

Article VIII.—NOTES ON REPTILES FROM FUKIEN AND
OTHER CHINESE PROVINCES¹

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PLATES XVII TO XX; TEXT FIGURES 1 to 19; 2 MAPS

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INTRODUCTION

This is a preliminary report on the reptiles collected by the Central Asiatic Expeditions of The American Museum of Natural History, but not included in Karl P. Schmidt's 'Notes on Chinese Reptiles,' and 'Reptiles of Hainan' (American Museum Bulletin, 1927). Schmidt's reports deal not only with the earlier Central Asiatic Expeditions' collections but with all the other Chinese material in the American Museum as well.

'Notes on Chinese Reptiles' is a report including 1603 specimens from the mainland, all but 116 of which were secured by American Museum expeditions. 'Reptiles of Hainan' reports on 1580 specimens collected by myself on that island for the Central Asiatic Expeditions during 1922 and 1923.

The present paper deals with some 2700 specimens, the vast majority of which I collected in Fukien and Kiangsi Provinces during 1925 and 1926. Those from Chihli and Shantung Provinces were secured by Wang Fa-hsiang, a native collector whom I trained personally, while Walter Granger collected several very interesting specimens in Yunnan Province. A few others were secured through various sources.

I am deeply indebted to Dr. Roy Chapman Andrews for the opportunity of serving for four years on the field staff of his Central Asiatic Expeditions. Mr. Karl P. Schmidt has gone over my first draft of the manuscript in detail, and with him I have discussed every problem. Many of his suggestions have been incorporated in the paper, and he has corrected several mistakes and called my attention to numerous oversights. For his invaluable help I am indeed grateful. Dr. G. Kingsley Noble has read the manuscript, and discussed many points with me, thus rendering valuable aid.

SUMMARY OF MATERIAL TREATED

Listed systematically, the 2749 reptiles, representing 13 families, 48 genera, and 96 forms, are distributed as follows:

	Genera	Forms	Specimens
TURTLES			
Platysternidæ	1	1	6
Testudinidæ	2	3	50
Trionychidæ	2	2	80
Total	5	6	136
LIZARDS			
Gekkonidæ	2	5	229
Agamidæ	1	1	52
Anguidæ	1	1	32 + 4 ¹
Lacertidæ	3	4	263 + 6
Scincidæ	5	8	489 + 6
Total	12	19	1065 + 16
SNAKES			
Typhlopidae	1	1	5
Pythonidæ	1	1	1
Colubridæ (<i>sens. lat.</i>)	26	63	1421 + 7
Hydrophiidæ	1	1	3
Crotalidæ	2	5	118 + 2
Total	31	71	1548 + 9

The following table shows the number of specimens taken in each locality or group of minor localities.

Locality	TURTLES		LIZARDS		SNAKES	
	Specimens	Forms	Specimens	Forms	Specimens	Forms
Futsing Hsien	51	3	85	6	343	26
Yenping	1	1	224	9	288	26
Ch'ungan Hsien	6	1	459 + 16	12	599 + 9	45
Other Fukien Localities	30	5	1	1	22	8
Kiangsi Localities	14	2	30	3	47	14
Chihli Localities	12	1	113	2	135	6
Shantung Localities	21	2	136	2	93	5
Yunnan Localities	0	0	17	2	14	10
Hunan, Mongolia, and Szechwan	1	1			7	4
Total	136		1065 + 16		1548 + 9	

¹Numbers following plus signs refer to embryonic series.

LIST OF NEW FORMS AND TYPE LOCALITIES

LIZARDS

<i>Gekko japonicus hokouensis</i>	Hok'ou	Kiangsi
<i>Apeltonotus sylvaticus</i>	Ch'ungan Hsien,	Fukien

SNAKES

<i>Pseudozenodon striaticaudatus</i>	Ch'ungan Hsien,	Fukien
<i>Pseudozenodon karlschmidti</i>	Ch'ungan Hsien,	Fukien
<i>Pseudozenodon fukienensis</i>	Ch'ungan Hsien,	Fukien
<i>Zaocys dhumnades montanus</i>	Ch'ungan Hsien,	Fukien
<i>Opisthotropis kuatunensis</i>	Ch'ungan Hsien,	Fukien
<i>Dinodon futsingensis</i>	Futsing Hsien,	Fukien
<i>Dinodon flavozonatum</i>	Ch'ungan Hsien,	Fukien
<i>Amblycephalus niger</i>	Yunnanfu,	Yunnan
<i>Hemibungarus kelloggi</i>	Ch'ungan Hsien,	Fukien
<i>Bungarus wanghaotingi</i>	Yuan Kiang,	Yunnan

LOCALITIES MENTIONED IN THIS PAPER

The following table will serve to locate the places from which the specimens come.

LOCALITY	SITUATION	PROVINCE
Amoy	Southeastern coast	Fukien
Ch'ienshan Hsien (Yuanshan)	Northeast, adjacent to Ch'ungan Hsien	Kiangsi
Ch'ungan City	On plateau of northwest	Fukien
Ch'ungan Hsien	Northwest, adjacent to Kiangsi	"
Foochow	Mouth of Min River	"
Futsing Hsien	On coast directly south and east of Foochow	"
Hok'ou (Hokow)	Northeastern corner	Kiangsi
Hsin Kai	Southwest of Yunnanfu	Yunnan
Kienning	On northern branch of Min River, north and a little east of Yenping	Fukien
Kienyang	On Ch'ungan branch of Min River, north and a little west of Yenping	"
Kolobolchi Nor		Mongolia
Kuatun	Village in mountains of Ch'ungan Hsien	Fukien
Nanan	Extreme southwestern corner	Kiangsi
Peking		Chihli
Pingshiang (Pingsiang)	Near western boundary	Kiangsi
San Chiang	Village in mountains of Ch'ungan Hsien, near to but lower than Kuatun	Fukien
Shaowu	Mountains of northwest; southwest of Kuatun	Fukien
Tsinan	North central; provincial capital	Shantung
Wanh sien	On Yangtze River, in extreme east	Szechwan

LOCALITY	SITUATION	PROVINCE
Western Hills	Just west of Peking	Chihli
Wu Ting Hsien	Southwest of Yunnanfu	Yunnan
Yenping	North central	Fukien
Yuan Kiang	Southwest; on Yuan or Red River	Yunnan
Yunnanfu	East central	"

Cities of certain political importance are called "fu" cities. When writing the names of such the "fu" is often left off of the end. For example, Yenping may be properly written Yenpingfu. It is immaterial whether many names are written as one or more words; for example, Wuting is the same as Wu Ting or Wu Ting Hsien. The suffix "hsien" indicates another grade of political importance and, like "fu," may be omitted. The area under the jurisdiction of a "hsien" or "fu" city also goes by the same name as the city itself. Ch'ungan may mean the city of that name or the area in which the city stands.

There is much confusion as to the proper romanization of Chinese names. I have used the spelling found on the Postal Map of China in nearly every case. Where I have departed from this accepted standard I have put in the list of localities the Postal Map spelling in parenthesis following the one I use.

After making a careful study of the Chinese reptiles in the American Museum, Mr. Schmidt was convinced that Fukien should be considered the key province for zoögeographic studies in Chinese herpetology. This is because it lies in an intermediate region, its northwestern part coming within the range of some northern and many central Chinese forms, its western mountain system bringing it into the typical Himalaya-Chinese distributional area, while its coastal plains are invaded by many purely tropical species. Moreover, it is in many sections almost untouched by the hand of man. In these regions primeval conditions prevail and wild life lives on in safety quite unconscious of the proximity of the most thickly settled and highly civilized sections of the earth, the alluvial plains of central and southern China.

Following Mr. Schmidt's advice I set out from New York in January, 1925, with Fukien as my objective. I did not arrive in Foochow until late in March. From April 1925, through September 1926, I continued to collect and study the reptiles, amphibians, fishes and mammals of northern Fukien. The amphibians and fishes will be studied later but reports on the mammals by Glover M. Allen are already appearing.

The following outline will give a more definite idea of my periods and places of active collecting.

Yenping	April 12,	through	June 2, 1925
Ch'ungan Hsien	June 12,	"	July 20, 1925
Futsing Hsien	August 24,	"	October 5, 1925
Ch'ungan Hsien	April 25,	"	September 3, 1926

While working in Ch'ungan Hsien I sent a collector to Hok'ou, Kiangsi, to get the commoner forms there. Specimens from Ch'ungan City, Kienyang, Kienning, and Foochow were taken at odd times either by myself or one of the men directly in my employ.

The method of collecting was much the same everywhere. Immediately upon arrival at a new place I would ask if any professional snake catchers, fishermen, etc., lived near and if any were found I would try to hire them. Then my own collectors would organize all idlers and ambitious boys, and teach them to catch and bring in the rarer forms. In addition, they, themselves, would take turns going out to get specimens, but one or two always had to act as receivers in camp. My own time was largely reserved for reconnaissance, special night studies of habits, and so forth.

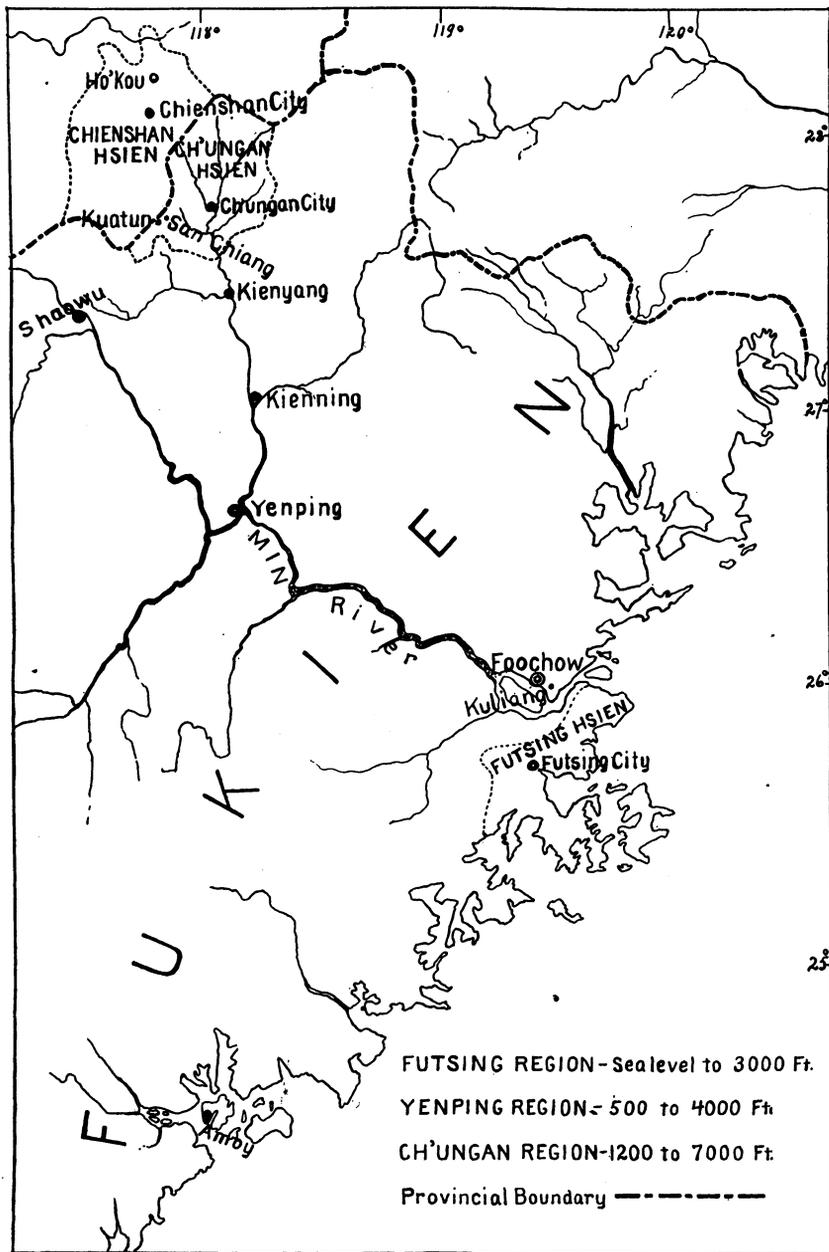
DESCRIPTION OF FUKIEN AND ITS THREE PRINCIPAL LOCALITIES

Fukien is one of China's "Eighteen Provinces." Located on the southeastern coast, it is bounded by the Formosan Strait on the east, Chekiang on the north, Kiangsi on the west, and Kwangtung on the south. It is roughly quadrangular in shape and set obliquely, the northwestern corner being a little east of the southeastern. With the exception of the four corners it lies wholly within the area bounded by the 24th and 28th parallels of north latitude, and the 116th and 120th meridians of east longitude.

In southeastern China, from southern Anhwei southward through Chekiang, Kiangsi (excepting the flat country in the Poyang Lake region) Fukien, and much of Kwangtung, there arise endless chains of steep, rugged mountains from three to more than seven thousand feet high. The wildest and highest ranges follow inland provincial boundaries, while along the sea the lowest regions are found.

It is obvious that an area lying just north of the Tropic of Cancer, having great altitudinal differences resulting from ranges extending often north and south, and an extensive coast line, would possess a rich and interesting fauna and flora. Fukien is just such an area and it will soon be shown that it is in nowise disappointing.

To the Chinese mind the name Fukien is almost synonymous with the word mountains. This, moreover, is a true conception. The deeply



Map 2.—Eastern Fukien showing the region in which intensive collecting was carried on by the Central Asiatic Expedition during 1925 and 1926.

indented coast, a result of subsidence, is no less rugged and hilly, though here the low mountains are broken by broad plains. The mountains increase and the plains diminish until, along the western border, high, steep ranges almost completely intercept transportation. In these mountains, peaks rise to 7000 feet or more, and sparsely settled, primeval forests abound. The ranges here in general extend from southwest to northeast. From the coast there is a general rise until in the northwest the mountains themselves take off from a plateau some 1200 feet above sea-level.

The northern half of the province, that region with which this paper directly deals, is drained for the most part by the Min River system. The headwaters of this river arise along the Fukien-Kiangsi boundary and descend as several streams before uniting at Yenping to form the Min.

The foregoing tables make it evident that only three localities are of relatively great importance. These are worthy of separate treatment. In order of importance they are:

CH'UNGAN HSIEN

Ch'ungan City, Kuatun, and San Chiang are all included in this area. In the neighborhood of Ch'ungan City there is a large, open plateau very highly cultivated. Interesting specimens are here extremely rare. Traveling westward one soon enters the Kuatun mountains where possibly the highest ridges of the entire Province are found. Kuatun itself is situated in a wide valley just below the highest peak of the region, while San Chiang, perhaps 1200 feet lower, is in a valley through which an interprovincial highway passes. The pass into Kiangsi is known as T'ung Mu Kuan.

Kuatun is famous as the collecting ground of both Abbé Armand David and Mr. J. D. La Touche. Mr. Outram Bangs of the Museum of Comparative Zoölogy, Cambridge, has supplied me with a list of 27 forms of birds with Kuatun as the common type locality. Seven reptiles have previously been described from there:

<i>Ophisaurus harti</i>	La Touche Collection
<i>Natrix percarinata</i>	“ “
<i>Natrix craspedogaster</i>	“ “
<i>Tapinophis latouchi</i>	“ “
<i>Trirhinopholis styani</i>	“ “
<i>Amblycephalus stanleyi</i>	Secured by Stanley
<i>Coronella bella</i>	“ “ “

This by no means exhausts the Kuatun new species list but only serves to give a proper conception of the scientific importance of this remote mountain village.

I have thought it wise to substitute in this paper Ch'ungan Hsien for Kuatun. The former term is more accurate because of the extreme zeal of the Kuatun collectors. Large numbers of the snakes brought in by them were not taken about Kuatun but miles off in the neighboring mountains. People from nearby villages also supplied us in part and it was impossible to tell the exact direction the specimen had come from.

Boulenger records some lowland species as coming from Kuatun but in all probability they were taken by collectors when on a trip down to the plateau after supplies and brought back as local specimens. Even though these men move around locally on hunts, and when fetching plateau rice, they seldom leave the hsien, so the danger of wrong localities is negligible when hsien names are used.

YENPING

This city, situated where the main branches unite to form the Min River, has been visited by botanists as well as zoölogists. Caldwell, Sowerby, and Andrews have collected here with good results. The waterfront of the town is only about 500 feet above sea-level, while the forested mountains six or eight miles west of the city reach an altitude of more than 4200 feet. Thus specimens from a great range in altitude may be taken.

FUTSING HSIEN

In this area an even mixture of seaside plains and low, rugged mountains one to three thousand feet high is found. It lies immediately south and east of Foochow, so the two localities are relatively close to each other.

ANALYSIS OF FUKIEN REPTILE FAUNA

It has been suggested in the foregoing pages that Fukien comes within several zoögeographic distributional areas. The following analysis should illustrate clearly the richness, complexity, and relative importance of its fauna.

The collections of the American Museum total seventy-seven species from Fukien. I have collected all but one of these (*Natrix helleri*). The list follows.¹

¹Marine forms are not taken into consideration here.

TURTLES

Platysternon megacephalum
Clemmys bealii
Geoclemys reevesii

Amyda tuberculata
Pelochelys cantorii

LIZARDS

Gekko japonicus
Gekko japonicus hokouensis
Gekko subpalmatus
Hemidactylus bowringii
Acanthosaura lamnidentata
Ophisaurus harti
Apeltonotus sylvaticus
Takydromus septentrionalis

Takydromus septentrionalis meridionalis
Sphenomorphus boulengeri
Sphenomorphus formosensis
Sphenomorphus indicus
Lygosaurus sowerbyi
Leiopisma modestum
Eumeces chinensis
Eumeces elegans

SNAKES

Typhlops braminus
Sibynophis collaris chinensis
Natrix æquifasciata
Natrix annularis
Natrix percarinata
Natrix craspedogaster
Natrix stolata
Natrix piscator
Natrix tigrina lateralis
Natrix helleri
Pseudozenodon bambusicola
Pseudozenodon striaticaudatus
Pseudozenodon fukienensis
Pseudozenodon karlschmidti
Zaocys dhumnades montanus
Ptyas korros
Ptyas mucosus
Tapinophis latouchi
Opisthotropis kuatunensis
Trirhinopholis styani
Dinodon futsingensis
Dinodon ruhstrati
Dinodon rufozonatum williamsi
Dinodon flavozonatum
Achalinus spinalis
Elaphe carinata
Elaphe kreyenbergi
Elaphe mandarina

Elaphe porphyracea porphyracea
Elaphe tzeniura yunnanensis
Gonyosoma melli
Liopeltis major
Macropisthodon rudis
Holarchus chinensis
Holarchus violaceus
Holarchus formosensis
Holarchus musyi
Holarchus (sp.?)
Calamaria septentrionalis
Enhydris plumbea
Enhydris chinensis
Boiga sinensis
Boiga multimaculata
Amblycephalus kuan tungensis
Amblycephalus stanleyi
Psammodynastes pulverulentus
Calliophis macclendani
Hemibungarus kelloggi
Bungarus multicinctus
Naja hannah
Naja naja atra
Agkistrodon acutus
Trimeresurus monticola
Trimeresurus mucrosquamatus
Trimeresurus gramineus gramineus
Trimeresurus gramineus stejnegeri

With the following addition of eight species recorded from Fukien, but not found in the American Museum collection from there, the list of Fukien reptiles is completed.

TURTLES

Ocadia sinensis (Stanley, 1914; Stejneger, 1925)

SNAKES

Python bivittatus (Stanley, 1914)
Opisthotropis maxwelli (Boulenger, 1914)
Elaphe climacophora (Stanley, 1914)
Holarchus cyclurus (Stanley, 1914)
Holarchus vaillanti (Stanley, 1914; Roux, 1919)
Coronella bella (Stanley, 1914, 1916)
Chrysopelea ornata (Stanley, 1914)

Stanley's records, especially for *Coronella bella* and *Elaphe climacophora*, require confirmation. The python, however, is well known in Fukien (see *Python bivittatus*, p. 388).

From the foregoing it is evident that definite records for some eighty-five species of reptiles inhabiting Fukien exist. Subsequent collecting will certainly increase that number and a more careful study of the present literature might even add a few.

Twenty-two species cannot well be included in a general consideration of distribution because they are known from too few localities. These are:

LIZARDS

<i>Gekko japonicus hokouensis</i>	<i>Sphenomorphus formosensis</i>
<i>Apeltonotus sylvaticus</i>	<i>Lygosaurus sowerbyi</i>
<i>Sphenomorphus boulengeri</i>	<i>Leiolopisma modestum</i>

SNAKES

<i>Pseudozenodon striaticaudatus</i>	<i>Holarchus musyi</i>
<i>Pseudozenodon fukienensis</i>	<i>Holarchus vaillanti</i>
<i>Pseudozenodon karlschmidti</i>	<i>Holarchus</i> (species?)
<i>Opisthotropis kuatunensis</i>	<i>Chrysopelea ornata</i>
<i>Opisthotropis maxwelli</i>	<i>Boiga sinensis</i>
<i>Elaphe climacophora</i>	<i>Coronella bella</i>
<i>Dinodon futsingensis</i>	<i>Amblycephalus stanleyi</i>
<i>Dinodon flavozonatum</i>	<i>Hemibungarus kelloggi</i>

This reduces the eighty-five to sixty-three. Three of the sixty-three do not prove helpful. One of them, *Amyda tuberculata*, has baffled all attempts at definite classification because it has doubtless been carried about all over China by man. It may be left out of the discussion. *Gekko japonicus*, widely distributed in the East, probably has also been spread by boats and will not shed valuable light on the problem at hand. *Geoclemys reevesii*, also found both in the north and south of eastern China, as well as in southern Japan, can hardly be considered helpful.

The remaining sixty forms when analyzed lead us to interesting conclusions. These conclusions are arrived at directly through a study of the following tables.

I.—FUKIEN FORMS OF KNOWN RANGE LISTED ACCORDING TO
LATITUDINAL DISTRIBUTION

(*Amyda tuberculata*, *Geoclemys reevesii*, *Gekko japonicus*, *Natrix tigrina lateralis* excepted)

SOUTHERN CHINESE FORMS	CENTRAL CHINESE FORMS	FORMS FROM BOTH SOUTHERN AND CENTRAL CHINA
<i>Platysternon megacephalum</i>		
<i>Ocadia sinensis</i>		
<i>Clemmys bealii</i>		
<i>Pelochelys cantorii</i>		
	<i>Gekko subpalmatus</i>	
<i>Hemidactylus bowringii</i>		
<i>Acanthosaura lamnidentata</i>		
<i>Takydromus sexlineatus meridionalis</i>		<i>Ophisaurus harti</i>
		<i>Takydromus septentrionalis</i>
		<i>Sphenomorphus indicus</i>
		<i>Eumeces chinensis</i>
		<i>Eumeces elegans</i>
<i>Typhlops braminus</i>		
<i>Python bivittatus</i>		
<i>Natrix æquifasciata</i>		<i>Sibynophis collaris chinensis</i>
		<i>Natrix annularis</i>
		<i>Natrix percarinata</i>
<i>Natrix stolata</i>	<i>Natrix craspedogaster</i>	
<i>Natrix piscator</i>		
<i>Natrix helleri</i>		
<i>Pseudozenodon bambusicola</i>		
<i>Ptyas korros</i>	<i>Zaocys dhumnades montanus</i>	
<i>Ptyas mucosus</i>		
<i>Tapinophis latouchi</i>	<i>Trirhinopholis styani</i>	
	<i>Dinodon ruhstrati</i>	
	<i>Dinodon rufozonatum williamsi</i>	
	<i>Achalinus spinalis</i>	
	<i>Elaphe carinata</i>	
	<i>Elaphe mandarina</i>	<i>Elaphe kreyenbergi</i>
<i>Elaphe porphyracea porphyracea</i>		

SOUTHERN CHINESE FORMS	CENTRAL CHINESE FORMS	FORMS FROM BOTH SOUTHERN AND CENTRAL CHINA
		<i>Elaphe tæniura yunnanensis</i>
		<i>Gonyosoma melli</i>
		<i>Liopeltis major</i>
	<i>Macropisthodon rudis</i>	<i>Holarchus chinensis</i>
<i>Holarchus cyclurus</i>		
<i>Holarchus violaceus</i>		
<i>Holarchus formosensis</i>		
<i>Enhydris plumbea</i>		<i>Calamaria septentrionalis</i>
<i>Boiga multimaculata</i>		<i>Enhydris chinensis</i>
<i>Psammodynastes pulverulentus</i>		<i>Amblycephalus kuangtungensis</i>
		<i>Calliophis macclelandii</i>
<i>Naja hannah</i>		<i>Bungarus multicinctus</i>
		<i>Naja naja atra</i>
		<i>Trimeresurus monticola</i>
		<i>Trimeresurus mucrosquamatus</i>
		<i>Trimeresurus gramineus stejnegeri</i>

Natrix tigrina lateralis is the one species that reaches Fukien from the north. Its southern limit is in the Ch'ungan highlands.

II.—FUKIEN FORMS OF KNOWN RANGE LISTED ACCORDING TO LONGITUDINAL DISTRIBUTION, INCLUDING ALL FORMS COMMON TO FUKIEN AND FORMOSA

(*Amyda tuberculata*, *Geoclemys reevesii*, *Gekko japonicus*, *Natrix tigrina lateralis* excepted)

FORMS KNOWN FROM FORMOSA	FUTSING FORMS NOT FOUND IN FORMOSA AND WEST	FORMS KNOWN FROM SZE- CHWAN AND YUNNAN, AND LOCALITIES AS FAR WEST AS THESE PROVINCES ¹
	<i>Platysternon megacephalum</i>	
	<i>Ocadia sinensis</i>	
	<i>Clemmys bealii</i>	
	<i>Pelochelys cantorii</i>	
<i>Hemidactylus bowringii</i>		<i>Hemidactylus bowringii</i>
<i>Ophisaurus harti</i>	<i>Ophisaurus harti</i>	<i>Acanthosaura lamnidentata</i>
<i>Takydromus septentrionalis</i>		<i>Takydromus septentrionalis</i>
		<i>Takydromus sexlineatus meridionalis</i>
<i>Sphenomorphus boulengeri</i>		

¹This, of course, refers to localities in western China or those reasonably near the southern or western border, and occasionally the "Eastern Himalayas."

FORMS KNOWN FROM FORMOSA	FUTSING FORMS NOT FOUND IN FORMOSA AND WEST	FORMS KNOWN FROM SZE- CHWAN AND YUNNAN, AND LOCALITIES AS FAR WEST AS THESE PROVINCES ¹
<i>Sphenomorphus formosensis</i> <i>Sphenomorphus indicus</i>		<i>Sphenomorphus indicus</i>
	<i>Lygosaurus sowerbyi</i>	
<i>Eumeces chinensis</i> <i>Eumeces elegans</i> <i>Typhlops braminus</i>		<i>Eumeces chinensis</i> <i>Eumeces elegans</i>
<i>Sibynophis collaris chinensis</i>		<i>Python bivittatus</i> <i>Sibynophis collaris chinensis</i>
	<i>Natrix xequifasciata</i>	
<i>Natrix annularis</i>		<i>Natrix annularis</i> <i>Natrix percarinata</i> <i>Natrix stolata</i> <i>Natrix piscator</i> <i>Natrix helleri</i>
<i>Natrix stolata</i> <i>Natrix piscator</i>		
	<i>Pseudoxenodon bambusicola</i>	
<i>Ptyas korros</i> <i>Ptyas mucosus</i>		<i>Ptyas korros</i> <i>Ptyas mucosus</i> <i>Tapinophis latouchi</i> <i>Trirhinopholis styani</i>
<i>Dinodon rukstrati</i> <i>Dinodon rufozonatum</i> (?)		
<i>Elaphe carinata</i>		<i>Achalinus spinalis</i> <i>Elaphe carinata</i> <i>Elape kreyenbergi</i> <i>Elaphe mandarina</i> <i>Elaphe porphyracea</i> <i>porphyracea</i> <i>Elaphe tæniura yunnanensis</i> <i>Liopeltis major</i> <i>Macropisthodon rudis</i> <i>Holarchus chinensis</i> <i>Holarchus violaceus</i>
<i>Elaphe tæniura yunnanensis</i> <i>Liopeltis major</i> <i>Macropisthodon rudis</i>		
<i>Holarchus formosanus</i> <i>Enhydris plumbea</i>		<i>Enhydris plumbea</i> <i>Enhydris chinensis</i>
	<i>Boiga multimaculata</i>	
<i>Psammodynastes pulverulentus</i> <i>Calliophis macclellandii</i> <i>Bungarus multicinctus</i>		<i>Psammodynastes pulverulentus</i> <i>Calliophis macclellandii</i> <i>Bungarus multicinctus</i>

¹This, of course, refers to localities in western China or those reasonably near the southern or western border, and occasionally the "Eastern Himalayas."

FORMS KNOWN FROM
FORMOSA

Naja naja atra
Agkistrodon acutus
Trimeresurus monticola
Trimeresurus mucrosquamatus
Trimeresurus gramineus
gramineus
Trimeresurus gramineus stejnegeri

FORMS KNOWN FROM SZE-
CHWAN AND YUNNAN, AND
LOCALITIES AS FAR WEST AS
THESE PROVINCES¹

Naja hannah
Agkistrodon acutus
Trimeresurus monticola
Trimeresurus mucrosquamatus

Trimeresurus gramineus
gramineus
Trimeresurus gramineus stejnegeri

III.—DISTRIBUTION OF FORMS WITHIN FUKIEN²FUTSING HSIEN AND
FOOCHOW

YENPING REGION

CH'UNGAN HSIEN, HOK'OU,
AND CH'IENTSHAN HSIEN

TURTLES

Platysternon megacephalum
[Ocadia sinensis]
Clemmys bealii
Geoclemys reevesii
Amyda tuberculata
Pelochelys cantorii

Amyda tuberculata

Geoclemys reevesii
Amyda tuberculata

LIZARDS

(*Gekko janonicus*)

[*Gekko subpalmatus*]³
Hemidactylus bowringii

Gekko subpalmatus
Hemidactylus bowringii
Acanthosaura lamnidentata

Gekko japonicus hokouensis
Gekko subpalmatus

Acanthosaura lamnidentata

[*Ophisaurus harti*]

Ophisaurus harti
Apeltonotus sylvaticus?

Takydromus septentrionalis

Takydromus septentrionalis

Takydromus septentrionalis

Takydromus sexlineatus meridionalis

[*Takydromus sexlineatus meridionalis*]

Takydromus sexlineatus meridionalis

Sphenomorphus boulengeri

Sphenomorphus boulengeri
Sphenomorphus formosensis

Sphenomorphus indicus

Sphenomorphus indicus

Lygosaurus sowerbyi

Leiolopisma modestum

Leiolopisma modestum

¹This, of course, refers to localities in western China or those reasonably near the southern or western border, and occasionally the "Eastern Himalayas."

²Those enclosed in parentheses are not in the present collection, while the bracketed forms are not represented in the American Museum collection.

³The "Foochow" record of these mountain species I doubt. The specimens were probably brought to Foochow from the mountains of the interior.

FUTSING HSIEN AND FOOCHOW	YENPING REGION	CH'UNGAN HSIEN, HOK'OU, AND CH'IENTSHAN HSIEN
	LIZARDS (<i>Continued</i>)	
<i>Eumeces chinensis</i>	<i>Eumeces chinensis</i> <i>Eumeces elegans</i>	<i>Eumeces chinensis</i> <i>Eumeces elegans</i>
	SNAKES	
<i>Typhlops braminus</i>	(<i>Typhlops braminus</i>) [<i>Python bivittatus</i>]	
<i>Sibynophis collaris chinensis</i>	<i>Sibynophis collaris chinensis</i>	<i>Sibynophis collaris chinensis</i>
<i>Natrix æquifasciata</i>	<i>Natrix æquifasciata</i>	
<i>Natrix annularis</i>	<i>Natrix annularis</i>	<i>Natrix annularis</i>
<i>Natrix percarinata</i>	<i>Natrix percarinata</i> <i>Natrix craspedogaster</i>	<i>Natrix percarinata</i> <i>Natrix craspedogaster</i>
<i>Natrix stolata</i>	<i>Natrix stolata</i>	<i>Natrix stolata</i>
<i>Natrix piscator</i>	<i>Natrix piscator</i>	<i>Natrix piscator</i> <i>Natrix trigrina lateralis</i>
	(<i>Natrix helleri</i>)	
<i>Pseudozenodon bambusicola</i>	<i>Pseudozenodon bambusicola</i>	<i>Pseudozenodon striaticaudatus</i> <i>Pseudozenodon fukienensis</i> <i>Pseudozenodon karlschmidti</i> <i>Zaoecys dhumnades montanus</i> <i>Zaoecys dhumnades montanus</i>
<i>Ptyas korros</i>	<i>Ptyas korros</i>	<i>Ptyas korros</i>
<i>Ptyas mucosus</i>	<i>Ptyas mucosus</i>	<i>Ptyas mucosus</i>
<i>Tapinophis latouchi</i>	<i>Tapinophis latouchi</i>	<i>Tapinophis latouchi</i> <i>Opisthotropis kuatunensis?</i> <i>Trirhinopholis styani</i> <i>Dinodon ruhstrati</i> <i>Dinodon rufozonatum williamsi</i> <i>Dinodon flavozonatum</i> <i>Achalinus spinalis</i> <i>Elaphe carinata</i> <i>Elaphe kreyenbergi</i> <i>Elaphe mandarina</i> <i>Elaphe porphyracea porphyracea</i> <i>Elaphe tenuira yunnanensis</i> <i>Gonyosoma melli</i> <i>Liopeltis major</i> <i>Macropisthodon rudis</i> <i>Holarchus chinensis</i>
[<i>Trirhinopholis styani</i>] ¹		
<i>Dinodon futsingensis?</i>	<i>Dinodon rufozonatum williamsi</i>	
<i>Elaphe carinata</i>		
<i>Elaphe porphyracea porphyracea</i>	<i>Elaphe porphyracea porphyracea</i>	
<i>Liopeltis major</i>	<i>Gonyosoma melli</i> <i>Liopeltis major</i>	<i>Gonyosoma melli</i> <i>Liopeltis major</i> <i>Macropisthodon rudis</i> <i>Holarchus chinensis</i>
[<i>Macropisthodon rudis</i>] ¹	<i>Holarchus chinensis</i> (<i>Holarchus violaceus</i>)	
<i>Holarchus violaceus</i>		
<i>Holarchus formosanus</i>	<i>Holarchus formosanus</i>	<i>Holarchus formosanus</i>

¹The "Foochow" record of these mountain species I doubt. The specimens were probably brought to Foochow from the mountains of the interior.

FUTSING HSIEN AND FOOCHOW	YENPING REGION SNAKES (Continued)	CH'UNGAN HSIEN, HOK'OU, AND CH'IENTSHAN HSIEN
		<i>Holarchus musyi</i>
		<i>Holarchus (sp.?)</i>
[<i>Calamaria septentrionalis</i>] ¹	<i>Calamaria septentrionalis</i>	<i>Calamaria septentrionalis</i>
<i>Enhydris plumbea</i>	<i>Enhydris plumbea</i>	<i>Enhydris plumbea</i>
<i>Enhydris chinensis</i>	<i>Enhydris chinensis</i>	<i>Enhydris chinensis</i>
<i>Boiga sinensis</i>		<i>Boiga sinensis?</i>
<i>Boiga multimaculata</i>		<i>Amblycephalus kuangtungensis</i>
		<i>Amblycephalus stanleyi?</i>
<i>Psammodynastes pulverulentus</i>	<i>Psammodynastes pulverulentus</i>	
		<i>Calliophis maclellandii</i>
		<i>Hemibungarus kelloggi</i>
<i>Bungarus multicinctus</i>	<i>Bungarus multicinctus</i>	<i>Bungarus multicinctus</i>
<i>Naja hannah</i>		
<i>Naja naja atra</i>	<i>Naja naja atra</i>	<i>Naja naja atra</i>
		<i>Agkistrodon acutus</i>
		<i>Trimeresurus monticola</i>
<i>Trimeresurus mucrosquamatus</i>	<i>Trimeresurus mucrosquamatus</i>	
<i>Trimeresurus gramineus gramineus</i>	<i>Trimeresurus gramineus gramineus</i>	<i>Trimeresurus gramineus gramineus</i>
<i>Trimeresurus gramineus stejnegeri</i>	<i>Trimeresurus gramineus stejnegeri</i>	<i>Trimeresurus gramineus stejnegeri</i>

From a study of the preceding data I am able to make the following table. The first division shows the percentage of forms that, when grouped according to general relative distribution, comprise the total fauna of the three important Fukien regions, the second the percentage of each group found in each region.

I

	Percentage Comprising Futsing and Foochow Fauna	Percentage Comprising Yenping Fauna	Percentage Comprising Ch'ungan Hsien Fauna
Southern China forms	50	43	22
Central China Forms	2	10	22
Forms found in both southern and Central China	36	41	51

¹The "Foochow" record of these mountain species I doubt. The specimens were probably brought to Foochow from the mountains of the interior.

II

	Percentage of Total Found in Foochow and Futsing Hsien Region	Percentage of Total Found in Yenping Region	Percentage of Total Found in Ch'ungan Hsien Region
Southern China forms (25 in number)	88	72	40
Central China forms (11 in number)	9	36	100
Forms found in both Southern and Central China (23 in number)	91	74	61

Before discussing and drawing conclusions it will be well to emphasize through repetition the relationship of the three localities whose faunas are under discussion, the Futsing-Foochow region, the country surrounding Yenping, and the Ch'ungan Hsien district. All three localities have mountains as well as more or less level sections. Futsing and Foochow are about half a degree south of Yenping and one and a half south of Ch'ungan Hsien. Measured on a map, Foochow is only 80 miles from Yenping and some 150 from Ch'ungan Hsien. By road the distance is of course very much greater.

1. RICHNESS OF FUKIEN FAUNA.—More than sixty species of snakes are known to occur in Fukien. This alone is a long list for such a small area. Sixteen turtles may be taken as a good number of species too. The Ch'ungan Hsien region is not rich in turtles and, in fact, the mountains of its western section seem to be devoid of them entirely.

2. FAUNAL RELATIONSHIPS.—This is an involved subject and can not be easily exhausted.

(a) Futsing Hsien and Foochow Region.—Eighty-eight per cent of the twenty-five Fukien forms classed as "Southern" are found here. Seven of these are not found in Formosa, Ch'ungan Hsien, nor western China. This group of seven are southern forms that find their northern limit here. That the Futsing-Foochow fauna is closely related to the Formosan is shown by the fact that twenty-one of the thirty-three forms common to Formosa and Fukien comprise a part of its fauna. "Central" Chinese forms comprise only two per cent of the Futsing-Fukien fauna. More than half of the twenty-two forms common to the Ch'ungan and Futsing-Foochow regions are widely distributed, open country reptiles while only nine of those found in the Ch'ungan mountains occur in Futsing and about Foochow.

Thus we see that the Futsing-Foochow fauna is composed primarily of "southern" Chinese forms and secondarily of forms widely distributed through central and

southern China, some of which have ranges still greater. Several tropical forms find their northern limit here.

(b) Yenping Region.—On account of its intermediate position, and the great range in altitude found within its limits, this region is not readily analyzed in regard to faunal distribution. The wide valley of the Min allows many southern forms to enter, while the high mountains west of the city approximate the conditions found in Ch'ungan Hsien. The Yenping fauna is made up of almost equal parts of "southern" forms and forms found in both central and southern China. Those classed as exclusively "central" comprise only ten per cent of the Yenping list.

(c) Ch'ungan Hsien Region.—In spite of the absence of turtles no less than sixty-two forms of reptiles are known from this region.

All of the eleven classed as "central" Chinese forms, sixty-one per cent of the twenty-three found in both southern and central China, but only forty per cent of the twenty-five "southern" forms occur here. Twenty-seven of the thirty-three Fukien forms known from Formosa have been taken in this region, or six more than the number from the Futsing-Foochow region.

It has long been known that many species found in the eastern Himalayas and the mountains of western China occur in the Formosan highlands. The Ch'ungan Hsien mountains are now known to harbor a great many western forms just as those of Formosa do. Among the mountain inhabiting forms found both in Fukien and the far west only nine occur in the Futsing mountains, while just twice as many are found in those of Ch'ungan Hsien. One form, *Natrix tigrina lateralis*, reaches Ch'ungan Hsien from the north.

The rich Ch'ungan Hsien fauna, then, includes the entire central Chinese fauna and is extremely rich in forms found in both central and southern China. Many mountain forms common in the eastern Himalayas and the higher ranges of western China extend across through the Ch'ungan mountains and to the highlands of central Formosa. The remainder of the fauna is made up of open country species whose ranges are very extensive in southeastern Asia.

Conclusions Drawn from Analysis of Fukien Fauna

1. The reptile fauna of Fukien contains in good measure all the faunal elements abundant in China, with the exception of the desert and semi-desert forms comprising the fauna of the Mongolian region.

2. This rich Fukien reptile fauna is made up of the following elements:

(a) Forms common in Central China:—occurring on the plateau and mountains of the western section of the Province.

(b) Tropical and semi-tropical forms:—found on the coastal plains at least as far north as Foochow and abundant on the low plains of the southeastern part of the Province.

(c) Widely distributed reptiles common over large areas of southern China and even southeastern Asia. These are widely distributed through the Province.

3. The reptile fauna of Fukien is closely related to that of Formosa as shown by the following:

(a) the marked similarity between forms inhabiting the plains and plateaus of both places, and,

(b) the striking resemblance of forms found in their highest ranges but absent in much intervening mountainous country.

HABITAT PREFERENCE

The behavior and habitat relationships of snakes have received comparatively little attention. These are, however, not only interesting from the point of view of the nature lover but, when properly recorded, may help in distributional, taxonomic and phylogenetic problems. While collecting I always made as many notes as possible on all the species that came under observation. Following the description of each form many detailed observations have been set down and, in order to bring these data together, I have made out a table. This table is of a general nature and not to be taken as final but only as a suggestion of the habitats preferred by the various species. There doubtless are errors. Starred forms are found in more than one column. Whenever there is doubt I have put a question mark.

