

Article V.—NOTES ON CHINESE AMPHIBIANS¹BY KARL PATTERSON SCHMIDT²

PLATES XXXI AND XXXII

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INTRODUCTION

The Chinese amphibians in The American Museum of Natural History, from all sources, number 1860 specimens, exclusive of the Hainan collection. Of these, 1389 were collected by the Third Asiatic Expedition; 173 were collected in Fukien by H. R. Caldwell; 82 were presented by Mr. J. W. Williams, of the College of Yale-in-China, Changsha, Hunan; 76 were collected by Mr. R. C. Andrews and Edmund Heller in Fukien and Yunnan, 1916–1917; 74 were purchased from the Rev. John Graham of Yunnanfu, Yunnan; 50 were purchased from Mr. Arthur Jacot, of Shantung Christian University, Tsinan, Shantung; 9 come from the Kreyenberg collection; 5 were presented by Mr. Makoto Nishimura; and two are from Mr. H. H. Johnson. Three specimens of a salamander of the genus *Batrachuperus*, presented to the Field Museum of Natural History by Mr. Robert B. Ekvall, Titao, Kansu, add a species to the list considered.

These specimens are distributed among the following families and genera:

SALAMANDERS			
	No. Genera	No. Species	No. Specimens
Salamandridæ	3	4	74
Hynobiidæ	1	1	3
FROGS AND TOADS			
Discoglossidæ	1	2	22
Bufonidæ	1	5	373
Hylidæ	1	2	100
Brevicipitidæ	2	3	225
Ranidæ	2	22	1066

¹Publications of the Asiatic Expeditions of The American Museum of Natural History. Contribution No. 77.

²Of the Field Museum of Natural History.

The new forms are five in number.¹

SPECIES	TYPE LOCALITY
<i>Batrachuperus tibetanus</i>	Tibetan Border of Kansu.
<i>Bufo andrewsi</i>	Likiang, Yunnan.
<i>Rana nigromaculata mongolia</i>	Mai Tai Chao, Shansi.
<i>Rana noblei</i>	Yunnanfu, Yunnan.
<i>Rana caldwelli</i>	Yenping, Fukien.

As in the case of previous papers on the collections of the Third Asiatic Expedition, I am indebted to Dr. Leonhard Stejneger of the United States National Museum and to Dr. Thomas Barbour, of the Museum of Comparative Zoölogy, for permission to examine specimens in their charge and for cordial aid and advice.

My connection with the present report results from a cordial co-operative agreement between the Field Museum of Natural History and The American Museum of Natural History, arranged at the instance of Mr. Roy Chapman Andrews, leader of the Third Asiatic Expedition.

ANNOTATED LIST OF SPECIES

CAUDATA

Hynobiidæ

Batrachuperus tibetanus, new species

TYPE.—A. M. N. H. No. 5900; adult female; Tibetan border of Kansu, at about latitude 33° N., elevation 9000 feet; December, 1923; Robert B. Ekvall.

DIAGNOSIS.—Closely allied to *Batrachuperus pinchonii*, from which it may be distinguished by the more posteriorly situated vomerine teeth; the more depressed head; the fourteen costal grooves; the absence of horny covering on the palms and soles, only the tips of the digits having a horny epidermis; the somewhat longer tail, .49-.52 of the total length; and the much lighter coloration.

DESCRIPTION OF TYPE.—Costal grooves, 14; the appressed toes overlap; head width 6 times, and head length $4\frac{1}{2}$ times in length from snout to vent; eye as long as its distance from tip of snout; a prominent labial fold on the upper jaw; a slight fold on the lower jaw; a shallow groove back of the eye; a well-marked groove from eye to gular fold; no groove to angle of jaw; gular fold extends on sides of neck to dorsal surface; limbs well developed, overlapping when appressed; fingers 2-3-4-1 and toes 3-2-4-1 in order of length; tips of digits covered with a thick horny epidermis, which is absent from the palms and soles; tail cylindrical at the base, flattened gradually to the tip, only the last one-fourth very flat; vent formed by the confluence of five grooves; much swollen; vomerine teeth 5-5, in slightly arched series beginning well within and slightly behind the internal nares and extending diagonally forward to the level of their anterior border; distance between the vomerine series about equal to the length of one of them; olive-gray above with indistinct black marbling.

MEASUREMENTS.—Body 85 mm.; tail 80 mm.; length head 18 mm.; breadth head 14 mm.; arm 23 mm.; leg 27 mm.

¹Diagnoses of these forms have appeared in Amer. Mus. Novitates, No. 157, February 13, 1925, and No. 175, May 28, 1925.

PARATYPES.—Two additional female specimens with the same data as the type agree with it in all essential characters.

RANGE.—Western Szechwan and Kansu, and borders of Tibet.

In recording a specimen of this genus from western Szechwan as *Batrachuperus sinensis* (Sauvage), (= *B. pinchonii* (David), cf. Stejneger 1925a, p. 5) in his valuable revision of the Hynobiidæ, Dunn describes in detail its differences from typical specimens of Mt. Omei *sinensis*. These had already been noted by Barbour in recording the same specimen for the first time (1912). While the locality is somewhat remote from that of the new specimens at hand, it seems very likely that this specimen, a male, belongs with the proposed *tibetanus*.

Salamandridæ

Tylototriton verrucosus Anderson

Two specimens, A. M. N. H. Nos. 5384–5385, were collected at Tengyueh, Yunnan, May 14, 1917, and one at Genkang, Yunnan, February 5, 1917, by R. C. Andrews and Edmund Heller.

Triturus orientalis (David)

A. M. N. H. Nos. 18549 and 21501–21506, collected at Ningkwo, Anhwei, September 28, 1921, by Clifford H. Pope.

One specimen, No. 18549, has a very smooth skin, in strong contrast with the remaining six specimens, and has a somewhat wider tail-fin. It thus strongly suggests an aquatic stage, while the more rugose specimens probably represent a terrestrial stage.

Measurements of two specimens.

A. M. N. H. Nos.	18549	21504, ♀
Total Length	72 mm.	54 mm.
Head Length	10	7
Arm	14	9
Leg	15	10

Triturus wolterstorffii Boulenger

A. M. N. H. Nos. 6560–6562, Yunnanfu, Yunnan, 1919, collected by John Graham.

Pachytriton brevipes (Sauvage)

Sixty-one specimens, collected in Fukien by H. R. Caldwell, as follows: A. M. N. H. Nos. 8097, 8099, 8123–29, 8131–32, 8134–35, 8143, Mountains near Yenping, August, 1920; and 18502–18548, Fukien Province, 1921–1922.

