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First printing of a significant historical work by Murray L. Johnson: REPTILES OF THE STATE OF WASHINGTON (1954)



NORTHWEST FAUNA NUMBER 3

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PREFACE

Dr. Murray L. Johnson is a retired surgeon who spent his professional career in Tacoma, Washington. He is probably best known to a wide circle of biologists as a mammalogist, and he continues to be active in that field. He has recently named a sibling species of the red tree vole as *Arborimus pomo*. He served as Curator of Mammals at the Slater Museum, University of Puget Sound (formerly College of Puget Sound), from 1948 to 1983, and has helped curate mammal specimens at the Burke Museum in Seattle (University of Washington) since 1983. At College of Puget Sound, Murray worked with such notables as James Slater, Gordon Alcorn, John Slipp and others.

In addition to careers in medicine and mammalogy, this remarkable man has done significant work in the field of herpetology. The outstanding collection of reptiles at the University of Puget Sound Slater Museum owes its existence largely to him. In published papers in 1942 and 1947, Murray resurrected the subspecies *Thamnophis sirtalis pickeringi*, separated *Thamnophis elegans* from *Thamnophis ordinoides* and named the subspecies *Thamnophis elegans nigrescens* (see bibliography this paper).

The present paper was originally written in 1954, and one may ask why it should be published some 40-plus years later. A perusal of the paper's contents will soon reveal to the reader that nothing published since 1954 can match the wealth of accurate and detailed information on Washington reptiles contained in this paper. It represents a valuable contribution to the herpetological literature of the Pacific Northwest. It has been published exactly as it was written in 1954. The table immediately following this preface provides the reader with updated common and scientific names according to Collins, J. T., 1990, Standard common and current scientific names for North American amphibians and reptiles, Society for the Study of Amphibians and Reptiles: Herpetological Circular No. 19.

Robert M. Storm 1623 SW Brooklane Corvallis, Oregon 97333

CURRENT NOMENCLATURE OF REPTILES IN THE STATE OF WASHINGTON

5661

Scientific Name, 1954 Paper Sceloporus graciosus gracilis Sceloporus occidentalis occidentalis

Uta stansburiana stansburiana

Phrynosoma orbiculare douglassii Phrynosoma platyrhinos platyrhinos Gerrhonotus coeruleus principis Gerrhonotus multicarinatus scincicauda Eumeces skiltonianus skiltonianus Charina bottae plumbea Diadophis amabilis occidentalis Coluber constrictor mormon Coluber taeniatus taeniatus Pituophis catenifer catenifer Pituophis catenifer deserticola Lampropeltis multicincta multicincta

Contia tenuis

Thamnophis elegans nigrescens Thamnophis elegans vagrans Thamnophis ordinoides Thamnophis sirtalis concinnus Thamnophis sirtalis pickeringi Thamnophis sirtalis trilineata Thamnophis sirtalis tetrataenia Hypsiglena ochrorhyncha Crotalus viridis oreganus Clemmys marmorata marmorata Chrysemys picta bellii Common Name, 1954 Paper Sand Lizard Pacific Blue-bellied Lizard

Northern Brown-shouldered Lizard Pigmy Horned-lizard Desert Horned-lizard Northern Alligator Lizard Western Alligator Lizard Western Blue-tailed Lizard Northwestern Rubber Snake Northwestern Ring-necked Snake Western Yellow-bellied Racer Western Striped Racer Coast Gopher Snake Desert Gopher Snake Western Coral King Snake

Sharp-tailed Snake Dusky Garter Snake Wandering Garter Snake Puget Garter Snake One-striped Garter Snake Nisqually Garter Snake Three-striped Garter Snake Northwestern Garter Snake Spotted Night Snake Pacific Rattlesnake Pacific Terrapin Western Painted Turtle Scientific Name, Collins, 1990 Same Sceloporus occidentalis occidentalis and Sceloporus o. longipes Same

Phrynosoma douglassii douglassii Same Elgaria coerulea principis Elgaria multicarinata scincicauda Same Charina bottae Diadophis punctatus occidentalis Same Masticophis taeniatus taeniatus Same Same Lampropeltis zonata

Same Same Same Same Same Joined with *T. s. pickeringi Thamnophis sirtalis fitchi Hypsiglena torquata* Same Same Same Common name, Collins, 1990 Northern Sagebrush Lizard Northwestern Fence Lizard Great Basin Fence Lizard Northern Side-blotched Lizard Pigmy Short-horned Lizard Northern Desert Horned Lizard Same Oregon Alligator Lizard Western Skink Rubber Boa Northwestern Ringneck Snake Western Yellowbelly Racer Desert Striped Whipsnake Pacific Gopher Snake Great Basin Gopher Snake California Mountain Kingsnake Sharptail Snake Same Same Northwestern Garter Snake Red-spotted Garter Snake Puget Sound Garter Snake Puget Sound Garter Snake Valley Garter Snake Desert Night Snake Northern Pacific Rattlesnake Northwestern Pond Turtle Same

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REPTILES OF THE STATE OF WASHINGTON

(1954)

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Dedicated to the memory of Professor James R. Slater



Professor James R. Slater (Photo by Keith R. Bauer, courtesy of the Slater Museum, University of Puget Sound)

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1995

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INTRODUCTION

The reptiles of the State of Washington have been very much neglected in natural history study and museum collecting since the work done by the early explorers and scientists who visited the Pacific Northwest. Most people think of Washington as the land of rain and forests, and do not consider the reptiles when they go about studying the natural history of this state. In reality we have an exceedingly interesting as well as cosmopolitan group of snakes, lizards and turtles. Not auspicious in comparison with the numerous species of the more arid parts of the country, they are nevertheless an interesting addition to our native fauna.

The author has been resident within the state for many years, with years of field work in herpetology. Beginning in 1937, an intensive and planned program of collecting reptiles was begun. Since then, the College of Puget Sound reptile collection has grown to be the largest of our native species in existence, with a number of excellent series and many locality records within the state, including several state records. Museums throughout the country have been contacted and visited. The larger collections have been examined, and the literature has been exhaustively studied, so we believe that this booklet should represent a worthwhile permanent contribution to the herpetological field. Much worthwhile remains to be done, especially in the field of ecology and life history. We hope this work may be a basis for future herpetological research.

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Museums throughout the country and their respective staffs have been most encouraging in sending lists of specimens, and checking doubtful records. This has taken time, I know. Among these should be mentioned:

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In addition, occasional suggestions or more, have been forthcoming from Gordon Alcorn, Walter Brown, Philip Cheney, R.L. Ditmars, R. Dunn, Henry Fitch, Stanley Jewett, Jr., Ernst Mayr, James Slater, John Slipp, Tracey Storer and others. Persons too numerous to mention have taken part in field work.

HISTORY

In beginning this study of reptiles of the state, it will be worthwhile to review briefly the historical background of natural history in the Northwest. Before the first overland expeditions (Lewis and Clark in 1806), there had been few scientists who visited the coast of Washington. In 1741 from the north, Steller, with Commander Behring made a magnificent natural history study of the northwest coast of Alaska, as the first student of such things on the north Pacific coast. Following Steller are such names as Anderson with Captain Cook, Menzies with Captain Vancouver in the 18th century, and early in the 19th century Scouler, Eschscholtz, Tolmie, Gairdner, and Pickering. All of these men were designated as surgeon and naturalist for ships or trading posts and were the first men to scientifically observe Washington State. Townsend, Nuttall, Lyall and Douglas were making their remarkable discoveries in the Northwest Territory at the same time. A student of reptiles will recognize few names in his field, this phase of natural history being much neglected.

During the last half of the 19th century the most intensive collecting and study of reptiles in the Northwest took place. This was in major part due to the United States exploration parties, boundary survey and railroad surveys under the War Department.

In this early and important era, the collectors were not those who named the species, and the men who studied the preserved specimens and made type descriptions for the most part did no field work in the area from which the specimens were secured. Thus was increased the probability of human error and loss of some of the finer points of field observation which help to make specific and subspecific determination more exact.

Two names are outstanding in the field of herpetology of the Washington Territory: Baird and Girard. Spencer F. Baird became associated with the Smithsonian Institution in 1850 and, with Charles Girard, wrote prolifically in many fields of natural history, some of which will be considered later. In 1857 these two men were instrumental in forming the United States National Museum. Girard was a prime factor in arousing interest among surgeons accompanying the exploring expeditions who, in turn, sent specimens to Washington D.C. to be classified.

In 1853 Drs. James Cooper and George Suckley of the U.S. Army Medical Corps, were stationed at Fort Steilacoom and showed themselves to be observers of no mean note. In 1859, *The Natural History of the Washington Territory* by James Cooper and George Suckley was published by the government printing office. This presents much material gathered by the Railroad Surveys and is the first attempt at organizing along with reports in other fields, the reptiles of the state.

Other men of this time were collecting in the Northwest Region. Dr. C. B. R. Kennerly, a former student of Baird, made numerous contributions in the eastern part of the state and Fort Steilacoom. Lieutenant Trowbridge, Lieutenant White, Dr. Newberry, and Lieutenant Bendire all have specimens of reptiles listed to their credit in the U.S. National Museum collection. Isaac Stevens, the first governor of Washington Territory, must have been interested in seeing that a reptile collection was instituted for his territory, for Cooper and Suckley often mention his name. Specimens are catalogued as having been sent in by Governor Stevens.

In 1866, John Lord published *The Naturalist in Vancouver Island and British Columbia*, extending his observations down through Washington and Oregon. His observations are interesting, but there is much apparent herpetological mis-identification and lack of completeness. Holbrook of South Carolina had published *North American Herpetology* in 1842 but there had been insufficient collections in the Northwest to make this work of value to us. Dr. Yarrow in 1883 put out the U.S. National Museum publication of catalogue of the reptiles in the Museum collection, including many Washington specimens. Edward D. Cope's

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publication on *The Crocodilians, Lizards and Snakes of North America* was published in 1900. This work included supernumerary species and subspecies which had been described by Cope and others, generally based on insufficient material. Boulenger and Gray in England, and Blainville in Paris, had publications which include most of the work on Washington State reptiles outside this country.

Since 1900 there have been many general works that help in our understanding of Washington reptiles. It must be noted, however, that there is a lack of correlated field work. Ruthven's Variations and Genetic Relationships of the Garter-snakes in 1908 is helpful on many points, but there were only small series from Washington. Among recent authors are Klauber (1936, 1946) on rattlesnakes, coral king snakes and the genus Charina, Taylor (1935) on the genus Eumeces, Blanchard (1920, 1921, and 1923) on the genus Lampropeltis, the reptiles of Stevens County, and the genus Diadophis, Stull (1932, 1940) on the genus Pituophis, Henry Fitch (1934, 1935, 1940, 1941) on the genera Gerrhonotus and Thamnophis, Pope (1939) on turtles, Svihla (1933) on the reptiles of Whitman County, Dice (1916) on the reptiles of Walla Walla and Columbia counties, Brown and Slater (1939) on the reptiles of the islands of Washington, and Owen's (1940) and Johnson's (1942) lists of Washington reptiles. The most comprehensive work is Van Denburgh's The Reptiles of Western North America, 1922.

DISTRIBUTIONAL DISCUSSION

There are two distinct areas in the state, the species of which do not tend to overlap. On the west side of the Cascade Mountains are the moist evergreen forests and brush lands, mainly Humid Transition Zone; on the east side are the largely treeless arid regions grown to sagebrush and other shrubs, including Upper Sonoran (south central) and Arid Transition Life Zones. Higher altitudes both east and west give areas of Canadian, Hudsonian, and Arctic-Alpine zones. We find in organizing our study that there is a geographical barrier, the Cascade Mountains, extending north and south from far above the Canadian border to the Columbia River and beyond, bisecting the state and providing a factor of mechanical separation, besides producing different climatic conditions east and west of the barrier. The Columbia River would seem to present a third factor; it separates Washington from Oregon and blocks off the extreme eastern part of the state from the middle eastern portions as it swings down from the north. This, however, does not appear to have been a serious barrier.

As one goes farther south into Oregon and southeast into Idaho, different conditions again prevail and we hear of species which have never been found in Washington. Perhaps some of these will be found living at present in our part of the country, but this is only conjecture. In our study we must remain with the facts as they present themselves.

SYSTEMATIC LIST OF WASHINGTON REPTILES

Genera, species and subspecies names in the order presented.

Reptilia (Class)	Diapsida (Subclass)
Squam	ata (Order) Sauria (Suborder)
	Iguanidae (Family)
1.	Sceloporus graciosus gracilis (Baird & Girard)
	Sand Lizard
2.	Sceloporus occidentalis occidentalis (Baird & Girard),
	Pacific Blue-bellied Lizard
3.	Uta stansburiana stansburiana (Baird & Girard)
	Northern Brown-shouldered Lizard
4.	Phrynosoma orbiculare douglassii (Bell)
	Pigmy Horned-lizard
5.	Phrynosoma platyrhinos platyrhinos Girard
	Desert Horned-lizard
	Anguidae (Family)
6.	Gerrhonotus coeruleus principis (Baird & Girard)
	Northern Alligator Lizard
7.	Gerrhonotus multicarinatus scincicauda (Skilton)
	Western Alligator Lizard
	Scincidae (Family)
8.	Eumeces skiltonianus skiltonianus (Baird & Girard)
	Western Blue-tailed Lizard
Serpen	tes (Suborder)
1.1.20	Boidae (Family)
9.	Charina bottae plumbea (Baird & Girard)
	Northwestern Rubber Snake
	Colubridae (Family)
10.	Diadophis amabilis occidentalis Blanchard
	Northwestern Ring-necked Snake
11.	Coluber constrictor mormon (Baird & Girard)
	Western Yellow-bellied Racer
12.	Coluber taeniatus taeniatus (Hallowell)
	Western Striped Racer
13.	Pituophis catenifer catenifer (Blainville)
	Coast Gopher Snake
14.	Pituophis catenifer deserticola Stejneger
	Desert Gopher Snake
15.	Lampropeltis multicincta multicincta (Yarrow)
	Western Coral King Snake

16.	Contia tenuis (Baird & Girard)
	Sharp-tailed Snake
17.	Thamnophis elegans nigrescens Johnson
	Dusky Garter Snake
18.	Thamnophis elegans vagrans (Baird & Girard)
	Wandering Garter Snake
19.	Thamnophis ordinoides ordinoides (Baird & Girard)
	Puget Garter Snake
20.	Thamnophis sirtalis concinnus (Hallowell)
	One-striped Garter Snake
21.	Thamnophis sirtalis pickeringi (Baird & Girard)
	Nisqually Garter Snake
22.	Thamnophis sirtalis trilineata (Cope)
	Three-striped Garter Snake
23.	Thamnophis sirtalis tetrataenia (Cope)
	Northwestern Garter Snake
24.	Hypsiglena ochrorhyncha (Cope)
	Spotted Night Snake
	Crotalidae (Family)
25.	Crotalus viridis oreganus (Holbrook)
	Pacific Rattlesnake
Synap	osida (Subclass) Testudinata (Order)
	Testudinidae (Family)
26.	Clemmys marmorata marmorata (Baird & Girard)
	Pacific Terrapin
27.	Chrysemys picta bellii (Gray)
	Western Painted Turtle

KEY TO THE REPTILIA IN THE STATE OF WASHINGTON

This key applies only to the State of Washington and the immediate surrounding territory. It should not be used for specimens from other localities. A key can be used for a majority of cases, but individual specimens will occasionally not conform.

A1. Body protected by a bony carapace of shell, covered with horny plates of leathery skin; jaws covered with horny material, without teeth...Turtles—Order Testudinata

B.1. Suture between abdominal plates less than twice length of suture between pectorals; inguinal plates not wedged in between abdominals & marginals.... *Clemmys marmorata marmorata*

B.2. Suture between abdominal plates about twice length of suture between pectorals; inguinal plates wedged in between abdominals and marginals...,*Chrysemys picta bellii*

A.2. Body not protected by bony carapace; jaws provided with teeth....Order Squamata B.1. Limbs four, well developed; eyes with movable lids...Lizards—Suborder Sauria

C.1. A series of femoral pores

D.1. Body slim, head without spines

E.1. Dorsal scales granular, gular folds well developed; brown spot on shoulder....*Uta stansburiana stansburiana* E.2. Dorsal scales sharply keeled; no complete transverse gular fold; no brown spot on shoulder

F.1. Adult size smaller; dorsal scales small, 50 to 68 between interparietal and back of thighs; usually with distinct longitudinal stripe on body....Sceloporus graciosus gracilis
F.2. Adult size larger; dorsal scales large, 35 to 48 between interparietal and back of thighs; often with a dorsalateral light stripe....
Sceloporus occidentalis occidentalis

D.2. Body broad; head with spines posteriorly.

E.1. Adult size small; head spines small (rudimentary); femoral pores.... *Phrynosoma orbiculare douglassii* E.2. Adult size large; femoral pores 6-12....*Phrynosoma platyrhinos*

C.2. No femoral pores

D.1. Lateral scales very much smaller than dorsals and ventrals (usually hidden by a lateral fold); dorsal scales keeled

E.1. Dorsal scales weakly keeled; head and body slim and moderately large.... Gerrhonotus coeruleus principis E.2. Dorsal scales strongly keeled; head and body broader and larger; temporals smooth.... Gerrhonotus multicarinatus scincicauda

D.2. Lateral scales not much smaller than dorsals and ventrals; scales flat and smooth; tail usually blue.... *Eumeces skiltonianus skiltonianus*

B.2. Limbs absent (or rudimentary in Boidae); eyes without movable eyelids.... Snakes—Suborder Serpentes

C.1. Dorsal scales smooth

D.1. Anal plate divided

E.1. A light transverse band at neck.... Diadophis amabilis occidentalis

E.2. No light transverse band at neck

F.1. Pupil of eye vertical; a series of dorsal blotches present.... Hypsiglena ochrorhyncha

F.2. Pupil of eye round; no dorsal blotches.

G.1. Gastrosteges with narrow transverse blackish bars; short pointed tail.... *Contia tenuis*

G.2. Gastrosteges without black transverse bars; tail long and tapering

H.1. Broad dark dorsal stripe, narrow light stripes on sides; scales in 15 rows.... Coluber taeniatus taeniatus H.2. No dorsal or lateral stripe (young spotted); scales in 17 rows....Coluber constrictor mormon

D.2. Anal plate single

E.1. Urosteges in two series; coloration in rings...Lampropeltis multicincta

E.2. Urosteges in one series; tail short and

truncate...Charina bottae plumbea

C.2. Dorsal scales keeled.

D.1. No rattle at end of tail; no pit between eye and nostril, no large erectile fangs

E.1. Dorsal scales in 27 to 35 rows, no longitudinal lines; blotches on body and tail.

F.1. Dorsal blotches 56 to 93, av. 70, on tail 14 to 30, av. 21; gastrosteges av. male 217, female 220.... *Pituophis catenifer catenifer*

F.2. Dorsal blotches on body 44 to 66, av. 55, on tail 12 to 21, av. 15; gastrosteges av. male 235, female 239.... *Pituophis catenifer deserticola*

E.2. Dorsal scales in 17 to 23 rows; frequent longitudinal lines; sometimes spotted....*Thamnophis* species—See special key under garter snakes

D.2. A horny rattle at end of tail; a pit between nostril and eye, a pair of erectile fangs...Crotalus viridis oreganus

ACCOUNTS OF SPECIES

In the accounts of species which follow, a synonymy of each species is given and references under each of the several names and references pertain to Washington specimens or observations.

The following abbreviations for museums and some persons will be used in giving specimen numbers or literature references in the accounts of species:

AMNH	
ANS	Academy of Natural Sciences, Philadelphia
CAS	
CNHM	
CPS	
FM	
LMK	
MVZ	Museum of Vertebrate Zoology, University of California
MZ	
O	
SDSNH	
USNM	
VVan	Denburgh, John T., Reptiles of Western North America, 1922
WC	
WSC	Charles R. Connor Museum, Washington State College

Sceloporus graciosus gracilis (Baird & Girard) Sage Swift; Sand Lizard

Sceloporus graciosus, Cooper and Suckley 1860:294; Snodgrass 1904:225; Dice 1916:300. Sceloporus graciosus gracilis, Van Denburgh 1922:285; Stejneger and Barbour 1923:56;

Stejneger and Barbour 1933:61; Slevin 1934:43; Burt 1935:278, 279; Stejneger and Barbour 1939:66; Owen 1940:169; Johnson 1942:15; Stejneger and Barbour 1943:77; Smith 1946:255; Pickwell 1947:31.

Range.—Eastern parts of Washington and Oregon, and south to middle California. Type Description.—As Sceloporus gracilis Baird and Girard Proc. of Acad. Nat. Sci. Phila., Vol. VI, 1852;175.

Type Locality.-Oregon.

Distribution in Washington.-Eastern part of state.

COUNTIES.—ADAMS: Lind (CPS 4551-6). BENTON: Plymouth, 6 mi. W (CPS 3530-1); Kennewick 10 mi W (CPS 4071-3). DOUGLAS: Rock Island 1 mi. S (CPS 4331). FRANKLIN: Pasco (CPS 3334-5), 2 mi. SE (CPS 4062-4, 4094-6); Connel, W (Snodgrass 1904:225). GRANT: Moses L., lower end (CPS 3148-54); Soap L., Grand Coulee (WSC 93-100); Coulee City (USNM 61459); Neppel (O:169); Vantage, near (O:169); Ephrata, 15 mi. S (CPS 4066-9). KLICKITAT: Smithville, 1 mi. SE of sand dunes of Grande Dalles (CPS 3391-6); Alderdale, 3 mi. N & 6 mi. W (CPS 3522); Wishram, 3 mi. W (CPS 3102 a-b); Grand Dalles, sand dunes (CPS 3293-97, 3406-07); Cliffs (USNM 60200). LINCOLN: Sylvan L., S shore (CPS 3087-8); Odessa (USNM 61460-1). OKANOGAN: Okanogan, 2 mi. NE (CPS 3543-6); Old Fort Okanogan (CPS 4039-42). WALLA WALLA: Wallula (MVZ 5579, O:169, CPS 3945-61); Touchet (USNM 44611). WHITMAN: Almota (USNM 44962-4); Pullman (AMNH 22548). YAKIMA: Sunnyside (FM 787); Mabton (USNM 44760-1); Pomona (O:169); Toppenish, 8 mi. SE (CPS 4329-30).

Description.—This is a small lizard of no unusual proportions. Dorsal scales are keeled, pointed and moderately small. Ventral scales are smooth. Males have enlarged postanal plates. Femoral pores vary from 12 to 20 in number. The ground color is gray with one dorsal and one lateral series of darker blotches. The males have blue blotches along either side of the abdomen and a reticulation of blue or gray on the throat. Otherwise the ventral surface is white. The females often have the blue on either side of the abdomen, but are much less colorful than the male.

Comparisons.—Sceloporus occidentalis occidentalis is the only other member of this genus to be included in our range. S. g. gracilis is much smaller, to be confused only with immature S. o. occidentalis specimens, but having an increased number of dorsal scales, counting 52 to 68 in a line from the head plates to a line across the posterior edge of the thighs, as compared to 35 to 46 dorsal scales in S. o. occidentalis. Also young males of S. o. occidentalis have distinct blue gular spots on either side as a distinguishing point. Sceloporus graciosus graciosus as compared with S. g. gracilis is described as having a decreased dorsal scale count, being from 42 to 53 in number, and in being larger in size, with brighter coloration and more distinct dorsal and lateral blotches to give plainer longitudinal bands.

Habits and Habitat.—We have found this species to be most common in sandy localities, sand dune country being most productive. At times rocky terrain is populated by large numbers of this lizard. They are active during the heat of the day and are very difficult to collect without arduous stalking and isolation technique or resorting to firearms. They tend to run to a secure hiding place as to the depths of a bush or into a rock crevice where they will stay despite much upset and commotion, running out as they are uncovered and streaking to the next nearest place of refuge. With the cool of the evening and on cold days they will retreat beneath objects presenting sufficient cover; this time is often optimum for collecting. A nice series can be secured with a bit of luck and perseverance by disrupting likely-looking coverings and manually securing the lizards as they recover their self sufficiency more slowly than usual. This species is always found in groups if present at a locality.

Food consists of insects almost entirely; Knowlton (1946) found the following arthropods in Utah and Idaho specimens of *S. g. gracilis*: grasshoppers, Mantidae, ant lions, stink bugs, false chimeh bugs, big-eyed bugs, leaf hoppers, lace bugs, scale insects, aphids, leaf beetles, weevils, click beetles, ladybird beetles, leaf beetles, caterpillars, maggots, blow flies, horse flies, ants, spiders, scorpions, mites, ticks, and insect eggs. Some roundworms were found also.

Breeding habits are not well known. Richardson records specimens collected in northwestern Nevada on June 16 to hold two or three eggs respectively; one on June 19 held 4 eggs. Van Denburgh (1922:285) says "The eggs are about 7x13 mm., each enclosed in a tough, leathery, non-calcareous shell. In the vicinity of the Yosemite Valley they are laid in June and July."

Woodbury and Woodbury (1945) found that the closely related *Sceloporus graciosus* graciosus at Salt lake City, Utah emerge from hibernation in early April. The young come out first, then the adult males and adult females. Pairing occurs right away and five or six eggs about 12 mm long are "probably buried a short depth in the soil sometime between June 12 and June 16." They estimate the period of development in the soil to be about two months. Adults go into hibernation in late September; the young are active until about two weeks later.

Remarks.—Previous works have recorded this species as occurring in western Washington. We have been able to find no specimens in field work except in the eastern part of the state, nor do we know where the specimens are located which are reported to be from "Kelso, Cowlitz County" and "near Puget Sound" (Van Denburgh). It is possible that specimens could occasionally descend from the upper Columbia River to the lower reaches, but the ecological niche of this lizard is not provided except in eastern Washington.

