UNIVERSITY OF KANSAS PUBLICATIONS
MUSEUM OF NATURAL HISTORY

Volume 15, No. 2, pp. 149-173
January 31, 1962

Some Reptiles and Amphibians from Korea

BY

ROBERT G. WEBB, J. KNOX JONES, JR.,
AND GEORGE W. BYERS

UNIVERSITY OF KANSAS
LAWRENCE
1962

UNIVERSITY OF KANSAS PUBLICATIONS, MUSEUM OF NATURAL HISTORY

Volume 15, No. 2, pp. 149-173
Published January 31, 1962

UNIVERSITY OF KANSAS
Lawrence, Kansas

PRINTED BY
JEAN M. NEIBARGER, STATE PRINTER
TOPEKA, KANSAS
1962

28-8517

Some Reptiles and Amphibians from Korea

BY

ROBERT G. WEBB, J. KNOX JONES, JR., AND GEORGE W. BYERS

In 1954, two of us (Jones and Byers) collected reptiles and amphibians in Korea incidental to field studies relating to hemorrhagic fever. The 382 specimens thus obtained were deposited either in the Museum of Natural History of The University of Kansas (KU), or in the Museum of Zoology of the University of Michigan (UMMZ), and are the basis for the present report. Continuous American military operations of one sort or another in Korea since 1945 have afforded opportunities for interested persons to obtain there collections of amphibians and reptiles, the study of which has resulted in several recent publications (Babb, 1955; Dixon, 1956; Hahn, 1959 and 1960; Shannon, 1956 and 1957; Stewart, 1953 and 1954; Tanner, 1953; Walley, 1958*a* and 1958*b*). This paper, which contains comments on the natural history and taxonomy of 22 species, all previously reported from Korea, supplements earlier studies, especially Shannon's (1956) annotated list of the herpetofauna of the country.

Shannon (*loc. cit.*) recorded 36 kinds of reptiles and amphibians from Korea. Subsequently, *Bufo stejnegeri* (previously omitted) was added by Shannon (1957), *Takydromus takydromoides oldi* was described by Walley (1958*a*), and *Takydromus kwangakuensis* was relegated to synonymy under *T. amurensis* by Walley (1958*b*). Presently, then, 37 kinds are on record from the Korean Peninsula.

In the accounts beyond, Jones and Byers are mostly responsible for the remarks on natural history, whereas Webb is mostly responsible for the taxonomic comments. The synonymies include (1) the original description, which is followed by (2) the first use of the name-combination here employed if it differs from the name as originally proposed, and (3) any synonyms having type localities in Korea. All measurements are in millimeters and all dates refer to the year 1954 unless otherwise indicated. A gazetteer of localities mentioned in the text and a list of literature cited follow the accounts of species.

We are grateful to the officers, enlisted men and civilians associated in 1954 with the Field Unit of the Commission on Hemor-

rhagic Fever, Armed Forces Epidemiological Board, who aided our efforts in Korea; we are especially mindful of the contributions of Dr. Albert A. Barber, Dr. Marshall Hertig, Mr. Louis J. Lipovsky and Dr. Warren D. Thomas. We are grateful also to Mr. Yoshinori Imaizumi, National Science Museum of Japan, for his translations of several papers in Japanese, and to Dr. Edward H. Taylor for making certain pertinent references available to us.

Hynobius leechii Boulenger

Hynobius Leechii Boulenger, Ann. Mag. Nat. Hist., ser. 5, 19:67, January, 1887 (type locality, Gensan [= Wonsan], Korea).

Hynobius leechii quelpaertensis Mori, Jour. Chosen Nat. Hist. Soc., 6:47 (Japanese) and 53 (English), March 25, 1928 (type locality, Quelpart Island [= Cheju Do], Korea).

Specimens examined (3).—1 mi. SW Inje, 1 (KU); 4 mi. NNE Sogwi-ri, Cheju Do, 2 (KU).

Description (KU 38774 from 1 mi. SW Inje).—Total length, 86 (head 13, body 40, tail 33); costal grooves (including axillary and inguinal), 13; two costal grooves between adpressed toes; length of inner branch of series of vomerine teeth less than distance between outer border of naris and peak of opposite series (tooth-rows V-shaped, approximately as long as broad); dorsal surface yellowish brown or buff (yellowish in life), having numerous blackish marks; venter yellowish cream, having an indistinct grayish mottling.

Remarks.—The salamander described above was found in a fox-hole with another desiccated individual (not saved) on a military compound on April 24. The only other occurrence of *H. leechii* on the mainland to come to our attention was the report of several larvae that were seen in a small pool on a hillside near Chip'o-ri in the summer of 1953.

Each of the two specimens from Cheju Do (KU 38775-76) differs from KU 38774 in having (1) the length of inner branch of the vomerine series slightly greater than the distance between outer border of naris and peak of opposite series (tooth-rows V-shaped, longer than broad), (2) a dorsal and ventral keel on the tail, (3) one costal groove (rather than two costal grooves) between adpressed toes, and (4) in being darker both dorsally and ventrally. The area of buff on the dorsal surface of each specimen is reduced by a fine, blackish mottling and stippling, and the venter of each is grayish. Respective total lengths of KU 38775 and 38776 are 84 (head 12, body 36, tail 36) and 89 (12, 35, 42), and the number of costal grooves 13 and 14. Although the two specimens are of approximately the same size, the tail of KU 38776 is noticeably the longer; the tail of KU 38775 is thicker and deeper than that of KU 38776.

The two specimens from 4 mi. NNE Sogwi-ri were taken on September 9 in damp substrate under volcanic rocks along a little-used road; although many rocks were overturned, only these two individuals were found. A South Korean soldier informed us that salamanders were fairly common on Cheju Do.

Mori (1928*a*:16) first mentioned in Japanese text the alleged distinctiveness of the salamander occurring on Cheju Do. Later, Mori (1928*b*:47 in Japanese, and 1928*c*:53 in English) provided valid descriptions of the subspecies, *Hynobius leechii quelpaertensis.* Okada (1934:17) questioned the validity of *H. l. quelpaertensis* and Sato (1943) regarded the salamanders of Cheju Do as inseparable from the Korean *H. leechii.* The English description of *quelpaertensis* is briefer than the preceding one in Japanese and lacks comparisons with related forms. KU 38775-76 seemingly differ appreciably from the description of *quelpaertensis* only in having the series of vomerine teeth narrowly V-shaped and longer than broad. We tentatively follow Sato in regarding *quelpaertensis* as a synonym of *leechii.*

Bombina orientalis (Boulenger)

Bombinator orientalis Boulenger, Ann. Mag. Nat. Hist., ser. 6, 5:143, pl. IX, fig. 2, February, 1890 (type locality restricted to Chefoo, China, by Pope, Bull. Amer. Mus. Nat. Hist., 61:435, August 29, 1931).

Bombina orientalis, Stejneger, Bull. U. S. Nat. Mus., 58:51, figs. 30-43, pl. VII (reproduction from Boulenger, *supra*), July 22, 1907.

Specimens examined (87).—2 mi. N Chip'o-ri, 8 (KU), 5 (UMMZ); 1 mi. SW Inje, 1 (KU); 15 mi. NE Mosulp'o, Cheju Do, 6 (KU); Sangdaehwa, 2 (KU); Taehoesan-ni, 1 (KU); 1 mi. W Tangjonggok, 32 (KU), 17 (UMMZ); Tangnim-ni, 2 (KU); 3 mi. SW Yanggu, 1 (KU); 2 mi. N Yongdae-ri, 8 (KU), 4 (UMMZ).

