has disappeared but the dorsolateral cream stripes covering the broad dorsolateral glandular fold are strongly in evidence.

The species attains a length of 78 mm. for females; 42 for males. It is widespread in the lowlands in southeastern Asia and Indonesia. The senior author has reported it on certain of the Philippine Islands.

*Rana chalconota* (Schlegel)

*Hyla chalconota* Schlegel, *Abbildungen neuer oder unvollständig bekannter Amphibien* . . ., 1837, p. 24, pl. 9,\* fig. 1.

A single poorly preserved specimen of *Rana chalconota* from Ban Chawang (village), Chawang Sieo (district), Nakhon Si Thammarat (province), Thailand is in the collection. It bears the KUMNH number 40007 (BL 20094). It was taken Feb. 1954 by Dr. Boonsong Lekagul.

*Rana* sp.

Nine tadpoles of an unidentified Anuran, presumed to be a *Rana* were taken on Khao Sawan (mt.), approx. 600 m. elev., Sieo (village), Loei (district and province), Thailand, by Dr. Boonsong Lekagul and R. E. Elbel, Nov. 29, 1953. The lot is numbered EHT-HMS No. 31841 (RE 3173). While these have been somewhat discolored by preservatives a median lighter muscular area beginning in the occipital region is evident. Near the beginning of the tail are two somewhat diagonal, rather large discrete brown spots closely approximated. A transverse bar or spot is present somewhat in advance of these and a median dark spot is present in the occipital area. The frontal region may have a few darker flecks or spots. A few small brown spots occur on the caudal fin and tail. The spiracle is sinistral; the anus dextral.

The mouth is surrounded by a papillate fringe. At the anterior median point is a short curved tooth series. The upper beak is of blackish horn as is the lower. Both are denticulate. On each side

\* Van Kampen (1923) regards fig. 3 of pl. 50, the illustration of this species (not fig. 1, pl. 9).



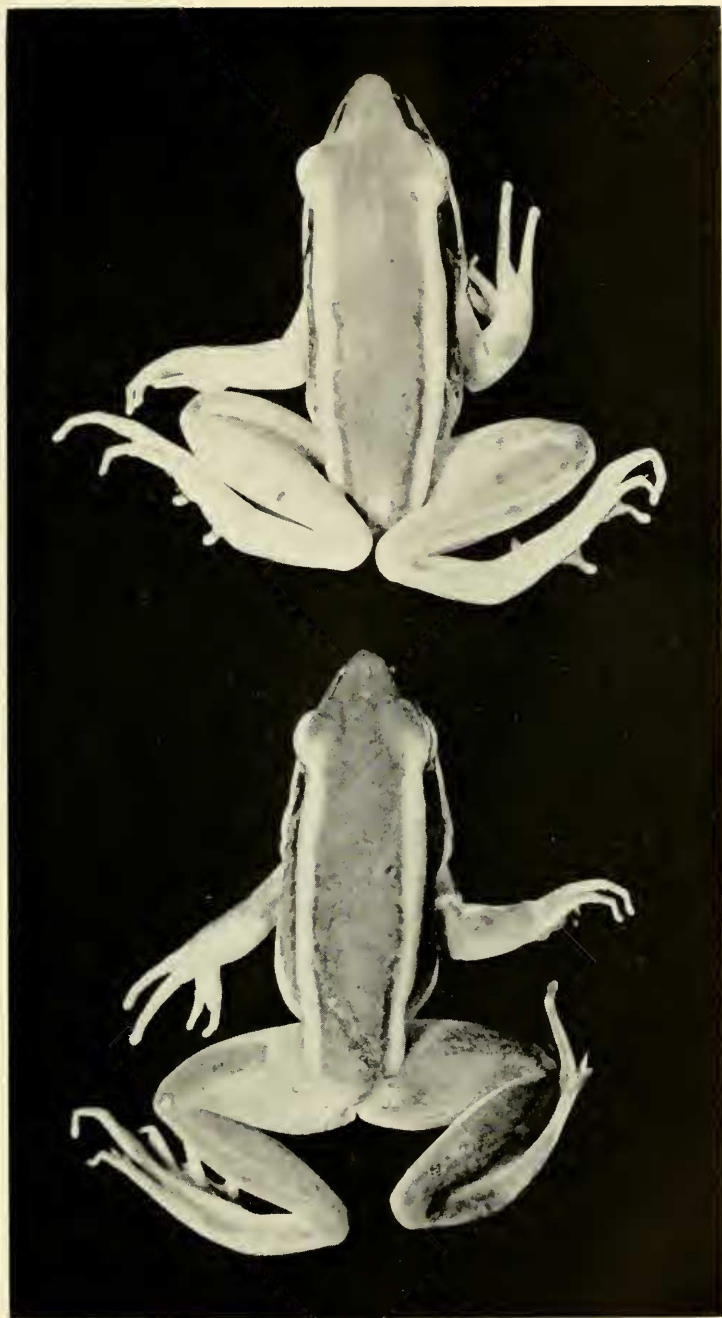


FIG. 8. *Rana erythraea* (Schlegel). Upper EHT-HMS No. 31684. Actual snout-vent length, 41 mm.; lower EHT-HMS No. 31689, actual snout-vent length, 40 mm. Both from Ban Nong Wai, Na Phung, Dan Sai, Loei (province), Thailand.

of the upper beak are five series of denticulations, diminishing in length posteriorly. The beak on the lower jaw is narrower than upper. On each side and extending somewhat posterior to it are five rows of denticulations growing longer toward the lower edge of the frill; on each side are about 25 very short fragmentary rows of denticulations. At most posterior part of area a median flat pad-like region edged anteriorly with denticulations.

*Micrixalus magnapustulosus* sp. nov.

(Fig. 9)

*Type*: EHT-HMS No. 31838 ♂, Ban Na Phua (subvillage), Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand, elevation approx. 200 m., collected July 28, 1954, by R. E. Elbel and Dr. B. Lekagul.

*Diagnosis*: A diminutive frog with unnotched tongue a little longer than wide, free laterally and free posteriorly for about one



FIG. 9. *Micrixalus magnapustulosus* sp. nov. Type EHT-HMS No. 31838 ♂, Ban Na Phua, Kan Luang, Na Kae (district), Nakhon Phanom (province), Thailand. Actual snout-vent length, 16 mm.

third of its length; no trace of vomerine teeth; lower jaw symphysis with a suggestion of a median denticulation; eye large, longer than snout (measured mesially); a sinuous fold from corner of eye behind and partly across tympanum to above arm insertion; tympanum covered with skin but its outline partly discernible; a curving fold runs from corner of mouth; dorsum and sides with numerous large pearl-tipped pustules, the skin between them with smaller pustules or roughened ridges; toes four-fifths webbed, the web reaching at least the small, slightly rounded tip of the fourth toe.

*Description of the type:* Tip of the snout broadly oval, the nostrils slightly elevated, situated about an equal distance from the eye and the median point on edge of upper lip, separated from each other by a distance equal to or very slightly less than median length of snout; width of an eyelid equal to or slightly less than the inter-orbital distance; tympanum covered with skin but moderately distinct, its diameter (1.5 mm.) much less than length of eye-opening (2.2 mm.); a sinuous fold from eye runs downward and backward behind tympanum and terminates on shoulder above the insertion of arm; a small curving fold runs back for a short distance behind mouth-angle; no canthus rostralis; the loreal area slightly convex rather than excavated; snout extends beyond mouth for about half a millimeter; eye large, strongly elevated, its length greater than median length of snout, but equal to a line from eye to the middle point on upper lip.

Tongue a little longer than wide ( $3 \times 2.7$  mm.), free posteriorly for more than a fourth of its length, and free laterally; no tongue papilla, but the surface minutely granular; choanae small, nearly lateral, not concealed by maxillary shelf when seen from below; no trace of vomerine teeth; openings of the Eustachian tubes smaller than choanae; no evidence of vocal slits. The symphysis of the lower jaws has no denticulate elevation.

Arm short, only the toes reaching beyond tip of snout; first finger very little longer than second; only a mere vestige of a web, the edges of the digits not or but slightly ridged on sides. Three small palmar tubercles the inner and outer a little more distinct than middle one, the outer elongated and completely separated from the middle one; four distinct subarticular tubercles.

Leg short, the tibiotarsal articulation reaches the middle of the eye; toes with only a slight development of the terminal discs, the web reaching the discs on one or more toes; a well-defined, somewhat compressed, elongate inner metatarsal tubercle; a very tiny

outer tubercle situated at the terminus of a slight pustular ridge along outer toe; well-developed subarticular tubercles; a short diagonal tarsal fold extending less than half length of tarsus; when legs are folded at right angles to body the heels fail to touch.

Skin on snout and interorbital area with a very indistinct elevation across head between anterior edges of eyes (the "eyespot" included); body with large craterlike pustules, the sides of which are excavated by numerous "valleys"; pustules pearl-tipped, between larger pustules are tiny pustules or ridges; sides with less distinct pustules; legs with numerous smaller pearl-tipped pustules tending to form longitudinal rows; chin nearly smooth; venter without distinct granules; underside of thighs smooth except on the posterior part; posterior face of thighs have a very few scattered granules.

*Color in preservative:* Generally brown above with two vague lighter areas on middle of back preceded and followed by slightly darker areas or lines; upper side of upper arm fawn brown, the forearm banded with brown. Leg, including tarsus, and foot, with narrow bands; chin and throat brownish with some lighter flecks; venter and part of underside of thighs nearly immaculate; soles dark lavender.

*Measurements in mm.:* Snout to vent, 16; width of head, 7; length of head, 6; arm, 8; leg, 22.5; tibia, 7; foot, 7.7.

*Remarks.* We are unable to determine the age of the specimen but believe it to be nearly adult, nor can we state certainly the character of the pupil, but believe it to be horizontal.

#### FAMILY RHACOPHORIDAE

##### *Rhacophorus leucomystax leucomystax* (Gravenhorst)

(Fig. 10)

*Hyla leucomystax* Gravenhorst, *Deliciae Musei Zoologici Vratislaviensis continens Chelonias et Batrachia*, fasc. 1, Lipsiae, 1829, p. 26.

*Rhacophorus leucomystax* Smith, *Jour. Nat. Hist. Soc. Siam*, vol. 2, no. 3, p. 229. Flower, *Proc. Zool. Soc. London*, Nov. 14, 1899, pp. 898-899, pl. 59, figs. 3, 3a (tadpoles).

*Polypedates leucomystax leucomystax* Taylor, *Proc. Acad. Nat. Sci. Philadelphia*, vol. 86, 1934, p. 283 (Chiang Mai).

Two specimens of this arboreal species (KUMNH Nos. 40193-94 [RE 3034]) are from Khon Kaen (city and province), Thailand, Nov. 13-14, 1953, Robert E. Elbel, coll., and one, No. 40017 is from Thailand without definite locality. Two of them (40193-94) are marked on dorsum with dark gray or brownish spots on a gray background; the third, No. 40017, is nearly uniform gray with some very indefinite mottling. The limbs of all specimens are barred dimly

with darker color. On the sides there may be a row of dark spots, as if a dark stripe beginning behind eye and passing through tympanum and beyond had been broken up. A very narrow cream line borders the lip in all of the specimens.

The posterior face of the thigh is brown, this color enclosing cream spots or flecks, while a similar coloration is dimly indicated

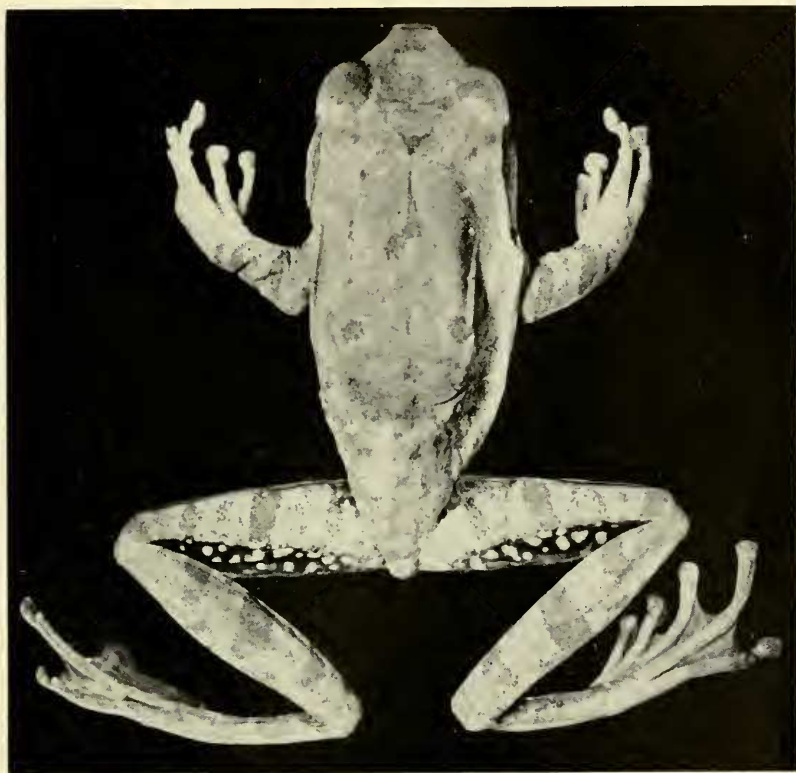


FIG. 10. *Rhacophorus leucomystax leucomystax* (Gravenhorst). KUMNH No. 40194 Khon Kaen (city and province), Thailand. Actual snout-vent length, 60 mm.

on the front of the thigh and groin areas. A small postcranial fold is indicated.

The palatal glands open in a transverse line of eight pores about midway between the anterior point of the palate and the anterior level of the choanae. The vomerine teeth are 8-10 on two converging ridges beginning on the anterior level of the choanae and terminating near their posterior level. The subtriangular openings

of the Eustachian tubes are of smaller area than the choanal openings.

The webbing on the hand is reduced to a vestige between the first three fingers; no web is evident between the two outer fingers. The webbing of the toes becomes progressively greater. The two inner toes are less than half webbed, while the other toes are from one-half to three-fourths webbed.

The pads have a deep groove around their outer edges and each is traversed by a groove somewhat posterior to the center on the underside.

No. 40017 has a more extensive web, the web reaching the base of the pads on some of the toes.

#### FAMILY MICROHYLIDAE

#### *Microhyla berdmorei* (Blyth)

(Fig. 11)

*Engystoma* (?) *berdmorei* Blyth, Jour. Asiat. Soc. Bengal, vol. 24, 1856, p. 720 (type locality, Pegu, Burma).

*Microhyla berdmorei* Parker, A monograph of the frogs of the family Microhylidae. 1934, pp. 127-28 (synonymy and distribution).

*Microhyla fowleri* Taylor, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, 1934, pp. 284-86, fig. 1, pl. 17, fig. 2 (type locality, Chieng Mai, Siam).

*Microhyla malcolmi* Cochran, Proc. Biol. Soc. Washington, vol. 40, 1927, p. 182 (type locality, Pak Jong, Siam).

A specimen of *Microhyla berdmorei* (KUMNH No. 40019) is in the collection from Phatthalung, Thailand, Dr. Boonsong Lekagul, coll. It is a female with the abdomen distended with eggs.

The following structural characters obtain in this specimen:

*Diagnosis:* A median groove present on the upper surface of the widened digital discs producing two separate elevations. Snout longer than eye; a rounded canthus rostralis; three palmar tubercles, the two outer closely approximated; two small rounded metatarsal tubercles; tibiotarsal joint extends about six millimeters beyond the tip of snout; venter and underside of limbs glassy smooth.

*Description of species:* Tip of snout forming a narrow oval, projecting beyond mouth 1.8 mm.; nostril equidistant between eye and the median point on upper lip; loreal region not concave; tympanum concealed by skin and partly covered by muscles; tongue narrowed anteriorly, widened posteriorly, free for half its length; shelf on the inner side of the maxillary joins with its fellow firmly to form a small anterior platform that does not conceal the choanae when seen from below; latter small, transversely oval; a rather broad transverse ridge across palate in front of oesophageal opening.

Skin smooth above and below (perhaps more so than normal because of the distension of the skin caused by the eggs within); the fingers reach beyond tip of snout when arm is laid forward; first finger much shorter than second, which in turn is shorter than the fourth; edges of fingers with slight lateral ridges but web is lacking except for the merest remnant; subarticular tubercles prominent;



FIG. 11. *Microhyla berdmorei* (Blyth). KUMNH No. 40187, Phu Kading (mt.), 1045 m., Si Than, Wang Saphung (district), Loei (province), Thailand. Actual snout-vent length, 39 mm.

palmar tubercles three, the two outer almost united, partially separated by a narrow groove.

Terminal pads scarcely wider than fingers, divided by a groove above, forming two small swellings on dorsal part of pad. Toes completely webbed, the tips of the toes widened and divided above by a groove forming two "scalelike" swellings; outer metatarsals united. Legs long, the tibiotarsal joint extending several milli-

meters beyond tip of snout; heels overlap ten millimeters when legs are folded at right angles.

*Color:* Purplish above becoming lavender-brown on sides. There is trace of a bar between eyes which begins a darker area that narrows on occiput, widens again on shoulders and then becomes lost on back. Some black rounded spots above and behind arm insertion; black spots on front of thigh and on the posteroventral region on tibia; underside of chin heavily mottled with brown; underside of tarsus and foot purplish brown; ventral surface of body and limbs largely cream. A triangular black mark in anal region.

*Measurements in mm.:* Snout to vent, 41; width of head at tympanum, 12.3; length of head, 16; arm, 20; leg, 77; tibia, 27; foot, 34.

A second specimen KUMNH No. 40187 (RE 3254), also a gravid female, agrees in most details with the preceding. It is from Phu Kading (mt.), 1045 m. elev., Si Than (village), Wang Saphung (district), Loei (province), Thailand, Jan. 1, 1954, R. E. Elbel and Dr. B. Lekagul, colls.

#### *Kaloula pulchra pulchra* Gray

*Kaloula pulchra* Gray, The zoological miscellany, 1831, p. 38 (type locality, "China"); Taylor, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, 1934, p. 284, pl. 17, fig. 1 (Chieng Mai, Siam).

*Callula pulchra* Günther, Reptiles of British India, 1864, p. 437 (Siam, etc.); Boulenger, Catalogue of the Batrachia Salientia and Ecaudata in the collection of the British Museum, 2nd ed., 1882, pp. 170-171, figs. (Siam, etc.); Nieden, Das Tierreich, Anura II. Lief. 49, 1926, pp. 22-23, fig. 18; Jour. Nat. Hist. Soc. Siam, vol. 2, no. 1, June, 1916, pp. 40-41; *idem*, vol. 2, No. 3, May, 1917, 226-231 (common and widely distributed in Siam).

*Kaloula pulchra pulchra* Parker, A monograph of the frogs of the family Microhylidae, London, 1934, pp. 84-86 (Bangkok, Chantaboon; literature list and synonymy).

A large specimen of *Kaloula p. pulchra* (KUMNH No. 31516) from Rat Buri, Thailand was collected by Dr. Boonsong Lekagul. The typical coloration is present. It measures 67 mm. in length.

The choanae, due to the extremely short snout, are at the anterior end of the palate. They are transversely widened and followed by strong ridges that are almost contiguous on the median line. There are no maxillary or vomerine teeth.

#### *Glyphoglossus molossus* Günther

(Fig. 12)

*Glyphoglossus molossus* Günther, Proc. Zool. Soc. London, 1868, p. 483, pl. 38, fig. 1 (type locality, Pegu).

The strongly truncate snout of this curious burrowing frog differentiates it from most of the Microhylidae, which are characterized, for the most part by narrow, somewhat pointed snouts. Their eyes



are diminutive, their length less than the distance between the eye and the tip of the snout. However, the upper eyelid is relatively heavy, overhanging and overlapping the lower. The head itself is strongly convex above, the occipital region highest, sloping gradually to the tip of the snout, the median line actually higher than the

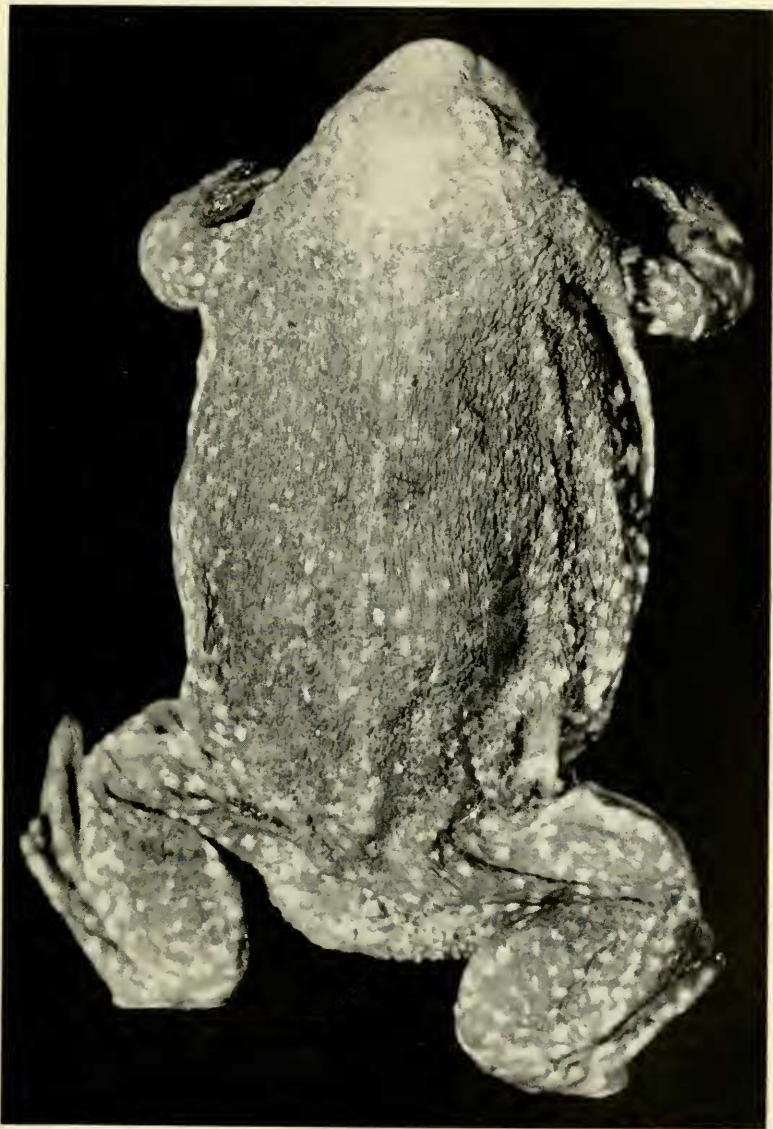


FIG. 12. *Glyphoglossus molossus* Günther. KUMNH No. 40018 "Thailand."  
Actual snout-vent length, 73 mm.

eyes. Both upper and lower jaws are truncate, giving the head a very blunt appearance. A rather dim fold crosses the head just behind the eyes and reaches down to the mouth angle. The choanae are diagonally elongate, partly divided by a fleshy process from the anterior edge. While vomerine teeth are absent there are two small bony bolitoid processes behind, but slightly internal to the choanae, resembling vomerine teeth. A rounded median papule lies immediately in front of, and contiguous with the broad transverse fold lying across the palate some distance in front of the oesophageal opening. The tongue is peculiar. It is somewhat rounded behind with a suggestion of an anterior notch, and on each side a thickening leaving a median depression. The thickenings narrow posteriorly, leaving two diverging fingerlike ridges that fail to reach the back edge of the tongue. The posterior part of the tongue is free for a little less than a fourth of its length. Openings of the Eustachian tubes are large and circular. The vocal sac in the males is evidenced by two slitlike openings, one on each side of the tongue near the anterior part of the mouth. Externally, a transverse fold marks the position of the median vocal sac, which has two extensions running back above arm to shoulder.

The digits on the hand have lateral ridges (or fringes) along their inner edges, while between the second and third there is a tiny web remnant. There are four subarticular tubercles followed by three small tubercles on the metacarpals, and two large palmar tubercles, the outer elongate extending to the back border of the palm, the inner shorter and more distinct but larger than inner.

The toes, fully webbed, have their tips somewhat enlarged and thickened into small terminal pads. There are two or three subarticular tubercles on toes, except outer. A large sharp free-edged shovel represents the inner metatarsal tubercle; the small outer tubercle is approximated to first. When the limb is adpressed the anterior edge of the shovel reaches the tip of the snout.

The skin of face, snout, eyelids, anterior part of lower jaw, and lips covered with tiny firm rounded, sometimes subspinose tubercles. The body skin is wrinkled sometimes showing indistinct granulation. The rather smooth venter is neither granular nor areolate.

The entire body is discolored by rust and the preserving fluid.

*Measurements in mm.:* Snout to vent, 60; between nostrils, 5.3; arm, 31; leg, 81; foot, 36; shovel, 9; tibia, 25.

*Remarks:* The data have been drawn from KUMNH No. 33519 ♂ from Rat Buri, Thailand. A second specimen a female

containing ovarian eggs is without specific locality other than "Thailand." This specimen is somewhat larger and the sides and limbs are flecked and spotted with cream on a black-brown ground color. Both were collected by Dr. Boonsong Lekagul.

## FAMILY BUFONIDAE

*Bufo asper* Gravenhorst

(Fig. 13)

*Bufo asper* Gravenhorst, *Deliciae Musei Zoologici Vratislaviensis continens Chelonias et Batrachia*, Fasc. 1. Lipsiae 1929, p. 58.

Two specimens of this large toad are present in the collection. These are KUMNH Nos. 40005 (BL 20125) and 40006 (BL 20039)



FIG. 13. *Bufo asper* Gravenhorst. EHT-HMS No. 30304, Km. 16 on Pahang Road, NW Kuala Lumpur, Selangor, Fed. Malay States. Actual snout-vent length, 80 mm.

both from Nakhon Si Thammarat, peninsular Thailand, Sept. 2, 1953, Dr. Boonsong Lekagul, coll.

The specimens are characterized as follows: a broad supraorbital ridge, often discernible with difficulty, and a short thick supratympanic ridge; snout short, bluntly oval, obliquely truncate; loreal region vertical, not or scarcely concave; interorbital region wider than an eyelid; tympanum small, distinct; fingers free, toes completely webbed, the digital tips widened; a strong inner tarsal ridge and two metatarsal tubercles, the inner largest. Tibiotarsal articulation reaches to eye; upper surfaces of body with rough, pyramidlike pustules and tubercles; parotid glands small but prominent.

Nearly uniform blackish brown; some light flecks on upper lip and under thighs.

The specimen figured is from Kuala Lumpur somewhat south of the Thai border. The species reaches a length of 215 mm.

*Bufo melanostictus* Schneider

*Bufo melanostictus* Schneider, *Historiae amphibiorum naturalis et literariae* . . . fasc. primus, 1799, p. 216 (type locality, "ex India orientali").

This common and widespread toad is represented by numerous specimens in the collection. The following localities are represented: EHT-HMS Nos. 31740-41 (RE 3946), Phu Kho (mt.), 522 m. elev., Kan Luang (village), Na Kae (district), Nakhon Phanon (province), R. E. Elbel and Dr. B. Lekagul colls., July 28, 1954; Nos. 31742-43 (RE 4261), Ban Nong Wai (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, Nov. 15, 1954, approximately 1780 m. elev., (same range as Phu Nam Lang (mt.) R. E. Elbel coll.; No. 31744 (RE 3833), Phu Phan (mt.), Sakon Nakhon (district), Sakon Nakhon (province), Thailand, July 2, 1954, elev. 550 m., Dr. B. Lekagul and R. E. Elbel, colls.; Nos. 31745-46 (RE 4030), Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, elev. *circa* 1780 m. (in same range of mountains as Phu Nam Lang (mt.) but farther north,) Sept. 30, 1954, R. E. Elbel, coll.

Two other specimens from Thailand are without locality data, the tags having been lost. One measures 102 mm. snout to vent. The specimen is a female, the ovaries filled with small ovarian eggs and a stomach packed with wingless termites.

## FAMILY PELOBATIDAE

Eight species representative of this family have been reported from Thailand as follows: *Megophrys nasuta* (Schlegel), *M. longipes* (Boulenger), *M. aceras* (Boulenger), *M. pelodytoides* (Boulenger), *M. carinense* (Boulenger), *M. feae* (Boulenger), *M. hasselti hasselti* (Tschudi), and *M. monticola* Günther.

*Megophrys hasselti hasselti* (Müller)

(Fig. 14)

*Leptobrachium hasselti* Müller in Tschudi, Classification der Batrachier, . . . 1838, p. 81, (attributed to Müller MS) (type locality, Java).

Two specimens, a male, EHT-HMS No. 31762 (RE 4078), and a dried female, 31763 (RE 4078), from Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, Oct. 4, 1954, R. E. Elbel, coll.

*Diagnosis:* Head as wide or wider than body; canthus rostralis sharp; arms and legs weak, slender, the tibiotarsal articulation not reaching eye; no palpebral appendages; no vomerine teeth; two moderate palmar tubercles; one metatarsal tubercle, the outer tubercle missing vertebrae procoelous.

*Description:* Head as wide as long, the canthus sharp, terminating at nostril; nostril a little nearer eye than median point on lip; loreal region sloping, somewhat concave; snout in front of nostrils sloping obliquely; interorbital distance once to once and a half the width of an upper eyelid, and a third greater than distance between nostrils; tympanum rather small, its diameter less than half the length of eye-opening, the upper part covered by a sinuous fold from eye to angle of jaws. Eyes prominent.

Posterior two thirds of the tongue free, notched behind; two large slitlike openings to the vocal sac far back near mouth angle; choanae large; no vomerine teeth; openings of the palatal glands two, lying between inner level of choanae, but slightly in advance of the choanae.

Skin on dorsum minutely granular or pustular, the pustules larger and more prominent on sides; chin with small granules; entire venter with larger granules or areolations; underside of thighs smooth except for a few proximal scattered granules; a few granules about vent; a more or less distinct fold on the side, anteriorly touching, but not continuous with the supratympanic fold.

Arm small, slender; first finger a little longer than second, latter a little longer than fourth; small subterminal pads but no sub-

articular tubercles; undersurface of digits with some broken elongate ridges or callous areas that may incorporate the tubercles; inner fingers and inner edge of outer fingers with a narrow fringe or ridge, but no web; two prominent palmar tubercles; toes short, one-



FIG. 14. *Megophrys hasselti hasselti* (Müller). EHT-HMS No. 31762 Ban Na Muang, Na Haeo (village), Dan Sai (district), Loei (province), Thailand. Actual snout-vent length, 46 mm.

third to one-half webbed on inner toes but continued as a fringe or ridge to the terminal pad. A well-defined inner metacarpal tubercle; no outer tubercle; no tarsal fold or ridge; when limbs are folded at right angles to body the heels fail to meet; an elongate ridge on underside of the third and fourth toes, indicated also on second toe.

*Color in preservative:* Above lavender with darker lavender or purplish; darker irregular spots on back and sides; a dark longitudinal interorbital line; loreal region and lip with three or four spots, a dark line from nostril to eye, and from eye along the supratympanic fold, widening on the tympanum; arms and legs banded dark lavender above. Belly and chin lighter (yellowish) with clouding of lavender, or numerous flecks of brown or lavender.

*Measurements in mm.:* Snout to vent, 46; head width, 21.5; head length, 21.5; arm, 29; leg, 49; tibia, 16.5; foot and tarsus, 22.

*Remarks:* A second specimen is badly dried. It measures 60 mm. snout to vent.

*Megophrys aceras* (Boulenger)

*Megalophrys montana aceras* Boulenger, Fascic. Malay. Zool., I, 1903, p. 131 (type locality, Malay Peninsula).

One specimen examined—No. 20113 without a definite Thai locality. Very probably the specimen is from Nakhon Si Thammarat, collected by Dr. Boonsong Lekagul.

CLASS REPTILIA

ORDER TESTUDINES

FAMILY PLATYSTERNIDAE

*Platysternon megacephalum* Gray

(Fig. 15)

*Platysternon megacephalum* Gray, Proc. Zool. Soc. London, 1831, p. 107; and Illustrations of Indian Zoology, vol. 2, 1834, p. 62 (type locality, south China).

A single young specimen from Thailand has lost its tag and is of uncertain provenance. However, it is practically certain that it came from Dan Sai (district), Loei (province). The species may be diagnosed by the following characters: a blunt median dorsal keel not or but lightly notched; costal plates each with a tubercular keel. Nuchal scales very small; five vertebrae wider than costals; five costals, the three posterior smaller than largest marginals; twelve marginals on each side; serrate behind. Head large; tail elongate, covered with shields as follows: 28 paired subcaudals + 3 single scales; a dorsal series of 28 widened scales each with a median dorsal keel except three or four at base; the terminal scute is compressed, equally as long as the five preceding scales; the dorsal series of scutes separated from the subcaudals by an intercalated series on the base of the tail extending to the eighth pair of subcaudals; two or three intercalated scales on sides of elongate dorsal terminal scute.

Plastron small with six paired plastral elements and a very small median scale (abnormal?) between the gulars and humerals; bridge of plastron narrow, separated from marginals by three or four in-framarginals.

Length of carapace, 50; width of carapace, 44; tail, 52.

Olive brown above with some black spots on the vertebral keels

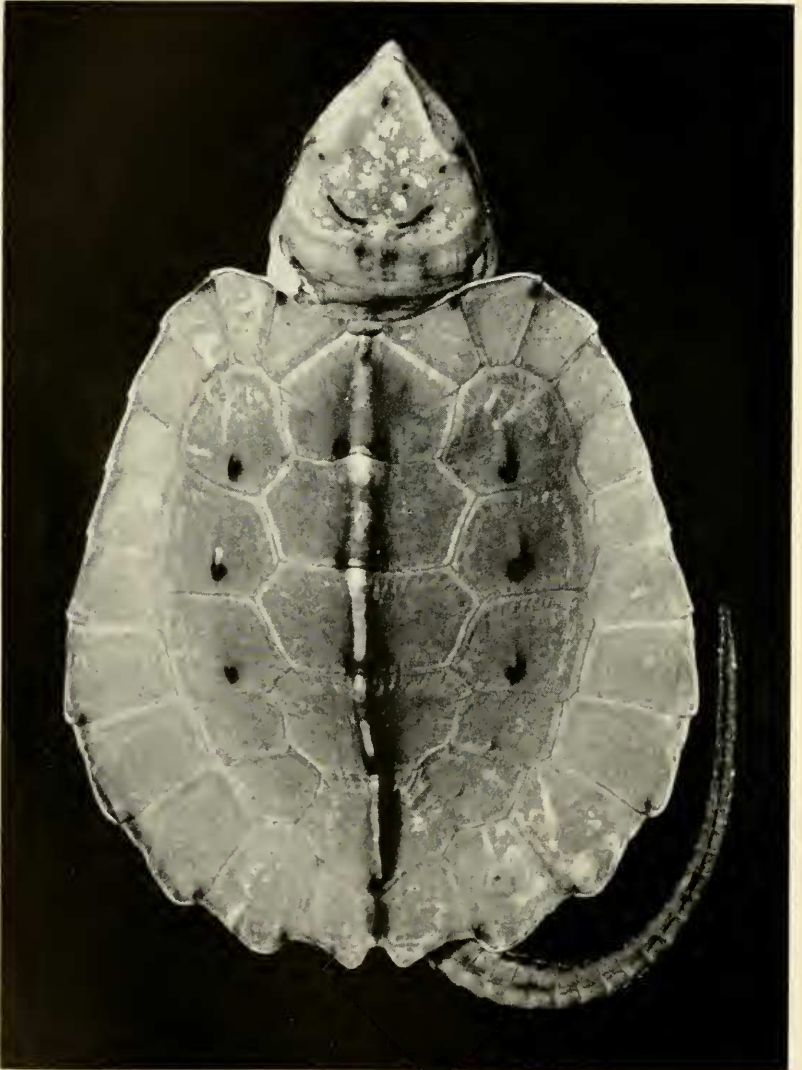


FIG. 15. *Platysternon megacephalum* Gray. KUMNH No. 40084, Thailand. Actual width of carapace, 44 mm.; greatest length, 50 mm.



and costal keels; blackish spots on anterior costal keels (see figure).

This species is an inhabitant of mountain streams and is said to be a tree climber!

#### ORDER CROCODYLIA

#### FAMILY CROCODYLIDAE

#### *Crocodylus siamensis* Schneider

*Crocodylus siamensis* Schneider, *Historiae Amphibiorum naturalis et literariae*, Fasc. II, 1801, p. 157 (type locality, Siam, based on drawings, *vide* M. Smith).

One typical young specimen (KUMNH 40085 [RE 784]) is in the collection from Bung Boraphet (lake), Nakhon Sawan (district and province), Thailand, collected by Robert E. Elbel Feb. 6, 1953.

