THE BATRACHIANS AND REPTILES OF FORMOSA.

By Leonhard Stejneger,

Curator, Division of Reptiles and Batrachians, U. S. National Museum.

When Robert Swinhoe, in 1863, published the first List of the Formosan Reptiles he had only 15 species to enumerate. After the lapse of forty-four years the species of reptiles known to occur in Formosa and its outlying islands had increased to 50, as given in my Herpetology of Japan.[a] To-day, three years after the issue of the latter, the number has risen to 66. The record of the batrachians is still more remarkable. Swinhoe collected only 4 species of batrachians in Formosa, as follows: *Hyla chinensis*, *Microhyla fissipes*, *Rana planeyi*, and *Rana tigerina*. In 1907 I recorded 9 species. In the present paper there are enumerated 20 species.

The activity in collecting these animals in Formosa since the publication in 1907 of the Herpetology of Japan has raised the total number of batrachians and reptiles known to occur in that island from 59 to 86 species. Of the 26 species thus added to the fauna, no less than 15 are new species, and 8 represent genera hitherto not known to occur on the island.

These additions are recorded in seven papers by five authors, as follows:

1908. Barbour, Thomas. Some new Reptiles and Amphibians. Bull. Mus. Comp. Zool., vol. 51, no. 12, pp. 315–325.

1909. Barbour, Thomas. Notes on Amphibia and Reptilia from Eastern Asia. Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, pp. 53–78, pls. 6–7.

1908. Boulenger, G. A. Descriptions of a new Frog and a new Snake from Formosa. Ann. Mag. Nat. Hist. (8), vol. 2, Aug. 1908, pp. 221–222.

1909. Boulenger, G. A. Descriptions of four new Frogs and a new Snake discovered by Mr. H. Sauter in Formosa. Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1909, pp. 492–495.

1909. Denburgh, John van. New and previously unrecorded Species of Reptiles and Amphibians from the Island of Formosa. Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, pp. 49–56.

1908. Namiye, M. Poisonous Serpent of Formosa. Zool. Mag. Tokyo, no. 236, June 15, 1908, pp. 192–194, pl. —.

1910. Siebenrock, L. Clemmys mutica Cant. von der Insel Formosa. Ann. Naturh. Hofmus. Wien, vol. 23, pp. 312–317, pls. 12–13.

[a] Bulletin 58, U. S. National Museum.

Of the 86 species enumerated below 7 are truly marine snakes and turtles, and therefore have no bearing on the problems of the geographical distribution of the other species.

Of the remaining 79 species no less than 24 species are peculiar to the island, as follows:

AMPHIBIA.

1. *Bufo bankorensis.*
2. *Microhyla fissipes.*
3. *Microhyla steinegeri.*
4. *Rana longicrus.*
5. *Rana swinhoana.*
6. *Rana sauteri.*
7. *Rana taipehensis.*
8. *Rana adenopleura.*
9. *Polypedates moltrechti.*
10. *Polypedates robustus.*

REPTILIA.

11. *Japalura swinhonis.*
12. *Japalura mitsukurii.*
13. *Takydromus formosanus.*
14. *Takydromus sauteri.*
15. *Takydromus kuenei.*
16. *Natrix swinhonis.*
17. *Natrix sauteri.*
18. *Xenodon stejnegeri.*
19. *Macropisthodon carinatus.*
20. *Achalinus formosanus.*
21. *Oligodon ornatus.*
22. *Dinodon ruhstrati.*
23. *Boiga kræpelini.*
24. *Amblycephalus formosensis.*

Thus 50 per cent of the batrachians of the island are peculiar, but only about 26 per cent of the reptiles.

Both of these figures are high, and it is quite possible that a few of the species now listed as peculiar may be discovered later in some part of southern China. It is also possible that a slight reduction may eventually have to be made in the genera *Rana* and *Takydromus*, but this loss is just as likely to be offset by future separation of island forms now thought to be identical with the mainland species.

Of the 10 peculiar batrachians the relationship of 2 is somewhat dubious, namely, *Microhyla steinegeri* and *Rana taipehensis*. Two have their nearest relations known in the Riu Kius and Japan, namely, *Polypedates moltrechti* and *P. robustus*. Two more are nearly related to Chinese species, namely, *Microhyla fissipes* and *Rana longicrus*, while the remaining 4 have distinct leanings toward species at home in the eastern Himalayas and the high country immediately to the east, Burma, Yunnan, etc.

Of the 14 peculiar reptiles the 3 species (?) of *Takydromus* are closely related to Chinese forms,[a] while all the others are more or less intimately related to species occurring in the western provinces, on the upper Yangtse River, Upper Burma, Assam, or the eastern Himalayas. Two of the snakes, *Oligodon ornatus* and *Boiga kræpelini*, do not appear to have any near relations in China at all. It is not intended, however, to lay stress on the absence of these species in China or in

[a] Which in their turn are related to a Himalayan species.

the more eastern provinces of that empire, as it is quite likely that these gaps may be filled when the mountain districts of southeastern China shall become better known, but rather to emphasize the strong connection between the Formosan species and those inhabiting the eastern Himalayas and the high land to the east.

This relationship is not only manifested by the peculiar species, but by the rest of the reptilian fauna as well. Leaving out the geckos and skinks, the geographical distribution of which is subject to so many accidental circumstances, we have 35 species of land reptiles left, which also occur outside of Formosa. Of these 3 are of very wide distribution, extending into the Malayan Archipelago, but not occurring in the Himalayas or the high land to the east. These are, therefore, species of decidedly southern affinities. Seven species which occur in southern China, some of them extending southward into Indo-China and Siam, may be included in this category. Ten species are of more or less general distribution in eastern China. Finally, 15 species, one of which is doubtful, occur in the eastern Himalayas or the high land to the east or both.

On the other hand, none of the Formosan batrachians occurring outside the island are found in the Himalayas or the high land to the east. Of the 10 species 4 are wide-ranging and southern, 2 likewise southern but of more restricted distribution, 1 is strictly eastern Chinese, while 3 are also found in the Riu Kiu Islands, 1 of undoubted southern affinity, the other 2 probably likewise.

It will thus be seen that all the batrachians which have Himalo-Chinese affinities have differentiated into more or less distinct species, while those of southern affinities have remained nearly unchanged. It is also evident that the reptiles of southern affinities have remained practically unaltered in the island and that the specific differentiation almost exclusively took place among the Himalo-Chinese species; but the amount of differentiation in the reptiles was not nearly as large, for while it affected all the batrachians, it affected only 44 per cent of the reptiles. Whatever may be the reason for the greater amount of batrachian differentiation, the fact that practically no southern forms have undergone speciation in the island seems to indicate most plainly that the Himalo-Chinese component of the herpetological fauna of Formosa has lived much longer in the island than the more southern element, which must be a later arrival.

In this review of the relationship of the Formosan herpetological fauna the most striking fact, next to the prevalence of the Himalo-Chinese element, is the total absence of any indication of affinity to the fauna of the Philippine Islands directly to the south. A number of wide-ranging species of southern origin occur in both faunas, but as these also occur in southern China, on the mainland opposite For-

mosa, their way of dispersal is clearly indicated. There are only two species of this category which have not yet been collected in Chinese territory, namely, *Dasia smaragdina*, of wide distribution and which may owe its occurrence in Formosa to introduction by human agency, the other being a snake, *Psammophis pulverulentus*, the discovery of which within the limits of China would not cause surprise, as its known distribution includes Sikkim, Assam, and the Shan states. There seems, therefore, to be good reason for asserting that there has been no direct land connection between Formosa and the Philippine Islands since Formosa received its batrachian and reptilian fauna.