Remarks.—Most of our specimens were taken from breeding congresses after heavy rains in rice fields and other shallow temporary waters. Thirteen individuals from Chip'o-ri were collected from foxholes around the edge of a military compound (two pairs in amplexus; no egg masses seen), and represent a small sample of frogs that were everywhere following a heavy rain on the night of May 13-14. On April 23, 32 *Bombina orientalis* and three *Rana temporaria dybowskii* were trapped in the water-filled bottom of an unused grease pit near Tangjonggok. Many tadpoles and two kinds of egg masses (small clusters and beadlike strings) were present; the small clusters of *Bombina* were commonest. On June 13 at the same locality, thousands of these toads were observed (hundreds in axillary amplexus) in foxholes, temporary rain pools, and backwashes along the Puk-ch'on [river]. On June 12 near

Yongdae-ri many individuals were seen (several pairs in amplexus), along Route 24 paralleling the Puk-ch'on, in rain pools and in ditches and backwashes from the river; almost all available water contained small (approximately 10 x 10 mm.) egg masses. Numbers of eggs per mass, selected at random, were 5, 2, 2, 5, 2, 8, 8, 2 and 5. Some that were saved subsequently hatched on June 15-17.

The call is a quiet low trill or series of staccato whistles rising slightly at the beginning; a short peeplike note also was heard. The specimens from Cheju Do, which are generally smaller than those collected on the mainland in spring, were taken on September 6 in a small stream that had large volcanic rocks in many places and that was flanked by thick brush and small trees. The earliest and latest dates on which *B. orientalis* was collected were April 21 and September 6, respectively.

In the breeding season, males are distinguished from females by the large blackish (probably brownish earlier in season) areas on the anteroventral surface of the antebrachium, the metacarpal tubercle, and the inner surface of the first finger (sometimes also the second and third). Also, males have conspicuous black-tipped tubercles on the back (usually absent in females) that extend onto the limbs (usually smooth in females, at least laterally). Field observations by one of us (Byers) suggested that the dorsal pattern of males had greater contrast than that of females and that the venter was brighter reddish. Eight females from Tangjonggok averaged 47.9 (43-51) in snout-vent length, whereas 24 males from there averaged 50.0 (46-55), indicating little, if any, size difference between the sexes.

Okada (1931:29) recorded variation in color of live Korean individuals (green or brown dorsally and pale yellow or red ventrally) and variation in extent of black markings on the belly (*op. cit.*:fig. 12). The specimens from Cheju Do (28, 32, 32, 32, 37 and 46 in snout-vent length) have less black ventrally than specimens from the mainland.

Bufo bufo gargarizans Cantor

Bufo gargarizans Cantor, Ann. Mag. Nat. Hist., ser. 1, 9:483, August, 1842 (type locality, island of Chusan, China).

Bufo bufo gargarizans, Stejneger, Bull. U. S. Nat. Mus., 58:59, July 22, 1907.

Specimens examined (10).—Central National Forest, near Pup'yong-ni, 1 (KU); 5 mi. NW Choksong, near Imjin River, 1 (KU); 5 mi. E Seoul, 1 (KU); 6 mi. E Seoul, 4 (KU), 2 (UMMZ); 1 mi. S Yami-ri, 1 (KU).

Description (nine females).—Dorsal surface brownish, having indistinct pale areas, some of which tend to form longitudinal stripes that extend pos-

teriorly from parotoid glands; blackish mark, usually on lateral part of parotoid, having short spurs directed posteriorly and ventrally; edge of upper jaw and warts on dorsal surface becoming blackish with increasing size; small, conspicuous group of warts near angle of jaw below parotoid; middorsal warts tending, at level of posterior edge of parotoids, to form a V that has its apex between the parotoids; ventral surface pale yellowish, sometimes having well-defined blackish marks; granular underparts of large specimens having small blackish tubercles.

Male (KU 40118 from 5 mi. E Seoul).—Snout-vent length, 65; no vocal sacs or slits; dorsal and inner surfaces of first and second fingers, and inner surface of third finger black; canthus rostralis indistinct (a well-defined ridge on right side); nostrils closer to tip of snout than to eye, their distance from each other slightly less than interorbital width; interorbital width (6.2) greater than width of eyelid (4.7); tympanum distinct, circular, its diameter (3.0) less than length of eye (6.5), and approximately twice distance (1.6) of tympanum from eye; no cranial crests; parotoid gland elongate, approximately twice as long as broad (12.5 x 5.0), narrowly separated from posterior edge of eyelid; head elongate (width at posterior edge of tympanum, 23.6); length from posterior edge of tympanum to tip of upper jaw, 18.9; first finger slightly longer than second, fourth finger about two-thirds as long as third; most subarticular tubercles divided; outer palmar tubercle larger than inner; heels not touching when folded legs placed at right angles to longitudinal axis of body; tibiotarsal articulation just reaching eye when leg laid forward; tarsometatarsal articulation not reaching beyond snout; foot large (tibiotarsal articulation to tip of fourth toe approximately 46.0); fourth toe approximately half webbed, other toes more than half webbed; edges of webs somewhat crenulate; some subarticular tubercles divided; length of inner metatarsal tubercle (4.5) more than half length of first toe (7.0); inner metatarsal tubercle larger than outer, both darkened; tarsal fold extending from inner metatarsal tubercle for approximately two-thirds length of tarsus; tips of toes (not fingers) darkened; dorsal surface of back and proximal part of hind legs coarsely granular, of rounded, pavement-type tubercles lacking sharp tips; small group of warts near angle of jaw below parotoids; dorsal pattern contrasting and irregular (especially on limbs), of dark brown and pale gray; conspicuous black mark (interrupted) on lateral surface of parotoid having two, well-defined spurs that project posteroventrally; undersurface granular, lacking markings except for two indistinctly-margined dark spots on chest, and black spot on left leg.

Remarks.—This nocturnal, introduced species (Okada, 1931:47) is presumably widespread in Korea and seemingly prefers lowland habitats. Individuals were taken in sparse vegetation on a sand flat near the Han River, at the edge of a rice field in a light rain, along a road at night, and in millet fields adjacent to the Han River, which was flooding at that time (July 9).

As is obvious from the foregoing descriptions, the male (KU 40118), which was obtained on March 19, differs considerably from the nine females; neither does it agree with Stejneger's (1907:66)

or Okada's (*op. cit.*:45-46, fig. 18) description of males of *Bufo bufo asiaticus* [= *gargarizans*] from Wonsan and Seoul. Upon cursory examination, KU 40118 is notable for having a contrasting dorsal pattern and elongate, ranidlike proportions. Some of the characteristics resemble those of *Bufo raddei* Strauch as given by Stejneger (*op. cit.*:70-72, figs. 53-57), Okada (1935:9, figs. 2 and 32-34, pls. II-III), and Liu (1950:203-205, fig. 43).

Stejneger (*op. cit.*:59-68) recognized *B. b. gargarizans* as occurring in southern China, and *Bufo bufo asiaticus* as the subspecies occurring in northern China. Subsequently, *asiaticus* was relegated to synonymy under the earlier-named *gargarizans*—see discussions by Pope and Boring (1940:33) and Liu (*op. cit.*:220).

Kaloula borealis (Barbour)

Cacopoides borealis Barbour, Bull. Mus. Comp. Zool., 51(12):231, April, 1908 (type locality, Antung, Manchuria).

Kaloula borealis, Noble, Amer. Mus. Novit., 165:6, April 16, 1925.

Specimens examined (8).—5 mi. ESE Seoul, 1 (KU); 6 mi. E Seoul, 3 (UMMZ); 7 mi. ESE Seoul, 4 (KU).