The ventral coloration in this series is highly variable. There is a tendency toward a mid-ventral longitudinal line. Juvenile specimens have much more sharply defined ventral markings.

Measurements of three specimens follow.

A. M. N. H. No.	18529	8126	18508
Sex	♂	♀	juv.
Total Length	173 mm.	168 mm.	88 mm.
Body	82	85	43
Head	21	21	12
Tail	19	83	45
Arm	18	17	11
Leg	21	21	13

The reference to this species by Werner (1924, p. 49) is evidently a *lapsus* for *Batrachuperus pinchonii* (David). His synonymy refers to the latter species.

SALIENTIA

Discoglossidæ

Bombina orientalis (Boulenger)

Five specimens of this species were presented to the American Museum by Mr. Makoto Nishimura: A. M. N. H. Nos. 5168–5169, Sokako in Amposen, Manchuria, and 5180–5182, Mukden, Manchuria.

Bombina maxima (Boulenger)

Seventeen specimens of this form are in the American Museum collection. A. M. N. H. Nos. 5445, 5447, Yunnanfu, 6550–6552, Hsin-shao, and 8144, Wutingchow District, were collected by John Graham in Yunnan. A. M. N. H. Nos. 5749–5759 were taken at Likiang, 8500 feet altitude, Yunnan, October 4, 1916, by R. C. Andrews and Edmund Heller.

Males of this species are apparently without vocal sacs and without asperities on the toes. The first, second, and third fingers, the metacarpal tubercle, and the inner face of the forearm are provided with horny nuptial asperities. The metacarpal tubercle is much enlarged in the males and scarcely evident in the females. In one specimen the asperities are wanting on the third finger of one side.

Bufonidæ

Bufo melanostictus Schneider

A. M. N. H. Nos. 674 comes from Pinghsiang, Kiangs; 18444, Yenping, Fukien, and 18467–18570, 18559–18565, Fukien Province, collected by H. R. Caldwell; and 5386–5407, 6313, Tengyueh, Yunnain, May, 1917, R. C. Andrews and Edmund Heller.

The Yunnan specimens differ somewhat from the Fukien series in having a more thickened supraorbital crest, which is decidedly crenulate in two specimens.

***Bufo bankorensis* Barbour**

Eighty-one specimens are referred to this species as follows: A. M. N. H. Nos. 11306, 11308, 11309, 11311, Base of Tei Pei Shan, Tsing Ling Mts., Shensi, October, 1921; 13158, 13162, 13164–13165, Chikungshan, Honan, August 26, 1918, J. W. Williams; 13153–13154, 13163, 13169–13170, 13172–13175, 13177–13178, 13180–13181, 13188–13190, Changsha, Hunan, 1919, J. W. Williams and K. F. Yan; 18649–18650, Shengchorefu, Hunan, H. H. Johnson; 18440, 21928–21954, Ningkwo, Anhwei, September–October, 1921, and 21507–21533, Wuhu, Anhwei, September–October, 1921, collected by Clifford H. Pope; 18597, Yen-chingkau, Szechwan, October, 1921, and 18441–18443, Luanshikau, Szechwan, September, 1921, collected by Walter Granger.

I am fully convinced that if *Bufo gargarizans* of Chusan Island and *Bufo asiaticus* of Shanghai are both placed as subspecies of *Bufo bufo*, they must be considered synonymous. The question of the identity of the present form however, is far from clear, as it strongly approaches *Bufo bankorensis* Barbour, described from Formosa. The larger specimens in the present series all have a perfectly smooth head, while juvenile specimens, and occasional half-grown specimens, are scarcely distinguishable from the northern form of *Bufo bufo* on this character.

The ventral coloration in this series is not evidently correlated with any other character. In the Anhwei series, of twenty-one juvenile specimens, one has very small, but distinct black dots; nine have well-defined black markings; and eleven are immaculate or with very indistinct or very few spots. In sixteen males, seven have rather distinct black markings; six have indistinct or very few spots, mostly posterior if present; and three are unspotted. In seventeen females, seven have well-defined black markings, and ten are nearly free from ventral spots. When the most strongly marked of these specimens are directly compared with the Shansi series, it is found that those from Anhwei are much less extensively and less intensely black than the northern species.

General smoothness of body appears as an occasional variation, and does not appear to be correlated with variation in coloration or in measurements.

The head of *Bufo bufo japonicus* appears to be more rounded when viewed from beneath, with a larger mouth. I have measured the distance

between the rictal angles and the vertical distance between the latter line and the front of the mouth to show this character. The ratio between the two characters appears as mouth proportion in the tabulation.

SUMMARY OF MEASUREMENTS				
	Sex	No. Specimens	Extremes	Average
Body Length	♂	10	75-115 mm.	86 mm.
	♀	10	85-114	99
Leg/Body	♂	10	1.17-1.47	1.35
	♀	10	1.11-1.31	1.20
Width Head/Body	♂	10	.35-. 39	.37
	♀	10	.35-. 40	.38
Length Foot/Leg	♂	10	.31-. 36	.35
	♀	10	.32-. 37	.33
Mouth Proportion	♂	10	.41-. 52	.45
	♀	10	.41-. 47	.44

A singular problem is presented by the distribution of the common toads of central China. It seems evident that the common species at Shanghai and in the provinces of Chekiang is a subspecies of *Bufo bufo*, while at Ningkwo and Wuhu, in Anhwei, the sole and very abundant species is *Bufo bankorensis*. A specimen of *bankorensis* in the Field Museum of Natural History received from Dr. C. Ping, Nanking, and the record of *Bufo bufo asiaticus* from the same locality and source by Stejneger (1925a, p. 7) indicate that both species occur in the vicinity of Nanking, and the two species are recorded from several localities in Szechwan.

Twenty stomachs contained food: twelve contained beetles or beetle fragments; five contained unidentified insect remains; four, ants; three, grasshoppers; three, millipedes; two, snails; two, plant remains; one (each), remains of a small toad, earwig fragments, spiders, and centipede fragments.

***Bufo bufo japonicus* (Schlegel)**

Thirty-two specimens are referred to this form: A. M. N. H. Nos. 11307, 11310, 18439, Peking, Chihli, October-November, 1921; 14551-14569, 14682, Hsing Lung Shan, Chihli, August, 1921; and 17882-17890, Kwei Hwa Cheng, Shansi, June 1-10, 1922, all collected by Clifford H. Pope.

The differences between this series and the common toad of central China have been noted above. I have referred them to *japonicus* because of the strongly maculate venter, the chief character emphasized by Stejneger for this form.