The present review is somewhat in the nature of a supplement to my Herpetology of Japan, hence a full synonymy of genera and species is only given in case of those which have been added since its publication in 1907, while in the other cases the page references to that work are given immediately below the specific name.

Class AMPHIBIA.

Order SALIENTIA.

Family BUFONIDÆ.

BUFO MELANOSTICTUS Schneider.

(Herpet. Japan, 1907, p. 72.)

Common. Recorded from Taipa, Giilan, and Taiwan fu.

BUFO BANKORENSIS Barbour.

1908. *Bufo bankorensis* BARBOUR, Bull. Mus. Comp. Zool., vol. 51, no. 12, p. 323 (type-locality, Bankoro, Central Formosa; type, No. 2432, Mus. Comp. Zool.; Owston collection); Proc. New England Zool. Club, vol. 4, 1909, p. 55, pl. 6.

Resembling *Bufo melanostictus*, but lacking the bony cranial crests. Exceedingly small tympanum. Also related to *Bufo himalayanus*.

Family HYLIDÆ.

HYLA CHINENSIS Guenther.

(Herpet. Japan, 1907, p. 86, pl. 9, fig. 4.)

In addition to the specimens there enumerated from Formosa, I have since examined a specimen belonging to Mr. Barbour (Owston collection) from the same island. It had no spots in the groin; teeth behind the choanæ.

Family ENGYSTOMIDÆ.

MICROHYLA FISSIPES Boulenger.

(Herpet. Japan, 1907, p. 88.)

1884. *Microhyla fissipes* BOULENGER, Ann. Mag. Nat. Hist. (5), vol. 13, p. 397; (8), vol. 4, Dec. 1909, p. 495.

In addition to those previously listed, Boulenger records specimens from Kosempo and Kanshirei.

MICROHYLA STEINEGERI Boulenger.

1909. *Microhyla steinegeri* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1, 1909, p. 494 (type-locality, Kanshirei, Formosa; types in Brit. Mus.; H. Sauter, collector).

Thus far only known from the specimens collected by Mr. Sauter at the village of Kanshirei.

Family RANIDÆ.

RANA PLANCYI Lataste.

(Herpet. Japan, 1907, p. 101.)

"The specimens recorded from Formosa are all in British Museum, the only ones with a definite locality being from Taiwan fu."

RANA LONGICRUS Stejneger.

(Herpet. Japan, 1907, p. 104.)

Only the type-specimen, from Taipa, is thus far known.

RANA LIMNOCHARIS Wiegmann.

(Herpet. Japan, 1907, p. 127.)

It is the commonest species of frog in Formosa, and is also recorded by me from the Pescadores and Botel Tobago.

RANA SWINHOANA Boulenger.

(Herpet. Japan, 1907, p. 132.)

1903. *Rana swinhoana* BOULENGER, Ann. Mag. Nat. Hist. (7), vol. 12, Nov. 1903, p. 556; (8), vol. 4, Dec. 1909, p. 495.

In addition to the types from Bangkimptsing, specimens have since been recorded from Kosempo.

RANA LATOUCHII Boulenger.

1899. *Rana latouchii* BOULENGER, Proc. Zool. Soc. London, 1899, p. 167, pl. 21, fig. 1 (type-locality, Kuatun, Fokien, China; types in Brit. Mus.; J. D' La Touche, collector); Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1, 1909, p. 495 (Fuhosho, Formosa).—DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 55 (Kanshirei, Formosa).

Originally described from the province of Fokien, China, this frog has been found in Formosa since the publication of the Herpetology of Japan, and recorded almost simultaneously by Boulenger and Van Denburgh.

RANA NAMIYEI Stejneger.

(Herpet. Japan, 1907, p. 36.)

1901. *Rana namiyei* STEJNEGER, Proc. Biol. Soc. Washington, vol. 14, Dec. 12, 1901, p. 190. — DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 55 (Kanshirei and Polisia, Formosa).

1909. *Rana kuhlii* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1, 1909, p. 495 (Fuhosho, Kanshirei, and Alikang, Formosa), (not of Duméril and Bibron ?).

Originally described by me from Okinawashima, Riu Kiu. The Formosan specimens are recorded by Boulenger as *Rana kuhlii* and by Van Denburgh as *R. namiyei*, the former expressing the belief that they should be united. Direct comparison between authentic specimens from Riu Kiu and from Formosa is required to decide which of the two forms occurs in the latter island.

RANA TIGERINA Daudin.

(Herpet. Japan, 1907, p. 139.)

Apparently common in Formosa.

RANA SAUTERI Boulenger.

1909. *Rana sauteri* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1, 1909, p. 493 (type-locality, Kanshirei village, 2,000 feet alt., Formosa; types in Brit. Mus.; H. Sauter, collector).

This addition to the Formosan fauna is said to be related to *Rana mortensenі*, from Burma and Siam.

RANA ADENOPLEURA Boulenger.

1909. *Rana adenopleura* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1, 1909, p. 492 (type-locality, Fuhacho village, 4,000 feet alt., Formosa; types in Brit. Mus.; H. Sauter, collector).

Another novelty, stated to agree very closely with *Rana pleuraden*, from Yunnan.

RANA TAIPEHENSIS Denburgh.

1909. *Rana taipehensis* DENBURGH, Proc. California Acad. Sci. (4), Dec. 20, 1909, p. 56 (type-locality, Taipeh, Formosa; type, California Acad. Sci. No. 18007).

This is possibly the same as the foregoing species, though a comparison of the original descriptions shows several discrepancies.

Thus in *R. adenopleura* the vomerine teeth are described as "between the choanæ," in *R. taipehensis* as "between and extending behind the choanæ;" first finger as "extending slightly beyond

second," against "first not longer than second." In the coloration the most notable discrepancy is in the markings on the limbs, which in *R. adenopleura* are said to be marked "with dark cross bars," but in *R. taipehensis* "with longitudinal dark stripes." Boulenger compares his species with *R. pleuraden*, Van Denburgh his with *R. erythræa*.

POLYPEDATES MOLTRECHTI (Boulenger).

1908. *Rhacophorus moltrechti* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 2, Aug. 1908, p. 221 (type-locality, Lake Candidje, Nanto district, central Formosa; types in Brit. Mus.; Dr. A. Moltrecht, collector); vol. 4, Dec. 1909, p. 495 (Kosempo, Formosa).

Not as yet reported from outside Formosa.

POLYPEDATES ROBUSTUS (Boulenger).

1909. *Rhacophorus robustus* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1909, p. 494 (type-localities, Kankau, Alikang, and Kosempo, Formosa; H. Sauter, collector).

According to Boulenger this form is closely allied to *P. buergeri* of Japan (Herpet. Japan, 1907, p. 150).

POLYPEDATES EIFFINGERI (Boettger).

(Herpet. Japan, 1907, p. 153.)