Parisitism by mites (species undetermined) is noted on specimens obtained in Grant County in the dunes near Moses Lake, the mites being in the external ear, axilla, groin, flexion of the knee, and the para-anal region.

Sceloporus occidentalis occidentalis (Baird & Girard) Pacific Blue-bellied Lizard; Brush Lizard; Fence Lizard

Sceloporus frontalis, Baird and Girard 1852:175.

Sceloporus occidentalis, Cooper 1860:293.

Sceloporus undulatus undulatus, Yarrow 1883:59; Cope 1900:374-5.

Sceloporus occidentalis occidentalis, Van Denburgh 1922:301; Stejneger and Barbour 1923:57; Stejneger and Barbour 1933:63; Slevin 1934:43; Stejneger and Barbour 1939:68; Brown and Slater 1939:19; Owen 1940:169; Slater and Brown 1941:75; Johnson 1942:15; Stejneger and Barbour 1943:79; Smith 1946:236; Pickwell 1947:32.

Sceloporus occidentalis biseriatus, Owen 1940:169.

Sceloporus occidentalis longipes (Baird 1858:254), Bell 1954:33.

Range.—Central California to Washington and possibly southwestern British Columbia.

Type Description.—As Sceloporus occidentalis, Baird and Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852:175.

Type Locality.-Benicia, California.

Distribution in Washington .- All of the state.

COUNTIES .- ASOTIN: Wenatchee Cr., Grouse Flat (CPS 3440). CHELAN: Wenatchee (CPS 3106); L. Chelan, Shrine beach (CPS 3108, 3114-5, 3179), upper (CPS 3179, 3187-8), Rex Cr. (CPS3232-6); Chelan (CPS 3260); Stehekin (USNM 61414-5, 61459); Entiat (USNM 61410, 61462-4); Peshastin Cr. (0:170); Mission Cr. (0:170). CLALLAM: Cape Flattery (USNM 2858). JEFFERSON: Port Townsend (USNM 2847); Becket's Point, Discovery Bay (CPS 4035-6); Duckabush R., at mouth (CPS 4419). KING: Vashon Is., 100 yds. to 200 yds. above S ferry landing on road bank (CPS 3329-33); Maury Is., SW corner (CPS 3506); Indian Pt., Vashon Is. (CPS 3510-11) Maury Is., S end (CPS 3575-6); Seattle, Lincoln Park, 1 mi. S (CPS 4543-7). KITSAP: Holly (CPS 4265-6). KITTITAS: Teanaway Junction (CPS 4112). KLICKITAT: Northwestern Lake, White Salmon River, 1 mi. NW (CPS 3519); Columbia R., near (CPS 3107); Satus Pass, 4 mi. NE (CPS 6251); Spearfish Indian Village, near (CPS 3117-21); Klickitat R. (CPS 3127-30); Goldendale (USNM 44965); Grand Dalles (USNM 60193); Trout Lake, 7 mi. S (CPS 4655); White Salmon (USNM 60194-6); White Salmon (USNM 61455-7, O:170). MASON: Belfair (MZ 86787a); Red Bluff, across Hood Canal from Hoodsport (CPS 4258). OKANOGAN: Beaver L. (O:170); Mazama, 6 mi, NW (CPS 6167, 6173-4). PIERCE: Gravel pit, 1 mi, E of New Tacoma cemetery (CPS 3014-16); Chamber Cr., County gravel pit (CPS 3054); Ketron Is. (CPS 3357-8); Steilacoom (CPS 3159-77, USNM 2841, 2850); Puget Sound (USNM 2860, 3072); McNeil Is. (CPS 3568-70); Devil's head (CPS 3932-4); Puget [town], 1 mi. N (CPS 3935-41); Herron Is., SE corner (CPS 3942-4), N end (CPS 4049); Fox Is., NW end (CPS 3996-9). SKAMANIA: Stevenson, 2 mi. E (CPS 3399). YAKIMA: Yakima Indian Reservation (USNM 60197-9); Simcoe Mts. (O:170, collected by W.W. Dalquest); Naches R.S. (CPS 4497-8).

Description.—This is a medium sized lizard of rather robust proportions. Dorsal scales are moderately large, sharp, and keeled; ventral scales are smooth. There are 13 to 20 femoral pores. Post anal plates in males are enlarged. The general color is dark brown to gray, depending on the amount of light and temperature of the environment. There is usually one series of irregular crescentic shaped blotches on either side of the back. Greenish or blue markings are seen posterior to these and laterally. The ventral white is, especially in adult males, replaced by lateral areas of blue, edged internally by black. There are two blue spots

on the gular area, often coalesced. A bright orange or yellow is irregularly suffused over the chest and limbs, more noticable in adult males.

We have found much color pattern variation within this species and color changes in individuals, conditions of temperature and light being important to allow a limited chameleonlike change. Most striking in the field is the response to light. This will darken individuals to almost a coal black color dorsally, bringing out also the dark coloration ventrally, accentuating in highly colored males the orange-black-blue color pattern on the gular and ventral regions. Orange is a prominent color ventrally, in the gular region and posteriorly on the thighs and lower tail, usually as a suffusion with no definite pattern, this being deepest in color on males. Cold will make a live specimen moderately dark; heat will lighten the color to a gray general appearance.

Comparisons.—This is the only subspecies of *S. occidentalis* found within the state, It differs from *S. o. biseriatus* in being somewhat smaller (*S. o. occidentalis* is 62-80 mm to anus; *S. o. biseriatus* is 75 to 90 mm to anus). *S. o. biseriatus* has the gular blue in one central patch which *S. o. occidentalis* does not, except by coalescing of the lateral blue patches; this is best revealed by examination of a series; the chest, mid-ventral band, and lower surface of the thigh tend to be darker in *S. o. biseriatus*, being black to gray.

Habits and Habitat.—This species is conspicuously a lizard of brush and rock-pile. They are active and easily noticed because of their habits of basking in the sun on prominent points. They rush off in great haste when an intruder comes too close and usually reappear, peeking around a corner with head cocked to one side. Around Hood Canal on Puget Sound, we have seen them playing around logs and refuse at the water's edge; but they absolutely cannot swim in the salt water, and drown if placed only two feet from land. S. o. occidentalis are not frightened easily; they reappear right away after almost being caught. They allow the hand to approach within a foot or so and can often be secured if a person is quick enough to grab suddenly from this position. Sudden motions of course send them scurrying off. When pursued persistently they may retreat to inaccessible depths of rock or within crevices of rotten trees and logs, scampering over rough rocky cliffs or the bark of trees with astonishing ability that is a joy to behold.

We have found S. o. occidentalis out as early as March 15 (1947).

A rarely heard hissing noise is made by individuals of this species when caught or cornered. Their bite is usually half-heartedly done, though occasionally will be fierce and entirely out of proportion to the damage they can do. Most specimens do not attempt any rough tactics when handled but are ready to jump away from the restraining hand at the first lessening of pressure.

Food consists of insects of all sorts and they eat live insects well in captivity.

Breeding habits in Oregon and California have been worked out well by Fitch (1940:159). One of four specimens was kind enough to lay some eggs in captivity; we recorded the following notes:

"1937, June 20. Lake Chelan, Shrine Beach. One female found under bark of fallen tree; weather very wet. Distended with eggs. Laid in Portland (Oregon) between the afternoon of July 2, 1937 and noon of July 3, 1937, fourteen eggs in the bunch. Two seemed rather dehydrated the first day they were noted. Were all in a bunch under a small amount of dried grass. Measurements on two (no great gross variation noted in all of series) were 14 mm by 7.5 mm and 13.5 mm by 7.2 mm. Semi-membranous, white. Red spot in one side of all good eggs measuring 10 mm by 7.5 mm in the first egg measured above. Was about the same size in all eggs. Preserved several the first day, the remainder three days later when they were found to be all shriveled to some degree."

The following observation was made by Dr. T. H. Lewis upon specimens secured at Seattle in 1941 (unpublished notes):

Ten large Sceloporus occidentalis occidentalis were placed in a cage on May 10.

Courting antics and rough mating attempts were observed on May 10, May 11, and May 22. The male usually aggressively seized the female (sometimes another male) with his jaws. Then he would attempt to turn her over in order to bring their cloacas into approach.

Eggs were found in the cage on June 13 (one bunch of 6 eggs, another of 16 eggs), June 20 (one egg), June 21 (4 eggs), June 23 (11 eggs scattered about), June 24 (4 eggs). The eggs were frequently dried and wrinkled when found, obviously not viable; those in best condition were buried partially in damp soil. Measurements of the good eggs recorded by Lewis are 11.4 mm by 7.7 mm to 12.8 by 9.1 mm.

On August 21, 1941 two juveniles measuring 56 mm and 58 mm were taken by him near Seattle.

We have one juvenile taken in early spring, March 16, 1947 measuring 59 mm, indicating little growth until the following year.

The number of eggs recorded per individual of *S. occidentalis* subspecies run up to 18 (Fitch, 1940:171).

Remarks.—Trauma to the tail in this species is often encountered in the natural state as evidenced by regeneration. The tail obviously acts as an organ of balance, for the deformed animals with a very short posterior member are much less graceful and agile in their movements.

Parasitism of S. o. occidentalis with the coast tick, *Ixodes ricinus californicus* (Banks), has been observed repeatedly by us in the Puget Sound and Chelan areas, as much as 20% of some series being infected by the seed tick or nymph forms, attached to the lateral gular pouches. "The adult tick is a serious pest of the deer, livestock and dogs and frequently bites man, often inflicting painful, slow healing wounds." (Jellison, 1934). This particular tick Jellison also reports in *Gerrhonotus multicarinatus scincicauda*. Gregson reports this tick on *Gerrhonotus coeruleus principis* (personal communication, 1937). We have confirmed both of these findings.

We found two nematode worms of the family Oxyuridae, both females, expelled from one specimen of *S. o. occidentalis* from Chelan. Guberlet (personal communication, 1937) of the University of Washington has written concerning these worms: "unquestionably the species is new to science and I am of the opinion that the genus may also be new. One cannot be sure without male specimens." Further specimens necessary for this determination have not yet been obtained.

Bell (1954) considers the Blue Mountains-Spokane area population to be subspecies Sceloporus occidentalis longipes Baird.

Uta stansburiana stansburiana (Baird & Girard) Northern Brown-shouldered Lizard, Little Brown Lizard

Uta stanburiana, Snodgrass 1904:225-6.

Uta stanburiana stanburiana, Van Denburgh 1922:232; Slevin 1934:43; Owen 1940:169; Johnson 1942:15; Stejneger and Barbour 1943:85; Smith 1946:273; Pickwell 1947:31.

Range.—Eastern Washington and Oregon, Idaho, Nevada, east into Colorado and parts of California, Arizona and New Mexico.

Type Description.—As *Uta stansburiana* Baird and Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852:69.

Type Locality.-Valley of the Great Salt Lake, Utah.

Distribution in Washington.-Eastern part of the state.

COUNTIES.—BENTON: Benton City, 10 mi. NE (CPS 4352, 6252); Carley, 2 mi, E (CPS 3529); Kennewick, 7 mi. NW (CPS 3483), 10 mi. NW (CPS 4070); Kiona, 1 mi. S (CPS 4559-61). CHELAN: Rock Island Dam, 2 mi. S (CPS 4839, 6165-6). DOUGLAS: Rattlesnake Springs (CPS 3465). FRANKLIN: Columbia R. opposite White Bluffs (Snodgrass 1904:225); Pasco, 4 mi. E (CPS 4557-8, 4639, 4656). GRANT: Vantage (MVZ 37179-89), 1 mi. S (CPS 3012), 4 mi. NE (CPS 4034). KITTITAS: Vantage (O:169), 5 mi. below on Columbia R. (CPS 3231). KLICKITAT: Alderdale, 3 mi. N & 6 mi. W (CPS 3523-5), 3 mi. N & 4 mi. W (CPS 3526-8). WALLA WALLA: Wallula (CPS 3962). YAKIMA: Satus Cr. at U.S. Highway 97 (CPS 3229-30); Yakima (V:232); North Yakima, just S (Snodgrass 1904:226).

Description.—This is a small lizard of no unusual proportions. The head plates tend to be convex and are rather large. Dorsal scales are small, granular appearing, weakly keeled, and number about 100 from the head plates to a line joining the posterior surfaces of the thighs. The scales on the tail are larger and strongly keeled. Ventral scales are smooth. Femoral pores vary from 11 to 17 in number. Coloration is varied in pattern and intensity, there usually being a drab brown ground color marbled, spotted or striped with shades of brown, blue or gray. There is usually a brown patch on the shoulder and a black to indigo axillary spot. Ventral color is light yellowish. Often there is blue and orange on the sides and chin. We have found our most colorful individuals in the spring time, probably related to mating season. Striking colorations are the bright orange along the neck and sides of the body, and speckling of small blue spots on the dorsum of the body, noted in adults. The younger individuals are much more drab than the adults, often not showing the post-axillary spot and being dull brown dorsally to lighter underneath without any of the brighter colors.

Comparisons.—This is the only *Uta* found anywhere near the state. It is most likely to be confused with *Sceloporus* species but has more granular appearing dorsal scalation instead of keeled pointed scales of the *Sceloporus*. *Euneces* and *Gerrhonotus* cause little confusion in diagnosis.

Habits and Habitat.—Uta stansburiana stansburiana is found in the eastern part of the state in dry desert areas. In 1935 we found great numbers of the species in the rock flats of the Columbia River below Vantage Ferry. There were countless numbers observed passing through the level, rock-strewn terrain. However, in subsequent years this country was found to be almost sterile of this species and mummified remains were found in shallow hiding places. This leads us to believe that climatic conditions decidedly influence the cycle of population of this species and undoubtedly is the limiting factor in their northward extension. These lizards may be observed around basalt flat formations when there is sufficient roughness to provide crannies into which to dodge. Dry washes may also be productive locations; even sagebrush flats are frequently inhabited by this agile little creature which needs only a corner around which to scurry to make an adequate home.

As noted above this is an exceedingly active and spry species. Seldom do they have any set place of retreat, rather dodging from rock to rock, they streak into one end of a deep crevice and sneak out the other, to survey their pursuers from some point of vantage. In open brush land they similarly retreat around sage bushes and put a goodly distance between themselves and their pursuer.

Where an individual is found in a locality, others are almost sure to be present. Little is known concerning breeding habits, other than this is an egg laying species.

Food habits include the ingestion of all forms of insect life, they being active predators, limited by their small size. Knowlton (1942) records the following taken by this species in Utah: nymph and adult leaf-hoppers, nymph and adult grasshoppers, nymph cynch bugs, alfalfa leaf bugs, pentomid bugs, harvester ants, springtails, pea aphids, spiders, beetles, Diptera, and syrphid flies.

Remarks.—Previous records from Washington are rare, there being only one specimen (from Yakima County) in the literature until Owen's checklist (1940:169). Nevertheless, as noted above, this is at times a most abundant species, and to be found in many of the counties east of the Cascade Mountains. They are difficult to catch by hand and indeed difficult to approach closely enough to secure an adequate observation. Collecting is done best by small shot in a small calibre gun, though agile and concentrated efforts will give occasional result by hand. Hot days of course increase the activity of these animals and decrease the probability of their being captured.

Phrynosoma orbiculare douglassii (Bell) Pigmy Horned-lizard; Pigmy Horned-toad

Tapaya douglassii, Cooper 1860:294.

Phrynosoma douglassii douglassii, Cope 1875:49; Cope 1900:412; Dice 1916:300; Van Denburgh 1922:375; Stejneger and Barbour 1923:61; Stejneger and Barbour

1933:67; Svihla and Svihla 1933:127; Slevin 1934:45; Burt 1935:261; Stejneger and Barbour 1939:74; Owen 1940:170; Smith 1946:299.

Phrynosoma douglassi douglassi, Yarrow 1883:68; Pratt 1923:202.

Phrynosoma douglassi pygmaea, Yarrow 1883:70.

Phrynosoma douglassii hernandesi, Cope 1900:414.

Phrynosoma douglassii, Snodgrass 1904:225; Stejneger and Barbour 1917:59.

Phrynosoma orbiculare douglassii, Klauber 1939:91; Johnson 1942:16; Stejneger and Barbour 1943:94; Pickwell 1947:33.

Range.—Deserts (Upper Sonoran) of northern California, Oregon, Washington and British Columbia.

Type Description.—As Agama douglassii Bell, Trans. Linn. Soc. London. Vol. XVI, 1828 (1833):105, Pl. x.

Type Locality.—"In Ora occidentali Americae Borealis ad ripae fluminis Columbiae."

Distribution in Washington.-Eastern Washington.

COUNTIES.—ADAMŚ; Cow L. (CPS 3890); Lind (CPS 4637). CHELAN: Chelan (CPS 3139, 3142). DOUGLAS: Withrow, 5 mi. E (CPS 3475). FRANKLIN: Pasco (WSC 75); Connell, W of (Snodgrass 1904:225). GRANT: Soap L., 2 mi. N (CPS 3013); Moses L. (CPS 3143-4); Vantage, 10 mi. NE (CPS 4353). KITTITAS: Ellensburg (O:170), 18 mi. E (CPS 4810, 4969-70). KLICKITAT: Smithville, 1 mi. SE (CPS 3390); Grand Dalles (CPS 3298). LINCOLN: Odessa, 12 mi. W (CPS 4065). OKANOGAN: Coulee Dam, 10 mi. N (CPS 3539); Pateros (O:170). SPOKANE: Spokane (V:375). WALLA WALLA: Wallula (MVZ 5578); Fort Walla Walla (USNM 10918). WHITMAN: Almota and Rock L. (Svihla and Svihla 1933:127); Central ferry, 5 mi. W (CPS 4601). YAKIMA: Sunnyside (FM 784-786), 5 mi. E (CPS 4257); Selah (O:170); North Yakima (V:375); Toppenish, 15 mi. SW (CPS 6029-30).

Description.—This is a small horned-lizard of rounded squatty form. The head spines are all rudimentary, the tail short. Dorsal scales are irregular in size, from larger tubercular keeled scales to smaller scales and granules. There is one series of small peripheral spines fringing the body. Ventral scales are smooth and imbricate. Males have enlarged postanal scales. There are 16 to 20 femoral pores. The ground color is gray to brownish above, yellowish white ventrally. There are usually two to four dark rectangular markings dorsally, marked with yellow or light gray posteriorly.

Comparisons.—Easily distinguished from the only other horned-lizard recorded for the state, *Phrynosoma platyrhinos*, by the smaller size and smaller head spines. It intergrades with *P. orbiculare ornatissimum* south and eastward, which subspecies has the rudimentary cephalic, temporal and occipital horns slightly larger. The temporals often, the occipitals sometimes are directed backward as in *P. orbiculare hernandesi*, a subspecies from regions farther south. The differences with *P. orbiculare ornatissimum* are not well worked out and will require comparison of larger series than heretofore available.

Habits and Habitat.—This is an animal of arid alkali flats, being found generally distributed in the sage brush and sand lands of eastern Washington. We have found this species up to about 3000 feet elevation on rolling sagebrush country near Ellensburg. In Oregon, Storm has found it up over 5000 feet in the Cascade Mountains. It is a ground loving

species, digging itself below the surface of the ground in the event of cold or adverse weather. Its actions are not what one would call agile but it scuttles about at a pretty good speed considering the rounded proportions of the body. When approached in the field this horned-lizard endeavors to put at least a bush between itself and the object of its suspicion. They are numerous in some areas but individually found as a rule. Often careful scrutiny of country known to harbor this little fellow will reveal no signs of its presence, climatic conditions influencing his appearance.

Diet includes all kinds of insects, *P. o. douglassii* is often found as a beneficial inhabitant of cultivated gardens, where it enjoys a good reputation among the agrarian populace.

Horned-lizards of this species are ovoviviparous, but the months of bringing forth young have not yet been determined for Washington; the number of young produced is probably 10 to 12.

The general attitude when captured is one of docility, never attempting to bite when handled. Occasionally a specimen will hiss at its captor after inflating itself to maximum roundness. We know of no reports of this species squirting blood from the conjuctivae of the eyes as other horned-lizards are known to do.

Remarks.—As noted above the relationship of this subspecies to *P. d. ornatissimum* is to be more clearly defined with more complete series, before stating just where the range of intergradation occurs.

Regarding the records of *P. o. douglassii* from Fort Steilacoom; we have studied the old records of the specimens in cooperation with the U.S. National Museum. We have come to the conclusion that these locality records are not valid. Of earlier writers who collected and observed in this territory, Suckley (1860:294) says "it is found in the eastern part of the territory to the Cascade Mountains." Cooper (1860:294) says "I never saw or heard of its occurrence west of the Cascade Mountains." Lord (1866:302) says "never seen west of the Cascades."

Phrynosoma platyrhinos platyrhinos Girard Desert Horned-lizard; Desert Horned-toad

Phynosoma platyrhinum, Yarrow 1883:65.

Anota platyrhina, Cope 1900:446.

phrynosoma platyrhinos, Stejneger and Barbour 1917:60; Van Denburgh 1922:424; Stejneger and Barbour 1923:63; Stejneger and Barbour 1933:69; Slevin 1934:45; Burt

1935:261; Stejneger and Barbour 1939:75; Owen 1940:170.

Phrynosoma platyrhinos platyrhinos, Johnson 1942:16; Stejneger and Barbour 1943:95; Smith 1946:313; Pickwell 1947:33.

Range.—Southeastern Washington to northeastern California, east to Idaho, Utah, Nevada, and southwestern Arizona.

Type Description.—As Phrynosoma platyrhinos Girard. Stansbury's Exped. Great Salt Lake, 1853:361-363, Pl. VII, figs. 1-5.

Type Locality.-Great Salt Lake.

Distribution in Washington .- Southern part of state, east of Columbia River.

COUNTIES .- WALLA WALLA: Ft. Walla Walla (USNM 10832-3)

Description.—This is a medium sized horned-lizard of robust form. The head spines are moderately long. Dorsal scales are large, tubercular and keeled, interspersed by smaller scales and granules. Ventral scales are smooth. Femoral pores are 6 to 12 in number. Males have enlarged postanal plates. Dorsal coloration is gray to brownish, marbled with black or slate. Ventral coloration yellowish white.

Comparisons.-See under comparison in discussion of P. o. douglassii.

Habits and Habitats.—This species is found on sagebrush desert land. It relies on deception and dodging rather than speed to escape enemies. Like other horned-lizards it will inflate itself and hiss when handled.

Food consists of insects, ground species of many kinds being found chiefly as one would expect, in gastric analyses.

In Nevada, Taylor (1912:351) notes mating on June 10, and found a female with ten eggs. Richardson (1915) notes three females in the last week in May and June 2, containing thirteen, thirteen and ten eggs, respectively.

Remarks.—There are only two specimens recorded from Washington. These are early ones collected by Chas. Bendire, in the collection of the U.S. National Museum. We have verbal reports of a larger horned-lizard from several areas in eastern Washington. As yet, however, specimens are lacking.

Gerrhonotus coeruleus principis (Baird & Girard) Northern Alligator Lizard

Elgaria principis, Baird and Girard 1952:175.

Elgaria principis, Cooper 1860:292.

Elgaria grandis, Cooper 1860:293.

Gerrhonotus principis, Cope 1875:46; Cope 1900:531; Stejneger and Barbour 1917:62; Van Denburgh 1922:438; Stejneger and Barbour 1933:71; Slevin 1934:45; Brown and Slater 1939:19.

Gerrhonotus grandis, Yarrow 1883:47.

Gerrhonotus multicarinatus, Cope 1900:525.

Gerrhonotus coeruleus principis, Fitch 1935:3; Fitch 1938:406; Stejneger and Barbour 1939:77; Owen 1940:170; Slater and Brown 1941:75; Svihla 1942:54; Johnson 1942:16; Stejneger and Barbour 1943:97; Lewis 1946:155; Smith 1946:448; Pickwell 1947:34.

Range.—Southern British Columbia to northwestern California, east into northeastern Washington, northern Idaho, and western Montana.

Type Description.—As *Elgaria principis* Baird and Girard, Proc. Acad. Nat. Sci. Phila., 1852:175.

Type Locality .-- Oregon and Puget Sound.