Remarks.—On April 5, one male and three females were uncovered by a bulldozer from between one and two feet below the surface of the ground in an old Korean burial mound; one individual was completely surrounded by compact soil. All quickly became active when placed in water. Two of the females (43 and 44 in snout-vent length) contained masses of immature eggs. A male obtained on June 4 was found during a rain; the three UMMZ specimens were obtained on July 8 on banks above the Han River. Breeding of this species seems to coincide with the rainy season in late spring and early summer when males were noted calling around flooded ditches and swales in deep grass. The local Korean name of the species, which sounds something like "maeng-kongi," is said to come from the call, which is best described as a monotonous, snoring sound that rarely is heard in two parts as suggested by the name.

Hyla arborea japonica Günther

[*Hyla arborea*] Var. *japonica* Günther, Catalogue of the Batrachia Salientia in the . . . British Museum, p. 109, 1858 (type locality, Japan).

Hyla arborea var. *savignyi* Boulenger, Ann. Mag. Nat. Hist., ser. 5, 19:67, January, 1887 (type locality, Gensan [= Wonsan], Korea).

Hyla stepheni Boulenger, Proc. Zool. Soc. London, p. 579, pl. 51, fig. 1 (for 1887), April, 1888 (type locality, Port Hamilton, a small island between Korea and Japan).

Specimens examined (44).—Central National Forest, near Pup'yong-ni, 2 (KU); 3 mi. NW Chip'o-ri, 1 (KU); 1 mi. N Mosulp'o, Cheju Do, 1 (KU);

1 mi. NW Oho-ri, 13 (KU), 3 (UMMZ); Sangbonch'on-ni, 2 (UMMZ); 5 mi. ESE Seoul, 8 (KU); 6 mi. E Seoul, 10 (KU), 3 (UMMZ); 7 mi. NNE Sogwi-ri, Cheju Do, 1 (UMMZ).

Remarks.—Hylids from 5 mi. ESE Seoul were collected from a cement-walled pit at the Seoul City Water Works; a specimen of *Elaphe rufodorsata* taken in the pit had eaten one hylid. Two individuals were taken in the morning of May 29 on leaf litter in a wooded valley in the Central National Forest where a number were calling in a light rain, but the species was rarely found in woods. Two frogs were found along a rocky stream at Sangbonch'on-ni. Most individuals were taken while calling, on grasses and reeds or on the ground, along the edges of rice fields. Sixteen hylids collected 1 mi. NW Oho-ri were calling in shallow water of a rice field on a hillside, but none was heard in a large lake nearby or in adjacent fields. On May 15, 4 mi. ESE Ch'orwon, approximately one hundred tadpoles, thought to be of this species, congregated near a drain (into a lower field) of an unused rice field; the tadpoles were well-developed, some having hind legs. The earliest and latest dates of collection represented in our material are May 8 and October 29. The call is best described as a raspy "waak," "week," or "wiick" in the middle register.

The listing of "Hylae arboreae var japonicae descript pars *Schleg. in Fauna Japon.* p. 112 . . ." by Günther (1858:81) in synonymy under the account of *Polypedates schlegelii,* implies that Schlegel was the first author to use the name-combination *Hyla arborea japonica.* Boulenger (1882:86, 381) went so far as to credit Schlegel as the author of the name *japonica.* The reason for this action is not known because Schlegel (*in* von Siebold, 1838:112) referred to this hylid only under the name "Hyla arborea."

Rana rugosa Schlegel

Rana rugosa Schlegel, Reptilia [Saurii et Batrachii], *in* von Siebold, Fauna Japonica, p. 110, pl. 3, figs. 3-4, 1838 (type locality designated as Japan, probably near Nagasaki, by Stejneger, Bull. U. S. Nat. Mus., 58:123, July 22, 1907).

Specimens examined (26).—Central National Forest, near Pup'yong-ni, 13 (KU), 1 (UMMZ); 2 mi. S Ch'orwon, 4 (KU); 2 mi. E Hoengsong, 3 (KU); 1 mi. NW Oho-ri, 1 (KU); 5 mi. ESE Seoul, 1 (KU); 6 mi. E Seoul, 3 (UMMZ).

Remarks.—*Rana rugosa* was associated with *Rana nigromaculata* and *Rana amurensis coreana* at all localities where the species was taken save at 2 mi. E Hoengsong, where *R. a. coreana* was not observed. Three specimens of *R. rugosa* were collected among

grasses and reeds in water along the edge of Ch'orwon Reservoir, 2 mi. S Ch'orwon, where they were difficult to find in the thick vegetation even though their low, soft calls were heard; the specimen from 1 mi. NW Oho-ri was found in a rice field. Otherwise, habitats recorded indicate a preference for small, fast-flowing streams, especially in wooded valleys. On one occasion, individuals were found trapped in cement-walled pits about old ruins on a wooded hillside in the Central National Forest. The earliest and latest dates of capture among our specimens are May 15 and November 6. In addition to the localities listed above, the species was observed 4 mi. W Ch'ungju.

R. rugosa may have an extensive breeding season as suggested by the variation in size of frogs collected or observed in 1954. Of nine frogs obtained on May 29, five ranged in snout-vent length from 26 to 28, and four from 42 to 54. Three specimens collected on October 9 measured 39, 41, and 55, and two obtained on November 6 measured 25 and 37.

Rana nigromaculata Hallowell

Rana nigromaculata Hallowell, Proc. Acad. Nat. Sci. Philadelphia, [12]:500 (for 1860), 1861 (type locality, Simoda, Japan).

Specimens examined (47).—Central National Forest, near Pup'yong-ni, 6 (KU); 2 mi. S Ch'orwon, 5 (KU); 4 mi. W Ch'ungju, 2 (KU); 7 mi. W Ch'ungju, 1 (KU); 2 mi. E Hoengsong, 1 (KU); 8 mi. SW Kunsan, 1 (KU); 1 mi. NW Oho-ri, 5 (KU); 5 mi. ENE Pusan, 2 (KU); 5 mi. ESE Seoul, 9 (KU); 6 mi. E Seoul, 3 (KU), 10 (UMMZ); 6 mi. NNE Sogwi-ri, Cheju Do, 2 (KU).

Description.—Back brownish or grayish (greenish in life), having few, indistinct or well-defined, dark blotches, or extensive blackish areas (representing fusion of markings); pale, middorsal stripe (pale green, buff or yellowish in life) from snout to anus, sometimes as wide as interorbital width, but indistinct or lacking when pattern on back absent; blackish bar often present behind tympanum; posterior surface of thigh mottled; underparts pale yellow to whitish, sometimes having a few dusky marks on throat; longitudinal ridges between dorsolateral folds indistinct in some small frogs; largest female and male having respective snout-vent lengths of 100 and 70.

Remarks.—Rana nigromaculata is the most abundant ranid in central Korea and, in a general way, the ecological equivalent of *Rana pipiens* in temperate North America. The species is associated with most aquatic habitats, from rocky streams to rice fields and large impoundments. In the vicinity of Seoul the din of large breeding congresses was heard more or less continuously from mid-April to mid-May. Large numbers of juveniles (approximately one inch long) were noticed first on July 8 and were present

thereafter for about three weeks, being commonest in standing water after heavy rains or during prolonged showers. These data and the different sizes of individuals collected at the same time suggest either variable growth or, more probably, an extensive breeding season. Our earliest and latest dates of collection are April 16 and October 7. The Korean name for "frog," most often applied to *R. nigromaculata*, sounds something like "keg-oh-ree." The call is a prolonged, raspy, staccato croak, sometimes with a rising inflection at the end.

In addition to the localities listed above, the species was observed 5 mi. W Kwangju and 3 mi. S Osan.

Despite a high degree of individual variation, *Rana nigromaculata* seemingly varies geographically as well; some subspecies probably should be recognized, but the species as a whole has never been thoroughly studied systematically. The division of *R. nigromaculata* into three subspecies by Schmidt (1927:563-567) was considered untenable by Fang and Chang (1931:95-98), and it has been regarded by most recent authors as a variable, monotypic species.