1895. *Rana eiffingeri* BOETTGER, Zool. Anz., vol. 18, July 8, 1895, p. 267.—*Rhacophorus eiffingeri* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1909, p. 495 (Kanshirei, Formosa).

The recording of this form in Formosa by Boulenger is very interesting, since, like *P. robustus*, it is also related to *P. buergeri*, of which species it has been regarded as the Riu Kiu representative. It is consequently the more to be regretted that the exact locality of the type of *P. eiffingeri* is not known. The question also arises whether any form corresponding to *P. robustus* may not occur in the Riu Kiu Archipelago. As another possibility it is suggested that Hallowell may have been correct in recording *P. burgeri* from the "Loo Choo Islands," and from "Ousima."

POLYPEDATES JAPONICUS (Hallowell).

(Herpet. Japan, 1907, p. 155.)

1860. *Ixalus japonicus* HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1860, p. 501. *Rhacophorus japonicus* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1909, p. 495 (Kankau, Formosa).

This is another Riukiuan species, now for the first time recorded from Formosa. As I have already shown in the Herpetology of Japan, it does not occur in Japan proper, notwithstanding the specific name given it by Hallowell.

Class REPTILIA.

Order SQUAMATA.

Suborder SAURIA.

Family GEKKONIDÆ.

GEKKO JAPONICUS (Duméril and Bibron).

(Herpet. Japan, 1907, p. 165.)

This species has its center of distribution in south-central and eastern China, and is said to be common everywhere in Formosa. The account of its habits by Swinhoe and reprinted in the Herpetology of Japan, pp. 164–165, refers particularly to Formosan specimens.

HEMIDACTYLUS FRENATUS Duméril and Bibron.

(Herpet. Japan, 1907, p. 172.)

Specimens from Taiwan fu are in British Museum and are in the Bergen Museum from "Formosa."

HEMIDACTYLUS BOWRINGII (Gray).

(Herpet. Japan, 1907, p. 176.)

1845. *Dorpura bowringii* GRAY, Cat. Liz. Brit. Mus., p. 156.—*Hemidactylus bowringii* BARBOUR, Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, p. 62 (Formosa).

In addition to the specimen recorded by me, Mr. Barbour has obtained two specimens from "Formosa."

COSYMBOTUS PLATYURUS (Schneider).

(Herpet. Japan, 1907, p. 178.)

No record additional to the one given there.

PEROPUS MUTILATUS (Wiegmann).

(Herpet. Japan, 1907, p. 180.)

The same remark applies to the present species.

Family AGAMIDÆ.

JAPALURA SWINHONIS Guenther.

(Herpet. Japan, 1907, p. 184.)

1864. *Japalura swinhonis* GUENTHER, Rep. Brit. India, p. 133, pl. 14, fig. *B*.—BARBOUR, Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, p. 63 Bankoro, Central Formosa).

Common throughout the island.

JAPALURA MITSUKURII Stejneger.

(Herpet. Japan, 1907, p. 190.)

Apparently restricted to the island of Botel Tobago.

Family SCINCIDÆ.

EUMECES ELEGANS Boulenger.

(Herpet. Japan, 1907, p. 202.)

Known both from Formosa and the Pescadores.

EUMECES CHINENSIS (Gray).

(Herpet. Japan, 1907, p. 208.)

Collected by Swinhoe at Tamsui and by Tada at Taipa.

MABUYA LONGICAUDATA (Hallowell).

(Herpet. Japan, 1907, p. 214, pl. 16.)

Nothing new has been added to our knowledge of the status of the Formosan specimens. Barbour, however, has examined specimens from Hainan and Siam and find that in these the scales have three keels, while Fischer's figure (reproduced in Herpet. Japan, pl. 16, fig. 5) shows only two, and on the strength of this discrepancy he suspects *Mabuya ruhstrati* (Fischer) from South Formosa of being a valid species.[a]

SPHENOMORPHUS INDICUS (Gray).

(Herpet. Japan, 1907, p. 216, pl. 17, figs. 1–2.)

1853. *Hinulia indica* GRAY, Ann. Mag. Nat. Hist. (2), vol. 12, Dec. 1853, p. 388.
Sphenomorphus indicus BARBOUR, Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, p. 64 (Bankoro, Central Formosa).

Two additional specimens, collected April 26, 1907, at Bankoro, Central Formosa, have been recorded by Mr. Barbour, to whose kindness I owe the privilege of examining them. Both have 34 scale rows around the middle of the body. The larger specimen is without a dark lateral band, which is quite pronounced in the smaller one.

Genus DASIA Gray.

1839. *Dasia* GRAY, Ann. Nat. Hist., vol. 2, no. 11, Jan. 1839, p. 331 (type, *D. olivacea*).
1843. *Liotropis* FITZINGER, Syst. Rep. p. 22 (type, *Euprepes cruesti* = *D. olivacea*).
1843. *Lamprolepis* FITZINGER, Syst. Rep., p. 22 (type, *Lygosoma smaragdinum*).
1845. *Keneuxia* GRAY, Cat. Liz. Brit. Mus., p. 79 (type, *K. smaragdina*).
1864. *Apterygodon* EDELING, Nederland. Tijdsschr. Dierk., vol. 2, (p. 201), (type, *A. vittatum*).

The genus being additional to the fauna of Formosa and not included in the Herpetology of Japan, the synonymy, as well as that of the following species, is here given in full.

[a] Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, p. 64.

DASIA SMARAGDINA (Lesson).

1830. *Scincus smaragdinus* LESSON, Voy. *Coquille*, Zool., vol. 3, pt. 1, p. 43, pl. 3, fig. 1 (type-locality, Ualan, Caroline Islands; Lesson, collector).—*Lygosoma smaragdinum* BOULENGER, Cat. Liz. Brit. Mus., vol. 3, 1887, p. 250.—BARBOUR, Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, p. 65 (Bankoro, Formosa).

1830. *Scincus viridipunctus* LESSON, Voy. *Coquille*, Zool., vol. 3, pt. 1, p. 44, pl. 4, fig. 1 (type-locality, Ualan, Caroline Islands; Lesson, collector).

1830. *Scincus cælestinus* GUÉRIN, Icon. Règne Anim., Rept., pl. 15, fig. 2 (type-locality not given, probably Java).

1872. *Lygosoma (Hinulia) smaragdinum* var. *viridifuscum* PETERS, Mon.-Ber. Berlin Akad. Wiss., 1872, p. 776 (type-locality, Boston Island; types in Berlin Mus.; Godeffroy collection).

1891. *Lygosoma acutirostre* OUDEMANS, in Semon, Zool. Forsch., vol. 5, (p. 141, fig.), (type-locality, Salayer Island, s. of Celebes).

A single, very young specimen was acquired by Mr. Barbour from Mr. Owston, whose collector obtained it in the central portion of Formosa. By a careful comparison I can find no character which would separate it from Philippine specimens.