This species may be distinguished rather readily from *Crocodylus palustris*, by having only four maxillary teeth instead of five (all visible from the outside of the closed mouth); from *Crocodylus porosus* by a shorter snout and in having the rows of bony dorsal plates in direct contact instead of having the bony parts separated by soft skin. In *siamensis* there are usually four (rarely two) postoccipital scutes, that are normally absent in *porosus*.

#### ORDER SQUAMATA

#### SUBORDER SAURIA

#### FAMILY GEKKONIDAE

#### *Cyrtodactylus intermedius* \* (Smith)

*Gymnodactylus intermedius* Smith, *Jour. Nat. Hist. Soc. Siam*, 1917, p. 221 (type locality, Khao Sebab, SE Siam); *The fauna of British India including Ceylon and Burma; Reptilia and Amphibia*, vol. 2, Sauria, 1935, pp. 44-45, pl. 1, fig. 1.

A specimen of this species from Phatthalung, Thailand, was examined in the collection of Dr. Boonsong Lekagul. It is a female and while agreeing in color markings it lacks the preanal pores of the male. There is, however, a long series of enlarged femoral scales extending most of the length of the femur. The essential characters of the form are: male with a wide-angled series of preanal pores, a group of enlarged preanal scales and a series of six to ten enlarged femoral scales; eleven to twelve supralabials and nine to ten infralabials; a lateral fold of slightly enlarged scales; belly with 40 to 50 scales between folds. Body covered with large

\* This species formerly was associated with *Gymnodactylus*. Garth Underwood, *Proc. Zool. Soc. London*, vol. 124, pt. 3, 1954, p. 475, revives the generic name *Cyrtodactylus* Gray with the type species *C. pulchellus*, restricting *Gymnodactylus*, *sensu strictu* to South America.

trihedral tubercles separated by small granules; tail with flat scales and whorls of larger tubercles, while there are transversely enlarged plates on underside. Grayish or brownish with blackish-brown cream-edged bands across back, the one on the neck reaching to eyes; tail banded.

*Hemidactylus frenatus* Schlegel

*Hemidactylus frenatus* Schlegel in Duméril and Bibrón, *Erpétologie Générale* . . . , vol. 3, 1836, p. 366 (type locality, Java).

The following specimens obtained by Robert E. Elbel are in the collections: EHT-HMS Nos. 31830-31834 (RE 4971), Phu Phak Khi Nak (mt.), near Ban Nam Yen (subvillage), Kok Sathon (village), Dan Sai (district), Loei (province), approximately 1300 m. elev., between the ranges of Phu Nam Lang and Phu Lom Lo (mts.), Mar. 18, 1955; and No. 31835 (RE 3985), Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, approx. 1780 m., in same range as Phu Nam Lang (mt.), Sept. 25, 1954.

KUMNH No. 31428 (RE 640), Banpong (city and district), Rat Buri (province), Thailand, Apr. 12, 1952; No. 31411, Banpong (city and district), Rat Buri (province), Feb. 29, 1952; No. 40086 (RE 914), Ban Lat (subvillage), Ban Kaeng (village), Phukhieo (district), Chaiyaphum (province), Thailand, Dec. 16, 1952, all collected by Robert E. Elbel.

*Cosymbotus platyurus* (Schneider)

*Stellio platyurus* Schneider, *Amphib. Physiol.*, vol. 2, 1792, p. 30, (type locality, unknown).

A series of specimens of *Cosymbotus platyurus* KUMNH Nos. 31413-31427 (RE 613, 619, 746) are all from Banpong (city), Banpong (district), Rat Buri (province), collected by Robert E. Elbel, Apr. 5, Apr. 8, and June 18, 1952, respectively.

*Peropus mutilatus* Wiegmann

*Peropus mutilatus* Wiegmann, *Nova Acta Acad. Leopold-Carol.*, vol. 17, 1835, p. 238 (type locality, Manila, P. I.).

Four specimens of this species collected by Robert E. Elbel are in the collection. These are EHT-HMS No. 31829 (RE 4575) from Ban Muang Khai (subvillage), Tha Li (village), Tha Li (district), Loei (province), Thailand; No. 31409 (RE 1085), Khorat (city and province), Thailand, Sept. 10, 1952; No. 31410, Banpong (city and district), Rat Buri (province), Thailand, Feb. 29, 1952.

*Gekko gekko* (Linnaeus)

*Lacerta gekko* Linnaeus, Systema Naturae, 10th ed., 1758, p. 205 (type locality, "habitat in Indies").

The following specimens are in the collections: EHT-HMS Nos. 31822-31823 (RE 4079), Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, Oct. 4, 1954, R. E. Elbel, coll. and EHT-HMS Nos. 31824, 31825 (RE 5297), Phu Namlang (mt.), 1780 m., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, May 23, 1955, Robert E. Elbel, coll.; KUMNH No. 33518 (BL 20024), Khao Khansong, Sriracha, Chon Buri, Thailand, July 15, 1953, Dr. Boonsong Lekagul, coll.; and No. 40020 (BL 20024), Ubon, Thailand, Nov. 9, 1953, Dr. Boonsong Lekagul, collector.

This very widely distributed species is easily recognized by its bluish (or ultramarine) to lavender color with numerous rusty-red spots on both upper and ventral surfaces. The first specimen, No. 31822, is the largest we have seen and doubtless is near the maximum size.

The two largest specimens, Nos. 31822, 31823, have the following measurements (in mm.) respectively: snout to vent, 185, 176; tail, 179, 150; total length, 364, 326; head width, 47, 42; head length, 54, 52; snout to arm insertion, 62, 60. The femoral pores are, 10-11, 12-11.

## FAMILY AGAMIDAE

## GENUS DRACO Linnaeus

Within the territory of Thailand there are more species of these unusual gliding lizards of the genus *Draco*, than in any other area of equal size. In the extreme southern part of peninsular Thailand, south of the Isthmus of Kra, Thailand shares with the Federated Malay States many species which have a distribution extending into Indonesia, some even into the western Philippines. There are certain other forms that seem to have developed in continental Asia that occur in the mainland area of Thailand and extend varying distances down into the peninsula. Thus from the mainland we have *Draco maculatus* Gray, *D. haasei* Boettger, *D. whiteheadi* Boulenger, *D. divergens* Taylor, and *D. taeniopterus* Günther. Species presumably confined to the southern peninsular area and the Indonesian-Philippine region are *Draco quinquefasciatus* Gray, *D. volans* Linnaeus, *D. punctatus* Boulenger, *D. cyanolaemus* Boulenger, *D. blanfordi* Boulenger, *D. formosus* Boulenger, *D. micro-*

*lepis* Boulenger, *D. melanopogon* Boulenger. Another species with an Indonesian distribution, *D. fimbriatus* Kuhl, has been reported by Taylor (1934) from Chiang Mai, Thailand. One might suspect that still other species from the south have already found their way farther into northern continental territory. Malcolm Smith (1930) has suggested the need of more distributional data on these forms in Thailand. We would further suggest the need for larger series from everywhere so as to ascertain the amount of variation that may be expected.

The group, consisting of *maculatus*, type locality unknown; *divergens*, type locality, Chiang Mai, northern Thailand; *haasei*, Chantaboon, southeastern Thailand; *whiteheadi*, Hainan Island—may represent only subspecies of a single species. Until their distribution and variation is better known, we propose to maintain them as separate species. Günther's (1864) figure of *maculatus* is of a specimen from the coastal area of Thailand. Malcolm Smith suggests "Penang" as the type locality. If the type characteristics of the type specimens of *maculatus* can be found in a population from Thailand or Malaya, the type locality should be fixed so that the species or subspecies may be placed properly and referred to under the correct name. If this cannot be done a locality must be fixed arbitrarily.

The following key should be helpful in ascertaining identities of these interesting lizards.

KEY TO THAILAND SPECIES OF THE GENUS DRACO

- |  |               |
|--|---------------|
| 1. Tympanum sealy . . . . .  | 2             |
| Tympanum naked, lacking a covering of scales . . . . .   | 6             |
| 2. Larger (to 105 mm. snout to vent); nostril directed upward; no compressed spine on the supraciliary edge; wing membranes red with a series of five curving blackish bands, each as wide as the red interspaces; black band across the neck behind the dewlap, <i>quinquefasciatus</i>   |               |
| Smaller (to 85 mm. snout-vent length); nostril lateral directed outward; a small compressed spine on supraciliary edge . . . . .   | 3             |
| 3. A blue spot on each side of base of gular appendage (dewlap) . . . . .  | 4             |
| No blue spot on each side of base of dewlap . . . . .  | 5             |
| 4. No distinct row of lateral, conical, or trihedral nuchal scales; a row of trihedral scales, widely spaced on the base of the wing membrane; lateral nuchal expansion ("wattles") covered above with scales larger than largest dorsals, which are twice size of ventrals; base of dewlap orange without blue marks. Coppery red above with metallic reflections and black spots; on wings, orange with rounded dots on proximal half; head scales large, flat, with no or with few indistinct keels; usually a low nuchal crest of eight scales . . . . . | <i>haasei</i> |

- Nostril pointing directly outward; dewlap tapering gradually to a fine point, blackish on anterior part, blue at the end, red behind the base; no lateral blue marks on each side; upper head scales strongly keeled; 8-9 supralabials; on each side of back a series of enlarged keeled dorsal scales; hind limb reaches halfway between elbow and axilla; wing reddish brown above with dark bars and small black spots; immaculate beneath. . . . . *whiteheadi*
5. Nostril pointing directly outward; upper head scales strongly keeled; no series of trihedral scales on side of neck, but a series along the base of the wing membranes; scales on lateral nuchal expansion about as large as largest dorsal scales; gular appendage often twice as long as head; dorsal scales but little larger than ventrals; wing membranes orange with scattered black spots rather uniform in size; wing membrane yellow below with one or two black spots; dewlap yellowish, with blue spots at base . . . . . *maculatus*
- Nostril directed outward and somewhat upward; head and neck prominently marked with black paired spots or transverse bars; spotting of wing membrane largely confined to proximal part, not arranged in rows; underside of yellow wing membrane much spotted with black; a nuchal crest involving 25 scales; dewlap yellow with paired blue spots at base, the length more than one and a half times that of head; loreal region and labials forming a broad shelf; snout constricted behind nostrils; a row of trihedral scales from neck along sides of body at base of wing; no distinctly Y-shaped group of scales, but a median row of three connecting with a transverse curving row of larger scales on snout; low tail crest present . . . . . *divergens*
6. Nasal scale lateral, the nostril directed outward. . . . . 7  
 Nasal scale dorsal, the nasal directed upward; dewlap longer than head . . . . . 10
7. No caudal crest evident. . . . . 8  
 A low caudal crest present. . . . . 9
8. Supralabials, 7-10, smooth, unkeeled; a Y-shaped series of scales on snout; small nuchal crest; dewlap much longer than head; snout usually equal to or shorter than diameter of orbit. . . . . *volans*  
 Snout equals diameter of orbit; nostril directed outward and slightly upward; 8-10 strongly keeled labials; dewlap translucent, covered with large scales; no caudal crest; wing membranes edged with brick red and with four or more black bands spotted with white; throat bluish; dewlap yellow. . . . . *cyanoaemus*
9. Supralabials, 10-13; small nuchal crest; nostril directed outward and slightly upward; upper head scales very small; snout longer than diameter of orbit; wing membranes dark brown with lighter lines; below dirty gray, immaculate, or with a few scattered spots; chin and throat bluish with a network enclosing white spots; dewlap red or salmon pink. . . . . *fimbriatus*  
 Snout equals diameter of orbit; Y-shaped series of scales on snout; two conical, triangular or spinelike tubercles on end of supraciliary (orbital) edge; 10-11 upper labials feebly keeled; dewlap of male about as long as head or shorter; tail crest strong; back and head

- with large black dots; four blotches form a cross between shoulders; wings black streaked with whitish; uniform whitish below; dewlap and nuchal appendages bright chrome yellow. . . . *punctatus*
10. Dewlap coal black; a transverse light orange or whitish band across neck connecting with color of underside of nuchals expansions; snout shorter than diameter of orbit; 11-15 supralabials; breast and belly usually with brown spots. . . . *melanopogon* 11  
 Not so marked. . . . . 11
11. Smaller; snout-vent length less than 85 mm.; snout equal to or shorter than orbit. . . . . 12  
 Larger; 100-125 snout-vent length; snout longer than diameter of orbit. . . . . 13
12. Snout shorter than orbit; dewlap not or but little longer than head; 11-14 supralabials; arm extended, the hand reaches beyond tip of snout; wing membranes with fine black ill-defined transverse bands; base of dewlap and underside of nuchal expansion purplish red, with a black spot at base of dewlap in males; head and body 80 mm. . . . . *microlepis*  
 Snout equals diameter of orbit; 7-9 supralabials; dewlap with very large scales slightly longer than head, arm reaches well beyond snout; hind limb to axilla or shoulder wing membranes with five arched transverse black bands sometimes forked at base; head and body 75 mm. . . . . *taeniopterus*
13. Supralabials, 9-10 keeled; dewlap much longer than head, translucent, covered with large scales; slight nuchal fold; arm reaches much beyond tip of snout; wing membranes marbled with dark brown and with lighter spots and thin white lines; immaculate beneath; scarlet on underside of nuchal expansions. . . . . *blanfordi*  
 Snout as long as diameter of orbit; 9-11 keeled supralabials; dewlap a little longer or equal to head length; thin, translucent, covered with large scales; arm reaches much beyond snout; wing membranes olive, edged with maroon or crimson; five transverse bands of blackish mottling, often indistinct; throat maroon or crimson in male, dark green in female. . . . . *formosus*

### *Draco whiteheadi* Boulenger

*Draco whiteheadi* Boulenger, Proc. Zool. Soc. London, Nov. 1899, pp. 956-957, pl. 66, fig. 1 (type locality, Hainan Island); Smith, The fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. II, Sauria, Feb. 7, 1935, p. 140 (northern Siam).

*Diagnosis:* Nostril directed laterally, tympanum scaled; head small, the snout considerably longer than the diameter of the orbit; 8-9 supralabials; dewlap one and one-half times as long as head; dorsal scales a little larger than ventrals, obtusely keeled; arm reaches tip of snout; wing membranes brick red above with round black spots, immaculate below; dewlap blue at end, blackish in front, red at base; related to *D. maculatus* but with longer snout, etc.

*Description of species:* Head short, the snout slightly shorter than the diameter of the orbit; rostral less than twice as long as wide, with eight glandular pits on front surface, bordered by two labials and five other scales; nasals craterlike, the nostril directed outward, separated from the rostral and labials by one row of scales; five or six scalerows separate the nasals; snout constricted behind nasals; a Y-shaped series of scales on snout, the basal part consisting of two large keeled scales, and the arms of two or three enlarged keeled scales reaching outward and backward; supra-orbital areas outlined by semicircular series of enlarged irregularly keeled scales that are separated mesially by three longitudinal series; outer row of supraoculars very large, keeled; one (or two) large keeled supraciliary scales extending half the length of the supraciliary border; on middle of the latter half of the border, a compressed triangular scale, and at the posterior border a large compressed tubercular one, flanked by one or two similar scales; six enlarged suboculars more or less continuous with a short series of three pyramidal scales, the last two largest; two or three irregular canthals; nine loreal series; supralabials ten, all with two to four pits; an enlarged triangular tubercle between scaled tympanum and angle of mouth; twin tubercles some distance back of tympanum, and another pair above and slightly posterior to tympanum; "occipital" scale narrow, elongate, flanked by groups of five enlarged irregular scales on each side; distal to each of the two groups and slightly posterior is a somewhat elevated group of about six irregular enlarged scales, separated from each other by four small or two enlarged scales; on nape at normal point for the beginning of a nuchal crest are two conical scales surrounded by eight scales, altogether forming a rosette. Infralabials 8-8, also bearing pits; mental unpitted, its border about equal to rostral border, touched behind by two labials and five scales; gular scales minute; male gular appendage (21 mm.) longer than head (14 mm.), covered on its distal half by large regular scales; lateral nuchal expansions relatively small, with larger scales above.

The nuchal crest is not or barely indicated; a series of large somewhat compressed pyramidal or trihedral scales begins on neck and curves up above arm, then follows along the base of the wing membrane to level of thighs, about 16 on neck anterior to wing, ten or eleven along wing base; a short indefinite row of similar scales higher up on shoulders; scales of the dorsal rows along back much larger than the small ventral keeled scales, keeled or smooth, often with their edges raised suggesting lateral keels. A

distinct caudal crest; a series of mucronate scales begin on the dorsal part of the tail separated at first by three scalerows from the caudal crest and more posteriorly comes to border the crest scales; another serrate series that begins on outer edge of the base of the tail comes later to border the two median ventral series, which have high keels. A fringe of enlarged scales along the posterior edge of thigh; front dorsal part of thigh and tibia with enlarged keeled scales; 27 lamellae under fourth toe; scales on breast, on dorsal part of upper arm, and on dorsal part of forearm, enlarged, keeled; posterior edge of forearm with a fringe of larger scales.

*Color in preservative:* Above brownish, reticulated or dotted with some lighter marks, and with deep black marks on head and neck; wing membranes light tan with black marbling or flecking, not forming bands or rows of spots; wing membrane below immaculate gray save for a narrow elongate curved black mark near outer border. Chin darker, speckled with lighter; breast flecked with brownish spots; tail gray, banded with darker to tip; dewlap blackish on anterior margins, remainder whitish, probably orange-red in life; along side of the base of the dewlap are black marks separating the light color of the underside of the lateral nuchal expansions from that of the dewlap area.

*Measurements in mm.:* Snout to vent, 64; tail, 102; length of head, 14; width of head, 10.5; height of head, 8.5; snout to orbit, 5; snout to tympanum, 12; axilla to groin, 33; arm, 27; leg, 33; length of gular appendage, 21; width of alar membrane, 22.

*Remarks:* Malcolm Smith (*loc. cit.*) has referred *D. whiteheadi* to the synonymy of *Draco maculatus* (Gray), but mentions the fact that specimens of this form occur in northern Thailand, Hainan and Tongking. The type is 86 mm. snout to vent, the tail, 148 mm.

#### *Draco haasei* Boettger

*Draco haasei* Boettger, Zool. Anz., no. 433, 1893, pp. 424-425 (type locality, "Pratchedhi Kan Sabab Chantaboon," Siam).

*Diagnosis:* Related to *D. maculatus* Gray but the upper side of the lateral nuchal expansion covered with scales which are larger than the largest scales on the back, which in turn are twice the size of the belly scales; the base of the gular appendage is deep orange, without blue flecks.

*Description of species:* Head small. Snout a little longer than the diameter of the orbit. Nostril lateral, directed outwards. Tympanum scaled. Upper head scales large, weakly keeled. A pair of scales on the supraocular region distinctly enlarged, much larger



than the supralabials; a distinct compressed or conical scale in the beginning of the last third of the supraciliary arch and a second broader and shorter one at the end of the supraciliary region; eight supralabials; gular appendage of the male long, nearly twice head length, covered with scales which are somewhat larger than the belly scales. Upper side of lateral nuchal expansions covered with very large, strongly keeled scales, larger than supralabials and the largest back scales. A very short and low nuchal crest consisting of eight scales. Scales of the back irregular, of very dissimilar form and size, the largest reaching twice the size of the sharply keeled belly scales, and with obsolescent keels or lacking keels altogether. On each side of the back and especially distinct in the posterior part, is a row of large trihedral keeled scales separated rather widely. The arm when laid forward reaches well beyond the tip of the snout; the hind leg reaches the axilla.

*Color:* Above coppery red with metallic reflections and marked with blackish dots, those on the neck arranged symmetrically; a triangular black interorbital spot; wing membrane delicate orange color with whitish longitudinal lines and on the proximal half richly strewn with small round black spots. Underside unicolor and only on the anterior point of wing membrane one or two black spots. Underside of the head with brownish reticulation; lateral nuchal expansion below, deep orange lacking dark spots.

Total length, 178; head length, 14; head width, 11; rump length, 51; arm, 28; leg, 38; tail, 113; dewlap, 23.

The type locality is Chantaboon [Chanthaburi], Siam. It was taken on a tree trunk near the village of Pratchedi, Kan Sabab, [Khao Sabap (mt.)] together with *Draco taeniopterus* Günther. The species was collected by Dr. Eric Haase, Director of the Royal Siamese Museum in Bangkok, who at the same time collected the following specimens at Bangkok: *Lygosoma chalcides* Linnaeus, *Dryocalamus davidsoni* Blanford, *Rana tigerina* Daudin, *Microhyla inornata*.

[The above is a free translation of the type description.]

### *Draco maculatus* (Gray)

*Dracunculus maculatus* Gray, Catalogue of the specimens of lizards in the collection of the British Museum, London, 1845, p. 236 (type locality, unknown).

*Draco maculatus* Günther, Reptiles of British India, 1864, p. 125, pl. 13, fig. C, (full drawing of a Siamese specimen. Also reports specimens from "Pinang" and Tenasserim); Smith, Bull. Raffles Mus., Singapore, Straits Settlements, no. 3, Apr. 1930, p. 21; Fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. II Sauria, Feb. 7, 1935, pp. 138-140, fig. 42.

*Diagnosis:* Tympanum scaled; head scales large, partly keeled; nasal lateral, the nostril directed outward; gular appendage uniform orange, very long, with a blue spot on each side of the base. A series of rather flat enlarged scales forming a Y-shaped group on the snout.

*Description of species:* (from KUMNH No. 40043 [BL 20008], Nakhon Si Thammarat, peninsular Thailand), Dr. Boonsong Leka-gul coll. Head moderately large, the snout as long as the diameter of the orbit; nasal scales lateral, craterlike, the nostril directed outward; rostral about two and one-half times as wide as high, bordered by two labials and seven postrostrals; nasal separated from the rostral by one scale, from its fellow by five scalerows; a median row of three large somewhat elevated scales on snout; on each side of the most posterior is a row of three still larger scales which run outward and backward to the upper edge of the orbital rim; three canthal scales, the last forming part of rim of orbit, very large, dimly keeled, followed by two supraciliaries; a compressed scale on supra-ciliary border some distance behind the two; a knoblike scale at back of the supraciliary (orbital) edge; a rather indefinite row of scales form semicircles about upper supraocular areas, separated mesially by two or three scalerows; a partial row of four large supraoculars and another somewhat smaller row; occipital area somewhat inflated with two converging heavy keellike ridges on each side of the median occipital region; scales in occipital region large, irregular, the "occipital" usually one of the smaller ones; the keel crossing two large scales on each side; a slight nuchal crest involving 10-12 scales; supralabials, 8-10; four or five slightly enlarged suboculars separated from the labials by two scalerows; three or four larger postoculars continuous with a series of three large scales running back from eye on the temporal region, the last somewhat pyramidal; a larger moundlike scale on anterior border of scaled tympanum; a few flat enlarged scales in upper temporal area, slightly craterlike; a compressed tubercular scale some distance above and a group of three a little behind the tympanum; mental bordered by two labials and five postmental scales; one or two enlarged scales along side of neck; smooth or slightly keeled dorsal scales nearly equal to the ventrals which are strongly keeled; a row of enlarged keeled trihedral scales along base of wing membranes; scales on top of nuchal expansion keeled, larger than dorsals; on under surface a patch of scales with edges curiously crenulated; dewlap elongate, the distal part covered with large imbricating smooth scales; an indistinct or low dorsal crest; scales on breast, on

dorsum of upper arm and forearm, on anterior dorsal part of thigh and lower leg, enlarged, keeled; a distinct fringe of large scales bordering posterior side of leg and outer edge of forearm. The keeling on the tail, owing to its preservation, is difficult to describe (scales soft and flattened); wing membrane ample; leg reaches a little more than halfway from elbow to axilla; arm brought forward the fingers extend beyond tip of snout.

*Coloration:* Gray to ultramarine with indefinite darker head marking; the sides of neck and back flecked or reticulated dimly with darker gray; wing membrane flesh color (reddish or orange in life) with very numerous brown or blackish spots or short bars forming indistinct irregular transverse rows, and longitudinal rows, the latter indistinctly connected by fine whitish lines; wing membranes gray, immaculate below; tail banded with darker; hind leg with one or two lighter bands.

*Measurements in mm.:* Length, snout to vent, 82; tail, 126; head length, 17; head width, 11; snout to tympanum, 14.5; snout to arm insertion, 31; axilla to groin, 45; dewlap, 27; arm, 33; leg, 40.

*Remarks:* Two females, KUMNH Nos. 40044 (BL 20106) and 40045 (BL 20109), Dr. Boonsong Lekagul collector, are from Thailand. The tags have disintegrated but they are most probably from Nakhon Si Thammarat. They cannot be associated certainly with any particular species having a scaled tympanum. The wing membranes are somewhat reddish or pinkish, the black coloration forming five or six transverse lines, the spots strongly confluent. The gular areas are probably uniform light orange in life; the dewlap is short but distinct. While the dorsal nuchal crest is absent, one specimen has a row of three larger median scales just back of the occipital region. The caudal crest is wanting but the small occipital ridges or keels are present. These may represent a subspecific form as yet unrecognized.

Two specimens, EHT-HMS Nos. 31789 (RE 4971) and 31790 (RE 4971) are seemingly typical. They were taken from Phu Phak Khi Nak (mt.), approx. 1300 m. elev., between Phu Nam Lang and Phu Lom Lo (mts.) near Ban Nam Yen (subvillage), Kok Sathon (village), Dan Sai (district), Loei (province), Thailand, Mar. 18, 1955, R. E. Elbel, collector.

#### *Draco blanfordi* Boulenger

*Draco major* (*nec* Laurenti) Blanford, Jour. Asiat. Soc. Bengal, vol. 47, 1878, p. 125 (type locality, forest east of "Tavoy, India").

*Draco blanfordi* Boulenger, Catalogue of the lizards in the British Museum, vol. 1, 1885, p. 267, pl. 20 (head); Smith, The fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. 2, Sauria, Feb. 7, 1935, pp. 141-142, fig. 41, B.

Two specimens are in the collections, KUMNH Nos. 40042, 40097. The first has the following characters:

Rostral bordered by seven scales; nasal large, separated from rostral by a single scale; snout about as long as the diameter of the orbit; nostril in craterlike nasal, directed upward; tympanum not covered with scales; scales on head rugose, keeled or ridged, especially on frontal and snout region; a longitudinal ridge on anterior frontal region consisting of three or four large scales; on each side of this the scalerows from the snout curve outward; at posterior end of the ridge the keels of the scales are transverse or curve outward and backward; a semicircular scalerow of larger scales outlines the orbit above, anteriorly bearing high keels directed outward; these two series separated mesially by three scalerows; supraoculars variable in size but eight or ten are larger than the rest, all bearing low keels; "pineal" eye in a tiny scale between a pair of larger scales; supralabials, 9-11; infralabials, 10-11; edges of lips with very numerous small well-defined pits, which represent gland openings; three or four irregular canthal scales; a large tubercle at posterior corner of eye; a row of three scales behind eye, the last largest; two rows of enlarged subgular scales behind mental separated from the labials; lateral nuchal expansion ample, the outer scales both above and below enlarged; gular appendage (dewlap) longer than head, translucent, the tip rounded, covered with scales larger than ventral scales. Dorsal scales somewhat irregular, smooth or slightly keeled; a faint trace of a nuchal crest; ventrals larger than dorsals, with strong keels; an irregular row of enlarged scales or groups of scales along side near base of wing membranes. Tail strongly compressed with a slight caudal crest and a ventrolateral row of micro-nate scales; undersurface of the tail with two rows of very heavily keeled scales. Arm brought forward, the hand extends beyond the snout; leg brought forward, the longest toe reaches to about halfway between the elbow and arm insertion. The wing membranes are ample, supported by four elongate ribs, and two short ribs anteriorly; a slight webbing on back of leg, fringed with enlarged serrate scales; 28 lamellae under longest toe.

*Color in preservative:* Generally brown or gray brown; head grayish, the upper orbital area outlined in dark brown; a median dark spot between eyes; a pair of occipital dark spots; upper nuchal region with several small dark flecks; when wing membranes are stretched under water very dim longitudinal discontinuous lines of brown can be discerned on the dorsal surface; below uniform gray

somewhat darker near anterior border (probably yellowish in life); dewlap whitish, possibly yellow in life; blackish areas on sides of neck, and a cream area under the nuchal expansion; back nearly uniform gray-brown without distinct banding or mottling; tail not banded, lighter than body.

*Measurements in mm.:* Length, snout to vent, 127; tail, regenerated, 117; snout to eye, 10; snout to auricular opening, 23; snout to arm insertion, 38.5; axilla to groin, 67; arm, 52; leg, 65.

*Remarks:* The single described specimen is No. 40042 from Nakhon Si Thammarat, Thailand, collected by Dr. Boonsong Lekagul. The species is regarded as rare but it probably ranges over most of the country. It has been obtained chiefly in peninsular Thailand.

The second specimen of this species in the collection is No. 40097 (RE 1433), from Hinlaem (village), Trakhanun (district), Kanachanaburi (province), Thailand, Nov. 6, 1952. Robert E. Elbel and H. G. Deignan, collectors. This preserved specimen shows the color as bluish gray-green with some metallic reflection. The wing membranes are light brown, lined with narrow whitish streaks (in No. 40042 the white has disappeared leaving the brown color appearing as dim narrow stripes; when held to the light the membrane is translucent and the white streaks above are visible through the wing). Venter light, lighter than the underside of the wing membrane. There is some evidence of mottling under the chin. The dewlap is creamy in color and semitransparent; there are large cream-white areas on underside of the nuchal expansions.

Somewhat above each tympanum is an enlarged pointed tubercular scale. Most of the characters listed for No. 40042 likewise apply to this second specimen.

### *Draco melanopogon* Boulenger

*Draco melanopogon* Boulenger, Catalogue of the Lizards in the British Museum, vol. 3, 1887, p. 492 (type locality, Malacca); Laidlaw, Proc. Zool. Soc. 1901, pt. 1, p. 307; Boulenger, Fascic. Malay Zool., vol. 1, 1903, p. 152; and A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra, to Singapore including the adjacent islands; Reptilia and Batrachia, 1912, pp. 62-63; Smith, Bull. Raffles Mus., No. 3, April 1930.

*Draco nigriappendiculata* Bartlett, Crocodiles and Lizards of Borneo, 1895, p. 82.

*Diagnosis:* This species is characterized by a small head, the snout shorter than the diameter of the orbit; tympanum distinct, not covered with scales; nostrils in craterlike scales, the openings directed upward and slightly backward; scales on latter two thirds of the supraciliary border not enlarged or specialized; arm as long as leg or nearly so; no Y-shaped grouping of enlarged scales on

top of snout; no trace of a nuchal crest; a narrow groove between the elevated orbits on midline of head. The gular appendage (dewlap) is a deep black color.

*Description of species:* (KUMNH No. 40047). Head relatively small; the snout slightly shorter than diameter of orbit, the frontal region declivous, the area between nostrils flattened; five scales between nasals; rostral about four times as wide as high, bordered by two labials and nine postrostrals; nasal high, craterlike, separated from rostral by one scale, nostril directed upward and somewhat backward; scales on snout small, subequal; the scales on the front edge of the bony orbit including canthals and anterior supraciliaries are elongate, heavily keeled, the scales standing nearly vertical. Supraorbital region strongly elevated, the outer supraoculars only slightly larger than other scales, the semicircular scale series not differentiated clearly; a deep groove between orbits; occipital region somewhat inflated, the scales larger than the supraoculars but very unequal in size; "occipital" with a distinct "eye spot," as large as any surrounding scales; supralabials, 12-13, each with a median longitudinal ridge, keel, or series of tubercles, the lower edges slightly elevated; infralabials, 12-13, each with two longitudinal ridges; mental subtriangular, as wide as rostral, bordered by two labials and four or five scales, the outer largest; no distinguishable rows of enlarged gulars; an indistinct rounded tubercle at extreme posterior part of the supraciliary edge on the orbital rim; no trace of a nuchal crest; wing membrane ample; a row of about seven large distinct keeled scales along basal border of membrane; scales on the nuchal expansions enlarged above and below near outer edge; gular appendage of the male elongate, narrowed towards tip. Arm brought forward, the anterior fourth of forearm and hand reach beyond snout; leg laid forward, the toes reach the axilla; a narrow web, or fringe, bordering the posterior border of the hind leg, is edged with a series of broadened scales; tail long, without crest, but at base on each side is a row of larger scales forming a flaring serrate edge; dorsal body scales small, subequal, feebly keeled or smooth, smaller than scales on ventral surfaces; very numerous glandular pits in scales or membranes within mouth near edge of lip.

*Color:* Generally brownish above on body; wing membranes dark blackish brown with rows of small white (yellow in life) spots that form both indefinite longitudinal and transverse rows; no markings on underside of wing membranes; breast and ventral surfaces with small brown spots. Chin, underside of neck, and

arms with some brownish flecks. Head rather light brown. Dorsum of neck and body with lighter yellowish or whitish flecks or markings. Underside of hind legs and under tail whitish (yellowish).

*Measurements in mm.*: KUMNH No. 40047 Phatthalung, Thailand, Sept. 15, 1954; No. 40048 Ban Chawang (village), Chawang (district), Nakhon Si Thammarat (province), Thailand, Mar. 1954; No. 40049 (exact locality uncertain), 1953, respectively: length, snout to vent, 80, 82, 73; tail, 91 (R), 153, 146; snout to orbit, 4, 4.5, 3.8; snout to ear, 10, 10, 10.3; snout to arm insertion, 28.5, 28, 25; axilla to groin, 48, 48, 41; height of head, 8, 8, 7; arm, 42, 43, 37; leg, 41, 45, 42.

*Remarks*: These three male specimens are the only ones in the collection; they agree very well in markings and general characteristics. However, there appears to be some variation in the length of the snout, the gular area of females is gray, and the arm is as long as or longer than the leg.

*Goniocephalus* \* *armatus armatus* \*\* Gray

*Agama armata* Gray, Zool. Jour., vol. 3, 1827, p. 216 (type locality, Singapore).  
*Acanthosaura armata* Boulenger, Catalogue of the lizards in the British Museum, vol. 1, 1885, p. 301, pl. 22, fig. 1.

*Goniocephalus armatus arma.us* M. Smith, Fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. II, Sauria, Feb. 7, 1935, pp. 157-160.

Although certain adult characters are not now evident, two juvenile specimens, from Phatthalung (district and province), largely on the basis of geographic probability, are assigned to this subspecies. They are KUMNH Nos. 40053, 40054. They were collected by Dr. Boonsong Lekagul, Sept. 15 and Nov. 1, 1954.

*Goniocephalus armatus crucigerus* (Boulenger)

*Acanthosaura crucigera* Boulenger, Catalogue of the lizards of the British Museum, vol. 1, 1885, p. 302, pl. 22, fig. 2 (type locality, Tavoy, Tenasserim).

*Goniocephalus armatus crucigerus* M. Smith, Fauna of British India, including Ceylon and Burma; Reptilia and Amphibia, vol. 2, Sauria, Feb. 7, 1935, pp. 160-161, fig. 49.

The following specimens are in the collections: EHT-HMS No. 31645 (RE 5240), Ban Bo (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, May 15, 1955, R. E. Elbel, coll., ("in the range of Phu Nam Lang (mt.) but farther north,

\* Kaup's original spelling was *Gonocephalus* (1825), but was corrected to *Goniocephalus* by him in 1827.

\*\* *Acanthosaura* Gray. Malcolm Smith has synonymized that genus with *Goniocephalus* since he regards the postorbital spine as not being of generic importance. Until further studies are made we will follow this disposition of the species formerly in *Acanthosaura*.

elev. approx. 1780 m.”); EHT-HMS Nos. 31714-16 (RE 3984), Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, approx. 1780 m. elev. (“range of Phu Nam Lang mt.”), Sept. 25, 1954, R. E. Elbel, coll.; EHT-HMS Nos. 31708-31710, same data; EHT-HMS Nos. 31712-31713 (RE 5490) from Phu Nam Lang (mt.) 1780 m., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 2, 1955, Robert E. Elbel, coll.; KUMNH Nos. 40099 ♀, 40010 ♀ (RE 1432-1434), Hin Laem (village), Tha Khanum (district), Kanchanaburi (province), Thailand, Nov. 3 and 6 (respectively), H. G. Deignan and Robert E. Elbel, collectors.

The two specimens from Kanchanaburi province are from a point about 135 km. east of the type locality but from a higher elevation. In these the nuchal crest is much higher than the dorsal crest (8 mm.-3 mm.). The postorbital and occipital spines measure four millimeters, while the length of the orbit is approximately nine millimeters. There is a faint suggestion of a gular pouch but since the specimens are soft the extent of the pouch cannot be accurately determined. The largest of these is 115 mm. snout to vent.