COUNTIES .- CHELAN: L. Chelan (CPS 3189, 3222), Rex Cr. (CPS 3237-38), Bear Cr. (CPS 3241); Wenatchee (CPS 3192, USNM 61466); Lucerne (USNM 61465). CLALLAM: Port Angeles (CPS 4131). CLARK: Fish Hatchery, about 8 mi. E of Vancouver on Camas Road (CPS 3216); Vancouver, 1 mi. N of Felida (CPS 3251); Salmon Cr., where upper road crosses (CPS 3252). Clark Co. (USNM 3083); Lewis R. at Columbia R. (CPS 3450-1). COWLITZ: German Cr. Road, 5 mi. up (CPS 3410); Longview (CPS 4086-7). GRAYS HARBOR: Elma, 21.5 mi. E (CPS 3046). ISLAND: Camano Is., Camano Beach (CPS 3327, 3992-3); Camano Beach, 2 mi. E (CPS 3315-6); Camano Is., Co. Gravel Pit (CPS 3313-4); Whidby Is. N end (CPS 4526). JEFFERSON: Seal Rock Camp (CPS 3193); Port Townsend (USNM 15940); Brinnen, 5 mi. N (CPS 3876); Marrowstone Is., 1 mi. N of bridge (CPS 3908); Indian Is., S end (CPS 3910-1); Protection Is. (CPS 3982). KING: Halfway House on Seattle-Tacoma Highway (CPS 3040); Univ. of Wash. Campus (CPS 3351); Vashon Is., Magnolia (CPS 3513); Seattle (FM 779-783; CAS 47492; FM 833; USNM 16163-8, 30711-2); Maury Is., Rosilla (CPS 3466); L. Sammamish (MZ 67848); Seattle, 1 mi. S of Lincoln Park (CPS 4548); Kirkland (CAS 30515). KITSAP: Catholic Church, S end of Bainbridge Is. (CPS 3356); Gorst Cr. (USNM 62712-4); Bremerton (USNM 64109-15); Port Orchard (AMNH 23456-57); Blake Is., E side (CPS 4014), W side (CPS 4013). KITTITAS: Cliffdell, 1.5 mi. NW (CPS 4661), 6 mi. NW (CPS 6247); Easton (USNM 44966). LEWIS: W fork of Tilton R. 3.5 mi. up trail (CPS 3095). MASON: Reach Is. (CPS 3906-7), E side of (CPS 3502), W side of (CPS 3503); Stretch Is. (CPS 3340); Shelton, on side of road 6 mi. S (CPS 3341-2); Hoodsport (MZ 48428-31); Skokomish R. Valley (MZ 54199); Staircase Cr. (AMNH 32484); L. Cushman (CAS 65036); Harstene Is., 2 mi. S of ferry (CPS 3899-3900); Harstene Is., S end (CPS 3917-3918). OKANOGAN: Beaver L. (O:170). PACIFIC: Chinook, 2 mi, W (MVZ 29344), 2.5 mi, SE (MVZ 34644). PEND ORIELLE: Newport, 4 mi, N (CPS 4403-4). PIERCE: Coll. Puget Sound Campus (CPS 3002, 3103); Anderson Is., NW corner (CPS 3029); Kapowsin, 3 mi. W (CPS 3051-3) Clear L. (CPS 3248); Tacoma (MZ 56926); McNeil Is. (CPS 3571); Ohop Valley N of Eatonville (CPS 3980); Falls, Little Mashel R., 1 mi. SW of Eatonville (CPS 3981); Fox Is., Sylvan (CPS 4002); Fox Is., 0.5 mi. S of ferry landing (CPS 4003-4). SAN JUAN: San Juan Is., Sparksman L. (CPS 3077-8); Shaw

1s., SW part (CPS 3079-81); Orcas Is., East Sound, 2 mi. S (CPS 3082); Orcas Is., below Orcas Knob (CPS 3359); Orcas Is., N end (CPS 3415, USNM 76299-300). SKAGIT: Lake Erie, 1 mi. W of Fidalgo Is. (CPS 3547); Fidalgo Is., Campbell L., W end (CPS 3549); Samish Is., W end (CPS 4521-5). SKAMANIA: Cape Horn (CPS 3226-7); Stevenson, 2 mi. E (CPS 3500-1). SNOHOMISH: Canijan Park (CPS 3003); Marysville, 9 mi. N (CPS 4527-30); Stillaquamish R., 2 mi. N on U.S. Highway 99 (CPS 3553); Darrington (CAS 30512). THURSTON: Upper Deschutes (CPS 3011); Nisqually P.O., 6 mi. S (CPS 3098-9); Powder Plant, New Highway 3 mi. W Nisqually (CPS 3300); Lacey, near (CPS 3104); Deschutes Falls (CPS 3608-9, 3467); Johnson's Point, 2 mi. SE (CPS 3931). WAHKIAKUM: Rosbury (CPS 3456); Cathlamet, 6 mi. E (CPS 3880); Columbia R., 0.5 mi. W of Cowlitz Co. line (CPS 4469-70). WHATCOM: Excelsior Trail, near 3 mi. W Suckson Camp (CPS 3324); Gravel Pit, 4 mi. E of Deming (CPS 3325-3326); Bellingham (MVZ 16960-63); Lummi Is., W side, N end (CPS 3620). YAKIMA: American R. camp, 1 mi. E (CPS 4566); Bumping L., 3 mi. S (CPS 4646); Thunder Bridge Forest Camp (CPS 6285).

Description.—This is a medium-sized slim lizard with a tail longer than the body. Dorsal scales are weakly keeled; ventral scales are smooth; there is a lateral area of granular scales on the loose skin. Dorsal color is brown with varied and irregular darker scales interspersed. Ventral color is yellowish or greenish white.

Comparisons.—There is only one other species of Gerrhonotus to be found within the state, G. multicarinatus scincicauda, this only in the south central part of the state. This species is larger than G. c. principis. The head of G. m. scincicauda is much broader and the whole of the body proportions more gross; also the dorsal coloration of G. m. scincicauda is distinctive with plainly defined cross bars. From other lizards of the state it is easily recognized by the drab brown color above, the slimness and length, the weakly keeled dorsal scales and the lateral bands of granules between the dorsal and ventral scales.

Habits and Habitats.—This lizard is characteristic of the brushy western part of the state, being the most common lizard here. It is not seen often because of its secretive habits, though often is heard scurrying away from the passer-by. After a while in a country abounding with these animals one can be certain by the sound of the rustle that a *Gerrhonotus* will be found if a thorough investigation is made. It is often difficult to procure by hand unless it takes refuge under bark or beneath a movable object. The long tail is seldom found intact in specimens collected, and various degrees of shortening and regeneration represent one to several escapes from predatory enemies. In hot weather this species is to be found in the damp cooler places. We have several times encountered it unexpectedly in the rocky beds of small creeks apparently hunting in the cool of the spray and moisture. This species, while more slow on cold days, nevertheless thrives well as evidenced by its being common in the damp and cool portion of the state. We have several dates of winter collection: December 18, 1940 (Jefferson County), March 10, 1937 (Thurston County), February 11, 1947 and March 9, 1947 (Pierce County).

Food habits follow the aggressive tendencies of this lizard. When grasshoppers are prevalent in an area, we have secured specimens which readily excrete fecal material containing the main undigestable portions of the hoppers. Other types of insects — ants, beetles, grubs of various sorts, are all included in this lizard's larder. Fitch (1935:34) records 10 beetles, 1 crane fly, 1 noctuid moth, 1 snail in 7 stomachs from Oregon. J. T. Lewis (unpublished notes 1940) records captive specimens taking carrion beetles, Isopoda, bumble bees, maggots, small beetles, small centipedes, moths, and occasionally earthworms.

Concerning breeding habits, we have several records of field observation of mating. A pair, found under a board, was observed on April 30, 1939, in Clark County. The male was over the dorsum of the female clasping with both fore feet and hind feet. They did not move when the board was taken away and were picked up together. They seemed loathe to move and separate. No secretion or genital contact was seen on this pair. Vestal (1940:51) records and figures copulation. The male grasps the neck of the female in his jaws and holding her thus, manipulates the posterior portion of the body to bring the genital orifices into contact.

Svihla (1942:54) records one pair observed in copulation in the field April 6, 1940 and states that on the next day the pair was still in a clasped position.

Lewis (1946:55) records dissection of a gravid female on April 26, 1941 containing 5 eggs 2.9 mm in diameter and 8 eggs 1.0 mm or less in diameter. He further records mating activity on April 26-28, 1941 in the laboratory.

Lewis' lizards brought forth young in the laboratory on August 15, 1940 (6 in brood), August 22, 1940 (7 in brood), August 29, 1940 (6 in brood), and September 5, 1941 (4 in brood).

One gravid female taken by us July 18, 1946 in Pierce County died August 15 and was found to contain 8 well developed embryos. Each measured about 2.5 cm in length when uncurled. Each egg sac was about 1.2 cm in diameter.

The young are born fully formed, enclosed in a very thin membranous sac and average 76 mm in length (Lewis 1946:155). They are active from birth. They are secretive and are occasionally found under rocks or logs between August and early October. They are lighter in color and have fewer bars dorsally than adults. A juvenile taken March 15, 1947 near Chambers Creek was 85 mm in total length with a tail of 50 mm.

Remarks.—Several specimens from east of the Cascade Mountains have 16 2/2 count of dorsal scales as compared to normal 14 or 14 2/2. Characteristics of the head scales and color show no significant differences however, and at present we find no justification for splitting this subspecies.

Parasitism with the coast tick, *Lxodes ricinus californicus* (Banks), is common, the site of predilection being in the external ear.

Gerrhonotus scincicauda scincicauda, Van Denburgh 1922:453; Stejneger and Barbour 1923:65; Stejneger and Barbour 1933:71; Slevin 1934:45.

Gerrhonotus multi-carinatus scincicauda, Fitch 1934:173; Burt 1935;265; Fitch 1938:389. Gerrhonotus multicarinatus scincicauda, Stejneger and Barbour 1939:78; Owen 1940:170;

Johnson 1942:16; Stejneger and Barbour 1943:99; Smith 1946:457; Pickwell 1947:35.

Range.-Yakima County, Washington to northern California.

Type Description.—As Tropidolepis scincicauda Skilton, Amer. Journ. Sci. Arts. VII(2), 1849:202, pl. at p. 312, figs. 1-3.

Type Locality.-Dalles of the Columbia.

Distribution in Washington.—Along Klickitat County and north to Naches, Yakima County.

COUNTIES.—KLICKITAT: Grand Dalles, 2 mi. N of Columbia R. (CPS 3397; Wishram, 5 mi. W (CPS 3258-9); Grand Dalles, 5 mi. back from Columbia R. (CPS 3286-90); Spearfish Indian Village, near (CPS 3116, 3122); Columbia R., opp. John Day R. (USNM 44967); Grand Dalles, 3 mi. N (USNM 60087); Lyle, 7 mi. E (CPS 4580); Toppenish, 21 mi. SW (CPS 6036); 4 mi. S and 2.5 mi E of Klickitat Hatchery (MZ 207381); Roosevelt (O:170). YAKIMA: Naches, 1.5 mi. NW (CPS 4659).

Description.—This is a large lizard much resembling an alligator in body form, with a tail longer than the body, when intact. Dorsal scales are large, keeled, in usually 14 longitudinal series. Ventral scales are large and smooth. Dorsal color is olive to brown, crossed by nine to sixteen cross bars of a dark brown color. Ventral color is yellow to gray. The younger juvenile forms lack the dorsal markings and the scales are smoother at this early age.

Comparisons.—This is much larger than *G. coeruleus principis* and has definite transverse dorsal markings. *G. m. scincicauda* has been found only in Yakima and Klickitat counties and the ranges apparently do not overlap.

Habits and Habitats.—This species is found in the brush and rock piles of the dry portion of Klickitat County, just east of the Humid Transition Zone where the Columbia Gorge cuts through the Cascade Mountains. It is interesting that there is such a sharp line of demarcation occurring within a few miles, on the west side of which only *G. c. principis* is found and on the east *G. m. scincicauda*. True enough we have sharp change in the climatic conditions and resulting difference in the flora indigenous here, but we also have active animals with a natural pathway to expansion opened and no evidence of any invasion of either species into the other's domain. This is also the dividing line of other desert species such as rattlesnake, horned-lizard, and sage swift from the moist green western part of the state.

These are rather slow moving, aggressive animals, which can move swiftly on occasion, as noted with *G. c. principis*. They are secretive, will scurry away from intruders, and like *G. c. principis*, can be identified by a trained observer from the characteristic rustle they produce in dry grass or leaves. Invariably they will attempt to bite when caught and have a strong set of muscles, as well as little teeth that are sharp enough to draw blood. They will hang on with bull-dog tenacity once they have a good grip. We had the sad experience of placing a nice specimen of *Etoneces skiltonianus* in the same container with a *G. m. scincicauda* when cramped for room in the field. After a few minutes when separating them, we found the *Eumeces* without its nice long tail, this member being nowhere in evidence until later when a gastric exploratory operation was performed and the tail, in three pieces, was removed to be preserved with the proper specimen. It is rare to find a *G. m. scincicauda* with an intact tail; there is most often a member about as long as, instead of longer, than the body.

Food probably includes whatever is of suitable size and can be caught that appeals to the voracious appetite. Phil Cheney reports to us that this lizard in captivity (Pt. Defiance Aquarium, Tacoma) actively attacked adult *Peromyscus maniculatus*, but never overcame any of these mice. Undoubtedly young mice represent very acceptable food.

Breeding habits are not well known. Juvenile forms are seldom seen, apparently being more secretive than the oldsters who can better protect themselves.

Eumeces skiltonianus skiltonianus (Baird & Girard) Skilton's Skink; Blue-tailed Lizard

Eumeces skiltonianus, Cope 1900:644; Stejneger and Barbour 1933:83; Svihla and Svihla 1933:127; Slevin 1934:44; Pickwell 1947:38.

Plestiodon skiltonianus skiltonianus, Van Denburgh 1922:583; Brown 1946:380.

Eumeces skiltonianus skiltonianus, Taylor 1935:426; Stejneger and Barbour 1939:91; Owen 1940:170; Johnson 1942:16; Stejneger and Barbour 1943:113.

Range.—British Columbia south to Lower California and Arizona east to Montana and Utah.

Type Description.—As Plestiodon skiltonianum Baird and Girard, Proc. Acad. Nat. Sci. Phila. Vol. VI, 1852:69.

Type Locality .- Oregon.

Distribution in Washington.-Eastern part of state.

COUNTIES.—ADAMS: Swamplake (Taylor 1935:426). ASOTIN: Snake R., 1 mi. above Grande Ronde mouth (CPS 3481). CHELAN: L. Chelan, Shrine Beach (CPS 3191); Congdon Up-lake Camp (CPS 3245-7); Chelan, 8 mi. N (CPS 4037), 13 mi. N (CPS 4396, 4582). DOUGLAS: East Wenatchee (CPS 4831-3). FERRY: Kettle Falls, 4.2 mi. W (CPS 4401). GARFIELD: Island below Alamota (CPS 4604-5); across from Wawawai (CPS 4606-12). GRANT: Coulee Dam, 5 mi. SE (CPS 3534); Dry Falls, Grand Coulee (MVZ 37193-4). KITTITAS: Ellensburg, 11 mi. NE (CPS 4583). KLICKITAT: Grand Dalles, 5 mi. back from Columbia R. (CPS 3278-85, 3400); Spearfish, near (CPS 3126, 3183). LINCOLN: Odessa, 9 mi. W (CPS 6287); 5 mi. E of Coulee Dam (CPS 3534). OKANOGAN: Pateros (CPS 4038). SPOKANE: Cheney (MVZ 8659-61); Spokane (MVZ 8662, CPS 3871). STEVENS: Colville (CPS 4407); Kettle Falls (CPS 4408). WHITMAN: Almota, 9 mi. W (CPS 4603); Pullman (MZ 56233, WSC 48-142); Wawawai (MZ 56234, CPS 4602); Wilma (Svihla and Svihla 1933:127). YAKIMA: Naches, I.3 mi. NW (CPS 4660).

Description.—This is a moderately small lizard with a slim head and body and a long tail. Limbs are small. Scalation over the entire body is smooth and shiny. The color dorsally is dark brown with two cream colored lines on either side. Ventral scales are light yellow to white.

In older specimens the colors are less bright, but in specimens of smaller dimensions the brightness is striking, the body being described as above, and the tail for its entire length being a brilliant ultramarine blue. Occasionally individuals, apparently the patriarchs, have lost all the characteristic markings to be a drab unicolor, brownish or reddish. During the spring mating season, males are adorned with a salmon pink coloration on the upper and lower lips, shading off into the gular area below.

Habits and Habitat — This species is found in the drier eastern portion of the state in areas presenting sufficient cover such as brush and rock slides. Though often residing near bodies of water, this is by no means the rule.

With special reference to the Lake Chelan area, we have several interesting experiences concerning *Eumeces skiltonianus*. The natives tell of the "blue-tailed lizards" fairly common at times in various localities around the lake; however, on most careful searching on many occasions, we were unable to find any of the desired specimens. During a very warm spell, two specimens were secured for us, and several more were observed in the same region, and we were led to do some fruitless searching. The weather had turned cooler. Again a warm day and this time we were on hand when a friend called to come quick, and we chased a wriggling elusive little fellow that streaked around stones and through pools of water on a rocky point of lake shore before finally being captured. Other similar observations make it evident that very warm weather is a factor in bringing this species into the open or to water where a collector or roving expedition may observe and secure specimens. *Eumeces* skiltonianus is undoubtedly more populous within the state than collection records indicate.

Miss E. Congdon, at Lake Chelan made this interesting observation of a small skink that came out of its retreat oblivious of the proximity of a human being: "He had come sneaking out from under the rocks, then stopped to reconnoiter, and while waiting curled both his hind and front feet up over his back so his legs were backwards along his sides and his feet on his back, sort of inside out —. He had stopped in a patch of sunlight and looked much as if he were taking a sunbath, but from the speed with which he eluded me when I reached for him, I'd say his position was for a quick take-off."

One Klickitat County area known well to us presents an interesting complex. We secured our first specimen after about two years of more or less close scrutiny of this region without even seeing a Eumeces. Another specimen was secured by a friend while excavating about one to two feet underground in the middle of June's hot weather. Our most productive expedition, as far as Eumeces skiltonianus is concerned, was in spring 1938, April 24th. What had been reported as a "rattlesnake den" by residents was being investigated, this being found to consist of a series of brushy, rock slides under low basalt cliffs, slanting off to a long decline toward the Columbia River five or six miles away. In this area many specimens of Eumeces were collected and observed, in addition to a goodly gathering of Gerrhonotus multicarinatus scincicauda, Sceloporus occidentalis occidentalis, Coluber constrictor mormon, and Crotalus viridis oreganus. The Eumeces appeared to have no fixed place of refuge, as is noted of other species, but dodged around and under boulders with such eel-like agility that many times we were forced to give up the search of an individual. The interesting fact of this series is that all eight specimens collected were males, all showed some degree of orange coloraton of the labial and gular scales, but on several visits to the same area later in the year only occasional specimens were observed and collected with much arduous searching. These were of both sexes and showed no evidence of the orange labial and gular areas. Hence it is apparent that as a mating season phenomenon the males become more bold and open in their action and are brightened up by the additional coloration of the lips and chin.

When caught, these lizards often attempt to bite, but their jaws are weak, the teeth small. In common with other reptilians, these often exude a soft black and white fecal material, or a clean liquid matter from the anus. There are no offensive or irritating properties of these excreta as observed by us. Most adult specimens of *Eumeces skiltonianus* have a shortened, regenerated tail, from previous trauma. In areas where *Eumeces* and *Gerrhonotus multicarinatus scincicauda* are neighbors, we believe the latter may be classed as a predator on the blue-tailed lizards. As noted in a previous description, when two individuals of these species were placed in a collecting bag together, the *Eumeces* came out minus its tail, the *Gerrhonotus* with a stomach full of succulent lizard tail.

Food consists of insects primarily. Van Denburgh (1922:585) says "Vegetable matter is sometimes found in its stomach, but is the food of caterpillars eaten by the lizard." One specimen from Lake Chelan was cut open by us because of a notable bulge; a large berry (about 6-8 mm) was obtained, not identified but similar to a gooseberry, containing large seeds with an outside skin. Certainly such a large piece of vegetable matter could not have been swallowed by mistake.

Van Denburgh (1922:584) describes the eggs of this lizard secured at Pacific Grove, California. "The five eggs were spherical and of a blackish brown color, with soft flexible shells. They were about the size of chipping sparrow's egg (*Spizella socialis occidentalis*). He found them in an open field, among a rock pile, under a flat rock. They were covered with about half an inch of loose earth. The female was found under the rock with them. The date was about June 15, 1898. The eggs were far advanced in incubation, the embryos presenting nearly all the adult characteristic markings, coloration, etc."

Remarks .- This species has not been found in the western part of the state, though

Boulenger records a specimen from Vancouver Island which has much the same climate as the evergreen portions of Washington. Willamette Valley, Oregon, to the south also has been recorded as a locality record. This area is also similar climatically, but is noted for many differences of flora and fauna. Hence for the present, at least, we will regard this as purely an eastern Washington inhabitant.

Skilton's skink from Washington are rare in all collections, there being no more than two or three specimens from any one locality and all previous records are in the extreme eastern part of the state in Adams, Whitman and Spokane counties.

NORTHWEST FAUNA

Charina bottae plumbea (Baird & Girard) Northwestern Rubber Snake; Two-headed Snake

Wenona isabella, Baird and Girard 1852:176.

Wenona plumbea, Baird and Girard 1852:176; Cooper 1860:303.

Charina plumbea, Yarrow 1883:142.

Charina bottae, Cope 1900:730; Dice 1916:314; Stejneger and Barbour 1923:80; Blanchard 1925:3; Stejneger and Barbour 1933:86; Svihla and Svihla 1933:127; Stejneger and Barbour 1939:95; Perkins 1940:22; Owen 1940:170; Slater and Brown 1941:77; Johnson 1942:16; Stejneger and Barbour 1943:118; Lewis 1946:158.

Charina bottae bottae, Van Denburgh 1922:641; Slevin 1934:37; Brown and Slater 1939:20; Pickwell 1947:40.

Charina bottae utahensis, Klauber 1943:83.

Range.—British Columbia south to southern Oregon, east into Montana and Wyoming, including Idabo, Utah and Nevada.

Type Description .- As Wenona plumbea Baird and Girard. Cat. N. A. Serp.,

1853:139.

Type Locality .- Puget Sound.

Distribution in Washington.-Throughout the state.

COUNTIES .- CHELAN: Chelan L., 25 mi. Cr. (CPS 3158); Lucerne (USNM 61597). CLALLAM: Elwha R. (CPS 4130); L. Mills, 5 mi. N of outlet (CPS 4422); Port Angeles (CPS 4129). COLUMBIA: Blue Mts. (V 1922:642). COWLITZ: Kalama, 2 mi. N (CPS 4388). FERRY: Danville, 4.5 mi. W (CPS 6286). KING: Lister (CPS 6298-9); Seattle (USNM 16148-52). KITTITAS: Cle Elum, 3 mi. W (CPS 4564). LEWIS: Ohanapecosh (CPS 3005). MASON: Boy Scout Camp across Hood Canal from Hoodsport (CPS 4415). OKANOGAN: War Creek (WSC 39(53)). PEND ORIELLE: (SDSNH 4919); Newport, 4 mi. NW (CPS 4395). PIERCE: Chambers Cr. (CPS 3024-6, 4052); East Cromwell (CPS 3336); Ft. Steilacoom (USNM 4494); Fox Is., old brick yard (CPS 3468); Tacoma, foot of Hylebos Hill (CPS 3930); So. 90th St. & Portland Ave. (CPS 4207). SPOKANE: Spokane (CPS 3872). THURSTON: Tenino, 7 mi. S (USNM 76199); Deschutes R., 3 mi. W of Rainier (CPS 3473); Long L., N. end (CPS 4997). WAHKIAKUM: Cathlamet, 8 mi. E (CPS 4425). WALLA WALLA: Kooskooskie (CPS 4435, 4651); College Place (CPS 6144). WHATCOM: Bellingham (MVZ 16964). WHITMAN: Pullman (MZ 56232, USNM 26628); Kamiak Butte (Svihla and Svihla 1933:127). YAKIMA: Bumping L. (USNM 60235-6). No county given: Puget Sound (USNM 594, 4492, 7299).

Description.—This is a small, drab, slow-moving snake with a blunt head and tail. Upper surfaces are grayish to greenish brown without dark or light markings; lower surfaces are light yellow to brown. Head scales are subject to much variation; the parietal is usually undivided. Gastrosteges are 196 to 217 in number, urosteges 28 to 38, single. Dorsal scales are smooth and small, the maximum rows being in the mid-portion of the body; they vary from 40 to 46, averaging 42.85 in 34 specimens.

Comparisons.—This subspecies differs from *C. b. bottae* in having a lower number of gastroseges: the average is 42.85 in 34 specimens, as compared to 46.43 in *C. b. bottae* (Klauber, 1943:86). In addition, the parietal scale is generally undivided in *C. b. plumbea*, the converse being true in *C. b. bottae*. A series of 9 specimens from the Provincial Museum was used in the compiling of comparative data, added to our own.

Habitat.—Typically it is found in the coniferous forests, generally in moist portions of the state. It is reported around farm houses and barns. Rock slides are particular sites of occurrence.

Habits.—It is gentle, slow moving, retiring and never attempts to bite. It is found
occasionally in trees.

It eats mice, lizards (*Sceloporus occidentalis occidentalis* reported) (Van Denburgh, 1922:642) and probably insects of all kinds. One kept by Walter Brown is reported to have regurgitated all attempts to force feed meat. Lewis (1946:159) reports that specimens in captivity ate *Mus musculus* and *Peromyscus* eagerly, striking after a stalking period, killing by quick constriction. Two good sized specimens kept at the Point Defiance Park Aquarium, Tacoma, were observed by park naturalists John Slipp and Philip Cheney. They lived in perfect harmony with *Thamnophis sirtalis tetrataenia* and *Coluber constrictor mormon*. They were the only specimens that would kill *Peromyscus* and usually would stalk the mammal as soon as it was put in the cage. However, they never did feed on the mice after they had killed them. Attempts to force feed horse meat were unsuccessful.

Tanner and Tanner (1939:28) report that Utah captive specimens ate the young of *Microtus* and *Peromyscus*. They would not eat the mice out of the nest, but would enter the nest and eat them. Several specimens, when captured, regurgitated young rodents.

We have one specimen (CPS 4435) from Walla Walla County, preserved *in situ*, about two-thirds ingested by a *Thamnophis elegans vagrans* which is about half again as large as the rubber boa.

Tanner and Tanner (1939:28-30) report several interesting notes regarding the breeding habits of *Charina bottae* in Utah. One of their specimens gave birth to three live young on September 9, 1938, the largest measuring 170 mm. Specimens examined by them contained eggs on the following dates: July 30, 1926, five eggs, embryos 96-99 mm in length; August 17, 1938, two eggs; July 29, 1935, eight eggs without evidence of embryonic development; August 4, 1938, three eggs without any apparent embryonic development. They have found one juvenile measuring 175 mm on 27 June 1939.

Van Denburgh (1922:642) reports a female taken in California in June containing large eggs.

Remarks.—Because of the shy, retiring habits of this snake, it is seldom seen when looked for, but residents in a locality will often know of its presence.