Description.—Mus. Comp. Zool.; Bankoro, Central Formosa; April 26, 1907; Owston coll. No. 9255. Distance between the end of snout and the fore leg equaling the distance between axilla and groin; snout long, pointed, depressed; lower eyelid scaly; rostral large, broadly in contact with fronto-nasal; fronto-nasal large, pentagonal, broader than long, in contact with anterior loreal and prefrontals; prefrontals broadly in contact separating fronto-nasal from frontal; frontal as long as fronto-parietals and interparietal together, narrow behind, in contact with first, second, and third supraoculars; four subequal supraoculars; nine superciliaries, first two largest; fronto-parietals and interparietal distinct, the latter as long as suture between the former; parietals broadly in contact behind interparietal; four nuchals on left side, three on right; nostril in the middle of a single nasal; no supranasal; two loreals, one behind the other, both longer than high, especially the anterior, which is of the same height as the nasal; eight supralabials, sixth forming a large subocular much larger than the others and as long as the two anterior to it; two large temporals, the lower wedge-shaped, the upper longer, with parallel upper and lower edges and in contact with parietal; ear-opening small, with one upper larger and two small lower lobes on its anterior border; 26 rows of smooth scales around the middle of the body; preanal scales somewhat larger than those adjoining, especially the middle pair; hind leg stretched forward reaches the axil; subdigital lamellæ under fourth toe 33; an enlarged scale on heel. Color above (in alcohol) light brownish gray, each scale edged with dark brown and almost every other in the

longitudinal rows with this dark edge widened at the tip into a dark brown spot, while the rest of the scale is occupied by a whitish dot in such a manner as to form a regular system of oblique lines of bead-like spots from the middle of the back toward the flanks; top of head with dark brown edges to the shields and a few symmetrical whitish dark-edged dots on the shields of the parietal region; legs above with rounded whitish dots; tail obscurely banded, with darker and lighter brownish gray; underside pale.

Dimensions.

	mm.
Total length	107
Tip of snout to vent	40
Vent to tip of tail	67
Snout to ear	10.5
Axilla to groin	18
Fore leg	15
Hind leg	20

Family LACERTIDÆ.

TAKYDROMUS SEPTENTRIONALIS Guenther.

(Herpet. Japan, 1907, p. 232.)

1864. *Tachydromus septentrionalis* GUENTHER, Rep. Brit. India, p. 69.—*Takydromus septentrionalis* DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 50 (Pescadores, Taihoku, Koshun, Polisia, and Kelung).

Apparently the commonest species of the genus in Formosa.

TAKYDROMUS FORMOSANUS Boulenger.

(Herpet. Japan, 1907, p. 235.)

No additional specimens have been recorded which might throw light on the status of this species.

TAKYDROMUS SAUTERI Denburgh.

1909. *Takydromus sauteri* DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 50 (type-locality, Koshun, Formosa; type, Cal. Acad. Sci. No. 18001; H. Sauter, collector).

This addition to the Formosan fauna belongs to the section of the genus characterized by four pairs of submental shields. Like *T. wolteri* it has only one inguinal pore, but is described as having head and tail very elongate. The color is bright green above.

TAKYDROMUS KUEHNEI Denburgh.

1909. *Takydromus kuehnei* DENBURGH, Proc. California Acad. Sci.(4), vol. 3, Dec. 20, 1909, p. 50 (type-locality, Kanshirei, Formosa; type, Cal. Acad. Sci., No. 18002).

Belongs to the same section as the foregoing, but is distinguished by having 4 or 5 pores in each groin.

Family ANGUIDÆ.

Genus OPHISAURUS Daudin.

1803. *Ophisaurus* Daudin, Hist. Nat. Rep., vol. 7, p. 346 (type, *O. ventralis*).
1820. *Hyalinus* Merrem, Tent. Syst. Amph., p. 79 (type, *O. ventralis*).
1830. *Ophiosaurus* Wagler, Nat. Syst. Amph., p. 159 (emendation).
1853. *Dopasia* Gray, Ann. Mag. Nat. Hist. (2), vol. 12, p. 389 (type, *D. gracilis*).
1853. *Ophiseps* Blyth, Journ. Asiat. Soc. Bengal, vol. 22 (p. 655), (type, *O. tessellatus=D. gracilis*).

OPHISAURUS, species.

1909. *Ophisaurus harti?* Denburgh, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 60 (not of Boulenger?).

The addition of a "glass-snake" to the fauna of Formosa is very interesting, though for the present the species must remain in doubt. To explain the situation, I can do no better than quote Van Denburgh's own words, as follows:

> The presence in Formosa of a species of *Ophisaurus* is attested by a specimen now in the Taiwan Medical School. This specimen was collected by the late Rev. Mr. Mackay, at Tamsue. Another specimen, collected at Shinchiku, was formerly in this museum, but has been lost. We have not as yet secured a specimen, but our collector states that individuals have been seen at Takao sunning themselves on a stone wall that borders a grove of screw pines.
>
> The general relationship of the fauna would lead one to suspect that the *Ophisaurus* of Formosa is probably identical with Boulenger's *O. harti* from Fokien, China; but the notes which I have received concerning the specimen in the medical school indicate that the Formosan lizard is distinct. The matter must remain undecided until a specimen is received for examination.

Suborder SERPENTES.

Family TYPHLOPIDÆ.

TYPHLOPS BRAMINUS (Daudin).

(Herpet., Japan, 1907, p. 260.)

Specimens of this widely distributed blind-snake have been collected in Formosa by Swinhoe, Dickson, and Novara.

Family NATRICIDÆ.

Genus SIBYNOPHIS Fitzinger.

1843. *Sibynophis* Fitzinger, Syst. Rep., p. 26 (type, *Herpetodryas geminatus* Schlegel).
1854. *Enicognathus* Duméril and Bibron, Erpét. Gén., vol. 7, p. 328 (type, *H. geminatus*), (not of G. R. Gray, 1840).
1876. *Henicognathus* Cope, Journ. Acad. Nat. Sci. Phila., vol. 8 (p. 138), (emendation), (not of Agassiz, 1846).
1890. *Polyodontophis* Boulenger, Fauna Brit. India, Rep., p. 301 (substitute for *Enicognathus*, preoccupied).

SIBYNOPHIS COLLARIS (Gray).

1853. *Psammophis collaris* GRAY, Ann. Mag. Nat. Hist. (2), vol 12, p. 390 (type-locality, Khasi Hills; types in Brit. Mus.; J. Hooker, collector).—*Polyodontophis collaris* BOULENGER, Fauna Brit. India, Rep., 1890, p. 302 (Himalayas; Assam; Arrakan; Upper Burma; S. China); Cat. Snakes Brit. Mus., vol. I, 1893, p. 184, pl. 12, fig. 1; vol. 3, 1896, p. 597.—DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 50 (Kanshirei, Formosa).

1889. *Ablabes sinensis* GUENTHER, Ann. Mag. Nat. Hist. (6), vol. 4, (p. 220), (type-locality, Ichang, Upper Yangtse Kiang, China; type in Brit. Mus.; A. E. Pratt, collector).

Two specimens of this addition to the Formosan fauna, from Kanshirei, are recorded by Mr. Van Denburgh.

NATRIX STOLATA (Linnæus).

(Herpet. Japan, 1907, p. 280.)

1758. *Coluber stolatus* LINNÆUS, Syst. Nat., 10 ed., vol. 1, p. 219.—*Natrix stolatus* BARBOUR, Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, p. 67 (Central Formosa; Hainan).

A common species in Formosa. Mr. Barbour has recorded it from Mount Arizan, Central Formosa.