Specimens from Loei (province) in the collection have a rather typical color pattern. Most of them are subadult. Several show the tympanum scaled over more or less.

All the specimens have the nuchal crest separated from the dorsal crest and the scales of the series have broader bases than are indicated in Smith's figure (*loc. cit.*).

Two or three of the specimens have ovarian or oviductal eggs. Smith (p. 158 *loc. cit.*) states that ten or twelve eggs are laid, 12 x 20 mm. in size. The eggs are not spindle-shaped.

#### GENUS CALOTES

Five species of the genus *Calotes* are well known in Thailand. One other, *Calotes microlepis* Boulenger, may also be present since it has been taken on both sides of the country in Tenasserim and Annam. The species may be distinguished by the following key:

#### KEY TO THE SPECIES OF CALOTES IN THAILAND

- |   |                    |
|---|--------------------|
| 1. A part of the lateral scales point backwards and downwards; no fold in front of shoulder on neck ..... | 2                  |
| Scales on sides all pointing backwards and upwards .....  | 4                  |
| 2. The leg reaches at least to eye; ventral scales larger than dorsals; generally greenish in life .....  | <i>crystalinus</i> |
| The leg fails to reach the eye .....  | 3                  |



3. Scales in 48-56 rows around body at middle; general color brownish in life; head slender ..... *floweri*  
 Scales in 65-72 rows around body at middle; color brownish in life ..... *microlepis*
4. No fold or pit in front of shoulder; two separated spines above tympanum ..... *versicolor*  
 An oblique fold or triangular pit in front of shoulder covered with small granular scales ..... 5
5. A postorbital spine; upper lip usually lacking a light stripe .... *emma*  
 No postorbital spine; usually a light labial stripe present, continued on neck some distance ..... *mystaceus*

One curious character of many, if not all, of the species of this genus is the hairlike structures on the scales. The keels are usually present and at least over much of the body they are produced into spines or mucrones which may have a terminal or a lateral crater. From this craterlike region a very fine hair emerges which may attain a length of from .2 to .45 mm. in length. *In situ* the hair appears to emerge directly from under the mucrone, or if a mucrone is absent it may emerge from a small pit near the back of the scale.

#### *Calotes floweri* Boulenger

*Calotes floweri* Boulenger, Fauna of the Malay Peninsula . . . , 1912, p. 70 (type locality, Chantabun, SE Siam and Tunong Tahan, Malay Peninsula); Smith, Jour. Fed. Malay States Mus., vol. 10, 1922, p. 269; Fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. 2, Sauria, Feb. 7, 1935; pp. 186-187.

*Calotes microlepis* (*nec* Boulenger) Boulenger, Jour. Fed. Malay States Mus., vol. 3, 1908, p. 66.

We propose to restrict the type locality of *Calotes floweri* \* Boulenger to Chantabun = Chanthaburi, SE Thailand.

A single Thai specimen (EHT-HMS No. 31717) in our collection belongs to *Calotes floweri*. The specimen has lost its field tag and we are uncertain as to its exact provenance.

The head is relatively narrow, its length equal to twice its width. The frontal region is flat, and the distance from the edge of the orbit to the nostril is slightly greater than the diameter of the orbit. The rostral is wide and low, bordered behind by two labials and five postrostrals. Following these scales on the snout and frontal area there is a group of keeled scales arranged in a slender Y-shaped series, the scales forming the branches of the Y continuous with the two enlarged "semicircular" scale series on the inner borders of the supraocular region. The two semicircular series are separated by three scalerows. At the level of the occipital scale there is a

\* Smith (*loc. cit.*) calls attention to certain differences between the northern (Indo-chinese) specimens and the southern (Malay) specimens.

transverse row of slightly elevated scales, and a few enlarged scales on each side of the occipital region. The scales covering the temporal regions are unequal with one irregular series from the eye to above the tympanum. The supralabials are twelve, the last three not clearly differentiated, the infralabials eleven. The mental is narrow, about as wide as long, followed by two enlarged rows of six scales each and separated from the labials (except first) and from each other by from one row of scales (anteriorly) to five rows of scales (posteriorly).

The lateral scales are arranged in more or less distinct transverse series, the scales pointing backward and downward. Dorsal scales are subequal in size or larger than those on the venter but the latter are more strongly keeled.

As is typical in *Calotes* the body is strongly compressed, the hind limbs slender, the gular pouch small or absent. The tail is definitely compressed, but swollen and serrate at its base, and the median dorsal scales somewhat larger than the rest. There are 64 scales in a transverse row around the body.

Four indefinite darker marks are present on the dorsum, the first between the shoulders. Radiating streaks from the eye are in evidence. The venter is light with or without dark marks. The tail is lighter than the body and barred with bands of brown and light tan.

### *Calotes versicolor* (Daudin)

*Agama versicolor* Daudin, Histoire naturelle des Reptiles, vol. 3, 1802, pp. 395-397, pl. 44 (type locality not stated by Daudin).

*Calotes versicolor* M. Smith, The fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. 2, Sauria, Feb. 7, 1935 (this is based on Kuhl's report). Malcolm Smith fixes the type locality as Pondicherry, India (may therefore be accepted as the "terra typica").

The specimens of *Calotes versicolor* in the collection are from the following localities:

KUMNH Nos. 31388 (RE 621), 31389 (RE 615), 31390 (RE 626), 31391 (RE 623), 31392 (RE 722), 31404 (RE 622), Banpong (city and district), Rat Buri (province), Thailand, Apr. 7-17, 1952; 31393 (RE 593), Latya (city), Latya (district), Kanchanaburi (province), Mar. 28, 1952; 31394 (RE 612), Ban Tham (village), Tamuang (district), Kanchanaburi (province), Apr. 5, 1952; 31395-31396 (RE 962), Khon San (village), Phukhiao (district), Chaiphum (province), Thailand, Dec. 24, 1952; all collected by R. E. Elbel.

KUMNH Nos. 40027 (BL 20009), 40028 (BL 20019), Nakhon Si Thammarat Sept. 1953; 40029 (BL 20096), Rayong, Sept. 21, 1954;

40030-32 (BL 20123) "Thailand"; 40033 (BL 20141), Mae Hong Son, Feb. 1955; 40034 (BL 20101), 40035 (BL 20102), 40036 (BL 20122), 40037 (BL 20124), 1954-55. Phatthalung; all collected by Dr. Boonsong Lekagul.

KUMNH Nos. 40089-90 (RE 3473), 40095 (RE 3551), Phu Lom Lo (mt.), 2100 m. Kok Sathon (village), Dan Sai (district), Loei (province), Mar. 26, and Mar. 31, 1954; 40092-94 (RE 3175), Khao Sawan (mt.), approx. 600 m. elev., Sieo (village), Loei (district and province), Thailand, Nov. 29, 1954; all collected by Robert E. Elbel, and Dr. Boonsong Lekagul.

### *Calotes emma* Gray

*Calotes emma* Gray, Catalogue of the specimens of lizards in the collection of the British Museum, London, 1845, p. 244 (type locality, "Afghanistan"); M. Smith, The fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. II, Sauria, Feb. 7, 1935, pp. 195-197, fig. 55.

This widespread species probably occurs throughout Thailand wherever suitable forested country exists.

The scales, usually terminating in spines or mucrones, also have a small fine flexible hairlike projection growing out from a small cavity just below the terminal spine and extending farther than the spine. These are usually much finer than human hair and their length is from .4 to .45 mm. in length.

Specimens of *Calotes emma* in the collection are from the following localities: EHT-HMS Nos. 31667 (RE 5240), Ban Bo (subvillage), "in the range of Phu Nam Lang (mt.) but farther north," elev. approx. 1780 m., Na Haeo (village), Dan Sai (district), Loei (province), Thailand, May 15, 1955, Robert E. Elbel, coll.

Nos. 31674 (RE 3675), Phu Phan (mt.), 550 m., Sakon Nakhon (district and province), June 12, 1954.

Nos. 31675 (RE 3918), 31676 (RE 3918), 31677 (RE 3868), 31678 (RE 3868), Phu Kho (mt.), 522 m., Kan Luang (village), Na Kae (district), Nakhon Phanom (province), July 17-25, 1954, Dr. Lekagul and Robert E. Elbel colls. No. 31679 (RE 4650), Phu Lom Lo (elev. 2100 m.), Kok Sathon (village), Dan Sai (district), Loei (province), Thailand, Feb. 15, 1955, R. E. Elbel.

KUMNH Nos. 40087 (RE 3416), Bang Sang Kho (subvillage), Khok Phu (village), Sakon Nakhon (district and province), Thailand, Feb. 8, 1954; 40088 (RE 3175), Khao Sawan (mt.), 600 m. Sieo (village), Loei (district), Loei (province), Thailand, collected by Robert E. Elbel.

Nos. 40023 (BL 20077), 40024 (BL 20100), 40025 (BL 20125), Phatthalung (province), Thailand, 1954; 40026 (BL 20088), Ban

Chawang (village), Chawang (district), Nakhon Si Thammarat (province), Thailand, Mar. 1954. All collected by Dr. Boonsong Lekagul.

*Calotes mystaceus* Duméril and Bibron

*Calotes mystaceus* Duméril and Bibron, *Erpétologie Générale*, vol. 4, 1837, p. 408 (type locality, Burma); M. Smith, *The fauna of British India including Ceylon and Burma; Reptilia and Amphibia*, vol. 2, Sauria, Feb. 7, 1935, pp. 197-199.

This species is widely distributed in continental Thailand but appears to be absent in the peninsular part of the country. It reaches elevations up to and perhaps above 1500 m. elevation.

The specimens of *Calotes mystaceus* are from the following localities: KUMNH Nos. 31399 (RE 719), 31400 (RE 721), 31401 (RE 724), Lam Phaya (village), Nakhon Pathom (district and province), Thailand, Apr. 17-18, 1952, R. E. Elbel coll. No. 31402 (Y 197), Boekprai (village), Bangpong (district), Rat Buri (province), Thailand, May 30, 1952, R. E. Elbel coll. Nos. 31403 (RE 872), 31442 (RE 873), 31443 (RE 893), Non Khun (village), Phukhio (district), Chaiyaphum (province), Thailand; Dec. 10, 13, 1952. R. E. Elbel, collector.

KUMNH 40038 (BL 20026), 40039 (BL 20026), Nakhon Pathom (province), Thailand, July 18, 1953, Dr. Boonsong Lekagul coll. No. 40040 (BL 20043), Nakhon Si Thammarat (province), Sept. 1953, Dr. Boonsong Lekagul coll.

*Liolepis belliana belliana* (Gray)

*Uromastyx belliana* Gray, *Zool. Jour.*, vol. 3, 1827, p. 220 (type locality, Penang; based on a drawing by Major-General Thomas Hardwicke [*vide* Malcolm Smith]).

Specimens of this large species in the collection are as follows: EHT-HMS Nos. 31754-31758 (RE 5169), Phu Phak Khi Nak (mt.), elev. approx. 1300 m., near Ban Nam Yen (subvillage), Kok Sathon (village), Dan Sai (district), Loei (province), "between the ranges of Phu Nam Lang and Phu Lom Lo," Mar. 28, 1955, Robert E. Elbel, collector.

KUMNH Nos. 31380 (RE 556), 31383 (RE 557), Phu Hin Tang (mt.), Latya (district), Kanchanaburi (province), March 25, 1952, Robert E. Elbel; Nos. 31381 (RE 642), 31384 (RE 643), Wang Pho (village), Thong Pha Phum (district), Kanchanaburi (province), Apr. 11, 1952; Robert E. Elbel; Nos. 31385 (Y 11), 31386 (Y 19), 31687 (Y 13), April 3-6, 1952, Phuchik (village), Pak Tho (district), Rat Buri (province), Robert E. Elbel; No. 40106 ♀, Kantalak (dis-

trict), Sisaket (province), May 31, 1954, Robert E. Elbel. No. 40041 "Siam," Dr. Boonsong Lekagul, collector.

One large female (135 mm. snout to vent, tail, 217 mm.) has retained the juvenile coloration. There are two broad continuous lateral stripes; the median stripe is narrower but bifurcates on the neck, and then the two stripes are broken into elongate spots. The venter and area under the tail are uniformly light-colored. The chin and throat are blackish with white flecks except anteriorly.

*Physignathus cocincinus* Cuvier

*Physignathus cocincinus* Cuvier, Règne Animal, 2nd ed., vol. 2, 1829, p. 4 (type locality, Cochin China).

One young specimen, EHT-HMS No. 31728 (3821) is in the collection from Phu Phan (mt.), 550 m. (104° 05', 16° 55'), Sakon Nakhon (district and province), Thailand, collected June 29, 1954, by Dr. Boonsong Lekagul and Robert E. Elbel.

This is the largest of the Siamese agamid lizards. In preservation the body and limbs have become plumbeous black. Ten dark brown bands on the lighter ground color of the tail are clearly evident but the terminal part of the tail is uniform brown, lacking bands.

The following characters obtain: snout to vent, 144; tail, 370; femoral pores, 7-6; head length, 42 mm.; width of head, 28 mm.; supralabials, 13-14; infralabials, 10-10.

FAMILY VARANIDAE

This family of large lizards is represented in Thailand by five forms. These are *Varanus rudicollis* (Gray), *Varanus dumerilii dumerilii* (Schlegel), *Varanus flavescens* Hardwicke and Gray, *Varanus salvator salvator* (Laurenti) and *Varanus bengalensis nebulosus* (Gray). The recent revision of the genus by Robert Mertens (*vide infra*) shows that each of these is a representative of a different subgenus.

*Varanus bengalensis nebulosus* (Gray)

*Monitor nebulosus* Gray, in Griffith's Cuvier's Animal Kingdom, vol. 9, Synopsis, p. 27 (type locality, Java).

*Varanus nebulosus* Smith, Fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. 2, Sauria. Feb. 7, 1935, pp. 403-404, fig. 94 (4).

V[*aranus*] (*Indovaranus*) *bengalensis nebulosus* Mertens, Abh. Senckenb. Naturf. Ges. Abh., no. 466, 1942, pp. 244-252; pl. 11, fig. 50.

One young specimen, KUMNH 40022 (BL 20002) is in the collection, from Nakhon Si Thammarat, peninsular Thailand, collected

Sept., 1953, by Dr. Boonsong Lekagul. In this the nostril is nearer the eye (5 mm.) than to the tip of the snout (7 mm.); five of the supraoculars are distinctly widened transversely, four of them two to three times as wide as long; a distinct longitudinal groove or depression on the snout; some scales at the tip of snout and in frontal region larger than the other head scales; dorsal body scales, as well as ventrals, smooth or only vaguely keeled.

Chin and throat cream, barred with black; some clouding or spots on side of head and on light supralabial area; body with numerous irregular transverse series of small cream or white ocelli and some indistinct dark transverse bands; the ocellated dots become obsolete on proximal fourth of the tail; two bands of cream on distal fourth, only the more distal one complete. Venter with rows of larger cream dots sometimes more or less connected. The specimen measures: snout-vent, 123 mm.; tail, 150 mm.

#### FAMILY SCINCIDAE

##### *Mabuia macularia* (Blyth)

*Euprepes macularius* Blyth, Jour. Asiat. Soc. Bengal, vol. 22, 1853, p. 652 (type locality, Rangpur, Bengal).

*Mabuia macularia* M. Smith, the fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. II, Sauria, 1935, pp. 264-266.

Since there is some doubt about the type locality we propose to fix the type locality at Rangpur, Bengal.

From the variation that obtains in this species it would appear that several subspecific forms will be recognized eventually. The last, most drastic treatment of the species is by Malcolm Smith, *loc. cit.* It has resulted in placing in it, as synonyms, *Euprepes brevis* Günther (type locality, Travancore and Anaimalai Hills); *Mabuia madaraszi* (Méhely\* (type locality, Ceylon); *Lygosoma dawsoni* Annandale (type locality, Maddathoray, Travancore) and *Mabuia allapallensis* Schmidt, Allapallai Forest, near Chanda, Central Provinces, India.

However, after synonymizing these Dr. Smith recognizes five forms (numbered from one to five). Four of these are Indian (India, Pakistan and Ceylon) while one is from southeastern Asia and the Malay Peninsula.

In the material at hand from Thailand there are three forms that we are referring to this species. They are distinguished as follows:

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\* Taylor has revived this name for a Ceylon species. *Ceylon lizards of the family Scincidae*. Univ. Kansas Sci. Bull., vol. 33, pt. 2, Mar. 20, 1950, pp. 481-518, text figs. 1-8; *A review of the lizards of the Ceylon*. Univ. Kansas Sci. Bull., vol. 35, pt. 2, Sept. 10, 1953, pp. 1525-1585.

KEY TO THE THAILAND FORMS OF *MABUYA MACULARIA* BLYTH

1. A postnasal present; no axillary pocket; an area of specialized scales above ankle, providing a chigger-mite "refuge." A somewhat darker lateral band, each scale with a small black spot; scales of the rows below the band each with a similar dark spot, the spots forming rather straight broken lines. A few tiny blackish spots with a cream center scattered on rump . . . . . *macularia postnasalis*
- No typical postnasal present; an axillary pocket present or absent; a group of specialized scales above ankle providing a chigger-mite "refuge" . . . . . 2
2. Four dark dorsal lines on back; an axillary pocket; scales on chin and throat with brown borders; scales of the dark blackish lateral band each with a whitish dot; anterior loreal divided leaving a scale behind supranasal (abnormal?) from 1780 m. elevation.  
*macularia quadrifasciata*
- Dorsum olive brown lacking dark lines or spots; no axillary pocket; no distinct white spots on dark lateral stripe, but some darker flecks, spots, or marbling, not forming distinct rows.  
*macularia malcolmi*

The following characters are held in common by these forms: three, five, or seven sharp keels on scales of back and upper parts of sides (all three kinds on same specimen); lower lateral scales smooth or nearly smooth; frontonasal and rostral in contact for a greater or lesser distance; prefrontals separated narrowly, rarely touching at one point; first pair of chinshields separated narrowly or touching at a point; the prefrontals usually touching the second supraocular, occasionally separated from it; supraciliaries normally five, rarely six; seven supralabials four preceding the subocular labial; adpressed limbs overlap, the longest toes reaching palm, wrist, or nearly half-way to elbow.

All forms seen from Thailand have the modified group of scales just above the ankle. The scales are pointed (often partially erect), offering refuge to chigger mites.

There are normally thirty scalerows around the body.

The material available does not suffice to treat of the more western populations of this species. The presence of the "chigger-mite refuges" on the legs seemingly has not been recorded and actually may be absent in western forms.

*Mabuya macularia quadrifasciata* subsp. nov.

*Type*: EHT-HMS No. 31802 (RE 5621), Phu Nam Lang (mt.), 1780 m. elev., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand; coll. June 10, 1955 by Robert E. Elbel.

*Diagnosis:* Four dark dotted dorsal lines on back; scales on chin and throat with brown borders; most scales of sides each with a lighter area; an axillary pocket; anterior loreal usually divided; area of specialized "chigger" scales on leg above ankle.

*Description of type:* Rostral in contact with frontonasal; supranasals separated; prefrontals separated from each other and from second supraocular; frontonasal touches frontal; no typical true postnasal but first loreal divided transversely leaving a scale behind supranasal; two or three presuboculars; six enlarged palpebral scales on eyelid; frontal longer than its distance from tip of snout, and longer than combined parietals; eight supralabials, five anterior to large subocular (one scale on left side abnormal in size); three primary and three secondary temporals; common frontoparietal suture two thirds of the length of the scales; one pair of nuchals; infralabials seven; mental border on lip much larger than that of rostral; a large azygous postmental; first two pairs of chinshields widened, separated narrowly from each other; five supraciliaries, four supraoculars, two touch frontal; thirty scalerows about middle of body; 15-16 lamellae under fourth toe; a distinct axillary pocket, floored with tiny scales, infested with chigger mites; tail partly regenerated; ear small, rounded, less than half size of a dorsal scale; scales on back quinquecarinate, denticulate behind; on the tail quadricarinate, the two median keels heavier and more widely spaced; scales on leg above ankle especially modified, somewhat pointed, semierect, the area strongly infested with chigger mites.

*Color:* A dim narrow continuous or dotted dorsolateral light line bordered above by a row of black flecks covering parts of two scalerows; two median scalerows each with a more or less continuous black line, the black extending onto the paravertebral row; laterally a dim broad dark band on side of body and tail bordered below on side of neck by a blue-white dotted line that is more or less continuous with the light line or row of white spots on supralabials; most scales of lateral dark stripe and of rows on side below stripe each with a larger or smaller bluish-white spot or area, producing a polka-dot effect; top of head brown; labial sutures brown or blackish; most scales on chin with brown posterior borders; front part of chin pure white.

*Measurements in mm.:* Snout to vent, 57; tail, 70 (regenerated); head length, 15; head width, 10; snout to ear, 13; snout to arm insertion, 24; axilla to groin, 25; arm, 17; leg, 25.

*Remarks:* Most of the dorsal scales are denticulated behind, the number of points depending on the number of keels on the scale.



It would appear that this, like *postnasalis* is a mountain form. The type locality is at an elevation of approximately 5800 ft. The type locality of *postnasalis* is at about 8000 ft. elevation. A specimen of *Mabuya* KUMNH 40114 from Phu Lom Lo (mt.) 2100 m. elev., Kok Sathon (village), Dan Sai (district), Loei (province), Thailand, has been badly injured and most scales are missing from the body. There is an axillary pocket; prefrontals rather widely separated; no postnasal; 14 lamellae under fourth toe; the first chin-shields barely touch mesially. Loss of dorsal scalerows prevents knowledge of the marking on the back but a few scales present on sides show the light spotting. The first loreal on one side is divided. We are unable to offer a satisfactory identification of the specimen. The third form, *macularia malcolmi*, seems to be a lowland form also lacking the postnasal.

*Mabuya macularia postnasalis* subsp. nov.

*Type*: KUMNH No. 40110. From Phu Lom Lo (mt.), 2100 m. elev., Kok Sathon (village), Dan Sai (district), Loei (province), Thailand; collected by Robert E. Elbel, Mar. 30, 1954.

*Paratypes*: Nos. 40109, 40111, 40112 all with same data.

*Diagnosis*: A postnasal present; a specialized group of scales on leg above ankle forming a chigger-mite refuge; no axillary "chigger pocket." A dark lateral band present bordered below by a light line; a few scales on rump and those on lower lateral rows with small blackish spots some of which may have a tiny cream spot in center; one or two presuboculars.

*Description of type*: A small species the limbs overlapping when adpressed; rostral and frontonasal touching; prefrontals narrowly separated from each other and touching the second supraocular; supranasals small, separated; anterior loreal single, higher but narrower than second; a true postnasal present; no scale behind supranasal; one presubocular; usually four enlarged palpebral scales; frontal about equal to its distance to the end of the snout, shorter than combined length of parietals; one pair of nuchals; seven supralabials; three primary and three secondary temporals; frontoparietal suture two thirds of the length of the scales, longer than the interparietal which separates parietals; eight infralabials; mental border on mouth wider than that of rostral; five supraoculars; four supraoculars, two touching frontal; 30 scalerows around body; 15-16 lamellae under fourth toe; no shallow pocket in axilla; tail complete with 71 subcaudals; ear about half size of a dorsal scale, with some tiny lobules bordering the anterior edge.

Area above foot on hind limb with specialized pointed scales strongly infested with chigger mites; scales of body three or five-keeled, or sometimes seven-keeled, becoming four-keeled on base of tail, the two inner keels stronger and a little wider apart, the median keel absent; scales not or scarcely denticulate behind; scales on sides of neck, on arm and leg, with two or three keels, more distinct on neck and leg. Ventrals smooth and lower lateral scalerows smooth or nearly so.

Two pairs of enlarged chinshields touching labials, the first pair very narrowly separated, the second pair separated by a scale; third chinshields small, separated from labials by an elongate scale; median preanals larger than outer ones; subcaudals slightly wider than adjoining scales.

*Color:* Above brown or brown olive with a very dim darker lateral band on side, most distinct on neck, bordered above by a slightly lighter line scarcely visible behind neck; there are eight scales on back between darker bands; numerous small dark equal-sized flecks scattered on rump, each with a tiny lighter middle part; along the lateral stripe all scales with a discrete black spot; below this stripe all scales with black dots tending to form rows; one or two similar lines of dots along tail; a distinct light line from tip of snout along supralabials below ear (but including lower edge) and continuing very dimly along side below dark stripe; chin without dark marks; seven median ventral rows of scales uniform, probably white or yellow in life.

*Measurements in mm. and scale data on type and paratypes of Mabuya macularia postnasalis, respectively*

Numbers	10109	10110	10111	10112
Length, snout to vent	58	55	56	55
Tail	—	80	85	72 broken
Head length	15.5	14	15	—
Head width	10.5	10.2	10.2	—
Snout to ear	12.3	11.2	12	—
Snout to arm	20.5	19.8	18	—
Axilla to groin	29	25.5	24.4	25.2
Arm	19	18.2	17	16.8
Leg	25.5	22.5	23	23
Postnasal	Yes	Yes	Yes	Yes
Prefrontals separated	Yes	Yes	Yes	Yes
Prefrontal touches 2nd supraocular	Yes	Yes	No	Yes
First chinshields separated	Yes	No	Yes	No
Supraciliaries	5	5	5	5
Axillary pocket	No	No	No	No
Chigger "area" on leg	Yes	Yes	Yes	Yes
Scalerows	30	30	30	30

*Mabuya macularia malcolmi* subsp. nov.

*Type*: EHT-HMS No. 31774, from Phu Phak Khi Nak (mt.), near Ban Nam Yen (subvillage), Kok Sathon (village), Dan Sai (district), Loei (province), Thailand, Mar. 18, 1955. Robert E. Elbel, coll.

*Diagnosis*: No trace of an axillary pit, no postnasal, but posterior part of nasal somewhat narrowed; frontal shorter than combined parietal but equal or a little greater than its distance from snout tip, wider than the frontonasal, but touching it; second loreal relatively short, much less than twice as wide as first loreal; a chigger mite refuge on the lower part of leg; leg reaches to elbow when adpressed; first chinshields separated mesially; transverse rows of scales, parietal to above vent, 38; from mental to vent, 47; 30 scale-rows about body.

*Color*: Above generally olive, each dorsal scale with a slightly darker central area; head darker olive; a dorsolateral stripe on side of head and neck continued on to the anterior part of body, and bordered below by a lighter line from the upper lip; four anal scales whitish.

*Mabuya multifasciata multifasciata* (Kuhl)

*Scincus multifasciatus* Kuhl, Beitr. Zool. vergl. Anat., 1820, p. 126 (no type locality stated).

It seems reasonably certain that the specimen described by Kuhl came from the Dutch East Indies, and perhaps most probably from Java. In view of the necessity of fixing a type locality so as to study variation in this widespread species, we propose to fix the locality at Batavia (Jakarta), Java.

The collection contains several specimens of this large form from the following localities:

EHT-HMS No. 31803 (RE 3755), Phu Phan (mt.), Sakon Nakhon (district and province), 550 m. (approx.  $104^{\circ} 05'$ ;  $16^{\circ} 55'$ ), June 20, 1954, Robert E. Elbel and Dr. Boonsong Lekagul. No. 31807 (RE 3947), Phu Kho (mt.), 522 m., Kan Luang (village), Na Kae (district), Nakhon Phanom (province), ( $104^{\circ} 22'$ ;  $16^{\circ} 49'$ ), July 28, 1954, R. E. Elbel and Dr. Boonsong Lekagul. No. 31804 (RE 4485), Ban Muang Khai (subvillage), Tha Li (village), Tha Li (district), Loei (province), Thailand, Jan. 15, 1955, elev. approx. 600 m., R. E. Elbel. 31806 (RE 5245), Ban Bo (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, May 16, 1955, approx. 1780 m., same mountain range as Phu Nam Lang (mt.), but farther north, Robert E. Elbel.

KUMNH No. 40055 (BL 20133) Phatthalung (district and province), Thailand, Nov. 1954, Dr. Boonsong Lekagul, coll. KUMNH No. 40056 (BL 20012) Nakhon Si Thammarat (district and province), peninsular Thailand, Sept. 1953, Dr. Boonsong Lekagul, collector.

KUMNH No. 40113 (RE 3484), Phu Lom Lo (mt.) 2100 m. elev., Kok Sathon (village), Dan Sai (district), Loei (province), Thailand, Mar. 26, 1954, Dr. Boonsong Lekagul and Robert E. Elbel, collectors.

No. 31807 is a gravid female. The dorsolateral line is scarcely discernible in color from the remainder of the dorsum. There are seven dark-brown dorsal stripes on the lateral edges of the dorsal scalerows. The outer scalerow does not extend beyond the shoulder. On the sides there is a brown stripe in which the outer parts of the scales are darker than the median parts. On the area above the arm insertion and posterior to it, the scalerows are directed upwards and backwards. Somewhat farther back on the sides of the body and tail, as well as on the sides of the neck, there are small bluish-white marks heavily bordered by black above and below. The sutures of many of the cephalic scales are edged with black.

One of the males, No. 31804, differs in pattern somewhat. There is a distinct dorsolateral light line bordered above by a light-olive line, the two covering two scalerows and including a row of small triangular dark spots, the second upper row bordered by a distinct black line. The four scalerows separating the black lines display no black except between the shoulders. The head of this specimen is gray-olive.

The keels in this form are normally three. Occasionally the nuchals show four or five keels but sometimes, especially in the very young and females, the nuchals may be smooth. Most specimens and especially females have the keeling reduced on the sides and some specimens have only dim keels on the arm. No. 40055 is striking in having the three keels placed very close together near the middle of the scute leaving the outer third on each side smooth. Thus the space between the series of keels is occupied by wide smooth strips.

The following variable characters obtain: scalerows around middle of body, three with 29, four with 30; transverse rows between parietals and above vent, 41-43; prefrontals touch; the supranasals separated; the prefrontals touch the second supraocular (50 percent); a postnasal invariably present; lobules invariably on front

border of ear-opening; the first loreal lower than second; supralabials, 7-7; the fifth widened, below eye (on one side, in one specimen, eight supralabials with five preceding the subocular labial); four or five large quadrangular scales on the translucent part of the eyelids; supraciliaries, usually 6-6.

The female contains six nearly full-time embryos each still with a bit of the yolk present in the yolk-sack. One embryo measures 35 mm. snout to vent, while the tail is approximately 47 mm. in length. (No. 31806, a recently born specimen in the collection measures 36 mm.) The mother has a snout-vent length of 120 mm. while No. 40056 has a snout-vent length of 125 mm. which is about the maximum size for the species.

*Mabuya longicaudata* Hallowell

*Euprepis longicaudata* Hallowell, Amer. Philos. Soc., ser. 2, vol. 11, p. 77, pl. IV, fig. 1 (type locality, "Siam." Here restricted to Bangkok, Thailand).

*Eunneces siamensis* Günther, Rept. Brit. India, 1864, p. 91 (type locality, "Siam." Here restricted to Bangkok, Thailand).

*Mabuya longicaudata* Smith, Fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. 2, Sauria, Feb. 7, 1935, pp. 270-271 ("The whole of Siam").

KUMNH No. 31397 (RE 520131), Ban Lat (subvillage), Ban Kaeng (village), Phukhiew (district), Chaiyaphum (province), Thailand, Jan. 31, 1952. KUMNH No. 31398 (RE 520132), Bangpong (city and district), Rat Buri (province), Thailand, Apr. 8, 1952; both collected by Robert E. Elbel.

EHT-HMS No. 31792 (RE 3947), Phu Kho (mt.), 522 m. elev., Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand, July 28, 1954; collected by Dr. Boonsong Lekagul and Robert E. Elbel.

EHT-HMS No. 23 (BL 1979), Bangkok, Thailand; collected by Dr. Boonsong Lekagul.

*Diagnosis:* Dorsal scales with two dim or fairly distinct keels, a median (third) keel dimly evident on some scales; supranasals in contact; prefrontals in contact and touching the second supraocular; supralabials seven; 28 scalerows about body; 49 transverse series between parietals and a point above vent; normally the supranasals separate rostral from the frontonasal; subcaudals, 127, 128; leg reaches halfway to elbow of adpressed arm; tail long, often two and one-half times head-body length.

The general color of all is as follows: there is an olive or olive-brown dorsum, and a broad brown stripe from eye to base of tail covering most of three scalerows, bordered above by a dorsolateral

bluish white stripe covering one or one and one-half scalerows. The edges of the dorsal scales are slightly brownish and there appear to be seven dim dorsal brownish lines. On one specimen the dorsolateral light line is invaded by black above and below leaving the line bordered above and below by blackish triangular dots for a part of its length.

All four specimens have 28 scalerows about the middle of the body, and 49 transverse rows between parietals and a point above vent. The lamellae under the fourth toe vary between 24 and 26.

We propose to fix the type locality of this species at Bangkok, Thailand.

*Measurements of Mabuya longicaudata*

	EHT-HMS	KUMNH	KUMNH	EHT-HMS
Number	23	31397	31398	31792
Snout to vent	92	115	95	—
Tail	227	tip miss.	tip miss.	233
Head length	22	30	21	—
Head width	15	17.5	14	—
Snout to ear	19	24	18	—
Snout to arm	31	36	32	—
Axilla to groin	46	52	48	44
Arm	29	33	30	28
Leg	39	43	39	41

*Eumeces quadrilineatus* (Blyth)

*Plestiodon quadrilineatum* Blyth, Jour. Asiat. Soc. Bengal, vol. 22, 1853, p. 652, type locality, China [Hong Kong<sup>2</sup>]; Taylor, Univ. Kansas Sci. Bull., vol. 23, 1935 (1936, Aug. 15), pp. 452-457.

*Eumeces quadrivirgatus* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 502 (type locality, Hong Kong).

*Diagnosis:* Palatine bones not meeting on midline of palate; eyelids scaly; nostril in single nasal; supranasals present; two frontoparietals; pentadactyl limbs; pterygoids toothed; two dorsolateral stripes separated by two scalerows and the edges of two others; three pairs of nuchals.

A specimen of this species, EHT-HMS 31791 (RE 5621) from Phu Nam Lang (mt.), 1780 m. elev., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 10, 1955, Robert E. Elbel, coll., has the following characters: the portion of the rostral visible above equals the greatest length of the internasals. The latter scales are diagonally elongate touching the postnasal behind the nasal, and in contact mesially. The fronto-nasal is about a fourth wider than long, touching the first loreal. The prefrontals are slightly wider than long, forming a common suture. The frontal is a little longer than its distance from the

tip of the snout, as well as longer than the distance from the nuchal. Its posterior border is rounded rather than angular. The frontoparietals are separate, forming a median suture less than a third the length of the scales. The interparietal is nearly a half longer than wide, and is enclosed narrowly by the parietals which are followed by three pairs of nuchals, of nearly equal size.

Three supraoculars border the frontal, the second longer but not quite as wide as third while both are larger than the first. The nostril is pierced in a small nasal. Also, there are present a postnasal, two loreals of which the anterior is higher but only about half the length of the second, seven supraciliaries, two presuboculars, four postsuboculars, eight supralabials of which five are in front of the subocular, and seven infralabials. The mental has a larger labial border than the rostral and is followed by two unpaired postmentals, which in turn are followed by three pairs of chinshields only the first of which is in contact. The last pair of chinshields are followed by an elongate postgenial scale bordering labials, three times as long as wide. The first labial touches the nasal and postnasal. The lower eyelid has an opaque area covered with quadrangular scales larger than those adjoining them. One primary temporal, two large secondary, and two smaller tertiary temporals are present. The ear-opening is small, with three lobules on the anterior border. There are 22 scalerows around the middle of the body. Dorsal scales are large, only two scalerows and the edges of two others lying between the white dorsolateral lines. There are two enlarged preanal scales. The subcaudals, much widened, number 87, the last 16 being on a regenerated part of the tail; 53 dorsal scales from parietals to above the vent. The adpressed limb reaches approximately to the elbow. A greenish or bluish white stripe following the second scalerow passes from the rostral onto tail where it widens and with its fellow practically encompasses the tail posteriorly. A lateral line from the labials passes through the lower part of the ear and continues as far as the groin.

*Remarks:* The longitudinal scalerows vary from 20 to 22; the transverse rows from parietals to above vent vary between 48 and 54. There are seven or eight supralabials, and the second postmental may be single or divided. The digits of the leg may reach to the base of the fingers or to the elbow of the arm when adpressed.

The amount of known variation in the characters of this species is relatively small, but it may prove to be geographical. One specimen partially digested was taken from the stomach of a *Natrix*

in the collection. The subcaudals are much widened and thus differing from most *Eumeces*. There is only a single divided scale following the vent. The widened subcaudals in the skinks are usually separated from the vent by several rows of small scales.