SUMMARY OF MEASUREMENTS

	Sex	No. Specimens	Extremes	Average
Body Length	♂	7	80-103 mm.	88 mm.
	♀	5	71- 99	84
Leg/Body	♂	7	1.32- 1.46	1.38
	♀	5	1.13- 1.42	1.26
Width Head/Body	♂	7	.35- .40	.37
	♀	5	.38- .42	.39
Foot/Leg	♂	7	.30- .40	.36
	♀	5	.29- .34	.33
Mouth Proportion	♂	7	.52- .64	.59
	♀	5	.50- .61	.55

Bufo andrewsi, new species

Plate XXXII, Figure 3

TYPE.—A. M. N. H. No. 5769; Likiang, 8500 feet altitude, Yunnan; October 4, 1916; R. C. Andrews and Edmund Heller.

DIAGNOSIS.—Closely allied to *Bufo bufo* from which it is distinguished by the presence of a tarsal fold, its finer and more uniform tuberculation, the less divergent parotids, and the tuberculate top of the head.

DESCRIPTION OF TYPE.—Head moderately wide, flat above; nostrils about equidistant from the point of the snout and the eyes, the distance between them about equal to their distance from the labial border and from the upper eyelid; tympanum distinct, vertically oval, its greatest diameter about equal to its distance from the eye; parotid glands large, slightly less than twice as wide, nearly parallel; arms rather long; first and second fingers equal; two large palmar tubercles, the smaller with nuptial asperities, which are also present on the upper surfaces of the first and second fingers and on the inner side of the third; subarticular tubercles of fingers not divided; heels barely meeting when the legs are placed at right angles to the body; toes webbed, the web extending as far as the end of the two basal phalanges of the third and of the first phalanx of the fourth toes; web extending as a narrow border to the tips of the toes, outer side of fifth toe with a similar "fin"; inner metatarsal tubercle rounded, about as long as wide, brown, one-half the length of the first toe; outer tubercle small; subarticular tubercles beneath the third and fourth toes divided; a well-defined tarsal fold, not reaching the heel; plantar and palmar tubercles smooth, without asperities. Upper surface covered with small spinose warts, some of which are confluent into elongate crests which form a well defined lateral row and a less distinct A-shaped group between the posterior ends of the parotids; a group of enlarged

tubercles behind the rictus; top of head tuberculate; the tubercles, except when multi spinose, all smaller than the tympanum; belly covered with rather uniformly set low tubercles, each faintly horny at its tip.

Nearly uniform dark brown above, with faintly suggested darker longitudinal bands; lower half of the parotid black; belly a little lighter brown, with distinct rather small black spots, uniformly distributed; similar spots on the lower surfaces of the limbs.

MEASUREMENTS

A. M. N. H. Nos.	5769, Type	5767	5773
Sex	♂	♀	juv.
Snout to Anus	71 mm.	82 mm.	36 mm.
Snout to Tympanum	16.5	21	9.5
Width of Head	23.5	29	12
Tympanum	3.0	4.0	2.0
Arm	48	50	24
Leg	93	100	43
Tibia	27	33	15
Hindfoot	34	34	14

PARATYPES.—Seven specimens, A. M. N. H. Nos. 5767–5768, 5770–5774 were collected at Likiang with the type. Six additional specimens received from the Rev. John Graham in Yunnan bear the following localities: Nos. 5449 and 12942–12943, Yunnanfu; 6553, Muyang, 40 miles N. of Yunnanfu; and 6593–6594, Wutingchow District.

Werner records six specimens of a *Bufo* from between “Yungning Yüngbei, and Lidjiang” in Yunnan as *Bufo vulgaris asiaticus*. He comments on their small size and on the frequent presence of a tarsal fold. These specimens appear to be plainly referable to the species above described. Stejneger’s *Bufo minshanicus* (1926, p. 446) appears to be allied to this form.

Bufo raddei Strauch

Two hundred and six specimens: A. M. N. H. Nos. 17891–18094, Mai Tai Chao, (43 miles S. E. of Paotowchen), Shansi, May, 1922, and 22074, Chen Tzu, Taiyuanfu, Shansi, August, 12, 1922, collected by Clifford H. Pope; and 906, Tsingta, Shantung.

Mr. Pope found this species breeding from May 6 to May 22 in northern Shansi. He comments on the striking differences between the sexes.

Perhaps owing to their capture during the breeding season, the majority of stomachs examined were empty. Five stomachs contained food, which was composed of beetle remains, among which snout beetles, Scarabidæ, and Carabidæ form the great proportion.

***Hyla chinensis* Günther**

A. M. N. H. Nos. 18471, Fukien Province, 18611–18616, Yenping, Fukien, collected by H. R. Caldwell; 5418, Futsing, Fukien, July 28, 1916, R. C. Andrews and Edmund Heller; 5304–5306, 5430–5435, 12944–12945, Yunnanfu, Yunnan, and 6590, Wutingchow District, Yunnan, collected by John Graham.

No. 18471 has the lateral spots confluent into two longitudinal bars with downward projections. In No. 5418 the dark spots are nearly completely fused into a lateral line.

I am unable to find characters to distinguish the Yunnan specimens from the Fukien series.

***Hyla immaculata* (Boettger)**

A. M. N. H. Nos. 18586, 21743–21790, Wuhu, Anhwei, and 21791–21822, Ningkwo, Anhwei, collected by Clifford H. Pope, September–October, 1921.

Dusky crossbars on the hind limbs are present in only one specimen in the large series at hand. The white lateral line is nearly always distinguishable on the sides of the body, and may extend from the canthus, over the edge of the upper eyelid, and over the tympanum, to the groin, widening somewhat on the sides. A second light line from the nostril, below the eye and tympanum may occasionally be distinguished. The white line above the very narrow dark border of the upper lip is sometimes sharply defined, and usually forms a loop in front of the shoulder and just below and behind the tympanum.

***Kaloula borealis* (Barbour)**

A. M. N. H. Nos. 14827–14937, 26 miles S. of Hsing Lung Shan, Eastern Tombs, Chihli, August 14, 1921, Clifford H. Pope.

Beyond a slight difference in the amount of web, I am unable to find any character to distinguish *Kaloula wolterstorffi* Stejneger (1925, p. 151) from this species. Wolterstorff's Shantung record of *Kaloula verrucosa* must certainly be referred to *borealis*, whose type locality is Antung, Manchuria, directly across Korea Bay from Chefoo. Such a distribution coincides with that of *Bombina orientalis* and *Bufo raddei*, and I am informed by Prof. Arthur Jacot, of Shantung Christian University, that this is a normal faunal relation, characteristic of other groups of animals also. The receipt of a specimen of *Bombina orientalis* from Nanking (the type locality of *Kaloula wolterstorffi*) suggests that both may be transported specimens. The Chinese penchant for the trans-

portation of odd-looking animals, and their use in the *materia medica*, requires a verification of all unusual locality records.