One thing we especially noted in a captive kept in an apparently escape-proof cage. Several mornings we were forced to make a search of the room for our escaped serpent. Often looking over the box after the snake had gotten out, we were unable to find the means of exit.

The largest individual yet recorded from Washington, to our knowledge, is a specimen from the collection of the State College of Washington (Geo. Hudson, Curator), from Pullman, Whitman County, collected by J. S. Grimes June 15, 1903. It has a total length of 620 mm (24.5 inches), preserved.

On the basis of Klauber's reports (1943) and the statistics determined in the preparation of this paper, the name *C. b. bottae* is validated as proper. It replaces *C. b. utahensis* Van Denburgh by reason of priority. *C. b. bottae*, as already shown has a restricted range in northern California and into southwestern Oregon. Our few western Oregon specimens appear to be intergrades. Klauber suggested that an entire area of western Washington and British Columbia is one of intergrade between *utahensis* and *bottae*. However, on a breakdown of the scale counts reinforced by the division or non-division of the parietal scale, a significant difference is seen. Klauber (personal communication, 1946) on the basis of our scale counts states: "There can be no question but that your snakes are nearer *utahensis* than they are to *bottae bottae* and consequently you would probably be justified in referring them to *C. b. isabella* with *utahensis* considered a synonym of that subspecies." (We originally suggested *isabella* as appearing preferably on the basis of prior page appearance, but we find that *plumhea* was used by subsequent authors and will follow that name.)

Diadophis amabilis occidentalis Blanchard Northwestern Ring-necked Snake; Red-bellied Snake

Diadophis amabilis occidentalis, Svihla and Svihla 1933:127; Svihla 1938:47; Uhler 1940:136; Owen 1940:170; Johnson 1942:16; Blanchard 1942:30; Stejneger and Barbour 1943:121.

Range.—Southern Washington to Sonoma County, California, east to Boise County,

Type Description.—As Diadophis amabilis occidentalis, Blanchard. Occ. Papers Mus. Zool. Univ. Mich., 142:6.

Type Locality.—Bridgeville, Humboldt County, California.

Distribution in Washington .--- Eastern and southern parts of state.

COUNTIES.—COWLITZ: Kalama (WSC no number, sent in by Loman S. Roach, Kalama, Wn., 19 August 1937). WHITMAN: Wawawai (WSC 19, coll by W. W. Baker, Sept. 1929); Colfax (Svihla 1938:47).

Description.—This is a small snake characteristically marked with a light collar just behind the head. The dorsal color is reticulated minutely, olive to brown or slate. Ventrally as well as the collar, the color is white to red or orange. The supralabials are usually seven in number, infralabials are usually eight. The dorsal scales are smooth, in fifteen rows. Gastrosteges are 182 to 212, urosteges 44 to 72, in two series.

Comparisons .- This is the only ring-necked snake in or near the state.

Habits and Habitat.—"Diadophis amabilis is most often found under boards or logs in moist localities, sometimes even in salt marshes. One specimen had half eaten a half grown tree-toad (Hyla regilla). Nothing is known of its breeding habits." Van Denburgh (1922:651).

It would seem reasonable to assume that this species is comparable to the eastern ring-necked snake in breeding habits which have been well worked out by Blanchard (1937). *Diadophis amabilis* has been shown to be egg-laying, usually 3 to 5 eggs to a female, the nests, frequently communal, being in logs lying exposed to the sun, with soft rotten insides. For that species the dates of egg laying are June and early July, in northern Michigan.

Remarks.—This snake is rare in Washington. Collectors have not observed this species until recent reports of Svihla.

Darling (1947) reports that this subspecies in Oregon was found to have eaten shed reptile skins, *Thamnophis ordinoides* and *Eumeces skiltonianus*.

Idaho.

Coluber constrictor mormon (Baird & Girard) Western Yellow-bellied Racer; Blue Racer

Bascanion vetustus, Cooper 1860:301.

Bascanion constrictor, Yarrow 1883:109.

Bascanion constrictor flaviventris, Yarrow 1883:110.

Zamenis constrictor, Cope 1900:795-6.

Coluber constrictor flaviventris, Stejneger and Barbour 1917:79; Blanchard 1921:6.

Coluber constrictor mormon, Van Denburgh 1922:663; Stejneger and Barbour 1933:94; Svihla and Svihla 1933:127; Slevin 1934:38; Alcorn 1935:103; Stejneger and Barbour 1939:103; Perkins 1940:23; Owen 1940:171; Johnson 1942:16; Stejneger and Barbour 1943:129; Pickwell 1949:197.

Range.—Southern British Columbia south to southern California, east to Montana, Idaho, Utah, and Nevada.

Type Description.—As *Coluber mormon* Baird and Girard, Stansbury's Exploration to the Valley of the Great Salt Lake, Appendix C, Reptiles, 1852:351.

Type Locality .--- Valley of the Great Salt Lake.

Distribution in Washington.-Eastern part of state and some of the dryer parts in the west.

COUNTIES .- ADAMS: Lind (CPS 4562-3); Washtucna, 8 mi. N (CPS 4054). ASOTIN: Rogersburg (USNM 62523); Bly (USNM 62524-5); Wenatchee Cr., near Grand Ronde R. (CPS 3484); Wenatchee Cr., Grouse Flat (CPS 3441). BENTON: Kennewick (O:171), 9 mi. NW (CPS 4053), 9 mi. S and 2 mi. E (MVZ 29250); Whitcomb, 4 mi. W (CPS 4393). CHELAN: Chelan (USNM 44388), 7 mi. N (CPS 4409-10); Dryden, 16 mi. S (MVZ 37195); Peshastin Cr. (O:171). DOUGLAS: Orondo, 2 mi. S (CPS 4836, 6270-1). FERRY: Curlew, 10 mi. N (MVZ 37196); Kettle Falls, 4.2 mi. W (CPS 4398). FRANKLIN: Kahlotus, 2 mi. SW (CPS 4565); Lyons Ferry (WSC 76); Pasco, 1 mi. SW (CPS 4636). GARFIELD: Alamota, 1 mi. E (CPS 4600); Pomeroy, 11 mi. E. (CPS 4389). GRANT: Dry Falls (CPS 3000, O:171); Crab Cr., 3 mi. above Moses L. (CPS 3145). KLICKITAT: Wishram, hwy. near (CPS 3242); Grand Dalles, 5 mi. E (CPS 3249); Spearfish, near (CPS 3124-5); Lyle (USNM 61629); Grand Dalles (USNM 60262, CPS 3607, 3472); Satus Pass, 4 mi. NE (CPS 6301). LINCOLN: Crab Cr., 2 mi. E of Sylvan L. (CPS 3083); Sprague (USNM 61627-8). OKANOGAN: Nespelem, 2 mi. S & 11 mi. W (CPS 3540); Kartar, 9 mi. NW (CPS 3542); War Cr. (O:171); Pateros (O:171); Tonasket, 11 mi. E (CPS 6160); Alta L.(CPS 4031). PEND ORIELLE: Baker L., near Davis L. (CPS 4630). PIERCE: Fort Lewis Reservation (CPS 4973); Shaver L., R.R. crossing W of (CPS 3073); Lakeview (CPS 3034); Ft. Steilacoom (USNM 1760, 5224, 5226). SKAMANIA: Cape Horn Sta., 1 mi. W (CPS 3253). SPOKANE: Spokane, S city limits (CPS 4120). STEVENS: Springdale (MZ 55158); Kettle Falls, 1 mi. E (CPS 4397). WALLA WALLA: Ft. Walla Walla (USNM 10834, 10908, 12583); Burbank, 2 mi. NW (MVZ 29254), 1 mi. N (MVZ 29253); Kooskooskie (CPS 4549); Walla Walla R. at mouth (CPS 4589). WHATCOM: Sumas (V 1922:633). WHITMAN: Almota (USNM 44320); Pullman and Hole-in-the-ground (Svihla 1933:127); Wawawai, 18 mi. SE (CPS 4394). YAKIMA: Mabton, 6 mi. NW (CPS 4636); North Yakima (USNM 44438, WSC 167); Toppenish, 9 mi. NE (CPS 4336). No county given: Puget Sound (USNM 4418-9, 4454).

Description.—This is a fast moving, slim and graceful snake of moderate to large size, with a plain drab olive to blue green dorsal color and light yellow ventral color. It has smooth scales in seventeen rows. The gastrosteges vary in number from 162 to 181, the urosteges 79 to 102, in two series. The eye is large. Young specimens present dorsal blotching and cross bars, which fade to the drab color as the tail is reached.

Comparisons.—A relative species, Coluber taeniatus taeniatus (Hallowell), is distinguished by the longitudinal striping, increased gastrostege (198 to 215) and urostege (114 to 157) counts, and a lessened number of dorsal scale rows (15). Masticophis flagellum flagellum Shaw, the western whipsnake, or red racer, may occur in the Blue Mountains area of the southeastern portion of the state, according to natives there. It may be distinguished by its generally brownish rather than greenish basic color of C. c. mormon; it has several bands across the back of the neck, and faint longitudinal lateral lines may frequently be seen. In addition, the scalation is different, gastrosteges being over 168, urosteges over 99 in C. f. flagellum; superior labials are eight or nine, inferior labials ten or eleven, as compared to seven and nine respectively, the usual counts for C. c. mormon.

Habitat.—It is generally found in the eastern part of the state in sagebrush, more especially near greener vegetation and along streams and ponds, in brushy tracts and rock slides. It is often found during the day under rocks or boards. In the western part of the state it may be found on the more open prairie portions.

Habits,—This species is graceful and fast moving, and is generally known by the residents of the eastern part of the state as the "blue racer". It is difficult to follow through the brush and relies upon speed to escape from enemies. When found in rock slides it will often retreat to inaccessible depths. There are many reports of the brush climbing capabilities of the western yellow-bellied racer. When caught this species very often attempts to bite but is, of course, not able to inflict wounds other than minor scratches.

The diet of this species probably includes insects of all kinds, tree frogs, occasional small rodents and birds along with their eggs. Fitch (1940:169) says "one of the most destructive enemies of the fence lizard is probably the yellow-bellied racer,"

Breeding habits have not been reported. This is an egg laying species.

Remarks.—This snake is usually obtained on collecting trips to the eastern part of the state but is seldom found in any number. However, we have seen one level grassy field along the Columbia River in Klickitat County where almost every step was an occasion for a sudden rustling caused by the departure of a western yellow-bellied racer from the path of the intruder.

The young of this species and less frequently the oldsters have a habit of vibrating the tail rapidly, much in the fashion of a rattlesnake, when active and aroused or handled.

Coluber taeniatus taeniatus (Hallowell) Western Striped Racer

Coluber taeniatus taeniatus, Slater 1941:74; Johnson 1942:16; Stejneger and Barbour 1943:131; Pickwell 1947:44.

Range.-South central Washington and Idaho south to California and just entering

Type Description.—As Leptophis taeniata Hallowell, Proc. Acad. Nat. Sci., Phila, Vol. 6, 1852:181.

Type Locality .- New Mexico west of Rio Grande.

Distribution in Washington.—Central and south central part of the state.

COUNTIES.—BENTON: Benton City, 10 mi. NE (CPS 4338-9). GRANT: Vantage Ferry (Svihla, letter of 23 Sept. 1941). KITTITAS: Ginko Petrified Forest State Park (CPS 4028). YAKIMA: Toppenish, 9 mi. SE (CPS 4337).

Description.—This is very slim, fast moving species of moderate to large size, with characteristic striping composed of a broad dorsal band of grayish brown bordered by lines of lighter yellow on the third and fourth rows of scales. On the first two lateral rows of scales there is a darker gray brown, bordered below by the light yellow of the gastrosteges. Dorsal scales are in fifteen rows, smooth. Gastrosteges vary from 198 to 215, urosteges from 114 to 157 (Van Denburgh, 1922). In young specimens the striping is more distinct. Our specimens agree very well with Van Denburgh's account of the species.

Comparison.-See under C. c. mormon for comparisons.

Habitat.—This species has been found in the arid portions of eastern Washington in areas of sagebrush and scab land.

Habits.—They are very agile and difficult to capture when working in the field alone. They tend to fight when caught. Little is known of their actual food habits, though they have been known to feed on lizards. Breeding habits are not reported.

Remarks.—The finding of this snake in Washington (Slater 1947:74) added another verification to our hypothetical list. Since then we have secured specimens at different times and at other locations.

Texas.

Pituophis catenifer catenifer (Blainville) Coast Gopher Snake; Bull Snake; Blow Snake

Pituophis wilkesii, Cooper 1860:300, Lord, 1866 Vol. 2:307.

Pityophis sayi sayi, Yarrow 1883:105.

Pituophis catenifer, Cope 1900:878.

Pituophis catenifer catenifer, Stejneger and Barbour 1917:85; Van Denburgh 1922:710; Blanchard 1925:16; Stejneger and Barbour 1933:102; Stejneger and Barbour 1939:112; Stull 1940:153; Perkins 1940:46; Owen 1940:171; Johnson 1942:16; Stejneger and Barbour 1943:141; Klauber 1947:12; Pickwell 1947:198. Range.—Western Washington to central California.

Type Description.—As Coluber catenifer Blainville. Nouv. Ann. Hist. Nat. Vol. IV, 1935:290, pl. 26 figs. 2-26.

Type Locality .- California.

Distribution in Washington .- Western part of the state.

COUNTIES.—PIERCE: Ft. Steilacoom (USNM 2287). No county given: Puget Sound (USNM 5471).

Description (including description of both subspecies, catenifer and deserticola).— These are medium to large snakes, are constrictors, and are usually rather slow moving. The ground color is light yellow to brown, marked by a series of 46 to 93 dark brown blotches which continue out on the tail, 12 to 30 in number here. Ventrally the ground color continues as light yellow, often with profuse markings of the same dark color as the dorsal blotches. Gastrosteges vary from 200 to 263, urosteges, in two series, from 50 to 69. These counts vary with subspecificity. Supralabials are usually 8, infralabials usually 13. Dorsal scales are keeled, in 29 to 37 rows.

Comparisons.—There are two subspecies to be considered in the state of Washington, namely P. c. catenifer and P. c. desterticola. Van Denburgh uses two other subspecific names— namely heermanni and stejnegeri as possibilities in eastern Washington but we do not believe these to be valid, from a purely local experience in the state of Washington. It is interesting to note that Olive G. Stull, working on the genus Pituophis arrived at the same conclusion in 1940, from a general point of view, considering heermanni to be synonymous with catenifer, stejnegeri with deserticola. We have had the advantage of knowledge of the great difference in environment produced by the Cascade Mountains as a barrier and recognize this as the dividing line of the subspecies within the state.

The gastrostege count appears to be the most constant point of difference, though specimens of *P. c. catenifer* from Washington are extremely rare, there being only two (USNM) individuals catalogued as from this state verified by personal examination. The gastrostege count in relation with the number of dorsal blotches is a fairly satisfactory combination of differential characters for separating these subspecies. In *P. c. catenifer*, the gastrostege count averages less, the number of dorsal blotches more than in *P. c. deserticola*. Using Van Denburgh's scheme of calculating the number of gastrosteges minus the total number of dorsal blotches on the body and tail, accentuates this combination of differential characters. This may conveniently be condensed in the following table.

	Gastrosteges	Dorsal blotches of body and tail	Gastrosteges minus dorsal blotches
P. c. catenifer	200 to 238	54 to 93, +16 to 30	101 to 146
P. c. deserticola	214 to 263	45 to 64, +12 to 20	141 to 178

This species is not to be confused with any other resident of the western part of the state.

Habits and Habitat.—They are gentle, though younger specimens may act fiercely. Food consists of small mammals, birds occasionally. An interesting note was seen (1938) in a Portland, Oregon paper. A gopher snake of large size was nearly victorious in a battle with a half grown cocker spaniel which became too playful, saved only by interference.

Van Denburgh (1922:712) describes the process of egg laying of a specimen which he had in captivity in which 19 eggs were laid at intervals over a day and a half, forming into a clustered arrangement of individual eggs, which when fresh are covered with a loose, soft, sticky, parchment-like membrane, which quickly dries.

Described also by Van Denburgh (1922:714) is the process of moulting, consisting of the following: "One morning after the animal had been in captivity for about four months, the skin on the preorbital portion of its head was seen to be free from the scales beneath. Some straw was placed in the terrarium and within a few minutes the snake was working rapidly back and forth through the straw, freeing itself from the old skin. At the place where its body was just being freed from the old skin, violent muscular expansions and contractions were being executed. The surface of the snake's body and the outside, originally the inside, of the sloughed skin were noticeably moist as a result of the secretions which had been poured out to assist in moulting. For several weeks previous to moulting the snake had been quite sluggish, remaining coiled in one corner of the terrarium and refused food. During this time its eye became gradually dulled and the skin was seen to be free from the body in several places. Immediately after the moult, the animal became very active."

Old moulted skins are found under boards or logs in amongst vegetation in the field. *Remarks.*—One specimen from the Wenas River (USNM 1822) appears to be typical of *P. c. catenifer* but this locality is inhabited by *P. c. deserticola*.

Lord (1866 Vol 2:307) states that *P. wilkesii* (= *catenifer*) is common on both sides of the Cascade Mountains, and mentions Sumas, Whatcom County as a locality, but apparently collected no specimens. It must be again stated that many of Lord's statements are not entirely reliable. There are no *P. c. catenifer* specimens recorded from Washington since the very early days.

Pituophis catenifer deserticola Stejneger Desert Gopher Snake; Blow Snake; Bull Snake

Pituophis wilkesii, Cooper 1860:300; Lord 1866 Vol. 2:307.

Pituophis sayi bellona, Yarrow 1883:106.

Pituophis catenifer, Cope 1900:878.

Pituophis catenifer catenifer, Dice 1916:307-308, 310.

Pituophis catenifer heermanni, Van Denburgh 1922:715.

Pituophis catenifer stejnegeri, Van Denburgh 1922:732.

Pituophis catenifer deserticola, Blanchard 1925:17; Stejneger and Barbour 1933:102; Svihla and Svihla 1933:127; Slevin 1934:39; Stejneger and Barbour 1939:113; Stull 1940:172; Perkins 1940:46; Owen 1940:171; Johnson 1942:16; Stejneger and Barbour 1943:142; Klauber 1947:27; Pickwell 1947:46.

Range.—Desert regions of southern California, Arizona, New Mexico, Colorado, Wyoming, Idaho, and eastern parts of Oregon, Washington, and British Columbia.

Type Description.—Not described, but noted as a different subspecies by Leonard Stejneger, N. Amer. Fauna, No. 7, 1893:206.

Type Locality.—Great Basin and southwestern deserts, the type specimens being from Utah, Beaverdam Mts. Paratypes from Panamint Mts., California.

Distribution in Washington.-Eastern part of the state.

COUNTIES .- ADAMS: Othello, 13 mi. E (CPS 4341); Washtucna, 5.4 mi. E (CPS 6249). ASOTIN: Bly (USNM 62546); Asotin (WSC 160); Silcot, 3.9 mi. W (CPS 4390). BENTON: Kennewick (O:171); Patterson (MVZ 29257); Richland, 2 mi. SE (MVZ 35204); Prosser, 2 mi. SE (CPS 4342). CHELAN: Chelan (CPS 3182, 3403); Meadow Cr. (USNM 61630). COLUMBIA: Dayton, 9 mi. N (CPS 4091-2); no place given (V:717). DOUGLAS: Rat Rock Is., E bank of Columbia R. (CPS 3028); Palisades in Moses Coulee (CPS 3566); Moses Coulce, Hwy. 1 mi. NE (CPS 3090); East Wenatchee, 8 mi. SE (CPS 4024). FRANKLIN: Pasco, 5 mi. ENE (MVZ 29258-9); Ringold, 0.5 mi. E (CPS 4169-71). GARFIELD: Central Ferry, S side of Snake R. (CPS 4074-5. GRANT: Trinidad (0:171); Grand Coulee (WSC 90-1); Vantage, 4 mi. N (CPS 4023); Moses L., 14 mi. W (CPS 4061), 11 mi. SE (CPS 4550); Wardon, 2 mi. E (CPS 4594). KITTITAS: Yakima Canyon, 19 mi. S of Ellensburg (CPS 4019), 10 mi. S of Ellensburg (CPS 4020); Cle Elum, 9 mi. E (CPS 4820); Ginko State Park (CPS 4021); Vantage, 2 mi. S (CPS 4022). KLICKITAT: Columbia R., 1.5 mi, from, up draw with little creek (CPS 3123); Grand Dalles (CPS 6027); Klickitat R., about 2 mi, up from Columbia R. (CPS 3131); Maryhill, Columbia R. (MVZ 17957); Hwy 14 at mile post 111 (MZ 207382). LINCOLN: Reardon, 10 mi. N (CPS 4577). OKANOGAN: Omak L. (USNM 63277-8); Pateros, 4 mi. S (CPS 4025), 3 mi. S (CPS 4026); Alta L. (CPS 4027). SKAMANIA: Hwy 14, 4 mi. W of Hood River Bridge (MZ 206415). SPOKANE: Marshall (USNM 16495); no place given (SDSNH 4916, 4920); Spokane, 3 mi. N (CPS 4133). STEVENS: Chewelah, 3 mi. SE (CPS 4588); Colville (V:717, Lord 1866 Vol. 2:307). WALLA WALLA: Walla Walla (MZ 56954, W.C. 5487-8), near (W.C. 3192, 3301), 15 mi. W (W.C. 5486); Wallula (0:171, MVZ 5577), 3 mi. E (MZ 56956-57, 56959); Prescott (MZ 56958, 56960); Ft. Walla Walla (USNM 10633, 10907, 10913, 12582); Touchet, 3 mi. W (CPS 3532). WHITMAN: Wawawai (MZ 56235-6, WSC 73-4); Almota (USNM 44369); St. John (WSC 69); Fullerton, 0.5 mi. E (CPS 4599), 1 mi. E (CPS 4598); Pullman (WSC 161-2); Rock Cr. (WSC 163). YAKIMA: Mabton, 3 mi. N (CPS 4340); Moxee, 1.75 mi. NE (MVZ 37122); Satus Cr., between Goldendale and Toppenish (CPS 3141); Toppenish (MVZ 37200), 12 mi. SW (CPS 6026).

Description.—As noted under Pituophis catenifer catenifer. Comparisons.—As noted under Pituophis catenifer catenifer. Habits and Habitat.—This is a well known resident of eastern Washington. Generally it enjoys a good reputation among ranchers who appreciate its appetite for rodents. It is common, but never seen in great abundance at one time or at one place. It may be found in open fields, brushy territory, woods, about streams and lakes, or miles away from the nearest water. It is often secured by overturning a flat rock or board. It is nocturnal during the warm months of the year.

This snake is gentle and slow of movement as a rule, and can be handled without showing signs of anger or irritability. It usually attempts to escape, but there are occasional stories told by natives whose word we do not doubt, regarding very aggressive tendencies of certain individuals in the field.

Remarks.—Stull (1940:152) states that *P. c. catenifer* "is found west and north of the Columbia River," and "in the eastern parts of Oregon and Washington it is replaced by *P. c. deserticola.*" However, the Cascade Mountains is the western limit of this subspecies, and the Columbia River has not acted as a herpetological geographical barrier. Therefore specimens from Chelan and Okanogan counties examined by Stull (1940:153) and from Douglas and Kittitas counties recorded by Owen (1940:171), as well as those in older literature are to be included under *P. c. deserticola*.

Lampropeltis multicincta multicincta (Yarrow) Western Coral King Snake; King Snake

Lampropeltis zonata, Johnson 1939:2.

Lampropeltis multicincta, Johnson 1942:16; Lewis 1942:129; Stejneger and Barbour 1943:148.

Lampropeltis multicincta multicincta, Klauber 1942:78; Pickwell 1947:48.

Range .-- Lower California, north to Klickitat County, Washington.

Type Description.—As Ophibolus getulus multcinctus Yarrow, Proc. U.S. Nat. Mus. Vol. V, 1882:440.

Type Locality.-Fresno, California.

Distribution in Washington .- Southern part of the state.

COUNTIES.—KLICKITAT: Bingen, on hwy. about 2 mi. E (CPS 3401); 5. 3 mi. E of Bingen (CPS 8283); White Swan, 0.25 mi. N (Lewis 1942:129).

Description.—This is a characteristically marked snake of medium to large size, with rings of black, red and yellow or white around the body, the black and white being side by side, the red being within the black area. Supralabials are usually seven in number, infralabials usually nine. Gastrosteges vary from 202 to 222, urosteges 45 to 61. Dorsal scales are smooth, usually in 23 rows.

Comparisons.—This is the only species of this genus found within the state. It differs from the venomous coral snake (*Elaps micrurus*), found in the southern portion of the range, in coloration, generally having the red separated by black from the white or yellow coloration. The coral snakes have red and white bands side by side.

Habits and Habitat.—Little is known concerning the habits of this snake. Van Denburgh (1922:751) reports it to bite when handled roughly. It is said to destroy many rattlers. Other snakes of the same genus have the same habit, so very likely this species does account for an occasional rattler. One of Van Denburgh's specimens had eaten two lizards (Sceloporus occidentalis occidentalis).

The habitat in California is claimed to be the moister cooler portions and at considerable altitudes in some instances. The two locality records in Washington would correspond fairly well to this general habitat.

Remarks.—Previous records are from the southern portion of Oregon so this locality extends the range several hundred miles north. This is already described in a previous Occasional Paper (1939) and verified by Lewis, Copeia 1942:129.

Contia tenuis (Baird & Girard) Sharp-tailed Snake

Calamaria tenuis, Baird and Girard 1852:176.

Lodia tenuis, Baird and Girard 1853:116; Cope 1875:36; Yarrow 1883:87; Cope 1900:927.