AQUATIC FORMS

Running Water		Quiet Water	
Mountain Streams	Hill and Plain Streams	Muddy Pools	Flooded Fields
* <i>Natrix percarinata</i>	<i>Natrix æquifasciata</i>	* <i>Enhydris plumbea</i>	* <i>Natrix annularis</i>
<i>Tapinophis latouchi</i>	* <i>Natrix annularis</i>	* <i>Enhydris chinensis</i>	* <i>Natrix percarinata</i>
<i>Opisthotropis kuatunensis</i>	* <i>Natrix tigrina lateralis</i> (in North China)		<i>Natrix piscator</i>
			* <i>Natrix tigrina lateralis</i> (in Central and North China)
			<i>Elaphe rufodorsata</i>
			* <i>Enhydris plumbea</i>
			* <i>Enhydris chinensis</i>

TERRESTRIAL FORMS

Mountain Forests	Open, Level, and Hilly Regions	Burrowing
<i>Sibynophis collaris chinensis</i>	<i>Natrix stolata</i>	
<i>Natrix craspedogaster</i>	* <i>Pseudozenodon bambusicola</i>	<i>Typhlops braminus</i>
* <i>Natrix tigrina lateralis</i> (in Fukien)	<i>Zaocys dhumnades dhumnades</i>	<i>Achalinus spinalis</i>
* <i>Pseudozenodon bambusicola?</i>	<i>Coluber spinalis</i>	
<i>Pseudozenodon striaticaudatus</i>	<i>Ptyas korros</i>	
<i>Pseudozenodon fukienensis</i>	<i>Ptyas mucosus</i>	
<i>Pseudozenodon karlschmidti</i>	<i>Dinodon rufozonatum rufozonatum</i>	
<i>Zaocys dhumnades montanus</i>	<i>Elaphe schrencki?</i>	
<i>Trirhinopholis styani</i>	<i>Elaphe carinata</i>	
<i>Dinodon futsingensis?</i>	<i>Elaphe diene</i>	
	<i>Holarchus chinensis</i>	

Mountain Forests	Open, Level, and Hilly Regions
<i>Dinodon ruhstrati</i>	<i>Holarchus violaceus</i>
<i>Dinodon rufozonatum</i> <i>williamsi</i>	<i>Holarchus formosanus</i>
<i>Dinodon flavozonatum</i>	<i>Calliophis septentrionalis</i>
<i>Elaphe carinata</i>	* <i>Boiga multimaculata</i>
<i>Elaphe kreyenbergi</i>	* <i>Psammodynastes pulverulentus</i>
<i>Elaphe mandarina</i>	<i>Bungarus multicinctus</i>
<i>Elaphe porphyracea</i> <i>porphyracea</i>	<i>Naja naja atra</i>
* <i>Elaphe tæniura yunnanensis</i>	* <i>Trimeresurus mucrosquamatus</i>
* <i>Gonyosoma melli</i>	* <i>Trimeresurus gramineus</i> <i>gramineus</i>
<i>Macropisthodon rudis</i>	
<i>Holarchus musyi</i>	
* <i>Boiga sinensis</i>	
* <i>Psammodynastes pulverulentus</i>	
<i>Amblycephalus kuangtungensis</i>	
<i>Amblycephalus stanleyi</i>	
<i>Calliophis macclellandii</i>	
<i>Hemibungarus kelloggi</i>	
<i>Agkistrodon acutus</i>	
<i>Trimeresurus monticola</i>	
* <i>Trimeresurus mucrosquamatus</i>	
* <i>Trimeresurus gramineus stejnegeri</i>	

ARBOREAL FORMS

- **Elaphe tæniura yunnanensis*
- **Gonyosoma melli*
- **Boiga sinensis*
- **Boiga multimaculata*
- **Trimeresurus gramineus gramineus*
- **Trimeresurus gramineus stejnegeri*

FOOD PREFERENCE

The stomachs of nearly all of the specimens treated in this paper have been examined and the resulting data supplemented by my field observations and data secured by Schmidt through a study of the stomach contents of the collection of Hainan snakes included in his 'Reptiles of Hainan.'

Species of the genus *Natrix* inhabit, for the most part, watercourses, flooded fields, and grass-grown moist or swampy areas. Their food consists in every case but one, at least, partly of frogs, and certainly that one, *N. æquifasciata*, will be found to eat frogs when more stomachs are examined. Fish, the only other element of their diet (excepting a single crayfish eaten by *N. percarinata*), were also found in the stomachs

of *annularis*, *percarinata*, and *piscator*, three exceptionally aquatic species. The single semiaquatic *Elaphe (rufodorsata)* eats both fishes and frogs, but three dry and forms do not include either amphibians or fishes in their diet, two of them, *mandarina* and *porphyracea porphyracea* living on mammals, the third, *carinata*, apparently specializing on snakes. This is our first indication of a highly specialized food habit. Contrasted to this is *Dinodon rufozonatum* (and form), adapted to a semi-aquatic as well as a completely terrestrial life that has extended its diet to include fishes, frogs, toads, lizards and even other snakes. This snake-eating tendency shows itself in another *Dinodon* species, *flavozonatum*, which, together with its congener *ruhstrati*, decidedly prefers to subsist on skinks and *Takydromus* species. With the exception of *gramineus* and *stejnegeri* the pit-vipers of the genus *Trimeresurus* consume birds and mammals, but at Kuatun *stejnegeri* is very fond of mountain streams where breeding frogs abound, and on more than one occasion I found good evidence of its fondness for frogs as food. *Agkistrodon acutus*, another pit-viper, eats rats as well as birds. *Boiga sinensis* and *multimaculata* seem to prefer birds, but one of the former was found to have taken a lizard.

From the foregoing it is evident that snakes show decided food preferences but vary greatly as to catholicity of appetite. It would be interesting to see just how fixed these preferences are, i.e., how easily they could be eliminated. This would require elaborate experimentation, but the fact that closely related forms often adopt very divergent habits indicates that the preferences are not rigid but come about largely through fortuity.

On the other hand, cases of apparent rigid specialization, comparable to that of *E. carinata*, are not of rare occurrence. The most striking ones follow:

1.—*Enhydris chinensis* and *plumbea* are exceedingly closely related but exceptionally stable species that frequent flooded fields where both frogs and fish abound. The former, however, lives on a fish, the latter a frog diet. This was true of both the Hainan and Fukien-Kiangsi series and thus their physical stability is reflected in their food habits. Preference for a fish diet probably indicates a more aquatic origin and further field observations should be made in widely separated parts of their ranges.

2.—*Liopeltis major*, in spite of its large size and diurnal habits, confines its diet to earthworms. It is neither a burrowing nor secretive form. This same habit in *Tapinophis latouchi*, a nocturnal, burrowing,

mountain-stream inhabitant, is more understandable and quite as fixed. *Trirhinopholis styani*, closely related to *latouchi*, seems to have similar food habits and it would be interesting to know whether or not the third member of this group, *Opisthotropis kuatunensis*, eats the same.

The data on which the foregoing is based are all too meagre and further study will certainly prove some of the conclusions to be premature.

No information was secured on the food habits of fourteen genera as follows: *Typhlops*, *Zaocys*, *Coluber*, *Opisthotropis*, *Lycodon*, *Achalinus*, *Gonyosoma*, *Holarchus*, *Calliophis*, *Amblycephalus*, *Calamaria*, *Hemibungarus*, *Bungarus*, and *Hydrophis*, while that secured on *Python* and *Pseudoxenodon* was too little to be of much value.

BREEDING HABITS

SEASON.—Data secured on six species of lizards from northwestern Fukien Province, *Acanthosaura lamnidentata*, *Ophisaurus harti*, *Apeltonotus sylvaticus*, *Takydromus septentrionalis*, *Leiolopisma modestum*, and *Eumeces elegans*, indicate that there is remarkable uniformity in time of egg-laying among them. Gravid females were taken in July, while well-developed eggs and newly emerged young were abundant in August. In Hainan a specimen of *Takydromus seclineatus meridionalis* deposited eggs on the twenty-first of April. This shows how retarded the season of the northwestern Fukien highlands is, compared to that of semitropical Hainan.

Seven among eleven species of snakes (*Natrix percarinata*, *Tapi-nophis latouchi*, *Elaphe carinata*, *Elaphe tæniura yunnanensis*, *Amblycephalus kuangtungensis* and *stanleyi*, and *Trimeresurus monticola*) closely agree with the lizards, but female *Enhydryis plumbea* and *chinensis* and *Psammodynastes pulverulentus* were gravid in May. A cobra, *Naja naja atra*, from Hok'ou, taken between June 20 and July 12, held eggs in well-advanced stages. At Ningkwo in Anhwei Province a *Natrix annularis* gave birth to young, September 28.

PRODUCTIVITY.—Among the lizards, no data on any of the Gekkonidæ or any *Sphenomorphus*, *Lygosaurus* or *Mabuya* species were secured, but the data on the remainder of the lizards were almost complete. The only agamid, *Acanthosaura lamnidentata*, leads in the number of eggs produced at one time, with an average of fifteen eggs for ten females. The only anguid, *Ophisaurus harti*, averages six eggs per female and thus agrees well with the two species of skinks on which there are data, *Eumeces elegans* and *Leiolopisma modestum*. Least productive of all are the three lacertid genera in which good data for four species are at hand,

Apeltonotus sylvaticus, *Takydromus septentrionalis*, *Takydromus sexlineatus meridionalis*, and *Eremias argus*. The number of eggs with these averages three or four.

Among the colubrid snakes, *Natrix piscator* seems to be capable of producing the greatest number of young, for one female contained forty-two well-developed eggs. The average for three specimens, twenty-five, is only three greater than that for four females of *Macropisthodon rudis*, the colubrid snake with the second highest egg-producing ability. *N. piscator* is a marked exception in its genus, because counts on five other species show a range in average of five to eight for each species, with no individual exceeding nine. In fact, there is great uniformity in this respect. Four *Elaphe* species are even more uniform, the average among three, *carinata*, *rufodorsata*, and *tæniura yunnanensis*, being twelve, while the single gravid *dione* contained eleven. *E. rufodorsata* shows a strong tendency to vary, ranging from four to twenty-one in eleven specimens. The remaining data throw the rest of the species into two heterogeneous groups:

Those that average three to six young:

Sibynophis collaris chinensis
Tapinophis latouchi
Dinodon ruhrstrati
Amblycephalus kuangtungensis
Calliophis macclellandii

Those that average seven to ten young—

Trirhinopholis styani
Dinodon rufozonatum williamsi
Achalinus spinalis
Liopeltis major
Amblycephalus stanleyi
Psammodynastes pulverulentus
Hemibungarus kelloggi
Naja naja atra

No counts were secured on the following colubrid genera: *Zaocys*, *Coluber*, *Ptyas*, *Lycodon*, *Gonyosoma*, *Holarchus*, *Calamaria*, *Boiga*, and *Hydrophis*, while the single one made on a *Pseudoxenodon* is scarcely worthy of mention. Much work remains to be done along this line.

Only a few pit-vipers were gravid but a large *Agkistrodon acutus* held twenty-six eggs, indicating an average much higher than that for any of the species of *Trimeresurus*. Two female *T. gramineus*, one of each form, contained four eggs apiece, while the good data secured on *T. monticola* show a count of five or six eggs to a nest. *T. mucrosquamatus*

probably exceeds these other species, three females holding five, nine, and thirteen eggs, respectively.

BROODING.—An anguid lizard, *Ophisaurus harti*, a colubrid snake, *Natrix percarinata*, and a pit-viper, *Trimeresurus monticola*, were found to possess a well-developed brooding instinct. The height of development is shown by the fact that all the brooded eggs were in advanced stages and, in the case of the snakes, especially the pit-viper, discovery did not result in desertion.

SEXUAL DIMORPHISM

Sexual differences among lizards and snakes are well known and no special study has been made of such in this paper, but certain obvious and striking cases are worth bringing together.

The most interesting examples among the lizards is the color difference in *Ophisaurus harti*; but striking as it may be it is not constant, some of the females being gaudily marked like the males. The lateral ocelli of *Takydromus sexlineatus meridionalis* are more vivid in the females. Two skinks, *Lygosaurus sowerbyi* and *Mabuya multifasciata*, have a slight difference in the coloration of the sides. Differences in size, such as the larger head of male *O. harti* and the shorter leg of female *L. sowerbyi*, are scarcely worthy of mention here.

Coming to the snakes we find more recorded differences. These are in (1) size, (2) proportion of length occupied by the tail, (3) squamation, especially of the ventrum, (4) coloration, and (5) external structure of the first pair of chin-shields and the anterior lower labials. These may best be considered separately.

1. **SIZE.**—The female of seventy-four per cent of the thirty-five species on which there is good data attain decidedly the greatest body-length. There is little sexual difference among seventeen per cent, but in the remaining nine per cent the males actually average a little longer.

2. **TAIL LENGTH.**—The males of seventy-three per cent of fifty-five species have proportionately longer tails, the difference being marked. The proportional tail-length is about equal in sixteen per cent, while in the remainder the females' tail is by a smaller margin relatively longer.

3. **SQUAMATION.**—(a) **Number of Ventrals.**—Good averages were secured for fifty species and in sixty-four per cent of these the females' averages noticeably exceeded those of the males. The male averages were only slightly higher in sixteen per cent, while the remainder showed no sexual difference.

(b) **Number of Caudals.**—Here the relation is reversed for the males markedly exceed the females in eighty-two per cent, equal them in sixteen, and fall below in only one case, or two per cent. Data on forty-five species is at hand.

4. COLORATION.—Sexual color differences are rare in Chinese snakes, only five of the present species having been found to show any: *Pseudozenodon bambusicola*, *Holarchus chinensis*, *Psammodynastes pulverulentus*, *Natrix annularis*, and *Trimeresurus gramineus stejnegeri*. In the first the difference is one of vividness of pattern, female *P. bambusicola* having a more contrasted coloration; in the next two the ground color differs, the female of *H. chinensis* being generally redder, that of *P. pulverulentus* decidedly darker than the male. There are fewer bands in the female of *N. annularis* (and possibly *N. percarinata* on which no data was taken), so here we get a different type of dimorphism. *P. bambusicola* shows indication of a similar but reversed difference, the females of my too small series averaging more than the males. The pattern of the side of the head in male *T. g. stejnegeri* generally differs slightly from that of the female.

5. STRUCTURE OF CHIN-SHIELDS AND LOWER LABIALS.—There are granules on the anterior lower labials and the first pair of chin shields in male *Natrix æquifasciata* and *percarinata*. Rarely the females of these species have similar but poorly developed granules.

Returning to the first three sexual differences the following generalization may be made. The females of Chinese snakes, especially those from the southeast, grow to be longer than the males and average more ventral plates. The males exceed in proportional tail-length and number of caudal plates. The severest test of such a rule is to see how many forms conform to it in its entirety. I find that seventeen of thirty-four forms with comparatively complete data fit the generalization, while nine additional species agree in all but the question of maximum size attained, data on this point being poor or entirely lacking.

Instead of giving complete lists I shall only record the names of the few species that are exceptional. *Pseudozenodon striaticaudatus*, *Liopeltis major* and *Holarchus musyi* are the three species in which the males attain the greatest body-length. *Dinodon flavozonatum* might well be placed here even though data on it are few. *Elaphe tæniura yunnanensis* has a tail so much longer in the female than the male that no other species can be compared to it. *Natrix percarinata*, *Ptyas mucosus* and *Boiga sinensis* agree with it but to a much less degree. Coming to the question of average number of ventrals I find four species in which there is a comparatively marked higher average count in the males: *Natrix æquifasciata* and *annularis*, *Tapinophis latouchi* and *Enhydryis chinensis*. In *Elaphe porphyracea porphyracea* alone does the caudal count of the female exceed that of the male.

A glance at the names given above shows that absolute body and proportional tail-length and the number of plates covering the ventrum considered from the point of view of sex give little clue to relationships. Only once in the preceding paragraph is a generic name repeated.

ONTOGENETIC COLOR CHANGE

The usual type of color change brought on by age among reptiles is a general fading of the most contrasted elements of the color pattern. This occurs in many banded *Natrix* species such as our *annularis* and *percarinata* and probably to a less degree in *æquifasciata*. The fading out of the ocelli on top of the head in *Clemmys bealii* may be placed here. A modification of this form is that found in *Ptyas korros* and *mucosus*, *Tapinophis latouchi* and *Opisthotropis kuatunensis* where elements of the pattern, weak even in the juveniles, disappear entirely with age.

Another common type is a partial fading accompanied by a shifting of emphasis in certain elements of the pattern and a slight change in general coloration. *Agkistrodon acutus* exhibits this kind and thus one is likely to be deceived by the appearance of the young. *Pseudoxenodon* species show a strong tendency to fade as they grow older but, in addition, at least one species exhibits an actual change in pattern. A field study alone will finally enable them to be accurately classified. *Elaphe kreyenbergi* might properly be mentioned here because of its rather marked change.

Most remarkable and interesting of all is the complete color transformation of *Ophisaurus harti*, *Eumeces elegans* and *chinensis*, and *Gonyosoma melli*. So striking is the change in each one of these that on a basis of coloration adult and young would never be placed together.

Schmidt (1927) speaks of the juvenile pattern of *Elaphe schrenckii*. I am not aware just how great the difference between adult and young is in this species. *Elaphe porphyracea porphyracea* may undergo a complete transformation of ground color but my notes on this point are confused and confirmation is needed.

ANNOTATED LIST OF SPECIES

TESTUDINATA**Platysternidæ****PLATYSTERNON****Platysternon megacephalum** Gray

Six specimens, five from Amoy (Nos. 35204-208), and one from Foochow (No. 35165), represent this species. Stanley (1914 and 1918) and Stejneger (1925) have reported this turtle from Fukien.

These agree well with the seventeen Hainan specimens recorded by Schmidt (1927). Measurements in millimeters of the Foochow specimen and the largest of each sex from Amoy follow.

A. M. N. H. No.	SEX	LENGTH CARAPACE	BREADTH CARAPACE	GREATEST DEPTH	LENGTH PLASTRON	LENGTH TAIL
35165	♀	135	102	43	104	113
35205	♂	119	91	41	100	107
35206	♀	119	84	41	93	123

I failed to find any of these, but a most reliable collector reported that they were taken in mountain streams. They certainly occur in Futsing Hsien but not in the Ch'ungan region, for the mountaineers there had never seen any sort of a turtle, and did not know what to call some which we had in our lowland collection.

Testudinidæ

CLEMMYS

Clemmys bealii (Gray)

Four specimens, two from Futsing Hsien (Nos. 34198-199), and two from Foochow (Nos. 35179-180) are in the collection and constitute the first Fukien records. Schmidt (1927) gave the first Hainan record: five examples from Nodoa.

The temporal ocellæ are faded in all the Fukien specimens though the pattern is perfectly distinct. This was the case in the largest Hainan specimen.

The measurements of this series are as follows:

A. M. N. H. No.	SEX	LENGTH CARAPACE	BREADTH CARAPACE	DEPTH	LENGTH PLASTRON	LENGTH TAIL
34198	♂	141	96	47	120	31
34199	♂	129	89	47	111	28
35179	♂	131	92	48	112	29
35180	♀	138	95	47	113	35

GEOCLEMMYS

Geoclemmys reevesii (Gray)

Forty-five specimens, seven from Tsinan, Shantung Province (Nos. 29629-635), twenty-eight from Futsing Hsien (Nos. 34193-197, 34200-211, and 34219-229), four from Foochow (Nos. 35181-184), and six from Hok'ou (35117-122), represent this species.

Schmidt's 1927 report included thirty-five from Hunan and Anhwei Provinces.

The melanistic phase is represented by two Futsing examples and one from Hok'ou. The largest specimen, also from Futsing, has a carapace 213 mm. long.

Geoclemys grangeri Schmidt

A single specimen (No. 35239) from the type locality, Yenchingkao, Wanhsien, Szechwan, also collected by Walter Granger, is in the present collection.

This specimen agrees with the type in coloration and in the smaller occipital shields of the skin, but the character chiefly relied upon, the larger size of the axillary shield and its broad contact with the fifth marginal, is not borne out by it. However, this second example has extremely long gular shields which nearly separate the humerals.

G. grangeri at best will prove to be little more than a subspecies. Further material must be secured before its position can be definitely settled.

Trionychidæ**AMYDA****Amyda tuberculata** (Cantor)

Eighty specimens, twenty-one from Futsing Hsien (Nos. 34212-218 and 34230-243), eleven from Foochow (Nos. 35168-178), one from Yenping (35164), four from Kianning (Nos. 35134-137), three from Kienyang (Nos. 35131-133), six from Ch'ungan Hsien (Nos. 35045-050), eight from Hok'ou (Nos. 35123-130), fourteen from Tsinan (Nos. 29636-649), one from Peking (No. 29369), and eleven from the Western Hills near Peking (Nos. 29618-628), probably represent this species.

Schmidt discusses the status of these turtles at length in his 1927 report and it is not necessary to repeat. More widespread material must be awaited.

PELOCHELYS**Pelochelys cantorii** Gray

Two specimens, both from Foochow (Nos. 35166-167), represent this species.

These small examples constitute the first Fukien record. Schmidt (1927) had the first two ever reported from Hainan. He figures the skull and hyoid.

SAURIA**Gekkonidæ****GEEKO**

Figure 1

Gekko japonicus hokouensis, new subspecies

TYPE.—A. M. N. H. No. 35090; ♂; Hok'ou, northeast Kiangsi Province, China; June 28-July 12, 1926; Clifford H. Pope.

DIAGNOSIS.—Differs from typical *japonicus* chiefly in having a large, undivided tubercular scale on each side of the base of the tail.

DESCRIPTION OF TYPE.—Head moderately large; snout longer than distance between eye and ear-opening, about twice diameter of eye; ear-opening suboval, oblique. Digits moderately expanded with slight but distinct rudiments of web; the single pair of chin-shields longer than broad, bordered in front and on the sides by mental, 2 lower labials, and 2 shields each half as large as the chin-shields; bordered behind by 4 small subequal shields. The back and limbs are covered with small, granular scales intermixed with numerous, small, subconical tubercles which are larger and more numerous along the upper sides than down the center of the back; preanal pores 6; single tubercular scale on each side of base of tail three-fourths as long as diameter of eye. Length from snout to vent 56 mm., from vent to end of tail (which has a bit of end missing) 65 mm.

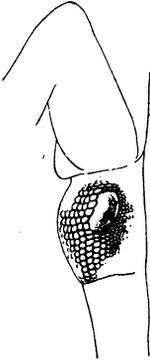


Fig. 1. *Gekko japonicus hokouensis*, new subspecies.

Tubercular scale at base of tail in type, A. M. N. H. No. 35090, six times natural size.

The color is grayish brown with 5 very indistinct, slightly darker cross-bands on the back and 9 rather distinct ones across the tail.

DESCRIPTION OF PARATYPES.—There are fourteen paratypes, thirteen from the type locality (Nos. 35087–089 and 35091–100), and one from Ch'ungan Hsien City (No. 33491). All of these were taken on a plateau, Hok'ou being at the western base of the dividing range, Ch'ungan Hsien City near the eastern.

Numerous tubercles are present on the dorsum and the webbing is rudimentary in all. There are 6 preanal pores in all of the seven males, except one which has 7; the shields of the single pair of chin-shields are large and undivided in all but two, divided on only one side in these two. The three largest males measure from snout to vent 63.5, 60, and 60 mm., the three largest females 66, 65, and 62, respectively. The tail occupies from 0.49 to 0.54 of the total length. The tubercular scales at the base of the tail are largest in the males and single everywhere except on one side in No. 35097 where there are 2. On one side in two and both sides in one there is a depression across the top of the tubercular scale. The body-bands are often obscure but, when visible, they number 5 in all but one which has 6. The tail, when fully banded, has from 8 to 10 bands.

I have re-examined twenty-three of the series of thirty-two collected by me at Ningkwo, Anhwei Province (see Schmidt, 1927) and find that the tubercular scales are 3–3 in nineteen, 3–4 in two, 2–2 in one, and 1–1 in but a single specimen. The Yenping specimen, also recorded by Schmidt (1927), has three of these scales on a side, as does No. 31121 from Shansi (Schmidt, 1927). Among six Changsha examples the tubercular scales are 3–3 in three, 2–3 in two, and 3–4 in one.

The following table should help to make the matter clear.

	ANHWEI SERIES 23 Specimens Nos. 31124-135, 31137-146, 31202 (<i>japonicus</i> <i>japonicus</i>)	HOK'OU SERIES 14 Specimens Nos. 35087-100 (<i>japonicus</i> <i>hokouensis</i>)	YENPING SERIES 14 Specimens Nos. 33014-021, 33025, 35156-160 (<i>subpalmatus</i>) .
Dorsal Tubercles	Numerous	Numerous	Lacking in 13
Webbing	Little	Little	Pronounced
Preanal Pores Average	5-8 6.4	6-7 6.1	10-11 10.7
Tubercular Scales Base of Tail	1-1 in 1	1-1 in 13	1-1 in 13
Length. Snout to Vent	1 > 57 mm. 23 < 61 mm.	11 > 67 mm. 14 < 66 mm.	7 > 70 mm. 14 < 77 mm.

The new subspecies, *hokouensis*, seems to be a plateau and foothill form of typical *japonicus* of the low river plains. It illustrates a development in the direction of the high mountain and forest species, *subpalmatus*.

The occurrence of typical *japonicus* at Yenping (Schmidt, 1927) does not harm my theory of distribution because the specimen undoubtedly was taken in the river valley there, which is probably less than 500 feet above sea-level. My series come from the range of mountains a few miles from the city of Yenping. The mountains of this range reach an altitude of more than 4000 feet.

Gekko subpalmatus Günther

Sixteen specimens, fourteen from Yenping (Nos. 33014-21, 33025 and 35156-60), and two from Ch'ungan Hsien (Nos. 34970-71), represent this species. Schmidt (1927) reported one example from Wanhsien, Szechwan Province, and three from Fukien. At least two of these three Fukien specimens are from Yenping.

Thirteen of the fourteen Yenping specimens are typical in lacking the dorsal tubercles; having fully webbed toes; tubercular scales at the base of the tail 1-1; and, in the males, 11 preanal pores on each side. The three largest females among nine measure from snout to vent 76, 75 and 74 mm., respectively, the largest males among four only 74, 71 and 57 mm. There are 5 dorsal bands in all but three examples.

The fourteenth from Yenping, a female No. 35156, differs from the rest in having an abundance of dorsal tubercles; the scales at the base of the tail in two rows on a side, three or four scales to a row; and a uni-

formly colored dorsum. It measures 66 mm. from snout to vent. This specimen is unique in having so many tubercular scales at the base of the tail and lacking a dorsal pattern. It resembles *subpalmatus* in the webbing of the toes, its large size and general form, while approaching *japonicus* in the presence of dorsal tubercles. Stejneger (1925) records a specimen collected at Foochow by Mr. Sowerby that may represent the present form. Unfortunately, he fails to give the number of tubercles at the base of the tail, the size and sex, and dorsal coloration, but dismisses the matter by considering it a seaport cross between *japonicus* and *subpalmatus*. Foochow may have been given as a general locality, so it is entirely possible that this gekko was taken in the nearby mountains and, together with No. 35156, represents a new form. The relationship of Yenping and Foochow material to that from Kuatun is more than apt to be remote. I hesitate to describe No. 35156 as the type of a new form because of its close habitat association with typical *subpalmatus* in a region where gekkos are very scarce and because only one specimen was secured.

The two from Ch'ungan Hsien are small in size and agree well with typical *subpalmatus* in having fully webbed toes, lacking the dorsal tubercles, having the tubercular scales at the base of the tail 1-1, and ten preanal pores on a side in the male.

Boulenger (1899) records a specimen from Kuatun. The only Szechwan example that I have seen has a depression across the middle of each of the single tubercular scales at the base of the tail.

Gekko swinhonis Günther

One hundred and seven of these gekkos from the Western Hills near Peking (Nos. 29511-617), and fifty-eight from Tsinan, Shantung Province (Nos. 29743-800), are in the collection. Schmidt (1925) has already reported on eighty-three additional ones from Chihli and Shansi.

He found that among twenty-one males the number of femoral pores ranges from 6 to 9 with an average of 7.4, while in my Tsinan series, among twenty-one specimens, the range is from 6 to 10 with 8.4 as the average. In both series 8 pores occur the greatest number of times. In *G. japonicus*, Schmidt found that among thirteen males the number of pores ranged from 5 to 8 with 6.3 as the average and 6 occurring the greatest number of times.

The size of the median pair of postmentals varies but these scales are smaller in this series than in my series of *japonicus*. One of the specimens from the Western Hills has a median postmental.

Among the one hundred and seven from the Western Hills, each of the three largest, all females, measured 61 mm. from snout to vent.

The characters generally used to distinguish *swinhonis* from *japonicus*, webbing, dorsal tubercles, and size of postmentals, are good enough when material is at hand, but in the absence of such they are anything but easy. Typical *japonicus* at best has only a slight web while *swinhonis* frequently has large tubercular scales. The size of the postmentals is variable in both species. In my large series I notice that the scales of *japonicus* are always much finer than those of *swinhonis*. The tubercles in *japonicus* are quite regularly distributed over the dorsum, while the enlarged or tubercular scales of *swinhonis*, when present in numbers, are irregularly arranged and concentrated along the mid-lateral regions of the dorsum.

There is nearly always more pigment on the lower labials of *japonicus* than on those of *swinhonis*. In fact, lower labials of the latter are generally unpigmented.

Schmidt and I have failed to find among two hundred and forty-eight specimens from five localities in Chihli, Shantung, and Shansi, a single one presenting great difficulty. However, when other series from localities farther to the south in the east, and to the north in the west, are available, the *japonicus-swinhonis* question may well be raised again, for the discovery of *japonicus* in central Shansi (Schmidt, 1927) is puzzling.

HEMIDACTYLUS

Hemidactylus bowringii (Gray)

Twenty-five specimens, twelve from Futsing Hsien (Nos. 34181-192), twelve from Yenping (Nos. 33022-24, 33026 and 35148-55), and one from Foochow (No. 35185), show that this gekko is common in the lowlands of northern Fukien. Stejneger (1925) has eight examples from Foochow, while Schmidt (1927) records a single one from Yunnanfu. Mell (1922) confirms older reports of its occurrence in Kwangtung.

My only adult male from Yenping has fifteen pores on each femur, but three from Futsing have 14-14, 13-14, and 13-14 pores, respectively.

Hemidactylus frenatus Duméril and Bibron

The range of this species is extended into southwestern China by eight examples collected at Yuan Kiang, Yunnan Province, by Walter Granger (Nos. 35221-28). Schmidt (1927) has already reported on one hundred and fifteen from Hainan.

In the new series the femoral pores vary from 25 to 29 in the four males. There is no great variation in the postmentals.

Agamidæ**ACANTHOSAURA*****Acanthosaura lamnidentata* Boulenger**

Thirty-six specimens from Ch'ungan Hsien (Nos. 33539-47 and 34683-709) and sixteen from Yenping (Nos. 33001-013 and 35161-63) make up the lot of this species. Schmidt (1927) records seven examples from near Yenping also in the Third Asiatic Expedition's collections. Boulenger (1899) records two specimens collected in Ch'ungan Hsien ("Kuatun"). Stanley (1914) also lists this species from "Fokien."

In the series from Ch'ungan Hsien, the six largest females average 108 mm. in body plus head-length, while the four largest males average only 88 mm. In this same lot the tails of the females vary from 0.59 to 0.60 of the total, while those of the males vary from 0.62 to 0.64.

Ten females from Ch'ungan Hsien contained from 8 to 22 well-developed eggs, the average for all being 14.6. On July 16 the one with twenty-two eggs was brought in and on the twenty-second another gravid female was bought.

This is strictly a mountain species that inhabits forests and bamboo groves. Near Yenping I saw them most often on trees but about Kuatun a colony lived in a boulder-strewn valley. The boulders were vine-covered and over and among them the lizards ran. When alarmed they merely dash away without attempting to secrete themselves in any of the abundant cracks and crevices. When picked up they often bite and try to escape at first but usually do not struggle long.

One individual turned from dull to distinct green while I watched it. This color change is rapid.

Anguidæ**OPHISAURUS*****Ophisaurus harti* Boulenger**

Plate XVII Figure 1

Thirty-two specimens of the Chinese "glass-snake" were secured in Ch'ungan Hsien (Nos. 33536-38 and 34941-69). In addition to this, four lots of embryonic material (Nos. 34493 and 35451-53) were collected in the same locality.

This species was described by Boulenger in 1899 from four specimens collected at Kuatun. It has been reported from Formosa by Van Denburgh (1909) and Stejneger (1919), and from Chekiang Province by Stejneger (1925). Additional Fukien records are by Werner (1909); Stanley (1914 and 1916); Schmidt (1927, Shaowu); and Stejneger

(1919, Foochow).¹ Moquard (1905 and 1910) has reported it from Tonkin.

The specimens at hand agree well with others already reported. Since my series is so large I am able to give a detailed description and clear up a few minor points.

In all the adults the ventral scales are in ten longitudinal series, while the dorsals range from 16 to 19, the majority having 18. There is no apparent difference between the sexes as regards this character. The dorsal scales, as determined by a count of the five largest examples of each sex, are in 96-101 transverse rows from the beginning of the lateral groove to the vent, with no apparent sexual discrepancy.

The following data were compiled from a study of the five largest examples of each sex.

The distance from tip of snout to vent ranges from 227 to 235 mm. with an average of 232 mm. in the females; from 230 to 245 mm. with an average of 238 mm. in the males. The tails vary from 0.60 to 0.62 of the total with no difference between the sexes.

The distance from the tip of the snout to the ear opening is 21 mm. in four of the five females while it ranges from 25 to 27 mm. with an average of 26.2 mm. in the males. The width of the head ranges in the females from 13 to 14.5 mm. with 13.7 mm. as the average. In the males the range is from 17 to 20.5 mm. with an average of 18.5 mm. Thus far the only noticeable difference between the sexes is in length and breadth of head.

There has been some confusion as regards color. Boulenger (1899) has already brought out the main points: (1) the complete change with maturity and (2) the gaudiness of the male as compared to the female. Boulenger's excellent figures illustrate these points nicely. All the males in my series have the cross-blotches (of blue in life) but the females vary from a uniformly marked dorsum to one decorated almost as conspicuously as that of the male. In life there may be a difference in the intensity of the blue. Among fifteen adult females two are unmarked, four are very faintly spotted, three are faintly blotched, while six are distinctly marked like the male but with narrower and less intense markings.

On August 17 a "glass-snake" guarding five eggs was discovered in Upper Kuatun valley. The eggs were deposited in a small, irregular cavity two to three inches below the surface of the floor of a thinned-out bamboo grove. The nest was at the edge of a pile of decaying bamboo

¹This specimen is recorded as having come from "within 200 miles of Foochow" but its collector, Mr. Kellogg, has since told me that the 200 should read 20.

waste which probably afforded suitable material in which to deposit the eggs. The adult, a female, took flight at slight alarm. She was irregularly coiled about the eggs and not in close contact with them. The eggs, not adherent, were white and ranged in length from 24.5 to 26.8 mm., in width from 16.2 to 18.5 mm. One egg contained a barely pigmented embryo 99 mm. long.

On this same day a batch of 5 similar eggs was bought. One contained an unpigmented embryo 71 mm. long.

The following day in a lower valley I saw a nest containing 6 eggs also guarded by a female *O. harti* (No. 34942). It was located immediately beneath a big, flat stone lying out in an open, dry field fully exposed to the sun. There was no other significant difference between this nest and the one described above. The eggs were slightly smaller, ranging in length from 22.5 to 23.1 and in width from 15.9 to 16.8 mm.

The last nest, also located near a pile of decaying bamboo waste, was examined on August 28 (Plate XVII, fig. 1). It was strikingly alike, and near to, the one discovered August 17. Even though the female took flight at a slight disturbance of her nest, it was on the very edge of a much-used path. The six eggs were about the same size as those seen August 18.

Finally, on September 3, seven eggs were bought containing well-developed embryos.

Between the 3d and 10th of September the remaining eggs of one of the two lots secured August 17 hatched into young 143, 142 and 134 mm. long, respectively, their tails occupying 0.56 to 0.57 of the totals.

No. 34944 contains 6 well-developed eggs.

This species is very secretive. I was never fortunate enough to run across one roaming abroad. When handled it does not bite.

Lacertidæ

APELTONOTUS

Apeltonotus sylvaticus, new species

TYPE.—A. M. N. H. No. 34975; ♀; Ch'ung-an Hsien, northwest Fukien Province, China; April-September, 1926; Clifford H. Pope.

DIAGNOSIS.—This species differs from *dorsalis* in having a less distinct collar, much shorter limbs, more scales across the middle of the back, a greater number of transverse series of ventral plates, and a distinctive color pattern.

DESCRIPTION OF TYPES.—Head twice as long as broad, its length contained four and one-half times in total length to vent; snout acutely pointed, a little longer than postocular part of head, with a sharp canthus, and a vertical, slightly concave loreal region. Neck slightly narrower than head. Hind limb stretched forward fails

to reach elbow; fore limb stretched backward fails to touch knee; hind limb 0.42 of distance from tip of snout to vent; foot slightly longer than head; tail long, slender.

Nasals not in contact behind rostral; rostral and frontonasal forming a short suture; frontonasal longer than broad; frontal as long as its distance from end of snout, narrower behind than in front; parietals about one and one-half times as long as broad, outer border convex; interparietal small, slightly longer than frontonasal; occipital very small; 2 large and 2 small supraoculars; supraciliaries 5, separated from supraoculars by a series of granules. Rostral just separated from nostril; a single postnasal; anterior loreal barely half as large as posterior, only third and fourth upper labial in contact with the posterior loreal. Four pairs of chin-shields, first pair completely in contact, second barely separated posteriorly.

Scales on back largest, strongly keeled; those on sides granular, the two types gradually merging, slightly intermixed; 44 scales across middle of body. Ventral plates in six longitudinal, twenty-four transverse rows, plates of outer longitudinal row distinctly keeled and pointed, remainder barely so. Preanal plate large, smooth, bordered by a semicircle of 6 plates as large as those of last transverse row of ventrals; 4 of 6 are anterior, 2 lateral. Three femoral pores on each side; 26 lamellæ under fourth toe. Caudal scales strongly keeled, twice as long as largest dorsals.

Color, dark green above, light below, lightest on the throat. A continuous white stripe from subocular to base of hind leg. This line passes just below tympanum, above base of fore limb, and along fourth to sixth lateral rows of scales; vivid on head and neck, distinctly less so on body.

NOTES ON PARATYPES.—The 4 paratypes (Nos. 34972–974, 34976) and the lot of embryonic material (No. 35467) all come from the type locality. The former agree with the type in having an ill-defined collar; hind legs from 0.43 to 0.47 of the length from snout to vent as compared to 0.48 to 0.52 in five *dorsalis* (among which only one falls below 0.51); 41–42 scales across the back against 28–35 in *dorsalis*; 28–32 transverse series of ventrals compared to 24 in *dorsalis*, and a uniform color pattern varying only a little in the intensity of the white line on the body.

The chin-shields are always 4–4 with 2 pairs almost completely in contact in all but one in which those of the second pair are more than half separated. Boulenger (1921) says that in *dorsalis* three pairs are in contact but I find upon examining six specimens only two pairs in contact in three, two and a fraction of the third in two, and three on one side in contact with two on the other in an irregular one. The slight difference in this respect between the two species is negligible. With one exception the nasals form a suture in *dorsalis*, but in *sylvaticus* they are in contact in only two out of five, the rostral touching the frontonasal in three. The femoral pores are 3–3 in two, 2–2 in one, and 2–3 in one. The longitudinal series of ventrals are constantly 6, all of which are keeled in one, the outer distinctly so in one, while in the other two there is only a trace of a keel even on the outer series, the rest lacking it entirely. The type is the longest, measuring 61.5 mm. from tip of snout to vent. No. 34976 has the longest tail, 200 mm., while its body is 58 mm. long. The lamellæ under the fourth toe in the 4 paratypes are 25, 26, 27 and 29, respectively.

The type and another gravid female held 3 well-developed eggs apiece and were taken on July 7 and 9. The lot of four embryos (No. 35467) was taken from as many almost spherical, finely mottled, pale

brown eggs brought in on August 19 at Kuatun. One of the eggs measured 10.8×8.1 , and another 10.9×8.6 mm.

These lizards had a very erratic distribution in the Kuatun region for they were common in a well-forested valley across the creek from Ch'ilichao but extremely rare or absent everywhere else. I encountered them there many times but so swiftly did they run over the forest floor and so wary were they that their capture was very hard to effect. They do not even suggest *Takydromus* in habits for I saw them only in or at the edge of forests and I could detect no ability to climb on their part.

The discovery of this genus in China is very significant and its occurrence in Formosa may be safely predicted.

TAKYDROMUS

Takydromus septentrionalis Günther

In the present collection there are one hundred and fifty-one specimens, three of which are from Hok'ou (Nos. 35114-116), three from Futsing Hsien (Nos. 34164, 34169 and 34171), thirty-five from Yenping (Nos. 33027-046 and 33048-062), and one hundred and ten from Ch'ungan Hsien (Nos. 33492-516, 33518-528, 33530-535, 34977-35044). Five lots of eggs come from Ch'ungan Hsien (Nos. 35460-64). Schmidt (1927) has already reported on thirty specimens from Anhwei, Hunan and Szechwan Provinces, also a part of the Third Asiatic Expedition's collection.

Hok'ou is the only new locality record, for Boulenger (1899) has recorded six examples from Ch'ungan Hsien ("Kuatun"), and Stejneger (1925) records three from Futsing and two from Yenping. Stanley (1914) also includes "Fokien" specimens in his list of Chinese reptiles. Mell (1922) found it common in northern Kwangtung, especially along the Hunan border.

The present series exhibits no notable variation. A summary of four important characters follows.

CHIN-SHIELDS.—In every specimen but one, 3 pairs were found. This one, from Ch'ungan Hsien, has 4 on one side and 3 on the other, one of these slightly notched as if a fourth had been almost formed on that side too. Stejneger (1925) reports a similar condition in a specimen from Nanking. Boulenger and Werner have observed it but also in a very limited number of specimens.

FEMORAL PORES.—These are invariably 1-1.

DORSAL LONGITUDINAL SCALE ROWS.—The most irregular in this respect are the three specimens from Futsing, all of which have eight rows, the two innermost dropping out a short distance behind the fore limbs, the next two running some distance back before disappearing.

By far the greatest number of specimens have 6 rows, the inner pair of which are small and nearly always drop out at a point slightly nearer the fore than the hind

limbs. Mell (1922) found this to be the case in his series. The three Futsing specimens excepted, there were six with a seventh row extending only a short distance posterior to the fore limbs, while in two from Yenping, the fifth and sixth dropped out anterior to the axilla, leaving only four rows for almost the entire length of the body.

VENTRAL LONGITUDINAL SERIES.—These were uniformly 8, but in thirty cases, instead of only two lateral rows of enlarged scales adjacent to the ventral plates on each side, there were three.

In fifty-nine specimens the rostral and frontonasal were in contact.