NATRIX PISCATOR (Schneider).

(Herpet. Japan, 1907, p. 288.)

No addition to my previous record.

NATRIX ANNULARIS (Hallowell).

(Herpet. Japan, 1907, p. 291.)

The same remark applies to this as to the foregoing species.

NATRIX SWINHONIS (Guenther).

(Herpet. Japan, 1907, p. 293.)

1868. *Tropidonotus swinhonis* GUENTHER, Ann. Mag. Nat. Hist. (4), vol. 1, 1868, p. 420.—BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, 1909, p. 495 (Kosempo, Formosa).

In addition to the unique type-specimen, the British Museum now has this species from Kosempo, collected by Mr. H. Sauter, as recorded by Boulenger.

NATRIX SAUTERI (Boulenger).

1909. *Tropidonotus sauteri* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1909, p. 495 (type-locality, Kosempo, Formosa; types in Brit. Mus.; H. Sauter, collector).

1909. *Natrix copei* DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 52 (type-locality, Kanshirei, Formosa; type, Cal. Acad. Sci. No. 18004).

The name given by Boulenger to this interesting novelty has about twenty days priority over that given by Van Denburgh. According to the first-mentioned author it is allied to *N. swinhonis*.

Genus PSEUDOXENODON Boulenger.

1830. *Xenodon* WAGLER, Syst. Amph., p. 171 (type, *X. inornatus* BOIE) (not of Fitzinger, 1825).

1890. *Pseudoxenodon* BOULENGER, Fauna Brit. India, Rep., p. 340 (type, *P. macrops*).

PSEUDOXENODON STEJNEGERI Barbour.

1908. *Pseudoxenodon stejnegeri* BARBOUR, Bull. Mus. Comp. Zool., Cambridge, vol. 51, no. 12, p. 317 (type-locality, Mount Arizan, Formosa; type, No. 7103, M. C. Z. C.; Owston collection); Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, p. 67, pl. 7, fig. 8 (type).

Only a single specimen from Mount Arizan, Central Formosa, was taken November 29, 1906. The species, according to its original describer, is related to *Pseudoxenodon dorsalis* from China.

Genus MACROPISTHODON Boulenger.

1893. *Macropisthodon* BOULENGER, Cat. Snakes Brit. Mus., vol. 1, p. 265 (type, *M. flaviceps*).

1909. *Pseudagkistrodon* DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 51 (type, *P. carinatus*).

The chief difference relied upon to distinguish *Pseudagkistrodon* from *Macropisthodon* is the lack of interspace between the anterior maxillary teeth and the posterior large fangs, a character scarcely sufficient in the present instance.

MACROPISTHODON CARINATUS (Denburgh).

1909. *Pseudagkistrodon carinatus* DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 51 (type-locality, Formosa; type, Cal. Acad. Sci., No. 18003).

In addition to the type which seems to have no definite locality attached to it, specimens are recorded from Toroku and Mount Arizan, central Formosa.

Apparently the present form is very closely allied to the Chinese species *M. rudis*, which is recorded from Fokien and Yunnan. It agrees with it in the very strongly keeled scales, the keeled temporals, and in the presence of suboculars. The scale formula is also substantially alike in the two species, except that in the Chinese specimens recorded the scale rows are 25, but in the Formosan 23.

ACHALINUS FORMOSANUS Boulenger.

1908. *Achalinus formosanus* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 2, Aug. 1908, p. 222 (type-locality, Punkiho, Kagi district, Central Formosa; type in Brit. Mus.; Doctor Moltrecht, collector).

Beyond the type-specimen nothing is known of this interesting addition to the Formosan fauna. In spite of its large number of scale rows (27) it appears to be more nearly related to *A. spinalis* than to *A. rufiscens*.

ENHYDRIS PLUMBEA (Boie).

(Herpet. Japan, 1907, p. 300.)

1827. *Homalopsis plumbea* BOIE, Isis, 1827, p. 550.—*Enhydris plumbea* BARBOUR, Proc. New England Zool. Club, vol. 4, 1909, p. 68 (Bankoro, Formosa; Hainan).

In addition to the Formosan specimens mentioned by me, Mr. Barbour has listed another from Bankoro, central Formosa.

ENHYDRIS BENNETTII (Gray).

(Herpet. Japan, 1907, p. 302.)

No further record of the occurrence of this snake in Formosa has been forthcoming since the issue of the Herpetology of Japan.

HURRIA RYNCHOPS (Schneider).

(Herpet. Japan, 1907, p. 304.)

The same remark applies to the present species as to the foregoing.

ELAPHE CARINATA (Guenther).

(Herpet. Japan, 1907, p. 308.)

Four specimens are thus far known from Formosa.

ELAPHE PORPHYRACEA (Cantor).

1839. *Coluber porphyraceus* CANTOR, Proc. Zool. Soc. London, 1839, p. 39 (type-locality, Mishmee hills, Assam).—BOULENGER, Cat. Snakes Brit. Mus., vol. 2, 1894, p. 34 (Eastern Himalayas; hills of Assam; Burma; Yunnan; Malay Peninsula; Sumatra); Proc. Zool. Soc. London, 1899, p. 165 (Fokien, China).—*Elaphe porphyracea* DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 53 (Kanshirei, Shinchiku, and Giran, Formosa).

1839. *Psammophis nigrofasciatus* CANTOR, Proc. Zool. Soc. London, 1839, p. 53 (type-locality, Singapore; type in Brit. Mus.; Cantor, collector).

1853. *Coronella callicephalus* GRAY, Ann. Mag. Nat. Hist. (2), vol. 12, p. 390, (type-locality, Khasi Hills; type in Brit. Mus.; J. Hooker, collector).

This is another east Himalayan species whose range has now been ascertained to extend to Formosa. Judging from the fact that the collector of the San Francisco Academy sent specimens from three different localities, it can not be very rare in the island.

ELAPHE RUFODORSATA (Cantor).

(Herpet. Japan, 1907, p. 310.)

Not recorded from Formosa since Swinhoe's time. He sent specimens from Tamsui to British Museum.

ELAPHE TÆNIURUS Cope.

(Herpet. Japan, 1907, p. 319.)

The record of this species in Formosa still rests on the two specimens in Museum Senckenbergianum in Frankfort-on-the-Main.

LIOPELTIS MAJOR (Guenther).

(Herpet. Japan, 1907, p. 338.)

1858. *Cyclophis major* GUENTHER, Cat. Colubr. Snakes Brit. Mus., p. 120.—*Liopeltis major* BARBOUR, Proc. New England Zool. Club., vol. 4, 1909, p. 69 (Formosa; Ichang, Hupeh, China).

The seventh specimen from Formosa, the female recorded by Mr. Barbour, I have had the privilege to examine. Its scale formula is as follows: Sc. 15; v. 169; a. 2; c. 92; oc. 3–2; t. 1+2; l. 8.

PTYAS MUCOSUS (Linnæus).

(Herpet. Japan, 1907, p. 345.)

Three specimens are recorded from Formosa, one of them from Taiwan-fu.

PTYAS KORROS (Schlegel).

(Herpet. Japan, 1907, p. 348.)

ZAOCYS DHUMNADES (Cantor).

(Herpet. Japan, 1907, p. 352.)