Contia tenuis, Stejneger and Barbour 1917:91; Van Denburgh 1922:773; Stejneger and Barbour 1923:103; Pratt 1923:222; Stejneger and Barbour 1933:111; Slater 1939:5; Stejneger and Barbour 1939:122; Perkins 1940:25; Owen 1940:171; Johnson 1942:16; Stejneger and Barbour 1943:153; Pickwell 1947:49.

Range.-South central California to Puget Sound.

Type Description.—As Calamaria tenuis Baird and Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852:176.

Type Locality .- Puget Sound, Washington.

Distribution in Washington.—Spotty distribution east and west of Cascade Mountains.

COUNTIES.—PIERCE: Gravelly L., N end of (CPS 3486, 4277); Puget Sound (USNM 7289).

Description.—This is a small, inconspicuous snake, dull and drab brown. Sometimes there is a light line along each side, beneath which there is often a darker linear marking, more marked in young. Ventrally the color is grayish white with dark cross bands. Distinctive points are a sharp short tail, divided anal scales, and smooth dorsal scales in 15 rows. There are usually seven superior and seven inferior labials. Gastrosteges vary from 147 to 186, urosteges 27 to 57.

Comparisons .- There is but a single species of this genus.

Habits and Habitat.—Very little is known about this harmless little snake. An interesting fact is that only three specimens that we have been able to obtain have been found in a basement of one house at Gravelly Lake, Tacoma. This indicates secretive, probably burrowing habits.

In Oregon, where this species is more common, it may be found under boards and other protective cover. Darling (1947) writes: "Out of twenty three specimens collected near Corvallis, Oregon, six contained gastropods. The number of slugs was from one to five and they were from four to eight millimeters in length. Species was not determined."

A further note of interest is the apparently spotty occurrence of this species to the north on Vancouver Island and North Pender Island in British Columbia recently reported by Carl (1944).

NUMBER 3

IDENTIFICATION KEY FOR THE GARTER SNAKES OF WASHINGTON

A. Dorsal scale rows 17 (less often 19), with 9 or less infralabials... Thamnophis ordinoides.

AA. Dorsal scale rows 19 or over, with 10 or more infralabials.

1. Dorsal scale rows 19, supralabials 7

a. Wide dorsal, light yellow line, no (or slight) lateral lines, very dark ventrally, prominent red bars in dorso-lateral area....*Thamnophis sirtalis concinnus*.

b. Wide dorsal, light yellow line, regular wide lateral lines, light ventrally, prominent red bars in dorso-lateral area....Thamnophis sirtalis tetrataenia.

c. Dorsal line, dull yellow, frequently narrow; lateral lines irregular. Dorso-lateral bars not prominent, may be red, whitish, or absent....Thamnophis sirtalis trilineata.

d. Dorsal line narrow, lateral lines irregular. Color of lines, dorso-lateral bars, and venter blue-green to turquoise....Thamnophis sirtalis pickeringi.

2. Dorsal scale rows 21, supralabials 8.

a. General color light, with small spots in the dorso-lateral area. Gastrostege count usually over 167....Thamnophis elegans vagrans.

b. General body color dusky, with larger spots in the dorso-lateral area and more black on the head and ventrally. Gastrostege count usually under 167....*Thamnophis elegans nigrescens*.

Thamnophis elegans nigrescens Johnson Dusky Garter Snake

Eutainia vagrans, Lord 1866:306.

Eutainia vagrans vagrans, Yarrow 1933:120.

Eutainia elegans vagrans, Cope 1892:656; Brown 1903:290.

Thamnophis ordinoides ordinoides, Ruthven 1908:147.

Thamnophis vagrans biscutata, Van Denburgh 1897:212.

Thamnophis ordinoides biscutatus, Van Denburgh and Slevin 1918:245; Van Denburgh 1922:834.

Thamnophis ordinoides vagrans, Brown and Slater 1939:22; Fitch 1940:16; Owen 1940:170; Johnson 1942:17; Pickwell 1947:54.

Thamnophis elegans nigrescens, Johnson 1947:159.

Range.—Southwestern British Columbia into western Washington and Oregon.

Type Description.—As Thamnophis elegans nigrescens Johnson, Herpetologica 3(5), 5 March 1947:161.

Type Locality .- Tacoma, Washington.

Distribution in Washington.—All counties bordering Puget Sound and south into Lewis County.

COUNTIES .- CLALLAM: Washington Harbor (CPS 3349). JEFFERSON: Duckabush R., at mouth (CPS 4420). KING: Hwy. 5 mi. S Seattle (CPS 3036); Grotto (CPS 3494-7); Seattle (T. o. biscutatus) (O:171); Bellevue, 4.5 mi. E (MVZ 38656, 38658-9, 38666, 38668-9, 38671-3); Paradise L., 0.5 mi. S (MVZ 41333). KITSAP: on road mid-way between Belfair and Bremerton (CPS 3382). LEWIS: Toledo, 1.5 mi. S (MVZ 24900), 1 mi. S (CPS 4372). MASON: Shelton, 5 mi. N (CPS 3018-9, 4499-506); Pond on Stretch Is. (CPS 3380); Hoodsport (MVZ 52907-8); L. Cushman (MZ); Allen, 2 mi. N (CPS 4451-2); On Hwy. from Allen to Gig Harbor (CPS 4597). PIERCE: Clover Cr. Sanitarium (CPS 3027); Ft. Lewis Reservation, Mooring Mast site (CPS 3035); So. Tacoma (CPS 3038-9); Little Mashel R., Eatonville, 2 mi. W (CPS 3049; Tacoma (CPS 3113); Ft. Lewis Reserv., Carstens Pons (CPS 3611); Henderson Bay, Camp Seymore (CPS 3886); Fort Steilacoom (USNM 7239); University Place (CPS 4450, 4471-2); Tacoma, Gravel Pit S of Meadow Park Golf Course (CPS 4507). SAN JUAN: Shaw Is., SW part (CPS 3056); Neck Point (MVZ 27010); Lopez Is., Odlin Park (CPS 3061); Friday Harbor, 2 mi. N (CPS 3064); Orcas Is., below Orcas Knob (CPS 3379), N end (CPS 3428-9); San Juan Is., Cattle Pt. (MVZ 27008); Friday Harbor (MVZ 27009, 27011-2, 36436-7). SKAGIT: Samish Is., W end (CPS 4515-20). THUR-STON: Hart's L., 2 mi. N (CPS 3610); McAllister Cr., Nisqually Flats (CPS 3888); Yelm, 2 mi. S (CPS 4163); Mud Bay (CPS 4186); Tenino, 4 mi. SW (CPS 4367-71); Black L. (CPS 4489), 7 mi. W (CPS 4490); Deep L. (CPS 4491). WHATCOM: Bellingham (MVZ 17002-11); Whatcom Pass (USNM 63269).

Description.—It is similar to *T. e. vagrans* in general form, size and color pattern, differing in having lower gastrostege counts (155 to 173, average female 162, male 165) and urostege counts (60 to 95, average female 72, male 76), and in being darker. The darkness is largely brought about by expansion of the dark elements of the standard pattern, the spots being larger, head darker, ventrals more suffused with black. Frequently specimens will be nearly all black.

Comparisons.—As noted under T. e. vagrans.

Habits and Habitat.—T. e. nigrescens is almost always found near water similar to T. e. vagrans, usually in or right at the edge of rocky streams, or around ponds or marshes. We have even secured specimens near salt water, in the San Juan Islands, where they were found hunting around barnacle covered rocks below the high tide mark, with no fresh water

nearby. It is interesting to note the lack of usual aquatic acrobatics (swimming below the surface) when placed in salt water, appearing not to be as much at home in this as in fresh water. We have found occasional specimens swimming away from shore in salt water.

In captivity this subspecies takes such delicacies as young *Hyla* only when quite hungry; their eagerness for this type of food is not nearly so great as *T. sirtalis* subspecies, which were observed simultaneously. One man in the University Place near Tacoma stated that his pool of goldfish was depopulated gradually during which time he noted *nigrescens* living nearby; actual observations of the deeds were not made by him, however. Our gastric analyses performed on several individuals indicate that snails and slugs are a substantial part of the diet in this subspecies. In our mammal collection we have a specimen of shrew-mole (*Neurotrichus gibbsii minor*) removed from a *T. e. nigrescens* on May 18, 1940, south of Tacoma. On July 20, 1947, we removed portions of a juvenile *Microtus townsendii* from the stomach of a *nigrescens*.

We have several dates of parturition of *nigrescens*. The type specimen of *nigrescens* (CPS 4471) brought forth nine young and three undeveloped eggs on September 6, 1946. There were none in the cage at 9:00 AM, but when seen at 2:15 PM, there were six young, two still in the membrane, and two undeveloped eggs. Two more young in the membranes were seen at 5:00 PM; one emerged from the membrane at 5:20 PM. At this time the mother was showing some intermittent contraction. Another young just emerging from its membrane was seen at 7:05 PM. In the litter there were four females varying from 180 to 197 mm in total length, and five males, varying from 207 to 224 mm in total length.

All of the young examined were found to have typical *T. e. nigrescens* scalation and color pattern—no evidence of blending of characters with *T. ordinoides* which cohabit the area.

There is an albino specimen of this species in the collection of the University of Washington, collected in Seattle, 1933 by Vic Scheffer.

The early date of appearance is 15 March 1947.

Thamnophis elegans vagrans (Baird & Girard) Wandering Garter Snake; Water Snake; Spotted Garter Snake

Tropidonotus ordinoides, Baird and Girard 1852:176.

Eutainia vagrans, Cooper 1860:297.

Eutaenia hammondi, Yarrow 1883:117.

Eutaenia vagrans vagrans, Yarrow 1883:119.

Eutaenia elegans plutonia, Cope 1900:1036.

Eutaenia elegans lineolata, Cope 1900:1039.

Eutaenia elegans vagrans, Cope 1900:1041; Brown 1903:290.

Thamnophis ordinoides vagrans, Cope 1900:1041; Van Denburgh 1922:832; Stejneger and Barbour 1923:115; Blanchard 1925:20; Stejneger and Barbour 1933:124; Svihla and Svihla 1933:127; Slevin 1934:40; Brown and Slater 1939:22; Stejneger and Barbour 1939:136; Fitch 1940:24; Perkins 1940:54; Owen 1940:171; Johnson 1942:17; Stejneger and Barbour 1943:170; Pickwell 1947:54.

Thamnophis elegans, Ruthven 1908:141; Dice 1916:303, 304, 310, 312, 319, 321.

Thamnophis ordinoides elegans, Blanchard 1921:6.

Thamnophis elegans vagrans, Johnson 1947:159.

Range.—British Columbia through Montana, eastern Washington and south to eastern California, Arizona and New Mexico, east to South Dakota, Texas, Nebraska, Kansas, and Oklahoma.

Type Description.—As Eutainia vagrans Baird and Girard. Cat. N. Amer. Rept., Pt. I, Sep., 1853:35.

Distribution in Washington .- Eastern part of the state in suitable localities.

COUNTIES .- ADAMS: Sprague, 6 mi. S (USNM 61516). ASOTIN: Grouse Flat (CPS 3863); Anatone, 10 mi. W (CPS 3442). BENTON: Paterson (MVZ 29264); Prosser, 2.4 mi. NW (CPS 6248). CHELAN: L. Chelan, Shrine Beach (CPS 3221); Congdon, Up-Lake Camp (CPS 3243); L. Chelan, Rex Cr. (CPS 3244); Chelan (CPS 3411; USNM 44231-2); Entiat (USNM 61616); Stehekin (USNM 61515, 61631); Wenatchee L. (USNM 61617; O: 171); Hart L. (USNM 61622); Meadow Cr. (USNM 61636). COLUMBIA: Humpeg Falls (V:832); Dayton, 7 mi. SW (CPS 4057-60); Marengo, 2 mi. NW (CPS 4569). DOUGLAS: Moses Coulee (CPS 3385); Rattle Snake Springs (CPS 3470-71); Rock Is., 2 mi. NW (CPS 4351). FERRY: Brush Cr. & Sanpail R. (CPS 3085). GARFIELD: Pomeroy, 10 mi. W (CPS 4570). GRANT: Coulee Dam, 5 mi. SE (CPS 3535-7). KITTITAS: Teanaway (CPS 3084), 9 mi. E (CPS 6172); Teanaway Junction (CPS 4110-11); Cle Elum (MVZ 37206). KLICKITAT: 2 mi. up Klickitat R. from Columbia R. (CPS 3132-33); Columbia R., near river slough (CPS 3277). LINCOLN: Crab Cr., 2 mi. E of Sylvan L. (CPS 3086); Peach (CPS 3499, 3850). OKANOGAN: Tunk Mtn. (USNM 63270); Methow R. at Beaver L. (0:171); Tonasket, 15 mi. E (MVZ 37205). PEND ORIELLE: Diamond L. (V:832); L. Sullivan (CPS 3852, MVZ 37207); Kaniksu Pass, 8 mi. E (CPS 3855); Newport, 8 mi. N (MVZ 37204). SPOKANE: Spokane (CPS 3873). STEVENS: Colville, 3 mi. W (CPS 3851); Springdale (MZ 55197-202). WALLA WALLA: Touchet, 3 mi. E (CPS 3533); Wallula (MVZ 5582-83); Ft. Walla Walla (USNM 10911-12, 15, 17, 13776); Touchet R., 2 mi. E of Prescott (MZ 56925); Prescott (MZ 56949-50, 56955); Kooskooskie (CPS 4591, 4650). WHITMAN: Bald Butte (WSC 72); Pullman (WSC 70-71; MZ 55468-70, 56238); Palouse R. (O:171); Palouse, 3 mi. SW (CPS 4571). YAKIMA: Yakima, 9 mi. S (CPS 3001); between Goldendale and Toppenish on Satus Cr. (CPS 3140); N. Yakima Naches R. (USNM 21485); Bumping L. (USNM 60245-6); McAllister Meadows (USNM 60248); Conrad Meadows (USNM 60249-53).

Description.—This is a medium sized snake. The ground color above varies from brownish to gray, usually with dorsal and lateral lines of yellow, the dorsal line being invaded by the upper of the two series of black spots. Ventral surfaces tend to light gray, often marbled. The distinctness of the spots varies much individually. Supralabials are 8, infralabials 10, in number normally; the dorsal scale rows are 21 as a rule. Gastrosteges vary from 155 to 182, urosteges from 67 to 95, in two series.

Comparisons.—Within the state, this species varies from the *sirtalis* group in having 21 rows of dorsal scales, 8 supralabials and the characteristic dorsal spots invading the dorsal line. Also, the ground color is more brown to gray, being more black in the *sirtalis* group. Red is never found in the coloration of T. *e. vagrans.*

From T. o. ordinoides there are many differences, outstanding of which are 21 dorsal scale rows instead of 17 or less frequently 19 of T. ordinoides; 8 supralabials instead of the usual 7 of T. o. ordinoides, and 10 instead of 8 or 9 infralabials. Gastrosteges are practically always over 155, in T. e. vagrans, generally below this in T. o. ordinoides. T. e. vagrans attains a much larger size than is ever seen in T. o. ordinoides. As to color pattern, there are individuals of T. o. ordinoides showing distinct spotting, but these spots are smaller and do not invade the dorsal line as a rule. T. e. vagrans may be called a water snake, T. o. ordinoides is not.

T. e. nigrescens is quite similar to *T. e. vagrans*, being distinguished by a general darkening of the ground color and extension of the melanistic elements of the color pattern, and by lower gastrostege and urostege counts.

Specimens from the northern border of the state east of the Cascade Mountains must be added to and examined with great care to determine their exact status. A tendency towards *nigrescens* is noted in the few individuals we have seen from this area.

Habits and Habitat.—Ordinarily this species will be found individually but may be numerous around some bodies of water. It lies and waits or basks on stones at the water's edge or in the vegetation in the water a few inches above the water's surface. It is frequently seen swimming about with characteristic slow, undulating, purposeful hunting motions below the surface of the water.

Diet is insectivorous and carnivorous of such small animal life as the snakes can secure. Amphibians at breeding and metamorphosing stages are especially liable to constitute a stable portion of the diet. Fish are known to be eaten by this species. A small mammal (species undetermined) was removed from the digestive tract of one individual (CPS 3855). Knowlton (1946) records two specimens of *T. e. vagrans* in Utah that had eaten the lizard *Uta stansburiana*. Breeding habits are insufficiently studied, but apparently from recorded data, the number of young is eight to twelve, brought forth in late summer.

Remarks.—Separation of *elegans* from *ordinoides* as a separate and distinct species was accomplished by showing the nearly complete overlap of various subspecies of *elegans* upon the range of *ordinoides* that exists from British Columbia to southern Oregon, without evidence of intergradation or interspersion of very distinctive specific characters (Herpetologica, 1947, 3:159).

Thamnophis ordinoides ordinoides (Baird & Girard) Puget Garter Snake

Eutainia cooperi, Cooper 1860:296.

Eutaina leptocephala, Cooper 1860:297.

Eutaenia cooperii, Cope 1875:41.

Eutaenia cooperi, Yarrow 1883:128.

Thamnophis leptocephala olympia, Meek 1899:235.

Thamnophis rubistriata, Meek 1899:235.

Eutaenia leptocephala, Cope 1900:1059.

Thamnophis ordinoides, Ruthven 1908:149.

Thamnophis ordinoides ordinoides, Stejneger and Barbour 1917:101; Van Denburgh 1922;815; Stejneger and Barbour 1923:113; Stejneger and Barbour 1933:122; Slevin 1934:40; Brown and Slater 1939:21; Stejneger and Barbour 1939:134; Tanner 1940:144; Fitch 1940:104; Stejneger and Barbour 1943:169; Pickwell 1947:52.
Range.—Coastal regions of California, Oregon, Washington and British Columbia. Type Description.—As Tropidontus ordinoides Baird and Girard, Proc. Acad. Nat.

Sci. Phila., Vol. VI, 1852:176.

Type Locality.—Puget Sound.

Distribution in Washington.—West of the Cascade Mountains; also 20 mi. east of divide in Yakima and Klickitat Counties.

COUNTIES .- CLALLAM: Washington Harbor (CPS 3450); Morse Cr., near hwy. (CPS 3212); Port Angeles, 30 mi. from (FM 485-6); Sequim, 1 mi. W (CPS 3489-91); Forks (CAS 47491); Port Angeles, 12 mi. S, Elwha R. (WSC); East Twin R. (WSC); Port Angeles (CPS 4132). CLARK: Fish Hatchery, about 8 mi. E of Vancouver on Camas Rd. (CPS 3218-20). COWLITZ: Cougar, Lewis R. (CPS 3254-6); German Cr. Rd., 5 mi. up (CPS 3408-9). GRAYS HARBOR: Westport (MZ 65059); Aberdeen (USNM 4437-8, 4425-6; CPS 3891); Melborne (CAS 29930-40); Montesano (CAS 24101-3); West Pont (? West Port) (MZ). ISLAND: Camano Beach (CPS 3994-5), on road 3 to 6 mi. N (CPS 3317-9), on road 3 mi. N (CPS 3304-6); Camano Is., jct. of roads about 2 mi. W of bridge (CPS 3302-3); Ala Spit (CPS 3372); Deception Pass bridge (CPS 4536-41); North Beach, 1.5 mi. S, on Whidby Is. (CPS 3552). JEFFERSON: Seal Rock Park (CPS 3196-98); Quilcene, 3 mi. N (CPS 3200-11); Elwha R. (USNM 64406); Mt. Steele (MZ 55429-30); Marrowstone Is., 1 mi. N of bridge (CPS 3909); Indian Is., S end (CPS 3912); Indian Is., 2 mi. N of ferry (CPS 3914); Protection Is. (CPS 4097, 4117). KING: Carnation (0:171): Vashon Is., S end (CPS 3337-8); Maury Is. (CPS 3345), S end (CPS 3574); Vashon Is., Swazie's place at Indian Pt. (CPS 3512); Vashon Is., Newberries (CPS 3514), Magnolia (CPS 3515), Harbor Heights (CPS 3516), Indian Point, (CPS 3517); Seattle (USNM 16153-5; SDSNH 4917-8; FM 792, 799; O:171; LMK). KITSAP: Bainbridge Is., beach on SW corner (CPS 3354-5); Hoods Canal, E side at Holly (MZ 65280); Port Orchard (USNM 16162, CAS 30400); Gorse Cr. (USNM 62688, 62690-1, 62693-700, 62702-4); Bremerton (USNM 64094-7, 64099, 64101-3); Blake Is., E side (CPS 4010-2). KLICKITAT: Northwestern L., 1 mi, NW of White Salmon R. (CPS 3520); Trout L., 3 mi. S (CPS 4662). LEWIS: Toledo (USNM 44239), 1 mi. S (CPS 4373-5, 4385), 5 mi. S (CPS 4160-2); Lewis and Clark State Park (MVZ 24899). MASON: McMicken Is. (CPS 3978); Stretch Is. (CPS 3347-8); Harsteine Is., W side (CPS 3504); Hoodsport (MZ 52907-8, 55423-5); L. Cushman (MZ 55418-22, 55427; CAS 55301; AMNH 55301; AMNH 324823), Dry Cr. (MZ 55426, 55428, 55431-3, 65316), Staircase Camp (AMNH 43488-9), Mt. Rose (MZ 65313-5), Putman Ranch (MZ 55434); Shelton (AMNH 23462); Harsteine Is., 0.5 mi. S of ferry (CPS 3898), 2 mi. N of ferry (CPS 3901); Reach Is. (CPS 3903-5); Hope Is. (CPS 3920-7); Squaxin Is., SW corner (CPS 3928-9). PACIFIC: Shoalwater Bay (USNM 957-8,

8055); Naselle (USNM 25954); Northhead (CPS 3878); Lebam (CAS 29922); Trapp Cr. (CAS 29923-6); Ocean Park (O:171), PIERCE: Anderson Is., school house (CPS 3020-1), NW corner (CPS 3032-3); Eatonville, 2 mi. W on Little Mashel R. (CPS 3050, LMK); Fort Steilacoom (USNM 951, 44429, 5224-5, 7239); Longmire, 3 mi. W (CPS 3381); Mt. Rainier (USNM 62528, 62549); Fox Is., Jackson's place near ferry (CPS 3041-5); Ketron Is. (CPS 3572); Tacoma (CPS 3096; CAS); Herron Is. (CPS 3976); Raft Is. (CPS 4005-6, 4015-6); Deadman's Is. (CPS 4007). SAN JUAN: Shaw Is., SW part (CPS 3057-9); Lopez Is., Odlin Park (CPS 3060); San Juan Is., Sportsman L. (CPS 3062), Garrison Bay (CPS 3614-6); Orcas Is., N end (CPS 3416-27), East Sound (CPS 3065-8); Sucia Is., Fossil Bay (CPS 3362-4); Blakely Is., Thatcher (CPS 3365, 3367-71); Lopez Is., Spencer Spit (CPS 3366); Friday Harbor (O:171). SKAGIT: Guemes Is., S beach (CPS 3070-1); Fildago Is., Anacortes (CPS 3073), Alex Beach (CPS 3074), Cranberry L. (CPS 3075); Cypress Is., Secret Harbor (CPS 3076); Mt. Vernon, 3 mi. W (CPS 3312); Fildago Is., Campbell L. (CPS 3301, 3307), Rosario Beach (CPS 3550); Cypress Is., Strawberry Bay (CPS 3360, 3373); Mt. Vernon (USNM 44286-8); Saddle Bag Is. (CPS 3069); Samish Is., W end (CPS 4513-4); Anacortes (Tanner 1940:144). SKAMANIA: Stevenson (USNM 61610); Skamania Co. (USNM 61611); Carson (USNM 61637); Cape Horn (CPS 3228); Randle, 28 mi. SE (CPS 4632). SNOHOMISH: (MVZ 18994-6); Darrington (CAS 30508-11); Everett, just above pulp mill (CPS 3962-9), 3 mi. E (CPS 4584-7); Mukilteo (CPS 4531-5). THURSTON: Nisqually, 3 mi. W (CPS 3300); Tenino (USNM 44258); McKenna, 1 mi. W (CPS 3105); Steamboat Is. (CPS 3971-5). WAHKIAKUM: Cathlamet, 6 mi. E (CPS 3879); Cathlamet (USNM 61609, 61638); Deep Cr. (CPS 3449); Grays River, 3 mi. N (CPS 4654). WHATCOM: Nooksack R., 2 mi. W of Deming (CPS 3309), 2 mi. S (CPS 4511); Toad L. (CPS 3310-1); Deming, 3 mi. E in gravel pit (CPS 3321-3); Nooksack Bottom (MVZ 16968); Bellingham (MVZ 16969-77, 79-80, 82-17000; O:171; Tanner 1940:144); Lummi Is., W side, N end (CPS 3618-9); Sumas, 10 mi. SW (CPS 6127-9). YAKIMA: American R. camp, 1 mi. E (CPS 4567); Boulder Cave Campground (CPS 6282-3).

Description.—This is a small snake exhibiting a maximum variation in color and scalation. There are usually a dorsal and two lateral stripes but any or all of these may be absent. Ground color is most often dark brown, with yellow, red, or gray for the stripes. Often seen are two series of small black dots on each side which do not invade the dorsal line. A frequent variation is red stripes and an irregular red suffusion of the body and head dorsally and ventrally. The head and eyes are relatively small for *Thamnophis*. Supralabials are usually 7 in number; infralabials less than 10. Dorsal scale rows are 17 or 19. Gastrosteges vary from 136 to 155, urosteges from 50 to 75, in two series. The anal plate is single.

Comparisons.—Differs from T. e. vagrans and T. e. nigrescens in having 17, more rarely 19, instead of 21 dorsal scale rows. Spots do not invade the dorsal line. Supralabials usually 7, are 8 in T. elegans; infralabials less than 10, in T. o. ordinoides, are 10 or over in T. elegans. This is less of a "water snake" than T. e. vagrans and T. e. nigrescens.