*Dasia olivacea* Gray

*Dasia olivacea* Gray, Ann. Mag. Nat. Hist., vol. 2, 1838, p. 331 (type locality, Penang I. Malaya).

*Euprepis olivaceus* Günther, The fauna of British India, 1864, p. 80, pl. X, fig. D.

*Diagnosis:* Dorsal scales finely striate, the striae somewhat sinuous; keels almost obsolete anteriorly; on posterior part of back scales bearing three, five, or seven dim keels; ear-opening greatly reduced, almost covered by large flat scales; second supraocular widely separated from the prefrontal; prefrontals not in contact; 28 scale-rows around body; 43 transverse scale series from parietals to above vent; no postnasal; two anterior temporals. Transverse irregular black bands on body, each scale bearing a bluish-white spot or fleck.

*Description of species:* Rostral large, its labial border distinctly less than that of rostral, moderately in contact with the frontonasal; latter broader than long (4.9 mm. x 3.7 mm.), and narrowly in contact with the frontal; prefrontals large, separated, touching both loreals; nasals single, much longer than wide, rectangular; supranasals separated, narrower than nasals; six supraciliaries; four supraoculars, three touching frontal; interparietals form a suture for half of their length; interparietal separates the parietals; a pair of nuchals; two presuboculars; two or three postsuboculars; seven supralabials, the fifth below middle of eye, in direct contact with eye granules; four large palpebrals on lower eyelid; two anterior temporals, three secondary and four tertiary temporals; six infra-labials; mental followed by a large azygous postmental which is in turn followed by two pairs of chinshields, the first pair in contact; third chinshield small, separated from labials by an elongate scale; frontal longer than combined parietals and longer than its distance from tip of snout. Scalerows, 28 around middle of body; about 44 transverse rows between parietals and a point above vent; about ten preanal scales, the two median enlarged; ear very small, the scales in front large, flat, nearly covering opening; the scales over dorsum and sides of body very finely striate, the striae forming wavy rather than straight lines—from 50 to 100 on each scale; scales of body and sides with low flat-topped keels varying from two to eight on scales in various parts of body, most numerous on scales of the



rump; scales of the posterior part of forearm usually dimly tricarinate, the fine striae continued on scales to the tips of the digits.

When limbs are adpressed the digits overlap; palm covered with rounded moundlike scales; the lamellae broad, not keeled; no enlarged scale at wrist; scales on sole similar to those of palm but a pair of enlarged scales at heel; subdigital lamellae broad, unkeeled, 19 under longest toe; tail broken, the subcaudals widened; scales on venter smooth.

*Color:* Body brownish gray with a series of dark irregular transverse bars across the neck and body each scale of which has a silvery or bluish-white fleck or spot; head with small somewhat symmetrical marks, pronounced in occipital region and on the supraoculars; limbs with some darker flecks suggesting bands.

*Measurements in mm.:* Snout to vent, 100; tail broken and partly lost; head width, 14.5; head length, 24.2; snout to ear, 20; snout to foreleg, 33; axilla to groin, 50; arm, 28; leg, 36.

*Remarks:* The specimen described is KUMNH No. 40057 from Nakhon Si Thammarat, peninsular Thailand, south of the Isthmus of Kra. While the type locality is relatively near (about 200 mi. south and on a coastal island) there are certain differences. The ear differs in its general make-up and appearance; the frontonasal is longer than broad. We have found no mention in the literature of the curious striation of the scales of this species. It is possible that it has been overlooked, yet it is also possible that it differs from the typical species of *Dasia* in this character.

It may be noted that *Mabuya longicaudata* has developed extensive striation on scales while most species of *Mabuya* lack the striae altogether.

### *Sphenomorphus indicus indicus* (Gray)

(Fig. 16)

*Hinulia indicum* Gray, Ann. Mag. Nat. Hist., ser. 2, vol. 12, 1853, p. 388 (type locality, "Himalayas." The type locality is restricted to "Sikkim, Himalayas" by Stejneger, *loc. cit.*).

*Sphenomorphus indicus* Stejneger, U. S. Nat. Mus. Bull. 58, 1907, pp. 216-218, pl. 17, fig. 1 (from Boulenger).

*Lygosoma indicum* Boulenger, A vertebrate fauna of the Malay Peninsula from The Isthmus of Kra to Singapore . . . Reptilia and Batrachia, 1912, p. 87, fig. 24; Smith, Jour. Nat. Hist. Soc. Siam, vol. 2, June, 1916, p. 55 ("Hills near Pre [northern Siam]"); Bull. Raffles Mus., no. 3, April, 1930, pp. 33-34.

This species unfortunately had no type locality given except "Himalayas." The generalized locality "Himalayas" has been fixed by Stejneger (*loc. cit.*) to Sikkim, Himalayas, which should suffice



FIG. 16. *Sphenomorphus indicus indicus* (Gray).  
KUMNH No. 40108, Phu Lom Lo (mt.), 2100 m.,  
Kok Sathon, Dan Sai, Loei (province), Thailand.  
Actual total length, 199 mm.

since the species occurs in this rather small Indian State, lying in between the countries of Nepal and Bhutan. From here the species ranges across southern China to Formosa, and south through Burma, Assam, Thailand, Indo-China and parts of Malaya. Knowledge as to whether or not it has developed subspecific forms in this vast range other than now recognized must await a review of considerable material. It is not a common species and seemingly it is not evenly distributed in Thailand. It is believed that *S. i. zebratus* Boulenger (1887) from Tenasserim should be recognized as a subspecies.

Two specimens of *S. i. indicus* are in the collection (KUMNH No. 40107-40108 (RE 3536-3567) from 2100 m. elev., on Phu Lom Lo (mt.), Kok Sathon (village), Dan Sai (district), Loei (province), Thailand, March 30, 1954, Dr. Boonsong Lekagul and Robert E. Elbel, collectors.

*Diagnosis:* No supranasal; frontonasal touches rostral; divided frontoparietals; prefrontals touch; nostril in a single nasal, no postnasal; lower eyelid scaly; parietals enclose interparietals; only four supraoculars; a dark lateral band from eye to groin, indefinite on lower side.

*Description:* (KUMNH No. 40107): Rostral convex, not flattened, forming a broad suture with the frontonasal which is much broader than long; prefrontals separated; the frontal shorter than the combined parietals, nearly a half longer than its distance from tip of snout; parietals enclose interparietal; a pair of nuchals separated from secondary temporals by a pair of tertiary temporal scales; four supraoculars, last touching large upper secondary temporal; eight or nine supraciliaries; two loreals, second widest, slightly lower than first; no postnasal; two preoculars, lower large; nine scales form a pre-, sub- and postocular series extending to the temporal; two or three small scales between last supraocular and the postoculars (sometimes described as small supraoculars); supralabials seven, the fifth and sixth below eye; infralabials seven; a pair of superimposed anterior temporals; a pair of larger secondary temporals, the upper touching the parietal, three tertiary, the upper lying behind parietals; a pair of large preanals.

Mental wider than rostral; postmental single, followed by two large chinshields in contact and these by a second pair separated by one scale, a third pair following separated by five scales; the chinshields all in contact with the labials; ear-opening moderate (1.6 mm. x 2 mm.), granules but no lobules on anterior border; lower

eyelid scaly without transparent disc; scalerows around body, 36; transverse scale series from parietals to above vent, 78; lamellae under fourth toe, 19-20 (95 subcaudals in No. 40108).

*Color:* Above olive-gray on head and dorsum; a dark lateral band from eye, passing above ear-opening then widening and continuing to groin, the upper edge well defined and bordered by a dim light line, its lower edge ill defined, generally covering much of three scalerows. All ventral surfaces immaculate except for some dim gray areas under sides of neck. A few dark flecks on dorsal part of neck, shoulder region, and a few near base of tail. Tail reproduced.

*Measurements in mm.* (of KUMNH Nos. 40107, 40108, respectively): Snout to vent, 95, 79; tail, —, 120; snout to ear, 17.5, 14.5; head length, 20, 18; head width, 15, 12.5; snout to arm insertion, 30, 26; axilla to groin, 53, 43; arm, 22, 20; leg, 33, 32.

*Remarks:* The second specimen agrees with the one described in most characters, but the supralabials have more or less distinct black spots on the sutures. The tail has a narrow dorsolateral black line to tip, and the olive back has more numerous but smaller dark flecks. On the median dorsal line of the tail there is a row of black dots. Toward the end of the tail most of the scales have blackish dots.

The hind limb in the young and in males reaches to the elbow; in large adult females they barely overlap. Both specimens have nuchal scales separated from the large secondary temporals by an enlarged tertiary temporal scale.

Boulenger states "nostril in a nasal or between nasal and post-nasal." We would suspect that the latter condition betokens a different form from *indicus*. There is not a trace of "large spots in flanks" mentioned by Boulenger (Cat. vol. 3, pp. 241-242, 1887).

### *Sphenomorphus maculatus* (Blyth)

(Fig. 17)

*Lissonota macula'a* Blyth, Journ. Asiat. Soc. Bengal, vol. 22, 1853, p. 653, (type locality, Assam).

A specimen of an adult gravid female lizard (EHT-HMS No. 31781 [RE 3887]) has the following characters that ally it with *maculatus*:

The rostral has a distinct concavity just in front of its straight transverse suture with the frontonasal. The prefrontals are widely separated. Of the five supraoculars, three touch the frontal. There are 34 scalerows around the middle of the body. While there are no distinct nuchals the median scales on the neck are usually widened.

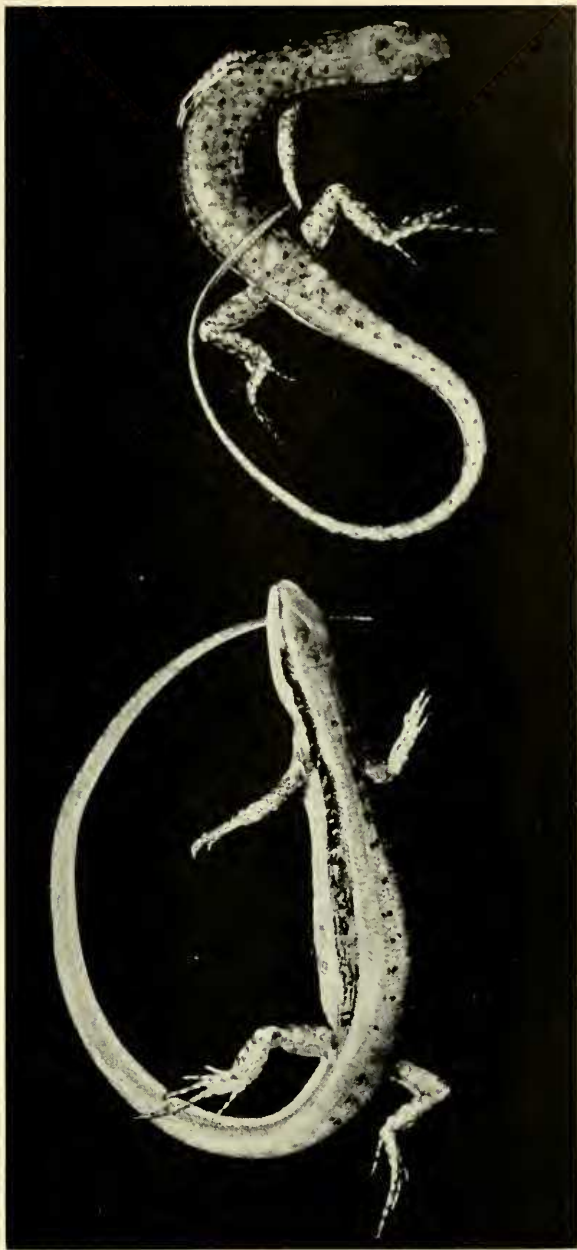


FIG. 17. *Sphenomorphus maculatus* (Blyth). Upper figure, EHT-HMS No. 31784, actual total length, 161 mm. Lower figure, EHT-HMS No. 31781, actual total length, 176 mm. Both from Phu Kho (mt.), 522 m. elev., Kan Luang, Na Kae, Nakhon Phanom (province), Thailand.

A stripe from the rostral passes through the eye, then widens and continues along the side. It is black anteriorly with a few small white spots, then more olive posteriorly, tending to form four narrow dark lines and three olive lines. The stripe continues along the side of the tail to tip but there it is nearly a uniform olive, edged with a scalloped brown line. A discreet white stripe from behind eye passes above the ear to the hind leg where it is interrupted, but continues somewhat indistinct for some distance on the tail. Below this the labials and sides of neck have some small dark spots or flecks, while below the lateral white line there is an indefinite darker stripe, broken anteriorly. The chin, venter, underside of limbs, and the subcaudal area are immaculate whitish-flesh. The dorsum is olive with dim paired dark dots on either side of the median line, and its outer border has a more or less distinct very narrow lighter line.

In a young specimen from the same locality and lot, the median paired dark spots are somewhat indistinct but the dorsal olive color is separated from the deep black lateral stripe by a narrow indefinite light line. A lateral white line is present, the edges irregular but clearly defined. Below this white line the black is arranged in a row of 18 spots, and the series is more or less continuous in front of thigh and tibia.

The two males (Nos. 31783-31784) lack the distinctive white lateral stripe. Their legs are longer and they show some other small differences in the color pattern. Seemingly the subcaudal count is lower and scalerows around the middle of the body higher (38).

The leg reaches to the elbow on the female distended with eggs. In males the leg reaches the axilla or a little beyond.

The specimens are from the following localities: EHT-HMS No. 31780 (RE 3755), Phu Phan (mt.), 550 m., Sakon Nakhon (province and district), Thailand, ( $104^{\circ} 05'$ ,  $16^{\circ} 55'$ ), June 20, 1954, R. E. Elbel and Dr. Boonsong Lekagul, colls. 31781-31784 (RE 3887), Phu Kho (mt.), 522 m., Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand, ( $104^{\circ} 22'$ ,  $16^{\circ} 49'$ ), July 19, 1954, Dr. Boonsong Lekagul and R. E. Elbel, colls.

*Measurements in mm. and scale data for Sphenomorphus maculatus*

Number and sex	Snout-vent length	Tail length	Total length	Dorsals to vent	Sub-caudals	Scalerows middle	White lateral line
31781 ♀	64	112	176	79	132	34	yes
31783 ♂	57	111	168	77	124	38	no
31784 ♂	59	102	161	75	123	38	no
31782 ?	28	—	—	80	—	38	yes
31780 ♀	60	—	—	80	—	36	yes

Genus *LEIOLOPISMA* Fitzinger

The species of *Leiolopisma* \* may be recognized by the following characters: rostral and frontonasal in contact; parietals enclose interparietal; four large supraoculars; six or seven supralabials; no supranasals; lower eyelid with an undivided transparent disc; limbs pentadactyl; prefrontals touch (in Thailand forms) usually making a substantial suture.

The following species are represented in the collection: *Leiolopisma eunice* Boulenger, *L. rupicola* Smith, *L. siamensis* sp. nov. Besides these the following occur:

*Leiolopisma kohtaoensis* Cochran (spots on throat; 30-32 scalerows; one or more nuchals; 16 lamellae under toes; limbs of adults not touching when adpressed). An island form which may or may not occur in peninsular Thailand (see Malcolm Smith, Fauna Brit. India, Rept. Amph. vol. 2, p. 297).

*Leiolopisma v. vittigerum* Boulenger [= ? *Leiolopisma pranensis* Cochran] (with a median white or golden stripe from snout to tail, usually bordered with black; in juveniles often three light stripes present on body; 28-30 scalerows).

*Leiolopisma doriae* Boulenger (three or four pairs of nuchals; 28-32 scalerows; six scalerows across back; dorsals much larger than laterals; prefrontals barely touching).

? *Leiolopisma melanostictum* Boulenger (34-38 scalerows; back dotted with black; a broken lateral stripe present).

*Leiolopisma tavesae* Smith (26 scalerows; longitudinal streaks on back and neck).

*Leiolopisma r. reevesi* Gray (eight scalerows above on back; 28 scalerows around body; several pairs of nuchals present).

*Leiolopisma rupicola* (M. Smith)

(Fig. 18)

*Lygosoma rupicola* M. Smith, Jour. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 46 (type locality, "Chong Kae, near Paknampo, central Siam").

Two specimens, EHT-HMS Nos. 31786-31787 (RE 3887) are in the collection from Phu Kho (mt.) 522 m. elev., Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand, July 19, 1954, Dr. Boonsong Lekagul and Robert E. Elbel, collectors. These specimens have the following characters:

\* Malcolm Smith, in a paper published in Records of the Indian Museum, vol. 39, pt. 3, Sept. 1937, pp. 213-234 (p. 223), treats of *Leiolopisma* as a section under the genus *Lygosoma* (if we interpret his arrangement correctly). He states, "Under *Leiolopisma* are included a number of species that cannot clearly be assigned to any genus . . . . The majority of the *Leiolopismids* have no doubt been derived from *Lygosoma* by the simple change in the eyelid, others from *Emoia* by loss of the supranasal shield through fusion with the nasal."

The general markings are shown in the figure. The color is variable light brown on dorsum and sides growing much lighter towards the venter. The spots are black, the lateral stripe broken by white or yellow spots. The venter is yellowish or whitish. The number

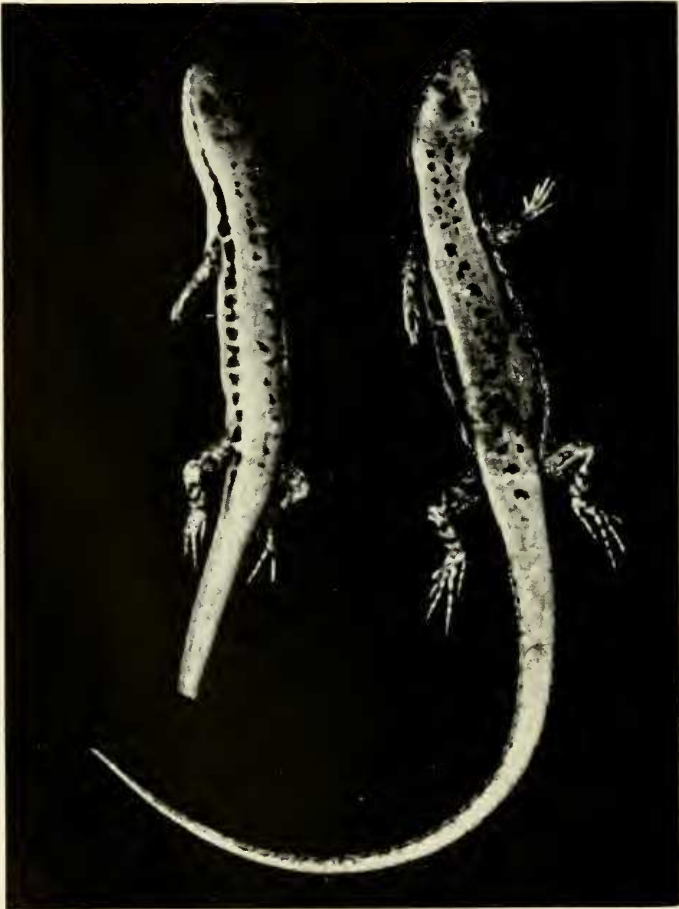


FIG. 18. *Leiolopisma rupicola* (M. Smith). Left figure, EHT-HMS No. 31787, actual total length, 45 mm.; right figure, EHT-HMS 31786, actual total length, 87 mm. Both specimens from Phu Kho (mt.), 522 m. elev., Kan Luang, Na Kae (district), Nakhon Phanom (province), Thailand.

of scalerows around the middle of the body is 34, the lamellae under fourth toe 18 or 19. There are 117 subcaudals in No. 31786, the median series slightly enlarged. Under a lens, scales indefinitely roughened on surface by from ten to twenty fine irregular longi-



tudinal lines covering all but front edge of the scale; venter scales smooth while the greater part of the tail is likewise smooth.

The snout-vent length of No. 31786 is 32 mm., the total length 87 mm.; of No. 31787, 29 mm.; tail lost. The leg reaches the elbow of the adpressed arm or a little farther.

*Leiopisma eunice* Cochran

(Fig. 19)

*Leiopisma eunice* Cochran, Proc. Biol. Soc. Washington, vol. 40, Dec. 2, 1927, pp. 187-188 (type locality, Bang Suk near Pak Jong,\* Thailand), USNM No. 72180 (Dr. Hugh Smith, coll.); Proc. U. S. Nat. Mus., vol. 77, 1930, p. 18, fig. 3 (Doi Angka, 700 ft., and Pak Jong\*).

*Leiopisma reevesi reevesi* Smith, The fauna of British India including Ceylon and Burma; Reptilia and Amphibia, vol. 2, Sauria, 1935, pp. 295-296.

**Diagnosis:** A small form reaching 56 mm. snout to vent; anterior loreal much higher and narrower than second; eight supralabials,

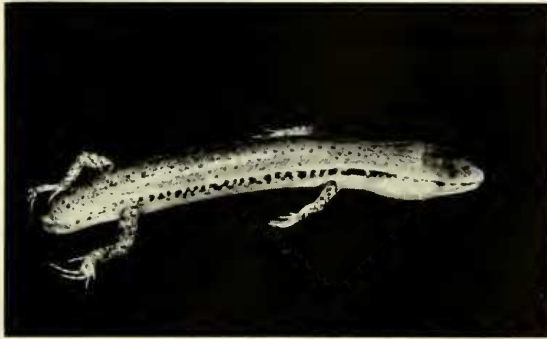


FIG. 19. *Leiopisma eunice* Cochran. EHT-HMS No. 31785, Ban Muang Khai, Tha Li (village), Tha Li (district), Loei (province), Thailand. Actual snout-to-vent length, 43 mm.

the sixth and seventh largest, below eye; one large anterior temporal; three secondary and three tertiary temporals; one distinct pair of nuchals; ear three or four times size of the palpebral disc; 32 scalerows around middle of body; two much enlarged anals flanked by two smaller scales; toes of adpressed limbs overlap two to three millimeters; four supraoculars.

A specimen (EHT-HMS No. 31785 [RE 4390]) from Ban Muang Khai (subvillage), Tha Li (village), Tha Li (district), Loei (province), Thailand, elevation approx. 600 m., Dec. 29, 1954, R. E. Elbel, coll., has the following characters: rostral convex reaching back to

\* Pak Jong = Pakchong, Doi Pia Fai Mts.

a line connecting the front edge of nostrils, broadly in contact with the frontonasal, which is much wider than long; prefrontals broadly in contact, each nearly as large as the frontonasal; frontal slightly longer than its distance from the tip of snout, more than a third shorter than the combined parietals; frontoparietals paired, each larger than the interparietal; latter enclosed by parietals; temporal formula,  $1 + 3 + 4$ ; supralabials eight, five preceding first subocular labial; a row of small suboculars below eye, the series broken medially so the first subocular labial is in contact with small granules of eyelid; a transparent eye-disc one third or one fourth of the area of ear-opening; labial borders of mental and rostral nearly equal; infralabials six, the last nearly concealed by last supralabial, first small; a large undivided postmental; three pairs of chinshields, the first in contact, second separated by a scale, third pair by three scales, fourth pair small separated by seven scales; all four of the chinshields touching labials. Most of the tail missing. Transverse scale series from parietals to above vent, 70; the distance between snout-tip and arm-insertion (15.4 mm.) is contained in the axilla-to-groin distance (20.2 mm.) 1.31 times. There are 17 lamellae under the fourth toe; eight scalerows between dorsolateral lines.

The color above gray-brown with very numerous fine black flecks, the larger flecks tending to be more numerous towards the middle line of the back; the dorsolateral black line, bordered by a dim line of very light tan, is more or less broken up by cream vertical bars into about twenty spots; on neck the line is nearly solid black posteriorly but it narrows and becomes broken behind eye; a black line across edges of eyelids, and a dark line across loreal region to rostral; arm and leg marbled or reticulated above; sides with a few fine scattered flecks; sutures of labials with indefinite dark spots.

*Remarks:* Dr. Cochran has suggested that *Leiolopisma eunice* has several pairs of nuchals. In the several species the scales on the neck are widened in the four dorsal rows. This is true in the described specimen but only the first pair are modified enough to be considered nuchals. Dr. Cochran's statement is "several pairs of feebly enlarged nuchals." The presence of 34 scalerows would, in my opinion, preclude association with the *Leiolopisma reevesi* from *Ningpo*. Malcolm Smith, however, has referred *L. eunice* to the synonymy of *L. reevesi reevesi* as a subspecies.

*Leiolopisma siamensis* sp. nov.

(Fig. 20)

*Type:* EHT-HMS No. 31788 (RE 3936) from Phu Kho (mt.), 522 m., Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand, ( $104^{\circ} 22'$ ;  $16^{\circ} 49'$ ), collected by Dr. Boonsong Lekagul and Robert E. Elbel, July 26, 1954.

*Diagnosis:* Prefrontals meet at a point; nostril in a nasal; no supranasals; large undivided disc on lower eyelid, less than one third of



FIG. 20. *Leiolopisma siamensis* sp. nov. EHT-HMS No. 31788, Kho Mt., 522 m., Kan Luang, Na Kae (district), Nakhon Phanom (province), Thailand. Actual total length, 116 mm.

the size of the ear; tympanum deeply sunk, three lobules barely indicated on border; sixth labial separated from large upper temporal by two temporal scales; fifth labial separated from it by one temporal scale; snout to arm insertion 19.5 mm.; axilla to groin, 24 mm.; 34 scalerows about middle of body; hind leg reaches elbow of arm; 20 lamellae under fourth toe; subcaudals not or but slightly widened except on regenerated part, lateral body scales as large as dorsals; a double frontoparietal; enlarged preanals; small median pair of nuchals, flanked by a larger one laterally; ear-opening 1.5

mm. x 1.1 mm. No black markings of any sort; brown above, growing light low on sides; venter, chin, throat, subcaudal region, and lower part of sides immaculate, without trace of pigment.

*Description of species:* Rostral large, length of the part visible on top of snout minutely less than its distance from frontal, broadly in contact with frontonasal; latter twice as wide as long, touching anterior loreal and nasal laterally; prefrontals meeting mesially at a point as do the frontal and frontonasal; frontal a third longer than its distance from tip of snout, shorter than interparietal and frontoparietals together; parietals broadly in contact behind interparietal; nostril in a single nasal, without a postnasal; two loreals, the anterior narrower and higher than second; two unequal superimposed preoculars; four large supraoculars, two touching frontal; 8-9 supraciliaries, first largest; an undivided transparent disc in lower eyelid; seven supralabials, the fifth and sixth largest below eye but separated from orbit by two irregular rows of suboculars; a wedge-shaped scale inserted partially between the fourth and fifth supralabials; two anterior temporals followed by two secondary, the upper very large; tertiary temporals four, the upper lying behind the parietal, separated from its fellow by a pair of nuchals; anterior temporals separated from eye and last supraocular by two or three rows of postoculars; tympanum deeply sunk; ear-opening large, rounded, oval, about size of eye-opening, three or four times size of the disc in the eyelid; about 65 scales from parietals to above vent; 34 scalerows about middle of body; subcaudals not or but slightly wider than adjoining scales except where tail is regenerated in which part the subcaudals are greatly widened.

*Color:* Generally light brown above with a faint indication of a lighter line on dorsolateral nuchal area separated from its fellow by six scalerows and disappearing back of shoulder; indication of a faint darker line from behind eye, passing above tympanum and above arm below dorsolateral line; faint indications of darker areas continue some distance on sides. Venter and all undersurfaces immaculate whitish lacking any trace of pigment except on hand and foot. Top of head a little darker than body.

*Measurements in mm.:* Snout to vent, 51; tail (regen.), 65; snout to arm insertion, 19; axilla to grain, 24.5; length of head, 13; width of head, 7.3; length of arm, 14; leg, 20.

*Remarks:* This species belongs in that group of the genus having the lateral and dorsal scales subequal, and a very large ear-opening which approaches the open eye in size. It differs from

*L. reevesi* in having the limbs overlap a greater distance (to elbow); more scalerows around body, no black marks on body; a pair of nuchals flanked by an enlarged outer pair of tertiary temporal scales, and three anterior temporals, instead of two.

From *melanostictum* it differs in having a greater overlap in the adpressed limbs, much enlarged preanals, the absence of distinct black markings on body, and in the distance from snout to arm insertion. The distance from axilla to groin is slightly less proportionally.

*Leiopisma eunice* Cochran, a species described from Bang Suk near Pakchong, Siam, differs in having a short snout, the limbs when adpressed failing to meet and the distance between axilla and groin is double that from tip of snout to arm insertion.

#### SUBORDER SERPENTES

#### FAMILY TYPHLOPIDAE \*

#### *Typhlops diardi mülleri* Schlegel

*Typhlops mülleri* Schlegel, *Abbildungen amphibiens*, 1839, p. 39, pl. 32, figs. 25-28 (type locality, Padang, Sumatra).

*Typhlops diardi* Schlegel, *Abbildungen amphibiens*, 1839, p. 39 (type locality, Indes Orientales); Smith, *The Fauna of British India, Ceylon, Burma*. . . . *Reptilia and Amphibia*, vol. 3, *Serpentes*, 1943, pp. 51-52, fig. 15 (synonymy and literature).

*Typhlops schneideri* Jan, *Iconographie générale des ofidiens*, tome 1, livr. 9, 1864, p. 20, pl. 1, fig. 3, (type locality, Bangkok, Siam).

*Typhlops siamensis* Günther, *Reptiles of British India*, 1864, p. 175, pl. 16, fig. D (3 figs.) (type locality, Siam).

*Typhlops diardi mülleri* Brongersma, *Zool. Meded.*, Leiden, vol. 17, 1934, p. 193.

The single specimen of *Typhlops diardi mülleri* in the collection is KUMNH No. 31436, from Chantuk (village), Sidiu (district), Khorat (province), Thailand; Robert E. Elbel, coll., Aug. 31, 1952. It agrees with the subspecies *mülleri* as to the color markings. There are 26 scalerows around the body near the middle, the eleven dorsal scalerows being dark brown, the remaining fifteen rows cream-white in color. Farther forward the white color impinges on the adjoining row until only nine dorsal rows are dark brown, and seventeen are cream-white. There are 305 transverse scalerows from the mental to the vent, and eight rows on the tail, counting the terminal spine. The total length is 332 mm., the tail 4.5 mm.

The nasals are incompletely divided. They form a very narrow contact behind the rostral (which is not mentioned as a character

\* We do not follow the recently proposed idea that the Typhlopidae are not serpents. It is not improbable that the Serpents are diphyletic in origin.

in either of the subspecies). The eye is distinct and lies wholly below the surface of the ocular scale. All anterior head scales have minute tubercles. The anterior nasal scale covers a depression below the nostril.

Held in certain lights the scales show a most elaborate criss-crossing striation on the undersurface of their exposed free parts. This is more evident when the scale is removed and viewed from below. This condition has also been observed in other species of *Typhlops*.

#### FAMILY DIPSADIDAE

#### *Pareas macularius* Theobald

(Fig. 21)

*Pareas macularius* Theobald, Jour. Linn. Soc., vol. 10, 1868, p. 54 (type locality, Martaban, South Burma).

The single specimen of *Pareas macularius* in the collection is EHT-HMS No. 31798 ♀. It is definitely from Thailand but the exact locality is uncertain owing to the disintegration of the tag.

*Diagnosis:* This species, which resembles *Pareas margaritophorus* Jan somewhat in color and markings, differs from it, however, in having a more compressed body, keels on the seven median scale-rows, and a somewhat larger series of ventrals and subcaudals. It seems to replace *P. margaritophorus* in Burma, Bengal, northern Thailand and Indo-China. The following characters are evident in the specimen at hand:

*Description:* Rostral large, slightly wider than high, its upper edge a straight transverse line; internasals more than twice as wide as long, notching upper line of the nasal, narrower than prefrontals; latter wider than long, touching preocular and loreal, entering orbit; frontal short, six-sided, its length greater than its width, longer than its distance from tip of snout, shorter than parietals; latter scales longer than their distance from tip of snout; nostril in a single nasal somewhat triangular; loreal about as wide as high; one preocular, one postocular; a large narrow curving subocular; supraocular not longer than eye; temporals two and three, however, they are irregular in second and third rows; seven supralabials, none entering eye, four or three touching subocular, last much the largest; mental small, touching one of the first pair of chinshields; eight (seven) infralabials, four (or five) touch first chinshields; second and third pairs of chinshields transverse, followed by first ventral, which is larger than succeeding scales. Eye distinctly larger than its distance to mouth.

Scales on back of head 20; 15 scalerows on neck, middle of body, and in front of vent. Ventrals 163, subcaudals 55, paired; anal single. Total length, 210 mm. Tail, 49 mm. Mandibular teeth, 29, the anterior 5 times as large as the posterior.

*Color:* The top of the head heavily speckled with brown; a pair of black-brown spots behind parietals; a diagonal brown line from upper level of eye to mouth angle; on seventh labial a suggestion



FIG. 21. *Paracas macularius* Theobald. EHT-HMS No. 31798 ♀, "Thailand." Actual total length, 210 mm.

of a second line from lower part of eye across the suture of the sixth and seventh labials; brown flecking on labials; a light nuchal band from which a process runs forward behind eye, and joins the light color of chin and throat behind jaw angle. General body color brown with approximately 60 transverse rows of small black dots or spots, each bordered in front by white on the same scale, the rows irregular and often incomplete. Outer part of ventrals and

subcaudals flecked with brown. A deep black W-shaped mark on neck preceded by an irregular neckband, yellowish (in life).

A photograph is shown.

*Pareas carinatus* Boie

(Fig. 22)

*Pareas carinatus* Boie, Isis, 1828, p. 1035 (type locality, Java).

The two specimens of *Pareas carinatus* are, EHT-HMS No. 31796 (RE 5246) Ban Po (subvillage) approx. 1780 m. elev. ("in the same range as Phu Nam Lang (mt.) but farther north"), Na Haeo (village), Dan Sai (district), Loei (province), Thailand, May 16, 1955, and EHT-HMS No. 31797 (RE 5610), Phu Nam Lang (mt.), 1780 m. elev., Ban Khok (subvillage), Na Phung (village), Kan Sai (district), Loei (province), Thailand, June 10, 1954, both collected by Robert E. Elbel.

No. 31797 ♀. The body is strongly compressed. The rostral of this species is much narrowed and visible above only as a point. The internasals, longest mesially, are one and a half times as wide as long. The prefrontals bend down on the sides of the head but do not enter orbit, the suture between them being a little longer than the internasal suture. The frontal is six-sided, the sides subparallel, longer than its distance to the tip of the snout and equally as large as the parietals. The supraocular is longer than the eye. The nasal is as high as long, the loreal distinctly higher than wide. The first pair of infralabials touch behind the mental. The first pair of chinshields is not longer than the second or third transverse pairs.

The color is nearly uniform brown, finely peppered with darker pigment. The venter is whitish with a row of irregular dark flecks on outer edge of ventrals and a discontinuous row of flecks in the middle of venter. A narrow line runs from eye back to the scalerow bordering the median row, and is lost almost immediately. The chin and neck are white, the head peppered with black flecks. Some trace of the dorsal markings, obvious in the male, may be discerned if the specimen is submerged in clear liquid.