Nothing has been recorded which will shed additional light on the status of these two species as members of the Formosan fauna.

Genus OLIGODON Boie.

1827. *Oligodon* BOIE, Isis, 1827 (p. 519) (type, *O. bitorquatus*).

OLIGODON ORNATUS Denburgh.

1909. *Oligodon ornatus* DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 53 (type-locality, Shinchiku, Formosa; type, Cal. Acad. Sci. No. 18005).

The occurrence of a species of this essentially Indian and Malayan genus in Formosa is quite unexpected, as no member of the genus has hitherto been found in China. However, as one species has long been known from Assam, while two others have recently been described from Nepal and Burma, the present addition to the fauna of Formosa, or a closely allied species, may some day turn up in the intervening territory of China, from which many a novelty may yet be expected.

The type-specimen is the only one thus far recorded.

HOLARCHUS FORMOSANUS (Guenther).

(Herpet. Japan, 1907, p. 354.)

1872. *Simotes formosanus* GUENTHER, Ann. Mag. Nat. Hist. (4), vol. 9, Jan. 1872, p. 20.—*Holarchus formosanus* BARBOUR, Proc. New England Zool. Club, vol. 4, 1909, p. 69 (Mt. Arizan, Formosa).

Seems rather common in Formosa. Barbour maintains that the Hainan specimens form a distinguishable "local color variety."

DINODON[a] RUFOZONATUM (Cantor).

(Herpet. Japan, 1907, p. 358.)

Common in Formosa, though not recorded as being in any of the collections recently made there.

DINODON SEPTENTRIONALE RUHSTRATI (Fischer.)

(Herpet. Japan, 1907, p. 370).

Nothing has been added since.

CALAMARIA BEREZOWSKII Guenther.

(Herpet. Japan, 1907, p. 376).

1909. *Calamaria parimentata* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1, 1909, p. 495 (Kosempo, Formosa) (not of Duméril and Bibron?).

Boulenger suggests[b] that Guenther's *Calamaria berezowskii* "is probably not specifically separable" from *C. parimentata*. This may be so, but for the reasons given in my Herpetology of Japan, p. 375, I "can not consider the question finally settled," and therefore prefer to leave the nomenclature undisturbed until sufficient material shall have accumulated to make a final disposition of these forms possible.

BOIGA KRÆPELINI Stejneger.

(Herpet. Japan, 1907, p. 381).

1902. *Boiga kræpelini* STEJNEGER, Proc. Biol. Soc. Washington, vol. 15, p. 16.—*Dipsadomorphus kræpelini* BOULENGER, Ann. Mag. Nat. Hist. (8), vol. 4, Dec. 1909, p. 495 (Kankau and Kosempo, Formosa).

The additional specimens listed by Boulenger make it appear probable that this snake is not so rare as its late discovery might suggest.

PSAMMODYNASTES PULVERULENTUS (Boie).

(Herpet. Japan, 1907, p. 383).

Nothing added to the status of this snake in Formosa.

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[a] No further light has been shed on the alleged occurrence of *Lycodon aulicus* (Linnæus) in Formosa (Herpet. Japan, 1907, p. 358).

In this latter work (p. 356, footnote) I stated that inasmuch as Boie himself, in 1827, fixed *L. audax* as the type of *Lycodon*, which was established in 1826 without designated type, this generic name must be retained for the South American *Lycognathus*. It appears, however, that Fitzinger (Neue Class. Rept., 1826, pp. 29, 30) designated *Coluber aulicus* as the type of the genus, consequently previously to Boie, and as not even the latter himself, under the International Code, could undo the previous action of Fitzinger, the name *Lycodon* must be retained in the sense adopted by Boulenger.

[b] Ann. Mag. Nat. Hist. (8), vol. 4, 1909, p. 495.

Family AMBLYCEPHALIDÆ.

(Herpet. Japan, 1907, p. 255.)

Genus AMBLYCEPHALUS Boie.

1822. *Amplycephalus* Kuhl, Isis, 1822, p. 474 (*nomen nudum*).
1827. *Amblycephalus* Boie, Isis, 1827, p. 519 (type, *A. laevis*).
1830. *Parcas* Wagler, Nat. Syst. Amph., p. 181 (type, *Dipsas carinatus*).

AMBLYCEPHALUS FORMOSENSIS Denburgh.

1909. *Amblycephalus formosensis* Denburgh, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 55 (type-locality, Kanshirei, Formosa; type, Cal. Acad. Sci. No. 18006).

This interesting novelty seems to hold a somewhat intermediate position between *A. monticola*, which occurs in the Eastern Himalayas, the Khasi hills and the Assam hills in Assam, and *A. moellendorffi* from southeastern China and Indo-China. With the former it shares scale-formula and enlarged median dorsals, with the latter the exclusion of the supralabials from the eye.

Family ELAPIDÆ.

CALLIOPHIS MACCLELLANDII (Reinhardt).

(Herpet. Japan, 1907, p. 391.)

1844. *Elaps macclellandii* Reinhardt, Calcutta Journ. Nat. Hist., vol. 4, p. 532.—*Callophis macclellandii* Denburgh, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 54 (Kosempo and Suishako, Formosa).

Van Denburgh simply remarks that specimens of this species have been received from the localities quoted above, but he does not give any scale formulas which would throw light on the question raised in the Herpetology of Japan, whether a high number of ventrals may not characterize a separate Formosan form.

CALLIOPHIS, species.

Callophis Denburgh, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 54 (Giran, Formosa).

A specimen preserved in the Taiwan library is doubtfully referred to by Van Denburgh as possibly "an undescribed species." From the description furnished by his correspondent it appears that the scale formula and other external structural characters are essentially as in the specimen of *C. macclellandii* from Formosa described by me in the Herpetology of Japan. Among other characteristics it thus possesses 243 ventrals. The coloration, however, is very different, being longitudinally striped instead of transversely barred, and by the additional lateral white spots reminds one of the pattern of *Hemibungarus boettgeri*. This similarity might tempt one to suggest that the Giran specimen may belong to the latter genus rather than to *Calliophis*,

but against this it should be noted that Van Denburgh expressly states that "no small teeth could be made out on the right maxilla" (the left was found to be destroyed). However, considered in connection with my former statement (Herpet. Japan, p. 387) that *Calliophis macclellandii* and *Hemibungarus japonicus* (and consequently also *H. boettgeri*) "seem to be so closely related to each other that the latter appears less nearly allied to any of the other species of *Hemibungarus*," the suggestion seems justified that the Riukiuan species is genetically connected with the Formosan form here discussed. If so, the distinctness of the last-mentioned genus, as now defined, becomes very dubious indeed.

NAJA NAJA ATRA (Cantor).

(Herpet. Japan, 1907, p. 394.)

Beyond the single specimen in the British Museum, which Mr. La Touche collected near South Cape, Formosa, nothing has been recorded regarding the occurrence of the cobra in this island.

BUNGARUS MULTICINCTUS Blyth.

(Herpet. Japan, 1907, p. 397.)

Found both in northern and southern Formosa, and according to Mr. Tada common around Taipa.

LATICAUDA LATICAUDATA (Linnæus).

(Herpet. Japan, 1907, p. 402.)

Apparently common along the coasts of Formosa.