Between August the 2nd and 25th four lots of eggs were brought in, all containing well-developed embryos. Three had 2 eggs each while one had 4. They were dug up by men weeding the high tea fields about Kuatun. The eggs are dull white faintly mottled with pale brown. The length of the eggs of three lots ranged from 12 to 14 mm., while the lesser diameter ranged from 9 to 11.2.

This species is found at higher altitudes in the southern part of the range and is scarce along the low coastal plain even as far north as Futsing. Mell reports it from 500–900 m. in Kwangtung. It was common in the highest valleys of the Kuatun range. About Ningkwo it is found at very low altitudes.

The number of eggs developed by one female varies from 1 to 6 with 3.2 as the average obtained from examination of twenty-three gravid specimens.

It is strictly a "grass lizard" of the open, sunny valleys and mountains. It lives above ground in the high grass. When alarmed it makes short dashes by jumping and running through the stems near their tops. Those observed near Ningkwo in Anhwei had a habit of suddenly changing their direction and then apparently vanishing. For this reason only they were hard to secure because they do not go far before pausing. The very long tail seems to be largely responsible for their ability to remain so high above ground among the grass tops.

***Takydromus sexlineatus meridionalis* (Günther)**

A series of twenty-three specimens, twenty-one from Futsing Hsien (Nos. 34157–163, 34165–34168, 34170 and 34172–180) and two from Ch'ungan Hsien (Nos. 33517 and 33529), represent this species. Although it has not been previously reported from the latter locality, Stejneger (1925) records six examples from Futsing and four from Yenping. Schmidt (1927), in his papers on former Third Asiatic Expedition collections, records thirteen from Fukien Province and two hundred and fourteen from Hainan Island.

All of the twenty-three specimens have 3 pairs of chin-shields, one

femoral pore on each side, and 12 longitudinal rows of ventrals. In one, a fifth and sixth dorsal row extends to the middle of the back but all the rest have the usual four rows. The rostral and frontonasal are well separated in all but three while they actually meet in only one of these. The largest example is a female 325 mm. long. The series agrees well with Stejneger's from Futsing.

Mell (1922) reports that it is common in the Canton-Hongkong region while I found it abundant on the Hainan plain. Obviously, then, this species inhabits the coastal plain from Fukien southward.

In my series the females as well as the males have rows of black-edged ocelli but in the former they are much less distinct, especially posteriorly.

Two females contained 2 eggs each while one contained 3.

Like *septentrionalis* it is a grass lizard inhabiting open country. It also lives up in the grass well above the ground.

EREMIAS

Eremias argus Peters

Eighty-five specimens, seventy-nine from Tsinan, Shantung Province (Nos. 29801-879), and six from the Western Hills, Peking (Nos. 29505-10), represent this species.

Schmidt's 1927 report included seventy-five *argus* from Chihli Province and one hundred and seventy-two *barbouri* and thirty *branchleyi*, all from Shansi Province.

The seventy-eight Shantung specimens may be divided into (1) those in which the subocular fails to enter the labial border and (2) those in which it does enter.

The sixty-three that make up the first group have been sorted over, the eleven largest of each sex examined, and found to average fifty-five and a fraction scales across the back for both sexes with a range in the males of 49-60, in the females, 47-69. Schmidt (1927) gives 57 and 56 as the averages for a series of Chihli *argus*. Since the type locality for this species is Chefoo, Shantung, we may conclude that these sixty-three are representatives of the typical form.

The fifteen that fall into the second group (Nos. 29804, 29812-13, 29823, 29825, 29828, 29834, 29836, 29844-45, 29847, 29851-53, 29861) average forty-eight and a fraction scales across the back, with the extremes in the six males at 46 and 51, and the nine females, 40 and 59. In shape of head as well as in dorsal pattern they are indistinguishable from the rest of the 78 Shantung specimens.

E. brenchleyi is distinguished from *argus* by (1) the descent of the subocular to the labial border, (2) a low dorsal count, (3) the tendency to uniform coloration, and (4) a more pointed head.

The second group, then, agrees with *argus* in the first character, is slightly nearer to it than to *brenchleyi* in the second, but fails to show an appreciable amount of agreement in the last two. Since all of the seventy-eight come from one locality it is safe to conclude that they are *argus*, the range of variation of which, through them, is greatly extended, and the gap between the two forms narrowed.

I have carefully compared the new Shantung lot with the series of *barbouri* and find it impossible to make any distinction in coloration. The small difference in dorsal scale count is entirely eliminated by the range in variation of *argus* described above. The two diagnostic characters of *barbouri*, in the light of new material, fail to hold true, so I suggest that it be put in the synonymy under *argus*.

Schmidt was puzzled by the occurrence of *brenchleyi* at So Huang in eastern Shansi where it is "inserted between the ranges of *barbouri* and *argus*" or, as we now have it, directly in the range of *argus*. So Huang is in the mountains so *brenchleyi*'s presence there might be explained by altitude preference. Since the new material has so greatly lessened the gap between these two associated forms, I believe that they should be written *Eremias argus argus* and *Eremias argus brenchleyi*. Additional material from high altitudes is much needed.

Fourteen females contained from 2 to 4 eggs apiece, averaging 3.

Scincidæ

MABUYA

Mabuya multifasciata (Kuhl)

Walter Granger collected nine specimens at Yuan Kiang, Yunnan Province (Nos. 35212-20). Schmidt (1927) has already reported two examples from this Province and forty-eight more from Hainan.

In the present series of nine the supraciliaries are uniformly 6 and the upper labials are 7 except on one side of one specimen where they are 6. The subdigital lamellæ under the fourth toe are 20 in the four males and 19 in all but one of the females which has 20. The scales around the body are 30 to 32 with 30.7 as the average. The dorsal scales down the back average 43.7 while those down the belly average 52.8. One female measures 122 mm. from snout to vent while two other females and one male measure just 120 mm. This series conforms remarkably well with the Hainan one.

SPHENOMORPHUS

Sphenomorphus boulengeri Van Denburgh

Twenty-seven specimens of this species were secured. Fourteen were collected at Yenping (Nos. 33169-81 and 33206), and thirteen in Ch'ungan Hsien (Nos. 33582-86, 34875, 34891, 34894, 34903-4, 34907-8 and 34913).

In twenty-two of the twenty-seven the supralabials are 7 on a side, the fifth under the eye. Eight appear on one side in four, and six in one.

The color pattern of the young is like that of the adult.

Oddly enough Van Denburgh's color description fits neither the Hainan specimens nor the Fukien series. He speaks of a "pale yellowish brown dorsolateral line" from the temporal region to the base of the tail, a "blackish brown band" from the nostril to the base of the tail, a "definite light lateral line" and a "dark band" starting with spots on the labials. I find only the blackish-brown band. Between it and the belly is a bluish area profusely spotted. The profusion of spots is everywhere evident in mine as in his. A light line extends from below and just behind the eye as far back as the arm in some specimens, so this may be an indication of his "definite light lateral line." Color pattern in these skinks is a very poor character unless considered in specimens from the same locality, so this apparent difference should not be taken too seriously.

This is distinctly a mountain and forest skink. It was not seen in open country on either plain or plateau. At Kuatun it ranges into the higher valleys.

The position of this series is fairly certain even though there are differences between my counts and Van Denburgh's. The following table shows clearly how my series compares with his lot of twelve.

	Patch of Enlarged Scales Back of Thigh	Scales Under Fourth Toe, Extremes and Mean	Percentage with 3 Supraoculars in Contact with Frontal	Scales Around Body, Extremes and Mean	Scales Down Back Extremes and Mean
27 Fukien Specimens	Present	18-20 19.2	4	36-40 37+	69-80 74+
12 Formosan Specimens	Present	22-23 22+	42	38-40 38.7	67-78 72.5

Van Denburgh says that in the types the frontal is broadly in contact with the frontonasal so I assume that such is the case in the entire

series. If my assumption is well founded we have an additional character linking the two series, for such is the case in my entire lot. The difference in the number of scales under the fourth toe is of little importance. It might be partly due to individual methods of counting. More important is the greater number of supraoculars in contact with the frontal.

There can be little doubt as to the validity of this species since at Yenping I found it associated with typical *indicus* and at Kuatun with *formosensis*. Out of a series of more than one hundred examples of these three closely related species there is only one specimen showing the slightest sign of intergradation. The three species can be separated instantly by sight.

Schmidt's (1927) *S. leveretti* from Hainan undoubtedly belongs here. The only differences I can detect are a slightly lower number of scales down the back (an average difference of six scales) and a longer hind leg in *leveretti*. In color pattern the two are identical and the patch of enlarged scales behind the thigh is present in the Hainan form. This question will be taken up conclusively in the Expedition's final reports.

Sphenomorphus formosensis Van Denburgh

Sixty-nine specimens of this species were collected in Ch'ungan Hsien (Nos. 33571-81, 33587, 34872-74, 34876-90, 34892-93, 34895-902, 34905-06, 34909-12, 34914 34916-22, 34924-25, 34927-30, and 34932-40). It was not seen elsewhere.

All but two of thirty examples have 7 upper labials on each side, the fifth under the eye.

The color is quite characteristic and there is no difference between young and adult. Van Denburgh's color description of *boulengeri* seems to fit this species better than his description of *formosensis* but fortunately I have a specimen of the latter before me. Although it is generally lighter and lacks the light lateral band of my *formosensis* the two are strikingly alike. *S. formosensis* from Fukien has the usual light belly. The dorsum is dark olive-brown with a varying number of dark spots distributed in greatest numbers along the sides of the back. There is a dark band from nostril to the hind leg, as wide as three scales at its widest point. This is bordered below along its entire length by a light area, one scale wide at the widest. This light area is separated from the belly color by a varying amount of dark pigment sometimes in the form of a dark band but often as irregular dark streaks or spots.

This species, it should be noted, was found only in the highest

mountains of the Kuatun range where it inhabited the forests and bamboo groves in great numbers. It is significant that it was not seen in the Yenping mountains.

The following table shows why I place it with Van Denburgh's *formosensis*.

	Percentage With Frontal Separated From Frontonasal	Percentage With 3 Supraoculars in Contact With Frontal	Scales Around Body, Extremes and Mean	Scales Down Back, Extremes and Mean
69 Fukien specimens	5	91	32-38 34+ (30 specimens)	67-80 72
82 Formosan Specimens	3.6	96	32-38 34.6	64-78 71

Three specimens from Yunnan (Nos. 12787, 20988-89), two of which were recorded as *indicus* by Schmidt (1927), have 36, 37, 38 scales around the body and 75, 78, 74 down the back. This indicates that they are *formosensis* rather than *indicus*, especially since the color is more like the former. However, the spots on the back appear as broken lines, so in this respect they resemble neither species. Eighty-two scales down the back and similarity in color also indicate that Schmidt's Szechwan specimen (No. 23555) belongs here.

***Sphenomorphus indicus* (Gray)**

There are twenty-one specimens of this species from Yenping (Nos. 33182-96 and 33199-204) and five from Futsing (Nos. 34146-50). No. 33207 from Yenping is placed here provisionally. Schmidt (1927) reported on seven examples from Fukien, Hunan, Yunnan, and Szechwan Provinces which he listed as *indicus*. Part of these must be referred to *formosensis*. Werner (1909) records a Foochow specimen.

In eighteen out of twenty examples the supralabials are 7 on a side, the fifth just under the eye. The other two are abnormal in having only six on one side.

The coloration of the adults is invariable and strikingly like that shown in Boulenger's plate (1887). The young have a characteristic pattern which at best is only very faintly retained in the adult. On either side of the tympanic opening in the juvenile specimens there is a white spot higher than wide and a little larger than the tympanic orifice. Dorsally its outline is distinct but it runs into the white of the belly below.

A row of five or six very similar spots extends forward on the upper labials, each spot smaller than its predecessor. The series is continued posteriorly from the tympanic opening along the side, fading out just before the groin. The spots become posteriorly not only fainter but more and more irregular in arrangement, size and shape.

Van Denburgh's series of nine from Chekiang may profitably be compared with my Fukien lot.

	Percentage With Frontal Separated From Frontonasal	Percentage With 3 Supraoculars in Contact With Frontal	Scales Around Body, Extremes and Mean	Scales Down Back, Extremes and Mean
26 Fukien Specimens	15	46	34-36 34.6	64-72 67.9
9 Chekiang Specimens	33	77	36-38 37.1	73-81 76.6

The differences in the head scales are not especially significant considering the small number of specimens in the Chekiang series, but it is hard to understand the great difference in dorsal scale count for no two counts overlap. Since Van Denburgh had series of the three related species before him it is certain that he was not confounding them.

It is very doubtful if Boulenger's 1899 series of eleven specimens from Kuatun is really this species for I failed to find any there. Judging by his scale-count (34-36) it is a mixture of *boulengeri* and *formosensis*. Werner's (1910) Foochow specimen with 38 scale-rows is uncertain. Unfortunately, Mell (1922) has not described his Kwangtung series so we remain completely in the dark concerning them. Stejneger's (1925) two from Yenping may be typical *indicus* but more likely they belong to one of the other two species since their scale count is above mine for both Yenping and Futsing. He fails to publish further details.

Schmidt's (1927) three specimens from Yenping have 34-36 scale-rows and the proper color pattern. They undoubtedly are typical *S. indicus*. A young Changsha specimen (No. 17459), also recorded by Schmidt, with 3 supraoculars touching on both sides, 35 scale-rows, 75 scales down the back, and color pattern as much like *indicus* as *formosensis*, is very puzzling and might be placed under either species.

No. 33207 from Yenping is the only one in a series of one hundred and twenty-nine whose color pattern does not conform to that

of one of the three species. Instead of the dorsum being dark olive it is reddish brown. A series of distinct black spots extends along the middle of the back from the neck to the hind legs. A black line, broken along the midlateral region, extends from the eye past the leg and on along the base of the tail. The supralabials are regular and there is no patch of enlarged scales on the thigh. The frontal is not in contact with the frontonasal and two supraoculars are in contact with the frontal on either side. The scale-count around the body is 38 and down the back 73. There are 14 subdigital scales. The specimens measure 53.5 mm. from snout to vent. Its proper position is very uncertain.

In the field *boulengeri*, *formosensis*, and typical *indicus* are not readily confused when their ranges and habits are known, and in the laboratory they may be told at a glance by their distinctive color patterns. In order to render the matter as clear as possible I have made a table which, with the exception of color, only records their differences and this as concisely as possible (see p. 383).

The scale-count down the back is begun at a point opposite the back of the thighs. In all three species there are several with two supraoculars in contact with the frontal on one side and three on the other, hence the percentages given in the divided columns do not make a full hundred. The count of the lamellæ under the fourth toe may be too low by one as I did not count the doubtful one at the base of the toe. The "length" in the next to the last column means the length from snout to vent.

LYGOSAURUS

Lygosaurus sowerbyi Stejneger

Six specimens of this skink were collected at the type locality, Fut-sing (Nos. 34151-56). Schmidt (1927) recorded the second specimen of this discovery by Mr. Sowerby which was described by Stejneger in 1924.

All of my five adults have 6 upper labials and 9 supraciliaries on both sides. In the two males the lamellæ under the fourth toe number 16 and 17, while in the three females they are 15, 15, and 16. The males have each 30, and the females 28, 28 and 30 scales around the body. The scales down the back could be determined in only one specimen which had 50. The ventrals from anus to chin-shields range in number from 53 to 59 with 56 as the average. The tail is from 0.45 to 0.50 of the total length with no apparent sexual difference. The hind leg of the two males is 0.23 of the distance from snout to vent, while in the three females it is only 0.21.

	Patch Scales Back of Thigh	Scale Count Around Body, Extremes and Mean	Scale Count Down Back, Extremes and Mean	Percentage with Frontal Separated from Fronto-nasal	Number of Supra-oculars in Contact with Frontal		Lamellae Under Fourth Toe, Extremes and Mean	Average Length of Largest Four		Distinctive Juvenile Color Pattern
					Percentage with 3-3	Percentage with 2-2		♂	♀	
<i>formosensis</i> 30 Specimens in Columns 2, 3 and 7; 69 Specimens in Others	Absent	34	72+	5	91	3	18.1	75.5	86.9	No
		32-38	67-80				16-20			
<i>houlengeri</i> 27 Specimens	Present	37+	74+	0	4	70	19.2	97.5	109.7	No
		36-40	69-80				18-20			
<i>indicus</i> 26 Specimens	Absent	34.6	67.9	15	46	31	16-18	78.5	81.5	Yes
		34-36	64-72				16.4			

The males have numerous irregularly distributed scales along the sides colored black anteriorly and white posteriorly. In the females the white is almost lacking while the black spots are regularly arranged, one for each scale. Otherwise the sexes are similarly marked.

When compared with *L. salsburyi*, the only differences to be seen are: (1) the slightly lower number of subdigital lamellæ; (2) the shorter hind leg, .21-.23 of the body length instead of .33-.35; and (3) the smaller and narrower head. These differences may be reduced when further specimens come to light, and it is evident that the Hainan form represents at most a subspecies of *sowerbyi*.

LEIOLOPISMA

Leiolopisma modestum (Günther)

Six specimens, two from Yenping (Nos. 33205 and 33208), and four from Ch'ungang Hsien (Nos. 34915, 34923, 34926 and 34931), represent this species. In addition there is a lot of eggs (Nos. 35465) from Kuatun.

On August first six whitish lizard eggs containing scaled and pigmented embryos of this species were brought in at Kuatun. The largest egg measured 9.5×8 mm. They testify to the great altitude to which this species ranges. These tiny skinks were, however, very rare in Fukien.

EUMECES

Eumeces chinensis (Gray)

Figure 2a

A total of one hundred and forty-seven specimens represent this species. Thirty-eight of these come from Futsing Hsien (Nos. 34108-145), ninety from Yenping (Nos. 33047, 33063-74, 33076-116, 33118-35, 33137-43, 33159-62, 33164-68, and 33197-8), six from Ch'ungang Hsien (Nos. 33548, 33552, 33563, 34853-4, and 34869), and thirteen from Hok'ou (Nos. 35101-13). Schmidt (1927) reported six examples, five from Fukien and one from Szechwan Province. Stanley (1914) also records it from Fukien.

Among the ninety from Yenping five have two postnasals while in six the second postmental is paired. Two have the postmental divided. Stejneger's (1925) series of twenty-five from this locality showed about the same amount of variation in regard to the presence and absence of postnasals but none of his lot had the second postmental divided.

In my thirty from Futsing four have a pair of postnasals while two more have only one each. The second postmental is divided three times. The nuchals are very irregular, but 2-2 occurs most frequently. In all of ten specimens counted, the rows of body scales are 24.

In the Hok'ou series none has a postnasal and the second postmental is divided in only two specimens. The nuchals vary, but 1-1 occurs most often. The body scale-rows are uniformly 24.

Among the six from Ch'ungan one has a divided second postmental and one a single postnasal.

Summarizing we see that there is a great uniformity in *chinensis* from the Fukien-Kiangsi region. Only 0.06 have a pair of postnasals while just 0.08 have the second postmental paired. The other variations are too slight to be worth recording.

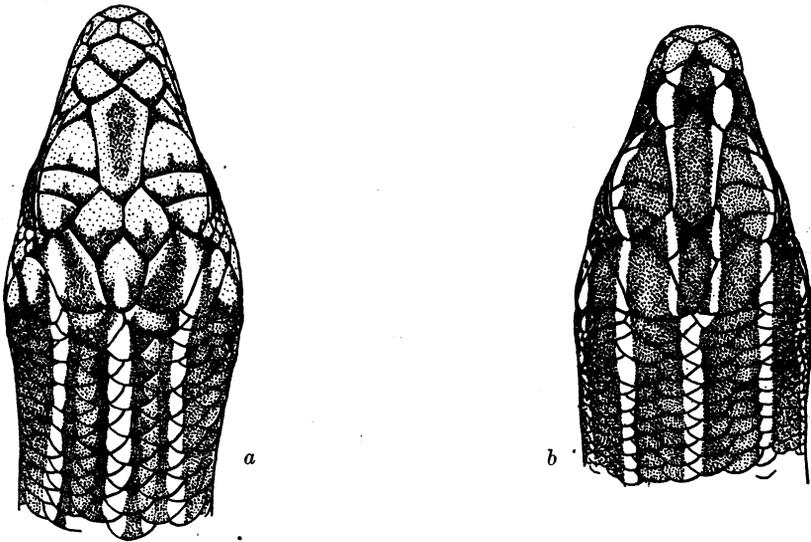


Fig. 2. *Eumeces chinensis* (Gray) and *Eumeces elegans* Boulenger.

a—Head and anterior dorsal pattern of juvenile *Eumeces chinensis*, A. M. N. H. No. 34144, five times natural size.

b—Head and anterior dorsal pattern of juvenile *Eumeces elegans*, A. M. N. H. No. 34770, six times natural size.

The maximum size is attained in a Futsing specimen 116 mm. from snout to vent. Another from Futsing measures 115 mm. which is the length of the largest Yenping example.

In the young, three yellowish stripes extend down the back on a very dark ground color. The central stripe follows the suture between the two mid-dorsal scale rows, the other two the next suture on either side but one. The central stripe ends at the parietals but the other two extend on to the supraoculars. All of the stripes disappear on the anterior half of the tail. The many lateral spots sometimes appear to be set in rows but generally they are quite evenly distributed over the sides. The

upper labials are white with dark borders and the head shields are bordered or centered with black.

The juvenile pattern is lost probably before maturity. Eight specimens measuring 55 to 60 mm. from snout to vent are in the transitional stage, the pattern having almost disappeared in some while it is obscure in all. *E. elegans* is a distinctly smaller species but the pattern is retained in perfection by examples of that species 60 mm. long. Here we have a marked difference between these two skinks. Their differences are summarized under *elegans*.

In the light of new material I have re-examined Schmidt's young *pulcher* (No. 31226, which measures 52 mm. from snout to vent) and found that it differs from juvenile *chinensis* in (1) the broken condition of the two dorsolateral stripes which causes them to look like rows of connected spots, (2) smaller and more contrasted lateral spots, (3) a darker belly, tail, and general background, (4) much more black and much less white on the upper labials which appear to be black with large central white spots. In other respects the *pulcher* pattern closely resembles that of *chinensis* rather than *elegans*. Schmidt's *pulcher* (No. 31205), though quite large (118 mm., snout to vent), retains distinct dorsal stripes. This may be a clue to another color difference between *pulcher* and *chinensis*.

I observed this to be the common skink of plain and plateau. It abounds along roads, paths, irrigation terraces and similar places all through the open, flat country and low "grass mountains." It was not seen in the valleys about Kuantun. Mell's (1922) observations in Kwangtung confirm mine.

***Eumeces elegans* Boulenger**

Figure 2b

Nineteen specimens from Yenping (Nos. 33075, 33117, 33136, 33144-158 and 31363), one hundred and seventy-nine from Ch'ungan Hsien (Nos. 33549-51, 33553-62, 33564-70, 34710-852, 34855-68, and 34870-71), and five lots of embryonic material also from Ch'ungan Hsien (Nos. 35454-459), make up the series of this species. Schmidt's (1927) former report records forty-nine specimens from Anhwei, Fukien, Hunan, Szechwan, and Yunnan Provinces.

My series of one hundred and ninety-eight specimens forms no exception to the rule of remarkable uniformity reported for this species. Fifteen of Schmidt's forty-nine came from Fukien Province and Stejneger (1925) lists eight additional ones from there. Mell (1922) says it is

common in Kwangtung Province. Stanley (1914) also gives Fukien records.

I examined one hundred and four of the Ch'ungan Hsien specimens in some detail and failed to find a postnasal or a second undivided postmental. The upper temporal of the second row is always the largest. The nuchals are uniformly 1-1 and in every case but one the posterior loreal touches two labials and in that it is in contact with three. In the Yenping series of nineteen, two specimens have only one nuchal each, otherwise they are perfect conformists. The color is quite uniform.

The young are gaudily marked with five gilt stripes on a blue-black ground color. Three of the stripes are dorsal and two lateral. The mid-dorsal one follows the line of sutures of the two central rows of scales, while each of the other two occupies the middle of a scale-row. The mid-dorsal stripe forks at the base of the interparietal to rejoin on the internasals after crossing the head lengthwise. Each lateral stripe begins on the posterior upper labials and runs down the middle of a scale-row for the greater part of its course. All five stripes disappear on the anterior half of the tail. The upper labials are white with dark borders.

The juvenile pattern is retained until after maturity, No. 33147 being a striped female 70 mm. long containing eight well-developed eggs. The ground color in these mature specimens is much lighter and the stripes more gray than gilt. The pattern probably disappears soon after maturity but this point has not been demonstrated. In a specimen 81 mm. from snout to vent the pattern has faded and the ground color is no longer dark. Since the second largest specimens among a series of one hundred and ninety-five measure but 93 mm., the above example is near the average adult size.

Young *elegans* differs from juvenile *chinensis* chiefly in (1) having five instead of three longitudinal stripes, (2) the relation of two dorsal stripes to the scale rows, (3) the forking of the mid-dorsal stripe and its subsequent extension in double form to the internasals, (4) lacking the lateral spots, (5) the retention of the pattern in slightly modified form even after maturity. Although *chinensis* attains a length of 116 mm., it loses the juvenile pattern by the time it is 60 mm. long, while *elegans*, with a maximum length of 96 mm., may retain the pattern even after it has reached a length of 80 mm.

During August, 1926, several lots of eggs were dug up in the high tea fields about Kuatun. On the 11th I noticed many recently hatched specimens abroad. Between the 16th and the 21st young emerged from at least two batches of eggs being kept by us. The number of eggs per

batch ranged from 7 to 10 in the five or six batches secured. The eggs of a batch of seven fully developed ones ranged from 24 to 26 mm. for the greater diameter, and from 12 to 13.2 for the lesser. The shell is a yellow-brown.

This species is obviously a mountain form never seen on the open, irrigated plain of the plateaus and valleys. At Kuantun it reaches the highest places. Stejneger's Foochow record indicates that it descends almost to sea-level provided there are mountains at these low altitudes to afford shelter. I failed to find it in the Futsing region which is near Foochow. This is hard to explain, since I worked in the mountains as well as on the plains.

My largest specimen measures 96 mm. from snout to vent while the next two in size measure 93 mm.

SERPENTES

Typhlopidae

TYPHLOPS

Typhlops braminus (Daudin)

Four examples from Foochow (Nos. 35186-189), and one from Nananfu, Kiangsi Province (No. 31779), represent this species. The latter was presented by Thomas S. Crossley.

Stanley (1914) reports this snake from Fukien, as do Stejneger (1925, Futsing) and Schmidt (1927, Yenping). It has long been known from Formosa (Stejneger, 1907, 1911; Oshima, 1910; Steindachner, 1913, etc.), and Smith (1923), as well as myself (Schmidt, 1927), found it common on Hainan. Mell (1922) now reports it common in Kwangtung where he found it up to 330 mm. above the sea. I could not discover it in Futsing Hsien.

There are 20 rows of scales in all of the specimens.

Boidæ

PYTHON

Python bivittatus Schlegel

Walter Granger secured in 1926 a small python at Yuan Kiang, southwest Yunnan Province (No. 35231).

Stanley's 1914 record of Fukien *reticulatus* doubtless belongs here. Mell (1922) records *bivittatus* from Kwangtung and Schmidt (1927) reported seven Hainan specimens. In 'Blue Tiger,' page 146, Harry R. Caldwell tells of killing a hundred-pound python near Yenping and he also gives a good photograph of the snake, Plate VI. Pythons are well known to the Fukien Chinese. Unfortunately, I did not secure a specimen.

The upper labials in No. 35231 are 13-13, the lower 20-20, and the oculars 8-8. The scales on the neck are 55, at midbody 69, and before the anus 46. The total length is only 863 mm.; 14 per cent of which is occupied by the tail. A rat, probably of the domestic variety, was found in the stomach.

Colubridæ

SIBYNOPHIS

Sibynophis collaris chinensis (Günther)

Twenty-seven specimens, twenty-one from Ch'ungan Hsien (Nos. 33736-737, 34522-538, and 34540-541), five from Yenping (Nos. 33387-391), and one from Futsing Hsien (No. 34102), make up the series of this species. No. 34539 is embryonic material from Ch'ungan Hsien.

Schmidt's *hainanensis* described from Hainan in 1927 has a low ventral count (167) well within the range (159-180) of *collaris collaris* and probably belongs in the synonymy of that form.

S. grahmi with only 83 subcaudals is puzzling because *collaris* from regions east as well as west of Yunnan have high caudal counts. Unfortunately, both the American Museum specimens have incomplete tails. In color there is little difference between these snakes and Fukien *chinensis*. Judgment on this matter must await new material.

Stejneger (1925), after discussing the relationship of eastern Chinese and far western *collaris*, concludes, on the basis of a difference in two characters, that eastern and central Chinese examples deserve a subspecific distinction. The present series perhaps weakens his conclusion to some extent but the matter still can stand best as he put it.

1. THE ENTRANCE OF THE LOWER ANTERIOR TEMPORAL INTO THE LIP.—I choose to put it this way and consider this scale a temporal and not a labial. In the present series this occurs only in three specimens out of twenty-seven and then on but one side, so we see that the character really holds good though not without exceptions. Steindachner (1913), however, finds no exception among thirteen Formosan snakes.

2. VENTRAL COUNT.—Stejneger gives the range of Chinese specimens as 178 to 187 ventrals and the western as 159 to 180. Twenty examples from the present series range from 167 to 183 but, only two fall below 171 and the average is 178.

The contact of the parietal with the lower postorbital is mentioned by Stejneger. Among the thirty-seven Fukien examples there is contact on both sides in four and on one side in another.

Other characters, though of less importance, may be recorded for twenty specimens out of the entire twenty-seven as follows:

The upper labials are 9-9 in all but three which have 8-8, 8-9, and 9-10. The preoculars are 1-1, the postocular 2-2 and the posterior temporals 2-2. I am considering the anterior temporals to be uniformly 2-2 for I have not counted as labials the three scales that enter the lip margin, but I have counted them as temporals. There are always 17 rows of scales. Unfortunately, only three males have complete tails and their subcaudal counts cover such a range (122, 120, and 109) that it is hard to conclude in regard to the relative number of these plates in the sexes. Eleven females range from 98 to 109 with an average of 107. The tails of these eleven females occupy from 0.30 to 0.33 of the total length, while in three males the tails occupy 0.34, 0.35 and 0.36. The two largest males measure from snout to vent 406 and 395 mm., the largest females 463 and 444 mm., respectively. The variability of the color pattern is striking. The head is always dark with a light patch on either side at the posterior edge of the dark area. From the center of the edge of the dark area a line always runs posteriorly. This line may extend even back on to the tail and often there is an additional line on either side parallel to it. Sometimes the central line barely extends back of the neck and in some specimens this line is present but the parallel lines are not evident. The lines may take the form of rows of dots. In the present series about one-third have three distinct lines and another third only the beginning of the central line, while the rest have combinations of the two extreme colorations. The pair of lateroventral lines is always present.

This most graceful snake is very common in the mountain bamboo groves and forests about Yenping and Kautun. I often took them as they glided over the shady forest floor and recall seeing as many as three in one day. They did not strike nor bite.

Skink remains were found in the stomachs of three and fragments of some species of *Takydromus* in two others.

Four females contained from two to four eggs each. A fairly well-developed egg measured 33×9.5 mm. On August 22 three white eggs (No. 34539) were brought in at Kautun. Two of them measured 36.5×15 and 34×13.3 mm. respectively, while the third was only 29.5 mm. long. Each contained a fully developed and well-pigmented snake, the longest of which measured 203 mm. from snout to tip of tail. The color pattern is identical in all three. The lines are evident, but faint everywhere except at the beginning of the central one. In the entire series of this species, as borne out by these three as well, there is no correlation between age and color pattern.

NATRIX***Natrix æquifasciata* Barbour**

Eleven specimens, ten from Futsing Hsien (Nos. 33814–823), and one from Foochow, make up the lot of this species.

Barbour (1908) described this striking snake from Hainan. Stejneger (1925) reports one from Yenping, and Schmidt (1927) records one from Futsing in the former Asiatic Expedition's collection.

The present series shows no marked variations so the counts will be recorded as concisely as possible. The upper labials are 9–9 in all but one in which they are 8–9; the lower are 10–10 in seven, 10–11 in two, 9–10 in one, and 8–9 in one. The preoculars are 1–1 in eight, 1–2 in two, and 2–2 in 1; the postoculars, 3–3 in nine, 2–3 in one, and 2–2 in one. The suboculars are 1–1 in seven, 1–0 in two, 1–2 in one, and entirely lacking in one. There is often doubt as to whether a scale behind and below the eye should be called a post- or subocular. At any rate this character is variable enough to be of little value. The suboculars may be very minute as in No. 35200. The anterior temporals are extremely variable being 2–2 in three, 2–3 in three, 3–3 in two, 3–4 in two, and 2–4 in one; the posterior, a little better with 3–3 in seven, 2–3 in three, and 3–4 in one. The scale formula is invariably 19–19–17.¹ The chinshields and first pair of lower labials are smooth in all six females but rough in three out of five males.

The ventrals in the five males range from 150 to 153 with 151 as average, in the six females from 144 to 148 with 145 as average. This snake very often suffers the loss of the tip of the tail, so the subcaudal counts and measurements are neither complete nor reliable. In three females with tails that appear to be complete the counts are 72, 75, and 76, while the single entire male has 73 subcaudals. The three largest of each sex measure (males) 735, 578, 560, and (females) 1100, 763, 701 mm. from snout to vent. The tail occupies 0.22, 0.23, and 0.24 of the whole in the three entire females and 0.22 in the single male. The anal is divided in all but one example. The large size *æquifasciata* may attain is illustrated by No. 33814, a female 1420 mm. from snout to tip of tail, and 153 mm. around the largest part of the body. This snake, nevertheless, was taken in a small mountain stream.

In strong contrast to *annularis* and *piscator* this species is a true inhabitant of mountain brooks. Even though I caught several and saw many that escaped me I never found one away from a stream. They were found either in the stream or basking on the bushes over the water into

¹Unless stated otherwise such numbers represent counts taken on neck, at midbody, and just before vent.

which they dropped when alarmed. Sometimes they dropped from a point ten or twelve feet above the water. After reaching the water they hid under stones on the bottom. Even though the brooks in which I observed these snakes flowed through flooded fields which, as well as the streams, were frequented by *piscator* and *annularis* I failed to find *æquifasciata* in the fields. This point is repeated for emphasis as it is interesting to note the tenacity with which this snake clings to its original habits.

When annoyed *æquifasciata* gathers itself into irregular coils, often striking violently and hissing at each stroke. It might be called "snappy" or "pugnacious."

A small fish of the genus *Zacco* was found in the Foochow specimen.

The Futsing streams in which *æquifasciata* was so common were the open kind found in hills and low mountains and not the high, shaded cascade type. The snakes were taken at very nearly sea-level and are probably to be reckoned as inhabitants of more gently flowing, open country, rather than heavily shaded, cascading mountain watercourses. This does not mean that they never venture into the latter.

Natrix annularis (Hallowell)

One hundred and four specimens, sixty from Yenping (Nos. 33306-365), twenty-five from Futsing (Nos. 33830-854), four from Ch'ungan Hsien (Nos. 33690-693), and fifteen from Hok'ou, Kiangsi Province (Nos. 35060-074), make up the large series of this species. Schmidt (1927) has already reported on the Expedition's former collection of thirty-two specimens from Anhwei and Fukien Provinces.

This species has now been recorded from central Szechwan (Vogt, 1924), and western Yunnan (Mell, 1922). Wall (1903) says that it is common in the Yangtze Valley, Mell found it so in northern Kwangtung, while Formosan records are numerous (Oshima, 1910; Steindachner, 1913, etc.). It is certainly abundant in Fukien.

The present series agrees well with Schmidt's. It is interesting though to note that the male has more bands than the female. Only two females out of eleven had more than 40 body-bands while none of the thirteen males had less than 40. Only one female out of eight had more than 20 tail-bands while every male had at least 22. A summary follows:

NUMBER OF BANDS			
	On Body		On Tail
13 ♂	40-46	10 ♂	22-27
11 ♀	34-44	8 ♀	16-22

Twenty-four specimens, including some from each locality (Nos. 33306, 33310-11, 33318, 33321-22, 33335, 33339, 33348, 33690-93,

33831-33, 33839, 33841, 33843, 35060, 35066, 35068 and 35073-74), were examined with the following results. The upper labials were 9-9 in fourteen, 8-9 in eight, and 8-8 in two; the lower 10-10 in nineteen, 9-10 in four, and 10-11 in one examples. The preoculars were uniformly one on a side and the postoculars were 3-3 in all but one which had two on each side. The anterior temporals were 3-3 in twelve, 2-2 in seven, 2-3 in four, and 3-4 in one; the posterior, 3-3 in sixteen, 2-3 in seven, and 1-2 in one. The scales were 19-19-17 in all but one which had the formula 19-19-18. The outer row was smooth in all, but the second was faintly keeled in twenty-three out of twenty-five specimens. In the remaining two it was smooth. The three largest females from snout to vent measured 552, 540, 510 mm., the largest males 441, 440, 428 mm., respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	13	153-163	157
	♀	11	145-159	151
Caudals	♂	10	63- 69	66
	♀	8	58- 61	60
Tail/Total Length	♂	10	.20-.23	.21
	♀	7	.19-.22	.21

Two females contained six, one nine, one five, and one four embryos, in various stages of development.

Five stomachs contained the remains of small loaches, four held remnants of eels of the genus *Fluta*, while in one stomach there were minnows and an eel head (*Fluta*). Frog remains were found in only two snakes. *N. annularis* thus shows a preference for fish over frogs though certainly one class of food is as abundant as the other in the streams and flooded fields frequented by these snakes.

N. annularis is common in Fukien from the coast up to the base of the high Kuatun range. Near Yepping it is extremely abundant even in the upper mountain valleys there. It does not frequent the shaded forest cascades but rather the irrigated fields and streams of the open valleys. It is as abundant in the rice fields as in the stream beds and in this way its habits contrast with those of *N. xequifasciata* which seems to be confined to the latter. I never saw *annularis* drop from a bush into the water but often found it in level, open, highly cultivated rice fields far from shade or streams. Probably it was originally an inhabitant of hilly

country streams and waterways but has now adapted itself to a rice-field life.

N. annularis is replaced in the mountains by *percarinata* from which it may be readily told by the difference in coloration of the throat. In *percarinata* the dark ventral bars fail to meet on the first few dozen ventral plates, while in *annularis* they unite in the midline almost up to the head. This is somewhat a matter of degree but the difference is very constant and is the surest simple way of distinguishing these very similar species.

In disposition it is a typical *Natrix*, most specimens being very vicious and wild.

***Natrix percarinata* (Boulenger)**

One hundred and six specimens, seventy-seven from Ch'ungan Hsien (Nos. 33653-689 and 34383-422), twenty-three from Yenping (Nos. 33366-386 and 35141-142), and six from Futsing (33824-829), make up the lot of this species. In addition there is an embryonic series from Ch'ungan (Nos. 34423-427). Schmidt (1927) has already reported on six specimens from Fukien, Szechwan and Anhwei, the specimen from the last locality having been bought. Boulenger (1899) described this species from a single Kuantun specimen.

Smith (1923) gives his Hainan record; Stejneger (1925) describes specimens from Mt. Omei, Szechwan; and Parker (1925) records Tonkin examples. Thus the known range of *percarinata* is rapidly expanding.

The present series agrees well with former descriptions. Eighteen examples, (Nos. 33367, 33376-78, 33674, 33687, 33824-27, 34383-84, 34387, 34389, 34390, 34395, and 34397-98), some from each locality, have been examined in detail. It is interesting to see that the rugosity on the chin-shields and the first pair of lower labials is a sexual character, all nine of the males examined having it developed to a marked degree while none of the females had it developed to any extent, even though in two, very small pimples could be made out. The upper labials are 9-9 in fifteen, 8-9 in two, and 9-10 in one; the lower, 10-10 in fifteen, and 10-11 in three. There is but one preocular on each side in all eighteen but the postoculars are 4-4 in ten, 4-5 in five, 3-3 in two, and 3-4 in one. The anterior temporals are 3-3 in thirteen, 3-2 in three, and 4-3 in two; the posterior, 3-3 in fourteen, 2-2 in two, 3-2 in one, and 4-3 in one. The scale formula is regularly 19-19-17.

Summary of Counts and Measurements

	SEX	No. OF		AVERAGES
		SPECIMENS	EXTREMES	
Ventrals	♂	9	139-143	140
	♀	9	138-142	140
Caudals	♂	8	70- 79	74
	♀	6	67- 73	70
Tail/Total Length	♂	8	.23-.27	.25
	♀	6	.26-.27	.26

The three largest females measure from snout to vent 730, 645, and 620 mm., the males 567, 524, and 515 mm., respectively.

Seven stomachs held frog, three tadpole, two loach, and one crayfish remains. In contrast to *annularis* this species seems to be a frog rather than a fish eater.

The number of eggs found in eleven females averaged 7.5 for each and ranged from 4 to 13. On August 31 at Kuatun a man brought in one of these snakes along with 10 white eggs. The snake was very docile and remained by the eggs, not making the invariable wild dash for freedom. It was kept for several days and remained quietly coiled about the eggs which had been placed in a small, dry tin can. Thus the adult clearly and beyond all doubt showed an interest in her eggs even though she would make no attempt to defend them. The eggs were kept until September 12 when they were opened and found to contain well-pigmented embryos, five of which are preserved (Nos. 34223-227). One of these is 170 mm., total length. They are in every way typical *percarinata*.

N. percarinata is an inhabitant of forested mountain streams and cascades. In Futsing it was found at low altitudes in the swift-flowing, clear streams of the low mountains there, but about Kuatun it was really at home. In the few San Chiang rice fields it simply swarmed and could be found most readily at night (Pl. XIX, fig. 1). San Chiang is near Kuatun but at a lower altitude. Unlike *xequifasciata* but like *annularis*, it leaves the streams for shallow water of irrigated fields where its food is undoubtedly abundant. I never found one sunning on a bush over the water like *xequifasciata*. About Yenping *percarinata* was associated with *annularis*, but their ranges scarcely overlap in Ch'ungan Hsien for the high mountains there were not frequented by *annularis*, not a single specimen having been taken in the Kautun region. *N. percarinata* is the forest and mountain form of *annularis*, from which it may be readily distinguished by the difference in color pattern of the throat. This difference is explained under *annularis*.

This snake is very active and has developed to a marked degree the

habit of throwing its body and twisting about violently when annoyed. It often strikes and bites viciously.