No. 31796 ♂ displays some 78 narrow dark slightly diagonal transverse markings, each having a width of less than a single scale, extending laterally to the ventrals. There are 7-7 supralabials, and 8-9 infralabials. Otherwise it agrees generally with the female in squamation. There are 77 dim dark bands on body formed by scales having a little black pigment on their edges. The median scalerow is nearly uniformly colored in dark gray with the centers of the scales a little lighter because of less gray pigment. The eye



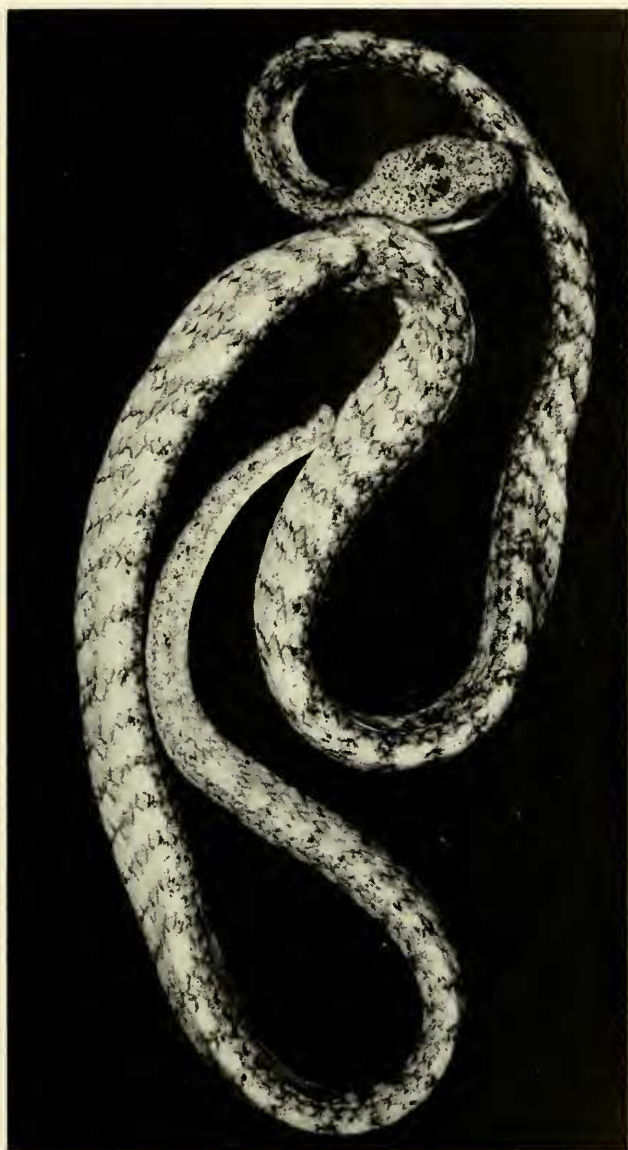


FIG. 22. *Pareas carinatus* Boie. EHT-HMS No. 31796 ♂, Ban Bo, Na Haeo, Dan Sai, Loei (province), Thailand. Actual total length, 430 mm.

is one-half times greater in diameter than its distance from the mouth, and equals the length of the snout in front of the eye. The head markings differ from the female in having a threadlike line running below the eye to the seventh supralabial. Three series of ventral spots or flecks are present. The median scalerow in the posterior part of the body is somewhat enlarged. The pupil is vertical.

There are 5 subequal maxillary, and 23 mandibular teeth, the anterior ones two to three times the size of the posterior. The distal half of the maxillary teeth have some distinct striations.

*Data on Pareas carinatus Boie*

Number	Scale-rows	Ventrals	Sub-caudals	Supra-labials	Infra-labials	Maxillary teeth	Mandibular teeth	Total length
31796	19, 15, 15, 15	181	26 +	7-7	8-9	5-5	23	430
31797	21, 15, 15, 15	178	71	6-7	8-5	5-4	23-21	522

In both there are 1-1 preoculars, 1-1 postoculars, 3-3 suboculars. The temporals are 3 + 4 + 3, and 3 + 3 + 4, respectively.

FAMILY COLUBRIDAÉ

SUBFAMILY SIBYNOPHINAE

*Sibynophis collaris triangularis* subsp. nov.

(Fig. 23)

*Type:* KUMNH No. 33520 (RE 233), Nongko (village), Siracha (district), Chon Buri (province), Thailand, Dr. Boonsong Lekagul, collector, Aug. 18, 1953.

*Diagnosis:* Related to *Sibynophis collaris* but differs in having the black nuchal band reduced to a triangle bordered on two sides by cream lines two scales wide, which are continuous with the cream line on labials; a series of cream or yellow spots chiefly on the fourth scalerow.

*Description of subspecies:* Rostral three-fifths times as high as wide, narrowly visible above; internasals a little wider than long, their posterior borders curving, laterally narrowed, touching loreal; frontal a little wider than supraocular (4 mm. x 2.5 mm.), longer than its distance from end of snout; parietals longer than wide, about equal to distance from rostral; nasal scale at least partially divided with a vertical depression following nostril, the posterior portion higher than anterior, touching two supralabials; loreal small, longer than high, touching two supralabials; a large preocular higher than wide; ten supralabials, the fourth, fifth and sixth enter orbit, the sixth and seventh touch lower postocular but the single anterior

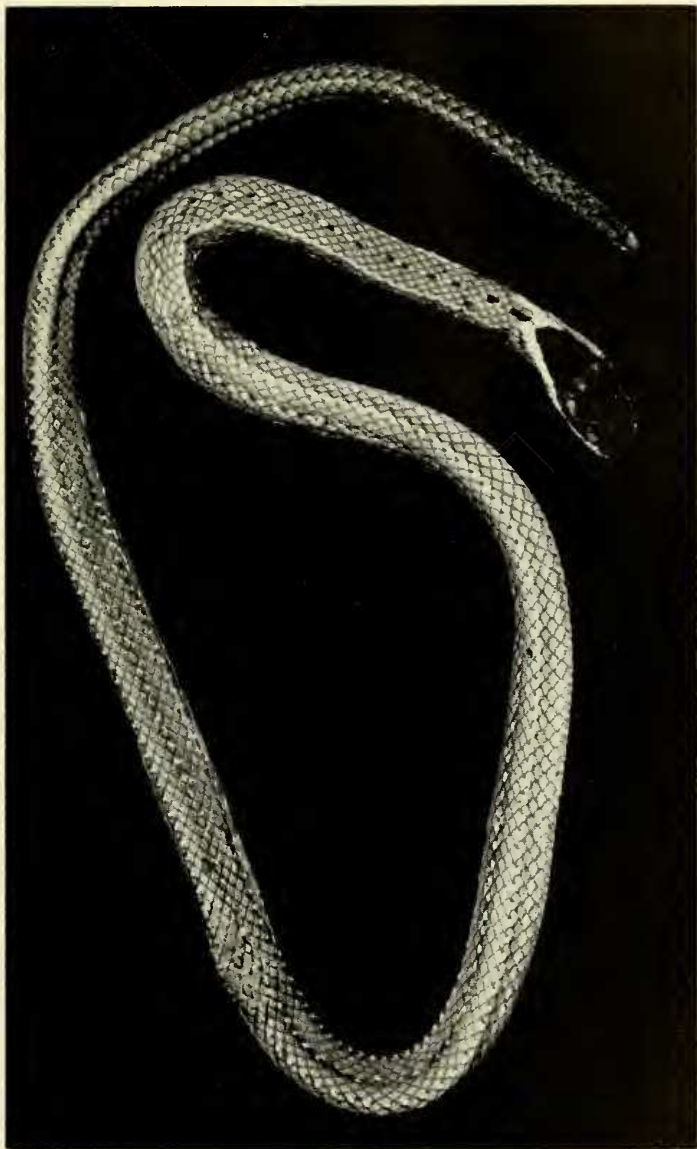


FIG. 23. *Sibynophis collaris triangularis* subsp. nov. Type. KUMNH No. 33520, Nongko (village), Siracha (district), Chon Buri (province), Thailand. Actual total length, 327 mm.

temporal touches only the eighth; tenth and last supra'abial much the largest of the series; two postoculars; the parietal touching only the upper postocular which is nearly square; the temporal formula is  $1 + \frac{1}{1+1}$ ; nine infralabials, the fourth largest, the first four touching the first chinshields which are larger than second pair; scales smooth; scalerows, 17, 17, 17; ventrals, 160; anal divided; subcaudals (incomplete), 49.

*Color:* Generally grayish brown with a fawn line beginning on neck at level of the eleventh ventral, following the fourth and part of fifth scalerows; somewhat farther back it becomes discontinuous forming elongate or rounded spots on the upper half of the fourth scalerow, sometimes including a part of the adjoining scale in the fifth row; pigment surrounding these spots becoming somewhat blackish; on the middorsal line a row of black spots continues for a short distance; farther back a discontinuous series of white dots begins and continues posteriorly; these finally become obsolete but they can be traced onto the tail; ventral surface whitish with a discreet rounded black spot on each ventral and subcaudal; the outer turned-up part of the ventrals pigmented like the lateral body scales.

Head variegated olive with brownish-black spots, one or two on each head scale; an indefinite transverse band across back of frontal and supraoculars. A second somewhat curving indefinite band bordering parietals and temporals, joining the deep black triangular nuchal spot and thus enclosing an olive area; a cream line from rostral passes back across the labials and meets its fellow on the median nuchal region; this bordered above on labials with black; on the lower part of some labials black spots present; the anterior part of infralabials light brown with darker-edged cream spotting.

*Dentition:* Maxillary teeth, 49-47; mandibular teeth, 53-52; palatine-pterygoid series, 53-53.

*Measurements in mm.:* Snout to vent, 239; tail (mutilated), 88; head width, 8.15; head length, 14.

*Remarks:* The snakes of this group (Sibynophinae) show a large percentage of individuals with mutilated tails. The senior author has recently pointed out that at least one species of the genus *Scaphiodontophis* also a member of the Sibynophinae, is capable of casting off the tail to escape. This is a habit common in lizards. Autotomy possibly is a subfamily character and may account for the mutilation so common in species of both genera of the subfamily. Possibly it is a primitive character of serpents harking back to some Saurian ancestor. The senior author has found a certain popula-

tion of gartersnakes (*Thamnophis*) with mutilated tails but in that particular case it was obviously brought about by disease. No such diseased condition has been reported in any sibynophid snake.

Malcolm Smith has observed this form, and in his *Serpentes*, vol. 3 of the "Fauna of British India" calls attention to it as follows: "Specimens from Siam and Annam may have a lateral series of



FIG. 24. *Acrochordus granulatus* (Schneider). KUMNH No. 40064 yg., Phet Buri, Thailand. Actual total length, 283 mm.

yellow spots on scalerow 4 and 5, and the yellow border on the nape may be chevron-shaped the apex pointing backwards.”

Bourret has listed three forms of *Sibynophis* for French Indo-China, two of which, *sinensis* and *grahami*, are regarded as subspecies of *collaris*. Both Pope (1935) and M. Smith (1943), however, have regarded these as of specific rank. In either case they are not to be confused with the form here described.

#### SUBFAMILY ACROCHORDINAE

##### *Acrochordus granulatus* (Schneider)

*Hydrus granulatus* Schneider, *Historiae Amphibiorum naturalis et literariae*, fasc. primus, 1799, pp. 243-244.

Three specimens of *Acrochordus granulatus* (KUMNH No. 40064-40066) are from Phet Buri, Thailand, collected by Dr. Boonsong Lekagul. One of the two smaller specimens (No. 40065) differs rather considerably by having the body much compressed and proportionally higher than the others, the black and cream bands of nearly equal width and extending completely around the body. The scalerows at the widest part of the body number from 130 to 140.

The largest specimen, No. 40066, has 53 black bands on body and 13 on the tail. The black bands are widened dorsally and narrowed somewhat laterally.

No. 40064 is longer and slenderer than 40065, the largest number of scalerows about the body being 103. There are 62 dark bands about the body, 13 on the tail, the bands narrowing and fading on the sides, and in some cases not crossing the venter. The body is less compressed than in No. 40065. In all three specimens there are eleven or twelve scales in a row between the eyes.

#### SUBFAMILY COLUBRINAE

##### *Elaphe radiata* (Schlegel)

*Coluber radiatus* Schlegel, *Essai sur la physionomie des serpens*, vol. 2, 1837, p. 135, pl. V, figs. 5, 6 (type locality, Java); Smith, *Fauna of British India, Ceylon and Burma; Reptilia and Amphibia*, vol. 3, *Serpentes*, Dec. 1943, pp. 146-148, text figs. 44 a, b, c, d, and 46.

The following specimens are in the collections: KUMNH No. 31445, Khorat (city and province), Thailand, Aug. 17, 1953, Robert E. Elbel coll. 31430 (RE 969) Khon San (village), Phukhio (district), Chaiyaphum (province), Thailand, R. E. Elbel coll. Dec. 25, 1952. 40073 \* “Thailand”; 40074, Phukhio (district), Chaiyaphum

\* This appears to be RE 950 Khon San (village), Phukhio (district), Chaiyaphum (province), Thailand, Dec. 23, 1952, R. E. Elbel coll. The tag is lost.

(province), Thailand, 1952; 40075 yg. (bad state), Kok Kong (village), Chanuman (district), Ubon (province) "from sand by Mekong River," May 31, 1954. R. E. Elbel coll. EHT-HMS No. 31719 (RE 5609), Phu Nam Lang (mt.), elev. 1780 m., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 10, 1953. R. E. Elbel coll.

The following table shows variation in our series.

Table of data on *Elaphe radiata* (Schlegel)

Number	Total length	Tail length	Ventrals	Sub-caudals	Supra-labials	Scale-rows	Maxillary teeth	Infra-labials
31430 ♂	1457	276	231	97	9-9	19-19-17	23	10-10
31445 ♂	1320	252	236	98	9-9	19-19-17	22	10-11
31719 ♂	1840	358+	232	90+	8-9	19-19-17	22	10-10
40073 ♂	?	296	...	97	9-9	19-19-17	21	10-10
40074 ♂	1845	362	238	101	9-8	19-19-17	21	11-10
40075 ♀ yg.	...	...	...	...	9-9	19-19-17	21	9-9

This form may be readily diagnosed by the four black lines on the anterior part of the body beginning on the neck some distance back of the head. The posterior part of the body is nearly uniform fawn or sometimes light olive. There are three radiating lines, one below, two behind the eye, the upper touching a transverse black postparietal line, from both ends of which narrow black lines run back to connect with black spot on the side of the neck.

### *Ptyas mucosus* (Linnaeus)

*Coluber mucosus* Linnaeus, Mus. Ad. Frid. I, 1754, p. 37, pl. 23; Systema Naturae, 10th ed., 1758, p. 226 (type locality, India).

The specimen, KUMNH No. 31444 (RE 723), is from Lam Phaya (village), Nakhon Pathom (district and province), Thailand, collected Apr. 18, 1952 by Robert E. Elbel.

The following characters obtain: supralabials, 7-8, with third and fourth, or fourth and fifth entering eye; 9-9 infralabials; ventrals, 199; subcaudals, 117; scale formula, 23 (head), 17, 15, 17. There are 32 tail bands, the last four or five touching a continuous dorsal line; labial sutures black; head brown; scales with two apical pits. Maxillary teeth 10 + 2 grooved fangs.

A second young specimen is KUMNH No. 40070 (BL 20148) from Thailand without specific locality data from the Dr. Boonsong Lekagul collection. Ventrals, 197; subcaudals, 120; scale formula, 25, 17 (18) 16 14. There is faint indication of keels on the posterior part of the body. There are light black-edged bands on latter half of the body the black continued on venter as black edges on ventrals. The anterior part of the body is nearly uniform olive (olive brown in preservative).

*Ptyas korros* (Schlegel)

*Coluber korros* Schlegel, Essai sur la physionomie des serpens, vol. 2, 1837, p. 139 (type locality, Java).

Four specimens of this species are in the collection, KUMNH No. 31434 (RE 951) from Khon San (village), Phukhideo (district), Chaiyaphum (province), Dec. 24, 1952; No. 31446 (RE 998), 6 km. N Chaiyaphum (city), Chaiyaphum (district and province), Jan. 3, 1953, and KUMNH No. 40080 (RE 3644), Ban Hua Bua (subvillage), Um Mao (village), Yangtalat (district), Kalasin (province), all collected by R. E. Elbel, May 6, 1954; KUMNH No. 40069 (BL 20040) "Siam", Dr. Boonsong Lekagul coll.

Table of data for *Ptyas korros*

Number	Sex or age	Ventrals	Subcaudals	Scalercrows	Snout-vent length	Tail length
31434	♀	177	141	15, 13, 11	935	533
31446	♀	170	153	15, 15, 11	1036	?
40069	yg	171	127+	15, 16, 11	329	143
40080	♂	163	?	15, 15, 11	1100	?

*Lycodon capucinus* Boie

*Lycodon capucinus* Boie, Isis, 1827, p. 551 (based on Russell, Indian Serpents, vol. 2, pl. 37, (type locality Trivandrum, India).

One typical specimen, BL coll. No. ? Rat Buri, Thailand, was examined. We do not regard this as a subspecies of *Lycodon aulicus* (Linnaeus) since each of these forms occupies a large part of the range of the other.

*Oligodon cyclurus* (Cantor)

(Fig. 25)

*Coronella cyclurus* Cantor, Proc. Zool. Soc. London, 1839, p. 50 (type locality, ?); M. Smith, Jour. Nat. Hist. Soc. Siam, vol. 4, 1920, p. 96.

*Simotes fasciolatus* Günther, Reptiles of British India, 1864, p. 218, pl. XX, fig. B (type locality "Petchabun," SE Siam).

*Simotes smithi* Werner, Sitz. Akad. Wiss. Wien, vol. 143, p. 58 (type locality, Siam).

The several varieties of this species were regarded by Malcolm Smith (1943) merely as color varieties that intergrade with one another. Certain of these variations are represented in the few specimens in the collections as follows:

KUMNH No. 31429 (RE 909), ♀ from Ban Lat (subvillage), Ban Kaeng (village), Phukhideo (district), Chaiyaphum (province), Thailand, Dec. 16, 1952, Robert E. Elbel, coll. This specimen has the following characters: supralabials, 8-8, the fourth and fifth border orbit; infralabials, 9-9; scale formula, 26 (head), 21, 21, 17; ventrals, 175, somewhat angulate laterally; subcaudals, 43; the anal



single; two pre- and two postoculars; temporals, 2 + 2; 10-9 maxillary teeth, three enlarged.

The triangular head markings are rather narrow, not drawn out anteriorly. The body markings are as follows: the thirteen black circular spots are separated from each other by three dark blotches or marks, the median one most distinct; two circular spots on tail.



FIG. 25. *Oligodon cyclurus* (Cantor). KUMNH No. 40067 "Thailand."  
Actual total length, 510 mm.

A row of small dark spots on the fourth and fifth scalerows; immaculate below except for some pigment on the outer edges of the ventrals. This color variety differs somewhat from those listed by Smith (1943, pp. 202-206).

EHT No. 31700 ♂ (RE 4215) from Ban Na Muang (subvillage), Na Haeo (village), Dan Sai (district), Loei (province), Thailand,

elev. approx. 1780 m., Oct. 23, 1954, collected by Robert E. Elbel, gives the following scale data: supralabials, 8-8; infralabials, 9-9; scalerows, 24 (head), 21, 21, 17, 15; scales smooth without pits; temporals, 2 + 2; frontal six-sided; preoculars, 1-2; postoculars, 2-2; loreal present; ventrals, 185; subcaudals, 56; anal single.

EHT-HMS No. 31701 (RE 3909), from Phu Kho (mt.) 522 m. elev., Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand, July 24, 1954, collected by Dr. Boonsong Lekagul and Robert E. Elbel, yields the following data: supralabials, 8-8, fourth and fifth enter orbit; infralabials, 9-9, four or five touch first chinshields; scale formula, 26 (head), 21, 21, 17, 17; ventrals, 161; subcaudals, 43; anal single; eleven maxillary teeth, last two large; head and neck pattern complete (see Smith, *loc. cit.*, p. 203). Between the ten large brown spots on body there are three, or more rarely four, indefinite transverse lines similar to the figure given by Smith, fig. D, p. 205, but more intense. Venter with some pigment on outer edge of ventrals.

KUMNH No. 40067, "Thailand" and EHT-HMS No. 31702 (RE 3817) from Phu Phan (mt.) 550 m. elev., Sakon Nakhon (district and province), June 28, 1954, R. E. Elbel and Dr. Boonsong Lekagul collectors, are also in the collection.

Table of data from *Oligodon cyclurus*

Number	Scalerows at middle	Ventrals	Sub-caudals	Supra-labials	Infra-labials	Pre-oculars	Post-oculars	Total length	Tail length
31700 ♂	21	185	56	8-8	9-9	1-2	2-2	812	136
31701 ♀	21	161	43	8-8	9-9	2-2	2-2	579	86
31702 ♂	21	166	54+	8-8	9-10	2-2	2-2	...	109
31429 ♀	21	175	43	8-8	9-9	2-2	2-2	685	90
40067 ♂	21	166	54	8-8	9-9	2-2	2-2	510	111

### *Oligodon cinereus* Günther

(Fig. 26)

*Oligodon cinereus* Günther, Reptiles of British India, 1864, p. 215 (type locality, Cambodia); Smith, Fauna British India, Ceylon and Burma. . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 215-217.

*Simotes inornatus* Boulenger, Jour. Nat. Hist. Soc. Siam, vol. 1, 1914, p. 69 (type locality, Sriracha, SE Siam).

*Oligodon violaceous* Smith, Jour. Nat. Hist. Soc. Siam, vol. 4, 1920, p. 96.

One specimen in the collection, EHT-HMS No. 31699 ♀ (RE 4532), resembles the body pattern of Malcolm Smith's var. II, *loc. cit.*, 1943, p. 216. It is from Ban Muang Khai (subvillage), Tha Li (village), Tha Li (district), Loei (province), Thailand, Jan. 20, 1955, Robert E. Elbel, coll. The following characters obtain: 8-7 supralabials, the fourth and fifth or the third and fourth entering eye (the third and fourth fused on one side); temporals, 2 + 2; two

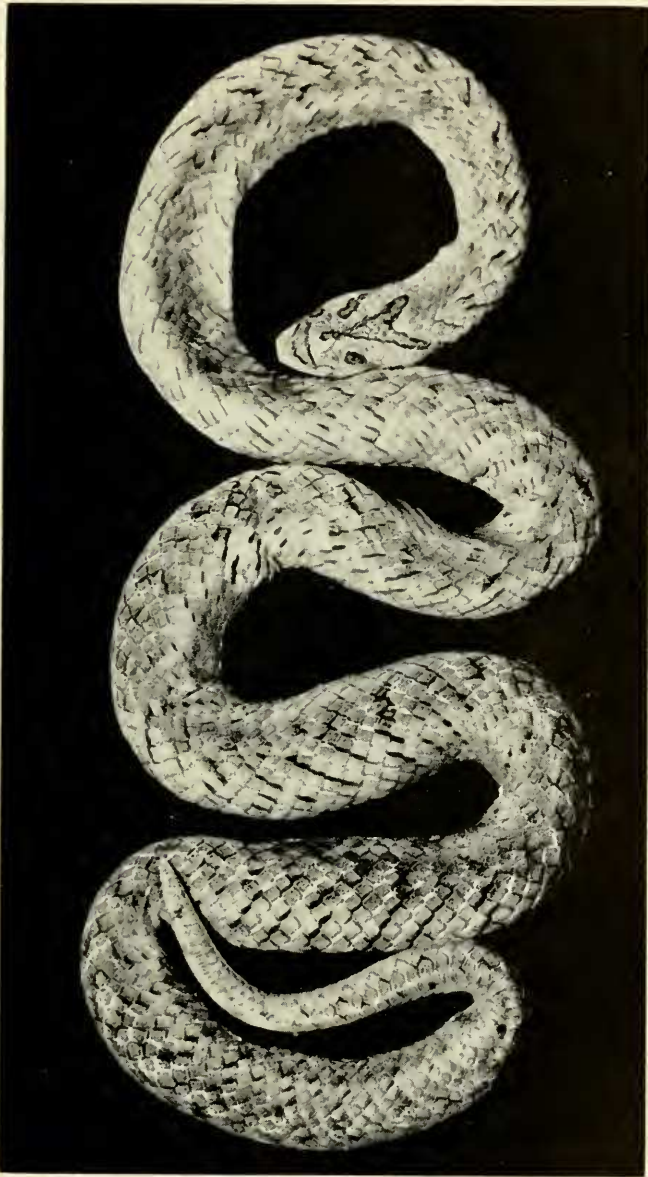


FIG. 26. *Oligodon cinereus* Günther. EHT-HMS No. 31699 ♀, Ban Muang Khai, Tha Li, Tha Li (district), Loei (province), Thailand. Actual total length, 600 mm.

preoculars, the lower much smaller than upper, which is quadrangular, more than twice as wide as high; scale formula, 19 (head), 17, 17, 17, 15; ventrals, 190; subcaudals, 39; anal single; 12 maxillary teeth.

The general color is dark gray with a series of diagonally placed, dotted dark lines often discontinuous along the edges of diagonal scalerows or on skin between; alternate scalerows have a dashed cream line along their edges often extending on the skin between. Tail with two or three indefinite small spots but the characteristic markings of body are absent. The ventrals are generally white with their outer ends dark gray or ash, and with large black spots on alternate ventrals. The subcaudals are white except on the ends and there are no spots evident. A well-defined interocular band is present.

*Oligodon quadrilineatus* (Jan)

(Fig. 27)

*Simotes quadrilineatus* Jan, Nouv. Arch. Mus. Paris, vol. 2, pt. 7; Iconographie général des ofidiens, tome 1, livr. 12, 1865, pl. 4, fig. 3 (type locality, Siam); Smith, The Fauna of British India, Ceylon and Burma; Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1953, p. 210.

*Simotes taeniatus* Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 2, pp. 227-228 (*part.*).

The name *Oligodon quadrilineatus* was resurrected by Malcolm Smith in 1943 for this species. It had long been considered a synonym of *O. taeniatus*. The two specimens in our collection help confirm the distinctness of *quadrilineatus*. These are KUMNH Nos. 40068, from Thailand (probably from near Bangkok), and No. 31437, from Ban Lat (subvillage), Ban Kaeng (village), Phukhieo (district), Chaiyaphum (province), Thailand, Jan. 17, 1952, Robert E. Elbel, coll.

The general characters of these two specimens, Nos. 31437 ♀ and 40068 ♂ respectively, are as follows: supralabials, 7-8, 8-8; infra-labials, 9-9, 9-9; labials enter orbit, 4th & 5th, 4th & 5th; preoculars and postoculars, 1-2, 1-2; scale formula, 22 (head), 19, 19, 17, 15; 22, 19, 19, 17, 15; suboculars, 0, 0; temporals, 1 + 1 + 2, 1 + 1 + 2; ventrals, 161, 151; subcaudals, 40, 44; anal, 1, 1. Total length in mm.: 354, 411; tail, 56, 68.

The specimens also agree in color. There is a pair of dark lines dorsally, separated by a narrow lighter line less than the width of a scalerow. The two dark lines meet on the nape of the neck, then widen, terminating on the parietal. On the head a pair of dark diagonal stripes run from the parietal across the angle of the mouth and there are two or three other transverse stripes across the snout.

Some scattered small dark marks are present on the head scales, including a diagonal line below the eye and a shorter one following it behind. The dorsal ground color is grayish tan. A narrow lateral brown line covers parts of the third and fourth scalerows and terminates at the level of the vent. The median pair of brown lines



FIG. 27. *Oligodon quadrilineatus* Jan. KUMNH No. 31437, Ban Lat, Ban Kaeng, Phukhieo, Chaiyaphum (province), Thailand. Actual total length, 354 mm.

continues to the tip of the tail. A very indefinite brownish line borders the outer edge of the subcaudals.

The venter is coral red in life (whitish in preservative) with triangular or quadrangular brown marks irregularly placed on ventrals. Usually a scale without marks alternates with one bearing one or two brown spots. The chin and subcaudal regions are immaculate.

*Ahaetulla ahaetulla ahaetulla* (Linnaeus)

*Coluber ahaetulla* Linnaeus, *Systema Naturae*, ed. 10, 1758, p. 228 (part).

*Ahaetulla ahaetulla ahaetulla* Smith, *Fauna of British India, Ceylon and Burma; Reptilia and Amphibia*, vol. 3, *Serpentes*, 1943, pp. 239-244, fig. 85.

There has been very considerable disagreement as to the proper name for this species.\* It was long known under the designation *Dendrophis pictus* and so appears in the major part of the literature dealing with the species.

One specimen (KUMNH No. 40076 [RE 1691]) from Pak-nampho (city), Nakhon Sawan (district and province), Thailand, was collected by the junior author.

The following characters obtain: maxillary teeth, 22; the four posterior largest; one preocular touching frontal; two postoculars the upper elongate; supralabials, 9-9, the 4th, 5th and 6th entering orbit; temporals, 2 + 1 + 2 (1 + 1 + 2); one loreal more than twice as long as high; scales following parietals and temporals somewhat enlarged; scale formula, 19 (head), 15, 15, 9; median row enlarged but definitely somewhat less wide than outer scalerow. The ventrals are 172½; subcaudals 130, anal divided. Scales with a single apical pit, the surface of the epidermis finely striate, not discernible when epidermis is shed.

There is a strong black line from behind eye onto neck; a cream line on the two outer scalerows with a well-defined dark line below it covering part of outer scalerow and outer edge of the ventrals. Type locality unknown.

SUBFAMILY BOIGINAE

*Boiga multimaculata* (Boie)

*Dipsas multimaculata* Boie, *Isis*, 1827, p. 549 (type locality, Java).

Our specimen, KUMNH No. 31439 (RE 890), is from Non Khun (village), Phukhieo (district), Chaiyaphum (province), Thailand; collected Dec. 12, 1952, by Robert E. Elhel.

\* Besides Malcolm Smith, *loc. cit.*, see also discussion by James Oliver, *Bull. Amer. Mus. Nat. Hist.*, vol. 92, art. 4, 1948, pp. 167-190, 267-272; J. M. Savage, *Bull. Chicago Acad. Sci.*, vol. 9, 1952, pp. 203-216.

This specimen has the following scale counts: supralabials, 8-8, the third, fourth and fifth entering the eye; infralabials, 11-11; preocular, 1; postoculars, 2; temporals, 2 + 2; scale formula, 27 (head), 19, 19, 13; ventrals, 223; anal single; subcaudals, 99. Body slender, compressed. Total length, 565 mm.; tail, 113 mm.

Two dark stripes begin on the posterior temporal areas and run forward diagonally and meet on the anterior part of the frontal, continuing on to the middle of the prefrontals; a dark stripe from angle of mouth runs forward to eye, and then continues in front of eye to nasal scale. Back and tail with a series of dark brown spots, often irregular in outline, running from neck to tail, separated mesially by a narrow line of the gray of the general coloration. Chin unspotted; anteriorly, dark marks present on outer part of ventrals; more posteriorly the flecks become more numerous extending over whole ventral region.

*Boiga cyanea* (Duméril, Bibron and Duméril)

(Fig. 28)

*Triglyphodon cyaneum* Duméril, Bibron and Duméril, *Erpétologie générale*, vol. 7, pt. 2, 1894, pp. 1079-1080 (type locality unknown).

Two specimens are at hand, EHT-HMS No. 31693 (RE 4016) from Ban Na Muang (subvillage), elev. approx. 1780 m. "in same range as Phu Nam Lang (mt.) but farther north," Na Haeo (village), Dan Sai (district), Loei (province), Thailand; Sept. 29, 1954, Robert E. Elbel coll., and EHT-HMS No. 31826 (RE 4689) from Phu Lom Lo (mt.), elev. 2100 m., Kok Sathon (village), Dan Sai (district), Loei (province), Feb. 18, 1955, R. E. Elbel, coll.

No. 31693 ♀ has the following characteristics: supralabials, 8-8; the third, fourth, and fifth entering eye; infralabials, 11-11, four (or five) touching first pair of chinshields; one preocular, reaching upper surface of head but not touching frontal; eye very large, its diameter equal to its distance from nearest point of rostral; two postoculars; temporals, 3 + 3 (median divided) + 4 on both sides; scale formula, 29 head, 21, 21, 15, 15, and the median row somewhat enlarged; ventrals, 248; subcaudals, 136; anal single. Body compressed. The subcaudals have an indistinct lateral keel; no gland visible through the posterior labials. Total length, 1558 mm.; tail, 311 mm.

The color was probably uniform green in life. In preservative it is bluish to bluish gray, the edges of the scales darker. The chinshields are cream.

No. 31826 is a young specimen and we are not wholly convinced that it is correctly referred to this species. The following characters obtain: supralabials, 8-8; the third, fourth, and fifth entering orbit;

11-11 infralabials, four touching first chinshields; one preocular reaching upper surface of head, but not touching frontal; scale formula, head 28, 22, 21, 15, the median row somewhat enlarged; ventrals, 250; subcaudals, 124, with an elongate terminal shield,

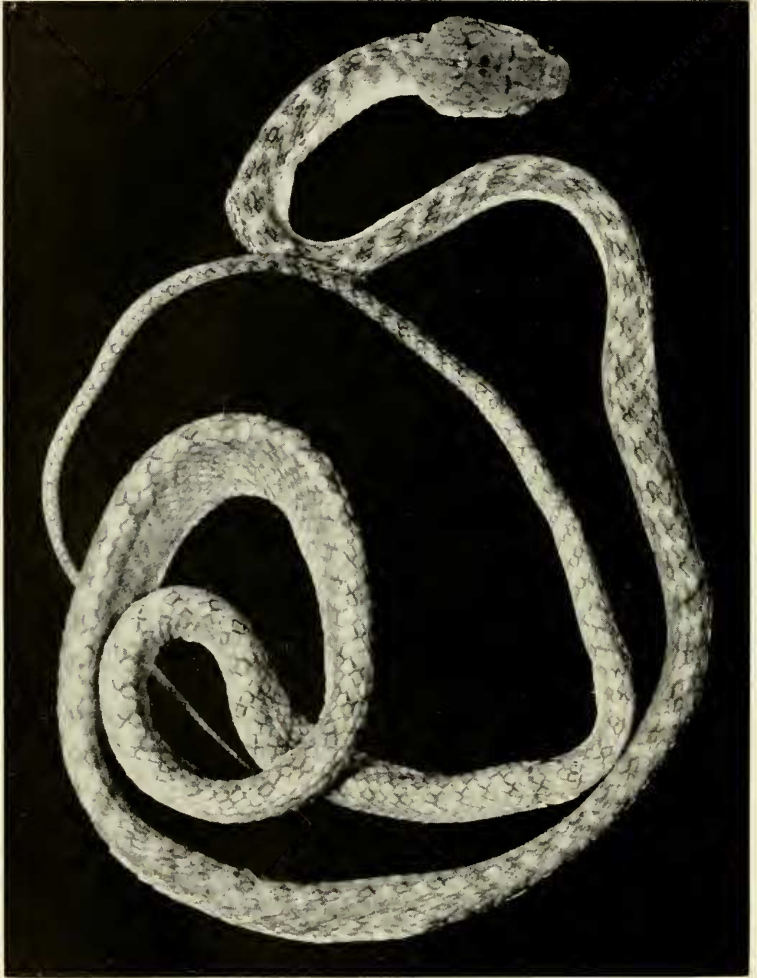


FIG. 28. *Boiga cyanea* (Duméril, Bibron and Duméril). EHT-HMS No. 31826, Phu Lom Lo (mt.), 2100 m. elev., Kok Sathon, Dan Sai, Loei (province), Thailand. Actual total length, 700 mm.

rounded at tip, grooved on both sides; anal single; temporals,  $2 + 3 + 3$  ( $2 + \frac{1}{2} + 3$ ); loreal as high as long; total length, 720; tail, 161 mm.



The head is uniform smoky black, probably green in life; three posterior supralabials semitransparent showing a cream-colored gland lying below them. Body with dark markings as shown in the figure.

The species has been reported from Nakon Lampang, Dong Rek Mts., and from certain islands in the Gulf of Siam.

Malcolm Smith and others have pointed out that the young are not green but are variously colored and marked. The squamation is practically identical to that of the adult specimen reported above. One specimen examined in the Boonsong Lekagul collection (No. 222) is from Khao Khansong (village), Sriracha (district), Chon Buri (province), Thailand, Aug. 1953, Dr. Boonsong Lekagul, coll.

#### *Boiga cynodon* Boie

*Boiga cynodon* Boie, Isis, 1827, p. 549 (type locality, Sumatra).

Our single specimen is EHT-HMS No. 31698 (RE 4099), from Ban Na Muang (subvillage, elevation 1780 m.), Na Haeo (village), Dan Sai (district), Loei (province), Thailand; October 6, 1954, Robert E. Elbel, coll. The following characters obtain: supralabials, 8-8, the third, fourth and fifth entering orbit; infralabials, 12-12, the first four (or five) touching the first pair of chinshields; second chinshields larger than first pair; frontal broader than long; eye equals its distance from nostril; temporals, 2 + 3, 3 + 3.

Scale formula, (head) 26, 23, 23, 15, 15; ventrals, 261, anal single, subcaudals, 118. Maxillary teeth, 11 + 2 grooved fangs.

Above clouded and indefinitely blotched with brown, fawn, and black. A series of light (fawn) blotches low on the sides surrounded by black, situated chiefly on the outer part of ventrals. Remainder of venter gray-brown.

#### *Dryophiops rubescens* (Gray)

*Dipsas rubescens* Gray, Illustrations of Indian Zoology, vol. 2, 1834, pl. 84, fig. 2 (type locality, ? Malay Peninsula).

One specimen seen is BL Coll. No. 20099, collected by Dr. Boonsong Lekagul, from "Siam." This widespread, usually arboreal species is relatively rare in collections. The senior author has taken it on Peñon de Corón, western Philippines, a limestone island covered sparsely with small shrubs and plants, but lacking trees owing to the almost complete absence of soil on the rock.

*Psammodynastes pulverulentus* Boie

*Psammodynastes pulverulenta* Boie, Isis, 1827, p. 547 (type locality, "Java").