The named subspecies *R. n. chosenica* (Okada, 1931:89, with type locality at Seoul, and geographically restricted to Korea) was considered a subspecies of *Rana plancyi* by Shannon (1956:36). The most trenchant characters of *planyci* seem to be the wide dorsolateral folds, the uniform greenish dorsum, the presence of dermal pustules on the back between the dorsolateral folds, and the lack of a mottled pattern on the posterior surface of the thigh. Among our specimens of *R. nigromaculata*, the width of the dorsolateral folds is variable, a uniform greenish dorsum is found only in large males, dermal pustules are mixed with ridges in only one male (KU 38733), and all have a spotted or mottled pattern on the posterior surface of the thigh. All of our specimens having an indistinct pattern on the back, or lacking a pattern, are males and resemble the photographs of males published by Moriya (1954: pl. I, fig. 5) and Liu (1936: pl. IV, figs. 1-2); juveniles of both sexes and large females have contrasting patterns.

None of our frogs seems, therefore, clearly referable to the species *plancyi*, although some characters are suggestive of *plancyi*. Moriya (*op. cit.*:19), who studied variation of *R. nigromaculata* in Japan, noted that one of the most distinct populations there (*R. n. brevipoda*) resembled *Rana plancyi*. Ting (1939) discovered that *nigromaculata* and *plancyi* were cross-fertile and raised hybrid

larvae through metamorphosis. Pope and Boring (1940) suggested hybridization between the two species in eastern China, and the above mentioned facts suggest to us the possibility of hybridization in other regions.

Rana amurensis coreana Okada

Rana temporaria coreana Okada, Annot. Zool. Japon., 11:140 (footnote), July 25, 1927, *nomen nudum.*

Rana temporaria coreana Okada, Jour. Chosen Nat. Hist. Soc., 6:19, pl. 1, fig. 7, 1928 (type locality, Keijo [= Seoul], Korea).

Rana amurensis coreana, Shannon, Herpetologica, 12:38, March 6, 1956.

Specimens examined (9).—Central National Forest, near Pup'yong-ni, 1 (KU); 2 mi. S Ch'orwon, 1 (KU); 4 mi. W Ch'ungju, 1 (KU); 1 mi. N Oho-ri, 1 (KU); 5 mi. ESE Seoul, 3 (KU); Yongp'yong, 2 (KU).

Remarks.—One individual of *R. a. coreana* (KU 38698) and one of *Rana temporaria dybowskii* (KU 38715) were collected on May 29 along a stream in the Central National Forest in association with *R. rugosa* and *R. nigromaculata.* Specimens of *coreana* from the vicinity of Seoul were found in rice fields. The earliest date of collection was April 13 at Yongp'yong. Our largest specimen of *coreana* measured 47 in snout-vent length.

Because *R. a. coreana* and *Rana temporaria dybowskii* are sympatric in central Korea and closely resemble one another, the two species were not distinguished in the field and the following observations may pertain to either (or both) species. Wood frogs were observed 2 mi. E Songdong-ni on July 12 in paddies (rice fields) along with individuals of *Hyla arborea, Rana rugosa,* and *Rana nigromaculata.* At Chip'o-ri on April 6, individuals (probably *R. t. dybowskii*) were seen in a seepage pool from an abandoned rice field; *R. nigromaculata* also was seen there. Six or seven egg masses (some having small tadpoles) were observed in the shallow water, but it was not certain to which species the eggs belonged. Completely metamorphosed young (probably *R. a. coreana*) were first seen 1 mi. N Oho-ri on June 9. At Taehoesan-ni on November 12, several sluggish frogs were seen in a small pool that was covered by a thin layer of ice.

On September 26 in the Central National Forest, many wood frogs of various sizes were observed. *R. amurensis* and *R. temporaria* probably have extended breeding seasons that correspond to those of *R. rugosa* and *R. nigromaculata.* Judging from our observations, *amurensis* prefers the proximity of water, whereas *temporaria* may occur some distance from permanent water.

In our specimens, *R. amurensis coreana* differs from *R. temporaria*

dybowskii in having (1) smaller maximal size, (2) more slender body, (3) shorter legs, (4) incompletely webbed toes, (5) no mottling or barring on lips, (6) no contrasting barred pattern on hind legs, (7) dark brown stripes (usually) between dorsolateral folds, (8) a dark brown, linear mark below canthus, and (9) an immaculate ventral surface. Two additional distinguishing characters, which we found difficult to evaluate, are the nearly straight, dorsolateral folds, and lack of vocal sacs or ostia in males of *R. a. coreana* (Shannon, 1956:38). Some of the differences between the two species were illustrated by Okada, 1931:107, fig. 48, *R. temporaria temporaria* [= *R. t. dybowskii*] and 123, fig. 54, *R. temporaria coreana* [= *R. amurensis coreana*].

Rana temporaria dybowskii Günther

Rana Dybowskii Günther, Ann. Mag. Nat. Hist., ser. 4, 17:387, May, 1876 (type locality, Abrek Bay, near Vladivostok, Siberia).

Rana temporaria dybowski, Shannon, Herpetologica, 12:38, March 6, 1956.

Specimens examined (20).—Central National Forest, near Pup'yong-ni, 7 (KU); Chip'o-ri, 2 (KU); 1 mi. SW Inje, 6 (KU); 8 mi. SW Kangnung, 1 (KU); Taegwang-ni, 1 (KU); 1 mi. SW Tangjonggok, 3 (KU).

Remarks.—On October 9 in the Central National Forest, five individuals were found in a concrete-walled pit in old ruins on a wooded hillside; no specimens of *Rana amurensis coreana* were taken there. *R. t. dybowskii* was most often taken on high, moist slopes, and seemed to be especially common in forests. The specimen from 8 mi. SW Kangnung was obtained in a wooded area along a mountain stream. The earliest date of collection of a specimen of *dybowskii* was March 7 at Taegwang-ni. See also the remarks under the preceding account of *Rana amurensis coreana.*

The largest male among our specimens measured 65 in snout-vent length and the largest female, 79. Five gravid females had snout-vent lengths of 64, 68, 69, 69 and 70.

Trionyx sinensis Wiegmann

Trionyx (Aspidonectes) sinensis Wiegmann, Nova Acta Acad. Leopold.-Carol., 17:189, 1835 (type locality, near Macao, China).

Specimen examined.—Han River, 5 mi. ESE Seoul, 1 (KU).

Remarks.—Our only specimen was purchased from a man who had captured it by hand in the Han River; it was the only turtle seen during our stay in Korea. Koreans eat turtles, and the elaborate (and relatively permanent) fish-traps that they construct across streams and small rivers probably reduce the size of populations of *T. sinensis* and other species.

Eremias argus Peters

Eremias argus Peters, Monatsber. preuss. Akad. Wiss., Berlin, p. 61, fig. 3 (for 1869), 1870 (type locality, Chefoo, China).

Specimens examined (23).—Chip'o-ri, 1 (KU); 5 mi. E Seoul, 3 (KU), 3 (UMMZ); 5 mi. ESE Seoul, 4 (KU); 6 mi. E Seoul, 10 (UMMZ); 7 mi. ESE Seoul, 2 (KU).

Remarks.—Individuals of *E. argus* were most often seen on dry hillsides having a relatively sparse cover of vegetation. The first lizard of this species was taken on April 2. In 1954 the last part of March and early part of April were generally warm, with temperatures above 70° F. on several occasions; probably some *E. argus* were active in late March. KU 38773 (snout-vent length, 51) laid three eggs between June 4 and 14; KU 38768 (snout-vent length, 58) obtained on May 8 was gravid, containing four eggs. Testes of lizards in the breeding season measure approximately 4.0 x 2.5 (KU 38772, obtained on June 16).