Callula tornieri Vogt may be expected to prove identical with this species, which would in that event be known from Korea, Manchuria, Chihli, and Shantung.

As in so many Brevicipitidæ, the diet of this species shows a strong preponderance of ants. Of forty stomachs examined, twenty contained food, and of these seventeen contained ants or ant remains, five contained beetles or their wing covers, and one contained plant remains, seeds, and small fragments of a fruiting spikelet.

***Kaloula verrucosa* (Boulenger)**

A. M. N. H. Nos. 3135, 5292-5298, 5300-5303, 6432, and 12946-12947, Yunnanfu, Yunnan, collected by the Rev. John Graham.

There seems to be no question of the entire distinctness of *verrucosa* from *borealis*. The Shantung records of *verrucosa* are probably to be placed with *borealis*.

***Microhyla eremita* Barbour**

A. M. N. H. Nos. 5795-5796, Pinghsiang, Kiangsi; 13226, Changsha, Hunan, April 22, 1918, J. W. Williams; 22070, Huping College, Yochow, Hunan, 1922, Clifford H. Pope; and 21823-21927, Ningkwo, Anhwei, September-October, 1921, Clifford H. Pope.

***Rana rugulosa* Wiegmann**

A. M. N. H. Nos. 18456, Yenping, Fukien, H. R. Caldwell; 22048-22069, Ningkwo, Anhwei, September-October, 1921, Clifford H. Pope; 13151-13152, 13155-13157, 13159-13161, 13166-13168, 13171, 13176, 13179, Changsha, Hunan, J. W. Williams and K. F. Yan.

The single specimen from Fukien agrees closely with a series from Formosa in the American Museum, and differs from the Anhwei and Hunan specimens in coloration and in having more numerous and longer glandular ridges. It seems possible, however, that these differences are due in part to different preservation.

***Rana limnocharis* Wiegmann**

Two hundred and sixty-six specimens represent this common species. A. M. N. H. Nos. 5417, Futsing, Fukien, July 28, 1916, R. C. Andrews and Edmund Heller; 18472-18475, 18486-18487, 18573-18577, Fukien Province, and 8083-8091, 18620-18621, Yenping, Fukien, collected by

H. R. Caldwell; 18552-18558, 18622-18631, Wanhhsien, Szechwan, September, 1921, and 18598, 18602, 18582, 18585, Yenchingkau, Wanhhsien, Szechwan, October, 1921, collected by Walter Granger; 18583, Yochow, Hunan, March 3, 1922; 18584, 21959-31964, Ningkwo, Anhwei, September-October, 1921, 21562-21728, Wuhu, Anhwei, September-October, 1921, and 22075-22100, locality doubtful (probably Ningkwo); collected by Clifford H. Pope; 13193-13195, 13197, 13202, 13205-13210, 13213-13215, 13219, 13232-13234, Changsha, Hunan, 1918-1919, J. W. Williams; 13198, Nanking, Kiangsu, April 17, 1918, J. W. Williams; and 13216-13217, Chikungshan, Honan, August 21, 1918, J. W. Williams.

***Rana phrynoides* Boulenger**

A. M. N. H. Nos. 5428-5429, Yunnanfu, Yunnan, December 15, 1917; and 8149-8150 Wutingchow District, Yunnan, July 26, 1920, Rev. John Graham.

No. 8149, 68 mm. in length, lacks the spines on the breast, though they are present on the fingers. As I find no other differences, this is probably a seasonal or age variation.

No. 8150 has a number of distome trematode parasites attached by means of raised papillæ behind the tongue.

***Rana spinosa* David**

Fifteen specimens, A. M. N. H. Nos. 669, Pinghsiang, Kiangsi; 5410-5415, Futsing, Fukien, July 28, 1916, R. C. Andrews and Edmund Heller; and 8082, 18450-18455, 18457, Yenping, Fukien, H. R. Caldwell.

No. 669 has no pectoral spines and none on the third finger. It measures 70 mm., and thus apparently presents a parallel to the condition of the spines in the half-grown male *phrynoides* noted above.

***Rana plancyi* Lataste**

A. M. N. H. Nos. 13204, Changsha, Hunan, July 9, 1919, J. W. Williams, and 21548-21561, 21729-21736, Wuhu, Anhwei, and 21955-58, Ningkwo, Anhwei, September-October, 1921, Clifford H. Pope.

***Rana nigromaculata nigromaculata* (Hallowell)**

Plate XXXI, Figure 2

One hundred-thirty five specimens, A. M. N. H. Nos. 14683-14818, collected 26 miles south of Hsing Lung Shan, Chihli, August 12, 1921, by Clifford H. Pope, and about thirty tadpoles in various stages of transformation, with the same data, A. M. N. H. No. 14819. Fifty

specimens, Nos. 11326–11375, collected by Arthur Jacot at Tsinan, Shantung, are also to be placed with this form.

The relations of this form are discussed below, under *Rana nigromaculata mongolia*.

Our Shantung specimens apparently agree closely with the Japanese specimens examined by Stejneger. The Hsing Lung Shan series does not contain adult specimens, but I have little hesitation in placing it with the Shantung and Japanese subspecies, with which it agrees in the character of the metatarsal tubercle. Typical *nigromaculata* is, therefore, restricted to Japan, Korea, Chihli, and Shantung, with the probable addition of the Siberian Coast Province and Manchuria.

***Rana nigromaculata reinhardtii* (Peters)**

Plate XXXI, Figure 1

One hundred and six specimens are here recognized as a subspecies of *nigromaculata* in south and central China. They were collected as follows: A. M. N. H. No. 666, Pinghsiang, Kaingsi; 8066–8079, 18478, 18481–18484, 18578–18581, Fukien Province, and 8092–8093, 18446–18448, near Yenping, Fukien, collected by H. R. Caldwell; 18458–18466, 18599–18601, 18603–18610, Yenchingkau, Wanhhsien, Szechwan, October, 1921, and 18587–18591, 18632, Wanhhsien, Szechwan, 1921, collected by Walter Granger; 21534–21547, 21737–21742, Wuhu, Anhwei, and 21965–21983, Ningkwo, Anhwei, collected September–October, 1921, by Clifford H. Pope; 13182–13186, 13191, 13199–13201, 13227–13228, 13231, Changsha, Hunan, J. W. Williams and K. F. Yan.