This variable and widespread form is represented by three specimens: EHT-HMS No. 31793 (RE 3817), from Phu Phan (mt.) 550 m. elevation, Sakon Nakhon (district), Sakon Nakhon (province), Thailand; collected by Dr. Boonsong Lekagul and Robert E. Elbel June 28, 1954. No. 31794 (RE 4689), a beheaded specimen, Phu Lom Lo (mt.) 2100 m. elev., Kok Sathon (village), Dan Sai (district), Loei (province), Thailand; Feb. 18, 1955, Robert E. Elbel, coll. No. 31795 (RE 5002), Phu Nam Lang (mt.) 1780 m. elev., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 2, 1955, R. E. Elbel, coll.

No. 31794 ♀ had recently eaten a young *Eumeces quadrilineatus*. The specimen is gravid, containing seven eggs. There are 49 subcaudals and 17 scalerows.

The following scale data are taken from No. 31795 ♀: supralabials, 8-8; infralabials, 8-8; five pairs of chinshields, the second and third about equal, three infralabials touching the first pair; one loreal, two pre- and two postoculars; supraoculars wider than frontal; ventrals, 163; subcaudals, 53; anal single; scalerows, head, 25, neck, 17, body, 17, in front of tail, 17, all without pits.

No. 31793 ♀ has the following scale counts: supralabials and infralabials, 8-8, the third, fourth, and fifth supralabials border orbit; three infralabials touch the first chinshields; one preocular; two postoculars; the temporals, 2 + 3 + 3. The second and third pairs of chinshields are longer than the first; scalerows, 24, 17, 17, 15; ventrals, 149; subcaudals, 52. The maxillary teeth vary greatly in size, the last two being grooved.

The species occurs also in Indonesia, and the senior author has collected it in the mountains of central eastern Mindanao, P. I.

*Chrysopelea ornata* (Shaw)

*Coluber ornatus* Shaw, General Zoology, 1802, vol. 3, p. 477 (type locality, East Indian Islands, based on Seba, Thesaurus, vol. 1, pl. 94, fig. 7; vol. 2, pl. 7, fig. 1 and pl. 61, fig. 2).

*Chrysopelea ornata* Brongersma, Zool. Meded. Leiden, vol. 20, 1938, p. 241; M. Smith, The fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese sub-region; Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 251-254, text figs. 86, 87.

Two forms of the arboreal *C. ornata* are recognized by Malcolm Smith, one occurring in Thailand, one in Ceylon and India.

The former is characterized as having "the black cross-bars much less conspicuous and may be entirely absent; the mesial streak on

each scale may then give the appearance of black longitudinal lines." The head markings consist of five or six golden yellow transverse bars following scale sutures between rostral, internasals, prefrontals, frontal and following parietal while one crosses the middle of the frontal. There are usually several golden dots between the lines. The lines may be apparently broken when crossing longitudinal sutures. In the latter form the black and yellow bars alternate.

Five specimens are at hand in the collection as follows: KUMNH Nos. 31431 (RE 1600), Paknampho (city), Nakhon Sawan (district and province), Thailand, Jan. 18, 1953, and 31432, Banpong (city and district), Rat Buri (province), June 16, 1952, both collected by Robert E. Elbel.

EHT-HMS Nos. 31817 (RE 3756), Phu Phan (mt.), 550 m., 104° 05'; 16° 55', Sakon Nakhon (district and province); 31818 (RE 3846), Phu Kho (mt.), circa 522 m. elev. (104° 22'; 16° 49'), Kan Luang (village), Na Kae (district), Nakhon Phanom (province). Collected June 20 and July 16, 1954, respectively by Dr. Boonsong Lekagul and Robert E. Elbel.

In the form occurring in Thailand the row of scales bordering the parietals and temporals behind are definitely enlarged; the ventrals, anals, and subcaudals are strongly keeled; in the region on sides and above anus the scales are usually more or less keeled. In all there are two postoculars, the temporals, 2 + 2 + 2, and the scalerows are 24 (25) head, 17, 17, 13. The infralabials are ten or eleven with five scales usually bordering the first chinshields.

*Chrysopelea paradisi* occurs in the peninsular area of Thailand, and also in Indonesia and the Philippines.

*Scale data on Chrysopelea ornata* Shaw

Number	Sex	Preocular	Preocular reaches frontal	Ventrals	Subcaudals	Anals
31817	♀	1-1	no	218	107+	2 2 ½
31818	♀	1-1	no	222	117	2 2 (?)
31819	♂	1-1	yes	223	138	2 2
31431	♂	1-1	no	224	141+	2 2
31432	♂	1-1	no	222	140	2 ½ 2

*Dryophis prasinus* Boie

*Dryophis prasinus* Boie, Isis, 1827, p. 545 (type locality, Java); Malcolm Smith, Fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese sub-region. Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 375-386, text fig. 120.

Malcolm Smith's (*loc. cit.*) treatment of the genus calls attention to the fact that *Dryophis xanthozonia* Boie should bear the name

*Dryophis mycterizans* (Linnaeus) while the species long known in literature under the latter name should bear the name *Dryophis pulverulentus* Duméril and Bibron and Duméril. This is mentioned here since *mycterizans* occurs in Thailand also. It may be separated from the present species by its undivided anal plate, fewer ventrals\* and subcaudals.

A single specimen of *Dryophis prasinus*, KUMNH No. 40077 (RE 3474) is in the collection. It was captured on Phu Lom Lo (mt.) 2100 m. elev., Kok Sathon (village), Dan Sai (district), Loei (province), Mar. 26, 1954, by Robert E. Elbel.

The following characters obtain: no proboscis, the nasals not in contact; sharp canthus; nasal single, elongate, the nostril in posterior part; two or three loreals separate prefrontals from labials; one preocular, longer than high, with a sharp canthus, broadly touching the frontal; supralabials, 9-9, the fourth, fifth and sixth enter orbit; two postoculars; frontal three times as wide anteriorly as posteriorly; temporals 2 + 2 + 3 + 3, the lower anterior very small; anterior chinshields broader and shorter than the very narrow posterior ones; infralabials, 9-9, the first four touch first chinshields.

Scale formula: 21 head, 15, 15, 11, the scales in the region of vent with keels or tubercles, the middle line of the scales with series of pits, four to five on some scales. Ventrals ? (body broken); subcaudals, 196; anal divided.

#### *Dryophis nasutus* Lacépède

*Dryophis nasutus* Lacépède, Histoire naturelle des serpens, vol. 2, 1789, Discourse and Table Methodique, p. 100. Also, pp. 277-279, pl. 4, fig. 2 (type locality, Ceylon, Guinea, Carolina); Smith, The fauna of British India, Ceylon and Burma, including the whole Indo-Chinese subregion. Reptilia and Amphibia, vol. III, Serpentes, Dec. 1943, pp. 376-378 (synonymy and literature), fig. 119 (head, three views).

Of the type localities listed by M. le Comte de Lacépède for this species, one only, Ceylon, has the species. In consequence the locality Ceylon is hereby designated as the revised type locality.

One specimen, KUMNH No. 31438 (RE 783) from Paknampho (city), Nakhon Sawan (district and province), Thailand, Jan. 30, 1953, Robert E. Elbel, collector, is in the collection. There are 202 ventrals, the last (preceding divided anal) also divided. The divided anal has a small intercalated median scute which may be an abnormality. The subcaudals are 163. The scalerows about the back part of the head are 20, about neck 15, about middle of body

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\* 186-195 ventrals, 132-156 subcaudals *vide* Malcolm Smith while *prasinus* has 194-235 ventrals, 165-187 subcaudals *vide* Malcolm Smith.

15, while in front of anus the number reduces to 11. There are two pre- and two postoculars.

The tooth series on the maxillary consists of three spaced teeth anteriorly followed by a fanglike tooth, which, after a diastema, is followed by four small teeth, and two enlarged grooved fangs.

The nasal appendage is formed entirely from the rostral. The loreal is absent.

Total length, 662 mm.; tail, 227 mm.

#### SUBFAMILY NATRICINAE

### *Pseudoxenodon macrops macrops* (Blyth)

(Fig. 29)

*Tropidonotus macrops* Blyth, *Asiat. Soc. Bengal*, vol. 23, 1854, p. 296 (type locality, Darjeeling, Bengal, India).

Two specimens are in the collection: EHT-HMS No. 31703 (RE 4521) is from Ban Muang Khai (subvillage), Tha Li (village), Tha Li (district), Loei (province), Thailand, Jan. 19, 1955, and EHT-HMS No. 31704 (RE 5533) juv., Phu Nam Lang (mt.), (elev. 1780 m.), Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 4, 1955; both collected by Robert E. Elbel.

There is a series of white (?) transverse bands across the mid-line extending throughout the body to the tip of the tail, the edges of each band in front and behind bordered by large dim dark spots formed of scales with black edges and grayish centers. Laterally the light bands terminate at black spots which form a row on the third to fifth scalerows. The space on the dorsal area between each two dark spots may be light (whitish) but is never as distinct as the primary white marks. There are quadrangular dark spots on the ventrals.

The following scale characters obtain: scalerows, 19, 15, 15; anterior temporals, 2; supralabials, 8; infralabials, 8; ventrals, 171; subcaudals, 63; anal, 2.

The young specimen has 174 ventrals and 67 subcaudals. The supralabials are 8-8, with dark sutures. The infralabials are 9-9. On the back there are 50 white transverse spots. The black chevron on the neck is preceded by a lighter line. Total length, No. 31793: 882 mm.; tail, 160; No. 31704: 263 mm.; tail, 47.5.

The larger contains 10 ovarian eggs.

Genus *NATRIX*

The genus *Natrix* is a heterogeneous assemblage and efforts to break up this unnatural group have not been successful. One group of species, characterized by very long posterior ungrooved fangs, is thrown in with species having little or no enlargement of the

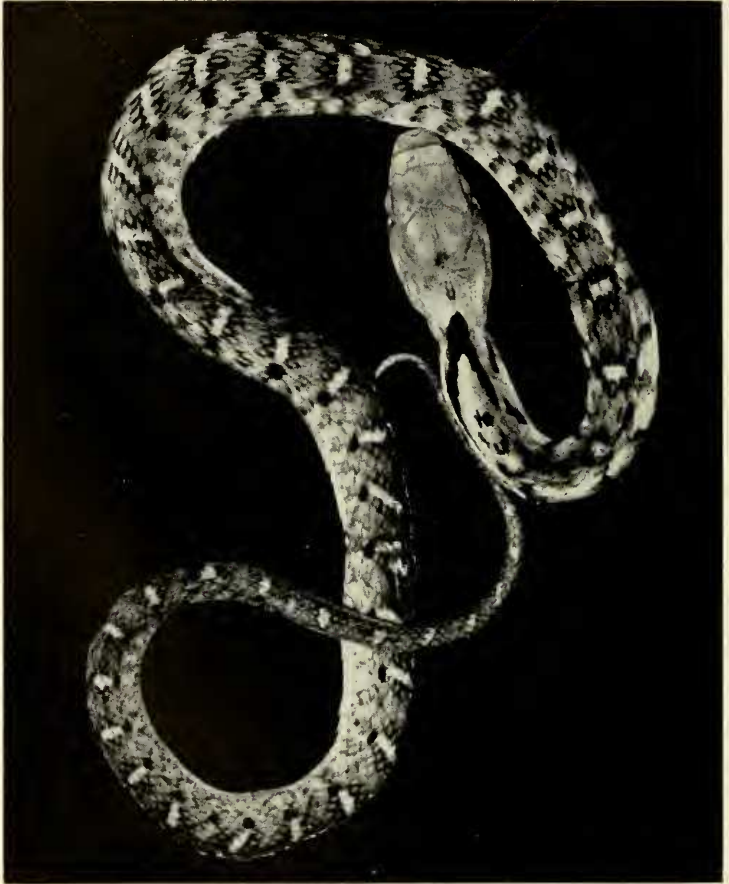


FIG. 29. *Pseudoxenodon macrops macrops* (Blyth). EHT-HMS No. 31704, Phu Nam Lang (mt.), 1780 m., Ban Khok, Na Phung, Dan Sai, Loei (province), Thailand. Actual total length, 263 mm. (Note that the head is proportionally large in this young specimen.)

posterior teeth. We are of the opinion that the entire matter is in strong need of re-examination.

In this paper we propose to recognize the large-fanged species under the generic name *Rhabdophis*. The following species of

*Natrix* (*sensu lato*) have been reported in Thailand: *deschauenseei*, *groundwateri*, *inas*, *modesta*, *piscator piscator*, *trianguligera*, *percarinata*, *subminiata subminiata*, *subminiata helleri*, *stolata*, *nigrocincta*, *chrysarga*. The last five forms are typical *Rhabdophis*, *R. subminiata* being the type of the genus. Certain other forms reported from Thailand may be misidentifications or are synonyms. Such a case is Bourret's *Rhabdophis tigrina lateralis* which Malcolm Smith places as a synonym of *piscator*.

*Natrix deschauenseei*, described by the senior author from Chiang Mai, Thailand, has also been placed as a synonym of *Natrix modesta* by Dr. Malcolm Smith. It, however, seems to differ from that Indian species in having 36 maxillary teeth (28 to 32 recorded for *modesta*); nasal divided; two preoculars, two postoculars (usually three); temporals, 1 + 2; only two (fifth and sixth labials) entering orbit instead of three; ventrals, 159, subcaudals, 137—total, 296, higher than reported for *modesta*. The body is very slender with a proportionally longer tail. The color pattern differs likewise in details (see figures of the type and compare with Boulenger, vol. 1, pl. 9, fig. 3). Dr. Smith states that he has not seen a specimen of *deschauenseei*. It is possible that collections from the region of Chiang Mai, the type locality, will provide data suggesting the distinctness of the species or confirming Dr. Smith's opinion as to synonymy. No material is available in this collection. Bourret has placed the species in the genus *Macropophis* Boulenger.

*Natrix piscator flavipunctata* (Hallowell)

*Amphiesma flavipunctatum* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 503 (type locality, Kwantung province, China).

Two specimens are referred to the subspecies *Natrix piscator flavipunctata*: KUMNH No. 31441 ♂ (RE 965), Khon San (village), Phukhieo (district), Chaiyaphum (province), Thailand, Dec. 24, 1952; No. 31440 ♂ (RE 967), same locality, Dec. 25, 1952. Robert E. Elbel, collector.

The following characters obtain in the two specimens, 31441 and 31440 respectively: snout pointed; internasals pointed anteriorly; body with a tendency to form a slight median ridge; supralabials, 9-9, 9-9; labials entering orbit, 4 and 5, 4 and 5; 4, 4 and 5; preoculars, 1-1, 1-1; postoculars and suboculars, 3-4, 3-3; infralabials, 10-10, 10-10, five touching the anterior chinshields which are shorter than second pair; scalerows, head, 25, 19, 19, 17; 24, 19, 19, 17; two outer scalerows smooth (3 anteriorly), others weakly keeled;

anterior temporals, 2, 2; ventrals 134 ♀, 127 ♂; subcaudals, 59 +, 85.

The head is black above in No. 31441 the color extending onto the neck; a diagonal black line along suture of sixth and seventh labials; another black line from behind eye runs down across the mouth angle then curves back up onto side of neck bordering the dark head mark; a distinct black spot on each side of the neck. Nearly uniformly lavender-brown with the merest trace of dark markings and numerous dashlike cream or yellow indistinct marks chiefly confined to interstitial skin or edges of scales; ventrals and subcaudals are dark edged. In No. 31440 some lateral dark marks running up on sides diagonally, ventrals and subcaudals cream or whitish, their edges barred with black.

The maxillary teeth in 31441, 24, the last four enlarged and strongly compressed; teeth in No. 31440, 26-24, the last four compressed and enlarged, the last a little larger than the others. There is no diastema between the larger and the smaller teeth.

While we follow Malcolm Smith in treating this form as a subspecific form of *Natrix piscator* there seems room for doubt that this is its true relationship.

*Rhabdophis subminiata helleri* (Schmidt)

*Natrix helleri* Schmidt, Amer. Mus. Novitates, no. 157, 1925, p. 3 (type locality, Tengyueh, 5500 ft. altitude, province of Yunnan, China).

The following series of specimens are referred to this form: EHT-HMS No. 31765 (RE 5504), Phu Nam Lang (mt.), 1780 m., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 2, 1955; EHT-HMS No. 31766 (RE 4323), 31812 (RE 4311), 31813 (RE 4305), 31814 (RE 4256), 31815 (RE 4256), 31816 (RE 4310)—all from Ban Nong Wai (subvillage), 1780 m., Na Phung (village), Dan Sai (district), Loei (province), Thailand, Nov. 15-20, 1954, all collected by Robert E. Elbel. KUMNH No. 40072 (RE 3189), Ban Muang Khai (subvillage), Tha Li (village), Tha Li (district), Loei (province), Thailand, about 600 m. elev., Dec. 4, 1953; collected by Robert E. Elbel, and Dr. Boonsong Lekagul.

The following table presents data from the above series of specimens.



*Data on Rhabdophis subminiata helleri*

Number	Sex	Supra-labials	Labials enter orbit	Infra-labials	Maxillary teeth and fangs	Ventrals	Sub-caudals
31766	♂	8-8	4, 5	10-10	{25+2 23+2	155	89+
31811	♂	8-8	3, 4, 5	10-10	22+2	153	84
31812	♀	8-9	{3, 4, 5 4, 5, 6	10-10	22+2	151	84
31813	♀	9-8	{4, 5, 6 3, 4, 5	10-10	22+2	152	78+
31814	♂	8-8	4, 5	9-10	22+2	158	81
31815	♀	8-8	4, 5	10-10	22+2	155	83
31816	♀	8-9	{3, 4, 5 4, 5, 6	10-10	23+2	163	—?

Young specimens have a large discrete black spot covering the back of the head and extending for ten to twelve scale-lengths behind parietals; it is bordered by a lighter line about one and one-half scale-lengths wide. There follow several rows of indefinite dark spots more or less connected and forming a reticulum. The enclosed scales have red interstitial skin, the color sometimes covering more than half of the scale. Farther back the color is uniform gray olive (somewhat blackish in preservative) with usually two series of single or double paired yellow dots on the sides; sometimes these pairs will be connected by small dashlike marks across the back. When the skin is distended more yellow marks are discernible on interstitial skin or on lower edges of scale. A few specimens show traces of black marks usually, appearing as black edges of certain adjoining scales.

The maxillary teeth are small anteriorly gradually attaining a slightly greater size, then, following a short diastema, are two greatly enlarged fangs directed nearly backwards. Ventral coloration is light, probably yellowish (or reddish) in life, the outer edges of the ventrals gray, often with small discrete or diffuse dots near their ends; supralabials light with a strongly defined diagonal bar below back part of eye. Dorsal head markings are dim or obsolete in old specimens.

*Rhabdophis stolata* (Linnaeus)

(Fig. 30)

*Natrix stolata* Linnaeus, Systema Naturae, 10th ed., 1758, p. 219 (type locality, Asia).

A single specimen, EHT-HMS No. 31761 ♂ (RE 3952), is from Ban Na Phua (subvillage), Kan Luang (village), Na Kae (district), Nakhon Phanom (province), Thailand, collected July 28, 1954, by Robert E. Elbel and Dr. Boonsong Lekagul. The markings are typical of the eastern (Chinese) specimens. The following

characters obtain: supralabials, 8-8; infralabials, 10-10; temporals, 1 + 1, or 1 + 2; scale formula, 19, 19, 17; ventrals, 144; subcaudals, 50; preocular, 1; postoculars, 3; maxillary teeth, 21 + 2 (enlarged). Snout-vent length, 356 mm.; tail, 92 mm.

There is a light chevron-shaped band across the neck. From this two stripes begin, covering the fifth scalerow and halves of the adjoining rows. These stripes, grayish at first, become white farther back and extend to the tip of the tail.

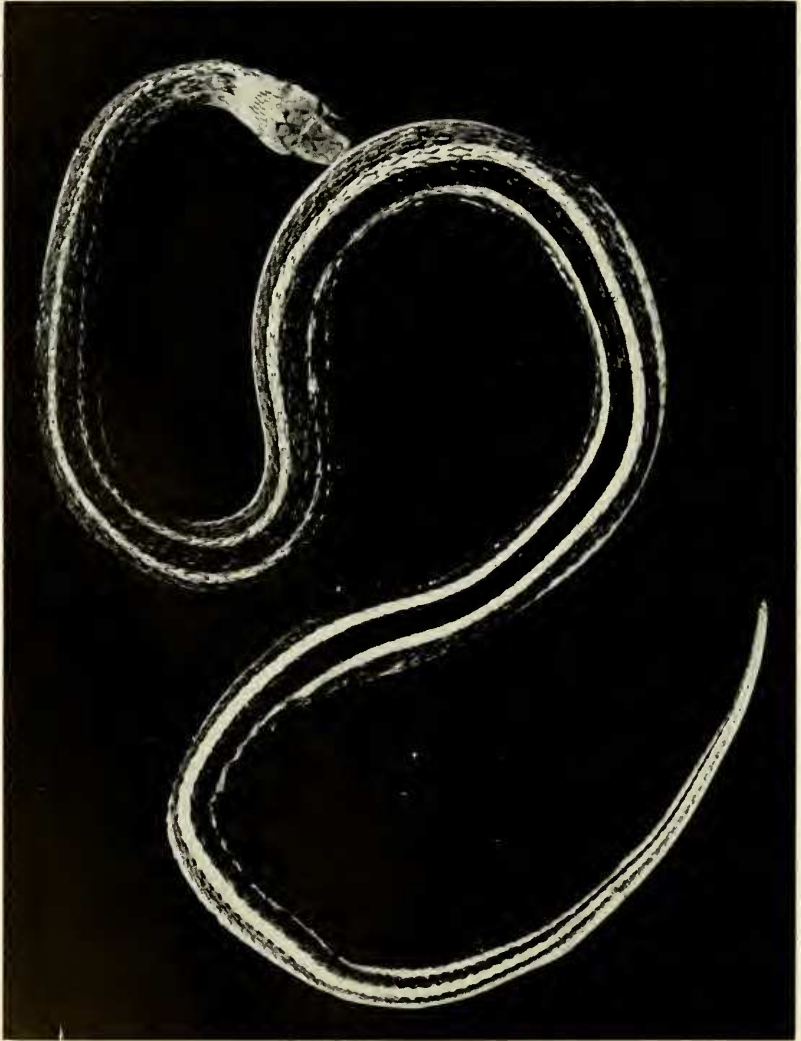


FIG. 30. *Rhabdophis stolata* Linnaeus. EHT-HMS No. 31761, Ban Na Phua, Na Kae, Nakhon Phanom (province), Thailand. Actual total length, 448 mm.

*Rhabdophis nigrocincta* (Blyth)

*Tropidonotus nigrocinctus* Blyth, Jour. Asiat. Soc. Bengal, vol. 24, 1856, p. 717  
(type locality, Pegu, Burma).

There are two specimens in the collections: EHT-HMS No. 31760 ♂ (RE 5517) from Phu Nam Lang (mt.), 1780 m., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 3, 1955, Robert E. Elbel, coll.; and KUMNH No. 40071 ♀ (RE 3541) from Phu Lom Lo (mt.), 2100 m. elev., Kok Sathon (village), Dan Sai (district), Loei (province), Thailand, Mar. 30, 1954, Dr. Boonsong Lekagul and Robert E. Elbel, collectors.

The following characters obtain in No. 31760: maxillary teeth, 29-30, followed by two suddenly enlarged fangs lacking grooves, several times larger than nearest tooth; ventrals, 167; subcaudals, 99; anal divided; scale formula, 27 head, 19, 19, 17; scales except outer row keeled; two anterior temporals; one preocular, three postoculars; supralabials, 9-9, the fourth to sixth enter orbit; internasals truncate anteriorly; a distinct series of 8 pairs of nuchal glands; on each side of median line of neck a short indistinct groove. Total length in mm.: 615; tail, 179.

A narrow band (six to eight rows wide) following the parietals is lighter than ground color, suggesting a juvenile light band; this is followed by a deep-black chevron pointing backward; general ground color dark gray with a series of 46 narrow transverse black bars on the body, sometimes broken mesially and alternating; tail banded and flecked with black. Venter with anterior part ivory, the median third gray, the posterior part with dark blackish-gray or brown clouding or blotching; underside of tail dark with white flecks; an immaculate white or cream spot on labials between a diagonal postocular stripe and a short subocular stripe.

No. 40071 is a larger specimen but it is injured anteriorly so that an accurate measurement cannot be made. It agrees in general with the above specimen. There are two anterior temporals, one preocular and four postoculars; 9-9 supralabials, 10-11 infralabials, five or six bordering the anterior chinshields which are shorter than posterior; latter separated by small scales; ventrals, approximately, 166, subcaudals, 88; anal divided. Scale formula, 28 head, 19, 19, 17. There are 31 + 2 maxillary teeth.

The stomach contains a specimen of a frog (*Megophrys*) partially digested.

*Rhabdophis chrysarga* (Schlegel)

*Tropidonotus chrysargus* Boie, Isis, 1827, p. 534 (Java), *nomen nudum*.  
Schlegel, Phys. Serp., vol. 2, 1837, p. 312, pl. 12, figs. 6-7.

A specimen (BL No. 20090 from "Thailand") was examined. This species is widespread, extending through southeastern Asia, Indonesia and into the Philippines.

*Parahelicops boonsongi* sp. nov.

(Fig. 31)

*Holotype*: EHT-HMS 31707 (RE 5500), Phu Nam Lang (mt.), 1780 m., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 2, 1955; Robert E. Elbel, collector.

*Diagnosis*: A natricine snake, with 30 maxillary teeth, the last three suddenly much enlarged but not grooved; internasals narrowed; a single prefrontal; three (or two) postoculars; two suboculars; one preocular; nasal partially divided; anal divided; with a divided scale also preceding it; all dorsal scalerows finely striate and heavily keeled, outer ones less so except outermost which is smooth anteriorly and faintly keeled posteriorly; posterior edges of scales notched, bearing a fine transparent fringe. Uniform gray-olive on dorsal parts (in preservative), growing gradually lighter laterally, the outer scalerows almost cream-white anteriorly; venter cream-white or yellowish; subcaudal region gray.

*Description of type*: Rostral once and a half as wide as high, very narrowly visible above; internasals elongate, narrowed anteriorly, rounded posteriorly, their length slightly greater than length of the prefrontal; latter twice as wide as long; frontal five-sided, slightly wider anteriorly than elsewhere, a little shorter than supraoculars, equal to its distance from rostral, a third shorter than parietals; nasal elongate; a suture from nostril to second supralabial; loreal as high as long; a large preocular not reaching frontal; three postoculars, two suboculars, the anterior reaching forward beyond middle of eye; temporals, 2 + 3 + 4; nine supralabials, the first three touching nasal, third only touches loreal, fourth and fifth enter orbit, seventh largest; mental wider than deep, as wide as rostral; infralabials ten, five touching first chinshields which are distinctly shorter than second pair; latter separated, narrowly so anteriorly.

Scalerows across back of head 25, at neck 19, middle of body 19, in front of vent 17. Ventrals, 141; anals, 2; subcaudals, 33 + (tail

broken and lost). Eye rather large, equal to its distance from nostril; pupil round.

*Color:* Nearly uniform gray-olive growing a little lighter laterally, becoming nearly cream-white on outer two or three scalerows anteriorly on side of neck; posteriorly two outer scalerows and to some extent the outer edge of ventrals with some grayish pigment; supralabials and suboculars cream; an indefinite fumate spot back

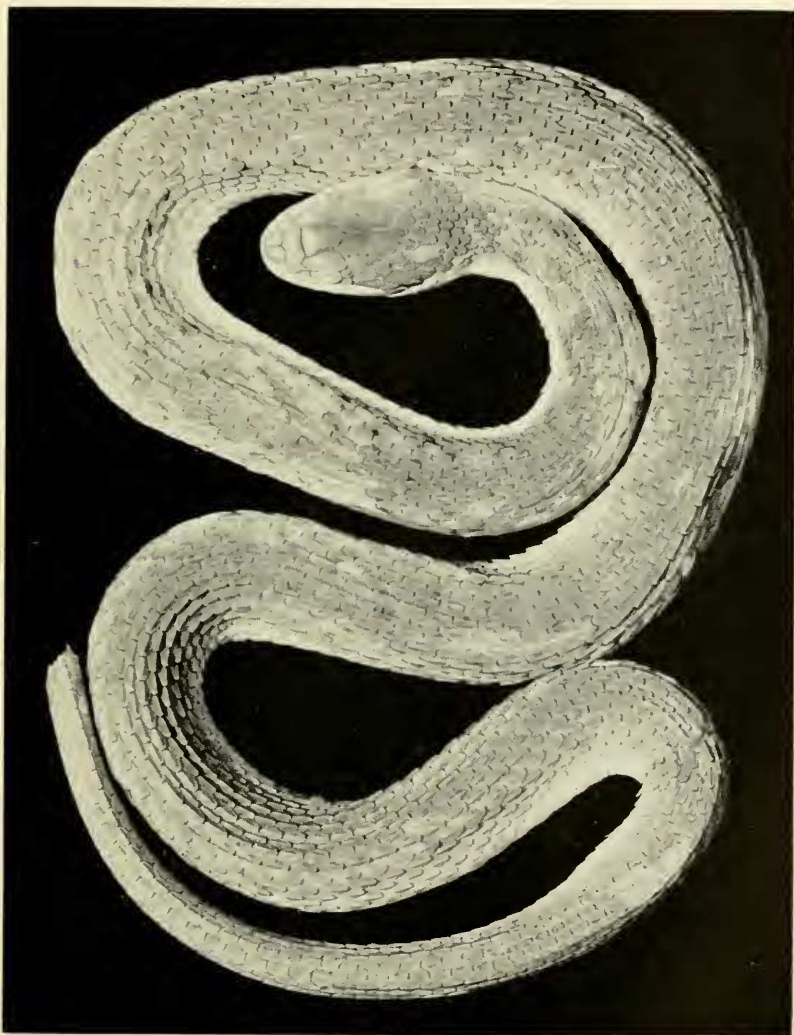


Fig 31. *Parahelicops Boonsongi* sp. nov. EHT-HMS No. 31707, Phu Nam Lang (mt.), 1780 m., Ban Khok, Na Phung, Dan Sai, Loei (province), Thailand. Actual total length 621 mm.

of jaw angle; tail incomplete; venter generally cream-white; subcaudal region with a median gray line and many scales with an indefinite pigmented area (on portion of tail remaining).

When the specimen is held in certain lights or immersed in clear liquid it is possible to discern dimly certain indefinite darker areas on the anterior half of the body.

*Measurements in mm.*: Snout to vent, 520; tail, 101 +; total length 621 +; length of head, 26; width of head, 18; width of neck, 13.

*Remarks*: The genus *Parahelicops* was proposed by Bourret for a species having a single prefrontal, the scales lacking apical pits, hypapophyses developed throughout the vertebral column, 25 maxillary teeth, the last two enlarged but not grooved. The present species differs from the described type of the genus *Parahelicops annamensis* Bourret in having a totally different pattern of coloration, more maxillary teeth (30 as compared with 25); the nasal partially instead of wholly divided; the scalerows 19, 19, 17 instead of 17, 17, 15; the anal double (preceded by a paired scale), instead of a single anal; eye larger, and the ventrals 141 (compared with 169 in *annamensis*). The character of the temporals (abnormal in *annamensis*) are 2 + 3 + 4 (as compared with 1 + 1 + 2 on the normal ? right side while on the left side there is one long fused scale followed by three). There are three instead of one (or two) suboculars.

The species is named for Dr. Boonsong Lekagul who has so generously provided the University of Kansas with Thailand amphibians and reptiles.

Pope (Rept. China, 1936, p. 125, and M. Smith, vol. 3, Fauna Indian Reptilia and Amph., 1943, p. 330), have placed *Parahelicops* in the synonymy of *Opisthotropis* together with seven or eight other generic names, thus bringing together a rather heterogeneous group of species. There are smooth and keeled forms; forms with maxillary teeth varying from 20 to 40, equal or "subequal" or having two or three much enlarged fanglike posterior teeth; groups with 19, 17, or 15 scalerows at midbody, groups with or without suboculars, etc. The one common character is the presence of a single prefrontal. Whether Günther's *atra* the type of the genus *Opisthotropis* is African as stated by Boulenger or is actually South Asian cannot be determined by us. We are recognizing Bourret's *Parahelicops* and placing this species in that genus rather than in *Opisthotropis*. It is significant that *Opisthotropis spenceri* M. Smith has been described from Thailand ("Muang Ngow, N. Siam") a

species having 17 smooth scalerows throughout, lacking the suboculars, and lacking the enlarged posterior maxillary teeth.

It is surprising that certain forms of both *Parahelicops* and *Opisthotropis* are nearly unicolored above and yellowish or whitish below. One suspects that this may be an adaptation to a stream habitat. However, but little is known of the ecology of these snakes.

#### SUBFAMILY HOMALOPSINAE

##### *Enhydris plumbea* (Boie)

*Homalopsis plumbea* Boie, 1827, p. 560 (type locality, Java).

Two specimens are at hand: EHT-HMS No. 31705 yg. (RE 3818) from Phu Phan (mt.), 550 m. elev., Sakon Nakhon (district and province), Thailand, June 28, 1954, Dr. Boonsong Lekagul and Robert E. Elbel, colls., and EHT-HMS No. 31706 (RE 541128), Kam (village), Khon Kaen (district and province), Nov. 28, 1954, collected by Robert E. Elbel.

These two have the following characteristics respectively: supralabials, 8-8, 8-8; infralabials, 10-10, 10-10; scale formula, 23, 19, 19, 15; 23, 19, 19, 13; ventrals, 127, 125; subcaudals, 39, 37; anals, 2, 2. Total length in mm., 220, 455; tail 31, 52.

No. 31706 contains 14 enlarged ovarian eggs.

##### *Enhydris enhydris* (Schneider)

*Hydru: enhydris* Schneider, *Historiae amphibiorum naturalis et literariae*, fasc. primus, 1799, pp. 245-246 (type locality, India orientalis, *vide* Russell).

One specimen, EHT-HMS No. 31759 (RE 541022) is at hand from near Kam (village), Khon Kaen (district and province), Thailand, collected Oct. 22, 1954, by Robert E. Elbel. It appears to be typical of the species. The following characters obtain: all scales smooth without pits; scale formula: 34, 21, 21, 21, 19; ventrals, 150; subcaudals, 47 + (tail broken); anal divided. Anterior chinshields shorter than second pair.

Dorsal scalerows nearly uniform brownish gray, the three outer scales at least partly without pigment. Ventrals outlined in brown; a median brown subcaudal line. The stomach contained eight small fish and parts of others. "Collected on road."

##### *Homalopsis buccata* (Linnaeus)

(Fig. 32)

*Coluber buccatu*; Linnaeus, *Mus. Ad. Frid.*, 1754, p. 29, pl. 19, fig. 3; *Systema Naturae*, 10th Ed., 1758, p. 217 (type locality, India).

*Homalopsis buccata* Smith, *Jour. Nat. Hist. Soc. Siam*, vol. 1, 1914, p. 101; *idem ibid.*, vol. 1, no. 4, p. 162 (Bangnara, Patani); *ibid. idem*, vol. 1, p. 213

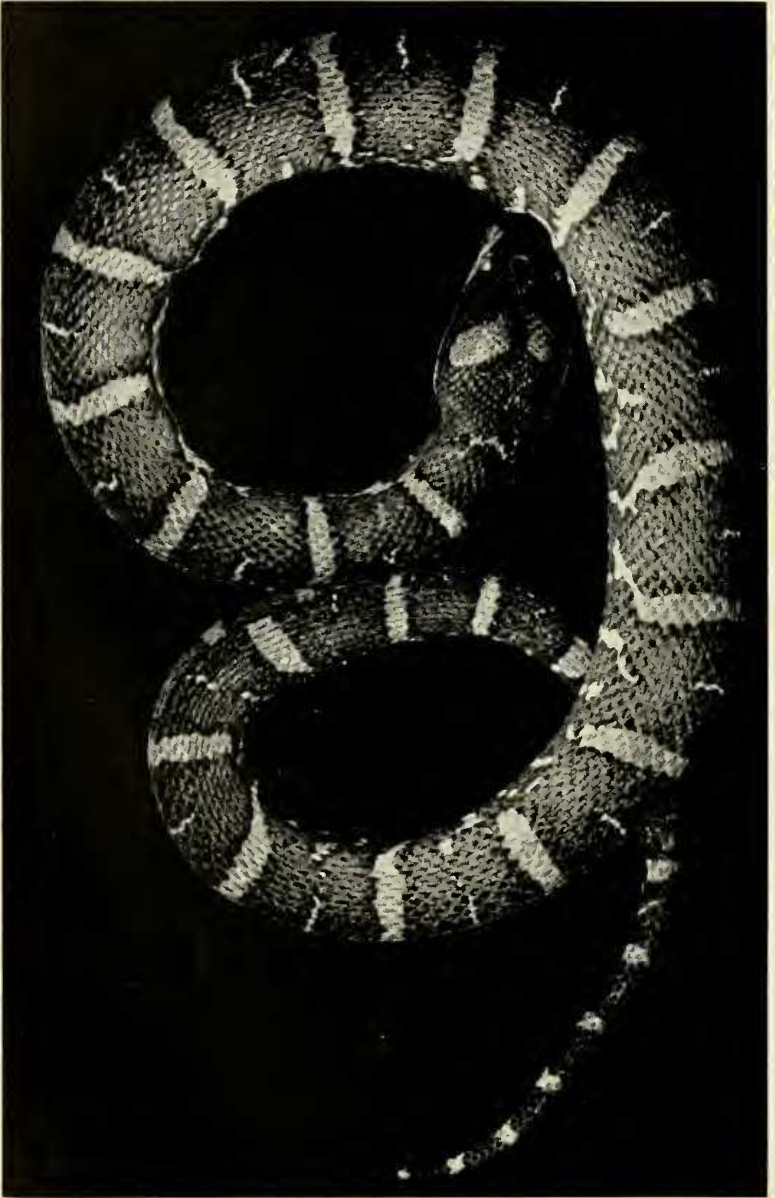


FIG. 32. *Homalopsis buccatus* (Linnaeus). EHT-HMS No. 31697, Phu Phan (mt.), 550 m., Sakon Nakhon (district and province), Thailand. Actual total length, 772 mm.