The snout-vent length of our largest female is 61, that of the largest male, 57. The snout-vent length of 11 specimens averaged 77 (67-96) per cent of length of tail.

Tachydromus amurensis Peters

Tachydromus amurensis Peters, Sitzungsber. Gesell. naturf. Freunde Berlin, p. 71, 1881 (type locality, Kossakewitcha, Amurland).

Specimens examined (3).—Central National Forest, near Pup'yong-ni, 1 (KU), 1 (UMMZ); Majon-ni, 1 (KU).

Remarks.—One of our specimens was found among grasses along a small stream in the Central National Forest. The other two were obtained by other persons and we lack knowledge of conditions of their capture.

A juvenile (KU 39416, snout-vent length, 25) that was obtained on September 9 is tentatively referred to this species. There seem to be three femoral pores on the left leg but the number is indistinct on the right. The specimen is dark and lacks a pattern. Its condition precludes counts of ventral scales (not keeled), but scalation is otherwise the same as a male (KU 40120, snout-vent length approximately 47, length of tail, 124). The third specimen, a male (UMMZ 113442, snout-vent length, 51, length of tail, 115), agrees with KU 40120, except in having 32 instead of 29 dorsal scales at midbody, 4-4 instead of 3-3 femoral pores, and in lacking a pale stripe from eye through ear to shoulder.

Tachydromus wolteri Fischer

Tachydromus Wolteri Fischer, Jahrb. Wiss. Anst. Hamburg, 2:82 (for 1884), 1885 (type locality, Chemulp'o, Korea).

Specimens examined (2).—Yongp'yong, 2 (KU).

Remarks.—On April 14, two females (57 and 45 in snout-vent length, the tail of the latter measuring 103) were easily captured by hand on a burned-over rice field.

Lygosoma reevesii (Gray)

Tiliqua Reevesii Gray, Ann. [Mag.] Nat. Hist., ser. 1, 2:292, December, 1838 (type locality, China).

[*Lygosoma* (*Liolepisma*) *laterale*] var. *reevesi,* Boettger, Katalog der Batrachier-Sammlung . . ., p. 104, 1893.

Specimens examined (6).—Central National Forest, near Pup'yong-ni, 3 (KU); 4 mi. NNE Sogwi-ri, Cheju Do, 1 (KU); 7 mi. NNE Sogwi-ri, Cheju Do, 1 (UMMZ); 16 mi. NE Mosulp'o, Cheju Do, 1 (UMMZ).

Remarks.—On October 23 an individual was captured while sunning on a stump on a wooded hillside in the Central National Forest; two others at this locality were collected on damp ground-cover on the same hillside. A juvenile from Cheju Do was found among moss-covered rocks in a stream bed; the other specimens from Cheju Do were found among moss-covered rocks on the western slope of Halla San.

Each ovary of a female obtained on October 23 contained five enlarged follicles, about 1 mm. in diameter. The left testis of a male obtained on August 10 seemed enlarged, indicating possible sexual activity, and measured approximately 6 x 2 mm. The snout-vent length of our largest male is 41, that of our largest female, 48. The prefrontals are in contact in all of our specimens save one (UMMZ 113446).

There is disagreement among herpetologists concerning the generic name of the small lygosome skink in the United States and its ecological equivalent in China and Korea. We tentatively use *Lygosoma* (Conant, 1951:207-208), although Mittleman (1950) pointed out reasons for using *Scincella.* Shannon (1956:41) discussed the debated issue whether or not the lygosome skinks of the New and Old worlds are conspecific.

Rhabdophis tigrina lateralis (Berthold)

Tropidonotus lateralis Berthold, Nachrichten Gesell. Wiss. Göttingen, p. 180, 1859 (type locality, China).

Specimens examined (26).—Central National Forest, near Pup'yong-ni, 1 (KU); 2 mi. N Chip'o-ri, 2 (KU); 3 mi. NW Chip'o-ri, 4 (KU); 4 mi. N Ch'onan, 1 (KU); 3 mi. S Kumhwa, 1 (KU); 1 mi. SW Naegong-ni, 1 (KU); 4 mi. E Seoul, 1 (KU); 5 mi. E Seoul, 2 (UMMZ); 5 mi. ESE Seoul, 4 (KU); 6 mi. E Seoul, 1 (KU), 4 (UMMZ); 7 mi. ESE Seoul, 1 (KU); 6 mi. NNE Sogwi-ri, Cheju Do, 2 (KU); 5 mi. NE Taejon, 1 (KU).

Remarks.—This common, vagrant species was found on brushy hillsides, near buildings on hills above rice fields, in tall grasses near streams, in rice fields, and along drainage and irrigation ditches. The earliest and latest dates of collection were April 5 and November 7. On the first date mentioned an individual was found in hibernation with five *Elaphe rufodorsata* and one *Agkistrodon halys* in an earthen Korean burial mound. The specimen was uncovered by a bulldozer at a depth of about one foot below the surface. We were told that 18 snakes of this species were found in the same place (7 mi. ESE Seoul) the previous winter.

The stomach of each of four individuals contained one *Rana nigromaculata.* The stomach of another individual contained a *R. nigromaculata* and remains of a carabid beetle, whereas another contained three small, partially-digested frogs that appeared to be *Hyla arborea.* P. M. Youngman reported to us that he found a snake of this species that was attempting to swallow a toad, *Bufo bufo gargarizans.* One of the small individuals from Cheju Do was being eaten by a *Zamenis spinalis* when found. One specimen was parasitized by three nematodes, *Kalicephalus natricis* (see Olsen, 1957:208).

Two females of this oviparous species (lengths of body, 680 and 700) collected on May 14 contained nine eggs (18 mm. long), and 13 eggs (15 mm.) respectively; a third (length of body, 610) obtained on June 26 contained 10 eggs that were approximately 18 mm. long. A female (UMMZ 113458, length of body, 710), which was captured on July 10 and kept alive in captivity, laid 11 eggs on August 12 between 9 and 10 in the morning. The weight of nine of these eggs averaged 3.32 (3.0-3.6) grams; the last two eggs deposited were small and weighed only 1.3 and 1.4 grams. The eggs were incubated unsuccessfully. One that was opened on September 14 and another opened on September 26 contained young easily recognized as of this species. In captivity the parent

snake underwent ecdysis on about July 20 and again on August 26.

Our largest female and largest male have respective total lengths of 1013 (840 + 173) and 740 (575 + 165). Our smallest specimens, captured on September 9, measured 215 and 230 mm. in length of body, and probably represent young of the year. The snake found in hibernation on April 5 measured 275 in length of body. The ventrals of 11 males averaged 161.3 (158-171) and those of 14 females, 165.1 (160-170); subcaudals of eight males averaged 69.6 (66-74) and those of 14 females, 61.5 (52-73).

Males seem to have small scales in the anal region that are more strongly keeled than scales elsewhere on the body (the scales catch on finger tips when rubbed in a posteroanterior direction), but males lack small tubercles on the upper and lateral parts of the head as mentioned by Maslin (1950:433). The comments of the same author (*op. cit.*:434) concerning integumental poison glands in the nuchal region of this species are of interest in view of several reports that we received of swollen extremities resulting from handling snakes of this species.

In using the generic names *Rhabdophis* and *Amphiesma* for species formerly placed in the genus *Natrix*, we follow Malnate (1960), who divided *Natrix* (*auct.*) into five distinct genera.

Amphiesma vibakari ruthveni (Van Denburgh)

Natrix vibakari ruthveni Van Denburgh, Proc. California Acad. Sci., ser. 4, 13(2):3, July 26, 1923 (type locality, Pusan, Korea).