The relations of this form are discussed below, in connection with the following subspecies.

I have followed Stejneger in preferring to disregard the name *chinen-sis* Osbeck as unidentifiable. Peter's description of *Hoplobatrachus reinhardtii* mentions the pointed snout which characterizes the present series, and I propose that this name be employed for a subspecies of *nigromaculata* in the Yangtze Valley and Fukien.

***Rana nigromaculata mongolia*, new subspecies**

Plate XXXI, Figure 3

TYPE.—A. M. N. H. No. 18149; ♂; Mai Tai Chao, Shansi, May, 1922, Clifford H. Pope.

DIAGNOSIS.—Derived from *Rana nigromaculata nigromaculata*, from which it differs in having a much more rugose skin, with very short longitudinal folds, shorter legs, especially the tibia, a relatively broader head, and a different style of coloration.

DESCRIPTION OF TYPE.—Vomerine teeth in two rounded groups between the choanæ, their distance from the latter about equal to the distance between them;

nostrils a little nearer the eye than the tip of the snout; distance between nostrils a little less than their distance from the orbits; interorbital space half the width of the upper eyelid; diameter of tympanum equals that of the orbit, and is four times its distance from the latter; first finger a little longer than the second, swollen at the base and provided with a very large velvety pad; toes nearly completely webbed, the web very narrow on the last phalanx of the fourth toe; outer metatarsals well separated; tips of digits tapering, rounded, not at all expanded or grooved; sub-articular tubercles distinct; inner metatarsal tubercle large, with a horny edge, its length nearly equal to that of the fifth toe; an indistinct outer tubercle; no tarsal fold; heels not meeting when the limbs are placed at right angles to the body; a well-defined but irregular and rugose dorsolateral fold, from the eyelid to the hip, its breadth at some points greater than that of the interorbital space; dorsal skin coarsely granular, with five irregular longitudinal folds between the dorsolateral folds; a strong glandular fold from the tympanum above the vocal sac to a point considerably behind the insertion of the arm; vocal sacs external, below and behind the tympanum.

Grayish olive above, with faint transverse black markings; limbs with darker crossbars; lower side immaculate; a paler mid-dorsal line, with no trace of paler lines on the dorsolateral fold.

MEASUREMENTS

A. M. N. H. No.	18175, Type	18149
Sex	♂	♀
Snout to Vent	69 mm.	65 mm.
Width of Head	26	25
Tympanum	7	6
Arm	36	38
Leg	105	104
Tibia	30	30
Foot	37	39
Metatarsal Tubercle	6.0	7.0
Fifth Toe	6.5	7.0

PARATYPES.—The twenty-eight paratypes: A. M. N. H. Nos. 18096–18104, Kwei Hwa Cheng, Shansi, June 1–10, 1922; 18122, 18127, 18129, 18132, 18146, 18149, 18168, 18173–18175, 18179–18180, 18182, 18191, 18204, 18213, 18216, 18222, Mai Tai Chao, Shansi, May, 1922; and 11304–11305, base of Tei Pei Shan, Tsing Ling Mts., Shensi, October, 1921, are all in the collection of the Third Asiatic Expedition made for the most part by Clifford H. Pope.

The only noteworthy variation in this series is seen in the two specimens from Shensi, which are distinctly longer legged than the Shansi specimens. They agree with the latter in width of head, dorsal rugosity, and character of the metatarsal tubercle.

COMPARATIVE TABLE OF MEASUREMENTS OF THE SUBSPECIES OF *Rana nigromaculata*

	Sex	Length of Body in mm.			Leg/Body			Tibia/Body			Width Head/Body		
		No. Spec.	Extremes	Mean	No. Spec.	Extremes	Mean	No. Spec.	Extremes	Mean	No. Spec.	Extremes	Mean
Shansi Series	♂	9	62-69	65	9	1.46-1.59	1.53	9	.43-.48	.46	9	.36-.38	.37
	♀	9	34-80	55	9	1.44-1.62	1.52	9	.43-.46	.44	9	.35-.41	.38
Shantung Series	♂	10	53-63	57	10	1.56-1.76	1.62	10	.46-.54	.49	10	.33-.38	.36
	♀	10	57-65	61	10	1.53-1.69	1.60	10	.45-.51	.49	10	.33-.37	.35
Anhui and Szechwan Series	♂	10	54-72	62	10	1.49-1.69	1.59	10	.48-.54	.51	10	.31-.36	.34
	♀	10	65-95	76	10	1.54-1.73	1.62	10	.47-.54	.51	10	.32-.37	.34
Fukien Series	♂	10	55-67	62	10	1.58-1.71	1.64	10	.49-.52	.51	10	.32-.36	.33
	♀	10	56-85	65	10	1.51-1.71	1.64	10	.48-.56	.52	10	.31-.34	.33

The specimens of *Rana nigromaculata mongolia* are well distinguished from the Shantung series at hand by their much greater rugosity and apparently different style of coloration, as well as by a considerable difference in measurements. The Shansi series agrees with the Shantung specimens in the length of the metatarsal tubercle, and both differ in this character from the south Chinese specimens. These differences may be expressed in key form as follows.

A.—Snout pointed, projecting; metatarsal tubercle much shorter than the fifth toe; size large; spots distinct, transverse; (south and central China).

nigromaculata reinhardtii.

AA.—Snout rounded, little projecting; metatarsal tubercle nearly or quite as long as the fifth toe; size moderate; spots often square or longitudinal, or absent in the adult.

B.—Back rather smooth, with longitudinal ridges; tibia about half the length of the body; limbs longer, head narrower; (Japan, Chihli, Shantung, etc).

nigromaculata nigromaculata.

BB.—Back very rugose, ridges irregular; tibia always less than half the length of the body; limbs shorter, head wider; (Shansi, Shensi, and Inner Mongolia)..... *nigromaculata mongolia.*

***Rana noblei*, new species**

Plate XXXII, Figure 1

TYPE.—A. M. N. H. No. 5285; ♀; Yunnanfu, Yunnan; John Graham.

DIAGNOSIS.—Allied to *Rana nigromaculata*, from which it is distinguished by its more rounded snout, absence of dorsal folds between the dorsolateral folds, smaller metatarsal tubercle, and very different coloration.