(listed); the fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese sub-region; Reptilia and Amphibia, vol. 3, Serpentes, pp. 390-392, fig. 123 (after Boulenger, 1890) (rivers, canals, ponds of Burma south of lat. 17°, Siam, Cambodia, Cochin-China, Malay Peninsula; Indonesia, usually found not far above tidal limits); Boulenger, A vertebrate fauna of the Malay Peninsula; Reptilia and Batrachia, 1912, pp. 162-163, fig. 50; Bourret, Les serpents de l'Indochine, tome 2, 1936, pp. 293-294, fig. 117 (listing of literature).

This widely distributed serpent is represented by four specimens: EHT-HMS Nos. 31694-31697 (RE 3818), all collected on Phu Phan (mt.), 550 m. elev., 104° 05'; 16° 55', Sakon Nakhon (district and province), Thailand, June 28, 1954, by Robert E. Elbel and Dr. Boonsong Lekagul. These vary in age and to some extent in color pattern. In No. 31695, the smallest specimen, (489 mm.), the body is brownish black on the back and sides, with 21 narrow (two or three scales wide) creamy-white transverse bands on body and 13 on tail. The bands on the back part of the body in some cases alternate with very narrow light lines which tend to divide the intervening dark blotches. An irregular cream line beginning at the mouth-angle runs back along the third and fourth scalerows for some distance, then becomes broken and some of the individual spots resulting are placed transversely on the venter. The venter is generally brownish black with many small rounded cream spots and anteriorly a few transverse bars, none completely crossing the venter.

A cream line from the angle of the mouth runs forward to below the eye to the nasal scale, while another begins at the same place, runs along the lower lip a short distance, then crosses the chin. From the middle part of the chin two cream lines run back onto the throat where they disappear. A pair of large rounded spots are present on the occiput.

In general this same detailed pattern is repeated in two other specimens, a male and female both larger than the described specimen. In a still larger specimen, No. 31696, the dorsal color is nearly brown and the transverse bands have become almost obsolete. The venter is brownish black showing small cream spots. The head markings are constant although dim in the largest specimen.

*Measurements and scale data on Homalopsis buccata*

Number	Total length	Tail	Chin scales	Ventrals	Anal	Sub-caudals	Scalerows
31695 ♂	489	114	11	157	2	84	48, 39, 27
31694 ♀	573	118	10	154	2 + 2	67	54, 39, 26
31696 ♂	782	185	8	160	2 + ½	82	53, 38, 27
31697 ♂	772	188	8	160	2	80	49, 39, 27

Malcolm Smith (1943) reports a Siamese specimen from "Eastern Siam, B. M. Coll." that has the whole lower part grey, thickly spotted with black. The largest known specimen measures 1310 mm., the tail being 285 mm. in length.

FAMILY ELAPIDAE

*Bungarus candidus* (Linnaeus)

*Coluber candidus* Linnaeus, *Systema Naturae*, 10th ed., 1758, p. 223 (type locality, India).

A specimen, KUMNH No. 31435 (RE 1063), was collected by the junior author Aug. 26, 1952, at Khorat (city and province), Thailand.

The following characters obtain: supralabials, 7-7, the third and fourth entering orbit; infralabials, 7-7; scale formula: 19, 15, 15, 15, the median row much enlarged; ventrals, 221; anal single; subcaudals, 42 + (tail incomplete). Total length, 1442; tail, 140 mm.

There are 23 light dorsal bars widening on the side, separated by 23 saddlelike black blotches, narrowing on the sides, reaching down and covering outer part of ventrals. The scales of the light areas have flecks or bars of dark color, the median row with two dark marks on each scale. A wide cream stripe follows the upper lip covering all or the greater part of all the labials. The top of the head is uniformly dark.

This is, we believe, the fifth specimen reported from Thailand.

*Naja naja kaouthia* Lesson

*Naja kaouthia* Lesson, in Ferrusac, *Bull. Sci. Nat.*, vol. 25, 1831, p. 122 (type locality, Bengal).

*Naja siamensis* Laurenti, *Specimen medicum, exhibens synopsis reptilium emendata* . . . , 1768, p. 91 (type locality, Thailand), based on Seba, vol. 2, pl. 89, figs. 1-2.

There are three specimens of this cobra in the collections obtained by the junior author. These are KUMNH Nos. 40081-40082 (RE 2624) Khao Khat (mt.), approx. 500 m. elev., Paknampho (city), Nakhon Sawan (district and province), Thailand, June 4, 1953.

The following characters obtain in 31433: scale formula 27 (neck), 21, 14-15; ventrals, 161, subcaudals 34 +; anal single. Total length 987 mm.; tail, 115 mm. (tip incomplete). This is from the same locality as the other two.

## FAMILY HYDROPHIIDAE

*Enhydrina schistosa* (Daudin)

*Hydrophis schistosus* Daudin, Histoire naturelle générale et particulière des reptiles, vol. 7 (an XI), 1803, p. 386 (type locality, "Coromandel").

A single young specimen of *E. schistosa* (KUMNH No. 40060) from Phet Buri, Thailand, was collected by Dr. Boonsong Lekagul.

The following scale characters obtain: rostral higher than wide, angulate above, the median lower part fitting into an indistinct notch in front part of lower jaw; nasals in contact, narrowed and angulate anteriorly, partly divided; one preocular, one postocular; prefrontals widened anteriorly, narrowed posteriorly, not in contact with labials; frontal small, narrower than a supraocular, angulate anteriorly and posteriorly, shorter than its distance from anterior end of nasals; eight supralabials, the four anterior enlarged, the fourth one entering orbit, four posterior ones small.

Temporals 1 + 1 + 2 + 4, the second touches the postocular; mental a very slender elongate scale nearly hidden in a groove; first supralabials narrow, much elongate, not in contact behind mental; two pairs of chinshields, the anterior largest in contact with three supralabials. Eight infralabials, the three or four posterior ones small.

Scale formula: 46 (head), 42, 47, 58, 35. Grayish white or cream with 34 brown spots on back and 4 on anterior part of tail (latter half of tail black). The specimen measures, total length, 325 mm.; tail, 38 mm.

*Thalassophina viperina* (Schmidt)

*Thalassophis viperina* Schmidt, Abh. Nat. Ver. Hamburg, Band 2, 1852, p. 79, pl. 3, (type locality, "Java").

The one specimen examined is BL No. 20063, Thailand (probably from the Gulf near Bangkok), collected by Dr. Boonsong Lekagul.

*Lapemis hardwicki* Gray

(Fig. 33)

*Lapemis hardwicki* Gray, Illustrations of Indian Zoology, vol. 2, 1834, pl. 87, fig. 2 (type locality, Penang); Smith, Monograph of the sea snakes (Hydrophiidae), London, Nov. 27, 1926, pp. 108-112, fig. 32, (Gulf of Siam).

A typical specimen of this widespread species (KUMNH No. 40063) from Phet Buri, Thailand, collected by Dr. Boonsong Lekagul, May, 1954, is in the collection. The total length is 646 mm.; tail, 66 mm.



FIG. 33. *Lapemis hardwicki* Gray. KUMNH No. 40063, Phet Buri (province), Thailand. Actual total length, 646 mm.

*Hydrophis mamillaris* Daudin

(Fig. 34)

*Hydrophis mamillaris* Daudin, *Historie naturelle générale et particulière des reptiles*, vol. 7, an XI=1803, p. 340 (based on Russel, vol. 1, p. 49, pl. 44 from Vizagapatam, India).

KUMNH No. 33517. We are associating with this species a specimen of sea-serpent from Bangphu (village), Bangkok, Thailand, collected by Dr. Boonsong Lekagul. The following characters

obtain: ten maxillary teeth following grooved fangs; 1 (2) pre-oculars, 1 postocular; supralabials, 7, second touches prefrontal on one side only; the fourth only enters orbit, last three small; infralabials, 10-10, three only touch the first chinshields, the second and third on one side separated from the lip by two or three intercalated

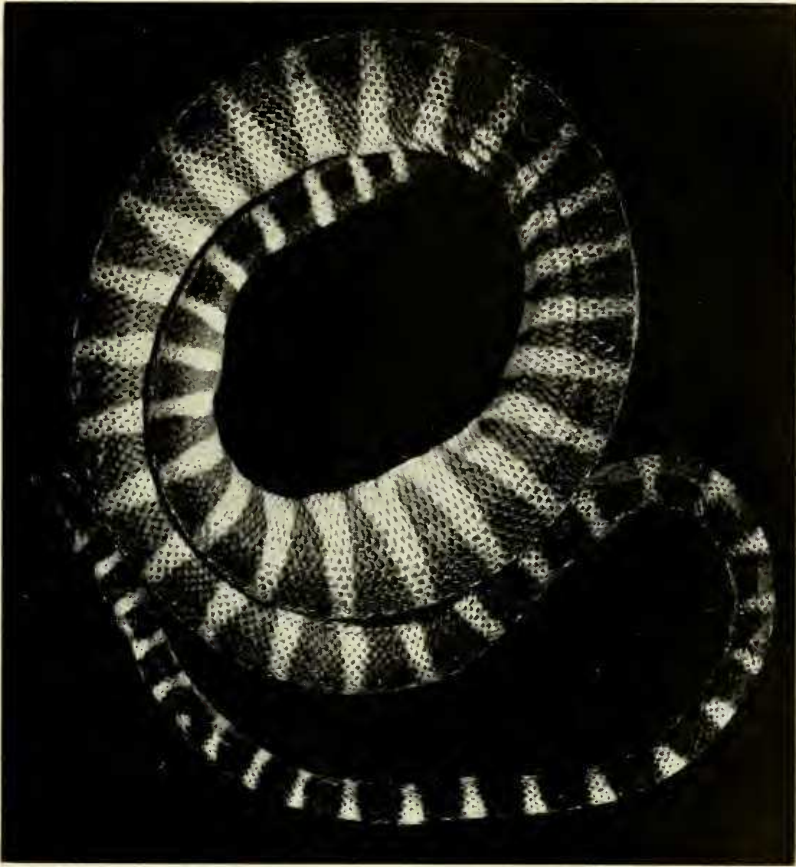


FIG. 34. *Hydrophis manillaris* Daudin. KUMNH No. 33517, Bangphu, Bangkok, Thailand. Actual total length, 655 mm.

small scales; posterior infralabials small. A single large anterior temporal followed by a still larger scale, and the latter touched by another enlarged temporal bordering the parietal. This last scale separated from its fellow by four small scales.

Scale formula, 36 (head), 33, 39, 32; ventrals, approximately \* 325,

\* Occasional small body scales are intercalated between ventrals making the count somewhat uncertain.

not double width of adjoining scales. Two preanals much enlarged, separated from each other by two and one half pairs of scales, the last pair extending somewhat behind them. A somewhat enlarged pair of postanal scales. Head small, scarcely wider than neck.

Head and neck about one-third times greatest diameter of body. Head black with a yellow streak on each side behind eye. Body blackish with 55 dark bands on body, and seven on flattened tail, wider dorsally, narrowing much on sides; except for the first eight, the white bands encircle the body, or occasionally fail to meet on venter by a very narrow margin. The dorsal and lateral scales of the light bands may have considerable pigment forming indefinite dark spots on the scales; most of the dorsal series of scales anteriorly have longer or shorter keels which more posteriorly become shortened into tubercles, the scales of the median dorsal row sometimes have two such tubercles, one following the other; ventrals usually with two lateral tubercles often indistinct.

The presence of a form of *mamillaris* in the Gulf of Siam is unexpected. There are some differences and with sufficient material a subspecific form might be recognized. The most significant differences are, only a single labial entering eye (the fourth); 33 scalerows around the neck; only a single postocular; only three scales touch the first small chinshields, the second pair distinguishable but not large. The head has a yellow streak on each side from nasal to eye and from eye to the first transverse white spot. There are two small scales bordering the lip between the anterior labials excluding the third labial on one side, and three small scales on the other side excluding both third and fourth from lip.

The species shows some similarity to *H. fasciatus atriceps* M. Smith and *holbrookei* Günther but the maxillary teeth are twice as numerous. It would appear that the maxillary teeth are less variable than other characters.

From *H. caerulea* it differs in a smaller number of teeth, smaller head and anterior body, a longer frontal, only *one* instead of two supralabials touching orbit, and a smaller number of scalerows on body.

The specimen is gravid, containing three very small embryos attached to large egg masses.

*Hydrophis caeruleus* (Shaw)

(Fig. 35)

*Hydrus caeruleus* Shaw, General Zoology, vol. 3, 1802, p. 561 (type locality, Indian Ocean).

Two young specimens, KUMNH Nos. 40061, 40062 from Phet Buri (province), Thailand, were collected by Dr. Boonsong Leka-

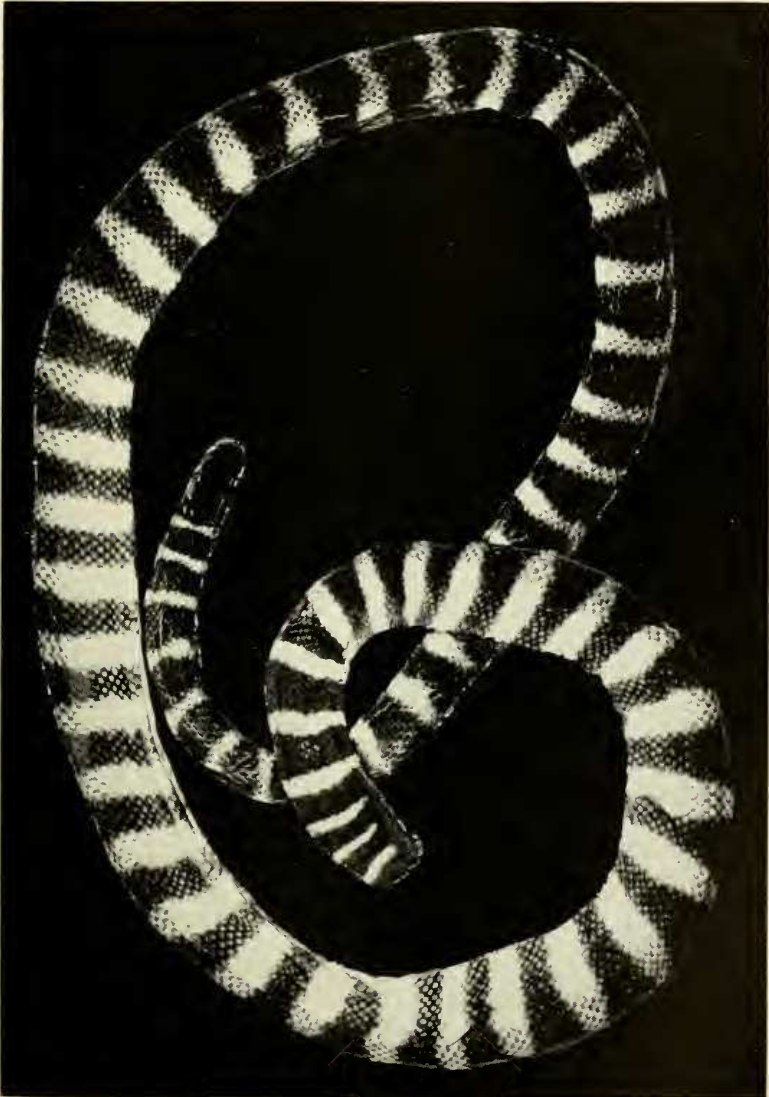


FIG. 35. *Hydrophis caeruleus* Shaw, KUMNH No. 40062, Phet Buri, Thailand. Actual total length, 537 mm.

gul. They have been assigned to *H. caeruleus* chiefly on the basis of the large number of teeth behind the poison fangs. In No. 40062 there are 14-16; in 40061 there are 14 teeth. The following characters obtain:

No. 40061: 1 preocular, 1 postocular, eight supralabials, the third and fourth enter orbit, the second touches prefrontal; the fifth labial is large and is possibly fused to the anterior temporal; last three labials small; infralabials seven, the first four small touching the anterior chinshields, last three small. Scale formula, 34 (neck)—42-35. Anal scales rather large, separated by three paired scales, the last pair almost completely behind them. Ventrals, 293; subcaudals, 410. Black bands on body and tail, 63, laterally tapering very slightly; those on tail connected below. Head black with some yellow lateral marks.

No. 40062 differs in some points. There are two postoculars on one side, the temporal is not fused to the labial, the anterior temporal contacts the eye at one point. There is a small scale on lip border between the third and fourth infralabials. There are 61 bands on body and tail; head without light marks; the light bands tend to be greatly narrowed, and interrupted ventrally; dorsally the white bands contain much dark pigment. Ventrals, 407; subcaudals, 36.

#### FAMILY CROTALIDAE

##### *Agkistrodon rhodostoma* (Boie)

*Trigonocephalus rhodostoma* Boie, Isis, 1827, p. 561 (type locality, Java).

One specimen, EHT-HMS No. 31718 (RE 3817) ♂, (bad state) is in the collection from Phu Phan (mt.), 550 m. elev. (104° 05'; 16° 55'), Sakon Nakhon (district and province), Thailand; June 28, 1954; Robert E. Elbel and Dr. Boonsong Lekagul, colls.

The following characters obtain: supralabials, 7-7; infralabials, 11-11, four touch the first chinshields; temporals, 2 + 1 + 2; two labials touch the single subocular; ventrals, 150; subcaudals, 53; scale formula, 19, 21, 21, 17.

#### KEY TO THAI SPECIES OF TRIMERESURUS

- |  |   |
|--|---|
| 1. First labial fused partially or completely with the nasal .....   | 2 |
| First labial completely separated from the nasal scale .....   | 3 |
| 2. Upper head scales small subequal, tubercular or granular; supra-oculars narrow (sometimes broken) separated by from twelve to fifteen scales; internasals two to three times size of adjoining scales, usually separated by a single scale; supralabials, 11-13, separated from the elongate subocular by from two to three rows of scales; scale formula, 25, (25, 27), (19, 21), strongly keeled. Usually |   |



uniform purplish-brown or olive with spots; tail spotted with brown ..... *Trimeresurus p. purpureomaculatus*

Upper head scales small, subimbricate; supraoculars narrow, not broken or divided, separated by from eight to twelve scales; internasals two to four times size of adjoining scales, usually in contact; 10-12 supralabials separated from large subocular by one or two rows of scales; scale formula, (21, 23), (21, 19), (15, 17). Green above, yellow or white below, males with a ventrolateral cream stripe, females with a row of light flecks on outer scalerow,

*Trimeresurus albolabris*

3. An elongate subocular present ..... 4  
 Supraoculars divided; no white or cream line along outer scalerow; supraoculars divided transversely, separated by eight scales; internasals separated by a single scale; ten supralabials, a single series of scales between labials and the elongate subocular; temporal scales small with obtuse keels; scale formula, 19, 19, 15; ventrals, 152; subcaudals, 42, tail prehensile. Brownish gray with a series of brown spots and smaller ones on sides . . . *Trimeresurus kanburiensis*
4. Supraoculars not divided transversely, usually their length equals twice their width, separated by from ten to thirteen subimbricate scales; internasals separated; temporals more or less strongly keeled; scale formula, 21 (23), 21, 15 (17). Green above, usually whitish below; a light stripe bordered below by orange or chocolate along flank and base of tail usually on first scalerow; a light post-ocular stripe. Hemipenes without spines . . . *Trimeresurus popeorum*  
 Similar to preceding but hemipenes spinose . . . *Trimeresurus stejnegeri*

*Trimeresurus albolabris* Gray

*Trimeresurus albolabris* Gray, Zool. Misc., p. 48, 1842 (type locality, "China"); Smith, Fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese Sub-Region; Reptilia and Amphibia. Vol. III, Serpentes, Dec. 1943, pp. 523-525.

Six specimens are referred to this species despite considerable variation. They are EHT-HMS No. 31768 (RE 4259) from Ban Nong Wai (subvillage), approx. 1780 m. elev., Na Phung (village), Dan Sai (district), Loei (province), Thailand, Nov. 15, 1954; EHT-HMS No. 31769 (RE 541118), Ban Sang Kho (subvillage), Khok Phu (village), Sakon Nakhon (district), Sakon Nakhon (province), Thailand, Nov. 18, 1954; EHT-HMS No. 31770 (RE 4028), Ban Na Muang (subvillage), approx. 1780 m. elev., Na Haeo (village), Dan Sai (district), Loei (province), Thailand, Sept. 30, 1954; EHT-HMS No. 31801 (RE 5501), Phu Nam Lang (mt.) 1780 m., Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 2, 1955; KUMNH No. 40083 (RE 3217), Ban Muang Khai (subvillage), Tha Li (village), Tha Li (district), Loei (province), Thailand, Dec. 7, 1953. All specimens

collected by Robert E. Elbel except last, collected by Dr. Boonsong Lekagul and Robert E. Elbel.

A young specimen, EHT-HMS No. 31769 (RE 541118) shows the male markings clearly. It is nearly uniform greenish above (greenish blue with a large series of brown marks on each side of the body in preservative), the venter white growing olive on outer edges of ventrals. A cream-white line originating on preoculars passes below the eye and over temporals covering most of two whole rows of temporals, then, crossing mouth angle, it continues along the outer scalerow covering more than half of each scale; on the tail it passes onto the outer part of the much widened subcaudals. The prehensile tail is more or less spotted with brown. Chin and to some extent throat, white; rostral and two first supralabials partly white.

The following scale characters obtain: supraoculars large, their length three times their width, separated from each other by nine scalerows, the scales flat, smooth, imbricate, the temporals not or but very indistinctly keeled. Internasals large, in contact, three to four times size of the adjoining canthal; supralabials, 11-12, first fused to nasal; long curved subocular; two postoculars; third supralabial touches the subocular; fourth separated from it by one scalerow, succeeding ones by two rows; infralabials, 12-14; two pairs of chinshields, the second small, in contact, separated from ventrals by four pairs of scales; scale formula: 46 (head), 21, 21, 15; scales not discernibly keeled; ventrals, 163; anal single, subcaudals, 73 + 1; total length, 251 mm.; tail, 45 mm.

The coloration of this specimen is quite different from that reported by other workers for the species. The specimen is very young and this coloration possibly is lost in the adult. The absence of keels on the scales is possibly owing to the youth of the specimen.

No. 31768 ♀. The following characters obtain: *internasals in contact*, three to four times as large as the two canthals; supraoculars four times as long as wide, separated by ten or eleven smooth, subimbricate scalerows; *three postoculars*, one long subocular; the fourth and fifth scales separated from it by one scale; rostral one and two-thirds times as wide as high; two pairs of chinshields, followed by four paired scales; infralabials, 12-11; ventrals, 157; anal single; subcaudals, 75 + 1; scale formula, 44 head, 23, 21, 15, *scales completely smooth*; no ventrolateral line and no line behind or under eye; whitish on chin; a row of light flecks on outer scalerow. Tail uniformly colored.

No. 31770 ♀. Internasals one and one-third times as long as wide, separated by two scales, one following other; two canthals less than half size of internasals; loreal present, reaching or just failing to reach canthal edge; 11-10 supralabials, *the first more than half fused with nasal*, the third touching subocular, fourth separated by one scale, fifth by two; two postoculars; one long subocular widened anteriorly; supraoculars four times as long as wide, separated by nine or ten small subimbricate scales; posterior temporals definitely ridged or keeled; *one pair of chinshields followed by six paired scales*, none separated by small scales; scale formula, 44 (head), 21 (22), 21, 15; ventrals, 167; subcaudals, 58 + 1. A row of cream flecks on outer scalerow. *Tail brown spotted.*

No. 40083. *Internasals rectangular*, about two and one-half times longer than wide, *separated by a single scale*; supraoculars about two and one-half times as long as wide, separated by 11-12 scales, not keeled but somewhat thickened, sometimes moundlike; supralabials, 12-12, *first completely fused to nasal*, third touches the subocular; other labials separated from it by two rows of scales; infralabials, 14-14; *two pairs of chinshields*, followed by four paired scales none separated by small scales; two postoculars; scale formula, 48 (head), 21, 21, 15. The ten to fifteen dorsal scalerows well keeled; ventrals, 163; subcaudals, 52 + 1.

*Color* (in preservative): uniform bluish-black, grayish on tail; venter bluish or bluish black, the posterior edges of the ventrals light; a row of light flecks on outer scalerow; tip of lower jaw black; light areas on chin and beginning of throat. *Tail grayish, not brown spotted.*

When skin is distended there appears to be transverse rows of light flecks, the light color being on skin between scales; these separated by similar dark areas. This occurs more or less distinctly in all the specimens (in 31769 the whole "light" area is brown).

*Trimeresurus popeorum* Smith

(Fig. 36)

*Trimeresurus popeorum* Smith, Jour. Bombay Nat. Hist. Soc., vol. 39, p. 730 (original spelling *popeiorum*, a clerical error, was corrected by the author) (restricted type locality, Khasi Hills, Assam).

Two specimens are referred to this species. They are EHT-HMS Nos. 31799 (RE 5503) and 31800 (RE 5620) from Phu Nam Lang (mt.), 1780 m. Ban Khok (subvillage), Na Phung (village), Dan Sai (district), Loei (province), Thailand, June 2, and June 10, 1955, respectively. Robert E. Elbel, collector.

The second specimen, 31800, has the following characters: rostral angular, slightly wider than high, narrower than mental; two loreals superimposed; eye relatively large, the length of snout a little less than twice its greatest diameter; internasals large, double the size of two enlarged contiguous canthals, but three to four times larger than other scales adjoining, separated from each other by one

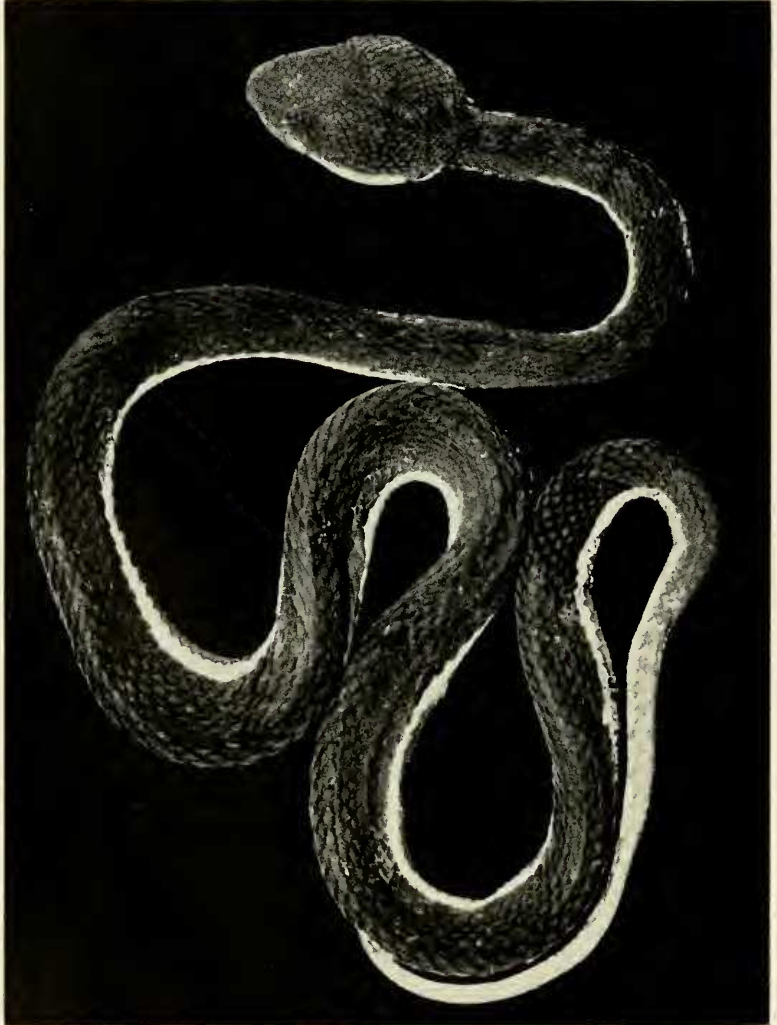


FIG. 36. *Trimeresurus popeorum* M. Smith. EHT-HMS No. 31800, Phu Nam Lang (mt.), 1780 m. elev., Ban Khok, Na Phung, Dan Sai, Loei (province), Thailand. Actual total length, 412 mm.

elongate scale; supralabials, 10-9, the first completely free from nasal, the second high forming anterior border of the pit, the third labial largest separated from the elongate subocular by one scale, the fourth labial separated from same by one (or two) scales; infralabials, 12-12, three touch chinshields; only one differentiated pair of chinshields, followed by five pairs of scales preceding the first ventral, the two anterior pairs separated each by a pair of small scales; supraoculars three to four times as long as wide separated from each other by 12-13 irregular rows of smooth subimbricate scales; temporals bordering labials largest. Scale formula, 45, head, 21, 21, 15; the dorsal 15 series vaguely keeled; posterior temporals with short posterior elevations or keels; subocular narrow, elongate, curving; two postoculars. Ventrals, 167, anal single, subcaudals, 64 + 1. Tail prehensile, slender, and practically the same diameter for much of its length. Total length, 412 mm.; tail 69 mm.

Dorsally nearly uniform green (dark blackish in preservative); a light ventrolateral line, cream above, orange along its lower edge, covering all of the outer scalerow, the lower two fifths of second row, and the extreme outer edge of ventrals; on the tail only part of the outer row is involved, the stripe covering also outer part of subcaudals. Tail flecked and spotted with brown and black, except terminal part which is uniform light brown. Beginning back of eye a cream line bordered by orange above runs diagonally back, crosses mouth-angle and is continuous with the ventrolateral stripe.

The second specimen is a young female. It agrees in general with the characters given. The following characters obtain: supraoculars three times as long as wide separated by 10-12 scales; length of snout not double eye diameter; internasals separated by two scales (abnormal); two loreals small, superimposed; supralabials, 10-10, first separated from nasal, third separated from eye by one scalerow, the fourth and succeeding labials by two rows; infralabials, 12-12; one pair of chinshields, followed by 5 pairs of scales, the first two separated by small scales. Scale formula, 48, 21, 21, 15; ventrals, 165; anal single; subcaudals, 57 + 1.

Head and body uniform bluish black except for a narrow bluish white line confined almost entirely to middle of the outer scalerow; on tail the outer edges of the subcaudals are somewhat involved. Total length, 285 mm.; tail, 44 mm.

*Remarks:* Malcolm Smith founded the name, *T. popeorum* on *T. gramineus* (Shaw) Pope and Pope. No type locality was mentioned by Smith.

The material treated by Pope and Pope under *T. gramineus* had a range from "Upper Burma southward into the Malay Archipelago". The exact localities were Darjeeling, Bengal; Mergui, Tenasserim; Prov. Wellesley, Malay Peninsula; Pinang, Malay Peninsula; "Sungei Kumbang, Korinchi", Sumatra; Lao Mts. Cochin-China; Saiap, Kina Balu, Borneo.

A detailed description of one specimen, (British Museum Register No. 72.4.17.137, Khasi Hills, Assam, Jerdon collector), is given by Pope and Pope. We propose to designate this specimen as the holotype of *T. popeorum*, and to restrict the type locality to Khasi Hills, Assam.