***Natrix craspedogaster* (Boulenger)**

Sixty specimens, forty-nine from Ch'ungan Hsien (Nos. 33738-742, 33746-747, and 34542-583), and eleven from Yenping (33392-402), represent this species.

Boulenger described and figured *craspedogaster* in 1899 from six examples secured at Kuatun. Schmidt (1927) reported on four additional specimens, three from Yenping, and one bought in Anhwei Province. Mell (1922) found it in northern Kwangtung. Stanley reported it from Chekiang and Fukien in 1914, and from Fukien again in 1916.

Thirteen Kuatun specimens (Nos. 33738, 33740-741, 34542, 34548, 34551, 34554-555, 34559, and 34565-568) have been found to agree with the original description. The upper labials are 8-8 in ten, and 8-9 in three; the lower, 10-10 in nine, 9-10 in two, 10-11 in one, and 11-11 in one. The preoculars are 1-1 in twelve, and 1-2 in one; the postoculars, 3-3 in eleven, 4-4 in one, and 1-3 in one. In Nos. 33740 and 34542 there are extra minute scales between the postoculars and the temporals. The anterior temporals are 2-2 in nine, 2-3 in two, 3-3 and 3-4 in one each. The scale formula is 19-19-15 in all but one, in which it is 17-19-17, and the anal is always divided.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	7	152-157	154
	♀	6	150-156	153
Caudals	♂	5	89-100	93
	♀	4	88-93	90
Tail/Total Length	♂	5	.28-.30	.292
	♀	4	.28-.29	.285

Four Yenping specimens (Nos. 33392, 33395, 33400, and 33402) were examined. All have upper labials 8-8, preoculars 1-1, postoculars 3-3, anterior temporals 2-2, and scales 19-19-17. The lower labials are 10-10 in three, and 9-9 in one; the posterior temporals 2-2 in two, 1-2 and 1-1 in one each. The ventrals are 147, 147 in the females, 150, 151 in the males; the subcaudals 83, 87, and ?, 96, respectively. The ventral counts in the sexes differ more markedly here than in the Ch'ungan series.

The three largest males in the entire series of sixty measure from snout to vent 435, 419, and 391 mm., the females, 490, 481, and 478 mm., respectively. The females are decidedly the larger.

One female contained five eggs, two of which measured 28×8.5 and 31×9 mm. Five more were found in each of two other females while two more held seven and nine, respectively. A single large egg measuring 39×9 mm. was seen in still another snake.

Five adults had eaten young frogs or toads, while another had small tadpoles in its stomach, all of uncertain identity.

N. craspedogaster was abundant in the mountains near Yenping and all about Kuatun. It is very docile.

***Natrix stolata* (Linnæus)**

Seventy-four specimens, forty-three from Futsing Hsien (Nos. 33973-34009 and 34092-097), twenty-eight from Yenping (Nos. 33457-483 and 35146), one from Ch'ungan Hsien (No. 33752), and two from Hok'ou (Nos. 35083-084), represent this species.

Schmidt (1927) reported on one hundred and seven from Hainan, two from Yenping, six from Futsing Hsien, one other from Fukien without specific locality, and one bought in Anhwei. Stanley lists specimens from Fukien (1914 and 1916) and Stejneger (1925) gives Foochow and Yenping records.

The present series shows remarkable agreement with those previously recorded. Twenty-two specimens have been selected for special study (Nos. 33457-458, 33462, 33465, 33469-474, 33476, 33752, 33975, 33994, 33999, 34002, 34005, 34478-479, 35083-084, and 35146). The upper labials are 8-8 in all but two, in one of which they are 8-9, and in the other 7-8; the lower are 10-10 in thirteen, 10-11 in five, 9-10 in two, and 9-9 in two. The preoculars are 1-1 in all; the postoculars, 3-3 in all but two in which they are 3-4. The anterior temporals are 1-1 in twenty-one and 1-2 in one, the posterior, 2-2 in twenty-one and 2-3 in one. The uniform scale formula in 19-19-17, and the anal is always divided.

Summary of Counts and Measurements

	SEX	No. OF SPECIMENS	EXTREMES	AVERAGES
Ventrols	♂	12	145-156	151
	♀	10	149-157	152
Caudals	♂	11	69-81	77
	♀	6	67-74	71
Tail/Total Length	♂	11	.24-.26	.258
	♀	6	.24-.25	.243

The three largest males in the entire lot of seventy-four measure from snout to vent 420, 413, and 410 mm., respectively; the largest

females 499, 485, and 478. In Schmidt's Hainan series the largest specimen was also a female.

Six females contained twelve, ten, nine, eight, six, and five eggs, respectively. One of these eggs measured 22×8 , and another 22×9 mm.

Frog remains were found in three stomachs. Schmidt's Hainan series contained nothing but frog remains also.

Near Yenping *stolata* was frequently seen along open mountain roads about dusk. When surprised it makes a dash for safety which often rattles the dry leaves or grass in which it is hiding. This habit is not shared by other snakes of the region and I could tell that one of these snakes had been started before even seeing it. It is a *Natrix* that to a large degree has given up its semi-aquatic habits and in this respect brings the American garter-snake (*Thamnophis*), to mind. Schmidt (1927) has quoted me to the effect that *stolata* neither strikes nor bites.

It does not range into the Kuatun mountain forests but is found on the plateaus flanking that region. The large series secured testify to its abundance.

***Natrix piscator* (Schlegel)**

Ninety-four specimens, eighty-two from Futsing Hsien (Nos. 34010-091), four from Yenping (Nos. 33484-487), one from Ch'ungan Hsien (No. 34657), four from Hok'ou (Nos. 35076-079), and three from Yuan Kiang, Yunnan Province (Nos. 35232-234), represent this species. The Yunnan examples were collected by Walter Granger.

Schmidt (1927) reported on one hundred and ten specimens from Hainan, and three from Futsing Hsien. Boulenger (1899) recorded one Kuatun *piscator*. Stanley, in 1914, listed "numerous examples from Chekiang and Fukien" and in 1916, one from Foochow. Stejneger (1925) records Futsing, Foochow, and Kuliang specimens. Other records are numerous.

Among the entire series seven specimens (Nos. 34010-016) have a varying degree of red on the first few rows of scales but in No. 34017 red is the predominant color, even the mid-dorsal scales and ventral plates having traces of it while the sides are distinctly red. In other respects these specimens agree with the rest in which there is no trustworthy variation.

Seventeen specimens from Fukien and Kiangsi (Nos. 33484, 33487, 34017, 34033, 34050, 34059, 34061, 34064, 34073, 34075, 34079, 34083, 34657, 35076-079) have been closely examined. The upper labials are 9-9 in thirteen, 8-9 in two, 9-10 in one, and 8-8 in one; the lower, 10-10 in eleven, 10-11 in three, and 9-10 in three. The preoculars are always

one on a side, the postoculars 3-3 in thirteen, 3-4 in two, 2-3 and 4-4 in one each. There is a subocular on one side in No. 34017, the red example. The anterior temporals are 2-2 in thirteen, 2-3 in two, 1-1 in one, and split up into four small scales on one side and six on the other in No. 35077. The posterior temporals are 2-2 in fifteen, and 2-3 in two. The scale formula is 19-19-17 in all seventeen.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	7	127-135	130.7
	♀	10	138-155	144.2
Caudals	♂	7	78-83	80
	♀	7	68-74	70
Tail/Total Length	♂	7	.30-.32	.310
	♀	7	.24-.26	.248

Schmidt's Hainan series averages fewer ventrals, 126.5 for the males, and 138.2 for the females.

The Yuan Kiang specimens have the upper labials 9-9, the lower, 9-10 in two and 9-? in a damaged one; the preoculars 1-1, the postoculars 3-3 in two, and 3-4 in one; the anterior and posterior temporals 2-2, and the scale formula 19-19-17. The ventrals are 140, 141 in the two females, and 130 in the male. Two of three tails are imperfect but the caudals in the single good one, a female, number seventy-four, the tail occupying 0.27 of the total length.

In the entire series there are but twenty-two males, the three largest of which measure from snout to vent 480, 431, and 419 mm., while the three largest females among 72 measure 738, 680, and 655 mm., respectively. The largest snake in the Hainan series was also a female.

One female contained forty-two, another twenty, and another fourteen eggs. One well-developed egg measured 21 × 11 mm.

A *Barbus snyderi* was found in the stomach of one, a Rhodein carp in another, and unidentifiable fish remains in six others. Three of the snakes had eaten amphibians, one a toad (*Bufo*) and the other two, *Rana limnocharis*. Only one of twelve full stomachs in the Hainan series held fish remains, while here we have seven with fish and only three with amphibian remains.

This snake was extremely abundant in the irrigated fields of Fut-sing Hsien. It frequented the wet and moist grassy banks and terraces of these fields in the open country. In the mountains near Yenping it was relatively rare. The Ch'ungan example was taken on the plateau near Ch'ungan City. Boulenger's Kuatun record is doubtful, for we saw

no trace of it there. Very possibly it was brought into the mountains by a passing traveler.

N. piscator often bites and strikes when handled freely but when surprised always prefers flight.

***Natrix tigrina lateralis* (Berthold)**

Twenty-three specimens, nine from Ch'ungan Hsien (Nos. 33639-640, and 34356-362), eight from the Western Hills, Peking (Nos. 29386-387, 29471-475, 29504), and six from the Tsinan region, Shantung Province (Nos. 29696, 29698-700, 29719, and 29721), represent this species.

Boulenger (1899) lists a specimen from Kuatun, and Stanley (1914) reported it from Fukien.

The present series conforms well with Schmidt's (1927) lot of fifty-two from Chihli, Shansi, Shensi, and Anhwei. All but one have 7 upper labials on both sides. That one has 8 on one side. The lower labials are 9-9 in eleven, 9-10 in six, 8-9 in three, 10-10 in two, and 8-10 in one. The preoculars are uniformly 2-2; the postoculars, 3-3 in thirteen, 3-4 in six, and 4-4 in four. These scales are 3-3 in all but one from Ch'ungan and in that one they are 3-4. The anterior temporals are 1-1 in all, the posterior, 2-2 in all but No. 29474 in which they are 2-3. The scale formula is uniformly 19-19-17 in all but No. 33640 in which it is 19-19-15, and the anal is always divided. The three largest males measure from snout to vent 730, 630, and 609 mm., but the largest from Ch'ungan is only 487 mm. long. The three largest females measure 780, 730, and 730 mm., respectively, but the largest from Ch'ungan measures only 720 mm. Thus the northern specimens are the larger.

Summary of Counts and Measurements

	SEX	No. of		AVERAGES
		SPECIMENS	EXTREMES	
Chihli and Shantung Series				
Ventrals	♂	8	148-160	155
	♀	6	153-162	160
Caudals	♂	8	60-67	64
	♀	5	52-56	54
Tail/Total Length	♂	8	.20-.22	.21
	♀	5	.17-.18	.174
Ch'ungan Hsien Series				
Ventrals	♂	6	148-155	152
	♀	3	154-157	155
Caudals	♂	6	57-73	64
	♀	2	56-65	60
Tail/Total Length	♂	6	.21-.25	.225
	♀	2		.20

The belly in Nos. 29471, 29474, and 34359 is uniformly colored, lacking entirely the median black area. This is an approach to *subminiata* and *helleri*.

One Ch'ungan snake contained nine eggs, another five, one of the five measuring 32×12 mm. Frog remains were found in two stomachs.

It is extremely interesting to note the proximity of the ranges of this species and *helleri* in northern Fukien. I was not fortunate enough to secure any of the latter at Yenping, but Mr. Caldwell did so (Schmidt, 1927). At Kuatun, *tigrina lateralis* was not common.

Natrix septemlineata Schmidt

One specimen of this species (No. 35210) described only in 1925, was taken at Hsin Kai, central Yunnan Province, by Walter Granger.

There are 8 upper, and 10 lower labials; 1 preocular and 3 postoculars on a side. The anterior as well as posterior temporals are single. The scales are 19-19-17. There are 162 ventrals and 73 caudals. The snake measures from snout to vent 428 mm.; its tail 141 mm. The tail is 0.25 of the total and the anal is divided. Thus, we see that it agrees in general with the type specimen, though the caudal count is a little low. The dorsal color encroaches on the ventrals more than in the type, while all the upper and two or three anterior lower labials are margined with black.

A small *Rana* was found in the stomach of this specimen.

Natrix helleri Schmidt

Walter Granger collected at Wuting Hsien, northwest Yunnan Province, one specimen (No. 35238) that represents this species described by Schmidt in 1927. Harry R. Caldwell collected a specimen at Yenping where it probably is not common since I failed to secure it there. It is closely allied to *subminiata* of Java and southeastern Asia.

No. 35238 has 8 upper and 10 lower labials on each side; preoculars 1-1, postoculars 3-3; anterior temporals 3-3, two of which on either side are very small; posterior temporals 2-3. There are 18 rows of scales on the neck, 19 at midbody, and 17 before the anus. The ventrals are 170, the subcaudals 88, and the tail .27 of the total length.

The type of *helleri* has 22 rows of scales on the neck, or four more than the new specimen. However, I have compared these two snakes closely and find that the actual difference is slight for if the count is taken a little farther back on the type, it too has but 18 rows. The extra rows on its neck are very short.

The stomach of No. 35238 held frog remains.

PSEUDOXENODON

The Chinese species of this genus have been badly confused for several reasons. First, the material has been scanty, and the descriptions all too brief; secondly, the species have much the same color pattern and scale characters; thirdly, there is often a change in pattern during ontogeny.

For example, Steindachner (1914) had fifteen specimens from Formosa which he called *macrops* yet his Plate III clearly shows that he had examples with a lineate tail which of course must belong to the *dorsalis-striaticaudatus* group. He writes that the majority of his specimens have the caudal stripes, yet the high range of ventrals and caudals given by him exclude not only the two species of the group just mentioned, but all the other eastern Chinese species as well. A single specimen recognized by him as distinct is figured and described as "*macrops* var. *sauteri*." It lacks the tail stripe and its ventral and caudal counts are also so high that it cannot be any of the new Fukien species. Now, I have shown that among the fifteen, the majority with the tail stripes and the single specimen of *sauteri* can be allocated only in a general way. The remaining few with their high ventral and caudal counts are probably allied to *karlschmidti* since the descriptions and figures fail to indicate such a contrasted pattern, especially of the head, as found in *fukienensis*.

It is unfortunate that Indian and western Chinese *macrops* have been confused with the eastern forms, not only by Steindachner but by Mell (1922), Werner (1909), and Stanley (1914, 1916) as well. *P. macrops* and *sinensis* form a group in the southwest with a distinct habitus and pattern. The shape of the head especially is noticeably different.

Barbour's *P. stejnegeri* (1909) is probably represented in Steindachner's series and, for the present, in default of adequate descriptions, the series described by Steindachner with a lineate tail may be called *stejnegeri* and considered to be the insular form of the *striaticaudatus-dorsalis* group.

The *macrops-sinensis* group comes into this paper only by virtue of its relationship with the eastern forms and the single specimen of *sinensis* collected by Walter Granger in Yunnan. Stejneger (1925) finds difficulty in separating the two and, as I have seen no Indian specimens, I am not in a position to carry the matter as far as he has. However, judging by the two Chinese specimens of *macrops*, and the large series of *sinensis* that I have examined, I conclude that the two forms are amply distinct in coloration and barely intergrade in ventral and caudal counts.

Summary of Characters for Species of *Pseudozenodon* in the American Museum Collection

SPECIES	LABIALS				OCULARS		TEMPORALS		SCALES ¹		VENTRALS		CAUDALS		MAXIMUM LENGTH SNOUT TO VENT		DORSAL SPOTS OR BANDS		TAIL/TOTAL LENGTH	
	Upper	Lower	Entering Eye	Contact First Pair Chin-Shields	Pre-	Post-	Anterior	Posterior	Number of Rows	Rows not Keeled at Midbody	Extremes and Averages ♂ ♀		Extremes and Averages ♂ ♀		Millimeters ♂ ♀		Body	Tail	Extremes and Averages ♂ ♀	
<i>bambusicola</i> 5♂ 5♀	8-8	10-10 in 5 9-10 in 3 9-9 in 1 ?-? in 1	4, 5-4, 5 in 9 ?-? in 1	5-5 in 5 4-4 in 1 4-5 in 3 ?-? in 1	1-1 in 10	3-3 in 8 2-2 in 1 2-3 in 1	2-2 in 9 1-1 in 1	2-2 in 9 1-1 in 1	19-17-15 in 9 17-17-15 in 1	1-1 in 8 ?-? in 2	mainland 4♂ 131-133, 132 Hainan 1♂ 140	139-142, 141	50-52 51	42-46 44	516 Hainan Example	530 Futsing Example	Range of Total Number of Dorsal Cross-bands 19-23 in 8		.18-.19 in 4 .16 in Hainan Specimen	.15-.15
<i>striaticaudatus</i> 9♂ 12♀	8-8 in 15 7-7 in 4 7-8 in 2	9-9 in 18 9-10 in 3	4, 5-4, 5 in 15 3, 4-3, 4 in 4 4, 5-3, 4 in 2	4-4 in 20 4-5 in 1	1-1 in 18 2-2 in 2 1-2 in 1	3-3 in 20 3-4 in 1	2-2 in 19 1-2 in 2	2-2 in 18 1-2 in 3	19-17-15 in 10 17-17-15 in 1 18-17-15 in 1	♂ 1-1 in 9 ♀ 2-2 in 7 3-3 in 3 1-1 in 1 2-3 in 1	140-144, 142	146-153, 149	8♂ 59-64, 61	11♀ 52-62, 57	676	635	Anteriorly, Spots Indistinct, Striped Posteriorly		8♂ .20-.22 .207	11♀ .17-.20 .185
<i>fukiensis</i> 12♂ 3♀	8-8 in 14 7-8 in 1	8-9 in 9 7-8 in 3 8-9 in 2 7-7 in 1	4, 5-4, 5 in 13 3, 4-4, 5 in 1 4-4 in 1	4-4	1-1	3-3 in 14 4-4 in 1	2-2	2-2 in 12 2-3 in 3	19-17-15	1-1 in 10 0-0 in 5	137-143, 140	147-148	61-65 63	54-57 56	493	535	25-29	13-16	.21-.24 .23	.18-.19
<i>karlschmidti</i> 4♂ 4♀	8-8 in 7 7-8 in 1	9-10 in 4 9-9 in 1 8-10 in 1 10-10 in 1 ?-? in 1	4, 5-4, 5 in 6 3, 4-4, 5 in 1 ?-? in 1	4-5 in 5 5-5 in 1 4-4 in 1 ?-? in 1	1-1	3-3 in 7 ?-? in 1	2-2	2-2 in 6 2-3 in 2	19-17-15	1-1	144-151, 148	149-154, 152	58-60, 59	54-56, 55	625	653	20-24	8-10 in 7 ? in 1	.18.19	.17-.18
<i>sinensis</i> 8♂ 14♀	7-7 in 21 7-8 in 1	Combinations of 8 and 9			1-1	3-3	2-2		19-19-15		138-146, 144	149-162, 155	60-68, 62	57-66, 61					.18-.22 .20	.19-.20 .19
<i>macrops</i> 1♂ 1♀	7-7	8-8			1-1	3-3 in 1 2-3 in 1	2-2	2-2 in 1 2-3 in 1	17-19-15 in 1 19-19-15 in 1		154	164	71	67	540	296			.23	.20

¹Scale counts made just posterior to head, at midbody and before vent.

This genus turns out to be most interesting. It is evidently speciating very rapidly, hence the large number of related forms in isolated mountain groups. The pattern is fundamentally the same but varies as the different color elements are pronounced or subdued. General descriptions are of little value. The habits, especially the actions when alarmed, should be carefully observed and compared. At least two of the three new forms flatten the neck when annoyed and I have gone into detail concerning the behavior of *bambusicola*. Probably there are many undiscovered forms in various parts of China and unless these are described with great care as they come to light the confusion already so bad will become even worse.

The validity of the three new species described herein might be questioned but, for the following reasons, I am convinced that they are perfectly distinct.

- (1) There is no sign of intergradation among them.
- (2) All are represented by adequate series.
- (3) The number of specimens in the series is relatively equal.
- (4) The ontogeny of the color pattern is known in each case.
- (5) Field observations indicate distributional and habitat differences.

The folding table summarizes the data of special diagnostic value for the species in the American Museum's collection.

***Pseudozenodon bambusicola* Vogt**

Eight examples, six from Yenping (Nos. 33405-409, and 35143), and two from Futsing Hsien (Nos. 34098-099), make up the series of this species.

Vogt (1922) described two new species from Mell's Kwangtung collection. These he called *melli* and *bambusicola*. Werner (1926) has shown these to be male and female of one species, *bambusicola*. Schmidt (1927) described a specimen that I collected on Hainan and another bought at Wuhu, Anhwei Province. Smith (1923) also secured a specimen on Hainan.

In all eight examples the fourth and fifth labials enter the eye. Five lower labials are in contact with the first pair of chin-shields in five specimens, 4 on one side, 5 on the other in three, while in a single one there are but 4 on a side in contact with them. All but the first row of scales on either side are keeled in seven, but in No. 34099 the first two are smooth. This specimen fails to conform in other respects. Seven anals are divided, one undeterminable. The following tables give the important characters for the Anhwei and Hainan specimens, as well as for the eight from Fukien.

MALES					
	Fukien	Fukien	Fukien	Anhwei	Hainan
A. M. N. H. Nos.	33405	33409	35143	23527	27753
Dorsal scales	19-17-15	19-17-15	19-17-15	19-17-15	19-17-15
Ventrals	131	131	133	131	140
Subcaudals	50	52	50	51	52
Upper Labials	8-8	8-8	8-8	8-8	8-8
Lower Labials	10-10	9-10	9-10	9-9	
Preoculars	1-1	1-1	1-1	1-1	1-1
Postoculars	3-3	3-3	3-3	2-2	3-3
Anterior Temporals	2-2	2-2	2-2	2-2	2-2
Posterior Temporals	2-2	2-2	2-2	2-2	2-2
Dorsal Cross-bands	14	16	16		
Total Length	413	276	418	339	618
Tail/Total Length	.18	.18	.19	.18	.16

FEMALE					
	Fukien	Fukien	Fukien	Fukien	Fukien
A. M. N. H. Nos.	33406	33407	33408	34098	34099
Dorsal Scales	19-17-15	19-17-15	19-17-15	19-17-15	17-17-13
Ventrals	142	139	142	142	140
Subcaudals	44	45	45	46	42
Upper Labials	8-8	8-8	8-8	8-8	8-8
Lower Labials	10-10	10-10	10-10	10-10	9-10
Preoculars	1-1	1-1	1-1	1-1	1-1
Postoculars	3-3	3-3	3-3	3-3	2-3
Anterior Temporals	2-2	2-2	2-2	2-2	1-1
Posterior Temporals	2-2	2-2	2-2	2-2	1-1
Dorsal Cross-bands	23	20	14	19	16
Total Length	378	398	311	624	174
Tail/Total Length	.15	.15	.15	.15	.15

The dorsal band count does not include any part of the pattern on the neck. All but one, two or three of the upper labial sutures are black. In color the sexes differ only in intensity of pattern, the male coloration being less vivid than the female. This is due to the slight intermixture of ground color with the dark cross-bands on the back in the male. The conspicuous head pattern is also more vivid in the female. I fail to detect all of the sexual color differences described by Werner (1926).

It is significant that this species was not found in the Kuatun mountains though it was common enough around Yenping. It probably does not reach central China but is widely distributed in the southeast, thus avoiding conflict with other species of the genus.

In handling four of these snakes I detected the following behavior: flattening of neck and part of body; inflation of same; opening of mouth

half-way; drawing up or curling of lips; vibrating tail; and an apparent simulation of death by turning on back and lying motionless for some minutes. Only one specimen showed this last behavior but it "played possum" repeatedly. However, when turned on its belly it would not immediately reverse itself as some examples of the genus *Heterodon* will do. Two specimens curled the lips upward but only one vibrated the tail. None could actually be made to bite in spite of the threatening attitude, with mouth partly open.

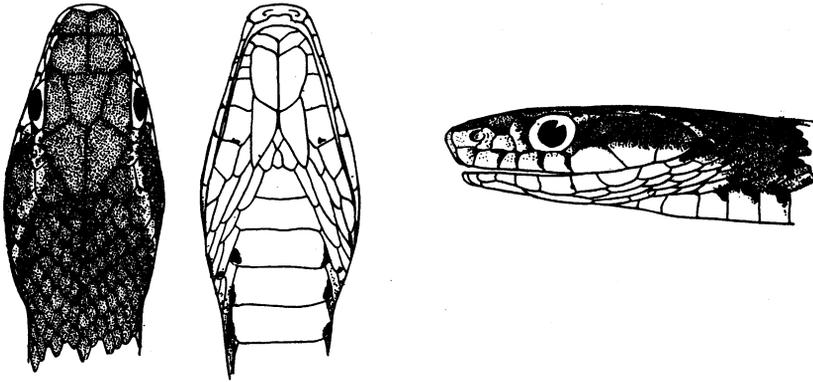


Fig. 3. *Pseudozenodon striaticaudatus*, new subspecies.
Dorsal, ventral, and lateral views of head of type, twice natural size.

***Pseudozenodon striaticaudatus*, new species**

Figures 3 and 4

TYPE.—A. M. N. H. No. 33759, ♀; Ch'ungan Hsien, northwest Fukien Province, China; June–July, 1925; Clifford H. Pope.

DIAGNOSIS.—A *Pseudozenodon* differing from its ally, *dorsalis*, in having a higher; ventral and subcaudal count, and in lacking all traces of yellow or red in its coloration.

DESCRIPTION OF TYPE.—Rostral much broader than deep, just visible from above, internasals slightly shorter than prefrontals; frontal longer than broad, as long as its distance from rostral, shorter than parietals which are twice as broad in front as behind. Loreal deeper than long; preoculars 1–1; postoculars 3–3; both anterior and posterior temporals 2–2. Upper labials 8–8, fourth and fifth entering eye; lower labials 9–10, four in contact with anterior chin-shields on one side, five on the other. The maximum number of scale-rows is 19, the minimum 15, the reduction to 17 taking place opposite the nineteenth ventral plate, that to 15 on either side of the seventy-first; at midbody, all but three rows on either side feebly keeled. Ventrals 148; anal divided; suboculars 55. Total length, 776 mm.; tail, 0.18 of total.

The dorsum is an obscure, intricate mixture of black and gray, blending on the neck to give a uniformly dark appearance but arranged along the midregion to form indistinct, black-bordered, diamond-shaped spots reaching to the second scale-row on either side. Most of the scales not entering this pattern are gray, many others are gray but bordered with black, while a few are entirely black. From a point a tail's length anterior to the anus a black-bordered mid-dorsal, light gray stripe extends to the tip of the tail. This is the most conspicuous marking on the dorsum. The light ventrum is profusely spotted with black. The spots run together laterally to form a black band and centrally are most numerous along the anterior edge of each plate. The spots are varied in size and shape and hazy in outline. They are present only on the tips of the first few ventrals.

There is a dark line from behind the eye to the angle of the mouth, while all but the last two upper labials are black-bordered posteriorly. The ventral surface of the head is milky white.

DESCRIPTION OF PARATYPES.—All of the twenty paratypes (Nos. 33760-762, 34596, and 34662-677) come from the type locality.

The upper labials are 8-8 in fourteen, 7-7 in four, 7-8 in two, with the fourth and fifth entering the eye in fourteen, the third and fourth in four, while in two the third and fourth enter on one side, the fourth and fifth on the other. The lower are 9-9 in eighteen, and 9-10 in two, with the first four touching the anterior chin-shields in all. The preoculars are 1-1 in seventeen, 2-2 in two, and 1-2 in one; the post-oculars 3-3 in nineteen, 3-4 in one; the anterior temporals 2-2 in eighteen, 1-2 in two; the posterior 2-2 in seventeen, 1-2 in three. In ten specimens the scales are in 17 rows on the neck, while in nine more they are in 19 rows there. A single example has them in eighteen. At midbody there are uniformly 17 rows, before the anus always 15. All but the first row of scales on either side are keeled at midbody in the nine males, while among the eleven females all but the first two rows are keeled in seven, the first three in two, the first in one, the first two on one side, the first three on the other, in the last. The anal and subcaudals are always divided. The three largest males measure 676, 625, and 620 mm.; from snout to vent, the largest females 614, 571, and 550 mm., respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	9	140-144	142
	♀	11	146-153	149
Caudals	♂	8	59-64	61
	♀	10	52-62	57
Tail/Total Length	♂	8	.20-.22	.207
	♀	10	.17-.20	.185

The color in the adults is fairly uniform. The black-edged, mid-dorsal, light stripe being one to two tail-lengths anterior to the anus, rarely only half a tail-length before it. There is a conspicuous black band from the eye to the angle of the mouth in all but one. The speckling on the belly varies in intensity, being profuse in two and sparse in four. Anteriorly the ventrum of twelve specimens is crossed by brown bars

each covering all or part of a plate. These bars are most evident in the largest specimens and absent in the smallest. The color pattern is vivid in the juveniles but essentially the same as in the adult, the difference being in the much greater intensity of the black parts of the pattern in the young. In the adult there is a strong tendency for the darker blotches to blend with the gray ground color, each scale losing much of its black. The contrast is greatest on the neck where the young are vividly barred, the adult almost uniformly gray. There is a faint, reddish interocular bar in the smallest examples. Only the upper labial sutures below and anterior to the eye are black, there being less black on the lip in this species than in *karlschmidti*. By far the greatest amount of labial black for the Fukien *Pseudoxenodons* is found in *fukienensis*.



Fig. 4. *Pseudoxenodon striaticaudatus*, new species.

Head and neck pattern of juvenile paratype, A. M. N. H. No. 34670, four times natural size.

The type of *dorsalis*, a female, has but 140 ventrals, or six less than any in the series of eleven female *striaticaudatus*, while the number of subcaudals in the type, 51, falls below the lower extreme of ten specimens of the new species. Furthermore, the color of *dorsalis* is clearly unlike that of *striaticaudatus*, for the latter has no sign of red or yellow in its pattern, nor has the adult a blackish band on the nape. Stejneger's supposition that the type locality of *dorsalis* is really Hupeh Province is strengthened by the evident difference between the type and the new Fukien *striaticaudatus*.

Werner (1909) records two specimens of *dorsalis*, one from Canton, and one without definite locality. The former, a male, agrees fairly well with *striaticaudatus* in having 43 ventrals and 58 subcaudals, but disagrees in having only 2 postoculars. None of the twenty-one *striaticaudatus* has less than 3 postoculars on either side. Mell (1922) does not record *dorsalis* from the Canton region. This specimen of Werner's is very puzzling and cannot be satisfactorily allocated. Werner's other example, also a male, disagrees markedly with *striaticaudatus* in having but 131 ventrals and 52 subcaudals. The description, however, matches that of *dorsalis* quite well and its identification may be taken as correct for the present.

***Pseudoxenodon fukienensis*, new species**

Figure 5

TYPE.—A. M. N. H. No. 34650; ♂; Ch'ungan Hsien, northwest Fukien Province, China; April-September, 1926; Clifford H. Pope.

DIAGNOSIS.—A small *Pseudoxenodon* without a caudal stripe but with a vivid

head and body pattern persistent throughout life. The ventral count is low, the caudal high, and as might be expected, the tail proportionately long. Lower labials only 8-8.

DESCRIPTION OF TYPE.—Rostral broader than deep, just visible from above; internasals shorter than prefrontals; frontal much longer than broad, as long as its distance from end of snout, slightly shorter than parietals, which are as long as their distance from internasals. Loreal deeper than long; preoculars 1-1; postoculars 3-3; both anterior and posterior temporals 2-2; upper labials 8-8, fourth and fifth entering eye; lower labials also 8-8, four pairs in contact with anterior chin-shields. Scale formula 19-17-15, the reduction from nineteen to fifteen taking place so abruptly at midbody that the section covered by seventeen rows is equal only to width of some twenty ventral plates; at midbody all scale-rows keeled. Ventrals 138; anal divided; subcaudals 62; total length 616 mm., 0.22 occupied by tail.

Fundamentally the dorsal color pattern is strikingly like that of the other *Pseudoxenodons*, but actually it is distinct because of the different values of the component parts. The rather faint, mid-dorsal light spots, 36 in number, are black-bordered before and behind, and from side to side cover three or four scale-widths, while longi-

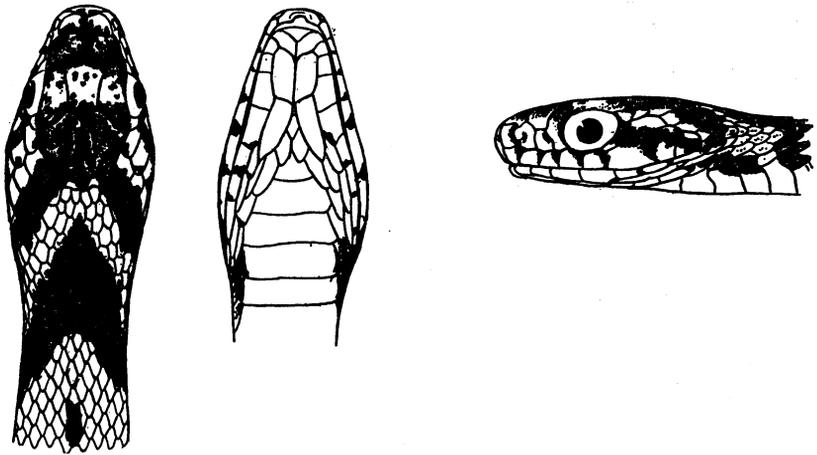


Fig. 5. *Pseudoxenodon fukienensis*, new species.
Dorsal, ventral, and lateral views of head of type, twice natural size.

tudinally they cover the length of a scale. The lateral black spots fall opposite the central light ones and are about twice as large. There is a purplish tinge to the ground color along the sides that is lacking down the middle of the back. On the tail only the light spots, 15 in number, predominate, for there the rest of the pattern is obscure.

The ventrum has the usual dark speckling which is almost lacking on the first score of ventral plates just as in the other species. The speckling is proportionately less concentrated laterally, but the individual spots tend to run together along the base of each plate, and, posteriorly, across the center. The greatest profusion of speckles is reached before the anus, for behind it they are only moderately profuse and almost lacking along the juncture of the divided subcaudal plates.

The top of the head is black except for a gray interocular band and a gray temporal stripe irregular in outline extending from the eye to a little above the angle of the mouth. The side of the head between the eye and nasal opening is also gray as is the rostral plate. At the suture between each of the first five upper labials is a wedge-shaped, black spot directed downward. A postocular stripe, just below the temporal one described above, borders the sixth and crosses the last two upper labials, sending a point downward at the suture between the sixth and seventh. There is a very conspicuous V-shaped, black band across the neck whose apex reaches almost to the parietals.

DESCRIPTION OF PARATYPES.—All of the fourteen paratypes (Nos. 33749, 34642-649, 34651-655) are from the type locality.

The upper labials are 8-8 in thirteen, 7-8 in one; the lower, 8-8 in eight, 7-8 in three, 8-9 in two, and 7-7 in one; the preoculars are uniformly 1-1; the postoculars 3-3 in thirteen, 4-4 in one; anterior temporals 2-2 in all; posterior, 2-2 in eleven, 2-3 in three. The scales are always in 19 rows on the neck, 17 at midbody, and 15 before the anus. At midbody all the rows are keeled in four specimens, all but one in ten. The anals are divided and the subcaudals are in two rows. The fourth and fifth labials enter the eye on both sides in twelve, the third and fourth on one side, fourth and fifth on other in one, while only the fourth enters on both in No. 33749. There are always four lower labials in contact with the anterior pair of chin-shields. The three largest males measure 493, 480, 457 mm. from snout to vent, the only three females 535, 502, and 182 mm., respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	11	137-143	140
	♀	3	147-148	147
Caudals	♂	11	61-65	63
	♀	3	54-57	56
Tail/Total Length	♂	11	.21-.24	.236
	♀	3	.18-.19	.186

The mid-dorsal light spots are 27 in six, 20 in five, 26, 28, and 29 in one each; the caudal 14 in five, 15 in four, 13 and 16 in two each, 11 in one. Anteriorly they are rather indistinct. The belly is more profusely spotted posteriorly than anteriorly and the spots blend along the ends of the plates. In a few specimens the spots are not profuse anteriorly. The pattern remains strong even in the largest specimens, the head markings being especially noticeable. The interocular, light gray band is always prominent and all the upper labial sutures are conspicuously black. In the very small specimens, the pattern is strongest and very clear, but in every particular like that of the adult.

When annoyed this species flattens its neck threateningly but makes only feeble attempts to bite. It is not rare in the forests about Kuantun. Frog remains were found in one stomach. One female held three well-developed eggs, one of which measured 47×13 mm.

This snake need not be confused with *karlschmidti* because that species has decidedly fewer spots on the dorsum, a less vivid dorsal pattern, and a uniformly colored head that contrasts strongly with the conspicuously banded head of *fukienensis*. There are many other differences as well.

***Pseudozenodon karlschmidti*,¹ new species**

Figures 6 and 7

TYPE.—A. M. N. H. No. 34658; ♀; Ch'ungan Hsien, northwest Fukien Province, China; April-September, 1926; Clifford H. Pope.

DIAGNOSIS.—A *Pseudozenodon* allied to *sinensis* from which it differs through a lack of yellow in the dorsal pattern, in having a narrower head, higher labial count, more ventrals in the males, fewer in the females, and fewer subcaudals in both sexes. Moreover, *karlschmidti* undergoes a more marked color change during ontogeny.

DESCRIPTION OF TYPE.—Rostral broader than deep, just visible from above; internasals much shorter than prefrontals; frontal much longer than broad, barely as long as its distance from end of snout, just as long as parietals, which are much less than twice as broad in front as behind. Loreal deeper than long; preoculars 1-1; postoculars 3-3; anterior temporals 2-2; posterior, 2-3. Upper labials 8-8, fourth and fifth entering orbit; lower labials 9-10, four in contact with anterior chin-shields on one side, five on other. Scales reduced from maximum of 19 to minimum of 15 at

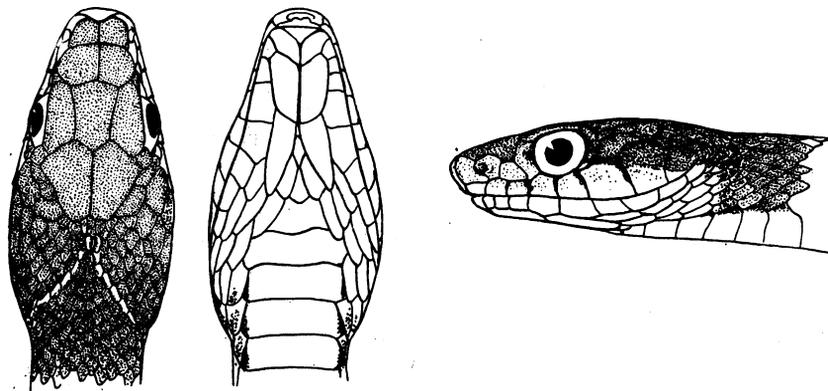


Fig. 6. *Pseudozenodon karlschmidti*, new species.
Dorsal, ventral, and lateral views of head of type, twice natural size.

midbody, consequently count of 17 extends along a distance equal to width of only some six ventrals. Ventrals 154; anal divided; subcaudals 56; total length 796 mm., 0.18 taken up by tail.

The ground color of the dorsum is blackish gray. Down the middle of the back are 24 light gray spots. From side to side each spot covers the width of four to six scales but longitudinally only the length of one. Some of these spots lie obliquely and

¹Named for Mr. Karl P. Schmidt who has already reported the former Asiatic collections of the American Museum.

all are surrounded by scales, part black and part gray. Anteriorly on either side is a very indistinct row of darkish spots made up of black-bordered scales. These darkish spots for the most part alternate with the mid-dorsal spots. The majority of the dorsal scales have minute traces of black. The light, mid-dorsal row of spots extends onto the tail where there are five distinct and two indistinct ones. There the black borders are very indistinct. Beginning about twenty plates from the chin-shields, the ventrals are speckled with black more and more profusely toward the tail, under which the speckling is so profuse that the subcaudals appear black. Laterally the speckles are concentrated along the tips of the ventrals to form a line, while in general they are gathered along the bases of the scales. The tips of even the first twenty plates are black.

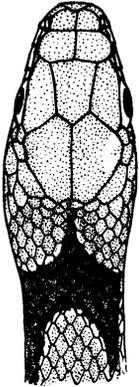


Fig. 7. *Pseudozonodon karlschmidti*, new species.

Head and neck pattern of juvenile paratype, A. M. N. H. No. 34641, fourtimes natural size.

The ventral surface of the head is immaculate. The temporal region is darker than the dorsal surface of the head but there is no distinct postocular band. All but the last two upper labials on either side are narrowly bordered with black behind.

DESCRIPTION OF PARATYPES.—The characters and measurements of the six paratypes, all of which come from the type locality, follow (see table, p. 412). A. M. N. H. No. 21014 from Yenping, recorded by Schmidt (1927) as *dorsalis*, is included; it extends the known range of the species.

The fourth and fifth labials enter the orbit on both sides in four specimens, the third and fourth on one side, the fourth and fifth on the other in the fifth, while the condition in the sixth cannot be made out. The number of lower labials in contact with the anterior chin-shields is 4-5 in four, and 5-5 in one, while these shields are damaged in one.

The number of spots on the belly varies considerably. Two specimens are almost free of ventral spots, and one is thickly spotted, while three have a fair number of them.

The spots always tend to be concentrated along the ends of the ventrals. On the throat in some specimens are large, dull brown spots which disappear when the loose scales are removed. All the labial sutures are black in every paratype but one, and only one suture lacks the black in that one.

The juvenile color pattern is generally more vivid than the adult. The black bars at either end of the light mid-dorsal spots are very evident and the top of the head is reddish brown instead of blackish gray as in the adult. On the neck there is a strong, black spot with a point projecting forward to the tips of the parietals, and a lateral posterior projection on either side of the neck. This blotch is entirely lacking in the larger adult.

This species lacks the caudal stripe of *striaticaudatus* and has fewer dorsal and caudal spots than *fukienensis*. The conspicuous head and dorsal pattern of *fukienensis* contrasts strongly with the lack of such in *karlschmidti*. There are many further points of difference between these three related forms.