DESCRIPTION OF TYPE.—Width of head equal to the distance from the snout to posterior border to the tympanum; snout broadly rounded, nearly vertical in front, not projecting; interorbital space about one-half the width of the upper eyelid; vomerine teeth in two closely approximated transverse groups between the choanæ tympanum large, very distinct, its diameter slightly greater than the distance between the nostrils; the latter about equidistant from the eyes and point of the snout. First and second fingers equal; tibio-tarsal articulation reaching the eye; heels broadly overlapping when the legs are placed at right angles to the body; tips of digits not dilated; outer metatarsals separated nearly to their bases; toes broadly webbed, the two distal phalanges of the fourth free; inner metatarsal tubercle small, rounded, its length less than half that of the first toe; a small but distinct outer metatarsal tubercle; a strong tarsal fold or ridge from the inner tubercle to the heel, and a less sharply defined one from the base of the fifth toe to the heel. Back with broad dorsolateral glandular folds, continuous from the upper eyelids to the hips, two-thirds the width of the eyelid, which is strongly pitted like the fold; a short glandular fold below the tympanum to a point above the insertion of the arm; very low, rounded and smooth glandular areas between the dorsal folds, with no longitudinal ridges.

Reddish brown above and below, with small sharply defined black spots on the back; a black spot at the base of each arm, a black mark behind the elbow, and one

on the front of the forearm; hind limbs without crossbars, with obscure dark mottling on the posterior face of the thighs.

•
MEASUREMENTS

Snout to Anus	91 mm.
Snout to Tympanum	22
Width of Head	28
Tympanum	7
Arm	48
Leg	146
Tibia	51
Foot	49

This species may represent *Rana nigromaculata* in the Yunnan area. I am unable to identify it with any of the south-Asian frogs listed in Boulenger's revision of 1920.

***Rana japonica* (Günther)**

A. M. N. H. Nos. 18551, 18592–18595, 18617–18619, Wanh sien, Szechwan, 1921, collected by Walter Granger.

These eight specimens are notably distinct from all of the remaining Chinese wood-frogs in the American Museum's collection in having a perfectly straight dorsolateral fold. I do not, however, find any other characters whereby they can be distinguished.

***Rana japonica* auct.**

A. M. N. H. Nos. 13187, 13202, 13212, 13230, Changsha, Hunan, 13196, 13220–13225, Nanking, Kiangsu, and 13229, Chikungshan, Honan, collected by J. W. Williams; 18550, 21984–22047, Ningkwo, Anhwei, September–October, 1921, collected by Clifford H. Pope; 22072, Yenping, Fukien, collected by H. R. Caldwell.

The Hunan, Kiangsu, and Anhwei specimens are certainly referable to a single species, and they represent the form which has been commonly referred to *Rana japonica*. Stejneger's revision of the Japanese wood-frogs (1924, p. 73) apparently leaves this form nameless. It is allied to *Rana asiatica* and *Rana amurensis* in having an angulate dorsolateral fold, but it is well distinguished from these species by its more slender habitus, narrower head, and paler coloration. It seems possible that *Rana chenchinensis* David should be used for this species rather than for *R. amurensis*.

The degree of angularity of the lateral fold is certainly subject to variation in this series.

***Rana longicrus* Stejneger?**

A. M. N. H. No. 668, Pinghsiang, Kiangsi; 8094-8095, 22071, near Yenping, Fukien, and 18476-18477, Fukien Province, H. R. Caldwell.

These specimens have a decidedly more slender appearance than the common wood frog of the Yangtze Valley, but it is difficult to find definable characters to separate the two forms. The slenderness of the tibia is perhaps the best differentiating character. The length of the leg ranges from 1.86 to 2.00 times the length of the body, compared with a range of 1.7 to 2.09 in the so-called *japonica*. There is no trace of grooves on the slightly dilated tips of the digits. The width of the head at the angles of the mouth divided by the length from snout to anus, ranges from .29 to .32, averaging .30.

The course of the dorsolateral fold is somewhat angular, and the specimens at hand are thus apparently excluded from *longicrus* as defined by Stejneger. The Fukien specimen recorded as *longicrus* by Boulenger (1920, p. 95) doubtless belongs here. Like the central Chinese "*japonica*," they are apparently without a name. I have refrained from proposing additional names for these two forms in the hope that a more adequate study of the whole "wood-frog problem" may be made in the future.

***Rana amurensis* Boulenger**

A. M. N. H. Nos. 14570-14681, 14820-14826, Hsing Lung Shan, Chihli, August, 1921, Clifford H. Pope.

This series differs from the large Shansi series in having a shorter web and narrower dorsolateral fold, and I therefore have little hesitation in referring them to *amurensis*.

***Rana asiatica* (Bedriaga)**

One hundred and three specimens in the collection, all from Northern Shansi, collected by Clifford H. Pope, May-June, 1922. A. M. N. H. Nos. 18105-18118, Kwei Hwa Cheng; 22073, 18119-21, 18123, 18126, 18128, 18130-18131, 18133-18145, 18147-18148, 18150-18167, 18169-18172, 18176, 18178, 18181, 18183-18190, 18192-18203, 18205-18212, 18214-18281, 18217-18221, 18223-18224, Mai Tai Chao.

This species has the angular course of the dorsolateral fold behind the eye well marked. The only notable variation is in the amount of the dorsal black markings and in the extent of the lateral granulation of the skin.

***Rana pleuraden* Boulenger**

Forty-four specimens in the American Museum's collection represent this species. A. M. N. H. Nos. 5775-5791, Likiang, Yunnan, October 4, 1916, collected by R. C. Andrews and Edmund Heller; 5286-5291, 5427, 5436-5444, 5763-5764, and 13451-13453, Yunnanfu, Yunnan, and 6528, 6591-6592, 8145-8147, Wutingchow District, Yunnan, collected by John Graham.

The Likiang specimens agree excellently with the topotypes from Yunnanfu.

***Rana grahami* Boulenger**

A. M. N. H. Nos. 5284, Yunnanfu, Yunnan, John Graham, and 5766, Likiang, Yunnan, October 4, 1916, collected by R. C. Andrews and Edmund Heller, represent this species.

The resemblance of this form to *Rana andersonii* is extraordinary. It apparently replaces the latter in the central Yunnan area. The Likiang specimen extends the known range of *grahamii* to the northward, as it has hitherto been recorded only from Yunnanfu.

***Rana guentheri* Boulenger**

Four specimens in the collection: A. M. N. H. Nos. 667, Pinghsiang, Kiangsi; 5419-5420, Futsing, Fukien, July 28, 1917, R. C. Andrews and Edmund Heller; and 18596, Luanshikau, Wanhhsien, Szechwan, September, 1921, collected by Walter Granger.