Specimens examined (5).—Central National Forest, near Pup'yong-ni, 1 (KU); 4 mi. SW Ch'ongyang-ni, 1 (KU); 10 mi. NE Mosulp'o, Cheju Do, 1 (UMMZ); 6-7 mi. NNE Sogwi-ri, Cheju Do, 1 (KU), 1 (UMMZ).

Remarks.—The specimen from the Central National Forest was captured on August 18 near a stream on a damp ground-cover of leaves. The specimens from Cheju Do were taken in early September, one in a grassy area, and the other two on earthen banks of road-cuts on the slopes of Halla San. The stomach of one individual from Cheju Do contained an earthworm. Our largest specimen, a male having 154 ventrals and 68 subcaudals, measured 508 (380 + 128).

The subcaudal counts of 68 (KU 38861) and 69 (UMMZ 113461) on two males from Cheju Do are higher than the maximal count known for the subspecies *ruthveni* in Korea, and resemble those of *Amphiesma vibakari vibakari* of the Japanese islands. The subcaudals average 61 (55-65) in *ruthveni* and 71 (63-83) in *vibakari*

according to Van Denburgh (1923:3-4). A juvenile from the Central National Forest (KU 38862), lacking the tip of the tail, has 64 subcaudals.

Dinodon rufozonatum (Cantor)

Lycodon rufo-zonatus Cantor, Ann. Mag. Nat. Hist., ser. 1, 9:483, August, 1842 (type locality, island of Chusan, China).

Dinodon rufozonatus, Peters, Sitzungsber. Gesell. naturf. Freunde Berlin, p. 89, 1881.

Specimens examined (4).—Central National Forest, near Pup'yong-ni, 3 (KU); Yongsan (Seoul), 1 (UMMZ).

Remarks.—The three specimens from the Central National Forest were taken in the period August 12-26. Two were caught in live-traps set for small mammals in deep forest among granite outcrops. The specimen from Yongsan was obtained on October 27 in a partly wooded area. Ventrals and subcaudals of our four specimens (all males) numbered, respectively, 198, 200, 198, 205, and 74, 75, 75, —. Total length of the largest specimen was 960 (790 + 170).

We follow Chang (1932:54) and most subsequent authors in regarding *D. rufozonatum* as a monotypic species.

Zamenis spinalis (Peters)

Masticophis spinalis Peters, Monatsber. preuss. Akad. Wiss., Berlin, p. 91 (for 1866), 1867 (type locality, unknown—"Mexico" erroneously listed).

Zamenis spinalis, Günther, Ann. Mag. Nat. Hist., ser. 4, 9:22, January, 1872.

Specimens examined (2).—5 mi. ESE Seoul, 1 (KU); 6 mi. NNE Sogwi-ri, Cheju Do, 1 (KU).

Remarks.—The specimen from Cheju Do was captured on September 9 in tall grass near a small stream and was eating a small *Rhabdophis tigrina.* The female from near Seoul was obtained from a Korean on June 10, and was gravid (six eggs, each approximately 35 mm. in length). The length of body measured approximately 550 and the length of incomplete tail 168 in one specimen (KU 38777, female from 5 mi. ESE Seoul), 540 and 183 in the other (KU 38778, female from Cheju Do). Respective ventral and subcaudal counts of the two females are 204, 194, and 74 +, 86.

There is some disagreement in the literature as to the proper generic name of this snake. Differences in dentition between Old World species (referable to *Zamenis*) and the American species (referable to *Coluber*) are discussed by Bogert and Oliver (1945: 365). The species *spinalis* has been referred to *Coluber* by several authors (see Pope, 1935:226).

Elaphe dione (Pallas)

Coluber dione Pallas, Reise durch verschiedene Provinzen des Russischen Reichs, 2:717, 1773 (type locality, "Salt steppes toward the Caspian Sea" according to Stejneger, Bull. U. S. Nat. Mus., 58:315, July 22, 1907).

Elaphis dione, Duméril and Bibron, Erpétologie générale . . ., 7:248, 1854.

Specimens examined (10).—Choksong, 1 (KU); 4 mi. N Ch'onan, 1 (KU); Seoul, 1 (KU); 5 mi. E Seoul, 1 (KU), 2 (UMMZ); 5 mi. ESE Seoul, 1 (KU); 6 mi. E Seoul, 1 (UMMZ); Taegwang-ni, 1 (KU); 2 mi. WSW Tongjonggok, 1 (KU).

Remarks.—This species seemingly occurs in upland habitats. Specimens were taken on rocky hillsides, on sparsely wooded hillsides, and in cultivated fields. November 21 was the latest date of capture of an active individual (UMMZ 113451), the head of which was seen many times prior to capture protruding from a hole beneath the concrete floor of a building. A female (KU 38855), measuring 915 (775 + 140) in total length, and obtained on June 13, contained nine eggs (32 mm. long). One juvenile had eaten a half-grown house mouse, *Mus musculus;* the stomach of a male contained three mice, one a striped field mouse, *Apodemus agrarius,* the other two probably also of that species but too far digested for certain identification. Eggs probably hatch in late summer. A young of the year (length of body, 340) was captured on September 30; another juvenile (length of body, 285) was obtained in May.

Our largest male (KU 40123) measured 904 (719 + 185) in total length. Ventrals and subcaudals of six females averaged 205.8 (198-211) and 62.2 (55-69), respectively, whereas corresponding counts of four males averaged 196.8 (190-214), and 71.0 (69-74). Each of nine specimens had dorsal scales in 23-25-19 rows except one (UMMZ 113451), which had 23-25-23 rows.

Elaphe rufodorsata (Cantor)

Tropidonotus rufodorsatus Cantor, Ann. Mag. Nat. Hist., ser. 1, 9:483, August, 1842 (type locality, island of Chusan, China).

Elaphe rufodorsata, Stejneger, Bull. U. S. Nat. Mus., 58:310, figs. 269-271, July 22, 1907.

Specimens examined (27).—7 mi. NW Changhowan-ni, 1 (KU); 3 mi. NW Chip'o-ri, 3 (KU); 7 mi. W Ch'ungju, 2 (KU), 1 (UMMZ); 3 mi. S Kumhwa, 2 (KU); 1 mi. NW Oho-ri, 1 (KU); 4 mi. E Seoul, 1 (KU); 5 mi. E Seoul, 2 (KU); 5 mi. ESE Seoul, 2 (KU); 6 mi. E Seoul, 3 (KU), 2 (UMMZ); 7 mi. ESE Seoul, 5 (KU); 4 mi. N Uijongbu, 1 (KU); 5 mi. NE Uijongbu, 1 (UMMZ).

Remarks.—*E. rufodorsata* was commonly observed and collected on barren hillsides, on country roads, in rice fields, and along drain-

age ditches and small streams. One was found sunning outstretched on a road. Two individuals were trapped in cement-walled pits at the Seoul City Water Works. On April 5, five snakes of this species with one *Rhabdophis tigrina* and one *Agkistrodon halys,* all partly caked with earth, were found sunning in a shallow depression on the side of a Korean burial mound, which was presumably a hibernaculum. Aside from one juvenile, four of the *E. rufodorsata* were of approximately the same size, having bodies ranging in length from 385 to 455.

Copulation was observed on April 25 (male, KU 38811, length of body, 400, and female, KU 38812, length of body, 565), and on May 4 (female, KU 38816, length of body, 620). Eggs doubtless hatch at various times in summer. One of five snakes obtained on April 5 (see above) measured 310 (250 + 60) in total length. Another juvenile (KU 38828), obtained on October 18, was 478 (385 + 93) long, and our smallest specimen of this species (KU 38821), captured on June 26, measured 275 (230 + 45).

The stomachs of two snakes each contained a *Rana nigromaculata;* another individual had eaten a *Hyla arborea,* and a fourth specimen had eaten a small fish. One specimen was parasitized by a cestode.