A. M. N. H. Nos.	34639	34640	34641	34660	34638	34659	21014
Sex	♂	♂	♂	♂	♀	♀	♀
Dorsal Scales	19-17-15	19-17-15	19-17-15	19-17-15	19-17-15	19-17-15	19-17-15
Ventrals	144	147	151	149	149	151	153
Subcaudals	58	60	60	52+	54	55	56
Upper Labials	8-8	7-8	8-8	8-8	8-8	8-8	8-8
Lower Labials	?	9-10	9-10	10-10	9-10	8-10	9-9
Preoculars	1-1	1-1	1-1	1-1	1-1	1-1	1-1
Postoculars	?	3-3	3-3	3-3	3-3	3-3	3-3
Anterior Temporals	2-2	2-2	2-2	2-2	2-2	2-2	2-2
Posterior Temporals	2-2	2-3	2-2	2-2	2-2	2-2	2-2
Dorsal Spots	24+?	21+8	25+10	20+8	23+9	20+8	24+9
Total Length	256	358	315	756	308	660	243
Tail/Total Length	.18	.19	.19	.17+	.17	.18	.18

Pseudozenodon sinensis Boulenger

Figure 8

One specimen collected by Walter Granger at Hsin Kai, central Yunnan Province (No. 35211), represents this species.

The upper labials are 7-7, the lower 8-8; the preoculars 1-1, the postoculars 3-3; the anterior temporals 2-2, the posterior, 2-3. The scales are 19-17-15, with all but the outer row keeled at midbody. There are 148 ventrals and 65 subcaudals. The anal is divided and the total length is 283 mm., 0.20 of which is occupied by the tail. The specimen is a male.

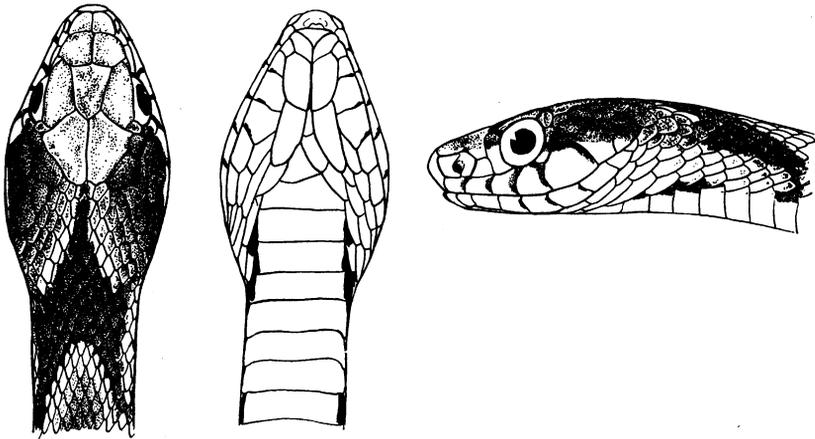


Fig. 8. *Pseudozenodon sinensis* Boulenger.

Dorsal, ventral, and lateral views of head, A. M. N. H. No. 12791, twice natural size.

In order to make this matter doubly clear I will copy here Schmidt's (1927) table giving the counts and measurements for twenty-two specimens of *sinensis* from Yunnanfu.

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	8	138-146	144
	♀	14	149-162	155
Caudals	♂	7	60-68	62
	♀	14	57-66	61
Tail/Total Length	♂	7	.18-.22	.20
	♀	14	.19-.20	.19

ZAOUCYS

The Chinese snakes of this genus present interesting problems of geographic variations that are worthy of careful study.

One of the species, *nigromarginatus*, is an Indian form shown by Stejneger (1925) and Schmidt (1927) to inhabit western China, Yunnan and Szechwan Provinces. Unfortunately, it has been confused with *dhumnades* even though the two species are amply distinct and do not intergrade. Stejneger records *nigromarginatus* as having a greater number of rows keeled, while Schmidt emphasizes its higher ventral count. Both of these characters are good but I find, upon examining a large series, that the differences in coloration are more reliable whenever evident. Unfortunately, the pattern may be entirely lost as in Nos. 23496, 23503, and 23510 from Wanhsien, Szechwan, in which the dorsum is a uniform, intense black and this in spite of the fact that one of the three measures only 880 mm. from snout to vent, while the largest measures 1228 mm. It is possible but not probable that this entire loss of pattern is the result of poor preservation.

A comparative description of the young will best show how fundamentally different the patterns of these related but distinct species are. It must be remembered that in *dhumnades* it tends to vanish posteriorly with age, while, as a rule, in *nigromarginatus* the caudal stripes are evident even in very large specimens. The persistence of stripes on the neck even in adult *dhumnades* and the lack of such in *nigromarginatus* of all sizes is not to be forgotten.

The pattern of No. 17707 (Fig. 9a), a juvenile *nigromarginatus* from Yunnanfu, is as follows. The length from snout to vent is 553 mm. A little more than the anterior third of the specimen is blue (green in life) and black, the black being confined to the edges of the scales. There is no sign of a stripe on this part. The ventral surface of the head and throat is milky, the entire remainder of the ventrum a slightly lighter shade of the ground color. About half-way between the head and tip of tail 4 black lines arise. These bands soon become intense, remaining so to the tip of the tail. As they intensify, the black borders of the intervening scales gradually disappear. Two head lengths before the vent the lower stripe covers two-thirds of the first row of scales, all of the second, and the edge of the third, while the upper one covers the edge of the fourth, all of the fifth and sixth, and the edge of the seventh. On the tail the first stripe covers the tips of the ventrals and half of the first row, while the second covers nearly all of the second and half of the third. The mid-dorsal ribbon of ground color covers, then, before as well as behind the vent, one half of each of the two mid-dorsal rows.

The pattern of No. 23540, (Fig. 9b) an example of typical *dhumnades* from Anhwei, is as follows. The specimen from snout to vent is 335

mm. long. The entire length posterior to the head is vividly striped with black, there being very little difference in the intensity of the stripes from the head to tip of tail. Anteriorly the intervening scales are black bordered but these borders gradually disappear posteriorly. The first stripe is weakest because the center of each scale involved retains a spot of the ground color. On the neck this first stripe is especially weak and occupies the third scale row. It strengthens as it progresses and, about half-way between the head and tip of tail, gradually shifts to the second row. Beyond the vent it occupies the tips of the ventrals and one-third of the first row. The upper stripe is intense and begins abruptly just behind the head, occupying the sixth, seventh, and border of the eighth row to a point about two head-lengths before the anus where it shifts to the fifth, sixth, and border of the seventh row, a result of the reduction in number of the scales. This means that throughout the two mid-dorsal rows retain their same position in relation to the upper stripes. Anteriorly the tip of the ventrals and the edges of the first row of scales are narrowly bordered with black, suggesting a third stripe. The ventrum is a shade lighter than the ground color, the ventral surface of the head milky. The transition from the light ventral color to the milky shade of the ventral surface of the head is very gradual.

When these color differences are understood the whole matter is simplified. *Z. nigromarginatus* may now be dropped. Stejneger, chiefly on the strength of a high subcaudal count, has separated the Formosan specimens as a distinct species, which he calls *oshimai*. He says that in color pattern this new form resembles *dhumnades*, so I conclude that Steindachner's *nigromarginatus* are really *oshimai*.

After carefully comparing Anhwei, Hunan, and Fukien specimens I conclude that on the mainland there is a lowland form with a low ventral and caudal count, and a mountain form with high counts. There are other differences, one of which is the blacker ventrum of the mountain snake. The number of caudals in the two Ch'ungan examples with complete tails are 131 and 137, so these approach *oshiami*, but ten among twelve have but two rows keeled while *oshimai* is said to have six. It seems necessary to describe the Ch'ungan examples as types of a subspecies of the typical lowland form which will be called *Zaocys dhumnades montanus*.

***Zaocys dhumnades dhumnades* (Cantor)**

Figure 9b

One of the four Changsha specimens presented by Mr. J. W.

Williams (No. 24655) belongs here. Schmidt's 1927 report includes twenty-five Anhwei specimens.

Characters and Measurements of No. 24655

Sex	♂
Dorsal Scales	16-14
Ventrals	188
Subcaudals	112
Upper Labials	7-7
Lower Labials	10-10
Preoculars	2-2
Postoculars	1-1
Anterior Temporals	1-1
Posterior Temporals	1-1
Total Length	1463 mm.
Tail/Total Length	.30

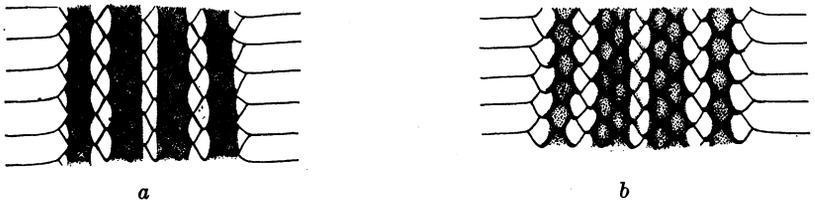


Fig. 9. *Zaocys nigromarginatus* (Blyth) and *Zaocys dhumnades dhumnades* (Cantor).

a—Juvenile pattern two head-lengths before vent of *Zaocys nigromarginatus*, A. M. N. H. No. 17707, three times natural size.

b—Juvenile pattern two head-lengths before vent of *Zaocys dhumnades dhumnades*, A. M. N. H. No. 23540, five times natural size.

On the body posterior to the neck there are two rows sharply keeled, and from midbody to the tail, two more faintly keeled. The belly is light and the subcaudals only a shade darker than the throat.

In ventral as well as subcaudal count this specimen falls below the average given by Schmidt for the twenty-five examples of typical *dhumnades* from Anhwei. The light ventrum also helps to place it. Unfortunately, field notes are lacking but almost certainly it was not taken along with Nos. 17445, 17452, and 24621 here recorded as *Z. dhumnades montanus* from Changsha. There are many mountains as well as much low country in Hunan Province.

No. 24655 is anomalous in having irregular upper labial, postocular and temporal counts. The two first upper labials obviously are coalesced but the temporals and postoculars appear to be normal in form and relative size.

Zaocys dhumnades montanus, new subspecies

TYPE.—A. M. N. H. No. 34334; ♀; Ch'ungan Hsien, northwest Fukien Province, China. April–September, 1926; Clifford H. Pope.

DIAGNOSIS.—Distinguished from the typical form by a higher ventral and caudal count. The ventrum is much darker than in typical *dhumnades*.

DESCRIPTION OF TYPE.—Rostral broader than deep, visible from above; internasals shorter than the prefrontals, which are not as long as their distance from end of snout; frontal almost as long as its distance from tip of snout, just as long as parietals which are almost as broad as long; loreal longer than deep; a large preocular with a small one below; 2 postoculars, 2 anterior and 2 posterior temporals. Eight upper labials, fourth and fifth entering eye; 10 lower labials, first five in contact with anterior chin-shields; scales reduced from maximum of 16 to minimum of 14 at a point opposite 103d ventral; smooth on neck, 2 rows sharply keeled at midbody and before vent; ventrals 195; anal divided; subcaudals 123+; total length 1475 mm.+; about 0.28 occupied by tail.

The posterior half of the body above and below is slaty black. The milky color of the throat and ventral surface of the head merges with the darkening belly color. Anteriorly, on either side of the two mid-dorsal rows of scales, is a black stripe itself covering two scale rows. Below this stripe the scales have black borders and bluish centers. The lateral tips of the ventrals are edged with black. Some distance posterior to the head, the scales of the third row lose their light centers forming a narrow black stripe that is soon lost in the uniform black of the posterior section of the snake. The top and upper sides of the head are slate colored.

DESCRIPTION OF PARATYPES.—There are eleven paratypes from the type locality (Nos. 33627–632, and 34329–333), and one from Yenping (No. 33242). I also place A. M. N. H. Nos. 17445, 17452, and 24621 from Changsha, Hunan Province, here. The Changsha specimens were presented by Mr. J. W. Williams.

The characters and measurements of the eleven paratypes from Ch'ungan Hsien follow. The upper labials are 8–8 in ten, 8–9 in one; the lower, 10–10 in six, 10–11 in three, 9–10 and 11–11 in one each; the pre- and postoculars are without exception 2–2; the anterior temporals 2–2 in ten, 1–1 in one, the posterior 2–2 in ten, 2–3 in one. The scales are uniformly 16–14 with the two mid-dorsal rows keeled except on the neck. In addition, No. 33627 has the rows adjacent to the mid-dorsal pair weakly keeled on the last third of the body. The anal is always divided. Nearly all of the specimens were skinned in the field, so accurate measurements cannot be made. The longest skin, that of a female, measures 2300 mm. from tip to tip.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	9	191–203	198
	♀	2	200–203	201.5
Caudals	♂	1	131	
	♀	1	137	
Tail/Total Length	♂	1	.28	
	♀	1	.29	

The ventrum is considerably darker in this series than in the Anhwei lot but this character is hard to measure and too much stress should not be put on it because it is very variable. The color pattern varies greatly in intensity with age, the tails of the adults being black as in the type.

COLUBER

Coluber spinalis Peters

Fourteen specimens, nine from the Tsinan region, Shantung Province (Nos. 29724-732), three from the Western Hills near Peking (Nos. 29476-478), one from Kolobolchi Nor, Mongolia (No. 31843) and one from Mongolia (No. 31844). Schmidt (1927) reported seven specimens from Chihli and Shansi.

This series presents no difficulty but is remarkable for its general uniformity, there being as great variation among specimens from one locality as among those from widely separated regions. The upper labials are 8-8 in all but one in which they are 7-8; the lower are 10-10 in eleven, and 9-10 in three. The preoculars are 2-2 in thirteen, and 2-1 in one; the postoculars, uniformly 2-2 as are the anterior temporals. The posterior temporals are 3-3 in six, 2-2 in four, and 2-3 in four. One example, No. 29726, has a small extra scale just below the loreal. The scales are regularly 17-15. The anal is always divided. The three largest males measure from snout to vent 570, 557, and 539 mm., the largest females 755, 613, and 610 mm., respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	7	188-192	189
	♀	7	201-207	204
Caudals	♂	6	91-99	94
	♀	6	90-93	96
Tail/Total Length	♂	6	.27-.27	.27
	♀	6	.23-.27	.26

PTYAS

Ptyas korros (Schlegel)

Twenty-five specimens, ten from Futsing Hsien (Nos. 33944-952 and 34107), nine from Yenping (Nos. 33245-252 and 35147), one from Ch'ungan Hsien (No. 34661), three from Hok'ou (Nos. 35080-082), and two from Yuan Kiang, Yunnan Province (Nos. 35235-236) represent this species. The last two were collected by Walter Granger. Schmidt

(1927) has reported on two specimens from Fukien, one of which came from Yenping, and seven from Hainan Island.

Stanley (1914 and 1917) records Fukien examples as does Stejneger (1925).

The present series is interesting only in the low subcaudal counts. Eleven of the Fukien-Kiangsi series have been examined critically, Nos. 33246, 33248-250, 33946, 33948-949, 33952, 34661, and 35080-081. The Yunnan specimens will be recorded separately. Eight of the eleven had upper labials 8-8, one 8-9, one 9-9 and one 7-8. The lower labials were 10-10 in seven, 11-12 in one, 9-10 in one, 11-11 in one, and 8-8 in one. The pre- and postoculars are uniformly 2-2 in all of the eleven. The anterior temporals are 2-2 in nine, and 2-3 in two; the posterior, 2-2 in eight, 2-3 in two, and 2-0 in one. The loreals were counted in all twenty-three and found to be 3-3 in thirteen, and 2-2 in ten. The scale formula is 15-13-11 in all. The number of rows drops from 15 to 13 at midbody, so these snakes by another might be recorded as having the formula 15-15-11 which is, as a matter of fact, given by Schmidt (1927) for seven of his nine Hainan examples. His seven and the present series undoubtedly have the same count.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	5	165-169	166
	♀	6	162-167	165
Caudals	♂	5	116-120	117
	♀	5	113-118	116
Tail/Total Length	♂	5	.32-.34	.334
	♀	5	.32-.35	.336

The three largest males measure 862, 820, and 798 mm. from snout to vent; the females 818, 775, and 717. In the juvenile specimens the base of many scales on the anterior two-thirds of the body is white. These white spots form irregular but discernible narrow cross-bands two to four scale-lengths apart. The rest of the body and the tail are uniformly dark. Traces of this pattern are retained in a female 802, and a male 603 mm. from snout to vent. However, slightly smaller examples sometimes lack them all together. It is most vivid in the smallest specimens.

The female from Yuan Kiang has 8 upper labials, the regular number of oculars and temporals, and 3 loreals. The scale formula agrees also. There are 9 lower labials on one side and the other side is damaged. The

Yuan Kiang male is also damaged but on the good side it has 10 lower labials, 3 loreals, and the usual number of upper labials, oculars and temporals. The scale formula agrees. The male has 173, the female 166, ventrals and the proportionate tail-lengths are .33 and .35 respectively. However, the subcaudals in the female are 128, and in the incomplete male 121. Here we have a distinct difference and comparing these with other specimens from the extreme south we see that *korros* from central China has a low subcaudal count. Stejneger (1907) gives five Siam specimens as ranging from 133 to 140 and Schmidt (1927) seven Hainan specimens as 128 to 141, while Wall (1903) found two in the Siccawei Museum at Shanghai with 100 and 116 subcaudals, respectively. I take it that these two are Yangtze Valley snakes. Formosan examples are puzzling. It is not the present purpose to take the question up in detail but only to suggest it so that others may be stimulated to give subcaudal counts.

Frogs, probably *Ranas*, were found in seven stomachs. This indicates that *korros* confines itself to such a diet.

Like *mucosus* this snake does not range into the forests of the Kuantun mountains though it is found on the Ch'ungan plateau.

***Ptyas mucosus* (Linnæus)**

Eleven specimens, five from Futsing Hsien (Nos. 33953-957), three from Yenping (Nos. 33241 and 33243-244), one from Ch'ungan Hsien (No. 33622), and two from Hok'ou (Nos. 35053-054), make up the series of this species.

Schmidt's (1927) report included eleven examples from Hainan. Stanley (1914) has reported specimens from Fukien.

There is no important variation in the present series except the lack of dorsal bars posteriorly in the Yenping specimen. These bars are well broken up in the two Hok'ou snakes. The upper labials are uniformly 8-8, the lower, 10-10 in eight, 11-11 in two, and 9-10 in one. The pre-as well as the postoculars are 2-2 in all. The anterior and posterior temporals are 2-2 in all but three examples. In one of these a tiny scale is inserted between the paired temporals, but on one side only; in another on one side one, and on the other side two extra small scales are thus inserted, while in the third two extras are found on the one and three on the other side. The scales are 19-17-14, and, as Schmidt remarks, are not keeled far anteriorly.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	4	192-196	194
	♀	7	194-197	195
Caudals	♂	2	111-114	112.5
	♀	6	105-114	108
Tail/Total Length	♂			
	♀	2	.25-.25	

The figures agree well with those for the Hainan lot.

The remains of several small *Bufos* were found in one Hok'ou specimen.

Like *korros* this species does not range into the Kautun mountains though it was found on the Ch'ungan plateau and was common about Yenping and Hok'ou and in Futsing Hsien.

TAPINOPHIS***Tapinophis latouchi* Boulenger**

Eighty-two specimens, sixty-nine from Ch'ungan Hsien (Nos. 33711-730, 33733-734, 33743, and 34441-486), twelve from Yenping (Nos. 33294-305), and one from Futsing (No. 33943), make up the series. In addition, there are three lots of embryonic material (Nos. 34489-491) from Ch'ungan Hsien.

The largest lot comes from the type locality whence Boulenger (1899) described not only the species but the genus as well. Mell (1922) records *latouchi* as common in the Kwangtung-Hunan-Kiangsi border region, and Stejneger (1925) reports one from Kuliang, Fukien Province, collected by Mr. Sowerby. Werner (1919)¹ gives Fukien records also.

Mell is sure of its occurrence about Talifu, Yunnan Province.

Seventeen specimens (Nos. 33295-298, 33713, 33717, 33719, 33721-722, 33943, 34455, 34457, 34463-464, 34472, 34474, etc.) from the three localities have been studied. In seven of these the upper labials are 8-9, in six more they are 9-9, while in the remaining four there are 8 on a side. The lower labials are 8-9 in nine, 8-8 in four, 9-9 in two, 9-10 in one, and 8-10 in one. There is but one preocular on a side in all but one example which has two on each side. The postoculars are 2-2 in fifteen, 1-1 in one, and 1-2 in the remaining one. The anterior temporals are uniformly 1-1; the posterior, 2-2 in nine, 1-1 in six, and 1-2 in two. The scales are 17 throughout and keeled except on the neck.

¹This *Cantonophis præfrontalis*. See Stejneger (1925a) *T. latouchi* synonymy.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	9	153-163	157
	♀	8	146-157	151
Caudals	♂	7	55-63	60
	♀	8	50-59	54
Tail/Total Length	♂	7	.19-.22	.209
	♀	8	.19-.20	.198

The anal is always divided. From snout to vent the three largest females measure 419, 406, and 399 mm., the three largest males 395, 361, and 360 mm., respectively.

In the juvenile examples each scale has a light longitudinal central area, the result being a finely lined general pattern. This is marked in the oldest embryos but in the largest adults the light streaks are noticeable only on the sides and even these in varying degree. Thus the oldest snakes retain only a vestige of this lined pattern. The first scale-row is never entirely pigmented and in seven examples out of the whole series it is free from color except for possible tiny traces on a few posterior scales. In seven more there are distinct but scattered fragments of color on this first row.

Boulenger (1899) says that there is a median line under the tail. In the entire Ch'ungan series of sixty-nine there is never a complete line under the tail and even fragments of such a line exist in only six examples. In three of the six the fragments put together would not equal half the tail-length. However, among the twelve Yenping examples four have such a line complete while only two lack it altogether. In three others, the fragments put together cover from one-third to three-fourths of the tail-length. There is no trace of the line, then, in 96 per cent of the Ch'ungan series against 17 per cent of those from Yenping. This is the only difference I am able to find between the two lots from the two localities.

The number of eggs ranges from 1 to 4. Thirteen females contained 3 eggs, eight contained 2, while 4 eggs were found in only six. A single one held but 1 egg. The following field records are not included in the figures just given. On July 8 one of these snakes was brought in at Kuatun with two pale yellow eggs measuring 37×7 mm. and 31×5 mm., respectively. On the 12th a Kuatun collector found a *latouchi* coiled about three eggs placed under a flat stone in the bed of a cascading stream. The eggs, according to him, were only half submerged. They were white

with yellowish tips and averaged 29 mm. in length. His report should be credited.

On August 15 a Kuatun man brought in three white eggs containing barely pigmented *latouchi* embryos (No. 34489). Two of the three eggs were adherent. On the 19th two white eggs containing well-pigmented *latouchi* embryos (No. 34490) were bought also at Kuatun. Finally, on the 28th at Kuatun four white, adherent eggs containing advanced embryos were secured (No. 34491). The longest was 28.5, the shortest, 25.5 mm. from tip to tip. The extreme measurements of the lesser diameter were 13.6 and 16.5. mm., respectively.

T. latouchi seemed to be rare in Futsing but this may be due to the scarcity of suitable cascades there. It was fairly common at Yenping but in the Kuatun mountains it was abundant even in the tiniest forest streams. It is a burrower in the beds of mountain springs and streams. In the day it may be found buried under loose rock, gravel and decaying vegetable matter in cold watercourses of all sizes. At night it is more easily discovered. When uncovered it at once attempts to burrow deeper and this it can do with great skill. We found that it cannot live in dry containers as the various species of *Natrix* can, for we lost several in attempting to send them only a few miles out of water. When handled it shows no signs of defensive behavior but emits a strong musky odor. It makes endless attempts to burrow or hide under something.

One specimen vomited a large earthworm and remains of such were found in the stomachs of five. In eight more the stomachs contained masses of gritty earth strongly suggestive of the same diet. The rest of the stomachs were empty.

OPISTHOTROPIS

Opisthotropis kuatunensis, new species

Figure 10

TYPE.—A. M. N. H. No. 34437; ♀; Ch'ungan Hsien, northwest Fukien Province, China; April–September, 1926; Clifford H. Pope.

DIAGNOSIS.—An *Opisthotropis* allied through strongly keeled scales and a low upper labial count to *rugosa* and *typica* of Sumatra and Borneo. The nasals are undivided and the prefrontal single.

DESCRIPTION OF TYPE.—Maxillary teeth 25, small, subequal. Head broad, depressed; nostrils near upper edge of the nasals which are not in contact. Internasals long, curved outward; prefrontal single. Frontal large, a little longer than broad, much shorter than parietals. Supraoculars divided on one side, entire on other; loreal longer than deep. Preoculars 2-2; postoculars 2-3. A total of 6 scales enter orbit on one side, 9 on other. Anterior temporals 1-1. Only first six upper labials on one side, first eight on other, extend from head shields to labial border; those following are divided horizontally, first into double, then triple, then again double rows. Their

number, when only those entering margin are counted, may be given as 15-16; lower labials are even more irregular. The very finely rugose anterior chin-shields are several times the size of narrow posterior ones. Scales in 19 rows, striated and strongly keeled throughout. Ventrals 160; anal divided; subcaudals 63. The tail occupies 0.23 of total length which is 666 mm.

The uniform olive-brown of the back extends down on either side to the third row of scales and is marked only by three very obscure, black, longitudinal lines, each as wide as a scale. The belly and first three rows of scales on either side are uniformly light. The ventral surface of the tail is clouded except just behind the anus. ■

DESCRIPTION OF PARATYPES.—The 15 paratypes (Nos. 33708-710, 34428-436, and 34438-440) come from the type locality, and agree with the type in the chief characters except that in No. 33710 there is a suture from the nostril to the edge of the nasal adjacent to the labials.

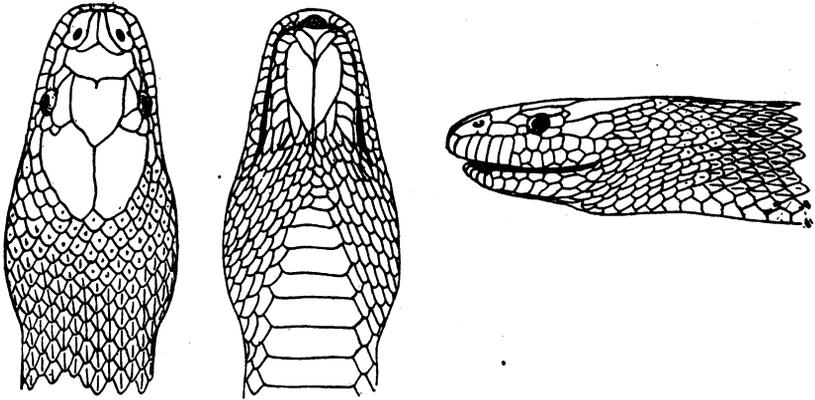


Fig. 10. *Opisthotropis kuatunensis*, new species.
Dorsal, ventral, and lateral views of head of type, three times natural size.

The upper labials are 14-15 in six; 16-16, 14-16, and 15-16 in two each; 15-15, 14-14, and 13-15 in one each. The figure of the type well illustrates the arrangement of the labials, which does not vary to a marked degree. The total number of scales entering the orbit is 8-8 in four, 8-9 in three, 7-9 and 6-7 in two each, 7-8, 7-7, 9-9, and 9-10 in one each. The preoculars are 2-2 in twelve, and 2-3 in three. The anterior temporals are 1-1 in thirteen, 2-2 and 1-2 in one each. In two specimens there are several small scales between the temporals and the postoculars. The scales are always 19 throughout and all the anals are divided. The only two males measure from snout to vent 523 and 513 mm., the four largest females 525, 523, 521, and 516 mm., respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	2	168-168	
	♀	13	146-154	150
Caudals	♂	1	59	
	♀	11	61-68	64.7
Tail/Total Length	♂	1	.20	
	♀	11	.22-.24	.227

The dorsal olive-brown may encroach on the third and even the second row of scales but the first is always free of pigment. Ten adults lack practically all traces of the three black, longitudinal lines, while in the two juveniles these lines are quite distinct. The ventral surface of the tail is always clouded for at least the greater part of its length.

These snakes inhabit the highest forest cascades of the mountains about Kuatun and San Chiang. They are very secretive and during the day are to be found concealed under loose rock, gravel and other débris forming the beds of the streams. I found one abroad in the bed of a large stream one night. When disturbed they only try to burrow into the surrounding débris and have no idea of biting or defending themselves except through flight. When handled they give off a strong, musky odor. They strongly resemble *Tapinophis latouchi* in behavior and habits, but are nothing like as abundant nor do they frequent the lower streams as in the case of *latouchi*.

Three females contained 5 eggs, two more 6, but one held only 3.

TRIRHINOPHOLIS

Trirhinopholis styani Boulenger

Nine specimens, all from Ch'ungan Hsien (Nos. 34626-634) represent this species. They come from the type locality. Boulenger (1899) described this species from two Kuatun specimens. Since then Thompson (1913) has recorded a Chekiang specimen, Stanley (1914 and 1915) has reported it from Chekiang, Kiangsi, and Fukien Provinces; and Stejneger (1925) records ten examples from Szechwan Province and one from Foochow.

The present specimens conform well with former ones. In all there are 6 upper and 6 lower labials on each side. The preoculars are uniformly 1-1, the postoculars, 2-2. There is a loreal on only one side of one specimen. There are 2 anterior temporals in all, but the posterior temporals are 2-2 in eight, and 2-1 in the remaining one. The scale formula is always 15-15-15.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGE
Ventrals	♂	3	114-118	116
	♀	4	121-126	123.5
Caudals	♂	3	27-29	28
	♀	4	22-29	26
Tail/Total Length	♂	3	.13-.14	.137
	♀	4	.11-.12	.118

The anal is always entire. Two juvenile specimens of doubtful sex had, respectively, 121, 29, .13, and 120, 26, .13 ventrals, subcaudals, and proportionate tail-length. The females measure from snout to vent 338, 315, 311, and 285 mm., the males 303, 239, and 197 mm., respectively.

A female contained 7 eggs, one of which measured 15.5×5.5 mm. The stomachs of three contained a lot of gritty dirt suggestive of an earthworm diet.

This snake was found in the high forests and bamboo groves about Kuatun. It is active and uses its head like a burrower. When teased it neither strikes, bites, nor assumes a defensive position. One specimen, when annoyed, flattened its body.

LYCODON

Lycodon fasciatus (Anderson)

A single male specimen (No. 35209) was collected at Yunnanfu, Yunnan Province, by Walter Granger. Schmidt (1927) reported one also from Yunnanfu.

The upper as well as the lower labials are 8-8 in No. 35209, and there are about 2 temporals on a side. On the neck and at midbody the scales are in 17 rows but just before the anus they are only in 15. The ventral count is 191, the subcaudal 76. The total length is 513 mm., 0.21 of which is occupied by the tail.

There are 27 jagged edged, white rings on the body, and 12 on the tail. Anteriorly along the middle of the back, these are a scale-length in width, but on the tail they increase to a width as great as the length of two scales while all along on the belly they are as wide as two ventral plates. On the neck the black interspaces cover the length of about 10 scales, posteriorly only 5.

Wall (1924) gives the range of ventrals as 201-213; subcaudals 74-94. Schmidt's Yunnan specimen had 195 ventrals and 70 subcaudals so it is entirely possible, as suggested by Schmidt, that eastern Yunnan is inhabited by a subspecies with low counts and certainly the averages will prove to be different. Because of close agreement in other characters and the lack of a series of eastern specimens I prefer to let the matter rest for the present. The type of *fasciatus* was taken near the western border of Yunnan, east of Bhamo, so according to the distribution given by Wall (1924) it really came from a locality intermediate between Assam and the interior of Yunnan.

DINODON***Dinodon futsingensis*, new species**

Figure 11

TYPE.—A. M. N. H. No. 34106; juvenile ♀; Futsing Hsien, Fukien Province, China; August–October, 1925; Clifford H. Pope.

DIAGNOSIS.—A black and white banded *Dinodon* allied to *ruhstrati*. The scales are smooth, in 17 rows on the neck and body to a point opposite the seventy-third ventral plate counted forward from the anus. Posterior to this plate they are in 15 rows. There are 197 ventrals, 79 subcaudals. Apical pits double.

DESCRIPTION OF TYPE.—On the anterior extremity of the maxillary there are 4 small, subequal teeth. These are followed immediately by 4 much larger ones, the third of which is the longest. The remaining teeth, about 3 in number, are arranged along the maxillary some distance behind the first eight.

Rostral broader than deep, plainly visible from above; internasals distinctly narrower than the prefrontals and only half as long. Frontal slightly longer than broad, shorter than parietals, as long as its distance from end of snout. Loreal twice as long as deep, not entering eye; preoculars 1–1; postoculars 2–2; anterior temporals 2–2; posterior, 3–3. Upper labials 8–8, the third, fourth and fifth entering the orbit

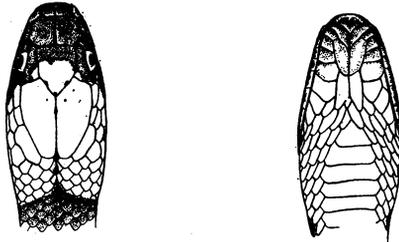


Fig. 11. *Dinodon futsingensis*, new species.
Dorsal and ventral views of head of type, four times natural size.

on one side, the fourth, fifth and sixth, on the other; lower labials 10–10, the first five in contact with the anterior chin-shields which are a little shorter than the posterior. Anal entire, subcaudals divided. Total length 227 mm., 0.21 occupied by tail.

The body is black, crossed by 22 white bands which are two scale-lengths in width on the middle of the back but wider on the sides where they join the faintly clouded, white belly. Nearly all of these bands split just before they reach the ventrals. The twelve white bands on the tail scarcely widen laterally. Except on the neck, where they are much more widely separated, these white bands are five to six scale-lengths apart. The suboculars are dark. There is a conspicuous white area extending anteriorly as far as the eyes and posteriorly three scales-lengths behind the parietals. Laterally it extends to the next to the last upper labial and finally joins the white of the throat. There are slight traces of black on this area, the most conspicuous being a narrow line from the posterior tip of the parietals to the beginning of the black ground color of the neck.

DESCRIPTION OF PARATYPE.—The single paratype, No. 34105, was taken along with the type and exactly agrees with it in sex, body and tail-length, and number of

bands on the tail. It has, however, 25 bands on the body. The upper labials are 8-8, the third, fourth, and fifth entering the eye; the lower, 10-11, five in contact with the anterior chin-shields on one side, six on the other. As in the type the preoculars are 1-1, the postoculars 2-2; the anterior temporals 2-2, the posterior, 3-3. The scales are in 17 rows as far back as the seventy-fifth ventral plate counted forward from the anus; at that point they are reduced to 15. There are 204 ventrals and 77 subcaudals. The anal is entire.

These 2 snakes were taken in the wooded mountains surrounding Ling Shih Szu.

***Dinodon ruhstrati* (Fischer)**

Three examples (Nos. 34584-586) from Ch'ungan Hsien represent this species.

Characters and Measurements

A. M. N. H. Nos.	34584	34585	34586
Sex	♀	♀	♂
Scales	17-17-15	17-17-15	17-17-15
Ventrals	221	227	223
Subcaudals	92	94	92
Upper Labials	8-8	8-8	8-8
Lower Labials	9-9(?)	10-10	10-10
Preoculars	1-1	1-1	1-1
Postoculars	2-2	2-2	2-2
Anterior Temporals	2-2	1-1	2-2
Posterior Temporals	3-3	2-2	3-3
Light Dorsal Cross-Bands	35+14	36+17	33+15
Total Length	817	672	729
Tail/Total Length	.22	.22	.22

The third, fourth and fifth upper labials enter the orbit; the first four lower labials are in contact with the anterior chin-shields in No. 34584, the first five in the other two. The loreal is pointed posteriorly in all and fails to reach the eye in two, barely doing so in the third, No. 34585. At midbody 9 to 10 scale rows are keeled. The anal is divided in all, and the apical pits are double. The light cross-bands are narrow and far apart anteriorly, but they widen and become more numerous toward the tail, actually becoming, in No. 34585, wider than the black areas of ground color. In No. 34584 they are never more than one-third the width of the black interspaces, while in No. 34586 they attain a width equal to half that of the intervening black. Posterior to the anus the dorsal pattern extends on to the ventrals so that the tails are completely ringed. In No. 34586 this is the case just before as well as behind the anus, and this specimen has more spots on the ventrals than No. 34585, while No. 34586 almost entirely lacks markings on the belly. In No. 34585 a broad, white band crosses the head. Anteriorly it reaches the

postoculars, posteriorly to about three scale-lengths beyond the end of the parietals. In the other two only an outline is evident, the band itself being almost obliterated by the clouding.

One stomach contained the remains of a small skink, another that of a species of *Takydromus*. The gravid female held 4 well-developed eggs, one of which measures 33×8 mm.

The three specimens were taken by torch-light at night in the beds of high mountain streams of the Kuatun neighborhood. No others were seen or heard of. Teasing caused one of these snakes to strike. It was very agile and quick in its movements.

Pratt's Kiukiang specimen included in Boulenger's 1893 description appears to agree well in pattern with the present specimens, but Boulenger's three Kuatun specimens listed as *septentrionalis* are puzzling because he remarks on the narrowness of the white areas and fails to mention the reversal in width of the bands from neck to tail. Moreover, this species is extremely rare at Kuatun and it is not likely that such a small collection would have had so many specimens of a rare species but none of the common *flavozonatum* described herein as new. I strongly suspect that Boulenger's Kuatun *septentrionalis* are in reality *ruhstrati*. This would also explain the failure of the former species to turn up in the present large collection.

Formosan *ruhstrati*, now known from thirteen specimens, has a ventral range of 212-224; a subcaudal range of 81-116. Pratt's Kiukiang specimen had but 211 ventrals and 88 subcaudals, while the present series has 221 to 227, and 92 to 94 ventrals and subcaudals, respectively. The exact relationship of the mainland and insular forms must await further material for clarification.

***Dinodon rufozonatum rufozonatum* (Cantor)**

Twenty-eight specimens, seventeen from the Western Hills, Peking, (Nos. 29390-403 and 29501-503), and eleven from the region of Tsinan, Shantung Province (Nos. 29686-695 and 29697).

Schmidt (1927) reported twenty-six examples from Chihli, Shansi, and Anhwei Provinces. Stanley (1914) records specimens from Anhwei, Chekiang, Chihli, Fukien, Kiangsi, Shantung, and Szechwan Provinces, but it is of course impossible to tell their exact status.

There is nothing striking about the present series. The upper labials are 8-8 in all, the lower 10-10 in twenty-four, 10-11 in one, 9-10 in one, and 11-11 in No. 29687. There is a single preocular everywhere except on one side in No. 29392 where it is lacking all together, and the post-

oculars are 2-2 in twenty-seven, and 1-1 in No. 29639. The anterior temporals are 2-2 in all, the posterior 3-3 in twenty-five, and 2-3 in three specimens from Western Hills. The scale formula is 17-17-15 in all but four from the Western Hills in which it is 17-17-17, 19-17-15, 19-19-15, and 20-19-15, respectively. All anals are divided; apical pits double. The three largest males measure from snout to vent 910, 902, and 859 mm., respectively, the largest females 980, 930, and 825 mm. The females probably average the larger. In this series they are outnumbered, there being fifteen males to thirteen females. Also two of the three juvenile specimens are females.

The loreal enters the eye in seven out of eleven, or 64 per cent of the Shantung lot; in nine out of seventeen, or 53 per cent of the Peking snakes. This character is very variable for Schmidt found that "the loreal enters the eye in 69 per cent of the Anhwei series and only in 35 per cent of the northern specimens." It must not be forgotten that 80 per cent of Schmidt's "northern" specimens came from Shansi. The loreal enters the eye in 92 per cent (eleven out of twelve) of the *williamsi* in the present series while, in the original six, type and paratypes, it enters everywhere except on one side in one specimen. We may conclude that this scale enters the eye more and more frequently as we proceed south and southeast from Shansi Province.

Summary of Counts and Measurements

	SEX	Shantung Series		
		NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	7	199-203	200
	♀	4	197-200	198
Caudals	♂	6	69-76	73
	♀	3	66-68	67
Tail/Total Length	♂	6	.18-.19	.18
	♀	3	.17-.19	.18
Body Bands	♂ + ♀	11	62-85	
Tail Bands	♂ + ♀	11	20-28	
Peking Series				
Ventrals	♂	8	195-198	196.5
	♀	9	191-197	193
Caudals	♂	7	67-69	68
	♀	8	64-68	66
Tail/Total Length	♂	7	.17-.19	.181
	♀	8	.16-.18	.172
Body Bands	♂ + ♀	14	45-66	
Tail Bands	♂ + ♀	14	16-23	

One female contained 11 well-developed eggs, one of which measures 15×13 mm. Another specimen held 8 well and 3 badly formed eggs.

Wall (1903) reports this snake as common about Shanghai. I found it so in Anhwei where it seemed to frequent native farm compounds. Jacot (1923) says that it is "commonly found about water courses." This I can also verify. I caught one that I saw in a small stream by tying a frog near to where it had secreted itself among the rocks and returning later to find it held by the string still tied to the frog which it had swallowed. Wall says that its disposition is good and this also I can verify, though some individuals will bite viciously.

This species has a diversified appetite. A Yenping *williamsi* had a loach in its stomach and another a frog, while two other stomachs contained skink remains. Two specimens of the typical form from Shantung in the present collection held frog (*Rana*) and one toad (*Bufo*) remains. Wall (1903) records one that had eaten a toad, while Jacot (1923) says it feeds on frogs and toads. In Chihli I saw one in the act of devouring a viper (*Agkistrodon halys brevicaudus*) not much smaller than itself, and in Anhwei I squeezed a toad out of a specimen.

***Dinodon rufozonatum williamsi* Schmidt¹**

Twelve specimens, one from Yenping (No. 33488), nine from Ch'ungan Hsien (Nos. 33648-649, and 34363-369), and two from Hok'ou (Nos. 35057-058) represent this species.

Schmidt (1927) based this subspecies on its "greater number of ventrals, subcaudals, and transverse dorsal markings." It is interesting to note that my Fukien-Kiangsi series agrees closely with his six from Changsha, but does not bridge the gap between *williamsi* and the typical form from nearby Anhwei though the Anhwei series is a large one. In order to simplify this complex matter I have made out a table which shows in brief the whole situation. Minor details, such as the exact number of specimens from which the caudal counts were made, have been disregarded, the number given for each series being the total of that series. Allowance must therefore be made for the few incomplete tails of each lot. These details may be noted in the several individual tables.

¹Paratypes Nos. 17432-3 and 17454-7, misplaced for some time, were found too late to be included in the following discussion or the summaries in the introduction to this paper.