These specimens agree with Boulenger's figure (1882, Pl. iv, fig. 2) except for a somewhat shorter body, and with his most recent description (1920, p. 133). The coloration of *guentheri* suggests that of *plancyi*, the two perhaps forming a pair somewhat like *R. grahami* and *R. andersoni*, or *R. adenopleura* and *R. pleuraden*.

***Rana caldwelli*, new species**

Plate XXXII, Figure 2

TYPE.—A. M. N. H. No. 18485; ♂; Fukien Province (probably near Yenping); H. R. Caldwell.

DIAGNOSIS.—Allied to *Rana adenopleura*, from which it is distinguished by having a more projecting snout, rougher skin, and the dorsolateral glandular folds broken up posteriorly.

DESCRIPTION OF TYPE.—Vomerine teeth in small oblique groups between the choanae, nearer to each other than to the latter.

Head a little broader than long; snout obtusely pointed, projecting well beyond the mouth, longer than the eye; canthus rostralis obtuse; loreal region moderately

oblique, concave; nostril equidistant from eye and tip of snout; distance between the nostrils greater than the interorbital width; tympanum very distinct, five-sixths the diameter of the eye, and four times its distance from the latter.

Fingers rather slender, with slightly swollen tips, with a rather indistinct groove on each side; first a little longer than the second; subarticular tubercles prominent.

Hind limb long, the heel reaching the tip of the snout; heels strongly overlapping when the legs are placed at right angles to the body; tibia a little less than twice in the length from snout to vent; toes slender, the tips dilated into small discs with sharply defined lateral grooves, moderately webbed, two and a half phalanges of the fourth toe free; outer metatarsals separated nearly to their base; a tarsal fold present; inner metatarsal tubercle about two-fifths the length of the inner toe; a small round outer metatarsal tubercle.

Skin finely rugose; a moderately broad glandular fold from above the tympanum to the groin, broken up posteriorly; the distance between the folds, on the middle of the back, four and one-half times in the length from snout to vent.

Grayish brown above, with a light vertebral line; a distinct dark band on each side of the head passing through the eye; dorsolateral fold dark edged; limbs with dark crossbars; hinder side of thighs light, marbled with brown; lower parts white, throat brownish; a black mark at the base of the arm, and one at the groin.

The first finger has a feeble pad, covered with a velvet-like grayish layer, on its inner side; a large flat gland, above and behind the axilla, is present.

MEASUREMENTS OF TYPE AND PARATYPE

A. M. N. H. No.	18485	18572
Snout to Vent	49 mm.	31 mm.
Snout to Tympanum	14	10
Width of Head	18	10
Tympanum	5	3
Arm	33	20
Leg	90	60
Tibia	28	19
Foot	29	19

PARATYPE.—A. M. N. H. No. 18572, with no other data than Fukien Province, agrees closely with the type.

This species is apparently the mainland representative of the Formosan *R. adenopleura*. A specimen from Yenping has been recorded by Stejneger under the latter name (1925a, p. 23).

Rana andersonii Boulenger

Two specimens from western Yunnan, A. M. N. H. Nos. 5408–5409, Tengyueh, April 24, 1917, collected by R. C. Andrews and Edmund Heller; and four specimens from Fukien collected by H. R. Caldwell, No. 8081, mountains near Yenping, August 1920, 18449, Yenping, April 24, 1921, and 18479–18480, Fukien Province.

There are decided differences between the Fukien and Yunnan specimens at hand. The former have a finely granulate dorsal skin, and much more distinct dorsal spots. The Tengyueh specimens are nearly smooth above, with low rounded warts, and much more distinct lateral warts. The variation in the size of the tympanum in the Fukien specimens indicates that *R. schmackeri* must either be united with *andersonii* or applied to its representatives in eastern China.

***Rana ricketti* Boulenger**

Twenty specimens of this striking species were collected by H. R. Caldwell in Fukien. A. M. N. H. No. 8080 is from the mountains near Yenping, August 1920, while the remaining series, doubtless also from the Yenping area, is labeled simply Fukien Province.

The males are without evident vocal sacs. They have the lower joint of the first finger much enlarged, covered with evenly distributed round tubercles which are not at all horny.

The measurements of two specimens are as follows.

A. M. N. H. No.	18567	18568
Sex	♂	♀
Snout to Vent	56 mm.	61 mm.
Snout to Posterior Border of Tympanum	18	19
Width of head	19	20
Tympanum	2	2.5
Arm	35	36
Leg	91	95
Tibia	31	33

***Polypedates exiguus* (Boettger)**

Two specimens, A. M. N. H. Nos. 670, Pinghsiang, Kiangsi, and 13192, foothills across Siang River, Changsha, Hunan, November 25, 1918, J. W. Williams.

This form was based on a juvenile specimen, and I am by no means sure of the identification of the present specimens with it. No. 13192 has the skin of the back nearly smooth; coloration very like that of *dennysii* but with a row of well-defined white spots along the sides; web between the outer fingers from the bases of the last phalanges, a little shorter between the inner fingers; toes webbed to the discs, but more deeply incised than in *dennysii*, the fourth toe having only a narrow margin of web on the last phalanx; prepollex strongly developed; a pectoral area between the shoulders smooth. No. 670 agrees closely

with the Changsha specimen in coloration and extent of webbing, but has a much more rugose skin on the back and head. It was identified as *dennysii* by Wolsterstorff, but it appears to be amply distinct from that species.

***Polypedates dennysii* (Blanford)**

Three specimens, A. M. N. H. Nos. 5416, Yuchi, Fukien, May 28, 1916, R. C. Andrews and Edmund Heller; 18445, Yenping, Fukien, September 26, 1921, H. R. Caldwell, and 18566, Fukien Province, H. R. Caldwell.

This large species is well characterized by the fully webbed toes and fingers. The disc of the third finger is wider than the diameter of the tympanum.

All three specimens are marked above (on a purple ground color) with dark brown spots, each of which is bordered by a ring of light brown. The distribution of these spots suggests that they are due to shot marks, but no lesion is discernible.

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PLATE XXXI

- Fig. 1.** *Rana nigromaculata reinhardtii* (Peters), Ningkwo, Anhwei.
Fig. 2. *Rana nigromaculata nigromaculata* (Hallowell), Tsinan, Shantung.
Fig. 3. *Rana nigromaculata mongolia* Schmidt, Mai Tai Chao, Shansi.