The largest female from our series (KU 38816) measured 740 (620 + 120), and the largest male (KU 38813), 595 (475 + 120). Respective ventral and subcaudal counts of 13 males averaged 170.5 (167-174) and 60.0 (56-63), ventrals of 12 females averaged 178.3 (169-182), and subcaudals of 11 averaged 51.0 (46-56).

Elaphe schrencki anomala (Boulenger)

Coluber anomalus Boulenger, Ann. Mag. Nat. Hist., ser. 8, 17:243, March, 1916 (type locality, Chihfeng, China).

Elaphe schrencki anomala, Pope, The reptiles of China, p. 266, fig. 57, May 11, 1935.

Specimens examined (7).—Central National Forest, near Pup'yong-ni, 2 (KU), 1 (UMMZ); 4½ mi. W Chip'o-ri, 1 (KU); 5 mi. N P'yong-taek, 1 (KU); 5 mi. E Seoul, 1 (KU); 5 mi. ESE Seoul, 1 (KU).

Remarks.—Individuals were observed or taken on dry, scrubby hillsides and in grassy upland areas. One of the three snakes from the Central National Forest was captured on a steep, forested hillside among granite outcroppings; another was obtained there along a stream bank and had eaten three bats, *Murina aurata* (see Jones, 1960:265), and one mouse, *Apodemus* sp. (tail only found). P. M. Youngman reported (personal communication) finding a rat (*Rattus* sp.) in the stomach of one individual. A female (KU 38830, length

of body, 1180) that was obtained on June 2 contained 17 eggs, each approximately 32 mm. long. The ventrals of two females numbered 223 and 229, and the subcaudals of the latter 70. Ventrals and subcaudals of five males were, respectively, 211, 213, 214, 215, 216, and 71, 75, 75, 69, 75.

The coloration and pattern of our seven specimens are of interest in view of the probable intergradation between *E. s. anomala* and *E. s. schrencki* in northern Korea (see comments by Shannon, 1956: 46). The smallest specimen (KU 38831), having a total length of 335 (280 + 55), was obtained 4 mi. N P'yong-taek on September 24. It is nearly uniform pale brown (lacks a dorsal pattern) and additionally is characterized as follows: incomplete pattern on the head; no black postocular band (pale brown with black posterior border); ventrolateral extensions of the head pattern that form longitudinal stripes of white on the third row of scales; a pale whitish stripe on the sixth and seventh scale rows that extends posteriorly to the level of the fortieth ventral and that has a narrow black border (sometimes interrupted); small and indistinct blackish markings and pale stripes on sides (no higher than sixth row of scales); underside of the head whitish; and venter grayish, having blackish margins on the ends of ventrals posteriorly. KU 38831 is unusual and perhaps anomalous in having a pattern that does not conform to the juvenal pattern of either subspecies.

A female (KU 38830), having a total length of 1390 (1180 + 210), from 5 mi. ESE Seoul conforms to descriptions of *anomala* in being uniformly pale brown above and in having indistinct dark smudges on the sides; the ventral surface is whitish having indistinct dark smudges, brown spots at the ends of each ventral, and the posterior edge of each ventral brown. A male (KU 40125), measuring 1090 (890 + 200) in total length, from 5 mi. E Seoul, is pale brown above and lacks markings on the anterior part of the body. Indistinct dark markings occur at midbody, whereas the posterior quarter of the body and tail have well-defined black bands on a buff background. The black bands posteriorly are arranged in pairs; each pair of bands is separated by two and a half to three scales, whereas the bands of each pair are separated by only one and a half scales. The ventral surface has an obscure marbled pattern. Our largest specimen, a male (UMMZ 113454) having a total length of 1488 (1230 + 258), from the Central National Forest, resembles KU 40125, except that pale brown blotches (29 on body, one blackish on neck) and dark lateral spots occur anteriorly on the body.

Another female (KU 38860, body length, 970) from 4½ mi. W Chip'o-ri, our northernmost locality of record, has a fairly distinct pattern dorsally. The 30 dark brown, black-edged blotches that are separated by a buff background are not arranged in pairs (as in KU 40125); the dorsal blotches sometimes alternate with small lateral blotches. The ventral surface is marbled throughout.

Two males from the Central National Forest, having total lengths of 1105 (920 + 185) and 830 (690 + 140), generally resemble one another in having the head and neck dark brown or blackish and the anterior part of body dark brown, but discernibly blotched. The posterior part of the body and tail of each bears well-defined blotches (dark brown or black) with buffy interspaces; the dorsal blotches are sometimes arranged in pairs. The ventral surface of each is marbled throughout. These two males are noteworthy in that the pattern anteriorly is obscure, but the ground color is dark, not pale as in the two specimens from the vicinity of Seoul.

Agkistrodon halys brevicaudus Stejneger

Agkistrodon blomhoffii brevicaudus Stejneger, Bull. U. S. Nat. Mus., 58:463, July 22, 1907 (type locality, Pusan, Korea).

Agkistrodon halys brevicaudus, Okada, A catalogue of vertebrates of Japan, p. 103, 1938.

Specimens examined (12).—Central National Forest, near Pup'yong-ni, 4 (KU); 3 mi. NW Chip'o-ri, 2 (KU); 16 mi. NE Mosulp'o, Cheju Do, 1 (UMMZ); 5 mi. E Seoul, 1 (UMMZ); 6 mi. E Seoul, 2 (KU); 7 mi. ESE Seoul, 1 (KU); 7 mi. NNE Sogwi-ri, Cheju Do, 1 (UMMZ).

Remarks.—Individuals of *Agkistrodon* were collected on brushy or wooded hillsides, along rock walls or in piles of rocks, and in damp, rocky, wooded ravines near streams. Many were docile when captured. One specimen was infested with nematodes, another with cestodes. One specimen had eaten a striped field mouse, *Apodemus agrarius*, and another had eaten a gray hamster, *Cricetulus triton*. One female, obtained on May 22, 6 mi. E Seoul, contained 14 embryos. Another female, obtained on August 25 in the Central National Forest, contained three well-developed embryos.

We have not included descriptive or taxonomic remarks concerning *A. halys* because Dr. Howard K. Gloyd, University of Arizona, who currently is studying the systematics of the genus *Agkistrodon*, has our specimens on loan.

Gazetteer

Listed below are all localities mentioned in the accounts of species; the latitude (north) and longitude (east) are given for each. All place-names can be found in "Gazetteer to maps of Korea," 3 vols., AMS 2, U. S. Army Map Service, September, 1950, and, except for the two marked by an asterisk, can be located on AMS map series L552 (Korea, 1:250,000). The McCune-Reischauer system of romanization of Korean names is used.

Changhowan-ni. 37°07′, 127°38′

Central National Forest. A small mixed forest 15-18 mi. NE Seoul and immediately west of the village of Pup'yong-ni; most of our collecting there was done approximately at 37°45′, 127°10′

Cheju Do (Quelpart Island). A large island in the East China Sea off the southwestern tip of the Korean mainland (see Mosulp'o and Sogwi-ri)

Chip'o-ri. 38°08′, 127°19′

Choksong. 37°58′, 126°57′

Ch'onan. 36°48′, 127°09′

*Ch'ongyang-ni. 38°15′, 127°23′

Ch'orwon. 38°15′, 127°13′

Ch'ungju. 36°58′, 127°57′

Halla San. A central, volcanic mountain on Cheju Do (see above)