Differs from the *sirtalis* group in the variability of the scale count and is seldom found with the standard *T. sirtalis* scalation, that is, 19 dorsal scale rows, 7 supralabials, 10 infralabials. The gastrostege count is often helpful here, also, there being few individuals of *T. o. ordinoides* having over 155, few specimens of *T. sirtalis* having below 155. Of course we find non-conformists to this generality. Knowing the group and seeing an individual in the field, the color pattern generally distinguishes the species at a glance.

Habits and Habitat.—This snake is typical of the brush of the western portion of the state. Usually it is found within close proximity to a safe brush heap or dense piece of terrain where retreat is safety. It is often common in deep grass in fairly open areas and around homes or buildings and may be seen on walks or lawns. It may retreat to the under side of a board walk, a log, or may be dug from the very center of a rotten log. An unusual location for a garter snake was noted in September 1946, a few miles south of Tacoma in a deep wooded

canyon. There was a snag about three inches in diameter, broken off about six feet high, partially rotten in the center with no branches. Here on top was a medium-sized T. o. *ordinoides* one day. As we observed him he disappeared down a hole no larger than himself, in the center of this snag.

While this species may be common along the sides of a marsh or stream, it cannot be called a water snake, seldom retreating to water when pursued, as the *sirtalis* group or T. *e. vagrans*. Just to show exceptions to the rule, however, we have on occasion seen T. *o. ordinoides* take to the water, and instead of swimming away on or under the surface as the more aquatic relatives do, they have gone to the bottom and gotten under boulders. Here they have remained for some minutes, sometimes with most of the body showing, as an ostrich with his head in the sand.

This species may be extremely common in certain areas within a given locality and none at all may be found in just as promising a habitat near-by. In the spring, and less often in the fall, large aggregations of individuals are occasionally found. Sometimes, on turning over a large flat cover of some sort, a squirming mass of ophidian fauna presents itself. Places of hibernation are more or less permanent and stable areas. In Tacoma, they have been observed out of hibernation as early as 7 February (1947).

Food habits are generally related to foraging in damp concealed areas. We have observed several instances of the taking of earthworms on lawns by T. *o. ordinoides*, and have taken large slugs and snails from the digestive tracts of many individuals. Fitch (1940:603) reports salamanders occasionally and one *Rana aurora* in the stomach contents of T. *o. ordinoides*.

This species is ovoviviparous and because of its small size produces a relatively few number of young at birth. We have found young snakes and females at term during the first two weeks of August, and have produced young in captive snakes, as late as the second week in October. Hebard (1951:177) records mating activity during the first two weeks in April (1948) and a short, approximately 63 day, gestation period. There was evidence of fall copulation from September 20 through October 9. By October 15, all *T. o. ordinoides* had gone into hibernation. In sixty-six females over 330 mm in length he found 67% were pregnant with three to fifteen embryos averaging 8.8 mm.

Remarks.—Within this species there is remarkable color variation, best noted when several hundred individuals are aggregated together from a given locality, this last to be seen at many places. Variations in scale counts as noted under species description are also more marked in this species than in other *Thamnophis* under our study.

Of particular significance is the fact that the newly born and late embyo individuals of many broods examined have shown a remarkable consistency of color pattern, even with much variation of adults. This standard pattern for T. o. ordinoides is as follows: Ground color dorsally brown to olive brown, with the head slightly darker. Dorsal stripe of light yellow or brown is absent or may be fairly distinct. Lateral lines usually not well defined, are light brown. Characteristic is a series of black dots just above the lateral line and frequently a series of alternating minimal black dots above the first series. Ventrally the chin is light yellow, shading to olive brown or grayish posteriorly.

More observations are necessary along this line, but the true relationships would appear to be more clear by this means of study. The assumption is that by environmental stimuli, somatic responses are accomplished, to give the full gamut of colors and patterns. Many adults show the juvenile pattern very well.

It is to be noted for example that by superficial examination an individual of T. o. ordinoides from the geographic range of T. s. pickeringi much resembled pickeringi in coloration, but the young produced could not be confused even by the rankest novice with the young of pickeringi.

While this species seldom is seen over 16 inches, we have one specimen from

Klickitat County (CPS 3520) that measures 740 mm (29.5 inches). This is a female and was at first thought to be gravid, but when opened up, was found to be filled with masses of fatty tissue.

We have two records of this species east of the Cascade divide in Yakima County, about 20 miles from the summit. Thomas B. Thornton of Yakima also showed us a specimen taken in the same general locality.

Thamnophis sirtalis subspecies

Description.—This group of *Thamnophis* is most constant in scalation of any of the garter snakes under study. Four distinct *T. sirtalis* subspecies are distinguished on the basis of color pattern within geographical ranges.

These are medium to large snakes. The head is distinct from the neck, general form of the body slim, with a long tail. Supralabials are normally seven in number, infralabials ten. Dorsal scale rows are nineteen in number; gastrosteges vary from 153 to 175, urosteges from 66 to 95, divided.

Four subspecific terms are applied to geographical races as follows: (1) *Thamnophis* sirtalis pickeringi, found in a limited area of southeastern Puget Sound; (2) *Thamnophis* sirtalis trilineata, found around Puget Sound, west to Grays Harbor, north into British Columbia; (3) *Thamnophis sirtalis concinnus*, found in this state only in the southern part near the Columbia River, between the Cascade and Coast ranges, and down into Oregon; and (4) *Thamnophis sirtalis tetrataenia* which is found over the entire state except in general in the area designated by (1), (2), and (3). The exact status of the extreme coastal forms is not determined with finality, but it appears to be closest to *tetrataenia*.

There are necessarily intergradations and often it may be difficult to place a given specimen but with a large series this factor only strengthens our definition of the subspecies.

Individual descriptions and differences will be discussed under each subspecific heading.

Comparisons (with other Thamnophis in the state).—Thamnophis ordinoides ordinoides usually has 17, often 19 dorsal scale rows. Usually there are less than 10, most often 8 infralabials. Generally the head and eyes are smaller. The color pattern is quite varied from well-lined to no lines visible; small spots are present on many *T. o. ordinoides*. Knowing the standard scalation of the *sirtalis* group and the color patterns of the four subspecies above, there is seldom any question to the specificity of any individual.

Thamnophis elegans vagrans always has 21 dorsal scale rows, usually 8 supralabials, (as compared to counts of 19 and 7, respectively) often over 10 infralabials. Spotting is very distinct, usually encroaching on the dorsal line; color tends toward gray; the gastrosteges and urosteges are nearly always marbled with black or slate. With these criteria, we have had no trouble with *T. e. vagrans*.

Thamnophis elegans nigrescens has scalation as noted under T. e. vagrans. Color pattern similar also, but more obscured by extension of melanistic elements.

Thamnophis sirtalis concinnus (Hallowell) One-striped Garter Snake

Eutainia concinna, Cooper 1860:298.

Eutaenia sirtalis concinna, Cope 1900:1082.

Thamnophis sirtalis concinnus, Ruthven 1908:174; Stejneger and Barbour 1917:103; Pratt

1923:228; Stejneger and Barbour 1939:137; Johnson 1942:17; Stejneger and Barbour 1943:172.

Range .- Southwestern Washington and northwestern Oregon.

Type Description.—As Tropidonotus concinnus, Hallowell Proc. Acad. Nat. Sci. Phila., Vol. VI. 1853:182. (Type is ANS 6324).

Type Locality .- Oregon Territory.

Distribution in Washington.-Southwestern part of the state.

COUNTIES.—CLARK: Evergreen Hwy., 2 mi. W of county border (CPS 3414); Ft. Vancouver (USNM 944); Lewis R. at Columbia R. (CPS: 3452-4); Vancouver, 6 mi. N (CPS 3387); Washougal, 3 mi. E (CPS 6034); Woodland, 1 mi. S (CPS 4376-7). COWLITZ: Longview (CPS 4088-9); Kalama, 2 mi. N (CPS 4378-82); Germany Cr., 1 mi. E (CPS 4482); Castle Rock, 5 mi. N (CPS 4483). WAHKIAKUM: Cathlamet, 1 mi. W (CPS 4479), 1 mi. E (CPS 4480-1).

Diagnosis.—Typical Thamnophis sirtalis scalation. Prominent dorsal light yellow line; no lateral line in most typical specimens, though individuals often show from a few suggestive yellowish markings along the second and third rows of scales to an irregular linear marking along the body on the second and third rows of scales. Generally dark, ground color black, with a series of salmon-red transverse bars on either side of the dorsal line.

Description (color pattern of living specimens).—General appearance dark, ground color black. Light yellow dorsal stripe covering one and two half rows of scales, fading somewhat on the tail. There is a series of salmon-red transverse bars, primarily on the skin between the scales, but involving the scales in more highly colored specimens. Typically, there is no lateral line, there being only an extension of the dorsal black down upon the gastrosteges, but all degrees of intergradation may be found in a series, from merely a few light yellow markings to a fairly definite yellow line on the second and third row of scales. In practically every case, there is no continuation of the salmon-red transverse bars into the lateral markings that may be present: in other words, the salmon-red bars are bounded inferiorly, as well as on either side, by black ground color.

The head is lighter than the rest of the body, being of a chestnut color, shading into the ground color at the occiput. Labials are light olive, generally shading to black, especially on the suture line of each scale. The mental region is olive to brown, shading darker into a black, which shade predominates over most of the gastrosteges. Occasionally, there may be a touch of red upon the labials and parietals over the dorsum of the head. Preserved specimens lose the red coloration after a time, this tending to turn to a light yellow-brown shade, similar to the line, and other colors become more drab.

Comparisons.—It differs from *T. s. pickeringi* generally in having a wider dorsal stripe, red in coloration of the transverse cross-bars, and no lateral line. The dorsal line color is yellow instead of green as in *pickeringi*.

It differs from T. s. tetrataenia chiefly in the lack of a lateral line and the tendency to be darker. Regarding the lateral line, T. s. tetrataenia <u>always</u> has a clearly defined, straight lateral line on the second and third rows of scales. We have examined many hundreds of specimens with this point especially in mind, including large series of unborn young, and have yet to find a single specimen from Washington that does not show this straight, welldefined line of T. s. tetrataenia, except from the geographical area of T. s. concinnus. However, we do not say it never happens for the law of individual variation allows this. Inside the geographical area of *T. s. concinnus* in this state, we occasionally find a specimen which is typical of *T. s. tetrataenia*, but most of those we have seen from this area have no sign of a lateral line, others showing variations as described above.

It differs from *T. s. trilineata* in having a well-defined wide dorsal line, prominent bars, and in the absence of the lateral lines. *T. s. trilineata*, however, frequently has an irregular lateral line as is seen in less typical *T. s. concinuus*.

Habits and Habitat.—As with others of the sirtalis group, it is common about marshy locations, feeding on the available insects and amphibians in all stages of development, and fish when able to secure them. In June 1946 in a series of six large adults caught near Woodland, Clark County, two had recently eaten blackbird fledglings. Where these snakes are numerous, as indeed they are in many marshes, they can well be a serious limiting factor on nesting marsh birds.

Not a great deal has been recorded concerning the breeding habits; these snakes are ovoviviparous as are other *Thamnophis*, bearing young in the late summer months.

Remarks.—One fact presented in the type description—that of "There are seventeen rows of carinated scales" (Hallowell, 1852:182) is rather misleading, as all of *Thamnophis sirtalis* group have nineteen rows of scales. However, with the cooperation of J. Townsend Sackett, we have examined this specimen at the Academy of Natural Sciences of Philadelphia and find it to have the usual nineteen rows of dorsal scales, the measurements of this specimen being 22.5 inches, of the body, 7.5 inches of the tail, instead of the "2 feet, 3 in., tails 5 in., 10 lines" noted in the type description.

Thamnophis sirtalis pickeringi (Baird & Girard) Nisqually Garter Snake; Pickering's Garter Snake

Eutainia pickeringi, Baird and Girard 1853:27; Cooper 1860:296.

Eutaenia sirtalis pickeringi, Cope 1875:41; Yarrow 1883:127.

Eutaenia sirtalis pickeringi, Cope 1900:1082.

Thamnophis sirtalis concinnus, Ruthven 1908:174; Van Denburgh 1922:798 (part).

Thamnophis sirtalis pickeringi, Perkins 1940:53; Fitch 1941:575; Johnson 1942:17; Stejneger and Barbour 1943:173; Pickwell 1947:54.

Range .- Restricted to the southern end of Puget Sound.

Type Description.—As Eutainia pickeringi, Baird and Girard Cat of N. Amer. Rept. Pt. 1, serpentes. S. F. Baird and C. Girard 1953:27. (Two type specimens, USNM 936).

Type Locality.—"Puget Sound." This locality we may restrict to the prairies east of the Nisqually River.

Distribution in Washington.-Southeastern border of Puget Sound, near Tacoma.

COUNTIES.—KING: Bothell, 4 mi. E (CPS 3493). PIERCE: Clover Park, S of Tacoma (CPS 4456-9, 4484-5); Fox Is., Sylvan 0.5 mi. W (CPS 4401); Tacoma, 10 mi. S (CPS 3009, 3261-2, 3268); So. Tacoma Swamp (CPS 3339). THURSTON: Patterson L., outlet (CPS 3868).

Diagnosis.—Typical *T. sirtalis* scalation in a dark snake with a narrow dorsal line, more or less irregular and broken lateral lines, with extensions of the same light color into transverse bars between the lateral and dorsal stripes. There is no red in the coloration.

Description (color pattern, living specimens).—The general appearance is very dark with a combination of black, and a blue-green to turquoise in the stripes and transverse bars and ventrally. The dorsal stripe is mostly on one row of scales, fading on the tail. The lateral stripe typically is more or less irregular—"swells and narrows like a knotted cord" (Baird and Girard, 1853:27), being confluent with and of the same color as the lateral bars. The lateral stripes are mainly on the second row of scales. The transverse bars are irregular, mainly on the skin between the scales. These correspond to the red bars noted in other *sirtalis* subspecies. Ventral coloration is the same as that of the stripes, darkened posteriorly, becoming lighter anteriorly, so as to be a pea green or light turquoise beneath the chin, extending over the labials and cheeks, quite beautiful in a freshly shed specimen. Preserved specimens tend to be darker and lose the brightness of coloration.

Comparisons.—It differs from T. s. concinnus, T. s. tetrataenia and most T. s. trilineata in having no red in the coloration—that is, no red bars between the lateral and dorsal stripes. Also, the turquoise-blue-green coloration is not seen in the other three subspecies. They tend to have a definite yellow dorsal stripe, and in T. s. tetrataenia and T. s. trilineata definitely yellow lateral stripes. It is a dwarfed race, generally well under 600 mm, a figure greatly exceeded by all other subspecies in question. It is the most differentiated color phase of western sirtalis.

Habits and Habitat.—The habitat of this snake is similar to that of the rest of the sirtalis species with which we are familiar within the state. It may be classified as a water snake, so invariably is its nearness to water. Usually individuals are startled right on the edge, or swimming among vegetation in the water. We have found them abundant some years about the prairie ponds in the vicinity of Tacoma, often a dozen or two being scared up in circumventing a small pond. This snake may be found fairly numerous at certain localities but not so common as the *T. ordinoides* that abound in the same area. They are to be looked on more as individualists than *T. ordinoides*. Later in the summer they may be found further away from water under logs and rocks.

Diet is naturally suggested by the habitat. Frogs, salamanders and small fish are sources of this reptile's food.

In captivity, they readily take recently transformed *Hyla regilla* and small *Rana aurora*. Even when hungry, they do not attempt to take small *Gerrhonotus coeruleus principis* or grasshoppers, although they would track the motions and flick thehoppers with their tongue. An interesting happening was a female giving birth to young and taking a half-grown *Rana aurora* at the same time, each function progressing perfectly normally.

Enemies include all sorts of minor predators, hawks being suggested a prime source of danger as evidenced by stomach analysis of several birds from the Tacoma area.

Young are brought forth in ovoiviparous state late in August and are fewer in number than in other subspecies of *sirtalis* under consideration, possibly because this is a smaller subspecies. An individual (CPS 4456) was operated upon, Caesarian section, by impatient scientists on August 19, 1946. Nine young were contained of which two had been injured and had been dead. The remaining seven were kept for several days. They were at term as evidenced by complete absence of yolk in the egg sac. All shed during the first 24 hours and otherwise behaved as normal youngsters. Another individual (CPS 4458) produced eight normal young on 23 August 1946. Two were born by 9:00 AM, a third by 9:15. (The mother ate a small *Rana aurora*). The fourth was born at 9:32, emerged from its membrane at 9:40. Irregular peristaltic-like motions could be seen over the posterior half of the mother's body. There were eight by 11:00 AM, all with typical *T. s. pickeringi* color and pattern. It is to be noted that the young are more active than the adult snakes during low temperatures of night and morning, as has been noted with young of *Gerrhonotus coeruleus principis* (Lewis 1946:157). The size of the new-born from the two broods ranged from 195 to 205 mm, except one 138 mm and one 168 mm.

Remarks.—This is a revival of a bit of subspecific nomenclature. The subspecies was first described by Baird and Girard in 1853, named after the finder Dr. Charles Pickering of the U.S. Exploring Expedition (Wilkes') and was recognized through Cope's (1898) and other's works until Ruthven's comprehensive survey of garter snakes (1908). Apparently insufficient specimens were at hand to allow later workers to judge properly a very distinct group, *T. s. pickeringi*. It is interesting to note that Henry Fitch, working independently arrived at the conclusion that *pickeringi* was a valid subspecies (personal communication 1938, 1940), (1941:570-592).

However, Fitch did not describe *pickeringi*, but *T. s. trilineata*. He again had no adequate series of *pickeringi* for determination. We can now limit the range of *T. s. pickeringi* and definitely establish *T. s. trilineata* (Cope). Because the color and pattern differences are most important here, it will be necessary to be more careful in identifying fresh material in the future. Only then will the final total range become known accurately and finally.

An interesting side-light is found in the examination of the two dead fetuses observed in the brood of CPS#4456, where development had been arrested at an early stage. From our notes, we quote: "The smallest dead fetus shows the least dark color; in other words, the lateral and dorsal lines are much more prominent and noticeable than in the fully developed young. This would seem to indicate the genetic forefathers were much lighter and colorful and that this subspecies represents the end product rather than any primitive race, or that the melanophores are late in the functional development. The other dead fetus likewise shows more lightness, but of less degree."

We have one specimen (CPS 3339) from South Tacoma Swamp that is much larger than any other individuals of this species yet seen. It has a total length of 39.5 inches.

Thamnophis sirtalis tetrataenia (Cope) Northwestern Garter Snake

Eutainia sirtalis tetrataenia, Yarrow 1875:546; Cope 1982:664; Cope 1900:1081. Eutaenia sirtalis parietalis, Yarrow 1883:125; Cope 1900:1079.

Thamnophis pickeringi, Meek 1899:234.

Thamnophis parietalis, Ruthven 1908:167.

Thamnophis sirtalis parietalis, Stejneger and Barbour 1917;103; Blanchard 1921:6; Van Denburgh 1922:798; Pratt 1923:228; Jordan 1929:243; Owens 1940:171.

Thamnophis sirtalis concinnus, Van Denburgh 1922:798; Stejneger and Barbour 1923:117; Svihla and Svihla 1933:127; Slevin 1934:40 (part); Brown and Slater 1939:23; Stejneger and Barbour 1939:137; Owen 1940:171.

Thamnophis sirtalis tetrataenia, Perkins 1940:53; Slater and Brown 1941:76; Fitch 1941:570; Johnson 1942:17; Stejneger and Barbour 1943:173; Pickwell 1947:54.

Range .- From California over eastern Oregon into Idaho and Washington.

Distribution in Washington.—All over state except in range of the subspecies concinnus, pickeringi, and trilineata.

COUNTIES .- ASOTIN: Grouse Flat (CPS 3864). CHELAN: Stehekin (USNM 61607); Chelan (CPS 3412); Winton (CPS 4032-3). CLALLAM: Cape Flattery, 8 mi. S (CPS 3213-4); Elwha R., below old home ranch (CPS 4447-9); Obstruction Point, 1 mi. S (CPS 4192); Ozetta L. (CPS 3215). CLARK: Vancouver, 8 mi. E (CPS 3217), 6 mi. N (CPS 3388). COLUMBIA: Maringo, 2 mi. NW (CPS 4568). COWLITZ: Castle Rock, 2 mi. S (CPS 3573); Merill L. (CPS 3257). DOUGLAS: Grand Coulee Dam, 6.5 mi. W (CPS 6169). FERRY: Republic (SDSNH 21101); Round L., 9 mi. W of Inchelium (CPS 4574). GRANT: Coulee Dam, 5 mi. SE (CPS 3538); Dry Falls (O:172, CPS 6039). GRAYS HARBOR: Cosmopolis, 2 mi. S (CPS 4496); Ewell Cr. Trail, 2 mi. S of Quinault R. (CPS 4648-9); Grayland (CPS 3892). ISLAND: Camano Beach, 5 mi. N (CPS 3320). JEFFERSON: Jackson R.S. (CPS 4663); Seal Rock Park (CPS 3195). KING: Denny Cr. (CPS 3022); Grotto, 7 mi. SE (CPS 4405-6). KITSAP: Blake Is., W side (CPS 4008). KLICKITAT: Trout L. (USNM 61614, 61634-5; CPS 6250); Bingen, 1.5 mi. E (CPS 3389); Spearfish Indian Village (CPS 3109-10); Guler (MVZ 29263). LEWIS: Canyon Rim, R.N.P. (CPS 3889); Chehalis, 1 mi. N (CPS 4124); Longmire, 0.7 mi. SW, S side Nisqually R. (CPS 3556). LINCOLN: Creston, 6 mi. W (CPS 3498). OKANOGAN: Beaver L. (0:172 under T. s. parietalis); Tonasket, 24 mi. E (CPS 4400). PACIFIC: Johnson's Landing (CPS 4473); Lon, Beach (CPS 6040); Naselle R. (CPS 3457); Northhead (CPS 3877); Smith Cr. R.J. (CPS 4474); Willapa Harbor, S end (CPS 4486). PEND ORIELLE: L. Sullivan (CPS 3853-4); Cusick, 11 mi. SW (CPS 4402); Baker L., near Davis L. (CPS 4590, 4592-3). SKAGIT: Fildago Is., W end of Campbell L. (CPS 3548); Sedro Woolley, 3 mi. NE (CPS 4512). SKAMANIA: Carson (USNM 61613); Council Pass, W of Mt. Adams (CPS 4652); Stevenson, 2 mi. W (CPS 3518); Willard R.S., 3 mi. S (CPS 4664); North Bonneville, 1 mi. W (CPS 6037); Moffit Hot Springs (CPS 6038). SNOHOMISH: Beckler R., 6 mi. up from Skykomish R. (CPS 4043-8); Snohomish, 3 mi. SE (CPS 4411); Verlot (CPS 4487). SPO-KANE: Spokane (CPS 3874); Cheney (MZ 46537-42, 46553). STEVENS: Springdale (MZ 55186-96); Chewelah, 8 mi. NW (CPS 4399); Hunter, 12 mi. S (CPS 4633-5); Old Dominion Mine Camp (CPS 4417). WAHKIAKUM: Skamakawa (CPS 4477), 3 mi. SE (CPS 4653), 4 mi. SE (CPS 4478). WALLA WALLA: Fort Walla Walla (USNM 10634-8, 10909-10, 10916). WHITMAN: Pullman and Almota (Svihla and Svihla 1933:127); Pullman (MZ: 46551-2); Thornton (SDSNH 24118). YAKIMA: Boulder Cave Campground (CPS 6284); N. Yakima (USNM 44289); Yakima Indian Reserv. (USNM 60257); Chinook Pass, 5 mi. E (CPS 4018); Toppenish, 9 mi. SE (CPS 4343).

Diagnosis.—This subspecies has typical *T. sirtalis* scalation. There are prominent, regular dorsal and lateral longitudinal lines and a series of transverse salmon-red bars between the lateral and dorsal lines on either side. Generally, it is rather dark, but the colors are bright. The belly is light gray to greenish or yellow anteriorly, shading posteriorly.

Description (color pattern, living specimens).—The general appearance is rather dark, but this is a highly colored snake. The light yellow dorsal stripe covers one and two half rows of scales; lateral lines are the same color and of about the same width, on the first, second, and third rows of scales. All three lines tend to narrow and fade somewhat toward the tail. These lines are straight and regular throughout their length. There is a series of 65 to 90 transverse salmon-red bars extending upward from the lateral stripes, primarily on the skin between the scales, but also involving the scales. There is often additional red pigmentation in the area superior to and between the transverse bars, on the scales or the skin between the scales.

The head is somewhat lighter, chestnut brown to olive, especially around the labial area, but even here the labial scales generally show invasion of the dark brown or black, from small areas at the posterior suture line to almost total shading of the more posterior labial scales. In many specimens there is a light salmon-red, of the same shade as the transverse bars on the body, present on the labial scales, extending over the temporal or even the parietal scales. The throat is yellowish white, this color becoming more yellow and darker along the belly as the posterior portion of the body is reached. Anteriorly, the ventral light coloration approaches the light lateral line, but generally there is a well defined dark area on the first row of scales and the tips of the gastrosteges. Many specimens show gastrostegal spots (dark areas on each gastrostege next to the suture, near the tip). Preserved specimens lose the red coloration, fading to white in formalin or alcohol. This can however, be distinguished on close observation from the faded yellow of the lateral and dorsal lines. The whole appearance is darker in formalin, lighter in alcohol preserved specimens. We have several melanistic specimens showing no stripes at all—entirely black and quite striking in the living specimen. Our largest specimen is 48 inches in total length (CPS 3889).

Comparisons.—*T. s. tetrataenia* differs from *T. s. pickeringi* in having red in the coloration, more definite and regular dorsal and lateral stripes, and it has none of the turquoise blue-green cast characteristic of living *T. s. pickeringi*.