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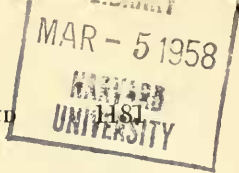
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## INDEX

	PAGE		PAGE
abbotti, <i>Goniocephalus</i> .....	1042	asper, <i>Bufo</i> .....	1075
<i>Acanthosaura</i> .....	1095	asper, <i>Philautus</i> .....	1040
<i>armata</i> .....	1095	atra, <i>Opisthotropis</i> .....	1158
<i>crucigera</i> .....	1095	barroni, <i>Oligodon</i> .....	1044
aceras, <i>Megophrys</i> .....	1077, 1079	baska, <i>Batagur</i> .....	1041
aceras, <i>Megophrys montana</i> .....	1079	<i>Batagur baska</i> .....	1041
Acrochordinae .....	1134	belliana belliana, <i>Liolepis</i> .....	1100
<i>Acrochordus granulatus</i> .....	1134	belliana, <i>Uromystax</i> .....	1100
<i>javanicus</i> .....	1134	bengalensis <i>nebulosus</i> , <i>Varanus</i> , .....	1101
aenea, <i>Rana</i> .....	1039	berdmorei, <i>Engystoma</i> .....	1070
<i>Aepyurus eydouxi</i> .....	1045	berdmorei, <i>Microhyla</i> .....	1070
affinis, <i>Cnemaspis</i> .....	1041	berdmorei, <i>Tropidophorus</i> .....	1043
agaardi, <i>Hydrophis torquatus</i> .....	1046	bibroni, <i>Pelochelys</i> .....	1041
<i>Agama armata</i> .....	1095	bimaculatus, <i>Philautus</i> .....	1040
<i>versicolor</i> .....	1098	bimaculatus, <i>Rhacophorus</i> .....	1040
Agamidae .....	1083	<i>Bitia hydroides</i> .....	1045
<i>Agkistrodon rhodostoma</i> .....	1168	bivirgata, <i>Maticora</i> .....	1045
<i>Ahaetulla ahaetulla ahaetulla</i> .....	1142	blanfordi, <i>Draco</i> .....	1083, 1086, 1091
<i>caudolineata</i> .....	1044	blythi, <i>Rana macrodon</i> .....	1053
<i>cyanochloris</i> .....	1044	boa, <i>Haplopeltura</i> .....	1043
<i>formosa</i> .....	1044	bocourti, <i>Enhydriis</i> .....	1045
<i>subocularis</i> .....	1044	<i>Boiga cyanea</i> .....	1143
<i>ahaetulla, Ahaetulla ahaetulla</i> .....	1142	<i>cynodon</i> .....	1145
<i>ahaetulla, Coluber</i> .....	1142	<i>dendrophila dendrophila</i> .....	1044
<i>albiceps, Typhlops</i> .....	1043	<i>multimaculata</i> .....	1142
<i>Aleuroscalabotes felinus</i> .....	1041	Boiginae .....	1142
<i>albolabris, Trimeresurus</i> .....	1169	boonsongi, <i>Parahelicops</i> .....	1156
<i>allapallensis, Mabuya</i> .....	1102	borbonica, <i>Bufo</i> .....	1039
<i>alticola, Rana</i> .....	1039	bowringi, <i>Riopa</i> .....	1043
<i>amboinensis, Cuora</i> .....	1040	braminus, <i>Typhlops</i> .....	1043
<i>Amphiesma flavipunctatum</i> .....	1151	brevis, <i>Euprepis</i> .....	1102
<i>Amyda cartilaginea</i> .....	1041	brevis, <i>Mabuya</i> .....	1102
<i>angularis, Cyrtodaactylus</i> .....	1041	brevipalmata, <i>Cyrtodaactylus</i> .....	1041
<i>anguinoides, Ophioscincus</i> .....	1043	brookei, <i>Hydrophis</i> .....	1046
Aniliidae .....	1043	buccata, <i>Coluber</i> .....	1159
annamensis, <i>Microhyla</i> .....	1040	buccata, <i>Homalopsis</i> .....	1159
annamensis, <i>Parahelicops</i> .....	1158	<i>Bufo asper</i> .....	1075
annandalei, <i>Kolpophis</i> .....	1045	<i>borbonica</i> .....	1039
annandalii, <i>Hieremys</i> .....	1041	<i>macrotris</i> .....	1039
annectens, <i>Microhyla</i> .....	1040	<i>melanostictus</i> .....	1076
anomalus, <i>Thalassophis</i> .....	1045	<i>parvus</i> .....	1039
<i>armata, Acanthosaura</i> .....	1095	<i>penangensis</i> .....	1039
<i>armata, Agama</i> .....	1095	Bufonidae .....	1075
<i>armatus armatus, Goniociphalus</i> , .....	1095	<i>Bungarus candidus</i> .....	1162
<i>armatus crucigerus</i> , .....		butleri, <i>Microhyla</i> .....	1040
<i>Goniocephalus</i> .....	1095	<i>Caecilia glutinosa</i> .....	1047

	PAGE		PAGE
Caeciliidae . . . . .	1047	<i>radiatus</i> . . . . .	1134
<i>caerulescens</i> , <i>Hydrophis</i> . . . . .	1167	Colubridae . . . . .	1130
<i>caerulescens</i> , <i>Hydrus</i> . . . . .	1167	Colubrinae . . . . .	1134
<i>Calamaria pavementatus</i> . . . . .	1044	<i>colubrina</i> , <i>Laticauda</i> . . . . .	1045
<i>Callophis gracilis hughii</i> . . . . .	1045	<i>condenarius indochinensis</i> ,	
<i>maculiceps</i> . . . . .	1045	<i>Psammophis</i> . . . . .	1044
<i>Calluella guttulata</i> . . . . .	1040	<i>coriacea</i> , <i>Dermochelys</i> . . . . .	1040
<i>Callula pulchra</i> . . . . .	1072	<i>Coronella cyclurus</i> . . . . .	1136
<i>Calotes</i> . . . . .	1096	<i>Cosymbotus craspedotus</i> . . . . .	1041
<i>Calotes cristatellus</i> . . . . .	1096	<i>platurus</i> . . . . .	1082
<i>emma</i> . . . . .	1097, 1099	<i>crassicollis</i> , <i>Siebenrockiella</i> . . . . .	1041
<i>floweri</i> . . . . .	1097	<i>cristatellus</i> , <i>Calotes</i> . . . . .	1096
<i>microlepis</i> . . . . .	1096, 1097	<i>Crocodylus siamensis</i> . . . . .	1081
<i>mystaceus</i> . . . . .	1097, 1100	Crocodylidae . . . . .	1081
<i>versicolor</i> . . . . .	1097, 1098	<i>Crocodylus siamensis</i> . . . . .	1081
<i>cancrivora cancrivora</i> , <i>Rana</i> . . . . .	1039	<i>palustris</i> . . . . .	1081
<i>cancrivora raja</i> , <i>Rana</i> . . . . .	1039	<i>porosus</i> . . . . .	1081
<i>candidus</i> , <i>Bungarus</i> . . . . .	1162	Crotalidae . . . . .	1168
<i>candidus</i> , <i>Coluber</i> . . . . .	1162	<i>crucigerus</i> , <i>Goniocephalus</i>	
<i>capucinus</i> , <i>Lycodon</i> . . . . .	1136	<i>armatus</i> . . . . .	1042
<i>carinatus</i> , <i>Pareas</i> . . . . .	1128	<i>eubitalis</i> , <i>Rana</i> . . . . .	1058
<i>carinatus</i> , <i>Zaocys</i> . . . . .	1044	<i>cyanca</i> , <i>Boiga</i> . . . . .	1143
<i>carinense</i> , <i>Megophrys</i> . . . . .	1077	<i>cyaneum</i> , <i>Triglyphodon</i> . . . . .	1143
<i>cartilaginea</i> , <i>Amyda</i> . . . . .	1041	<i>cyanochloris</i> , <i>Ahaetulla</i> . . . . .	1044
<i>Caudata</i> . . . . .	1038	<i>cyanocinctus</i> , <i>Hydrophis</i> . . . . .	1046
<i>caudolineata</i> , <i>Ahaetulla</i> . . . . .	1044	<i>cyanoaemus</i> , <i>Draco</i> . . . . .	1083, 1085
<i>Cerberus rhynchops</i> . . . . .	1045	<i>cyanophlyctis</i> , <i>Rana</i> . . . . .	1039
<i>chalconota</i> , <i>Rana</i> . . . . .	1064	<i>Cyclemys amboinensis</i> . . . . .	1040
<i>Chelonia mydas</i> . . . . .	1040	<i>dentata</i> . . . . .	1040
Cheloniidae . . . . .	1040	<i>mouhotii</i> . . . . .	1040
<i>chinensis</i> , <i>Enhydria</i> . . . . .	1045	<i>cyclurus</i> , <i>Coronella</i> . . . . .	1136
<i>Chitra indica</i> . . . . .	1041	<i>cyclurus</i> , <i>Oligodon</i> . . . . .	1136
<i>Chirixalus doriae</i> . . . . .	1040	<i>Cylindrophis rufus rufus</i> . . . . .	1043
<i>chrysarga</i> , <i>Rhabdophis</i> . . . . .	1151, 1156	<i>cynodon</i> , <i>Boiga</i> . . . . .	1145
<i>chrysargus</i> , <i>Tropidonotus</i> . . . . .	1156	<i>Cyrtodactylus angularis</i> . . . . .	1041
<i>Chrysopelea ornata</i> . . . . .	1146	<i>brevipalmatus</i> . . . . .	1041
<i>paradisi</i> . . . . .	1044	<i>consobrinoides</i> . . . . .	1041
<i>cinereus</i> , <i>Oligodon</i> . . . . .	1138	<i>intermedius</i> . . . . .	1081
<i>Cnemaspis affinis</i> . . . . .	1041	<i>oldhami</i> . . . . .	1041
<i>siamensis</i> . . . . .	1041	<i>peguensis</i> . . . . .	1041
<i>cocincinus</i> , <i>Physignathus</i> . . . . .	1101	<i>pulchellus</i> . . . . .	1081
<i>collaris triangularis</i> , <i>Sibynophis</i> , . . . . .	1130	<i>Damonia subtrijuga</i> . . . . .	1041
<i>colletti</i> , <i>Rhacophorus</i> . . . . .	1040	<i>Dasia olivacea</i> . . . . .	1112
<i>Coluber ahaetulla</i> . . . . .	1142	<i>davidsonii</i> , <i>Dryocalamus</i> . . . . .	1044
<i>buccatus</i> . . . . .	1159	<i>dawsoni</i> , <i>Lygosoma</i> . . . . .	1102
<i>candidus</i> . . . . .	1162	<i>dendrophila dendrophila</i> , <i>Boiga</i> , . . . . .	1044
<i>korros</i> . . . . .	1136	<i>Dendrophis pictus</i> . . . . .	1142
<i>mucosus</i> . . . . .	1135	<i>dentata</i> , <i>Cyclemys</i> . . . . .	1040
<i>ornatus</i> . . . . .	1146	Dermochelidae . . . . .	1040

	PAGE		PAGE
<i>Dermochelys coriacea</i> .....	1040	<i>Enhydrina schistosa</i> .....	1163
<i>deschauenseei</i> , Natrix .....	1151	<i>Enhydris bocourti</i> .....	1045
<i>diadema</i> , <i>Hydrophis torquatus</i> , .....	1046	<i>chinensis</i> .....	1045
<i>diardi</i> , <i>Typhlops</i> .....	1125	<i>enhydris</i> .....	1159
<i>diardi mülleri</i> , <i>Typhlops</i> .....	1125	<i>jagori</i> .....	1045
Dipsadidae .....	1126	<i>plumbea</i> .....	1159
<i>Dipsas multimaculata</i> .....	1142	<i>smithi</i> .....	1045
<i>rubescens</i> .....	1145	<i>enhydris</i> , <i>Enhydris</i> .....	1159
<i>divergens</i> , <i>Draco</i> 1083, 1084, .....	1085	<i>enhydris</i> , <i>Hydrus</i> .....	1159
<i>Dogania subplana</i> .....	1041	<i>Eretmochelys imbricata</i> .....	1040
<i>doriae</i> , <i>Chirixalus</i> .....	1040	<i>erythraea</i> , <i>Rana</i> .....	1064
<i>doriae</i> , <i>Goniocephalus</i> .....	1042	<i>Eumeces quadrilineatus</i> .....	1110
<i>doriae</i> , <i>Leiolopisma</i> .....	1119	<i>quadrivirgatus</i> .....	1110
<i>doriae</i> , <i>Rana</i> .....	1039	<i>siamensis</i> .....	1109
<i>Draco</i> .....	1083	<i>eunice</i> , <i>Leiolopisma</i> , 1119, 1121, .....	1125
<i>Draco blanfordi</i> .. 1083, 1086, .....	1091	<i>Euprepis brevis</i> .....	1102
<i>cyanolaemus</i> .....	1083, 1085	<i>longicaudata</i> .....	1109
<i>divergens</i> .....	1083, 1084, 1085	<i>macularius</i> .....	1102
<i>fimbriatus</i> .....	1084, 1085	<i>olivaceus</i> .....	1112
<i>formusus</i> .....	1083, 1086	<i>eydouxi</i> , <i>Aepyurus</i> .....	1045
<i>haasei</i> .....	1083, 1084, 1088	<i>fasciatus atriceps</i> , <i>Hydrophis</i> ..	1046
<i>maculatus</i> , 1083, 1084, 1085, .....	1089	<i>fasciatus</i> , <i>Bungarus</i> .....	1045
<i>major</i> .....	1091	<i>fasciatus</i> , <i>Lycodon</i> .....	1044
<i>melanopogon</i> .. 1084, 1086, .....	1093	<i>fasciolatus</i> , <i>Simotes</i> .....	1136
<i>microlepis</i> .....	1083, 1086	<i>feae</i> , <i>Megophrys</i> .....	1077
<i>nigriappendiculata</i> .....	1093	<i>felinus</i> , <i>Aleuroscalabotes</i> .....	1041
<i>punctatus</i> .....	1083, 1086	<i>fimbriatus</i> , <i>Draco</i> .....	1084, 1085
<i>quinquefasciatus</i> .....	1083, 1084	<i>flavescens</i> , <i>Varanus</i> .....	1101
<i>taeniopterus</i> .....	1083, 1086	<i>flaviceps</i> , <i>Bungarus</i> .....	1045
<i>volans</i> .....	1083, 1085	<i>flaviceps</i> , <i>Macropisthodon</i> .....	1045
<i>whiteheadi</i> , 1083, 1084, 1085, .....	1086	<i>flavipunctata</i> , <i>Natrix piscator</i> ..	1151
<i>Dryocalamus davidsoni</i> .....	1044	<i>flavipunctatum</i> , <i>Amphiesma</i> ..	1151
<i>Dracunculus maculatus</i> .....	1089	<i>flavolineata</i> , <i>Elaphe</i> .....	1044
<i>Dryophiops rubescens</i> .....	1145	<i>floweri</i> , <i>Calotes</i> .....	1097
<i>Dryophis mycterizans</i> .....	1148	<i>formosa</i> , <i>Ahaetulla</i> .....	1044
<i>nasutus</i> .....	1148	<i>formosus</i> , <i>Draco</i> .....	1083, 1086
<i>prasinus</i> .....	1147	<i>fowleri</i> , <i>Microhyla</i> .....	1070
<i>pulverulentus</i> .....	1148	<i>frenatus</i> , <i>Hemidactylus</i> .....	1082
<i>xanthozonia</i> .....	1147	<i>garnoti</i> , <i>Hemidactylus</i> .....	1041
<i>dumerilii dumerilii</i> , <i>Varanus</i> ..	1101	<i>gecko</i> , <i>Gekko</i> .....	1083
<i>Elachyglossa gyldenstolpi</i> .....	1039	<i>Gekko gekko</i> .....	1083
<i>Elaphe flavolineata</i> .....	1044	<i>smithii</i> .....	1041
<i>porphyracea porphyracea</i> ..	1044	<i>gecko</i> , <i>Lacerta</i> .....	1083
<i>radiata</i> .....	1134	Gekkonidae .....	1081
<i>taeniura</i> .....	1044	<i>geminatus</i> , <i>Sibynophis</i> .....	1043
Elapidae .....	1162	<i>Geoemyda grandis</i> .....	1041
<i>elongata</i> , <i>Testudo</i> .....	1041	<i>spengleri</i> .....	1040
<i>emma</i> , <i>Calotes</i> .....	1097, 1099	<i>spinosa</i> .....	1040
<i>emys</i> , <i>Testudo</i> .....	1041	<i>trijuga edeniana</i> .....	1041
<i>Engystoma bermmorei</i> .....	1070	<i>glandulosa</i> , <i>Rana</i> .....	1040

	PAGE		PAGE
glutinosus, Ichthyophis . . . . .	1047	enhydrus . . . . .	1159
Glyphoglossus molossus . . . . .	1072	Hydrophiidae . . . . .	1163
Goniocephalus . . . . .	1095	Hydrophis brookei . . . . .	1046
Goniocephalus abbotti . . . . .	1042	caerulescens . . . . .	1166, 1167
armatus armatus . . . . .	1095	cyanocinctus . . . . .	1046
armatus crucigerus . . . . .	1095	fasciatus atriceps . . . . .	1166
lepidogaster . . . . .	1042	holbrookei . . . . .	1166
doriae . . . . .	1042	klossi . . . . .	1046
Gonyosoma oxycephalum . . . . .	1044	mamillaris . . . . .	1164
gracilis gracilis, . . . . .		ornatus ornatus . . . . .	1046
Microcephalophis . . . . .	1045	schistosus . . . . .	1163
gracilis hughi, Callophis . . . . .	1045	torquatus agardi . . . . .	1046
grahami, Sibynophis . . . . .	1134	torquatus diadema . . . . .	1046
gramineus, Trimeresurus . . . . .	1173	Hydrostentor pantherinus . . . . .	1050
grandis, Geoemyda . . . . .	1041	Hydrus granulatus . . . . .	1134
granulatus, Acrochordus . . . . .	1134	Hylidae . . . . .	1039
granulatus, Hydrus . . . . .	1134	Hyla annectens . . . . .	1039
groundwateri, Natrix . . . . .	1151	chalconota . . . . .	1064
guttulata, Calluella . . . . .	1040	erythraea . . . . .	1064
gyldenstolpei, Elachoglossa . . . . .	1039	leucomystax . . . . .	1068
gyldenstolpei, Ophiocincus . . . . .	1043	Ichthyophis glutinosus . . . . .	1047
Gymnodactylus . . . . .	1081	monochrus . . . . .	1047
intermedius . . . . .	1081	imbricata, Eretmochelys . . . . .	1040
pulchellus . . . . .	1081	imprissa, Testudo . . . . .	1041
haasei, Draco . . . . .	1083, 1084, 1088	inas, Natrix . . . . .	1151
haasei, Rana . . . . .	1040	indica, Chitra . . . . .	1041
hamptoni, Pareas . . . . .	1043	indicum, Hinulia . . . . .	1113
Hamadryas hannah . . . . .	1045	indicum, Lygosoma . . . . .	1113
hannah, Hamadryas . . . . .	1045	indicus indicus, Sphenomorphus, . . . . .	1113
hascheana, Rana . . . . .	1039	inornata, Microhyla . . . . .	1040
hardwicki, Lapemis . . . . .	1163	inornatus, Simotes . . . . .	1138
hasselti hasselti, Megophrys . . . . .	1077	intermedius, Cyrtodactylus . . . . .	1081
hasselti, Leptobrachium . . . . .	1077	intermedius, Gymnodactylus . . . . .	1081
helleri, Natrix . . . . .	1152	intestinalis, Maticora . . . . .	1045
Hemidactylus frenatus . . . . .	1082	isodactylus, Riopa . . . . .	1043
garnoti . . . . .	1041	jagori, Enhydris . . . . .	1045
Hemiphylloactylus typus typus, . . . . .	1041	javanicus, Acrochordus . . . . .	1043
herberti, Riopa . . . . .	1043	javanicus, Xenodermus . . . . .	1043
Herpeton tentaculatum . . . . .	1045	jerdoni siamensis, Kerilia . . . . .	1045
heymonsi, Microhyla . . . . .	1040	joynsoni, Oligodon . . . . .	1044
Hieremys annandalii . . . . .	1041	Kalophrynus pleurostigma . . . . .	1040
Hinulia indicum . . . . .	1113	Kaloula mediolineata . . . . .	1040
Homalopsisinae . . . . .	1159	pulchra . . . . .	1072
Homalopsis buccata . . . . .	1159	pulchra pulchra . . . . .	1072
plumbea . . . . .	1159	kanburiensis, Trimeresurus . . . . .	1169
horridus, Philautus . . . . .	1040	kaouthia, Naja naja . . . . .	1162
humeralis, Rana . . . . .	1039	Kerilia jerdoni siamensis . . . . .	1045
hydroides, Bitia . . . . .	1045	klossi, Hydrophis . . . . .	1046
Hydrus caerulescens . . . . .	1167	kochangae, Rana . . . . .	1039



	PAGE		PAGE
kohtaoensis, <i>Leiopisma</i>	1119	<i>indicum</i>	1113
<i>Kolpophis annandalei</i>	1045	<i>quadrupes</i>	1042
<i>koratensis</i> , <i>Riopa</i>	1043	<i>rupicola</i>	1119
<i>korros</i> , <i>Coluber</i>	1136	<i>Mabuya allapallensis</i>	1102
<i>korros</i> , <i>Ptyas</i>	1136	<i>brevis</i>	1102
<i>kuhli</i> , <i>Ptychozoon</i>	1041	<i>longicaudata</i>	1109, 1113
<i>kuhli</i> , <i>Rana</i>	1057	<i>macularia</i>	1102
<i>Lacerta gecko</i>	1083	<i>macularia malcolmi</i>	1103, 1107
<i>laevis martensi</i> , <i>Oxyglossus</i>	1049	<i>macularia postnasalis</i>	1103, 1105
<i>laevis martensii</i> <i>Phrynoglossus</i>	1049	<i>macularia quadrifasciata</i>	1103
<i>laevis</i> , <i>Pareas</i>	1043	<i>madaraszii</i>	1102
<i>Lapemis hardwickii</i>	1163	<i>multifasciata multifasciata</i>	1107
<i>laticeps</i> , <i>Rana</i>	1039	<i>praesigne</i>	1042
<i>Leiopisma</i>	1119	<i>rugifera</i>	1042
<i>doriae</i>	1119	<i>macrodaetylus</i> , <i>Rana</i>	1039
<i>eunice</i>	1119, 1121, 1125	<i>macrodon blythi</i> , <i>Rana</i>	1053
<i>kohtaoensis</i>	1119	<i>Macropisthodon flaviceps</i>	1045
<i>melanostictum</i>	1119, 1125	<i>rhodomelas</i>	1045
<i>pranensis</i>	1119	<i>macrodon</i> , <i>Rana</i>	1053
<i>reevesi</i>	1125	<i>macrognatha macrognatha</i> ,	
<i>reevesi reevesi</i>	1119, 1121	<i>Rana</i>	1054
<i>rupicola</i>	1119	<i>macrops macrops</i> ,	
<i>siamensis</i>	1119, 1123	<i>Pseudoxenodon</i>	1149
<i>tavesae</i>	1119	<i>macrops</i> , <i>Tropidonotus</i>	1149
<i>vittigerum vittigerum</i>	1119	<i>macrotis</i> , <i>Bufo</i>	1039
<i>Lepidochelys olivacea</i>	1040	<i>macularia</i> , <i>Mabuya</i>	1102
<i>lepidogaster</i> , <i>Goniocephalus</i>	1042	<i>macularius</i> , <i>Euprepis</i>	1102
<i>Leptobrachium hasselti</i>	1077	<i>macularius</i> , <i>Pareas</i>	1126
<i>leptoglossa</i> , <i>Rana</i>	1061	<i>maculata</i> , <i>Lissonota</i>	1116
<i>leucomystax</i> , <i>Hyla</i>	1068	<i>maculatus</i> , <i>Draco</i>	1083
<i>leucomystax leucomystax</i> ,			1084, 1085, 1089
<i>Rhacophorus</i>	1068	<i>maculatus</i> , <i>Dracunculus</i>	1089
<i>leucomystax leucomystax</i> ,		<i>maculatus</i> , <i>Sphenomorphus</i>	1113
<i>Polypedates</i>	1068	<i>maculiceps</i> , <i>Callophis</i>	1045
<i>lima</i> , <i>Ooeidozyga</i>	1048	<i>madaraszii</i> , <i>Mabuya</i>	1102
<i>limnocharis</i> , <i>Rana</i>	1051	<i>magnapustulosus</i> , <i>Micrixalus</i>	1066
<i>limnocharis limnocharis</i> , <i>Rana</i>	1051	<i>major</i> , <i>Draco</i>	1091
<i>lineatus</i> , <i>Typhlops</i>	1043	<i>malaccanus</i> , <i>Pareas</i>	1043
<i>Liolepis belliana belliana</i>	1100	<i>malcolmi</i> , <i>Microhyla</i>	1070
<i>lionatus</i> , <i>Ptychozoon</i>	1041	<i>mamillaris</i> , <i>Hydrophis</i>	1166
<i>Lissonota maculata</i>	1116	<i>margaritophorus</i> , <i>Pareas</i>	1126
<i>longicaudata</i> , <i>Mabuya</i>	1109, 1113	<i>martensii</i> , <i>Phrynoglossus</i>	1049
<i>longipes</i> , <i>Megophrys</i>	1077	<i>martensii</i> , <i>Phrynoglossus laevis</i> ,	1049
<i>luctuosa</i> , <i>Rana</i>	1040	<i>mediolineata</i> , <i>Kaloula</i>	1040
<i>Lycodon capucinus</i>	1136	<i>megacephalum</i> , <i>Platysternon</i>	1079
<i>fasciatus</i>	1044	<i>Megalophrys montana aceras</i>	1079
<i>laevis</i>	1044	<i>Megophrys aceras</i>	1077, 1079
<i>subcinctus</i>	1044	<i>carinense</i>	1077
<i>Lygosoma dawsoni</i>	1102	<i>feae</i>	1077

	PAGE		PAGE
hasselti hasselti	1077	nasutus, Dryophis	1148
longipes	1077	Natricinae	1149
nasuta	1077	Natrix	1150
montana aceras	1079	deschauenseei	1151
monticola	1077	groundwateri	1151
pelodytoides	1077	helleri	1152
melanopogon, Draco, 1084, 1086,	1093	inas	1151
melanosticum, Leiopisma, 1119,	1125	modesta	1151
melanostictus, Bufo	1076	percarinata	1151
Micrixalus magnapustulosus	1066	piscator piscator	1151
tenasserimensis	1040	piscator flavipunctata	1151
Microcephalophis gracilis		stolata	1153
gracilis	1045	trianguligera	1151
Microhyla annectens	1040	nebulosus, Monitor	1101
annamensis	1040	nebulosus, Varanus	1101
berdmorei	1070	nebulosus, Varanus bengalensis,	1101
butleri	1040	Nectophryne hosii	1039
fowleri	1070	nicobariensis, Rana	1039
heymonsi	1040	nigriappendiculata, Draco	1093
inornata	1040	nigrocincta, Rhabdophis	1151, 1155
malcolmi	1070	nigrocinctus, Tropidonotus	1155
ornata	1040	nigropalmatus, Rhacophorus	1040
pulchra	1040	nigrovittata, Rana	1061
microlepis, Calotes	1096, 1097	Notochelys platynota	1041
microlepis, Draco	1083, 1086	novae-guinea, Dibamus	1043
microlepis, Tropidophorus	1043	nuchalis, Plagiopholis	1044
miopus, Rana	1039	oldhami, Cyrtodactylus	1041
modesta, Natrix	1151	Oligodon barroni	1044
molossus, Glyphoglossus	1072	cinereus	1138
molurus bivittatus, Python	1043	cyclurus	1136
Monitor nebulosus	1101	joynsoni	1044
monochrous, Ichthyophis	1038	quadrilineatus	1140
monticola, Megophrys	1077	purpurascens	1044
mortenseni, Rana	1039	taeniata	1044
moulhotii, Cyclomys	1040	violaceous	1138
mucosus, Coluber	1135	olivacea, Dasia	1112
mucosus, Ptyas	1135	olivacea, Lepidochelys	1040
mülleri, Typhlops diardi	1125	olivaceous, Euprepis	1112
multifasciata, Mabuya	1107	Oeidozyga lima	1048
multifasciatus, Scincus	1107	ornata, Chrysopelea	1146
multimaculata, Boiga	1142	ornata, Microhyla	1040
multimaculata, Dipsas	1142	ornatus ornatus, Hydrophis	1046
mutilatus, Peropus	1082	ornatus, Coluber	1146
mystaceus, Calotes	1097, 1100	Ophioscincus anguinoides	1043
mycterizans, Dryophis	1148	roulei	1043
Naja naja kaouthia	1162	gyldenstolpei	1043
siamensis	1162	Opisthotropis	1158
naja kaouthia, Naja	1162	atra	1158
nasuta, Megophrys	1077	spenceri	1158

	PAGE		PAGE
oxycephalum, Gonyosoma	1044	porphyracea porphyracea,	
Oxyglossis lima	1048	Elaphe	1044
Oxyglossis laevis martensi	1049	praesigne, Mabuya	1042
palustris, Crocodylus	1081	pranensis, Leiolopisma	1119
pantherina, Rana tigerina	1050	prominans, Rhacophorus	1040
pantherinus, Hydrostentor	1050	prasinus, Dryophis	1147
paradisi, Chrysopelea	1044	Psammodynastes pulverulentus,	1146
Pareas carinatus	1128	Psammophis condensarius	
hampтони	1043	indochinensis	1044
laevis	1043	Pseudorhabdion longiceps	1044
macularius	1126	Pseudoxenodon macrops	
malaccanus	1043	macrops	1149
margaritophorus	1043, 1126	Ptyas mucosus	1135
Parihelicops annamensis	1158	korros	1136
boonsongi	1156	Ptychozoon lionatum	1041
parvus, Bufo	1039	kulli	1041
peguensis, Cyrtodactylus	1041	pulchellus, Cyrtodactylus	1081
Pelamus platurus	1045	pulchra, Callula	1072
Pelochelys bibroni	1041	pulchra, Kaloula	1072
Pelobatidae	1077	pulchra, Microhyla	1040
pelodytoides, Megophrys	1077	pulverulentus, Psammodynastes,	1146
percarinata, Natix	1151	pulverulentus, Dryophis	1148
Peropus mutilatus	1082	punctatus, Draco	1083, 1086
Philautus asper	1040	puniceus, Trimeresurus	1046
bimaculatus	1040	purpurascens, Oligodon	1044
horridus	1040	purpureomaculatus andersoni,	
petersi	1040	Trimeresurus	1046
pictus	1040	purpureomaculatus purpureo-	
vittatus	1040	maculatus, Trimeresurus	1169
Phrynoglossus laevis martensii	1049	Python reticulatus	1043
Physignathus cocincinus	1101	molurus bivittatus	1043
pictus, Dendrophis	1142	quadrilineatum, Plestiodon	1110
pileata, Rana	1039	quadrilineatus, Eumeces	1110
piscator flavipunctata, Natix	1151	quadrilineatus, Oligodon	1140
piscator piscator, Natix	1151	quadrilineatus, Simotes	1140
Plagiopholis nuchalis	1044	quadrivirgatus, Eumeces	1110
platurus, Cosymbotus	1082	quadrivittatum, Siaphos	1042
platurus, Stellio	1082	quadupes, Lygosoma	1042
Platysternidae	1079	quinquefasciatus, Draco	1083, 1084
Platysternon megacephalum	1079	radiata, Elaphe	1134
Plestiodon quadrilineatum	1110	Rana aenea	1039
pleurostigma, Kalophrynus	1040	alticola	1039
plumbea, Enhydris	1159	cancrivora cancrivora	1039
plumbea, Homalopsis	1159	cancrivora raja	1039
Polypedates leucomystax		chalconota	1064
leucomystax	1068	cubitalis	1058
popeorum, Trimeresurus	1169	cyanophlyctis	1039
	1171, 1174;	doriae	1039
porosus, Crocodylus	1081	erythraea	1064

	PAGE		PAGE
glandulosa	1040	roulei, <i>Ophioscincus</i>	1043
haasei	1040	rubescens, <i>Dipsas</i>	1145
hascheana	1039	rubescens, <i>Dryophiops</i>	1145
humeralis	1039	rudicollis, <i>Varanus</i>	1101
kochangae	1039	rufus rufus, <i>Cylindrophis</i>	1043
kuhli	1057	rugifera, <i>Mabuya</i>	1042
laticeps	1039	rupicola, <i>Leiolopisma</i>	1119
limnocharis limnocharis	1051	rupicola, <i>Lygosoma</i>	1119
luctuosa	1040	russelli siamensis, <i>Vipera</i>	1046
macroactyla	1039	salvator salvator, <i>Varanus</i>	1101
macrodon	1053	Sauria scaphiodontophis	1132
macrodon blythi	1053	schistosa, <i>Enhydrina</i>	1163
macrognatha macrognatha	1054	schistosus, <i>Hydrophis</i>	1163
miopus	1039	schneideri, <i>Typhlops</i>	1125
mortenseni	1039	Scincidae	1042
nicobariensis	1039	<i>Scincus multifasciatus</i>	1107
nigrovittata	1061	scriptus, <i>Liopeltis</i>	1044
pileata	1039	siamensis, <i>Cnemaspis</i>	1041
scutigera	1039	siamensis, <i>Crocodilus</i>	1081
signata	1039	siamensis, <i>Crocodylus</i>	1081
tasanae	1039	siamensis, <i>Eumeces</i>	1109
tigerina pantherina	1050	siamensis, <i>Kerilia jerdoni</i>	1045
tigrina pantherina	1050	siamensis, <i>Leiolopisma</i>	1119, 1123
Ranidae	1048	siamensis, <i>Naja</i>	1162
Reptilia	1079	siamensis, <i>Typhlops</i>	1125
reevesi reevesi,		Sibynophinae	1130
<i>Leiolopisma</i>	1119, 1121	<i>Sibynophis collaris triangularis</i> ,	1130
reticulatus, <i>Python</i>	1043	gemminatus	1043
<i>Rhabdophis chrysarga</i>	1151, 1156	grahami	1134
nigricincta	1151, 1155	sinensis	1134
stolata	1151, 1153	<i>Siebenrockiella crassicollis</i>	1041
subminiata	1151	<i>Simotes fasciolatus</i>	1136
subminiata helleri	1151, 1152	inornatus	1138
subminiata subminiata	1045	quadrilineatus	1140
Rhacophoridae	1068	smithi	1136
<i>Rhacophorus bimaculatus</i>	1040	taeniatus	1140
colletti	1040	sinensis, <i>Sibynophis</i>	1134
leucomystax leucomystax	1068	smithi, <i>Enhydris</i>	1045
nigropalmatus	1040	smithi, <i>Gekko</i>	1041
prominatus	1040	smithi, <i>Simotes</i>	1136
rhodomelas, <i>Macropisthodon</i>	1045	spenceri, <i>Opisthotropis</i>	1158
rhodostoma, <i>Agkistrodon</i>	1168	spengleri, <i>Geoemyda</i>	1040
rhodostoma, <i>Trigonocephalus</i>	1168	spinosa, <i>Geoemyda</i>	1040
rhyncops, <i>Cerberus</i>	1045	<i>Sphenomorphus indicus</i>	1113
<i>Riopa bowringi</i>	1043	indicus indicus	1113
herberti	1043	maculatus	1116
koratense	1043	zebratus	1115
isodactyla	1043	stejnegeri, <i>Trimeresurus</i>	1169
robinsoni, <i>Tropidophorus</i>	1043	<i>Stellio platurus</i>	1082

	PAGE		PAGE
stolata, <i>Natrix</i> .....	1153	microlepis .....	1043
stolata, <i>Rhabdophis</i> .....	1151, 1153	robinsoni .....	1043
subcinctus, <i>Lycodon</i> .....	1044	thai .....	1043
subminiata <i>helleri</i> , <i>Natrix</i> .....	1151	<i>Tylototriton verrucosus</i> .....	1038
subminiata subminiata, <i>Natrix</i> ..	1151	Typhlopidae .....	1125
subminiata <i>helleri</i> , <i>Rhabdophis</i> , ..	1152	<i>Typhlops albiceps</i> .....	1043
subminiata, <i>Rhabdophis</i> .....	1151	braminus .....	1043
subocularis, <i>Ahaetulla</i> .....	1044	diardi .....	1125
subplana, <i>Dogiana</i> .....	1041	diardi mülleri .....	1125
subtrijuga, <i>Damonia</i> .....	1041	floweri .....	1043
taeniatus, <i>Oligodon</i> .....	1044	lineatus .....	1043
taeniatus, <i>Simotes</i> .....	1140	mülleri .....	1125
taeniopterus, <i>Draco</i> .....	1083, 1086	schneideri .....	1125
taeniura, <i>Elaphe</i> .....	1044	siamensis .....	1125
<i>Takydromus sexlineatus</i> .....	1042	typus typus,	
tasanea, <i>Rana</i> .....	1039	<i>Hemiphyllodaectylus</i> .....	1041
tavesae, <i>Leiopisma</i> .....	1119	unicolor, <i>Xenopeltis</i> .....	1043
tentaculatum, <i>Herpeton</i> .....	1045	<i>Uromystax belliana</i> .....	1100
tenasserimensis, <i>Micrixalus</i> .....	1040	Varanidae .....	1101
Testudines .....	1079	<i>Varanus bengalensis nebulosus</i> , ..	1101
Testudinidae .....	1040	<i>dumerilii dumerilii</i> .....	1101
<i>Testudo elongata</i> .....	1041	<i>flavescens</i> .....	1101
<i>emys</i> .....	1041	<i>nebulosus</i> .....	1101
<i>impressa</i> .....	1041	<i>rudicollis</i> .....	1101
thai, <i>Tropidophorus</i> .....	1043	<i>salvator salvator</i> .....	1101
<i>Thalassophis anomalus</i> .....	1045	<i>vermiformis</i> , <i>Calamaria</i> .....	1044
<i>Thalassophina viperina</i> .....	1163	<i>verrucosus</i> , <i>Tylototriton</i> .....	1038
<i>Thalassophis viperina</i> .....	1163	<i>versicolor</i> , <i>Agama</i> .....	1098
<i>tigerina pantherina</i> , <i>Rana</i> .....	1050	<i>versicolor</i> , <i>Calotes</i> .....	1097, 1098
<i>tigrina pantherina</i> , <i>Rana</i> .....	1050	<i>violaceus</i> , <i>Oligodon</i> .....	1138
<i>tigrina lateralis</i> , <i>Rhabdophis</i> ..	1151	<i>Vipera russelli siamensis</i> .....	1046
<i>trianguligera</i> , <i>Natrix</i> .....	1151	Viperidae .....	1046
<i>angularis</i> , <i>Sibynophis collaris</i> , ..	1130	<i>viperina</i> , <i>Thalassophina</i> .....	1163
<i>Triglyphodon cyaneum</i> .....	1143	<i>viperina</i> , <i>Thalassophis</i> .....	1163
<i>Trigonocephalus rhodostoma</i> ..	1168	<i>vittatus</i> , <i>Philautus</i> .....	1040
<i>trijuga edeniana</i> , <i>Geoemyda</i> ..	1041	<i>vittigerum vittigerum</i> ,	
<i>Trimeresurus</i> .....	1168	<i>Leiopisma</i> .....	1119
<i>albolabris</i> .....	1169	<i>volans</i> , <i>Draco</i> .....	1083, 1085
<i>gramineus</i> .....	1173	<i>wagleri wagleri</i> , <i>Trimeresurus</i> ..	1046
<i>kanburiensis</i> .....	1169	<i>whiteheadi</i> , <i>Draco</i> .....	1083
<i>poeporum</i> .....	1169, 1171, 1174	1084, 1085, 1086	
<i>purpureomaculatus</i> .....		<i>xanthozona</i> , <i>Dryophis</i> .....	1147
<i>purpureomaculatus</i> .....	1169	<i>Xenoderminae</i> .....	1043
<i>stejnegeri</i> .....	1169	<i>Xenodermis javanicus</i> .....	1043
<i>Tropidonotus chrysargus</i> .....	1156	Xenopeltidae .....	1043
<i>macrops</i> .....	1149	<i>Xenopeltis unicolor</i> .....	1043
<i>nigrocinctus</i> .....	1155	<i>Zaocys carinatus</i> .....	1044
<i>Tropidophorus berdmorei</i> .....	1043	<i>zebratus</i> , <i>Sphenomorphus</i> .....	1115