[LATICAUDA COLUBRINA (Schneider).]

(Herpet. Japan, 1907, p. 406.)

No actual capture of this species on the coasts of Formosa has as yet been recorded, though there is every reason to believe that it occurs there.

[LATICAUDA SEMIFASCIATA (Reinwardt).]

(Herpet. Japan, 1907, p. 409, pl. 22.)

Occurring, as this species does, in the sea surrounding the neighboring islands of the southern Riukius and also in the Moluccan Sea, it may be looked for with confidence in Formosan waters as well.

EMYDOCEPHALUS IJIMÆ Stejneger.

(Herpet. Japan, 1907, p. 413.)

In a recent paper[a] Doctor Boulenger admits the validity of the genus *Emydocephalus* and supplies several additional cranial charac-

[a] Note on the Ophidian genus Emydocephalus, in Ann. Mag. Nat. Hist. (8), vol. 1, Mar. 1908, p. 231.

ters in support of it, but he still maintains the identity of the present species with *E. annulatus*. Doctor Wall, on the other hand, who in his two earlier papers[a] supported Boulenger's view, in his recent Monograph of the Sea Snakes,[b] comes to the same result as I, though quite independently of my arguments in the Herpetology of Japan, which had not reached him at the time he prepared his work.

DISTEIRA MELANOCEPHALA (Gray).

(Herpet. Japan, 1907, p. 421.)

It is equally gratifying to see that Doctor Wall, also quite independent of my action, has suppressed the genus *Hydrophis* and united it with *Disteira*,[c] a procedure likewise indorsed by Mr. Van Denburgh and Doctor Thompson.[d]

In his Monograph of the Sea Snakes, Doctor Wall not only unites *D. spiralis*, *brugmansii*, *melanocephala*, *subcincta*, *melanosoma*, *vrayi*, *flowri*, and *alcocki*, but suggests that *cyanocincta* and *lapemoides* "will eventually be united" with *D. spiralis*. It is quite possible that he is right or nearly right in this view, but I think he has to some extent anticipated what will "eventually" take place. In saying this I allude to the fact that he states that he considers them "all divided on insufficient grounds, affecting shields known to be subject to variation in this and other allied species." It is not reassuring to read that analogy from *other allied species* has to be invoked in order to effect this wholesale lumping. Even the fact that some of the characters relied upon for distinction are *subject to variation* is not in itself sufficient cause for uniting allied forms. Every herpetologist knows that in numerous cases of undoubtedly distinct species the variation of individual shields is so great that recourse has to be had to a combination of characters in order to phrase a diagnosis that will apply to most of the specimens. If Doctor Wall requires absolutely hard and fast lines in these snakes he may eventually be compelled to make further reductions in the number of species. Adding to these considerations the further fact that the difference between *D. spiralis* and *D. melanocephalus* is sufficiently marked to draw from him the admission "that *melanocephalus* is a local variety of *spiralis* characterized by rather fewer neck scales" (p. 212), I believe myself justified in retaining *Disteira melanocephala* as a distinct heading, at least for the present.

Beyond the specimen recorded by me from the Pescadores nothing further is known about this snake on Formosa, though it probably is common around the coasts of that island.

[a] Proc. Zool. Soc. London, 1903, pp. 84–102, and 1905, vol. 2, pp. 511–517.

[b] Mem. Asiatic Soc. Bengal, vol. 2, no. 8, 1909, p. 187.

[c] Idem, p. 193.

[d] Proc. California Acad. Sci. (4), vol. 3, Dec. 31, 1908, p. 41.

DISTEIRA CYANOCINCTA (Daudin).

(Herpet. Japan, 1907, p. 128.)

As for the status of this species I may refer to the remarks under the foregoing species. It appears to be common around Formosa.

[DISTEIRA VIPERINA (Schmidt).]

(Herpet. Japan, 1907, p. 131.)

As this species has been recorded from Hongkong and from Swatow, on the mainland side of the Formosa Channel, there is every reason to suppose that it also occurs on the island side, though not actually recorded from there as yet.

Genus PELAMYDRUS,[a] new name.

1890. *Hydrus* BOULENGER, Fauna Brit. India, Rep., p. 397 (type *H. platurus*), (not of Schneider, 1799).—STEJNEGER, Herpet. Japan, 1907, p. 138.

Under article 30, I, d, of the International Rules of Zoological Nomenclature, Pallas' *Coluber hydrus* becomes the type of Schneider's genus *Hydrus*.[b] Latreille, in 1802, substituted for *Hydrus*, which he considered preoccupied by *Hydra*, the name *Hydrophis*.[c] The following year Daudin, considering *Hydrophis* inappropiate, as these snakes inhabit the sea, substituted *Pelamis* for it.[d] Both of these names being expressly designated as substitutes and without designated type must have for type the same species which is the type of *Hydrus*.[e] Gistel's *Elaphrodytes* of 1848 is in the same category, and the genus comprising Linnæus's well-known *Anguis platura* must be given a new name.

PELAMYDRUS PLATURUS (Linnæus).

1766. *Anguis platura* LINNÆUS, Syst. Nat., 12. ed., vol. 1, p. 391. *Hydrus platurus* STEJNEGER, Herpet. Japan, 1907, p. 139.

"Of regular occurrence around Formosa."

[a] From πηλαμύς, a young thunny, and ὕδρος, a water snake.

[b] See opinion by International Committee of Zoological Nomenclature in Science (n. s.), vol. 31, Jan. 28, 1910, p. 150.

[c] "Nous croyons devoir, pour éviter la confusion, substituer le mot *hydrophis*, qui veut dire serpent d'eau, à celui d'hydre ou d'*hydrus* de Schneider." Hist. Nat. Rep., vol. 4, p. 193.

[d] "Ce genre comprend trois espèces * * * elles ont servi à Latreille pour former son genre hydrophis; mais comme elles habitent la mer, je les ai appelées de préférence *pélamides*, et j'ai substitué le nom *d'hydrophis* aux orvets à queue plate et venimeux qui vivent dans l'eau douce." Hist. Nat. Rep., vol. 7, p. 361.

[e] International Rules of Zoological Nomenclature, art. 30, II, f.

Family CROTALIDÆ.

AGKISTRODON ACUTUS (Guenther).

1888. *Halys acutus* GUENTHER, Ann. Mag. Nat. Hist. (6), vol. 1, 1888 (p. 171; pl. 12), (type-locality, mts. w. of Kiukiang, China; types in Brit. Mus., A. E. Pratt, collector).—*Ancistrodon acutus* BOULENGER, Cat. Snakes Brit. Mus., vol. 3, 1896, p. 524 (Ichang).—*Agkistrodon acutus* NAMIYE, Zool. Mag., Tokyo, No. 236, June 15, 1908, p. 192, pl.—DENBURGH, Proc. California Acad. Sci. (4), vol. 3, Dec. 20, 1909, p. 55 (Koshun and Shinchiku, Formosa).

This interesting addition to the Formosan fauna was made by Namiye in 1908, and its occurrence in the island has since been corroborated by the collection made for the California Academy. Occurring, as it does, on the upper Yangtze Kiang and in the province of Fokien, opposite Formosa, its capture in the latter adds another fact to the many previous ones connecting its fauna with that of the Chinese mainland.