Counts of *rufozonatum rufozonatum* and *rufozonatum williamsi* Compared

	(Only extremes given)			
	VENTRAL PLATES	CAUDAL PLATES	TRANSVERSE DORSAL MARKINGS	
			Body	Tail
Changsha <i>williamsi</i> (6 specimens)	207-213	77-86	59-74	21-26
Fukien-Kiangsi <i>williamsi</i> (12 specimens)	207-219	76-88	54-74	15-29
Typical <i>rufozonatum</i> from Chihli, Shansi and Shantung (38 specimens)	188-203	60-76	43-66	12-23
Typical <i>rufozonatum</i> from Anhwei (13 specimens)	196-205	65-84	50-70	14-26

There is nothing to do but await the acquisition of larger series from intermediate regions.

The details of the twelve *williamsi* from Fukien and Kiangsi are as follows. The upper labials are always 8-8, the lower 10-10 in eight, 9-10 in three, and 11-11 in one. The preoculars are uniformly 1-1, the postoculars 2-2. The anterior temporals are 2-2 in all, the posterior 3-3 in eight, and 2-3 in the rest. The loreal enters the eye in all but No. 35058. The scales are uniformly 15 before the vent; 17 (in four) or 19 (in seven) at midbody; and 19 on the neck in all but one which has 21. From snout to vent the largest females measure 995 and 975 mm., the largest males 840 and 755 mm. respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrols	♂	6	207-219	211
	♀	6	209-218	214.5
Caudals	♂	5	79-88	81
	♀	4	76-82	79.5
Tail/Total Length	♂	5	.18-.20	.192
	♀	4	.19-.21	.197
Transverse Dorsal Markings on Body	♂ + ♀	12	54-74	
Transverse Dorsal Markings on Tail	♂ + ♀	10	16-29	

A loach was found in one, a frog in another, and a skink in each of two others.

Evidently rare at Yenping, *williamsi* is not uncommon in the Kuatun forests though it is probably more at home in the hilly and flat country of south central China. I caught a specimen one night crawling along the rockwork face of a San Chiang rice-field terrace, a decidedly wet place.

***Dinodon flavozonatum*, new species**

Figures 12 and 13

TYPE.—A. M. N. H. No. 34371; ♂; Ch'ungan Hsien, northwest Fukien Province, China; April–September, 1926; Clifford H. Pope.

DIAGNOSIS.—Closely allied to *rufozonatum* from which it differs chiefly in having yellow instead of red cross-bands.

DESCRIPTION OF TYPE.—Rostral broader than deep plainly visible from above; internasals much shorter than prefrontals, which are a little shorter than frontal; frontal slightly longer than broad, just as long as its distance from rostral; length of parietals equals their distance from end of snout; loreal longer than deep, not entering eye. One pre- and two postoculars; temporals 2–3; 8 upper labials, third, fourth, and fifth entering eye; 10 lower labials, first five in contact with anterior chin-shields which are as long as, and slightly broader than posterior. Scales in 17 rows to a point opposite seventy-first ventral plate from anus where fourth row drops out; in 15 rows posterior to this; 7 rows feebly keeled at midbody; all scales smooth on neck. Ventrals 218; anal entire; subcaudals 87; apical pits double. Total length 965 mm., 0.20 of which is tail-length.

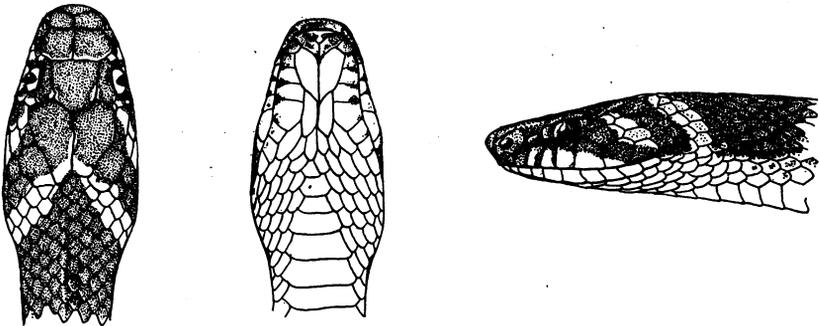


Fig. 12. *Dinodon flavozonatum*, new species.
Dorsal, ventral, and lateral views of head of type, twice natural size.

The uniformly black ground color of the dorsum is crossed anterior to the vent at regular intervals by 68 narrow, yellow bands each about half as wide as a scale is long. Every band divided on the fifth scale-row, each half joining a branch from the adjacent ones before descending to the ventrals. This lateral pattern is not very distinct and encroaches slightly on the white ventrals. Most of the 21 tail-bands are as wide as a scale is long, and none of them splits laterally. The subcaudals are black, weakly light mottled. The top of the head is black save for a yellow stripe from behind the eye to the angle of the mouth; narrow yellow borders on some of the plates, and a nuchal V-shaped, yellow band with its apex on the posterior tips of the parietals.

The first two and the eighth or last upper labials are black, the rest black and yellow. The throat is white except for black trimmings on the anterior lower labials. The yellow of the dorsum fades with preservation into a dirty white.

DESCRIPTION OF PARATYPES.—The nineteen paratypes (Nos. 33641–647, 34370, and 34372–82) come from the type locality.

The upper labials are uniformly 8–8, the third, fourth and fifth entering the eye; the lower, 10–10 in thirteen, 9–9 and 9–10 in two each, 8–8 and 8–10 in one each; 5 in contact with the anterior chin-shields in seventeen, 4 in one, 4 on one side and 5 on the other in the remaining one. The preoculars are always 1–1, the postoculars 2–2; the anterior temporals invariably 2–2, the posterior 3–3 in seven, 2–2 in six, 2–3 in five, and 2–? in a damaged example. There are always 17 rows of scales on the neck and at midbody, 15 before the anus. The anal is always entire. Among eight specimens the number of scale-rows keeled at midbody varies from 6 to 9, just half having 7 rows keeled. The only four females measure from snout to vent 671, 668, 590, and 460 mm., respectively. The four largest males measure 825, 815, 805, and 790 mm. The

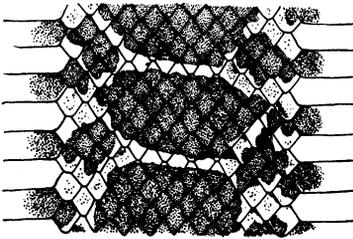


Fig. 13. *Dinodon flavozonatum*, new species.

Dorsal color pattern of type, twice natural size.

number of dorsal cross-bands ranges from 51 to 78 on the body and 17 to 24 on the tail. On the whole the color pattern is remarkably constant but there is variation in the lateral pattern which is often confused and irregular. The color pattern is remarkably like that of *rufozonatum* except that the cross-bands in this species are yellow instead of red.

Summary of Counts and Measurements

	SEX	No. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	15	211–221	217
	♀	4	212–218	214.5
Caudals	♂	10	81–88	84
	♀	4	80–84	81
Tail/Total Length	♂	10	.19–.20	.197
	♀	4	.18–.20	.189

One snake had eaten a lizard (*Takydromus* sp.), another a skink, and a third a comparatively large snake of the genus *Holarchus* (No. 29943).

This species was encountered only in the high forests of the Kuantun region where it was not uncommon. It resembles *rufozonatum* in disposition.

Mell and Vogt (1922) record *semicarinatum* from Kwangtung but the meagre description given does not enable one to determine the relationship between mainland and insular *semicarinatum* and the Fukien material,

coming as it does from intermediate territory. Vogt gives the cross-bands as 60, while in Stejneger's specimen there are only 40. This higher number suggests relationship to the Fukien species.

ACHALINUS

Achalinus spinalis Peters

Fifteen specimens from Ch'ungang Hsien (Nos. 33750-751 and 34613-625) make up the series of this rare species.

Stejneger (1925) first reported this snake from Fukien but Stanley (1914) has recorded it from Chekiang Province.

The present series substantiates Stejneger's conclusion that *braconieri* and *spinalis* are identical. His Foochow specimen with a mid-dorsal stripe removed the last distinction between these two species. The five additional characters that were supposed to separate them will also be enumerated below.

1. MID-DORSAL STRIPE.—Ten out of fourteen (71 per cent) of the series at hand have the stripe but it is faint in six of them. In all but two it covers the width of one scale only but in those two it is twice as wide.

2. SCALE ROWS.—The scale formula in six out of fourteen is 23-23-23 and in five more it is 23-23-21. Two are irregular with 23-23-22 and two have 21 rows throughout. At midbody there are 23 rows in about one-seventh of this lot while, in Stejneger's (1907) list of seven Japanese examples one of the seven has 21 rows. Here again is noteworthy agreement.

3. COMPARATIVE LENGTHS OF INTERNASAL AND INTERPREFRONTAL SUTURES.—Even though the former is always shorter than the latter both vary considerably and the character may be rated as a bad one.

4. NUMBER OF CHIN-SHIELDS.—Here we get the greatest difference, for thirteen of the present lot have regularly but two pairs and the remaining two have three on only one side, as is the case in Stejneger's recent Foochow specimen. We may conclude that two is the normal number for mainland specimens.

5. VENTRAL AND SUBCAUDAL COUNTS.—Here is remarkable agreement, for the range in my fifteen is just the same as in Stejneger's six, 146-166 ventrals. My average is 158, his 159. The subcaudal counts do not agree so well for his series ranges from 49 to 62, mine from 39 to 56. My average is 47, his 54.

The series of fifteen shows a decided sexual difference. The males range from 146 to 155 and average 151, the females from 160 to 166 and average 163. Conditions are reversed in the subcaudal counts for the females range only from 39 to 46, with 42 as average, while the males range from 50 to 56 with 53 as average.

6. MIDVENTRAL TAIL STRIPE.—None of the Ch'ungang Hsien specimens shows signs of such a stripe.

A few remaining characters, not being especially significant, may be recorded briefly.

The upper labials are uniformly 6, the lower 6 everywhere except on one side of one where they are 7. There is never a trace of postoculars.

The anterior temporals, both of which are in contact with the eye in all but No. 33751, are 2 on a side in twelve specimens; in two the upper one is split into 2 scales on one side, while in a single one the supraocular has absorbed one anterior temporal on both sides. On one side in No. 33751 the lower temporal is excluded from the eye, while on the other it barely touches. The posterior temporals are uniformly 2 on a side in all but one which has a third irregular one on one side. The anal is never divided and the scales are always keeled. In the females the tail occupies from 0.14 to 0.16 of the total, in the males from 0.20 to 0.22. The three largest among the nine females measure from snout to vent 345, 335, and 320 mm., among the six males 272, 237, 217 mm., respectively. In life the scales are highly iridescent and the belly yellowish.

It is hard to say just where Mr. Sowerby's Foochow specimen (Stejneger, 1925) came from. We found this snake only in the highest mountains about Kuatun where it is not uncommon. It is extremely delicate and dies more readily than almost any other snake. Soon after death it dries and hardens in a most unusual way. This drying up might lead one to conclude that it is a secretive burrower but the greatly reduced rostral is anything but a characteristic of burrowing species. It shows not the slightest signs of defensive behavior when handled.

One female contained 7 well-developed eggs, one of which measures approximately 19×7 mm.

ELAPHE

Elaphe schrenckii Strauch

Two specimens from the Western Hills, Peking (Nos. 29388-389), represent this species. Schmidt (1927) reported on nine examples from Hsing Lung Shan, Eastern Tombs, Chihli Province.

Four males from the Eastern Tombs had from 206 to 216 ventrals, while the only one in the new series has 218; four females, 220 to 222, the single new female, 212. These figures indicate that the males from the Western Hills have the greater number of ventrals, while the females from the Eastern Tombs have the higher count. It will be prudent to await further evidence before drawing conclusions. The subcaudal counts of the two series conform well, the male from the Western Hills having 70+ and the female 68 subcaudals. The Eastern Tombs males averaged 74, the females 69. In other characters these two new specimens conform well with the larger series. The upper labials are 8-8, the fourth and fifth entering the eye in both; the lower, 10-10, the first five pairs in contact with the anterior chin-shields. The preoculars are 2-2 in one, 1-1 in the other; the postoculars, 2-2 in one, and 2-? in the

other. The anterior temporals, 2-2 in both; the posterior, 3-3 in both. The scale formula is 23-23-17 in one, 23-23-19 in the other. The male measures 1540 mm. from snout to vent; the tail occupies 0.15+ of the total length. The female has been skinned so its present measurement of 1600 mm. to the vent is inaccurate. There are 8+12 pairs of black cross-bands on the body and tail, respectively, in one, and 9+10 on the other. These figures are only approximate because the bands are irregularly arranged and paired.

Elaphe carinata Günther

Twenty-five specimens, twenty-two from Ch'ungan Hsien (Nos. 33617-621 and 34296-312), two from Futsing (Nos. 33958-959), and one from Hok'ou (No. 35075) represent this species.

Schmidt (1927) reported on two examples from Yunnan. Boulenger (1899) and Stanley (1914) give Kuantun records.

The present lot is in general agreement with former series. Twelve of the Ch'ungan snakes (Nos. 33618-619, 34297-300, 34302-305, 34310 and 34312) have been examined. The upper labials are uniformly 8-8; the lower, 11-11 in six, 10-11 in four, 11-12 in one, and 10-10 in one. The preoculars are 2-2 in one, and 3-3 in one; the postoculars 2-2 in ten, and 2-3 in two. No. 34300 has on either side an extra scale between the postoculars and the temporals. The anterior temporals are 2 on a side in eight, 3 on a side in three, while in the remaining one there are 2 on one side and 3 on the other. No. 33618 has an extra tiny scale inserted between the temporals on the right. Nine specimens have 3 posterior temporals on a side, two have two on one and 3 on the other, while the remaining one has 4 on each side. The scale formula in seven is 23-23-19; in three more it is 23-23-17, while it is 23-23-18, 21-23-17, and 21-23-19 in one each. The anal is divided in all.

One male from snout to vent measures 1357 mm. The largest specimens are skinned and the longest skin measures from tip to tip 2030 mm. In life the snake was undoubtedly shorter than this as the skins are prone to stretch.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrols	♂	6	218-224	221
	♀	6	216-224	221
Caudals	♂	4	93-101	96
	♀	6	84-91	90
Tail/Total Length	♂	2	.20	.20
	♀	4	.19	.19

The two snakes from Futsing and the Hok'ou specimen have the numbers of upper labials, pre- and postoculars, and anterior and posterior temporals that occur most frequently in the Ch'ungan series. The lower labials are 11-11, 9-9 and 10-11; the posterior temporals, 3-3 in two, and 2-2 in one. The scale formula in the two Futsing examples is 23-23-19, in the other, 23-23-17. In ventral count there is a decided gap between the two from Futsing (206 and 208) and all the others, the Hok'ou one agreeing with those from Ch'ungan (225). This gap is bridged over by Stejneger's (1907) series of seventeen in which the extremes are 212 and 217. Oshima (1908) gives extremes for seven from Formosa as 211 and 216. A larger number from Futsing would undoubtedly show a lower average than the present Ch'ungan lot. This point is worthy of note.

In the entire series of twenty-five the outer scale-row is smooth. At midbody the second row is more or less faintly keeled in all but three specimens. The keels begin at a point posterior to the middle of the body in these.

On the 29th of July a batch of 12 white, adherent eggs, obviously deposited by this species, was found buried near the loose surface of a pile of soft, decaying bamboo waste lying in a clearing of the high bamboo forests near Kuatun. Three adults were taken at the pile, one of them a female containing 12 well-developed eggs. Three of the eggs taken from the "nest" measured 47×30.5 , 51×29 , and 45×29 mm., respectively.

In Futsing *carinata* seemed to be rare while at Yenping we failed to find it. About Kuatun it was common enough and it also was not difficult to secure on the plateau near Ch'ungan City. Its presence on the Kiangsi side is testified to by the specimen taken there.

E. carinata is decidedly ophiophagous. One specimen had a large *Boiga kræpelini* (No. 34519) in its stomach; another had a half-grown *Agkistrodon acutus* and an adult *Zaocys dhumnades*, while a third was taken just after it had swallowed an *Elaphe osborni*. It is docile and easily handled.

***Elaphe kreyenbergi* (Müller)**

Six specimens, all from Ch'ungan Hsien (Nos. 34636-637, 34679-682), represent this species described as *Spaniopholis kreyenbergi* from Pingshiang, Kiangsi Province, by Müller in 1907, and re-described from two Yunnan specimens by Schmidt (1927) as *Elaphe osborni*. *Spaniopholis* was very properly placed in the synonymy of *Elaphe* by Werner, 1923.

Counts and Characters

A. M. N. H. Nos.	34636	34679	34682	34637	34680	34681
Sex	♂	♂	♂	♀	♀	♀
Dorsal scales	21-23-19	21-21-17	21-23-17	21-23-17	21-23-17	21-23-19
Ventrals	223	219	219	217	218	220
Caudals	98	87+	99	93	86	91
Upper Labials	8-8	7-8	8-8	8-8	8-8	8-8
Lower Labials	11-11	11-11	11-12	10-11	11-11	11-11
Preoculars	2-2	2-2	2-2	2-2	2-2	2-2
Postoculars	2-2	2-2	2-3	2-2	2-2	2-2
Anterior						
Temporals	2-2	1-2	2-3	2-2	2-2	2-2
Posterior						
Temporals	2-3	3-3	3-3	3-4	2-3	2-2
Total Length	587+140	388+80+	418+103	584+133	384+88	397+97
Tail/Total Length	.19	.17+	.20	.19	.19	.20

The fourth and fifth upper labials uniformly enter the orbit. Five pairs of labials are in contact with the anterior chin-shields in all but two specimens, both of which are irregular in having 6 labials in contact on one side and the usual 5 on the other. The anal is always divided. The outer row of scales is never keeled. At midbody the second row is smooth in one snake but weakly keeled in the rest.

Schmidt's color description is that of a young example. The present series agrees in general but no two individuals are alike. The markings vary greatly in comparative intensity. The adult anteriorly is mottled brown and black; posteriorly it is uniform brown. Traces of the juvenile pattern may be detected.

I found one of the specimens still alive in the stomach of a large *E. carinata*. The latter was taken in a high bamboo forest near Kuantun. Two others I caught well above Kuantun village on a grass- and bamboo-covered ridge. They were docile and did not bite when handled. One stomach contained frog and another skink remains, while a third held the half digested body of a water-snake (*Natrix percarinata*).

Schmidt's types of *E. osborni* have been examined and there can be no doubt that his form is essentially the same as the Fukien one here described. The Yunnan specimens have somewhat fewer subcaudals, 77 and 79, but in this character Müller's three Kiangsi specimens are exactly intermediate. The differences between the known specimens do not justify geographic subdivision.

This identification disposes of Schmidt's supposition that *osborni* might be identified with *Coluber walli* Werner, as Werner's type has lately been examined by Smith who identifies it as *Elaphe erythrura*.

Now that adults are known, *Elaphe kreyenbergi* proves to be a relative of *E. carinata* rather than of any other Asiatic species of the genus. There is striking resemblance in shape and color of the head, and marked similarity in general coloration of the adult. It should not be forgotten that both species eat other snakes.

***Elaphe mandarina* (Cantor)**

Three specimens (Nos. 33735, 34504-505) were secured at Kuantun. Schmidt (1927) has reported on two specimens from Szechwan and one bought in Anhwei. Stanley reported it from Fukien in both 1914 and 1916.

The present specimens agree well with those already recorded.

Counts and Measurements

A. M. N. H. Nos.	33735	34504	34505
Sex	♂	♂	♂
Dorsal Scales	23-23-19	23-23-19	23-23-19
Ventrals	215	214	215
Caudals	72	72	
Upper Labials	7-7	7-7	7-7
Lower Labials	9-9	8-8	9-9
Preoculars	1-1	1-1	1-1
Postoculars	1-1	2-2	2-2
Anterior Temporals	2-2	2-3	2-2
Posterior Temporals	3-3	2-2	3-3
Total Length	635+144	900+205	868+?
Dorsal Markings	25+9	24+10	28+7+
Tail/Total Length	.185	.185	

The anal is divided in all.

One stomach contained balls of short gray (rodent?) hair.

The smallest snake was found crawling over one of a group of vine-grown boulders strewn in an open area in the forests near Kuantun at San Chiang. It was slow and deliberate in its movements and quite docile.

***Elaphe porphyracea porphyracea* (Cantor)**

Fourteen specimens, twelve from Ch'ungan Hsien (Nos. 33731-732, and 34494-503), one from Yenping (No. 33489), and one from Fut-sing Hsien (No. 34101), represent this species.

Schmidt (1927) reported on two Hainan specimens. Boulenger (1899) recorded four Kuantun examples, while Stanley lists "four specimens from Taipingfu, Chekiang and Fokien" in 1914, and two from Fukien again in 1916. Van Denburgh recorded it from Formosa in 1909.

The characters of the twelve Ch'ungan examples are as follows.

The upper labials are always 8-8; the lower are 10-10 in nine, 9-10 in two, and 9-9 in one. The preoculars are uniformly 1-1, the postoculars 2-2 in eleven, and 1-2 in one. The anterior temporals are 1-1 in all, the posterior, 2-2 in all but one in which they are 2-3. The scale formula is always 19-19-17 and all the anals are divided. The three largest males from snout to vent measure 733, 723, and 715, the females 742, 715, and 704 mm., respectively. There are ten saddles anterior to the vent in seven, 9 in four, and 11 in one example, while on the tail all the specimens have 3 except one which has 4.

Summary of Counts and Measurements

	SEX	No. OF SPECIMENS	EXTREMES	AVERAGES
Ventrols	♂	6	189-207	196
	♀	6	199-204	202
Caudals	♂	6	59-66	62
	♀	6	64-69	66
Tail/Total Length	♂	6	.16-.18	.163
	♀	6	.16-.17	.168

The upper labials, oculars, and temporals in the two remaining specimens, both males, are regular. The Yenping snake has 9, the Futsing 10, lower labials on a side. The ventral and caudal counts, proportionate tail-length, and body and tail saddles are as follows, the figures for the Yenping specimen coming first: 198 and 192, 65+ and 64, .17+ and .18, 11+4 and 9+3.

One stomach contained the remains of a small mammal.

I have carefully studied the series from Fukien, Hainan, and Yunnan, and come to the following conclusions.

1.—Schmidt's new subspecies, *pulchra*, described in 1927, is perfectly good, although it is distinguished by its color pattern rather than by a low ventral count. This means that A. M. N. H. Nos. 21065-21067 from Tengyueh listed by him as typical *porphyracea* really belong under *pulchra*, their high ventral count notwithstanding. This disposes of Werner's 1926 criticism on the grounds of his Yunnan material having a great range in ventral count. He fails to describe the color pattern before him so it is impossible to say what new light his large series might shed on this difficult problem.

The subspecies *pulchra* is distinguished by (1) a series of 12 to 15 narrow, black and white bordered links laid across the dorsum anterior to the vent, descending to the ventrols on either side and enclosing an island of color, matching or nearly matching the ground color. These links, disposed at regular intervals, are as wide as two or three scales are long, both anteriorly and posteriorly, the interspaces of ground color always being much wider than the links. (2) Two black, longitudinal dorsolateral lines that arise behind the seventh to tenth link are at first discontinuous but finally become complete and extend to the end of the tail. The ground color is grayish fawn.

The young have the usual sharply defined black blotches instead of the weaker ones of the adult.

2.—The Fukien and Hainan specimens do not even approach the Yunnan form in pattern. The dorsal markings are for the most part transverse blotches rather than links, being on the average more round in form and almost lacking the strongly contrasted black and white borders. The blotches, 9 to 11 in number, extend downward to, or almost to, the ventrals, cover the length of five or six scales (only three or four in three exceptional cases out of fifteen) on the neck, but only two to four before the vent, and are as wide as or wider than the interspaces on the neck, but not nearly so wide on the posterior part of the body. The pair of dorsolateral black bands extends along the entire length of the body and tail, being full and strong in all the Fukien specimens, weaker in the Hainan ones. The ground color is distinctly reddish rather than grayish fawn, and the pattern in the young is sharply defined as in *pulchra* but exhibits most of the differences of the adults. I seem to remember that in life one juvenile specimen taken near Kuatun had a yellowish ground color but no sign of such is any longer evident.

3.—So far the matter is cleared up, but the difficulty arises with Wall's description of a Burmese specimen with 14 to 17 blotches covering the length of six to eight scales anteriorly but decreasing in width toward the tail. Moreover, on the neck the blotches are described as wider than the interspaces, much less so posteriorly, and at midbody a pair of narrow longitudinal lines arise. To make matters worse he finds only a dull white border to the blotches. His specimens agree with the Hainan and Fukien series in (1) width of blotches, (2) spacing of same, (3) outline of blotches; with *pulchra* in (1) number of blotches, (2) restriction of longitudinal lines to the posterior part of the body.

I see nothing to do but await adequate description of new material. It is highly probable that the form from southeastern China deserves subspecific distinction but with only incomplete description of Indian specimens it is impossible to form a definite idea of its coloration.

***Elaphe rufodorsata* (Cantor)**

One hundred and thirty-six specimens, eleven from Peking (Nos. 29370, 29373, 29376–380, and 29382–385), sixty-three from the Western Hills, Peking, (Nos. 29405–407, 29409–411, 29413–421, 29423–425, 29427–429, 29431–434, 29436–444, 29447–452, 29454–457, 29459–463, 29465, 29467, 29470, 29483–4, 29486, 29492–7, and 29499–500), thirty-six from Tsinan, Shantung Province (Nos. 29650–685), and twenty-six from the Tsinan region (Nos. 29701–716, 29720, and 29733–741), represent this species.

Schmidt (1926) reported on thirty-five examples from Anhwei Province. In general there is very close agreement between the two lots, the only significant difference lying in the slightly higher ventral count of the northern snakes, Schmidt's males averaging but 166 and his females only 177 ventral plates.

Twenty-four specimens have been examined, twelve from Chihli, (Nos. 29376, 29379, 29383, 29385, 29405, 29407, 29413, 29415, 29484, 29486, 29493, and 29495), and twelve from Shantung (Nos. 29662, 29673, 29682, 29702, 29705-706, 29710, 29714-716, 29734, and 29739) with results as follows. The upper labials are 7-7 in nineteen, 7-8 in two, 8-8 in Nos. 29376 and 29734, and 6-7 in one; the lower, 10-10 in seventeen, 9-10 in six, and 10-11 in one. The preoculars are uniformly 1-1 while the postoculars are 2-2 in all but one in which they are 2-3. The anterior temporals are always 2-2, the posterior, 2-3 in twelve, 3-3 in ten, 1-2 in one, and 3-4 in one. There are always 21 rows of scales around the neck and at midbody. No. 29710 has 15 rows just before the vent while all the rest have the usual 17. The anal is entire only in No. 29413.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Chihli Series				
Ventrols	♂	6	166-173	170.5
	♀	6	181-187	184.5
Caudals	♂	6	56-65	60.3
	♀	5	48-54	50.8
Tail/Total Length	♂	6	.18-.21	.192
	♀	5	.15-.15	.15
Shantung Series				
Ventrols	♂	6	173-178	174.7
	♀	6	181-185	183.3
Caudals	♂	4	53-63	.595
	♀	5	51-54	.528
Tail/Total Length	♂	4	.19-.20	.195
	♀	5	.15-.16	.154

Eleven females contained 4 to 21 eggs, averaging 12.4 apiece. One fully developed embryo measured 212 mm. from snout to tip of tail, the tail occupying 0.20 of this length.

Six stomachs contained remains of frogs, four of non-spinous loaches.

Elaphe dione (Pallas)

Thirty-six specimens, five from Peking (Nos. 29371-372, 29374-375 and 29381), twenty-six from the Western Hills, Peking, (Nos. 29404, 29408, 29412, 29422, 29426, 29430, 29435, 29445-446, 29453, 29458, 29464, 29466, 29468-469, 29479-482, 29485, 29487-491, and 29498), four from the Tsinan region, Shantung Province, (Nos. 29717-718 and 29722-723), and one from Tsinan (No. 29742), represent this species.

Schmidt's (1927) report included sixty-four examples of this widely distributed snake from Chihli, Shansi, and Inner Mongolia. The present series agrees well with his as the following figures compiled from an examination of thirteen specimens, Nos. 29371-372, 29374-375, 29381, 29488, 29490-491, 29717-718, 29722-723, and 29742, show.

The upper labials are 8-8 in eleven, 8-9 in one, and 8-? in a damaged male; the lower, 11-11 in nine, 11-12 in two, 10-11 in one, and 12-12 in No. 29717. The pre- as well as the postoculars are without exception 2-2. The anterior temporals are 2-2 in nine, 2-3 in three, and 3-5 in a very irregular specimen; the posterior, 4-4 in seven, 3-3 in four, and 3-4 in two. The scale formula is 25-25-19 in nine, 27-27-19 in two, 27-27-21 in one, and 23-25-19 in one.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Series from Peking and Region				
Ventrals	♂	4	184-194	187.5
	♀	4	193-205	198.2
Caudals	♂	3	70-77	73
	♀	4	61-69	63.7
Tail/Total Length	♂	3	.19-.21	.20
	♀	4	.17-.18	.175
Series from Tsinan and Region				
Ventrals	♂	1	183	
	♀	4	195-204	200.5
Caudals	♂	1	67	
	♀	4	59-64	61
Tail/Total Length	♂	1	.21	
	♀	4	.16-.17	.165

The three largest females in the entire series measured from snout to vent 900, 845, and 840 mm., the males 820, 780, and 650 mm., respectively. The largest specimen in Schmidt's series was also a female.

One gravid specimen contained 11 well-developed eggs.

Schmidt (1927) described *bimaculata* from three specimens that I secured at Ningkwo, Anhwei Province. No further material is at hand so the validity of this species, based on color characters, can not be checked. It is important that specimens from the Shanghai-Nanking region be secured for comparison with typical *dione* from the North, and the position of *bimaculata* determined.

Elaphe taniura yunnanensis (Anderson)

Twenty specimens, all from Ch'ungan Hsien (Nos. 33623-626, and 34313-328), represent this species.

Stanley (1914) records the typical form from Fukien but it is of course impossible to tell what he had.

The characters and measurements of the present series follow. The upper labials are 9-9 in sixteen, 8-9 in three, and 10-10 in one; the lower, 12-12 in ten, 12-13 in five, 11-12 in two, and 11-13, 10-12, 13-13 in one each. The preoculars are 2-2 in all, but in two examples there is on each side an extra small scale before the preoculars, while this extra scale occurs four more times but on one side only; the postoculars are regularly 2-2 but in one specimen the second is very minute. The anterior temporals are 2-2 in fifteen, 3-3 in two, 3-4, 2-3, and 1-2 in one each; the posterior, 3-3 in nine, 3-4 in six, 2-3 in three, and 4-5 in two. The scales were counted on the neck, at midbody, and before the anus, and found to be 25-25-19 in eleven, and 23-25-19 in four, while the following combinations occurred on but one snake each: 23-23-19, 25-23-19, 23-23-21, 23-24-19, and 25-27-23. Among twenty specimens, then, thirteen had 25 rows of scales on the neck, fifteen had 25 at midbody, while in all but two there were 19 before the vent, one of these being very irregular with 23. Eighteen anals were divided, one entire, and one damaged. Most of the specimens had been skinned and the three longest skins were from females. The longest of all measured 2212 mm. but had doubtless been stretched considerably.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	7	241-252	245
	♀	13	245-258	250
Caudals	♂	5	95-109	102
	♀	8	98-111	103
Tail/Total Length	♂	1	.15	
	♀	2	.19-.21	.20

On June 28 I secured two specimens, one contained 11 and the other 12 fully developed eggs. Also, on July 11, I got one with 12 well-developed eggs.

A Chinese showed me one of these snakes climbing about in low trees. It remained in them for some minutes and when finally disturbed attempted to escape without descending to the ground. My most reliable field-man, "Da Da," shot a large specimen out of a tree. This was the only snake that "Da Da" had treated in this way and when asked about it declared that the snake when found was far above reach in the

tree and that he had through necessity resorted to the only method of securing it. These snakes are common in the Ch'ungan mountains.

E. t. yunnanensis differs from the typical form in its high ventral count so it is significant to find the average of the present series, 248, following one below that given by Schmidt (1927) for eight specimens, most of which are from Yunnan. The average for fifteen examples of the typical form from Anhwei is only 236.

I have carefully compared specimens from Anhwei, Szechwan, and Yunnan with the Fukien material for differences in pattern but find very little. The blotches of the fore body are smaller and less conspicuous in the Anhwei snakes. However, the Ch'ungan series varies greatly in color pattern and the differences between the series are not constant enough to be relied on.

***Elaphe radiata* Schlegel**

One specimen (No. 35237) was collected at Yuan Kiang, southwest Yunnan Province, by Walter Granger.

This snake, rare in China, had not been previously collected by the Expedition nor did the American Museum possess an example. Wall (1903) gives definite Hongkong records and Mell (1922) reports it from Kwangtung.

The upper labials are 8-8, the fourth and fifth entering the eye; the lower, 10-10, the first 5 pairs in contact with the anterior chin-shields. The preoculars are single, the postoculars 2-2; the anterior temporals, 2-2, and posterior, 3-3. The scale formula is 21-21-17; there are 231 ventrals and 101 caudals. The anal is entire. The total length is 1330 mm., 0.22 of which is taken up by the tail.

At midbody all but the 7 or 8 central rows of scales are smooth, while a short distance before the vent only 1 outer row on either side lacks a keel. Along the neck the keeling is reduced to a bare trace on the mid-dorsal row.

GONYOSOMA

***Gonyosoma melli* (Vogt)**

Four examples, one from Yenping (No. 33456), and three from Ch'ungan Hsien (Nos. 34355, and 34590-591), represent this species.

Schmidt (1927) had a specimen from Yenping which he described as *Gonyosoma caldwelli* in American Museum Novitates No. 157, 1925. He considers *caldwelli* and *melli* distinct on the strength of differences in ventral, caudal, and anterior temporal counts. These differences are practically obliterated by the new series, and *caldwelli* must be placed in

synonymy. Mell's range in ventrals is 212-216, the range in the new series, 213-223, while the type of *caldwelli* has 223. Mell's have from 144 to 148 caudals, the present lot from 129 to 135+. The gap here is very small. The type of *caldwelli* has a damaged tail so its count (108) is unreliable. In the present series the anterior temporals are 2-2 in two, 2-1 and 1-1 in one each. Schmidt gives *caldwelli* anterior temporals as single, while *melli* is described as having 2 on a side. We see that the anterior temporals may be 2-2 or 1-1. The counts and measurements for the present series follow.

A. M. N. H. Nos.	33456	34355	34590	34591
Sex	♂	♀	♀	♀
Dorsal Scales	19-19-15	19-19-15	19-19-15	19-19-15
Ventrals	217	213	220	223
Caudals	135+	129	131	135
Upper Labials	8-8	8-9	8-8	8-8
Lower Labials	10-11	10-10	11-11	10-10
Preoculars	1-1	1-1	1-1	1-1
Postoculars	2-2	2-2	2-2	2-2
Anterior Temporals	2-1	1-1	2-2	2-2
Posterior Temporals	2-2	3-3	2-2	2-3
Total Length	1028+430+	670+258	291+110	347+121
Tail/Total Length	.29+	.28	.27	.26

In the two large specimens 7 and 8 scale-rows are feebly keeled but in the two small ones keels can scarcely be detected. The anal is divided in all.

The coloration of juvenile specimens in the present series corresponds closely to that described by Vogt from Kwangtung specimens. The spotted juvenile coloration of this species exhibits the relation between *Gonyosoma* and *Elaphe*.

LIOPELTIS

Liopeltis major (Günther)

Eighty-three specimens, thirteen from Futsing Hsien (Nos. 33960-972), forty-four from Yenping (Nos. 33412-455), and twenty-six from Ch'ungan Hsien (Nos. 33633-638 and 34335-354), represent this species.

Schmidt (1927) reported on two from Futsing, one from Yenping, and one from Anhwei, while Boulenger (1899) lists three Kuatun specimens. Werner (1908) records five from Foochow; Stanley (1914 and 1916) lists Fukien and Chekiang examples. Stejneger (1925) gives Yenping, Foochow and Chekiang records. Mell (1922) says that it is common in Kwangtung. Thus, we see that this snake has long been known from this part of China.

Nineteen specimens have been selected for study, Nos. 33417, 33419', 33425, 33431, 33435-436, 33453, 33633, 33635, 33637-638, 33960, 33962-964, 33967, 33965, 34335 and 34350. The upper labials are 8-8 in eighteen, and 7-8 in one; the lower, 7-7 in twelve, 6-7 in five, 7-8 and 8-8 in one each. The preoculars are always 1-1, the postoculars, 2-2. There is one anterior temporal on each side in all and the posterior temporals are 2-2 in eighteen and 2-3 in one. The scales are 15-15-15 in all. There is only one (No. 33453) in the entire series with an undivided anal. The three largest males measure 713, 710 and 650 mm. from snout to vent, the three largest females 678, 608 and 608 mm., respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	11	158-166	162
	♀	8	161-170	167
Caudals	♂	11	82-90	85
	♀	7	76-82	80
Tail/Total Length	♂	11	.24-.28	.263
	♀	7	.24-.26	.250

In the field a female containing 8 well-developed eggs was brought in. One measured 29×14 mm., another 30×13.5 mm. A second female held 13 eggs. Of six preserved females three contained 7, one 6, one 4, and one 8 eggs.

L. major obviously lives on earthworms, for remains of such were found in nine stomachs, while five others contained gritty earth. The remaining stomachs were empty.

This snake seemed to be really at home in the Yenping mountain bamboo forests where it was exceedingly abundant. I used to encounter it daily gliding about on the forest floor. It was not very common at Kuatun and we secured two examples on the open plateau in the Ch'ungan City region. It was not rare in Futsing Hsien.

Liopeltis major was never observed to either bite, strike or assume a defensive posture.

MACROPISTHODON

Macropisthodon rudis Boulenger

Sixteen examples, all from Ch'ungan Hsien (Nos. 33650-652, 34506-517, and 34520), make up the series of this species.

Stanley (1914) reports "specimens from North-eastern Fokien" and Werner (1908) records a Foochow example. The upper labials are 7-7 in all but two, each of which has an extra one on one side; the lower,

9-9 in twelve, 9-10 in three, and 10-10 in one. There are regularly 3 preoculars on a side, and in all but two the suboculars are 3-3; in those two they are 2-3. The postoculars are 3-3 in seven, 4-4, 3-4, and 2-3 in three each. The anterior temporals are 3-3 in thirteen, and 2-2 in the rest. The scales are uniformly in 23 rows on the neck and at midbody, in 19 before the vent. The anal is divided in fourteen, and entire in two. The three largest females measure from snout to vent 805, 775, and 770 mm., the largest males 590, 560, and 543 mm., respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	6	133-142	138.5
	♀	10	145-152	147.6
Caudals	♂	6	54-58	55.7
	♀	10	45-50	46.9
Tail/Total Length	♂	5	.25-.29	.27
	♀	8	.18-.20	.19

In 2 juvenile females the tail occupies but 0.16 of the total, in a single male but 0.19. This is in marked contrast to the condition in the adult.

Mell's (1922) new subspecies *melanogaster* is apparently based on color characters.

A toad was disgorged by one specimen.

Four females held respectively 18, 22, 23, and 25 well-developed eggs.

This snake was found only in the high forests about Kuatun. A large example, when annoyed, threw itself into regular coils, flattening its head, neck, and body until the conspicuous spots stood out boldly and the head, which was drawn back in a most threatening attitude, became arrowhead-shaped. It would make only half-hearted strokes, apparently being satisfied to pose thus. Repeated teasing and handling failed to make it actually bite.

HOLARCHUS

Holarchus chinensis (Günther)

Five specimens, two from Yenping (Nos. 33403-404), one from Ch'ungan Hsien (No. 34656), and two from Hok'ou (Nos. 35055-056), represent this rare snake.

Günther described this species from the mountains north of Kiu-kiang in 1888; Wall (1903) saw two in the Siccawei Museum, Shanghai,

and caught one near that city; Stanley (1916) reported one from Changning, Kiangsi Province; Mell (1922) found it in Kwangtung; and Schmidt (1927) records one from Ningkwo, Anhwei Province, and one from Yunnanfu.

The single female has a decidedly reddish tinge that is lacking in the males. The anal is always entire. The Ch'ungan Hsien specimen was caught in the open country near Ch'ungan City.

Scale Characters and Measurements

A. M. N. H. Nos.	34404	33403	35055	35056	34656
Sex	♀	♂	♂	♂	♂
Dorsal Scales	17-15	17-15	17-15	17-15	17-15
Ventrals	190	183	173	176	179
Caudals	50	55	58	60	59
Upper Labials	8-8	7-8	7-8	7-7	7-8
Lower Labials	8-8	8-9	8-8	7-7	9-9
Preoculars	1-1	2-2	2-2	1-2	1-1
Postoculars	2-2	2-2	2-2	2-2	2-2
Anterior					
Temporals	1-3	1-2	1-2	1-2	2-2
Posterior					
Temporals	2-4	2-2	2-2	2-2	2-2
Dorsal Cross-					
bands	13+4	13+4	10+4	12+4	12+4
Length	512+90	364+83	470+113	481-117	200+40
Tail/Total					
Length	.15	.18	.19	.20	.17

These specimens conform well with those previously described except that Schmidt's Yunnan specimen has the light vertebral stripe mentioned by him. He records its upper labials as 9-9, but I find that they are only 8-8 and appear to be 9-9 because of the badly damaged condition of the head.

This snake seemed to be absent on the Futsing coastal plain as well as in the Kuatun mountains.

Holarchus violaceus (Cantor)

There are three specimens, all from Futsing Hsien (Nos. 33807-809) in the present collection.

Schmidt (1927) reported on two Fukien specimens, one of which came from Yenping, a single individual bought in Anhwei Province, and forty-three from Hainan Island. Boulenger (1894) quotes an Amoy record, Stanley (1914) lists specimens from Fukien, while Stejneger (1925) records a Foochow example.

The three specimens at hand conform well with others. The upper labials are 8-8 in two, and 7-7 in the third, while the lower are 8-8 in one, 7-8 in one, and 7-7 in one. The preoculars are 2-2 in all, the postoculars 2-2 in two, and 2-1 in the third. The anterior temporals are uniformly 1-1, the posterior 2-2 in two, and 2-1 in one. The scale formula is 17-17-15 in the three. In the males there are 156 ventrals while the single female has 160. In the males the caudals are 39, 35, in the female 32. From snout to vent the three specimens measure 459, 419, and 412 mm., the female being the longest. The tail occupies 0.13 of the total in the female and 0.14 in both of the males. The anal is always entire.

This species, common in the south, reaches its northern limit in Fukien.

Holarchus formosanus Günther

Nine specimens, four from Futsing Hsien (Nos. 33810-813), one from Foochow (No. 35199), two from Yenping (Nos. 33410 and 35144), one from Ch'ungan Hsien (No. 33758), and one from Hok'ou (No. 35059), make up the series of this species.