It differs from *T. s. concinnus* in being somewhat lighter in color as a rule and in always having definite lateral stripes.

It differs from *T. s. trilineata* in being of brighter color generally. The red bars are easily seen without having to stretch the scales apart, and are always present. The dorsal stripe and lateral stripes are always bright yellow and broad; the converse is true usually in *T. s. trilineata*.

The differences from T. s. parietalis are several. To gain a better idea of the differences, a large series of T. s. parietalis from Missouri, Iowa, Kansas, and Minnesota, (type locality is in Missouri) were examined from the U.S. National Museum and the Chicago Museum of Natural History. The following characteristics were noted: the gastrostege count averaged 154.0 in 38 specimens, varying from 139 to 165, as compared to an average of 162.1 in 40 individuals of T. s. tetrataenia varying from 154 to 175. Gastrostegal spots are more frequent in T. s. parietalis, being present in a majority of specimens examined. On many specimens there is a series of black to brown spots, a spot in each dark area, just above the lateral line between each transverse bar, not observed in any of our specimens of T. s. tetrataenia. On the contrary in several specimens of T. s. parietalis studied, the dorsal stripe is mainly on the central row of dorsal scales, and on our Washington specimens, one and twohalf rows of scales are nearly always completely covered by the dorsal stripe. As noted, T. s. pickeringi and T. s. trilineata have this narrower dorsal stripe, but both T. s. concinnus and T. s. tetrataenia have a well defined broad dorsal stripe. Specimens of *T. s. infernalis* from California were examined from the San Diego Natural History Society, California Academy of Sciences, and the University of California. Differences as noted by Fitch (1941) were found.

A most striking observation resulted from opening a pregnant T. s. trilineata (CPS 4455); the unborn young were examined for color pattern. There was a moderate amount of yolk remaining, indicating the snake was several weeks before term. The fetuses all exhibited, as has been noted in other similar cases, very small amounts of dark pigment. In several there was a striking resemblance to the types of T. s. tetrataenia, with a definite four lines noted on either side. T. s. trilineata being a very dark form, we know that these characteristics are gradually covered up as the young snake develops.

Habits and Habitat.—Found almost always near moisture. This may not be so noticable in the damper portions of the state, west of the Cascade Range, where individuals are found in the forests, usually in open places but even here usually not too far from some stream or lake. In the dry eastern portion of the state we have never seen this snake at any distance from a pond or stream. Either sunning on the banks or swimming about in the water, they are at times fairly numerous though more often are found separately. We have seen them in great numbers in a small pond deep in the Blue Mountains of southeastern Washington. They were not clustered together but sunning themselves individually or swimming about on top or under the water in purposeful hunting motion. In the same pond were equal numbers of *Thannophis elegans vagrans* whose habits were about the same. This pond was teeming with developing *Ambystoma macrodactylum* and *Hyla regilla*. We have secured an individual of this subspecies in Oregon on the slopes of Mount Hood above Timberline Lodge (el. 6000') in August. This location is free of snow only about five months of the year and demonstrates the hardiness of this particular race.

Eating habits are suggested by the habitat. Amphibians, small fish, and possibly nestling birds are the major part of T. s. tetrataenia food. We have regurgitated as many as three freshly injested small slough fish from individuals near the Columbia River in Klickitat County. Here the hunting was carried out beneath the surface of a very muddy, murky fluid in the same slow, undulating, purposeful hunting movements as noted above.

Breeding habits need much more observation and tabulation of facts to be presented in a worthwhile fashion. Generally speaking, the young are produced alive enclosed in a sac, the so-called ovoviviparous state, in late summer, July to September, depending on the lateness of the season and altitude or range within the state. A large number of young may be produced by a large adult, one in the College of Puget Sound Museum yielding twenty-four young near term when opened.

Remarks.—This is what has previously been referred to as *T. s. concinnus* and constitutes the most wide-spread group within the state. While there are many minor variations within the general color pattern, the main points of color and lateral stripes remain as indisputable facts to corroborate our view. Within such a large geographical range as we have included for this subspecies, there is naturally expected to the minor variations which may be individual or racial.

Some of these differences between individuals of the T. s. tetrataenia which may puzzle the inexperienced observer may be noted. Specimens from the dry desert areas of the eastern part of the state tend to be lighter in color and show fewer variations. Low gastrostege counts are found in the extreme coastal belt and in the Olympic Mountains, in individuals otherwise typical of T. s. tetrataenia. This apparently represents a blending of characters with T. s. trilineata or may be a result of lower temperatures during the incubation period.

Of the out-of-state subspecies, T. s. infernalis approaches T. s. tetrataenia most closely, this being more noticeable in the eastern and southern portions of the state; Fitch has adequately shown the range of this race.

The reason for T. s. tetrataenia being so wide-ranging is at once apparent when one

sees the extreme range of habitat under which it thrives, from arid desert country to the humid coast belt. Most important, however, is the fact that mountain ranges act as no barrier. In many areas of the Canadian life zone, we find this subspecies existing well, and we have taken specimens in the Hudsonian Zone nearly as high as the Arctic-Alpine Zone.

Thamnophis sirtalis trilineata (Cope) Three-striped Garter Snake

Eutaenia sirtalis trilineata, Cope 1892:662, 665.

Thamnophis parietalis pickeringi, Van Denbugh 1897:204.

Eutainia sirtalis pickeringi, Brown: 1903.

Thamnophis sirtalis concinnus, Ruthven 1908:173; Stejneger and Barbour 1917:103; Van Denburgh 1922:795; Owens 1940:169.

Thamnophis sirtalis pickeringi, Brown and Slater 1939:24; Slater and Brown 1941:76; Perkins 1940:53; Fitch 1941:575; Johnson 1942:15; Stejneger and Barbour 1943:173.

Range.—Puget Sound lowland country, west to Grays Harbor, and British Columbia. Type Description.—Eutaenia sirtalis trilineata Cope, Proc. U.S. Nat. Mus. XIV, 1892:662, 665 (lectotype USNM 5275).

Type Locality .- "Fort Townsend, Oregon" (Port Townsend, Washington).

Distribution in Washington.—The lowlands of the Puget Sound country, except in the range of *T. s. pickeringi*, and extending west to Grays Harbor. The status of the coastal *sirtalis* needs further clarification.

COUNTIES .-- CLALLAM: Port Angeles, 23 mi. SE (CPS 4440). GRAYS HAR-BOR: Aberdeen, city reservoir (CPS 4542); Copalis Beach, 9 mi. E (CPS 4465). ISLAND: Whidby Is., N end (CPS 3551). JEFFERSON: Indian Is., 2 mi. N of ferry (CPS 3913); Crocker L. (CPS 4439, 4442-6, 4455, 4460-1a-m, 2-3a-f); Port Townsend (USNM 5275; Seal Rock Park (CPS 3194, 3199). KING: Webb Center, 2 mi. E (CPS 3037); L. Meridian (CPS 6138). KITSAP: Bainbridge Is., Lake (CPS 3352), S end (CPS 3353); Blake Is., E side (CPS 4009); Port Orchard, 4 mi. S (CPS 4268). LEWIS: Randle, 1 mi. SE (CPS 3010). MASON: Allyn, 2 mi. N (CPS 4453), on road toward Gig Harbor (CPS 4696); Shelton, 5 mi. NE (CPS 3343); Stretch Is. (CPS 3346). PACIFIC: Naselle R. (CPS 3458), 1 mi. E R.J. So. Bend Hwy. (CPS 4476); Raymond (CPS 4475). PIERCE: Eatonville, 2 mi. W (CPS 3047-8); Gig Harbor, on road toward Allen (CPS 4595); Glen Cove, Henderson Bay (CPS 3885); Herron Is., N end (CPS 3977); Raft Is. (CPS 4017); Clear Cr., Puyallup Valley (CPS 4494-5). SAN JUAN: Friday Harbor (CPS 3063); Garrison Bay, San Juan Is. (CPS 3374); Thatcher Bay, Blakely Is. (CPS 3375-8). SKAGIT: Guemes Is. (CPS 3072); Fildago Is. Campbell's L. (CPS 3307). SNOHOMISH: Everett, 3 mi. E (CPS 4468); Stickney L. (CPS 4665-7). THURSTON: Deep L. (CPS 4492-3), 1 mi. N (CPS 3875); Mud Bay (CPS 4488). WHATCOM: Sumas, 8 mi. SW (CPS 6126).

Diagnosis.—This snake may be considered as intermediate between *T. s. tetrataenia* and *T. s. pickeringi* in color pattern. It attains a moderately large size. The dorsal and two lateral stripes are dusky yellow, typically not as wide or regular as seen in *T. s. tetrataenia*. The lateral bars may be red or colorless and are typically confined to the intrascutellar skin.

Description (color pattern in living specimens).—The general appearance is dull. The head and ground color are black. The dorsal and lateral lines are dull yellow; the dorsal line is typically less than one and two half scales wide; each lateral line is more often than not regular. The black ground color conceals the dorso-lateral bars that are dull salmon-red or white to dull yellow. The chin is light yellow or greenish, becoming slightly darker posteriorly along the gastrosteges.

Comparisons.—It differs from *T. s. concinnus* in having lateral stripes and in suppression of the lateral bars; it is less dark ventrally and frequently has a narrowing of the dorsal line.

It differs from *T. s. tetrataenia* in having a narrower dorsal stripe, less regular lateral stripes, and suppression or total absence of the dorso-lateral red bars. There is less often red

on the head of trilineata.

It differs from *T. s. pickeringi* in larger size, more yellow in the dorsal and lateral stripes which are typically more regular than *pickeringi*.

Though more work on comparative gastrostege and urostege counts must be done, it appears that *trilineata* averages lower counts than other subspecies. It must be noted, however, that individuals with typical *tetrataenia* color patterns have low counts in the Olympic Mountain area. These may not be genetic, but environmental.

Habits and Habitats.—This subspecies differs not at all from others under consideration in habit and habitat. It is typically found near stagnant water, and is most common in swampy areas.

Rana catesbeiana and Rana aurora have both been found in the gastrointestinal tracts of *T. s. trilineata*. In captivity individuals of this subspecies voraciously ate young Rana and Hyla, but would not touch Gerrhonotus nor young of their own species, even when hungry. One large female specimen lived in the same pen with a large Rana aurora for ten days, during which time she made no attempt to molest it. However, shortly after shedding its skin (July 23, 1946) she readily ate this cell mate, in addition to a three-quarters grown Bufo boreas and several more Rana.

It was generally observed with captive snakes that they would take one or two frogs when hungry, then for a week or so would appear not to desire food. Therefore it cannot be assumed that these snakes are serious predators as single observations of ingestion of multiple victims might seem to indicate.

On September 1, 1945 a specimen was found in Mason County that disgorged a small mouse (species undetermined—probably *Microtus*).

Young are brought forth in late August and September. One specimen (CPS 4455) was killed and opened in late August 11, 1946. There were twenty-one young within, with quite a lot of yolk still present. It is interesting to note that, in these not fully developed specimens, the lateral lines and lateral light bars were more prominent than in young at term showing a late development of the melanistic elements.

Another individual (CPS 4460) gave birth to 13 young (CPS 4461 a-m), all born by 8:00 AM on September 5, 1946 (birth was not observed). All shed their skins by noon, and were lively. During birth the mother regurgitated a partially digested frog (R. aurora) which she had taken two days prior; the head and most of the body were digested. All young were between 185 and 195 mm in total length.

A detailed account follows of a specimen (CPS 4462) which delivered thirty-two (CPS 4463 a-ff) young on September 11, 1946.

Five or six young were born when first observed at 11:45 AM One egg was observed extruded at 12:00 noon. This was preceded by visible enlargements just anterior to the anus, with some writhing of the posterior part of the body and tail. The entire membranecovered young slipped out in a single smooth motion, taking about two to three seconds. Another followed at 12:03, another at 12:05. It was noted that the tail lifts up as the anal plate opens downward. The young were emerging from the membrane in two to twenty minutes. At 12:11 two young were extruded in a single effort, definite squeezing and intermittent motion being observed just over the anterior portion of the prominent bulge.

During these births, the mother was sliding around leisurely, this motion probably aiding in the caudal progression of the young within. Definite segmental peristaltic-like efforts could be seen over the posterior portion of the body, and on occasion the enclosed young could be observed to move caudally three or four inches at a time.

The presenting part was either the head or a loop of the body. The smooth membrane filled with fluid presents a good wedge to facilitate forward motion and expulsion.

Additional young were born at the following times (PM): 12:18, 12:20, 12:27, 12:30, 12:32, 12:35 (two at once), 12:38, 12:39, 12:42, 12:47, 12:50, 12:53, 1:03, 1:10, 1:15. There

was another young born at 2:15, and a count taken at 4:00 PM showed a total of thirty-two for the brood. All were between 200 and 222 mm in total length, except a. (188 mm) and y. (195 mm).

Remarks.—The revival of this subspecies is the result of much field work and genetic studies during the years 1946 and 1947, in trying to establish the relationship of *T. s. tetrataenia* to *T. s. pickeringi*. In doing so, we found that *pickeringi* in its restricted range was a pure breed without any admixture of *tetrataenia*. However, we also found that individuals we had previously referred to as *pickeringi* on the single criterion of absence of red in the lateral bars covered a wide geographic range where specimens referred to as *tetrataenia* occurred only rarely. Examination of broods confirmed our opinions from adult series.

We discovered that in the lowland area around Puget Sound, the *sirtalis* could be separated from series from other regions of the state. The exact status of *tetrataenia* is somewhat confused by finding well-marked individuals, constant in series, in Pacific County (extreme southwest) and Clallam County (extreme northwest), with *trilineata* extending toward Grays Harbor County in the midwest portion. Further extensive series are needed to clarify this situation. It is well known to us that *tetrataenia* extends down from higher elevations in the Cascade and Olympic Mountains and intergrades are frequent in the intervening altitudes. An additional note of interest is that *tetrataenia* is to be found on the Puget Sound Islands.

In checking the color patterns of two large broods (from Lake Leland, Jefferson County, near the type locality of *trilineata*), we found one brood, CPS 4461, contained a total of thirteen young, of which only two had full width dorsal stripes, and nine showed definite redness in the barring. One showed a lack of barring except slightly on the anterior onequarter of the body; the barring was noticable without stretching the skin (that is, it involved scales as well as the skin between) on only two of the young. From the second brood (CPS 4463) thirty-two young were obtained; of these, seventeen showed no redness, fifteen definite redness in the lateral barring; only two have a full width dorsal stripe. It must be mentioned that a series of six or eight adults collected in the same area all showed red in the barring, suggesting that further color changes occur as growth takes place.

Regarding the establishment of the type locality at "Fort Townsend, Oregon", Dr. Doris Cochran has kindly furnished us with the following statement, undated and in Dr. Leonard Stejneger's handwriting:

"trilineata, Eutainea sirtalis Cope 1892. The type material consists of five cotypes as follows (acc. to the original Museum register): No. 5275. Thamnophis - Ft. Townsend -Lieut. White - 2 (Spms.) (entered Feb. 5, 1861) No. 5493. Eutainia - Ft. Benton (W of ?) - Lt. Mullen 8 (Spms) Black (later addition: '1 Philad.' meaning that one specimen has been sent to Acad.) (What became of the missing one specimen is not known). These data under 5493 are dittoed from No. 5492. The original entry seems to have been blank and the ditto marks, ", and several question marks are apparently of a later date. Because of this uncertainty and as Cope's fig. 308 is taken from No. 5275, and because Dr. Cochran's and my own comments give for this specimen 154-1-68 close enough to Cope's 157-1-68 with measurements agreeing exactly with his I have designated it as 'lecto' type (restricto-type?) of trilineata."

Such characteristic thoroughness certainly makes our task more easy and certain.

Hypsiglena ochrorhyncha Cope Spotted Night Snake

Hypsiglena ochrorhynchus, Svihla and Knox 1940:52; Anderson 1940:36; Owen 1940:172; Lewis 1942:129; Johnson 1942:17; Stejneger and Barbour 1943:175; Lewis 1946:157; Pickwell 1947:55.

Range.—Central Washington to Mexico, east to southwestern Texas, Kansas, and Idaho.

Type Description.—As Hypsiglena ochrorhynchus Cope, Proc. Ac. Nat. Sci. Phila., 1860:246.

Type Locality.—Cape Lucas, Lower California.

Distribution in Washington.—Central Washington.

COUNTIES.—GRANT: Beverly, 3 mi. N (CPS 4335); Vantage Ferry [Vantage] (Svihla and Knox 1940:52; Lewis 1942:129).

Description.—A small smooth scaled snake much resembling a young Pituophis. The ground color above and below is yellowish white. Dorsal blotches are present, as well as two to four lateral series of dark brown spots. There is a sprinkling of dark dots dorsally to give an ashy appearance to the ground color. The pupil of the eye is vertical. The anal plate is divided.

Comparison with scale counts of *Pituophis* will be helpful in description and differentiation.

1. N. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	H. ochrorhyncha	P. c. desterticola
Gastrosteges	160-191	211-263
Urosteges	38-66	50 - 69
Dorsal scale rows	21 (23)	29 (27-33)
Superior labials	8 (7-9)	8 (7-10)
Inferior labials	10 (9)	13 (11-14)

Comparisons .--- This is the only snake of this genus to be found in the region of our

Habits and Habitat.—Very little is known concerning this snake's way of living, but it is possibly nocturnal to a large degree, and is usually collected by overturning stones or pieces of wood. It is known to feed on lizards, scorpions, and centipedes (Cowles 1941:4).

The following note was found concerning the egg of this species (Lewis, T. H., unpublished notes 1947). "Peculiar egg found in cage Aug. 14, 1941 (three adults from Vantage Ferry, June, 1941). This egg had slightly wrinkled, cream-colored, leathery shell. After incubating for three days in damp sawdust, blood was visible through shell. A few days later the contents coagulated. 37.4 mm length. Greatest diameter 9.5 mm."

Recent observations (Cowles 1941:4-6 and Lewis 1946:157) indicate that this species is venomous. Lewis found that *Uta stansburiana stansburiana* was apparently affected by a toxin after being bitten. The mechanism shown by detailed reports of Lewis indicate that there may be a similarity between the hypothetical venom of *Hypsiglena* and that of *Micrurus*, the coral snake. Individuals of both genera use a chewing motion that in *Micrurus* is known to allow the rear fangs to come into play and insert their very deadly toxins into the victim. Also the symptoms exhibited by the lizards would be those produced by a primary neurotoxic venom. Another point of similarity is the fact that *Micrurus* is known to feed on lizards, aided by the action of its venom, as *Hypsiglena* apparently does. Apparently the Lyre snake (*Trimorphodon*) of southwestern U.S. has a similar toxin and mode of injection.

study.

Crotalus viridis oreganus (Holbrook) Pacific Rattlesnake

Crotalus lucifer, Cooper 1860:295; Yarrow 1883:76.

Crotalus confluentes lucifer, Cope 1900:1179.

Crotalus oregonus, Dice 1916:301-302, 307-308; Stejneger and Barbour 1917:110; Blanchard 1921:6.

Crotalus oreganus, Van Denburgh 1922:936; Stejneger and Barbour 1923:125.

Crotalus confluentus oregonus, Stejneger and Barbour 1933:134; Svihla and Svihla 1933:128; Slevin 1934:42; Klauber 1936:11; Ditmars 1937:107.

Crotalus viridis oreganus, Klauber 1936:243; Stejneger and Barbour 1939:153; Perkins 1940:23; Owens 1940:172; Johnson 1942:17; Stejneger and Barbour 1943:191; Pickwell 1947:60.

Range.—From lower California to British Columbia and eastward to Idaho and Arizona.

Type Description.—As Crotalus oregonus Holbrook, N. Amer. Herpet., Ed. 1. Vol. 4, 1860:115, pl. 29.

Type Locality .- Columbia River.

Distribution in Washington .- East of Cascade Mountains.

COUNTIES.-ADAMS: Marcellus (CPS 3487). ASOTIN: Grande Ronde R. (USNM 62526). BENTON: White Bluffs (WSC 165,169); Kennewick, 9 mi. NW (CPS 4056); no place given (CPS 3983). CHELAN: Congdon Camp, Up-Lake, Chelan (CPS 3190, 3239-40), 3 mi. N (MVZ 37211); Wenatchee (SDSNH 1880, 1887, 1896, 1899, 21572); Chelan (USNM 44381); Entiat (USNM 61590, 61625); Leavenworth (MVZ 3710). DOU-GLAS: Moses Coulee (CPS 3386). FERRY: Republic, 15 mi. S (CPS 6184). FRANKLIN: Pasco, 8 mi. ENE (MVZ 29281); Ringold, 5 mi. N (CPS 4172). GRANT: Moses L., upper end (CPS 3146), lower end (CPS 3147); Coulee City (USNM 61591); Trinidad, 1 mi. N (CPS 4030); Vantage (O:172); Ephrata (O:172); Quincy, 5 mi. W (CPS 4578). KITTITAS: Vantage, 6 mi. S on W side of Columbia R. (CPS 4029), 4 mi. S (CPS 4789). KLICKITAT: Lyle (SDSNH 772); Wishram (CPS 3521); Grand Dalles (USNM 60242-3), 4 mi. N (CPS 3604-6), 3 mi. N (CPS 3622-3), 5 mi. back from Columbia R. in river bed (CPS 3270-6). LINCOLN: Sylvan L., 2 mi. E (CPS 3089); Downs, 5 mi. S (CPS 4055). OKANOGAN: Pateros (CPS 3007-8, SDSNH 4499-4510; O:172; Klauber 1936:11; and many others); Nespelum, 2 mi. S & 11 mi. W (CPS 3541); Omak L. (USNM 63279); War Cr. (O:172); Brewster (0:172). SKAMANIA: no place given (USNM 51875). SPOKANE: Chapman L. (CPS 4671). STEVENS: Springdale (MZ 55159). WALLA WALLA: Ft. Walla Walla (USNM 10914). WHITMAN: Alpowa, 12 mi. W of Lewiston (CPS 4391); Almota and Holein-the-Ground (Svihla 1933:128); Wawawai (MZ 56237), 17 mi. SE (CPS 4392). YAKIMA: Moxie (CPS 3328).

Description.—This is a medium to large sized rattlesnake. The ground color is brown to olive or gray with variable large darker colored dorsal blotches. Ventral coloration is light yellow, and may be clouded with brown. The head is broad and flat, distinct from the body, which is thick and muscular. The fangs are on either side of the upper jaw, enclosed with velum, followed by secondary fangs of smaller size. The tail is short, the rattles placed around the tail in a vertical plane. Gastrosteges vary from 158 to 189, urosteges 14 to 27, undivided. Dorsal scales usually 25, keeled except the most inferior rows. Supralabials are 14 to 16 as a rule, infralabials 15 to 17.

Comparisons.—This is the only rattlesnake to be found in or near the State of Washington.

Habits and Habitat .- This snake is found in the dry portions of the state in a varied

type of terrain, from the wooded mountains to the barren rock slides and open sagebrush land. It is likely to be found near water, especially during hot weather, but this is not the rule, often there being no obvious moisture for miles around a place which is heavily populated with rattlesnakes. They tend to den up during the winter, coming out *en masse* under the warming influence of spring, depending, of course, upon the lateness of the season. Local "dens" are well known in most regions to the residents and one will hear reports of hundreds of snakes being killed in one locality, on a single day. Apparently as they first emerge, the rattlers stay close to their place of hibernation, lolling about the mouths of their retreats during the heat of the day and not coming forth on a cold day. As the season progresses, they will venture away from the places of hibernation, down into cultivated fields or more productive hunting grounds to fatten up before fall chills call those survivors of predators and civilization back to hibernation. In the hottest weather, they become night travellers. During the stage of migration many individuals will be found upon the highways; but between migration phases none will be seen.

The "dens" are seldom found to be true caves, and actually are varied in form—rock slides of basalt formations, fissured buttes or arroyos, with multiple openings only large enough for the reptiles to pass to the depths of sufficient warmth and protection where winter may be passed in safety. We have seen dens at some localities that will produce *Crotalus* in numbers, *Coluber, Pituophis, Eumeces, Sceloporus*, and *Gerrhonotus* as well as being an obvious home of marmots. Rattlesnakes congregate closely during the process of hibernation, as reports from blasting crews which have disturbed winter dens have proven. A characteristic fetid odor can be detected at the opening of inhabited dens.

During the summer, rattlesnakes may be rather inactive during the heat of the day, or may be found in more shady places. Collecting is often more successful in the morning or evening; we have known several times when specimens have been secured in an apparently sterile country just before a rain or when the day has turned cooler following a very hot spell, stimulating something in the reptilian body to make them more active.

The rule is that individuals will retreat to a place of sanctuary whenever disturbed, with or without a warning rattle, as a person draws near. When cornered, some specimens will strike at objects presented them, more notably younger ones, the fiercest being the little one-button individuals. Often, even when in a corner, a rattlesnake will not strike at irritating objects. The strike, when made, is lightning-like, recovery slow, and the distance is never more than one-half the length of the snake. Fangs are independently operated and one may readily observe this by holding the snake by the neck with the mouth open. Fangs may be unilaterally advanced to an optimum position, and likewise the venom may be expulsed independent of the strike. There are more than one pair of fangs hidden by the velum of the upper jaw, so loss of the comparatively unstable primary fangs do not completely disarm the snake. Often in captured specimens we prophylactically remove the longer fangs and milk out the venom, thus removing the more dangerous possibilities when a live specimen must be kept. Securing of specimens is easily and safely performed by using a short stick to pin down the head, then with a gauntlet-gloved hand, the snake is grasped around the neck. A short hold is necessary for, as pointed out above, the action of the fangs and a flexible neck make some care necessary here. As with other snakes, Crotalus viridis oreganus will emit foul smelling secretions from the peri-anal glands to make his presence unsavory to the captor.