TRIMERESURUS MUCROSQUAMATUS (Cantor).

(Herpet. Japan, 1907, p. 467.)

1870. *Trimeresurus mucrosquamatus* SWINHOE, Proc. Soc. Zool. London, 1870, p. 411, pl. 31.—BARBOUR, Proc. New England Zool. Club, vol. 4, 1909, p. 75 (Bankoro, Central Formosa).

No additional light has been thrown on the occurrence of this species on the mainland, and the identity of the Formosan specimens with the species described from the "hills" in Assam remains still in obscurity. The specimen recorded by Barbour from Bankoro, in central Formosa, has the unusual number of 18 scales between the supraoculars, the latter being extremely narrow. Otherwise it comes within the limits of variation recorded by me.

TRIMERESURUS MONTICOLA Guenther.

1853. *Parias maculata* GRAY, Ann. Mag. Nat. Hist. (2), vol. 12, Dec. 1853, p. 392 (type-locality, Sikkim; type in Brit. Mus.; Dr. J. Hooker, collector), (not *Trimesurus maculatus* GRAY, 1842).

1861. *Trimeresurus monticola* GUENTHER, Rep. Brit. India, p. 388, pl. 24, fig. B (type-localities, Nepaul and Sikkim; types in Brit. Mus.; Hodgson and Hooker, collectors).—BARBOUR, Proc. New England Zool. Club, vol. 4, Nov. 24, 1909, p. 74 (Mt. Arizan, Central Formosa).—*Lachesis monticola* BOULENGER, Cat. Snakes Brit. Mus., vol. 3, 1896, p. 548 (Tibet, Himalayas, Assam to Malay peninsula and Sumatra).

1870. ? *Trimeresurus convictus* STOLICZKA, Journ. Asiatic Soc. Bengal, vol. 39, p. 224, pl. 12, figs. 1–1*b* (type-locality, Penang).

Another Himalayan species added to the Formosan fauna. Barbour in recording the fact remarks as follows:

Stejneger (Herp. of Japan, 1907, p. 480) wrote at the end of his remarks on *T. okinavensis* that no near ally of this species was known from Formosa. He notes its relationship to *T. monticola*, and says "the latter or a related form may be expected to

occur in that island [Formosa]." It is interesting to record now how correct Stejneger's surmise was. A fine specimen from Tapposha, Mt. Arizan, central Formosa, was acquired with the Owston material. It is colored as Indian specimens are, but differs very slightly in having 10 scale sseparating the supraoculars and 10 supralabials. The scale rows are 27 in number, which Boulenger states is a rare condition. V. 155; anal entire; C. 46.

TRIMERESURUS GRAMINEUS (Shaw).

(Herpet. Japan, 1907, p. 480.)

1802. *Coluber gramineus* SHAW, Gen. Zool., vol. 3, pt. 2, p. 120.—*Trimeresurus gramineus* BARBOUR, Proc. New England Zool. Club, vol. 4, 1909, p. 76 (Bankoro, central Formosa).

Common. Barbour records two additional specimens.

Order TESTUDINATA.

Suborder ATHECÆ.

Family DERMOCHELIDÆ.

[DERMOCHELYS SCHLEGELII (Garman).]

(Herpet. Japan, 1907, p. 485.)

Not recorded from, but undoubtedly occurring occasionally, at least, in the waters surrounding Formosa.

Suborder LAMINIFERA.

Family TESTUDINIDÆ.

OCADIA SINENSIS Gray.

(Herpet. Japan, 1907, p. 489, pl. 28.)

Apparently common.

CLEMMYS MUTICA (Cantor).

1842. *Emys mutica* CANTOR, Ann. Nat. Hist., vol. 9 (p. 482), type-locality, Canton, China; type in Brit. Mus.; Cantor, collector.—*Damonia mutica* BOULENGER, Cat. Chel. Brit. Mus., 1889, p. 96 (Canton).—*Clemmys mutica* SIEBENROCK, Ann. Naturh. Hofmus. Wien, vol. 23, 1910, p. 312, pls. 12–13 (Formosa).

1855. *Emys nigricans* GRAY, Cat. Shield Rep. Brit. Mus., vol. 1, p. 20 (part: type-specimen of *E. mutica*).—SIEBENROCK, Sitz.-Ber. Akad. Wiss. Wien, vol. 112, 1903 (p. 439) (Ningpo, China).

1894. *Clemmys schmackeri* BOETTGER, Ber. Senckenberg. Ges., 1891 (p. 129, pl. 3, fig. 1 *a–b*) (type-locality, China, probably Hainan; type in Mus. Senckenberg.).

This addition to the fauna of Formosa was recorded by Doctor Siebenrock while the present paper was in the press. I can therefore only refer to his article, from which the above synonymy is derived. The Vienna Museum received eleven specimens from Fuhosho, South Formosa.

CYCLEMYS FLAVOMARGINATA Gray.

(Herpet. Japan, 1907, p. 503, pl. 33.)

The type of this species came from the Tamsui River, where, according to Swinhoe, it is the prevailing species.

Family CHELONIIDÆ.

[CARETTA OLIVACEA (Eschscholtz).]

(Herpet. Japan, 1907, p. 507, pl. 34.)

As this marine species is common both to the north and the south of Formosa, it is pretty certain that it occurs also in the waters surrounding this island, though no record of actual capture is known as yet.

CHELONIA JAPONICA (Thunberg).

(Herpet. Japan, 1907, p. 509.)

Already cited as Formosan by Swinhoe under the name *Chelonia virgata*.

ERETMOCHELYS SQUAMOSA (Girard).

(Herpet. Japan, 1907, p. 511.)

Same remark as under foregoing species.

Suborder CHILOTÆ.

AMYDA SINENSIS (Wiegmann).

(Herpet. Japan, 1907, p. 524.)

1834. *Trionyx* (*Aspidonectes*) *sinensis* WIEGMANN, Nova Acta Acad. Leop. Carol., vol. 17, p. 189.—*Amyda sinensis* BARBOUR, Proc. New England Zool. Club, vol. 4, 1909, p. 77 (Kagi, Formosa).

Two soft-shelled turtles from China (Cat. Nos. 39313–14, U.S.N.M.), collected by Mr. Sowerby in the Hoang-ho, at Honan-fu, province of Honan, 1,000 feet altitude, appear to me, after direct comparison, to be inseparable from Japanese specimens of the same size. They differ, consequently, as much from the Pechili specimens (*A. schlegelii*) as the Japanese specimens do. At present the Hoang-ho empties into the Gulf of Chili, not far from the mouth of the rivers in which *A. schlegelii* is at home, but this embouchure is only a recent one, as prior to 1852 the Yellow River emptied into the sea not far from the mouth of the Yang-tse-Kiang, the lower part of these two river systems being more or less connected through extensive lakes and swamps, as well as canals. Whether the soft-shelled turtles from these two rivers are identical, time alone will show, and as the type-locality of *A. sinensis* is Macao, the question of the latter's relation to the above and to the Formosan forms is equally for the future to answer.

[DOGANIA SUBPLANA (Geoffroy-Saint-Hilaire).]

(Herpet. Japan, 1907, p. 531.)

The occurrence of this species in Formosa is still very problematical.