Schmidt (1927) records eight specimens from Hainan as *formosanus hainanensis*. Boulenger (1894) and Mell (1922) have both reported this Formosan snake from Kwangtung while Stejneger (1925) records one from Yenping.

This series agrees well with Formosan snakes. The upper labials are 8-8 in seven, 7-8 in two; the lower, 9-9 in three, 8-9, 8-8, and 7-8 in two each. The preoculars are 2-2 in all, the postoculars, 2-2 in all but one in which they are 1-1. The anterior temporals are 1-1 in seven, and 1-2 in two, the posterior, 2-2 in eight, and 1-2 in one. The anal is always entire. The two largest males measure from snout to vent 525 and 480 mm., the females 467 and 465 mm. The largest specimen, in Schmidt's series of *hainanensis*, is a male. This is also the case in Steindachner's lot of twelve. The male, then, is the larger in this species.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	4	159-162	161
	♀	5	164-168	167
Caudals	♂	4	46-50	48
	♀	4	42-45	44
Tail/Total Length	♂	4	.18-.19	.185
	♀	4	.14-.16	.152

Schmidt (1927) was lead by the high ventral count of Boulenger's Swatow specimen (173) to suggest that it is the Hainan form that inhabits the mainland. A glance at the above table will show that the line between the two forms must fall south of the localities of our specimens. Unfortunately, Mell and Vogt do not give their scale counts. The Fukien specimens closely agree with the Formosan lots. Schmidt gives 164.4 as the average of eight from Formosa. The present series of nine averages 164.2.

This snake is common, though not abundant, on all the plains, plateaus and hilly regions of the country worked. It was not seen in the high Ch'ungan forests.

Holarchus musyi (Roux)

Figure 14

Nine specimens, all from Ch'ungan Hsien (Nos. 33753-757, and 34592-595), represent this species.

The upper labials are uniformly 6-6, the third and fourth entering the eye; the lower, 7-7 in five, 6-6 and 6-7 in two each, with the first 4 on each side in contact with the anterior pair of chin-shields in six, three on one side, and four on the other in the remaining three. The preoculars are 1-1 in eight, 2-2 in one; the postoculars, 2-2 in six, 1-2 in two, and 1-1 in one. The anterior temporals are 2-2 in eight, and 1-2 in one; the posterior, 2-2 in five, 1-1 in three, and 1-2 in one. If the anterior temporals are considered to be 1-1 then the upper labials must be taken as 7-7 instead of 6-6. The scales are in 15 rows throughout, the anal always divided. The three largest males measure, from snout to vent, 508, 497, and 480 mm., respectively, the largest females 452, 405, and 330 mm. In five out of nine there are 7 cross-bands on the body, 1 over the vent, and 2 on the tail. Expressed as a formula the figures for all nine are 7-1-2 in five, 9-1-2 in two, 9-0-2 and 8-1-2 in one each. Along either side of the ventrum is a single row of dark spots between which lies a conspicuous, broken line of bright red.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	5	170-172	171
	♀	4	172-182	177
Caudals	♂	5	36-40	38
	♀	4	27-34	32
Tail/Total Length	♂	5	.15-.16	.154
	♀	4	.11-.13	.120

These snakes were found only in the Ch'ungan Hsien mountains of the Kuatun neighborhood where they were not uncommon.

Roux (1919) described this species from a single Fukien specimen with 172 ventrals and 44 subcaudals. He gives the total length as 450 mm., and that of the tail as 70 or .155 of the total, calling the specimen a female. The high subcaudal count as well as the long tail indicate, however, that he had a male. If he really did sex his specimen correctly

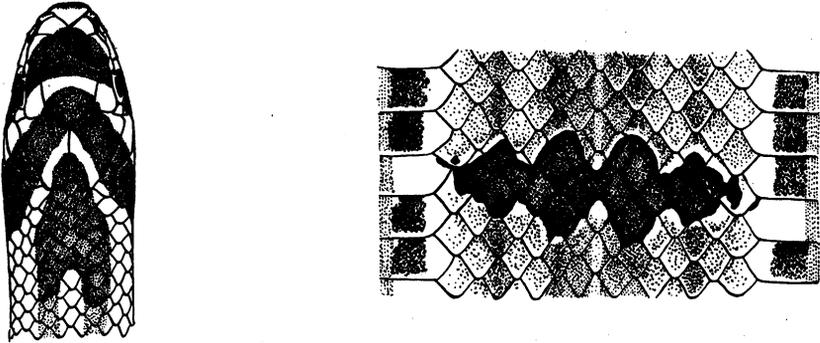


Fig. 14. *Holarchus musyi* (Roux).

Color pattern of head and section of body, A. M. N. H. No. 33756, three times natural size.

it has 10 more subcaudals than any one of my four females, but I am inclined to believe, since the rest of the description, except the omission of the red on the ventrals, fits so well that his was a male with a high subcaudal count.

The Formosan representative of this form was described by Van Denburgh in 1909 as *Oligodon ornatus* with 161 ventrals, 37 subcaudals, and a tail .148 of the total, so it may be considered a male. In 1910 Oshima re-described this snake also from Formosa, as *Holarchus torquatus konishii* with 159 ventrals, 35 subcaudals, and a tail .125 of the total length. His type was probably a female. His second specimen had 172 ventrals, 30 subcaudals, and a tail only .064 of the total. His data are here probably at fault. Steindachner (1914) records nine examples and gives their ventrals as 159–173; subcaudals 32–39, but does not separate the sexes. The gap between the mainland and island form is small and consequently their relationship must be close. Only Oshima mentions the red of the ventral plates.

Holarchus (species?)

No. 29943 is a partly digested snake taken from the stomach of a large *Dinodon flavozonatum* caught in Ch'ungan Hsien.

The scales at midbody and just before the anus are in 15 rows, all but the outer 2 on either side keeled. The anal is entire and there are 51 subcaudals, all divided. The tail ends in a sharp spine. The specimen is a female.

The dorsum is uniform red-brown, broken only by scales marked with black arranged so as to suggest numerous narrow, broken cross-bands. The ground color extends on to the tips of the ventrals, the rest of which are very pale yellow. Over the ventrum there is a sparse sprinkling of dark spots very variable in size and irregular in outline.

The stomach contained a slug.

CALAMARIA

Calamaria septentrionalis Boulenger

Two examples, one from Yenping (No. 33411), and one from the Kuatun region (No. 34635), represent this species. In addition there are nine specimens from Nananfu, Kiangsi Province, presented by Thomas S. Crossley.

Schmidt (1927) records eight Anhwei specimens. Boulenger (1899) lists a Kuatun example; Stanley (1914), "10 specimens from Wuhu, Weichow, and Fokien," and Stejneger (1925), one from Foochow. Werner (1924) gives a new Kiangsi record.

The entire series is quite regular. There are 4 upper and 5 lower labials; 1 pre- and 1 postocular, and 13 rows of scales in the two Fukien snakes. The figures for the ventral and subcaudal counts and the proportionate tail-length in the Yenping female are 176, 9, and 0.037; in the male from the Kuatun region, 162, 16, and 0.065. From snout to vent the Yenping specimen measures 334 mm., the other only 185 mm.

Six of the Nananfu specimens have been studied (Nos. 31770, 31772-773, and 31775-777). With the exception of one in which the mental on one side is irregularly shaped and the lower labials reduced to 3, these six agree with the Fukien specimens. The figures for the ventral and caudal counts, and the proportionate tail-length are as follows: 160, 158, 153; 15, 16, 17; 0.071, 0.063, 0.079, respectively, in the three males; 174, 171, 174; 8, 9, 8; 0.032, 0.035, 0.032, respectively, in the three females. The females measure from snout to vent 350, 307 and 240 mm., the three males 118, 118 and 105 mm., taken in order of size. The females are uniformly the larger.

This snake must be rare about Yenping. It was unknown to the native collectors immediately at Kuatun but seemed to be found not rarely in the lower mountains several miles away. Boulenger's Kuatun

specimen was likely brought from some distance as was the one recorded here as being from the "Kuatun region."

ENHYDRIS

Enhydri plumbea (Boie)

Eighty specimens, fifty-one from Futsing Hsien (Nos. 33891-33931 and 33933-942), three from Foochow (Nos. 35196-198). Twenty-one from Yenping (Nos. 33273-293), three from Kienning (Nos. 35138-140), and two from Ch'ungan Hsien (Nos. 33706-707) represent this species. Kienning is near Yenping.

Schmidt (1927) records one hundred and twelve examples from Hainan, one from Yenping, and one bought in Anhwei. Stanley (1914) lists specimens from Fukien, while Stejneger (1925) records two from Futsing Hsien, six from Foochow, one from Kuliang near Foochow, and one from Yenping.

The remarkable uniformity in this species is shown by Schmidt's series as well as the present one. His males averaged 129, his females 128 ventrals, as do those selected from the present series.

Eleven specimens (Nos. 33273, 33282, 33285, 33288, 33706-707, 33892, 33904, 33906, 33921, and 35140) have been counted and measured. The upper labials are 8-8 in ten, and 7-8 in one; the lower, 10-10 in nine, and 10-11 in one. The preoculars are always 1-1, the postoculars, 2-2. The anterior temporals are 1-1, the posterior 2-2, in all. The scale formula is invariably 19-19-17. The three largest males of the entire series measure from snout to vent 358, 324, and 310 mm., the three largest females 378, 361 and 340 mm.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	7	127-130	129
	♀	4	127-128	128
Caudals	♂	7	37-41	38
	♀	3	31-34	33
Tail/Total Length	♂	7	.13-.14	.136
	♀	3	.11-.13	.117

Eight females contained from 2 to 9 eggs, the average being 5.9. Schmidt records a range of from 4 to 11 for the Hainan series. The gravid females were, with a possible exception, collected at Yenping in May.

While collecting these snakes I was able to detect no difference in

either habits or habitat. Both may be found at night in the flooded fields and irrigation ditches throughout the region worked, with the exception of the Kuatun mountain district, and both are abundant. Examination of the stomachs has shown that *plumbea* lives on an amphibian, *chinensis*, a fish diet. Seven stomachs of the present series of *plumbea* contained frog remains and the rest were empty or nearly so, while fishes were found in the four *chinensis* stomachs that held identifiable remains. Schmidt found nothing but fish remains in *chinensis*, and frog remains in *plumbea* stomachs. These two snakes are enabled to inhabit the same fields through an avoidance of competition in feeding, one preying on fish, the other on frogs.

As Schmidt suggests, the Kuatun range effectually cuts *plumbea* off from the Kiangsi plateau. It was much rarer than *chinensis* even on the Ch'ungan side of these mountains. The Ch'ungan Hsien specimens were taken near Ch'ungan City.

***Enhydryis chinensis* (Gray)**

Seventy-five specimens, thirty-six from Futsing Hsien (Nos. 33855-890), three from Foochow (Nos. 35193-195), twenty from Yenping (Nos. 33253-272), fourteen from Ch'ungan Hsien (Nos. 33694-705 and 34487-488), and two from Hok'ou (Nos. 35085-086), represent this species.

Schmidt (1927) reported on forty-six from Hainan, and two from Fukien. Stanley (1914) listed "numerous examples from Fukien" and in 1916 recorded it from Changning, Kiangsi Province. Stejneger (1925) has one example from Futsing Hsien and one from Foochow.

There is little variation within this series and it agrees well with the Hainan lot, except for a slightly higher number of ventrals and caudals. Fifteen specimens have been selected for study, Nos. 33254, 33259, 33260, 33269, 33697-689, 33704-705, 33857, 33860, 33870, 33885, and 34085-086. All of these have 7 upper labials on both sides, while the lower are 10-10 in eight, 9-10 in three, and 9-9, 10-11, and 11-11 in one each. The preoculars are always 1-1, and the postoculars 2-2; the anterior temporals always 1-1, the posterior, 2-2. The scale formula is 23-23-21 in six, 23-23-19 in five, and 23-25-19, 25-23-21 and 25-23-19 in one each. Among the entire series of seventy-five the three largest females measure from snout to vent 500, 480 and 480 mm., respectively, the largest males 390, 384 and 380. Thus, we see that the females are decidedly the larger.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	7	146-151	149
	♀	8	141-146	143
Caudals	♂	6	46-50	48
	♀	8	37-42	40
Tail/Total Length	♂	6	.15-.16	.157
	♀	8	.13-.14	.132

One stomach contained the remains of a small carp, one of a goldfish (*Carassius*) or a carp (*Cyprinus*), one of a small fish (*Macropodus viridauratus*), and another an entire specimen of *Erythroculter aokii*. For a discussion of the feeding habits of *chinensis* and *plumbea* see *plumbea*.

Ten gravid females from Yenping held from 3 to 7 eggs but averaged only 4.7 apiece, while five from Ch'ungan Hsien averaged 8.6 and held from 5 to 13. Two Futsing Hsien specimens held respectively 4 and 5 well-developed embryos, 2 of which measured from snout to tip of tail 155 and 165 mm. It is hard to explain why the snakes from the higher altitude produce the greater number of young. The gravid females from Yenping were taken, with a possible exception, in May, those from Ch'ungan Hsien, in June. Since none of these contained well-advanced embryos we can get a good idea of the breeding time. The two Futsing females with the advanced embryos were collected the last week in August or later. It should be noted that only two among thirty-six were gravid, the rest probably being spent.

No. 34488 was brought in by a Kuantun man who said that it was taken there, but this is doubtful for it was probably brought up from the plateau some miles distant. If it does occur in these highest mountains certainly it is exceedingly rare there. All the other Ch'ungan Hsien specimens came from the plateau near Ch'ungan City.

BOIGA***Boiga sinensis* Schmidt**

Four specimens, one from Futsing Hsien (No. 34100), two from Ch'ungan Hsien (Nos. 34518-19), and one from Ch'ien-shan Hsien, Kiangsi Province (No. 34521), represent this species described by Schmidt in 1927 from a Fukien specimen. Ch'ien-shan Hsien is just across the provincial line from Ch'ungan Hsien.

The third, fourth, and fifth labials enter the eye in all, and in addition, the sixth does so on one side in No. 34518. The first 4 pairs of lower labials are in contact with the anterior chin-shields in three specimens, the first 5 in the remaining one.

Characters and Measurements

A. M. N. H. Nos.	34100	34518	34519	34521
Sex	♂	♂	♀	♀
Dorsal Scales	25-21-15	25-21-15	25-21-17	25-21-17
Ventrals	235	237	234	230
Caudals	136	127	130	136
Upper Labials	9-9	9-10	9-?	9-10
Lower Labials	12-12	12-12	12-?	13-13
Preoculars	2-2	2-2	2-2	2-2
Postoculars	2-2	1-2	2-2	1-2
Length of Body	740	595	1000	748
Length of Tail	268	179	330	263
Tail/Total Length	.26	.23	.25	.26

One of these snakes disgorged a bird. No. 34519 was taken from the stomach of a half-grown *Elaphe carinata*. *B. sinensis* is very docile, only one of two specimens handled attempted to bite and that one did not strike. They are not readily secured but evidently frequent all the wooded hills and mountains of the region worked.

The present series bridges the gap between the ventral count of mainland *sinensis* and Formosan *kræpelini* with its range of 236-250 compared to that of 230-237 in *sinensis*. However, the average in ten Formosan examples, 240, is much higher than 233, the average of the five mainland specimens. The gap between the subcaudal counts stands unbridged though somewhat reduced: *sinensis* 127-136, *kræpelini* 140-154. Larger series may bridge this subcaudal gap and make it necessary to give *sinensis* subspecific rank.

***Boiga multimaculata* (Boie)**

One specimen, a male, from Futsing Hsien (No. 34103) represents the species. Schmidt's (1927) report includes twenty-three specimens from Hainan.

Stanley (1916) records *multimaculata* from Changning, Kiangsi Province. I found it abundant on Hainan (Schmidt, 1927) and, in addition to Schmidt, Barbour (1909), Stanley (1917), and Smith (1923) have all reported it from there. Mell (1922) found it in Kwangtung. It is not surprising that it is rather rare as far north as Futsing.

The counts and measurements are quite regular. There are 8 upper, and 11 lower labials; 1 pre- and 2 postoculars. The anterior temporals are 2-2, the posterior 3-3. The scale formula is 19-19-15. Two rows drop out just posterior to the middle of the body, however. There are 197 ventrals and 84 subcaudals, while the tail occupies 0.20 of the total

length. The vertebral row of scales is enlarged. From snout to vent the specimens measures 398 mm.

When annoyed this specimen coiled symmetrically and struck with clock-like regularity just as the Hainan specimens had done.

AMBLYCEPHALUS

Amblycephalus boulengeri Angel

Figure 15

One specimen, No. 23505, was collected at Luanshikao, near Wansien, eastern Szechwan Province, by Walter Granger in September, 1921. It was taken at an altitude of 3000 feet. In his 1927 report, Schmidt recorded this as *chinensis*. I have, with the new Fukien series at hand, gone over the description of all the Chinese species and am convinced that he was mistaken. In *chinensis* the loreal does not reach the eye as in *boulengeri* and the upper labials are 8-8 only in the one Chinese species. There are further differences between *chinensis* and *boulengeri*.

The lower labials in No. 23505 are 9-10 with 4 in contact with the anterior chin-shields on one side and 5 on the other. This character alone

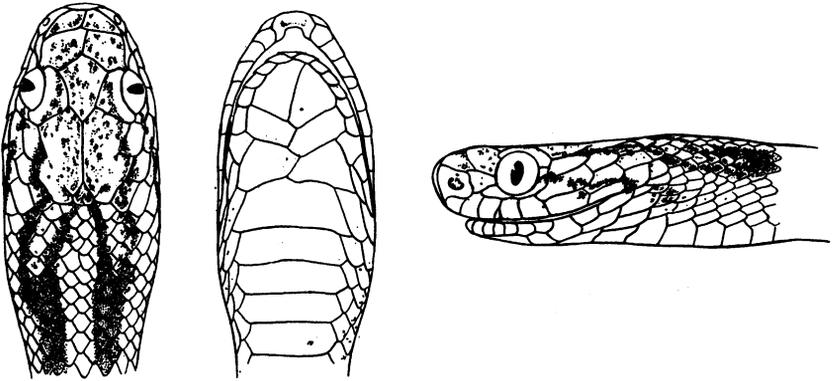


Fig. 15. *Amblycephalus boulengeri* Angel.

Dorsal, ventral, and lateral views of head, A. M. N. H. No. 23505, four times natural size.

might serve to distinguish it from all other Chinese forms but unfortunately in the description of the type of *boulengeri* the lower labial count is not given. Moreover, the first 6 on either side are imbricate, a condition not found in the other species.

No. 23505 is a female with 177 ventrals, 63 subcaudals, and 15 rows of smooth scales. The distinct subocular and supraocular unite behind the eye above the center. The loreal narrowly enters the eye and the upper labials are 8-8.

Amblycephalus kuangtungensis Vogt

Figure 16

Five specimens, all from Ch'ungan Hsien (Nos. 33748, 34600, 34603, 34605, and 34608), and a lot of embryonic material (No. 34609), represent this species.

Characters and Measurements

A. M. N. H. Nos.	33748	34600	34603	34605	34608
Sex	♂	♂	♀	♀	♀
Dorsal Scales	15	15	15	15	15
Ventrals	185	182	183	186	188
Subcaudals	83	88	72	76	77
Upper Labials	7-7	7-7	7-7	7-7	7-7
Lower Labials	8-9	8-8	7-8	8-8	7-8
Labials Enter					
Orbit	Yes	No	Yes-No	Yes	No
Loreal to Eye	No	No	No	No	No
Anterior					
Temporals	2-2	2-2	2-2	2-2	1-2
Posterior					
Temporals	3-3	3-3	3-3	3-3	3-3
Total Length	342	580	568	492	640
Tail/Total					
Length	.23	.25	.22	.22	.23

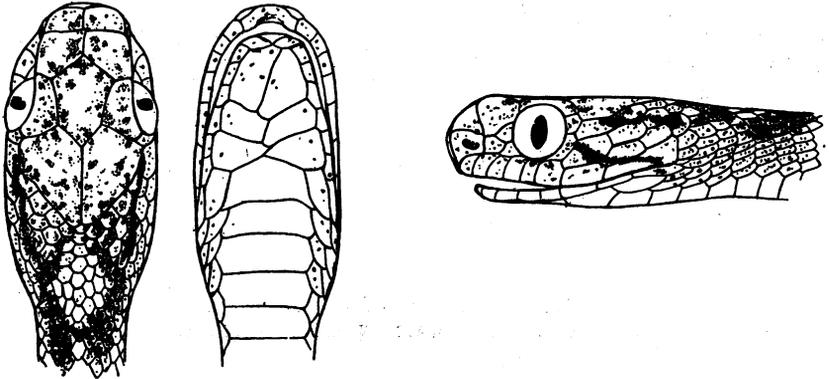


Fig. 16. *Amblycephalus kuangtungensis* Vogt.

Dorsal, ventral, and lateral views of head, A. M. N. H. No. 34600, four times natural size.

The anal is always entire and the chin-shields in three pairs. The scales are smooth and the vertebral row is slightly enlarged in two, not enlarged in three specimens. The entire top of the head is profusely speckled with black in varying degrees of intensity but there is never a

sign of the clean-cut conspicuous light margin to this black so constant in *stanleyi*.

The description of *kuangtungensis* fits this series quite well as might be expected from the proximity of Fukien to Kwangtung.

On August 23 four white eggs containing well-developed embryos were brought in (No. 34609). One egg measured 25×15 mm., while one embryo was just 157 mm. long.

The docility of these snakes has been referred to under *stanleyi*. Like that species they were taken in the high Kuatun mountains.

Amblycephalus niger, new species

Figure 17

TYPE.—A. M. N. H. No. 22703; ♀; Yunnanfu, Yunnan Province, China; John Graham.

DIAGNOSIS.—An *Amblycephalus* with a black tail and a large amount of black on the dorsum. The loreal is excluded from the eye, and at midbody 7 rows of scales are keeled.

DESCRIPTION OF TYPE.—Rostral as broad as deep; internasals in contact with loreal and half as large as prefrontals which enter the orbit; frontal without its posterior projection about as broad as deep, much shorter than, but about as wide as parietals which are as long as their distance from tip of snout. Loreal widely

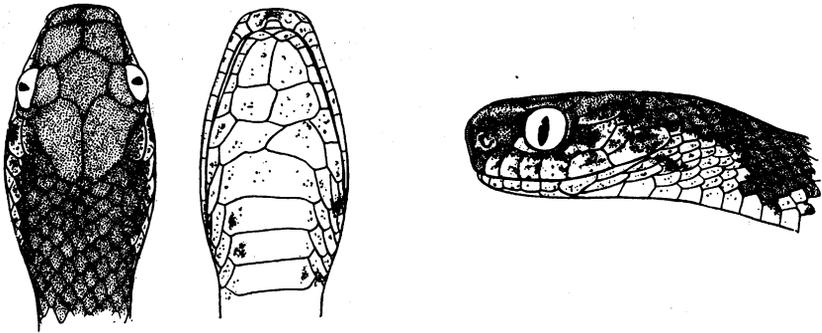


Fig. 17. *Amblycephalus niger*, new species.

Dorsal, ventral, and lateral views of head of type, four times natural size.

separated from eye by a distinct preocular and enlarged end of a subocular; a long, narrow scale separates eye from upper labials; anterior temporals 2, separated from eye by narrow scale below, wider one above; posterior temporals 3-3. Upper labials 7-7; lower, 7-7, first pair narrowly in contact behind mental; first 4 in contact with anterior chin-shields which are longer than broad; second pair slightly broader than long, third much broader than long; diameter of eye equals half interorbital space. Scales in 17 rows, vertebral row not enlarged; ventrals 165; subcaudals 64; anal entire; total length 502 mm., 0.22 occupied by tail.

The solid black of the top of the head extends down about to the loreal and lower anterior temporal where it begins to break into profuse spots which in turn become less profuse until, on the upper labials, they are sparse. On the lower labials and chin-shields the spots are reduced to a little scattered speckling. The neck and back are black but the black is broken on the sides by very irregular, light areas extending upward from the light ventrals, and suggesting the remnants of bands that have all but disappeared. Toward the tail these light areas are much more marked than they are anteriorly. The belly is light except for very irregular, sparse mottling mostly in the form of spots or narrow intrusions of the black of the dorsum. The tail is uniformly black with a little light mottling on the first 10 to 12 subcaudals.

The type is unique and was reported by Schmidt in 1927 as *chinensis*.

A. niger differs markedly in color from all the Chinese species. In addition it is distinguished from all but *yunnanensis* and *stanleyi* by its keeled scales. In *yunnanensis* the loreal reaches the eye and the vertebral row is enlarged, so from this species *niger* is amply distinct. The low caudal count in *stanleyi* separates it not only from *niger* but the rest of the Chinese species as well.

***Amblycephalus stanleyi* Boulenger**

Figure 18

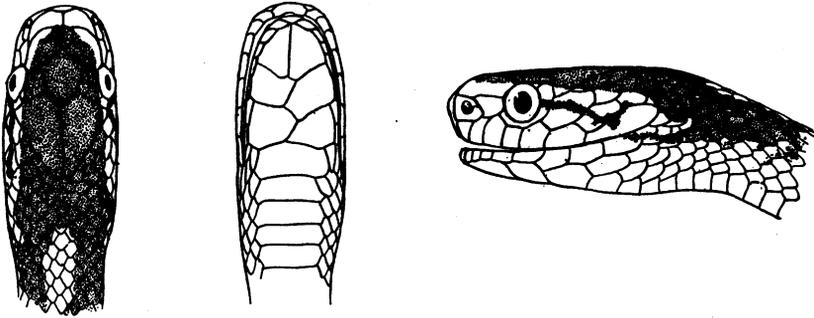
Eight specimens, all from Ch'ungan Hsien (Nos. 34597-599, 34601-602, 34604 and 34606-607), represent this species which was described from Kuatun by Stanley in 1916 as *sinensis*. Nos. 34492, and 34610-11 are sets of embryonic material also from Ch'ungan Hsien.

Characters and Measurements

	MALES			
A. M. N. H. Nos.	34599	34602	34606	34607
Dorsal Scales	15	15	15	15
Ventrals	157	160	151	157
Subcaudals	58	60	59	59
Upper Labials	7-7	7-7	7-7	7-7
Lower Labials	8-8	8-8	9-9	8-8
Labials enter Orbit	No	No	No	No
Loreal to Eye	Yes	Yes	Yes	Yes
Anterior Temporals	1-2	2-2	1-2	2-2
Posterior Temporals	2-2	3-3	2-3	3-3
Total Length	236	296	468	216
Tail/Total Length	.20	.20	.22	.19
	FEMALES			
A. M. N. H. Nos.	34597	34598	34601	34604
Dorsal Scales	15	15	15	15
Ventrals	157	159	157	160
Subcaudals	48	49	53	48
Upper Labials	7-7	7-8	7-7	7-8

FEMALES

Lower Labials	8-8	8-8	9-9	8-8
Labials enter Orbit	No	No	No	No
Loreal to Eye	Yes	Yes	Yes	Yes
Anterior Temporals	1-2	1-1	1-1	1-1
Posterior Temporals	3-3	3-3	3-3	1-2
Total Length	215	189	375	224
Tail/Total Length	.16	.16	.19	.17

Fig. 18. *Amblycephalus stanleyi* Boulenger.

Dorsal, ventral, and lateral views of head, A. M. N. H. No. 34601, four times natural size.

From 5 to 7 rows of scales are feebly keeled and the vertebral row is never enlarged. On one side in No. 34607 a labial almost enters the orbit. The head is longer and narrower, the eye much smaller than in the other species. The top of the head is intense black conspicuously and evenly bordered with the body ground color. This alone serves to distinguish the species. All the specimens show this characteristic head pattern without variation.

An August 20 six white eggs were bought at Kuatun (No. 34610). They evidently belonged to one batch and their greater diameter ranged from 24 to 26 mm., the lesser from 12 to 13.2. On the 25th another lot containing 4 white eggs was secured. These (No. 34611) ranged from 22 to 26.2 mm. in greater, and from 14 to 15.5 mm. in lesser diameter. These eggs were said to have been dug up by men weeding the high Kuatun tea fields. There is little reason to doubt the report. Probably the snakes inhabit the scrubby, bushy, growth of the Kuatun valley. No. 34492, two well-developed but unpigmented embryos from a lot of 12 eggs, is dated August 16 and 19.

The specimens of *stanleyi* and *kuangtungensis* handled by me were docile and could not be persuaded to bite or show any other defensive tactics.

PSAMMODYNASTES

Psammodynastes pulverulentus (Boie)

A series of eighteen specimens, seven from Yenping (Nos. 33234-240), and eleven from Futsing Hsien (Nos. 33796-806), represent this species.

Stejneger (1907), on the strength of its presence in Formosa, predicted its discovery in Fukien. In 1914 Stanley reported it from this Province, and Stejneger has recently (1925) recorded a Yenping specimen. Mell (1922) says that it is common in Kwangtung. Schmidt (1927) studied seven Hainan examples.

The present series presents no problem though the ventral and caudal counts are rather low. Schmidt's Hainan series has a ventral and subcaudal range of 157-171 and 59-70; Steindachner's large Formosan lot, 161-175 and 55-70, while this range in the present series is 150-165 and 46-54.

Ten adults (Nos. 33234-239, 33797, 33799, and 33801-802) have been examined critically. All of these have upper labials 8-8, while the lower are 8-8 in all but one in which they are 7-8. The preoculars are always 1-1, the postoculars are 2-2 in six, 3-3 in two, and 2-3 in two. The anterior temporals are 2-2 in nine, and 2-3 in one; the posterior 2-2 in five, 2-3 in three, and 3-3 in two. The scale formula is regularly 17-15. The largest females of the entire series of 18 measure from snout to vent 421, 388 and 382 mm., the largest males 381, 370 and 349 mm., respectively. The eleven females are much darker than the seven males. Schmidt does not correlate sex with color even though he records six light and one dark, six males and one female, in his series of seven.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	5	150-159	154
	♀	5	153-165	162
Caudals	♂	4	51-54	52
	♀	5	46-51	48
Tail/Total Length	♂	4	.19-.20	.198
	♀	5	.16-.18	.168

Ten well-developed eggs were found in one snake. One of these measured 13×9 mm. Three eggs, one of which measured 13.5×6 mm., were found in another. Three others held 9, 8, and 5 eggs, respectively. All of these, with one possible exception, were females taken at Yenping in May. This gives an indication of the breeding time.

Two of three stomachs contained skink remains while the third held parts of a *Takydromus* species.

It is significant that *pulverulentus* was common in Futsing Hsien and about Yenping but unheard of at Kuatun.

The behavior of this snake is worthy of notice. It often holds the mouth half open when annoyed. I recall finding one lying on the edge of a mountain path. It lay as if dead for some moments while I knelt down to examine it carefully. After I had examined it closely enough to wonder why it was so still it suddenly flung itself off the path and down the hill in a most un-snakelike fashion. My Hainan field notes (Schmidt, 1927) describe interesting behavior and close observation should bring more to light.

CALLIOPHIS

Calliophis macclellandii (Reinhardt)

Three specimens, all from Ch'ungan Hsien (Nos. 33745, 34587 and 34589), represent this species. Boulenger (1899) reported a specimen from this locality (Kuatun). Stanley (1914, 1916) gives more Fukien records, while Schmidt's 1927 Hainan report includes five specimens from that Island.

Scale Characters and Measurements

A. M. N. H. Nos.	33745	34589	34587
Sex	♀	♂	♂
Dorsal Scales	13	13	13
Ventrals	213	201	203
Subcaudals	28	32	33
Upper Labials	7-7	7-7	7-7
Lower Labials	6-6	6-6	6-6
Preoculars	1-1	1-1	1-1
Postoculars	2-2	2-2	2-2
Anterior Temporals	1-1	1-1	1-1
Posterior Temporals	1-1	1-2	1-1
Dorsal Cross-bands	29+4	28+5	31+6
Total Length	595	239	664
Tail/Total Length	.08	.10	.10

No. 33745 is much darker than the others and differs further in having more black on the belly, and a faint, broken line of spots on the mid-dorsal scale-row, each spot occupying the center of a scale. In all three specimens there are small, paired spots midway between the cross-bands, these spots being confined to the neck and posterior part of the body in No. 34587, to a short section of the middle part of the body and the region just before the vent in No. 33745, while in No. 34589 they are found everywhere except on the neck and tail. Three or four of the cross-bands are broken in Nos. 33745 and 34589.

The female contained 4 well-developed eggs. These snakes were found only in the high forests of the Kuatun region. They seem to be

stupefied and only jerk about when annoyed. I could not persuade one to strike or bite.

The ventral and caudal counts show great range of variation in this species as does the coloration. Wall has described forms differing in color alone. Schmidt's Hainan specimens are very different from the present series in color pattern and size and doubtless deserve a subspecific name. Van Denburgh's *swinhoei* from Formosa (1912) is very close to the Fukien form, but for the present and until more material is adequately reported it will have to stand. The great range of pattern in the three Ch'ungan specimens shows that large series are much safer to work with.

HEMIBUNGARUS

Hemibungarus kelloggi,¹ new species

Figure 19

TYPE.—A. M. N. H. No. 33744; ♀; Ch'ungan Hsien, northwest Fukien Province, China; June-July, 1925; Clifford H. Pope.

DIAGNOSIS.—A *Hemibungarus* with 15 rows of scales, no longitudinal lines on the body, and head rather distinct from the neck.

DESCRIPTION OF TYPE.—Maxillary with a pair of large, grooved poison-fangs and two small, solid teeth separated by a space from the fangs. Rostral broader than deep; frontal a little longer than deep, as long as its distance from tip of snout, and much shorter than parietals. Diameter of eye equal to its distance from edge of lip; pupil round. Upper labials 7-7, third and fourth entering eye, sixth largest. Lower labials 6-6, four pairs in contact with anterior chin-shields. Preoculars 1-1; postoculars 2-2; anterior temporals 1-2; posterior temporals 2-2. Scales in 15 rows throughout. Ventrals 203; subcaudals 28, divided. Anal divided. The total length is 774 mm., 0.09 of which is occupied by tail.

The dorsum is purplish brown with three sets of markings. The most conspicuous of these is made up of twenty-two light-edged, black cross-bands, each a scale length in width distributed down the back and descending to the edge of the ventrals. They may even join the ventral spots. This set is continued on the tail where there are three additional bands. The second set of markings is composed of a series of paired, light-edged, black spots, each about the size of a scale, located on either side of the central scale row midway between the cross-bands. On the tail these spots are a little irregular. The third set of markings is a broken series of small, black spots each occupying the center of a mid-dorsal scale. These spots are absent on the neck, tail, and the scales adjacent to the cross-bands.

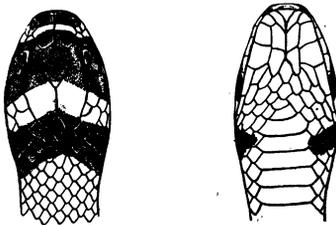


Fig. 19. *Hemibungarus kelloggi*, new species.

Dorsal and ventral views of head of type, twice natural size.

¹Named after Mr. Claude R. Kellogg, of the Fukien Christian University, who is devoting his life to the teaching of Biology in China.

The ventrum is milky white with forty-nine black blotches of varying size and outline disposed along its center. Five of the blotches fall behind the anus.

The head is black crossed by two white bands; a narrow one beginning on the second and third upper labials and crossing over the snout at the juncture of the prefrontals with the internasals; a much broader one with the form of a shallow V having its anterior edges on the posterior upper labials and its apex at the posterior tip of the frontal.

NOTES ON PARATYPES.—There are three paratypes: No. 34588 collected at the type locality, April-September, 1926; No. 33490, secured near Yenping, April-August, 1925; and No. 34104, collected in Futsing Hsien, August-October, 1925.¹

Characters of Paratypes

A. M. N. H. Nos.	33490	34104	34588
Sex	♀	♀	♂
Dorsal Scales	15-15-15	15-15-15	15-15-15
Ventrals	202	196	191
Caudals	33	34	38
Upper Labials	7-7	7-7	7-7
Lower Labials	6-6	6-6	6-6
Preoculars	1-1	1-1	1-1
Postoculars	2-2	2-2	2-2
Anterior Temporals	1-1	1-1	1-1
Posterior Temporals	2-2	2-2	2-2
Dorsal Bands	20+4	21+4	21+4
Total Length	542	201	193
Tail/Total Length	.11	.10	.12

All of the paratypes lack the small spots on the mid-dorsal scale-row and in No. 34104 the paired spots set midway between the cross-bands are absent on the tail. In none of the paratypes do the cross-bands ever join the ventral spots and in No. 33490 they descend only to the first row of scales. They reach the ventrals in No. 34104 but just fail to do so in No. 34588. This small series exhibits great variability in details of color pattern. The resemblance of this species to *C. macclellandii* is remarkable though the greater number of scale-rows in *kelloggi* distinguishes it at once. Also the larger of the two white head bands is V-shaped in *kelloggi* and does not completely cover the parietals nor reach the anterior temporals, while in *macclellandii* it is broader with parallel edges, about as wide as the parietals are long, and always reaches the postoculars.

The type contained 14 well-developed eggs, while six more were found in No. 33490. These snakes were seen only in the high, forested mountains of the Kuatun neighborhood where they were anything but common. They are reputed by the mountaineers to be nocturnal and certainly

¹In the original description (Amer. Mus. Novitates, No. 320, 1928) all the paratypes were incorrectly recorded from Ch'ung'an Hsien.

their stupid behavior substantiates this reputation. In captivity they seem dazed and will only jerk about spasmodically when annoyed. I could not get them to assume any defensive posture or show any other signs of liveliness. At night the brightly marked head exhibits a strange appearance as it is moved about by the snake and tempts one to postulate on its use as an attracting device for prey. The coloration of the dorsum renders the body relatively inconspicuous. It would be interesting to know what this snake eats.

BUNGARUS

Bungarus multicinctus Blyth

Twelve specimens, seven from Futsing Hsien (Nos. 33789-95), three from Foochow (Nos. 35190-92), and two from Yenping (Nos. 33230-31), represent this species.

This snake is common on Formosa (Stejneger, 1907; Steindachner, 1914), in Kwangtung (Mell, 1922), and on Hainan where I secured seven specimens (Schmidt, 1927). Boulenger (1899) recorded it from Kuatun; Stejneger (1925) from Kuliang, near Foochow, and Foochow; Schmidt (1927) from Shaowu, which is not far from Kuatun, and Stanley (1914, 1916) from both Chekiang and Fukien Provinces.

The upper labials are 7-7 in eleven, 6-6 in No. 33790; the lower, 7-7 in all twelve; the preoculars 1-1 in twelve; postoculars 2-2 in twelve; anterior temporals 1-1 in ten, 1-2 in one, and undetermined in one; posterior, 2-2 in eleven, undetermined in one. The scales are uniformly in 15 rows.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	5	206-211	208
	♀	7	200-211	207
Caudals	♂	5	45-51	47
	♀	7	41-48	44
Tail/Total Length	♂	4	.12-.12	.12
	♀	7	.11-.13	.12
Body Bands	♂	5	43-45	44
	♀	7	35-44	40
Tail Bands	♂	5	11-16	14
	♀	7	9-12	11

Boulenger's Kuatun specimen was probably caught in some neighboring valley and brought into the high mountains by a traveler.

Bungarus wanghaotingi,¹ new species

TYPE.—A. M. N. H. No. 35230; ♀; Yuan Kiang, southwestern Yunnan Province, China; November, 1926; Walter Granger.

DIAGNOSIS.—Allied to *candidus* from which it differs chiefly in having a higher ventral count. The dorsal bands are much more numerous than in *multicinctus*.

DESCRIPTION OF TYPE.—Rostral much broader than high, touching six scales, its suture with first upper labial about one-fifth as long as that with nasal; internasals two-thirds as long as prefrontals, which in turn are three-fourths as long as frontal; frontal slightly shorter than its distance from tip of snout, just as wide as parietals, which are as long as their distance from rostral; a single scale between nasal and eye; 7 upper labials, third and fourth entering orbit; 2 postoculars, upper twice as large as lower; one temporal; 7 lower labials, first four in contact with anterior chin-shields, fourth much the largest; posterior pair of chin-shields shorter than anterior. Scales in 15 rows throughout; ventrals 228; subcaudals 53; total length 484 mm., 0.13 occupied by tail; anal and subcaudals entire.

The black ground color is crossed by 23 white bands on the body, 11 on the tail. These white bands cover 3 mid-dorsal scales on the neck where they are sixteen scale-lengths apart, while posteriorly they are only half as wide, and four scale-lengths apart. All of them expand before joining the uniform white of the belly, and near the center of each, at its junction with the belly, there is a small, dark spot. Many of the white bands have a few black-centered scales. The black of the ground color barely encroaches on the tip of the ventrals. Above the upper labials the top and sides of the head are black. On either side of the neck, just back of the parietals, the scales are dimly white-tipped.

The single paratype (No. 35229), also a female, comes from the type locality, and closely agrees with the type in coloration, the dorsal bands being 22+10. The ventrals are 225, the subcaudals 47, and the tail occupies 0.11 of the total length, 428 mm. The head is imperfect, so some of the characters cannot be made out.

Wall (1924) gives the ventral range of *candidus* as 195–218, and presumably he has examined scores of specimens, so the average would hardly exceed 210, while the average of the present species would be as high as 225 in all probability. The subcaudal range in *candidus* is 37–50, so again there is a marked difference though in this character not so great a one. The number of cross-bands on the body are the same in the two species, but the number on the tail in both examples of the new species exceeds the upper limit for *candidus*. The species are, however, closely related.

The range in number of body cross-bands for *multicinctus* from southeastern China is 35–50 among twenty-three specimens from Hainan, Formosa, and Fukien, while in no one of the twenty-three are there more than 216 ventrals. Wall gives the range in ventrals for this species as 194–221, but the foregoing figures definitely show that the southeastern Chinese specimens are widely separated from the new Yunnan form in ventral count as well as number of cross-bands.

NAJA**Naja hannah** (Cantor)

A single specimen of the king cobra (No. 29944) was secured by Mr.

¹Named for Mr. Wang Hao-t'ing of Peking, who for two years faithfully painted reptiles and amphibians from life for the Third Asiatic Expedition.

Claude R. Kellogg near Foochow and presented to the American Museum. I know of no previous record of its occurrence so far north in eastern China. It is presumably rare in Fukien, for I was unable to secure one myself nor did I hear tales of its presence. Schmidt (1927) mentions a skin that I saw in Hainan which may be taken as evidence of its occurrence there; Mell (1922) reports it from Kwangtung where it seems to be abundant enough.