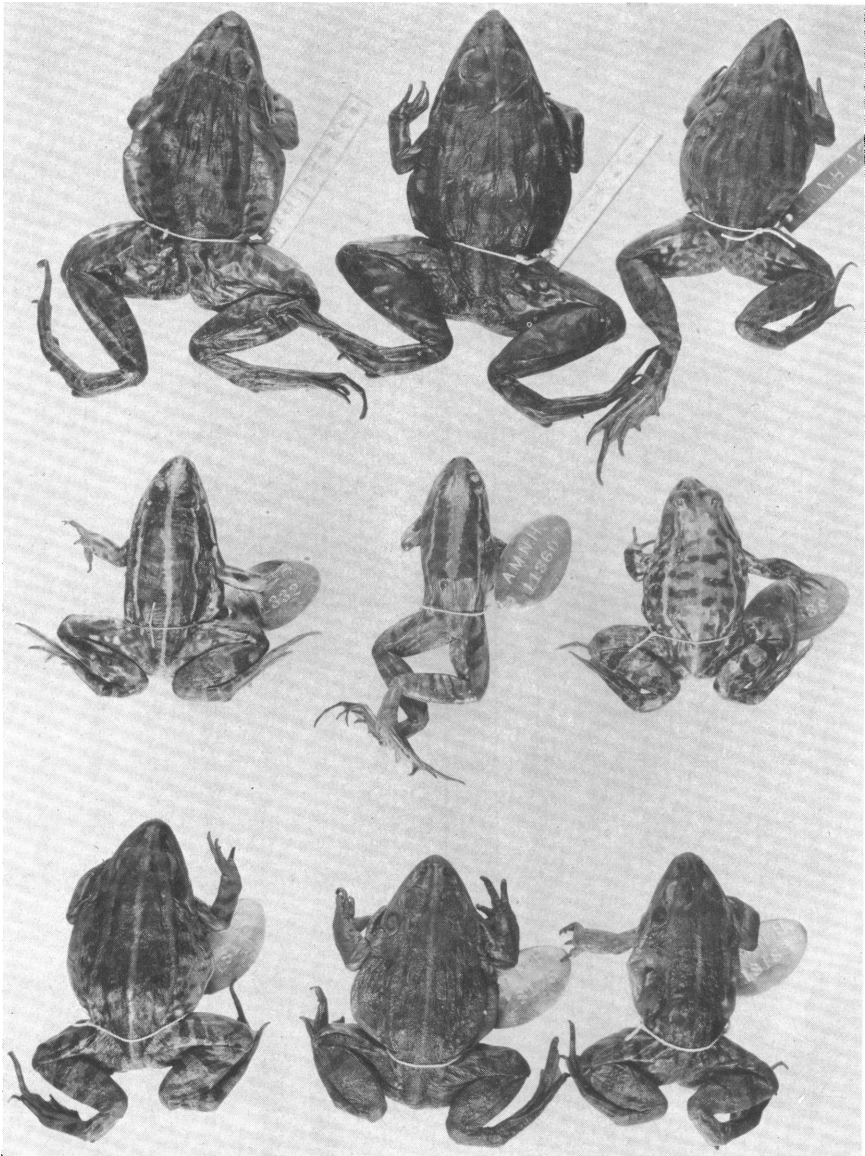
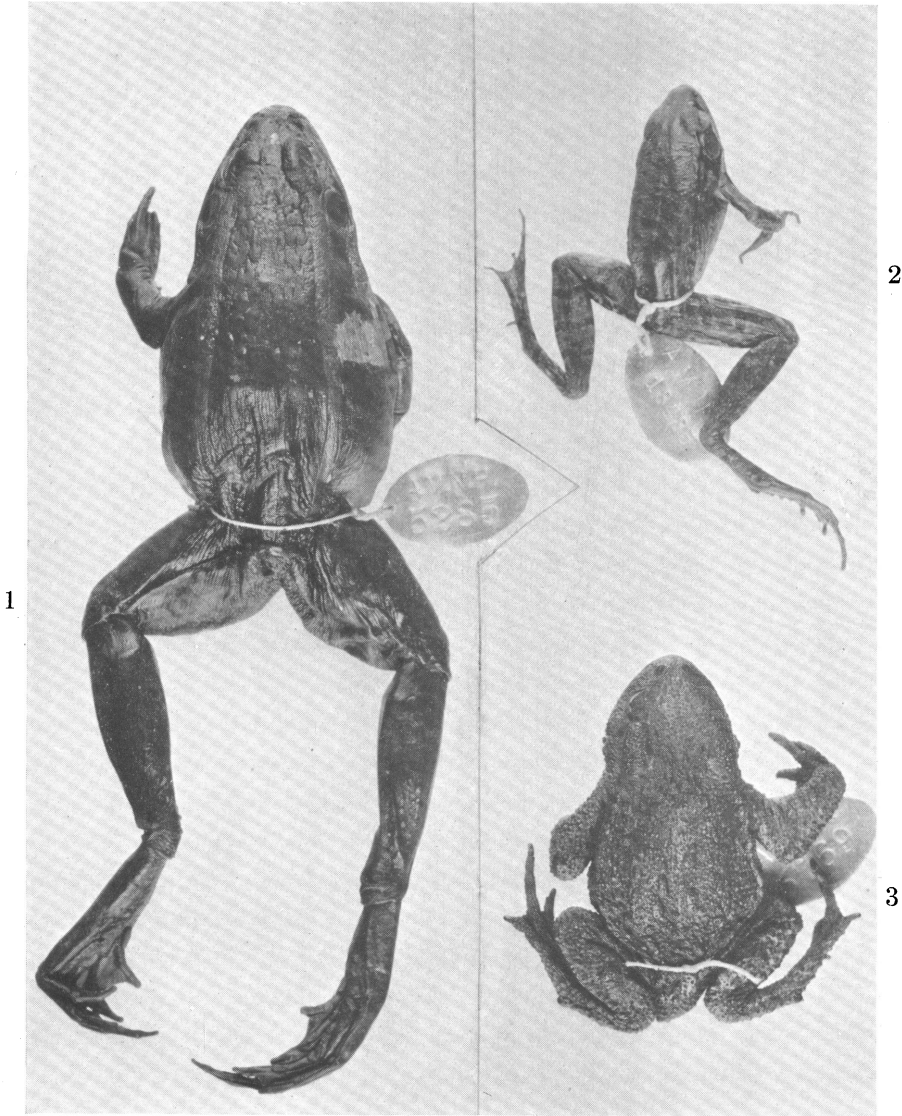


PLATE XXXII

Fig. 1. *Rana noblei* Schmidt, type.

Fig. 2. *Rana caldwelli* Schmidt, type.

Fig. 3. *Bufo andrewsi* Schmidt, type.



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