Hoengsong. 37°29′, 127°59′

Inje. 38°04′, 128°11′

Kangnung. 37°45′, 128°54′

Kumhwa. 38°17′, 127°28′

Kunsan. 35°59′, 126°43′

Kwangju. 35°09′, 126°55′

Majon-ni. 37°52′, 126°46′

Mosulp'o. 33°13′, 126°15′

Naegong-ni. 37°41′, 127°10′

Oho-ri. 38°20′, 128°32′

Osan. 37°09′, 127°04′

Pup'yong-ni. 37°44′, 127°12′

Pusan. 35°08′, 129°04′

P'yong-taek [= P'yongt'aeng-ni]. 36° 59′, 127°05′

Sangbonch'on-ni. 37°27′, 127°16′

Sangdaehwa. 37°30′, 128°26′

Seoul. 37°32′, 127°00′

Sogwi-ri. 33°15′, 126°34′

Songdong-ni. 38°01′, 127°16′

Taegwang-ni. 38°11′, 127°06′

*Taehoesan-ni. 38°04′, 127°14′

Taejon. 36°20′, 127°26′

Tangjonggok. 38°11′, 128°19′

Tangnim-ni. 37°50′, 127°37′

Uijongbu. 37°44′, 127°03′

Wonsan. 39°09′, 127°27′

Yami-ri. 38°03′, 127°16′

Yanggu. 38°06′, 128°00′

Yongdae-ri. 38°13′, 128°23′

Yongp'yong. 38°01′, 127°13′

Literature Cited

BABB, G. H., JR.
1955. An annotated checklist of the amphibians and reptiles of Korea. Bull. Philadelphia Herp. Soc., 1:17-23.

BOGERT, C. M., AND OLIVER, J. A.
1945. A preliminary analysis of the herpetofauna of Sonora. Bull. Amer. Mus. Nat. Hist., 83:297-426, 8 pls., 13 figs., 2 maps, March 30.

BOULENGER, G. A.
1882. Catalogue of the Batrachia Salientia s. Ecaudata in the collection of the British Museum. Taylor and Francis, London, xvi + 503 pp., 30 pls.

CHANG, M. L. Y.
1932. Notes on a collection of reptiles from Szechuan. Contrib. Biol. Lab., Sci. Soc. China, Zool. Ser., 8:9-95, 28 figs., February.

CONANT, R.
1951. The reptiles of Ohio. Second edition (with revisionary addenda). Amer. Midland Nat., Univ. Notre Dame Press, 284 pp., 27 pls.

DIXON, J. R.
1956. A collection of amphibians and reptiles from west central Korea. Herpetologica, 12:50-56, 1 fig., March 6.

FANG, P. W., AND CHANG, M. L. Y.
1931. Amphibia of Nanking. Contrib. Biol. Lab., Sci. Soc. China, Zool. Ser., 7:65-114, 18 figs., May.

GÜNTHER, A.
1858. Catalogue of the Batrachia Salientia in the collection of the British Museum. Taylor and Francis, London, xvi + 160 pp., 12 pls.

HAHN, D. E.
1959. Observations and collecting notes on *Rana n. nigromaculata* in central Korea. Jour. Ohio Herp. Soc., 2:7-8, September 20.
1960. Collecting notes on central Korean reptiles and amphibians. Jour. Ohio Herp. Soc., 2:16-24, 4 figs., September 20.

JONES, J. K., JR.
1960. The least tube-nosed bat in Korea. Jour. Mamm., 41:265, May 20.

LIU, C.
1936. Secondary sex characters of Chinese frogs and toads. Zool. Ser., Field Mus. Nat. Hist., 22:115-156, 12 pls., October 31.
1950. Amphibians of western China. Fieldiana: Zool. Memoirs, Chicago Nat. Hist. Mus., 2:1-400, 10 pls., 100 figs., June 15.

MALNATE, E. V.
1960. Systematic division and evolution of the colubrid snake genus *Natrix*, with comments on the subfamily Natricinae. Proc. Acad. Nat. Sci. Philadelphia, 112:41-71, 2 figs., 4 maps, September 23.

MASLIN, T. P.
1950. Snakes of the Kiukiang-Lushan area, Kiangsi, China. Proc. California Acad. Sci., ser. 4, 26:419-466, 10 figs., April 28.

MITTLEMAN, M. B.
1950. The generic status of *Scincus lateralis* Say, 1823. Herpetologica, 6:17-20, June 5.

MORI, T.
1928*a*. A presumption of the age in which the separation of Japan and Korea had occurred and the general condition at that age estimated from the distribution of animals in Saishuto and Tsushima. Chosen, pp. 14-25, January, 1928 (in Japanese).
1928*b*. On amphibians and reptiles of Quelpaert Island. Jour. Chosen Nat. Hist. Soc., 6:47-52, March 25 (in Japanese).
1928*c*. On a new Hynobius from Quelpaert Isl. Jour. Chosen Nat. Hist. Soc., 6:53, March 25.

MORIYA, K.
1954. Studies on the five races of the Japanese pond frog, *Rana nigromaculata* Hallowell. I. Differences in the morphological characters. Jour. Sci. Hiroshima Univ. (ser. B, div. 1), 15:1-21, 2 pls., 1 fig., December.

OKADA, Y.
1931. The tailless batrachians of the Japanese Empire. Imp. Agric. Exp. Sta., Tokyo, 215 pp., 29 pls., 97 figs., March 30.
1934. A contribution toward a check list of the urodeles of Japan. Copeia, 1934 (1):16-19, April 24.
1935. Amphibia of Jehol. Rept. First Sci. Exped. Manchoukuo, sect. V, div. II, pt. II, art. 1, pp. 1-24 (in Japanese) and 25-47 (in English), 7 pls., 9 figs., November 30.

OLSEN, L. S.
1957. A new species of *Neoascaris* (Nematode) from a Korean wood mouse. Trans. Amer. Micros. Soc., 76:205-208, 9 figs., April.

POPE, C. H.
1935. The reptiles of China (Natural History of Central Asia, Vol. X). Amer. Mus. Nat. Hist., New York, lii + 604 pp., 27 pls., 78 figs., May 11.

POPE, C. H., AND BORING, A. M.
1940. A survey of Chinese Amphibia. Peking Nat. Hist. Bull., 15:13-86, 1 map, September.

SATO, I.
1943. The tailed batrachians of Japan. Tokyo, 520 pp., illustrated (in Japanese).

SCHLEGEL, H.
1838. Reptilia (*in* von Siebold, Fauna Japonica), pp. 1-144, illustrated.

SCHMIDT, K. P.
1927. Notes on Chinese amphibians. Bull. Amer. Mus. Nat. Hist., 54: 553-575, 2 pls., October 14.

SHANNON, F. A.
1956. The reptiles and amphibians of Korea. Herpetologica, 12:22-49, 1 pl., 1 fig., March 6.
1957. Addition to the herpetofauna of Korea. Herpetologica, 13:52, March 30.

STEJNEGER, L.
1907. Herpetology of Japan and adjacent territory. Bull. U. S. Nat. Mus., 58:xx + 577, 35 pls., 409 figs., July 22.

STEWART, G. D.
1953. Notes on a collection of amphibians from central Korea. Herpetologica, 9:146-148, October 30.
1954. A small collection of reptiles from central Korea. Copeia, 1954 (1):65-67, February 19.

TANNER, V. M.
1953. Pacific Islands herpetology No. VIII, Korea. Great Basin Nat., 13:67-73.

TING, H.
1939. A study of the reciprocal hybrids of two species of frogs, *Rana nigromaculata* and *Rana plancyi*. Peking Nat. Hist. Bull., 13: 181-200, 3 pls., March.

VAN DENBURGH, J.
1923. A new subspecies of watersnake (*Natrix vibakari ruthveni*) from eastern Asia. Proc. California Acad. Sci., ser. 4, 13:3-4, July 26.

WALLEY, H. D.
1958*a*. A new lacertid lizard from Korea. Herpetologica, 14:203-205, 1 fig., December 1.
1958*b*. "The status of *Takydromus kwangakuensis* Doi." Copeia, 1958 (4):338, December 22.

Transmitted June 30, 1961.