The specimen at hand has on either side 7 upper labials and 8 lower, 4 of the lower in contact with the anterior chin-shields; 1 pre- and 3 postoculars; 2 anterior and 2 posterior temporals; 15 scale-rows before the anus and at midbody, 19 across the neck; 243 ventrals and 90 subcaudals, all but 9 of which are in 2 rows. It, then, agrees well with recorded series. The badly stretched skin is 2100 mm. long to the tail which measures 460 mm. The forward and middle parts of the body are dark brown crossed by wavy black bands a little more than a scale-length in width and three to four scales apart. Posteriorly this banded pattern gradually merges into that found on the tail which has 15 white crossbands on a dark ground-color. Each band is as wide as the length of a scale. Ventrally the body is dark, the tail black.

***Naja naja atra* (Cantor)**

Fourteen cobras were secured, nine from Futsing Hsien (Nos. 33780-88), two from Yenping (Nos. 33232-33), one from Ch'ungan Hsien (No. 33616), and two from Hok'cu (Nos. 35051-52).

Schmidt's 1927 report included one from Yenping, one from Futsing Hsien, and thirteen from Hainan. Stanley (1914) has reported numerous specimens from Kuatun and Ningteh in Fukien.

The counts and measurements of the present series fall within reported limits. The upper labials are 7-7 in all fourteen; the lower 10-10 in five, 9-9 in four, 9-10 in two, and 8-9, 8-8, and 10-11 in one each. The preoculars are uniformly 1-1; the postoculars, 3-3 in five, 2-3 in four, 1-2 in three, and 2-2 in two. The anterior temporals are 2-2 in ten, 1-1 in three, and 1-? in a damaged specimen; the posterior, 3-3, 3-4 and 2-3 in three each, 4-4 and 2-2 in two each. They cannot be made out in the remaining one. The scale formula is 25-21-15 in eleven, 23-21-15 in one. The three largest females among eight measure from snout to vent 1135, 1045 and 925 mm., the two largest males among four, 960 and 950 mm., respectively.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	4	164-170	168
	♀	10	167-178	173
Caudals	♂	2	50-50	
	♀	6	43-45	44
Tail/Total Length	♂	2	.145-.150	.147
	♀	4	.13-.14	.138

In color pattern there is great variation. The ventrum is always creamy white to a point just posterior to the spot on the "hood." This white is followed by a dark band covering some four scales and behind this comes a second light area varying greatly in extent. This last light area may even extend to the vent and beyond or it may be only a few scales wide followed by a uniformly dark section extending even to the end of the tail. Combinations of these extreme patterns are frequent and take the form of dark and light banded bellies in which the dark predominates posteriorly, or bellies light in the center and dark along the sides. Among fourteen specimens there are two with light bellies, two more with the bellies light down the center, while more than half the ventrum is uniformly dark. The dorsal cross-bands, usually light, may be narrow and single, narrow and paired, wider and black-edged, or even dark, bordered with light. They are often absent anteriorly and rarely almost absent posteriorly. My series are not large enough to show locality and altitude differences.

This cobra is certainly common about Yenping and in Futsing Hsien. It is interesting to find two loaches (*Misgurnus anguillicaudatus*) and an eel (*Fluta alba*) in the stomach of a Hok'ou specimen. This shows an adaptation to food because of its prevalence and accessibility for Hok'ou is in the rice-culture region where loaches and eels abound in flooded and barely flooded fields. In the latter the cobra probably finds the capture of common field-fish very easy. A Futsing specimen contained two rodents, probably house-rats. Nine well-developed eggs were found in the Hok'ou female. One of the larger is 60 mm. long. This snake was killed between June 28 and July 12, so we have an indication of the date of its breeding. It is significant that none of the three adults from Futsing bears eggs. All were taken after the 25th of August.

HYDROPHIS**Hydrophis cyanocinctus** Daudin

Three specimens from the region of Foochow (Nos. 35201-203) represent this species.

Malcolm Smith (1926) gives Shanghai and Foochow records and says that these snakes are abundant in the Straits of Hainan, while Stejneger (1907) reports them common about Formosa.

The characters are as follows:

A. M. N. H. Nos.	35201	35202	25203
Sex	♂	?	♂
Dorsal Scales	27-37-32	27-37-29	27-41-35
Ventrals	337	?	326
Upper Labials	8-8	7-7	?
Lower Labials	9-9	8-9	?
Preoculars	1-1	1-0	1-1
Postoculars	2-2	1-1	2-2
Temporals	2-2	2-2	2-2

The first figure in the scale formula gives the number of rows at a point one head-length behind the head; the second, the maximum number on the body, while the third refers to the number at a point one head-length before the anus. The nasals are in contact in all three specimens.

The annuli are distinct on the back and belly but narrow and faint on the lower sides in Nos. 35201 and 35202. In No. 35203 they are distinct on the back but only slightly narrowed on the lower sides, while along the belly they tend to run together to form an indistinct, ventral stripe.

Crotalidæ

AGKISTRODON

Agkistrodon acutus (Günther)

Plate XVIII, Figure 1

Thirty-six specimens, all from Ch'ungan Hsien (Nos. 33606-615 and 34244-269) represent this species described in 1888 from the "Mountains north of Kiukiang" by Günther (see Plate XVIII, fig. 1).

Boulenger (1899) lists two examples from Kuatun; Schmidt (1927) records one from Hunan.

Sixteen specimens (Nos. 33607-610, 33613, 33615, 34247, 34252, 34259-260, 34262, and 34265-269) have been examined and found to agree with those formerly described. The upper labials are 7-7 in all but two in which they are 6-7; the lower, 11-11 in fourteen, and 10-11 in two. The scale formula is 23-21-17 in thirteen, and 23-23-19 in three. Two rows usually drop out on the neck so a slight shifting of position in counting will give the formula 21-21-17 in most specimens. The anal is entire in all. Nearly all of the subcaudals are divided, the number of entire ones ranging from 5 to 16 and averaging 7.4.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGE
Ventrals	♂	8	157-165	160
	♀	8	165-171	168
Caudals	♂	8	53-60	57
	♀	8	52-55	53
Tail/Total Length	♂	6	.14-.15	.145
	♀	5	.12-.14	.130

Nearly all of the adult specimens were skinned. A large male in the flesh measured from snout to vent 1120 mm., a large female 1100. The measurements of the skins are inaccurate but indicate that the females attain a greater size. The largest skin, that of a female, measures from snout to vent 1450 mm.

Although the pattern remains generally the same, the complete change in intensity and comparative value of the varied shades of brown, gray, and black cause the adult to look very different from the young. The adults are darker but this darkening takes place to a greater degree in definite areas. The top of the head is light gray in the young, so the dark streak posterior to the eye is brought out in strong outline. Its lower edge, moreover, has a narrow light border. In the largest examples the top and upper side of the head is uniformly very dark, the streak from the eye having lost its light border and united with the darkened top of the head. The lateral triangles in the young are also narrowly light-bordered, but this border is lost in the general darkening brought on by age. Thus, the lighter young are more vividly marked than the darker adults.

One female contained 26 well-developed eggs. The remains of a bird were found in the stomach of one specimen, and a large mountain rat was disgorged by another. A half-grown *acutus* was found in the belly of an *E. carinata*.

I caught no less than five of these snakes myself. Three of the five were taken on a wild, boulder-strewn, forested mountain side. Another was captured in a deep, forested, rocky ravine. Three of the five, then, were discovered among boulders while only one was not found in such a locality. *A. acutus* is sluggish, reluctant to either fight or retreat, but it will do either with vigor when aroused. I have seen it handled by the Chinese though the few I caught did not hesitate to bite viciously when pinned. About San Chiang it is abundant in the valleys and on the hill-sides where cliffs and boulders abound. Its habits and juvenile pattern strongly suggest the copperhead of the United States, while the

ontogenetic color change brings the New World water moccasin to mind. These three snakes belong to the same genus.

Stories of its attacking man are of course false (Wall, 1903 quoting Heude), and I failed to detect any noise produced by its tail (Günther, 1888). The well-developed snout of course projects upward and forward, not straight forward as figured by Günther in the original description.

TRIMERESURUS

Trimeresurus monticola Günther

Plate XVIII, Figure 2

Fourteen specimens (Nos. 34270–276, and 34288–294), and two lots of embryonic material (Nos. 34295, and 34612), all from Ch'ungan Hsien, represent this species.

Stanley (1914) records *monticola* from Chekiang and Fukien Provinces.

Schmidt (1927) described *orientalis* from Shaowu, a locality also in northwest Fukien. I have examined his type and find that it and the Ch'ungan specimens are identical. *T. orientalis* is "distinguished from its very near relative, the Himalayan *T. monticola*, by having ten upper labials instead of eight or nine," according to the description. In the present series the upper labials are 9–9, and 9–10 in five examples each, 10–10 in two, 10–11 and 9–11 in one each. Werner (1926) records Kwangtung and Yunnan material that links *monticola* with *orientalis*, and, in his opinion, makes them inseparable. He had two specimens with but 8 upper labials. In the light of the most recent data, *orientalis* cannot well stand. However, the great uniformity of the Fukien specimens in scale counts and coloration indicates that a Chinese subspecies, for which Schmidt's name *orientalis* is available, may ultimately be recognizable. Unfortunately, I have no Himalayan specimens for comparison. It is also possible that the Kiating specimens recorded by Boulenger represent a third subspecies.

The characters for the present series, half of which are newly hatched specimens from one batch of eggs, follow:

The upper labials are 10–10 in six, 11–11 in four, 11–12 in two, 10–11 and 12–12 in one each; the postoculars are 2–2 in eleven, 2–3 in two and 3–3 in one; the suboculars are 2–2 in twelve, 3–3 and 1–1 in one each. There are 7 scales between the supraoculars in six, 8 in six, and 6 in two specimens. The scales are uniformly in 19 rows just before the anus; 23 at midbody in all but two with 25, and from 23 to 28 on the neck with 25 in seven, 26 in three, 27 in two, 28 and 23 in one each. It is doubtful if all the variation on the neck is actual, for much of it is probably due to a

slight difference in the point of count. The only adult specimens, six females, are remarkably uniform in size, measuring from snout to vent 535, 530, 525, 520, and 503 mm., respectively. Their coloration exhibits very little variation. The following table shows that the same is true of their ventral and caudal counts:

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrols	♂	3	137-138	137.3
	♀	11	137-144	140.9
Caudals	♂	3	41-43	41.6
	♀	11	36-38	36.8
Tail/Total Length	♂	2	.163-.166	.164
	♀	10	.12-.14	.135

In order to show the range of variation within one family I shall now give separately the date for the seven juveniles hatched from one batch of eggs. These seven specimens are, however, included in the preceding summary. The upper labials are 9-10 in four, 9-9 in three; the lower, 10-10 in six, 11-12 in one; the postoculars 2-2 in five, 2-3 in two; the suboculars 2-2 in all. Before the anus are the usual 19 rows of scales, and at midbody the usual 23 except in one which has 25; on the neck there are 26 in three, 25 in two, 27 and 28 in one each.

Summary of Counts and Measurements

	SEX	NO. OF SPECIMENS	EXTREMES	AVERAGES
Ventrols	♂	3	137-138	137.3
	♀	4	139-142	141.5
Caudals	♂	3	41-43	41.6
	♀	4	36-38	36.9
Tail/Total Length	♂	2	.166-.163	.164
	♀	3	.146	.146

Two of the seven were dissected from the eggs and it is interesting to note that with them, one male and the other female, there is a reversal of proportional tail-length in the sexes, the male having a tail only .143 of the total length, while in the female it is .152. In the juveniles it has decreased to .146 in the female, but increased to .164 in the young males. The adult females show a greater decrease, averaging only .135. Unfortunately, no adult males are at hand. The only half-grown female has a very short tail (.125) so the reversal in proportion may be more apparent than real.

I was told about this viper by the Kuantun Chinese for three months before being able to secure any. This is probably because these snakes

are so secretive that only the nesting females can be found. All of my large examples are females so the whereabouts of the males remains somewhat of a mystery.

The Kuantun people prepare from bamboo a coarse fibre from which paper is made. This necessitates the shredding of great quantities of bamboo, and waste material from this process lies all about in low piles. It was in one of these that a beautiful *monticola* nest was found August 12, at Upper Kuantun. The snake did not desert the nest and on the 16th I photographed it (Plate XVIII, fig. 1). The female remained on guard until the eggs had actually been removed. They were deposited in a roughly rounded cavity some twelve inches below the surface of the very low pile of decaying, fibry waste. The eggs, six in number, were white and adherent in a globular mass. Four were measured and found to range from 26 to 40 mm. in greater diameter, and from 23 to 24 in the lesser. One contained a barely pigmented embryo 128 mm. long.

Again on the 16th, and not far away, I was shown another nest freshly dug up in a grassy, open tea field. The adult guarded the eggs but the nest had been so deranged that its form or depth could not be made out, though obviously it had been within a few inches of the surface. The eggs were white, adherent and slightly longer than those from the first nest, the largest being 42 mm. long. One embryo was faintly pigmented and 140 mm. long.

A batch of five *monticola* eggs that had been roughly handled, was brought in on the 12th of August. They were like those already described.

Several eggs from the above batches were kept but all the young emerged by September 12. One newly hatched specimen measures 183 mm. from snout to end of tail.

These vipers strike from an S-shaped, or single coil. They are sluggish but the females when guarding their eggs strike viciously.

A small shrew was found in the stomach of one adult.

***Trimeresurus mucrosquamatus* (Cantor)**

Fourteen specimens, ten of which are from Yenping (Nos. 33209-218) and four from Futsing Hsien (Nos. 33763-66), represent this species. Schmidt's 1927 report includes one specimen from Yenping, and Stanley (1914) has also reported this species from Fukien.

Long known to be common on Formosa, it may now be considered abundant in parts of Fukien and in northern Kwangtung (Mell, 1922).

The present series conforms well with those previously reported as

the following summary will show. The upper labials are 10-10 in five, 9-10 in three, 9-9 in two, 8-9, 8-10, 10-11, and 11-11 in one each; the lower labials 14-15 in five, 15-15 in four, 14-14 in two, 15-16, 14-16, and 13-14 in one each. The subocular is regularly single; the preoculars are 3-3 in nine, 2-2 in three, 2-3 in one, and 3-4 in one; the postoculars are 2-2 in nine, 2-3 in three, 3-3 in one, and 3-4 in one. The scales between the internasals are 4 in nine, and 3 in five, while eight specimens have 14 scales between the supraoculars, three have 15, two have 16, and one has only 12. There are 3 rows of scales between the subocular and the supra-labials in all but three specimens which have only 2. All have 19 rows of scales just before the vent, while all but five have 25 around the neck. At midbody there are usually 25.

The four largest females measure 970, 858, 797, 728 mm. from snout to vent, while the same measurements for the largest males are 723, 627, 610, and 605 mm., respectively. Sexual dimorphism in size is marked.

Summary of Counts and Measurements

	SEX	No. OF SPECIMENS	EXTREMES	AVERAGES
Ventrals	♂	7	201-218	210
	♀	7	205-214	211
Caudals	♂	7	82-91	89
	♀	4	78-88	82
Tail/Total Length	♂	7	.17-.19	.184
	♀	4	.16-.17	.165

The distribution of this species in Fukien is interesting. It was common in the low mountains near the coast of Futsing Hsien, while in the higher ones about Yenping it was abundant. In the still higher Ch'ungan range we could find no trace of it and yet it has been reported from Horisha, Formosa (Oshima, 1910), which, according to maps, is situated in the central region at considerable altitude, and Barbour (1909) records it from "Bankoro, in the highlands of central Formosa." More material is much needed.

During a noon-hour stay in a mountain village near Yenping two of these snakes were discovered, one lying on top of the wall and just below the roof of a work house, and the other in a crevice of a rock wall nearby. The former was reposing in sight of many laborers, where it appeared to be perfectly at home, and was easily taken. The villagers said that these vipers are frequently found in the rockwork. On two occasions a rat was taken from the belly of one of these snakes, and I recall seeing one disgorge a bird. They are sluggish and reluctant to strike.

Three females contained, respectively 5, 9, and 13 well-developed eggs.

There is remarkable agreement between Formosan and mainland specimens. Oshima (1910) and Steindachner (1914) give counts of ten and seven examples, respectively, which, when taken together, show a ventral and subcaudal range of 202-219 and 64-95. The range in the present series is 201-218 and 78-91. The ventral agreement is remarkable, and the subcaudal not much less so for among the seventeen only two counts fall below 76, and it is probable that one or more low counts are due to incomplete tails.

***Trimeresurus gramineus gramineus* (Shaw)**

Eight specimens represent this species, six from Futsing Hsien (Nos. 33767-768, 33770-772, and 33774), one from Yenping (No. 35145), and one from Ch'ungan City (No. 34286). Schmidt's 1927 report included forty-three from Hainan Island, and one bought in Anhwei Province.

This is the plain and plateau form. In the low mountains along the coast it was found associated with *stejnegeri*, and on the Ch'ungan Hsien plateau it ranges to an altitude of about 1200 feet.

The nine characters which serve to distinguish it from *stejnegeri* have been given in detail under that species and need not be repeated. The following are of no diagnostic value but may be recorded briefly. Five examples have suboculars 1-1, two have them 2-1, while only one has 2 on each side. The preoculars are 2-2 in five, and 3-3 in three specimens, while the postoculars are 2-2 in three, 2-3 in three, 2-1 in one, and 3-3 in one. There are 10 scales between the supraoculars in three, 11 in two, 12 in two, and 13 in one. The scale-rows are invariably 21-21-15. The largest females measure 666 and 614 mm. from snout to vent. The only male of any size is but 409 mm. to the vent. Unfortunately, the series of *gramineus* is too small to enable one to compare it in size with *stejnegeri*. The upper half of each scale of the first row is almost invariably white, while the lower is green or red. The lateroventral stripe thus formed is not only variable in color but in intensity as well. The amount and shade of the red on the tip of the tail varies considerably.

A rat was found in the belly of one from Futsing, while the Ch'ungan City specimen contained 4 well-developed eggs.

***Trimeresurus gramineus stejnegeri* (Schmidt)**

Forty-six specimens represent this species, seven from Futsing Hsien (Nos. 33769, 33773, and 33775-779), eleven from Yenping (Nos. 33219-

229), and twenty-eight from Ch'ungan Hsien (Nos. 33588-605, 34277-285 and 34287). *T. stejnegeri* was described by Schmidt in 1925 from one Anhwei and two Fukien snakes.

If the first student of these pit-vipers had had the present series of fifty-four specimens to work with no confusion could possibly have arisen because two perfectly distinct species are represented, the first a plain and plateau, the second a mountain and forest form.

Most attempts to classify these snakes have been based on such inadequate material that the results have been almost worthless. The first good effort that helped to straighten the matter out was made by Mell (1922) who observed these snakes in Kwangtung and concluded that there was a northern mountain and a southern lowland form. Schmidt (1927) next found that specimens from the lowlands of Hainan agreed with Mell's southern form, but two from the mountains of Fukien, and one of uncertain origin, he named *stejnegeri*, regarding the new form as identical with Mell's northern, mountain form. *T. stejnegeri* is based on four characters as follows: (1) "very small shields between the chin-shields and the first ventral plate, (2) the smaller and more widely separated supranasals, (3) the distinct first labial . . . , (4) and the usual uniform green coloration of the side of the head."

Stejneger (1927) has recently discussed the whole matter in great detail and concluded that two forms occur in southeastern China which he calls *Trimeresurus gramineus gramineus* and *Trimeresurus gramineus stejnegeri*. In separating them he uses Schmidt's first three characters, omits his fourth, and adds the "presence or absence of one or more scales between the nasal and the shield bordering the pit anteriorly." Thus, he has greatly simplified the matter and conclusively reduced the green pit-vipers of southeastern China to two forms, a southern (lowland) and a northern (mountain) form.

The series at hand essentially substantiates Stejneger's conclusion though it is hard to see why two snakes differing in nine characters should be treated trinomially. I find little sign of intergradation and in habits they are distinct as is shown by their choice of habitat. It is not merely a question of altitude, for the *stejnegeri* taken on the Ch'ungan Hsien plateau was living at a much higher altitude than those taken in the low, coastal mountains of Futsing Hsien. As much might be said about the question of latitude, at least until the range of *stejnegeri* is better known. The habitat preference is clearly demonstrated by Mell's as well as the present series.

The two species as represented in the present series differ in nine characters as follows:

(1) INTERNASALS SEPARATE OR IN CONTACT.—The internasals are separated in all of the forty-six *stejnegeri* while they are in contact in seven out of eight *gramineus*. In the eighth they are barely separated.

(2) FIRST UPPER LABIAL DISTINCT OR FUSED WITH NASAL.—Here again the character proves to be good, for labial and nasal are separate in all of the forty-six *stejnegeri* and fused in all of the eight *gramineus*. However, there is a notch in the posterior edge of the scale formed by this fusion in most of the *gramineus*.

(3) GULARS PAIRED OR IRREGULAR.—There is no real exception to the rule of paired gulars in *gramineus* and irregular ones in *stejnegeri* in the present series, even though in four of the latter they approach regularity of arrangement.

(4) PRESENCE OR ABSENCE OF ONE OR MORE SCALES BETWEEN THE NASAL AND THE SHIELD BORDERING THE PIT ANTERIORLY.—There are no signs of such scales in six *gramineus* while the remaining two have a very minute one on one side only. All but three of the forty-six *stejnegeri* have one or more such scales on each side. These scales are 1-1 in twenty, 2-2 in seventeen, 2-1 in five, and 2-3 in one.

(5) COLOR OF THE BELLY.—This, though only a color character, is after all the simplest as well as the surest, for all of the *stejnegeri* have the green belly, while *gramineus* (with one doubtful exception, No. 35145, which will be discussed below) has white abdominal plates. The belly color is always uniform.

(6) COLORATION OF THE SIDE OF THE HEAD.—In *gramineus* the upper half as far down as the lower edge of the eye is green, the lower white. Any sign of a stripe is lacking in all but No. 35145 in which there is an indication of one under the eye. The side of the head is uniform green in *stejnegeri*, but this is often encroached upon by a forward extension of the lateroventral stripe. Usually this stripe reaches the eye in the male but seldom does so in the female. The following table gives the data on this point:

	♂	♀
Stripe to Eye	17	4
Stripe to Angle of Jaw	6	1
Stripe Absent on Head	5	13

(7) LABIAL COUNTS.—This may best be shown by the following table, since there is considerable overlapping and irregularity.

Labial Formula	UPPER		LOWER	
	<i>stejnegeri</i> No. of Specimens	<i>gramineus</i> No. of Specimens	<i>stejnegeri</i> No. of Specimens	<i>gramineus</i> No. of Specimens
9-9	4			
9-10	5			
10-10	4	2		
10-11	3	3		
11-11		2	1	
11-12		1	4	
12-12			4	
12-13			3	3
11-13			2	
13-13			2	1
13-14				1
14-14				3

(8) NUMBER OF VENTRAL AND SUBCAUDAL PLATES.—*T. g. stejnegeri* has an average of 166 ventral plates and a range of 161–170, while the same figures for *gramineus* are 158 and 153–162. Counts were made on sixteen examples of the former and eight of the latter. The subcaudal plates in sixteen *stejnegeri* range from 60 to 71 and average 66 while in *gramineus* they range from 51–66 and average 55. The two male *gramineus* have 62 and 66 plates while the six females have from 51 to 54 only. There seems to be a sexual difference but this point cannot be determined with such a small series.

(9) PROPORTIONATE TAIL-LENGTH.—The difference between the tails of the two sexes of *gramineus* indicated under character eight is substantiated by the measurements given in the following table. The figures in the column represent the number of specimens having a certain proportionate tail-length.

Percentage of Length Occupied by Tail	<i>gramineus</i>		<i>stejnegeri</i>	
	♂	♀	♂	♀
0.13		2		
0.14		2		
0.15		2		
0.16				
0.17				1
0.18	1		1	3
0.19				5
0.20	1		1	

No. 35145 is brown instead of blue (in alcohol) and the belly is not pure white. I account for this through poor preservation for probably my collector purchased it from a farmer who had put it temporarily in native spirits. This is also probably the case with Schmidt's Anhwei specimen, No. 23534, for it was bought at Wuhu (Schmidt, 1927, p. 546).

A few characters which do not help to separate these particular species remain to be recorded. The suboculars are 1–1 in nine out of ten, and 2–1 in the tenth example; the postoculars are 2–3 in four, 2–2 in two, 3–3 in two, 2–4 in one, and 3–4 in one, while the preoculars are 3–3 in seven, 2–2 in two, and 2–3 in one. There are 12 scales between the supraoculars in eleven, 11 in three, and 13 in two. The scale-rows are 21–21–15 in eleven, and 23–21–15 in five. From snout to vent the four largest females measure 731, 725, 625 and 575 mm., while the four largest males measure 682, 670, 653, and 611, respectively. The upper half of each scale of the first row is almost invariably white, while the lower is usually green or red, the former color predominating in the females and the latter in the males. The lateroventral stripe thus formed is not only variable in color but in intensity as well. The amount and shade of the red on the tip of the tail varies considerably.

These snakes may be found in abundance at night in the cascading streams of the high mountains about Kuatun. On three occasions I

found them prowling among the boulders lying in stream beds. One night two were seen. This is especially significant because in all my hunting in China I never found one anywhere else. A reliable collector reported killing four one night. They probably go to the streams in search of frogs. One of those I found had just eaten a species of *Rana*, and another speedily swallowed a small *Megalophrys* that I gave it. The stomachs of four of the preserved series contain frog, 1 rat, and 1 shrew remains.

When surprised at night this snake not only strikes viciously but often violently thrashes the entire posterior end of its body about in a most surprising fashion. A Chinese used to bring these snakes to me, carrying them in his bare hands. I watched him more than once and can only conclude that, like certain other snakes, these vipers do not always bite objects actually attached to them but rather strike anything waved in front of them. This same man insisted that these snakes would remain hanging from a peg "overnight." We experimented and found that they will remain thus suspended for minutes at a time apparently reluctant to drop to the ground. This is an indication of arboreal habits.

One female contained 4 well-developed eggs.

The additional characters cited in the present series, together with the fact that both forms occur in Futsing without indication of intergradation, lead one to suppose that the two are distinct species rather than subspecies, as Stejneger has suggested. The subspecific status may be maintained until the related forms can be more fully examined.

BIBLIOGRAPHY

- ANGEL, M. F. 1920. 'Liste de Reptiles récemment déterminés et entrés dans les Collections et Description d'une nouvelle espèce du genre *Amblycephalus*.' Bull. Mus. d'Hist. Nat., Tome 26, pp. 112-114.
- BARBOUR, THOMAS. 1908. 'Some New Reptiles and Amphibians.' Bull. Mus. Comp. Zoöl., Cambridge, LI, pp. 313-325, text figs. 1-3.
1909. 'Notes on Amphibia and Reptilia from Eastern Asia.' Proc. New England Zoöl. Club, IV, pp. 53-78, Pls. VI-VII.
1912. 'Some Chinese Vertebrates. Amphibia and Reptilia.' Mem. Mus. Comp. Zoöl., XL, pp. 125-136, Pls. I-II.
- 1912a. 'A Contribution to the Zoögeography of the East Indian Islands.' Mem. Mus. Comp. Zoöl., XLIV, pp. 1-203, Pls. I-VIII.
- BEDRIAGA, J. VON. 1907. 'Wissenschaftliche Resultate der von N. M. Przewalski nach Central Asien unternommenen Reisen.' Zoolog. Theil., Band III, Abt. I, Amphibien und Reptilien, Lfg. 2. Lacertilia, pp. 73-278, Pls. II-IV.
1909. Idem, Lfg. 3, pp. 279-502, Pls. V-VII.
1912. Idem, Lfg. 4, pp. I-IV, 503-769, Pls. VIII-X.
- BOETTGER, OSKAR. 1888. 'Materialien zur herpetologischen Fauna von China. II.' Ber. Offenbacher Ver. Naturk., XXVI-XXVIII, pp. 53-176, Pls. I-II.
1893. 'Katalog der Reptilien-Sammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt-am-Main, I Theil. (Rhyngocephalen, Schildkröten, Krokodile, Eidechsen, Chamæleons).' Frankfurt a. M., 8°, pp. x+140.
1894. 'Materialien zur herpetologischen Fauna von China. III.' Ber. Senck. Ges., pp. 129-152, Pl. III.
1898. 'Katalog der Reptilien-Sammlung in Museum der Senckenberischen Naturforschenden Gesellschaft in Frankfurt-am-Main. II Theil. (Schlangen).' Frankfurt am Main, 8°, pp. I-IX, 1-160.
- BOULENGER, GEORGE ALBERT. 1885. 'Catalogue of the Lizards in the British Museum (Natural History).' Second Edition. London, 8°, I, pp. xii+436, Pls. I-XXXII.
1887. Idem, III, pp. xii+575, Pls. I-XL.
1889. 'Catalogue of the Chelonians, Rhyngocephalians and Crocodiles in the British Museum (Natural History).' London, 8°, pp. x+311, Pls. I-VI, 73 text figures.
1893. 'Catalogue of the Snakes in the British Museum (Natural History).' London, 8°, I, pp. xiii+448, text figures 1-26, Pls. I-XXVIII.
1894. Idem, II, pp. xi+382, text figs. 1-25, Pls. I-XX.
1896. Idem, III, pp. xiv+727, text figs. 1-37, Pls. I-XXV.
1899. 'On a collection of Reptiles and Batrachians made by Mr. J. D. La Touche in N. W. Fokien, China.' Proc. Zoöl. Soc. London, pp. 159-172, Pls. XVI-XIX.
- 1899a. 'On the Reptiles, Batrachians and Fishes collected by the late Mr. John Whitehead in the Interior of Hainan.' Proc. Zoöl. Soc. London, pp. 956-962, Pls. LXVI-LXIX.

1904. 'Descriptions of New Frogs and Snakes from Yunnan.' *Ann. Mag. Nat. Hist.*, (7) XIII, pp. 130-134.
1906. 'Descriptions of New Reptiles from Yunnan.' *Idem*, (7) XVII, pp. 567-568.
1914. 'Description of a New Snake of the Genus *Coluber* from Northern China.' *Idem*, (8) XIII, p. 576.
1916. 'Description of a New Snake of the Genus *Coluber* from Northern China.' *Idem*, (8) XVII, p. 243.
1918. 'Description of a New Lizard of the Genus *Acanthosaura* from Yunnan.' *Idem*, (9) II, p. 162.
1921. 'Monograph of the Lacertidæ.' London, 8°, II, pp. viii+451.
- DE ROOIJ, NELLY. 1917. 'Reptiles of the Indo-Australian Archipelago.
- GEE, N. GIST. 1919. 'A Beginning of the Study of the Flora and Fauna of Soochow and Vicinity.' *Journ. N. China Br. Roy. Asiatic Soc.*, L, pp. 170-184.
- GÜNTHER, ALBERT C. L. G. 1864. 'The Reptiles of British India.' London, 4°, pp. xxvii+452, 7 text figs., Pls. I-XXVI.
1888. On a 'Collection of Reptiles from China.' *Ann. Mag. Nat. Hist.*, I, part 6, pp. 165-172.
1892. 'List of the Species of Reptiles and Fishes Collected by Mr. A. E. Pratt on the Upper Yang-Tze-Kiang and in the Province of Szechwan, with Description of New Species.' In Pratt, A. E., 'To the Snows of Tibet Through China.' London, 8°, appendix II, pp. 238-242.
1896. 'A Report on the Collections of Reptiles, Batrachians, and Fishes Made by Messrs. Potanin and Berezowski in the Chinese Provinces of Kansu and Szechwan.' *Ann. Mus. Zoöl. Acad. Sci. St. Petersburg*, I, pp. 199-210, Pls. I-II.
- JACOT, ARTHUR. 1923. 'Shantung Herpetology.' *China Journ. Sci. Arts*, I, pp. 257-260.
- MELL, R. 1922. 'Beitrage zur Fauna sinica I Die Vertebraten Südchinas: Feldlisten und Feldnoten der Säuger, Vogel, Reptilien, Batrachier.' *Arch. Naturg.*, LXXXVIII, Abt. A, Heft 10, pp. 1-146, text fig., map, and Pls. I-IV.
1928. 'Beobachtungen über das Sinnesleben chinesischer Reptilien, insbesondere Schlangen.' *Zeitschrift für Morphologie und Ökologie der Tiere*, Abt. A., II Band, 5 Heft.
- MOCQUARD, F. 1897. 'Notes herpetologiques.' *Bull. Mus. Hist. Nat.*, Paris, pp. 211-217.
1905. 'Diagnoses du quelques Espèces nouvelles de Reptiles.' *Bull. Mus. Hist. Nat.*, Paris, pp. 76-79.
- MÜLLER-MAINZ, LORENZ. 1907. 'Über einen neuen Gecko aus Kamerun und eine neue colubrine Schlange aus Centralchina.' *Zool. Anz.*, XXXI, pp. 824-830.
- OSHIMA, M. 1910. 'An Annotated List of Formosan Snakes, with Descriptions of Four New Species and One New Subspecies.' *Ann. Zool. Jap.*, VII, pp. 185-207.

- PARKER, H. W. 1925. 'Variation of the Lepidosis of a Snake from S. E. Asia.' *Ann. Mag. Nat. Hist.*, (9) XV, pp. 296-298, diagram.
- POPE, CLIFFORD H. 1924. 'Hainan, an Island of Forbidding Reputation That Proved an Excellent Collecting Ground.' *Natural History*, XXIV, pp. 215-223, figures.
1927. 'Frog Hunting in Fukien, China.' *Natural History*, XXVII, pp. 462-473.
1927. 'A Snake-buyer in China.' *Asia Magazine*, August, p. 636, etc.
1928. 'A Modern Medicine-man in China.' *Natural History*, XXVIII, 3, pp. 253-263.
- 1928a. 'Seven New Reptiles from Fukien Province, China.' *Amer. Mus. Novitates*, No. 320, pp. 1-6.
- 1928b. 'Four New Snakes and a New Lizard from South China.' *Amer. Mus. Novitates*, No. 325, pp. 1-4.
- PRATT, A. E. 1892. 'To the Snows of Tibet Through China.' London, 8°, parts of text and Appendix II, pp. 238-242.
- ROUX, J. 1919. 'Sur un nouveau Serpent (*Simotes musyi*), provenant de la Chine.' *Revue Suisse de Zool.*, XXVII, pp. 61-63.
- SCHMIDT, KARL P. 1925. 'New Reptiles and a New Salamander from China.' *Amer. Mus. Novitates*, No. 157, pp. 1-5.
- 1925a. 'New Chinese Amphians and Reptiles.' *Idem*, No. 175, pp. 1-3.
1927. 'The Reptiles of Hainan.' *Bull. Amer. Mus. Nat. Hist.*, LIV, pp. 395-465, Pl. xxvii, text figs. 1-17.
- 1927a. 'Notes on Chinese Reptiles.' *Idem*, pp. 467-551, Pls. xxviii-xxx, text figs. 1-22.
- SIEBENROCK, FRIEDRICH. 1903. 'Schildkröten des östlichen Hinterindien.' *Akad. Wiss. Wien (math.-natur.)*, CXII, Abt. 1, pp. 333-352, 2 Pls.
1906. 'Zur Kenntniss der Schildkröten-fauna der Insel Hainan.' *Zool. Anz.*, XXX, pp. 578-586, fig.
1907. 'Über einige zum Teil seltene Schildkröten aus Südchina.' *Sitzber. Akad. Wiss. Wien (math.-natur.)*, CXVI, Abt. 1, pp. 1741-1776. Pl.
1909. 'Synopsis der rezenten Schildkröten.' *Zool. Jahrb., Suppl.*, X, pp. 427-618.
- SMITH, MALCOLM A. 1923. 'Narrative of a Journey to the Interior of Hainan.' *Journ. Nat. Hist. Soc. Siam*, VI, pp. 185-194, Pls. xiii-xiv.
- 1923a. 'On a Collection of Reptiles and Batrachians from the island of Hainan.' *Idem*, pp. 195-212, text figures 3-4.
1926. 'Monograph of the Sea Snakes (Hydrophiidae).' London, 8°, pp. xx+130, 35 text figs., Pls. i-ii.
- STANLEY, ARTHUR. 1914. 'The Collection of Chinese Reptiles in the Shanghai Museum.' *Journ. N. China Br. Roy. Asiatic Soc.*, XLV, pp. 21-31.
1915. 'Acquisitions to the Museum.' *Idem*, XLVI, pp. xii-xiv.
1916. 'Museum Acquisitions.' *Idem*, XLVII, pp. xiii-xv.
1916. 'Two New Species of Chinese Snakes.' *Idem*, XLVII, pp. 83-84.
1917. 'Museum Acquisitions.' *Idem*, XLVIII, pp. xii-xiii.
1918. 'Museum Acquisitions.' *Idem*, XLIX, pp. xiii-xiv.
1919. 'Museum Acquisitions.' *Idem*, L, pp. xv-xvi.

- STEINDACHNER, FRANZ. 1914. 'Bericht über die von Hans Sauter auf Formosa gesammelten Schlangenarten.' Denkschr. Akad. Wiss. Wien (math-natur), XC, pp. 319-361, text figs. 1-21, Pls. I-IV.
- STEJNEGER, LEONARD. 1907. 'The Herpetology of Japan and Adjacent Territory.' Bull. U. S. Nat. Mus., No. 58, pp. xx + 577, text figs. 1-409, Pls. I-XXXV.
1910. 'The Batrachians and Reptiles of Formosa.' Proc. U. S. Nat. Mus., XXXVIII, pp. 91-114.
1919. 'The "Glass-snake" of Formosa.' Proc. Biol. Soc. Washington, XXXII, p. 142.
1924. 'Herpetological Novelties from China.' Occ. Papers Boston Soc. Nat. Hist., V, pp. 119-121.
1925. 'Descriptions of a New Scincid Lizard and a New Burrowing Frog from China.' Journ. Wash. Acad. Sci., XV, pp. 150-152.
- 1925a. 'Chinese Amphibians and Reptiles in the United States National Museum.' Proc. U. S. Nat. Mus., LXVI, Art. 25, pp. 1-115.
- SUN, T. P. 1926. 'Notes on the Lizards of Nanking.' Com. Biol. Lab. Sci. Soc. China, II, pp. 1-10.
- VAN DENBURGH, JOHN. 1909. 'New and Previously Unrecorded Species of Reptiles and Amphibians from the Island of Formosa.' Proc. California Acad. Sci., III, pp. 49-56.
1912. 'Concerning Certain Species of Reptiles and Amphibians from China, Japan, the Loo Choo Islands, and Formosa.' Idem., pp. 187-258.
- VOGT, THEODOR. 1914. 'Über die Reptilien- und Amphibienfauna der Insel Hainan.' Sitzber. Ges. Naturf. Freunde Berlin, 1913, pp. 222-229.
1922. 'Zur Reptilien und Amphibien-Fauna Südchinas.' Arch. Naturg. LXXXVIII, Abt. A, Heft 10, pp. 135-146.
1924. 'Reptilien und Amphibien aus Szechwan, Ostt Tibet, und Tschili.' Zool. Anz., LX, pp. 337-344.
- WALL, FRANK. 1903. 'A Prodromus of Snakes Hitherto Recorded from China, Japan, and the Loo Choo Islands; with some Notes.' Proc. Zool. Soc. London, pp. 84-102.
- 1924-5. 'A Hand-list of the Snakes of the Indian Empire.' Journ. Bombay Nat. Hist., Soc., XXIX, parts 1-3, pp. 345-361, 598-632, 864-878; XXX, parts 4-5, pp. 12-24, 242-252
- WERBER, FRANZ. 1903-4. 'Über Reptilien und Batrachier aus Guatemala und China in der Zoologischen Staats-Sammlung in München, nebst einem Anhang über seltene Formen aus anderen Gebieten.' Abh. Bayer. Akad. Wiss., II Kl., XXII, pp. 343-384, text figs. and Pl.
1909. 'Über neue oder seltene Reptilien des Naturhistorischen Museums in Hamburg.' I. Schlangen. Mitt. Naturh. Mus. Hamburg, XXVI, pp. 205-247.
1910. Idem (II. Eidechsen.), XXVII, pp. 1-46.
1922. 'Neue Reptilien aus Süd-China gesammelt von Dr. Handel-Mazetti.' Anz. Akad. Wiss. Wien, LIX, pp. 220-222.
1924. 'Ergebnisse der Expedition Dr. Handel-Mazetti's nach China 1914

- bis 1918 auf Kosten der Akademie der Wissenschaften in Wien
Über Reptilien und Amphibien aus Südchina.' Denkschr. Akad.
Wiss. Wien (math.-natur.), XCIX, pp. 39-58.
- 1924a. 'Neue oder wenig bekannte Schlangen aus dem Naturhistorischen
Staatsmuseum in Wien.' Sitzber. Akad. Wiss. Wien (math.-natur.),
Abt. I, CXXXIII, pp. 29-56, figs. 1-9.
1926. 'Synonymisches über Schlangen von Hainan und vom chinesischen
Festland.' Zool. Anz., LXVII, pp. 141-144.

PLATES XVII TO XX

PLATE XVII

Fig. 1. *Ophisaurus harti* and eggs.

This specimen was photographed on its nest, August 28, before it had taken alarm.

Fig. 2. Adult *Ophisaurus harti* Boulenger.



PLATE XVIII

Fig. 1. *Agkistrodon acutus* (Günther).

This photograph was taken on August 16, four days after the discovery of the viper and eggs, for the snake continued to guard its nest until the eggs were removed.

Fig. 2. *Trimeresurus monticola* and eggs.



PLATE XIX

Fig. 1. San Chiang, Ch'ungan Hsien, Fukien.

Work in the Ch'ungan Hsien region was carried on with this village as a base. The base of Kuatun Mountain shows dimly in the distance. Bamboo groves are also seen in the background. *Natrix percarinata* abounded in the foreground rice fields, the highest rice cultivation of the region.

Fig. 2. The high range of mountains opposite Kuatun Mountain seen from Lower Kuatun.

All of the highest tops of the mountains of this region are "bald." The heavy forests of the steep flanks are shown here. In the foreground is a bark roof.



PLATE XX

Fig. 1. Ling Shih Monastery, our Futsing Hsien base.

This Monastery stands in a forested, mountain-encircled basin with a rim 3000 feet high at some points.

Fig. 2. View across a Futsing Hsien plain.

Most of the mountains of this Hsien have been denuded of their forests as those seen in the background of this photograph. Highly cultivated plains nearly at sea-level separate low mountain ranges.