Food habits are interesting in that this snake, while not above active hunting and entering burrows of prospects, nevertheless is more of a Mohamet—food comes to it and it strikes out in a sudden, sure motion that is so unlike its clumsy, slow method of propulsion when on the move. Rodents comprise the most stable article of food, for which we should give rattlesnakes full credit. We have regurgitated from one specimen as many as five full grown *Microtus* in varied stages of digestion, obviously the product of a morning's activity. One specimen was found to contain a full grown Merrill's song sparrow, but records of ingestion of avians are rare indeed. Larger snakes will eat larger rodents, as *Citellus* species. Head first is the mode, but not an absolute rule of taking food. The marvelous pliability of the jaws and body and the equally marvelous digestive power produces phenomenal gastronomic capability.

Mating, according to Klauber (1936:205) takes place in the spring, the young being brought forth between August and October near the hibernaculum prior to hibernation. This genus is ovoviviparous. We have found the young individuals at times in large numbers in the localities of the dens in spring, which suggests the possibility that at our more northerly locality young could be born during the hibernation state.
Clemmys marmorata marmorata (Baird & Girard) Pacific Terrapin

Emys marmorata, Baird and Girard 1852:177

Actinemys marmorata, Cooper 1860:292.

Chelopus marmoratus, Yarrow 1883:36.

Clemmys marmorata, Stejneger and Barbour 1917:114; Van Denburgh 1922:976; Stejneger and Barbour 1923:130; Stejneger and Barbour 1933:141; Slevin 1934:37; Storer 1937:67; Slater 1939:32; Stejneger and Barbour 1939:158; Pope 1939:101; Owen 1940:172; Johnson 1942:17; Stejneger and Barbour 1943:197.

Clemmys marmorata marmorata, Seeliger 1945:158; Pickwell 1947:61.

Range .- Pacific slopes from British Columbia to northern California.

Type Description.—As Emys marmorata Baird and Girard, Proc. Acad. Nat. Sci. Phila., 1852:177.

Type Locality.-Puget Sound.

Distribution in Washington.—West of the Cascade Mountains around Puget Sound and a few localities along Columbia River.

COUNTIES.—KING: Meridian L. (CPS 4992); Seattle (V:976). PIERCE: Ft. Lewis Military Reservation, NE corner (CPS 3020, 3621); Sportsmans L. (CPS 4971); Steilacoom (USNM 77); Puget Sound (USNM 88, 7594-6). THURSTON: Long L. (CPS 6300).

Description.—This is a small turtle, drab brown color above and yellow below, irregularly blotched with brown. The head is dark above, yellow with dark markings below. The limbs and tail are irregularly marked with yellow and brown. The carapace is broader posteriorly than anteriorly, its surface is moderately rough due to concentric ridging of the plates; its border is slightly serrated.

Comparisons.—This is the only species found in the region under study, of the genus *Clemmys. Clemmys marmorata* differs from *C. p. belli* in being smaller, having no red in its coloration, having a rougher, serrated carapace. Further differential points are as follows: The suture between the abdominal plates is less than twice the length of the suture between the pectoral plates, the inguinal plates are not wedged in between the abdominal and marginal plates in *C. marmorata*, the reverse being true in *C. p. belli. C. p. belli* is only found east of the Cascade Mountains except in the case of individuals transported over the mountains as pets or down along the Columbia River. *Clemmys marmorata* is found only in the western part of the state.

Habits and Habitat.—Always found in or near water, in ponds, lakes or in slower moving portions of streams. Formerly apparently numerous in western Washington, this species has undergone a retreat from civilization. Many ponds which are reportedly habitats of numerous individuals thirty years ago are sterile or yield only an occasional specimen.

It is omnivorous and can be caught on a baited hook. This species lays eggs being "eliptical with hard, white, limy shells, and measure about 34 by 21 millimeters" (Van Denburgh 1922:977). Reports indicate that the number of eggs per animal is small, probably not more than three or four as a rule, being laid in the summer months of June to August.

A nest consisting of four eggs of this species was found by Mrs. Chambers of Roy, Washington on August 24, 1941. She kept the eggs in earth and opened one on September 10 finding a live embryo. Another egg hatched on September 15, and the young turtle was loaned to us and reared until the end of May 1942. The other eggs were preserved 20 September. One of the authors visited the site of the nest on 25 September and found the skins of previously hatched eggs. From this fact and that one of the eggs collected by Mrs. Chambers was much stained and contents dried, it was concluded that this same nesting site had been used on a previous year by the same or another turtle. Two of the eggs measured 38x22 mm and 37.5x22.5 mm. The young turde which was removed from shell and preserved has a small yolk sac hanging from the center of the plastron. The carapace measures 23x21 mm. The tail from the edge of the carapace to the tip is 19 mm. This characteristic of the long tail in the young of this species was very noticable in the one we reared and fed in the laboratory until it disappeared late in May 1942 (supposedly eaten by a rat).

Evenden (1948:202) states that in the Willamette Valley of Oregon this species has been found as early in the year as February 28 (1948) and as late as November 19 (1942). He reports that they feed intensively on the "pods" of the yellow pond lilly (*Nuphar*). His dates of leaving ponds for egg laying are earlier (late April and early May) than we have noted a few times in the Puget Sound area and in the Klamath region of southern Oregon (June).

Remarks.—Lord reports (1866:301) "I have found them in nearly every lake and pool east and west of the Cascades. They are common on Vancouver Island." He records them from Walla Walla. However, we know that *Chrysentys picta bellii* is a common species with *C. marmorata* unknown this far east in this state so we must discount somewhat John Lord's observation.

This species was considered "lost" by Storer (1937:66), as far as Washington state was concerned in various printed articles, but recent work has led to a report (Slater, 1939:32) describing observations in the Puget Sound area.

In view of remarks by Evenden (1948), a few words must be said concerning the past distribution of this species in western Washington. Dr. James G. Cooper (1860:292) states: "This is common in freshwater ponds and rivers west of the Cascade Mountains. The specimen I preserved was taken when about to deposit its eggs, on the 9th of June. — Found in the ponds about Fort Steilacoom."

In the days of family picnics by street car (circa 1920) out to the lakes south of Tacoma, turtles were common in the area by many reports. This area is now built up and, apparently, turtles no longer exist in these lakes.

It is our experience that searching for turtles is a somewhat specialized type of herpetological collecting, and thus we do not find them except when particularly looking for them. There is no question in our minds that this turtle maintains a precarious existence in a once populous area.

Chrysemys picta bellii (Gray) Western Painted Turtle

Chrysemys bellii, Dice 1916:306, 312.

Chrysemys marginata bellii, Stejneger and Barbour 1917:118; Blanchard 1921:6; Van Denburgh 1922:948; Stejneger and Barbour 1923:134; Slevin 1934:37.

Chrysemys picta bellii, Storer 1932:10; Pope 1939:202.

Chrysemys bellii bellii, Stejneger and Barbour 1933:146; Svihla and Svihla 1933:128; Storer 1937:67; Slater 1939:32; Stejneger and Barbour 1939:162; Owen 1940:172; Johnson

1942:17; Stejneger and Barbour 1943:202; Pickwell 1947:61.

Range.—Western Illinois, southern Wisconsin, Northern Michigan, central Missouri, northwest into Oregon, Washington and British Columbia east of the Cascade Mountains, south west into New Mexico and Texas.

Type Description.—As Emys bellii Gray, Syn. Rept. Griffith's An. Kingd. 1831:31. Type Locality.—America?

Range in Washington.—East of the Cascade Mountains and along the Columbia River to below Vancouver.

COUNTIES.—ADAMS; Dead Man's L., N of Othello (CPS 3488). BENTON: Prosser, 4 mi, W (CPS 4346). CLARK: Vancouver, 1 mi. N (CPS 3250). COLUMBIA: no place given (V:984). FERRY: Round L., E of Twin Lakes. (CPS 4575-6). GRANT: Moses L., S end crossing (CPS 3006); Moses L. (CPS 4085, MVZ 37212-3), lower end (CPS 3155-7). KITTITAS: Ellensburg, 5 mi. NW (CPS 4345). LINCOLN: Irby (USNM 61351); Pacific L., 6 mi. NW of Odessa (CPS 3093-4). OKANOGAN: Johnson's L., 5 mi. N of Nespelum (CPS 3091-2). PEND ORIELLE: Dalkema, 1 mi. NW (CPS 4572-3). SKAMANIA: Bridge of Gods, near, on highway detour (CPS 3402). SPOKANE Medical L., Custiodial Sch. (CPS 3097). STEVENS: Springdale (MZ 55620-1); Colville, 6 mi. E (CPS 3492); Springdale, Cr. near (MZ 55622). WALLA WALLA: Walla Walla, 14.4 mi. W (CPS 3004); Lowden (MVZ 11214); Ft. Walla Walla (USNM 11646); Touchet (USNM 46122); Bolles (WSC 171). WHITMAN: Pullman (Svihla and Svihla 1933:128). YAKIMA: Yakima (WSC 170); Mabton (USNM 45535); Alphata (CPS 4167).

Description.—This is a very colorful, medium-sized turtle. The shell is rounded, smooth, somewhat narrowed, and is dark green dorsally, red beneath with a "large blackish lyriform blotch which is marbled by pale yellow" (Hunter, 1911). The head, limbs and tail are brown marked with yellow and red stripes.

Comparisons.—See under comparisons in discussion of *Clemmys marmorata*. This is the only other species present within the state.

Habits and Habitat.—Found in or near ponds or stagnant waters of streams in the eastern part of the state and down to the western part, following the Columbia River. Occasional specimens are found scattered in the human population centers of the western part of the state as their bright colors lead to their acquisition as pets by tourists. They are very numerous in some of the alkali lakes, for instance as recorded in one of our field notes of May 15, 1937. "Moses Lake, Grant County—about 12-15 specimens caught—very common, seen covering stones in the middle of and at the border of the upper lake, and down near lower end. Those caught were in shallow water, quite lethargic on the bottom in 3-4 inches of water. One was seen taking a piece of rotten fish away from shore. Two found with cracks in shell, posteriorly, at about 4-5 o'clock. Perhaps shot by a .22 rifle. Several quite mossy on bottom, especially posteriorly."

John Keast Lord (1866) gives an interesting field note of an area along the Columbia River near the Walla Walla River, the time being June 21 and July 2. "In the grass surrounding our camp are quantities of the Western Pond Turtle (Actimets marmorata) large, small - tiny little fellows not bigger than a horse bean and stout old males and females; the females are busy depositing their eggs in the hollow places under the wild sage brushes, or amidst tufts of grass; but why the little ones come on land as well, puzzles me. It is next to impossible to catch them in the water, their habit is to come out on the edge of the pond or stream, what they like better is to scramble up on a floating log and enjoy the sunshine as it drifts about. The slightest noise at once sends them hurry, scurry to the bottom. Now I can pick them up easily as I could hedge snails in Devonshire; they do not even attempt to get out of the way."

"The eggs are white, and devoid of shelly covering, the contents being enclosed in a tough membrane, I discover about 15 in each nest, deposited in a heap, very similar to the way our British garden-snail deposits its eggs in holes in the earth. The sun hatches them and I regret that I could not ascertain how long a time the eggs take to hatch by the sun's heat; we had to proceed in our journey, so I was obligated, though reluctantly, to abandon this interesting investigation."

As noted it is very difficult to catch specimens usually, it being almost impossible to approach basking specimens along the sides of the water, without them slipping into the water. Just what causes them to be so easy to secure at certain times and in certain localities is an interesting problem.

They are omnivorous and certainly scavengers, acting beneficially in this capacity.

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DISTRIBUTION OF AMPHIBIANS AND REPTILES IN WASHINGTON STATE

1995

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INTRODUCTION

There is considerable history to the study of the distributions of amphibians and reptiles in Washington. The earliest significant collection and classification of these and other vertebrates accompanied the biological surveys for a railroad route (Suckley and Cooper 1860). Distributional information and knowledge of identification of individual species advanced over time and relatively comprehensive publications were assembled by Slevin (1928) and Van Denburgh (1932). In the late 1930s, scientists at the College of Puget Sound, most notably James R. Slater and Murray L. Johnson, initiated broad collection efforts in an attempt to document the distributions of amphibians and reptiles in the state. Slater's written works are the best early references on the subject (Slater 1955, 1963, 1964). Johnson (1995) summarized considerable information on the distribution and natural history for the reptiles of the state. Slater's summaries included charts depicting species' presence by county. The supporting documentation included a listing of the museum specimens used to compile the charts. Range maps were published in a variety of references, most notably the comprehensive guides of Stebbins (1951, 1954, 1985) and, more recently, a field guide to the amphibians of Washington and Oregon (Leonard et al. 1993). Probably the earliest maps which displayed species' distributions with dots on a Washington State background map were those of Metter (1960), who worked exclusively in eastern Washington. These "dot maps" provided an opportunity for a reader familiar with the geography and physical environment of the state to see correlations between species' distributions and physiographic features. Nussbaum et al. (1983) provided such dot maps for all of Washington, Oregon, Idaho, and British Columbia and derived much of the information from a subset of museum collections that form the historic baseline of data used in this project.

The initial impetus for this work came from a need to study patterns of change in the distributions of amphibians and reptiles. To do this, it was necessary to know, as precisely as possible, the locations where populations were once found so these sites could be visited to determine if populations were still present. The first of such investigations involved *Rana pretiosa* (McAllister and Leonard 1990, 1991, McAllister et al. 1993) and *Plethodon vandykei* (Wilson 1993). A similar survey of historic *Rana pipiens* localities is in progress (Leonard, McAllister, and Andelman, unpubl. data). Museum specimen records have proved to be valuable sources for providing an historical baseline.

THE DATABASE

The Washington State Gap Analysis Project (WAGAP) provided the stimulus for a more ambitious approach to the compilation of distributional data. Gap Analysis seeks to identify gaps in the protection of biological diversity through the use of Geographic Information Systems (GIS) technology and knowledge of the distributions and habitat affinities of all vertebrates and as many invertebrates as possible. With the help of local experts, volunteers, WAGAP staff and the staff of a large number of herpetological collections, a GIS data layer was developed. This database consists of 12,105 records, 9,614 from herpetological collections and 2,491 from other sources.

In building this coverage, the initial emphasis was on museum specimen records. There are several reasons why museum specimen records were well-suited for this compilation. Many of the specimens in these collections were taken over 50 years ago and provide an appropriate baseline of distributional data prior to recent habitat alterations associated with timber harvest, agriculture, and urban development. Additionally, museum specimen records come in batches that have similar attributes such as species designation, collector, date, county, and location. This makes data entry and mapping more efficient. Lastly, specimens are available for inspection if questions arise concerning species identification. A drawback of museum specimen records is the frequent lack of geographic precision. It is standard practice for locations to be described in numbers of miles in a compass direction from a town or city. It is seldom clear whether the description is based on a straight line map distance or an odometer measurement of road miles. For cities of large geographic extent, precision is further reduced.

Washington records were requested from over 100 museums. Thirty-four collections with Washington specimens agreed to provide their records for our use and two, the University of Michigan Museum of Zoology and the National Museum of Natural History, provided data on disk rather than hard copy. Other collections that supplied data were the American Museum of Natural History; Auburn University; Brigham Young University; California Academy of Sciences; Florida Museum of Natural History; Field Museum of Natural History; Fort Worth Museum of Science and Industry; University of Illinois at Urbana-Champaign; Illinois Natural History Survey; Los Angeles County Museum; Louisiana State University, Harvard's Museum of Comparative Zoology; Michigan State University; Museum of Vertebrate Zoology at University of California, Berkeley; North Carolina Museum of Natural History; New Mexico State University; Pacific Lutheran University; Slater Museum of Natural History at University of Puget Sound; Southern Illinois University; Stecker Museum at Baylor University; Texas A&M University; Tulane University; University of Colorado; University of Missouri at Columbia; University of Idaho; University of Kansas; University of Oklahoma; University of Texas at El Paso; University of Washington Burke Museum; Walla Walla College; Washington State University; and Yale University.

A database derived from museum specimen records tends to be dominated by information dated prior to 1960. Some of these older records are indicative of localities where a species no longer occurs. Recent surveys for *Rana pretiosa* suggest that the species is extirpated from much of western Washington (McAllister et al. 1993). Similarly, *Rana pipiens* may now be restricted to the Crab Creek drainage near Moses Lake (Leonard, McAllister, and Andelman, unpubl. data). *Clemmys marmorata* is effectively extirpated from the southern Puget Sound region. Animals found in this region during the past decade are believed to be either remnants of native populations or escapees from captivity (possibly turtles brought in from outside Washington). Occurrence of *Rana cascadae* at four locations near sea level on the Olympic Peninsula is documented by numerous specimens collected prior to 1920. There is no recent evidence of this species at these lower elevations.

Much of the recent (post-1960) distributional data used in this monograph was not found in museum records or published material. These data were based on sight records recorded by trained biologists. Such data were carefully reviewed with consideration of the experience of the observer. Corroborating photographs were reviewed in many instances. If there was

inadequate information to judge the validity of a record significantly outside a species' known range, the record was not used. There are vast quantities of unpublished data and it takes considerable effort to compile even a small proportion of what exists. It is usually very timeconsuming to process these kinds of data because of the wide variety of ways in which they are recorded.

The database benefitted from the ongoing database development of the Wildlife Survey Data Management section of the Washington Department of Fish and Wildlife (WDFW) which has been collecting and digitizing distributional records for Species of Special Concern for 15 years. However, the WDFW effort had not utilized some sources of information and was confined to Species of Special Concern records from 1930 to the present.

Additional wildlife inventory data can only be found in unpublished reports. This is true for significant survey data for Plethodon larselli (Larsen and Schaub 1982, Larsen and Herrington 1983, Wash. Dept. Wildlife 1993) and Plethodon vandykei (Wilson 1993). Distributional data for pond-breeding amphibians and a few other species can be found within reports on surveys for Rana pretiosa, and Rana pipiens (McAllister and Leonard 1990, 1991, 1993; Leonard, McAllister, and Andelman in prep.). Reptile occurrences can be found in Folliard and Larsen (1991) and Swanson and Owen (1993). Broad geographic area inventories for reptiles and amphibians are sometimes maintained as agency databases, such as the Naches Ranger District database initiated by Colin Leingang. In other instances, these data exist as both unpublished reports and digital databases, such as the data from inventories in Mount Rainier National Park (Pigeon et al. 1991, 1992). Surveys on the Cle Elum Ranger District were summarized by Darda and Kelley (1992). Data for selected lakes and ponds in the North Cascades were extracted from a report on research directed at aquatic communities in lakes with and without planted fish (Liss et al. 1991) and from a study of amphibians and acid neutralizing capabilities of high mountain lakes (Rowe-Krumdick 1991, Rowe-Krumdick and Matthews 1991). Surveys for Clemmys marmorata have produced numerous records of amphibians and reptiles encountered incidentally (Carey and Bury, 1993; Forrester and Storre, 1992; Nordby, 1992; Stringer, 1992).

THE MAPS

The maps included here display the GIS data in a very simple form. Locations for which voucher specimens (either the preserved animal or photos) are available in one or more museums are represented by solid circles. Sight records are represented by open circles. One of the advantages of a GIS coverage is that maps can be created at any scale. Mapped data can be subsetted by species, date, or other attributes. Other data layers portraying, for example, elevation, precipitation, or vegetative cover types can be used in a variety of ways to enhance the value of distributional data.

Not all species of amphibians and reptiles that might be found in the wild in Washington have been included in this monograph. Sea turtle maps have been omitted because sea turtle occurrence in Washington is usually only detected when they have fallen victim to ill health or death, resulting in strandings on the state's ocean beaches. Occurrences of this kind, while interesting in terms of the species involved, timing, and numbers, are not very meaningful when rendered as dots on a state map. Exotic species have been excluded except where there is evidence of at least one established breeding population that has persisted for sufficient time to indicate that it has become a long-term part of the Washington fauna. This is certainly the case for *Rana catesbeiana*, *Rana clamitans*, and *Trachemys scripta*. *Chelydra serpentina*

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may qualify for inclusion, however, there is only one definite record of breeding in the state, a female from Lake Washington that laid over 60 fertile eggs (F. Slavens, Curator of Reptiles, Woodland Park Zoo, pers. comm.). All other records are of single individuals. A wide variety of other escapees, mainly turtles, have turned up in the wild. As with *Chelydra serpentina*, there is currently insufficient information to establish which, if any, of these species are now established in functioning, reproducing populations.

Some museum collection records, attributed to Washington State, have been omitted. The most prominent are records from the mid to late-1800s. For these old collections, locational descriptions were often too imprecise to be useful. In other instances, errors in location or species identification seemed likely. The U.S. National Museum in Washington D.C. holds many of the earliest collections for Washington. Within this museum's catalog are numerous records from "Puget Sound," "Fort Steilacoom" and "Fort Walla Walla." Records from Puget Sound were too imprecise to map and some of the species ascribed to Puget Sound have not, since the time of these collections, been verified to occur in western Washington. These include Rana sylvatica, Taricha torosa, Pituophis catenifer, and Sceloporus undulatus. Unlike "Puget Sound," it is possible to map Fort Steilacoom and Fort Walla Walla with accuracy. However, it is not clear whether specimens ascribed to these localities were always collected nearby. For instance, species ascribed to Fort Steilacoom which have not been subsequently found in the region include Phrynosoma douglassii, Pituophis catenifer, and Lampropeltis getulus. Interestingly, George Suckley indicated that Pituophis catenifer was "found sparingly at Puget Sound" (Suckley and Cooper 1860). Though no specimens are recorded at the U.S. National Museum, Suckley also indicated that Sceloporus graciosus was found at Steilacoom. From Fort Walla Walla, specimens of Phrynosoma platyrhinos were recorded. This species has not been found in the region since. Because all of the aforementioned species lack subsequent verification of occurrence in the region, they were not included in the distribution maps. Contia tenuis and Coluber constrictor specimens from Fort Steilacoom were also deposited in the U.S. National Museum and these records were included in the maps because both species were subsequently collected in the Puget Sound region. However, over 40 years have passed since either species has been verified to occur there.

For marginal records or distant outliers, it is reasonable to question whether single individuals should be used as evidence of a species' range. For some, occurrence in an area may be the result of human transport. For example, *Sceloporus occidentalis* is known to be native to many Puget Sound beach areas, but at Chuckanut Beach in Whatcom County the species is known to have been introduced. Turtles, both native and exotic, seem to have been commonly introduced to new areas via one means or another. Of course, record keeping errors and species identification errors account for some outlying records. Lastly, occurrence of a species in a particular geographic location could be anomolous. For example, streams might carry animals into areas where they may not survive or reproduce. A very large river, such as the Columbia River prior to the construction of dams, had the potential to carry animals long distances from their natural range. These are some of the considerations important to interpreting distribution data.

A select few distant outliers were omitted from the maps. A single *Clemmys marmorata* in the University of Illinois Urbana-Champaign collection was listed as captured on San Juan Island. There is no evidence of a population of this species on any islands in Washington and San Juan Island is well north of the species' known native range. For these reasons, the locality was not included on the map for the species. Also omitted were two localities based on specimens of *Ambystoma tigrinum* from Mount Rainier National Park in Pierce County. A specimen in the Museum of Vertebrate Zoology (University of California, Berkeley) was

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reportedly collected by C. H. Lavers on 31 August 1938 and was used by Robert C. Stebbins for an illustration included in *Amphibians of Western North America* (Stebbins 1951). The other specimen is in the University of Washington Burke Museum collection. Sharing the jar with the adult *Ambystoma tigrinum* are one *Dicamptodon tenebrosus* and one *Ambystoma macrodactylum*. A label, floating freely with the three specimens, reads "Indian Henry's Hunting Ground, July 15, 1932." Mount Rainier National Park is so far outside the known geographic range and Washington habitat type for *Ambystoma tigrinum* that these records were omitted.

NOTES ON NOMENCLATURE AND DISTRIBUTION

Nomenclature in this monograph follows Collins (1990) with a few exceptions. The revisions of *Rhyacotriton* (Good and Wake 1992), and *Rana pretiosa* (Green et al. in press) are followed here. *Scaphiopus* is used here rather than *Spea* based on a recommendation by Robert C. Stebbins. Lastly, *Hyla regilla* was chosen over *Pseudacris regilla* because of the unresolved questions concerning the systematics of this species (Cocroft 1994).

Nomenclature associated with museum specimens often requires some interpretation. Often, nomenclature in museum catalogs has not been updated since the original collection entries were made. For species groups with significant recent revisions, problems abound. This is the case for species of the family Ranidae, with Rana cascadae, described by Slater (1939), often listed by museums as Rana pretiosa. The museum specimens of the genus Dicamptodon have similar errors, largely because of the relatively recent revisions by Nussbaum (1970) and Good (1989). Dicamptodon copei and Dicamptodon tenebrosus are frequently listed by the museums as Dicamptodon ensatus. Now that Rhyacotriton has been subdivided into four species (three of which occur in Washington), there will undoubtedly be similar problems with updating nomenclature. These taxonomic revisions are often based on samples from areas representing much of the taxon's range. However, the exact geographic borders for newly described species can be a matter of speculation and many museum specimens may be difficult to assign to a newly named taxon based on collection locality alone. The recent tendency for taxonomic revisions to be based on genetic analysis rather than morphology makes species assignment based solely on geographic origin a near necessity. Even if there were funds available to evaluate the genetic characteristics of museum specimens, many specimens may not be suitable for such analyses due to the effects of preservation in formalin.

The distribution of amphibians and reptiles in Washington are incompletely known. For some species, there will no doubt be considerable range extensions. Patty Garvey-Darda's discovery of *Plethodon larselli* northeast of Snoqualmie Pass in Kittitas County during 1994 qualifies as one of the more significant in recent years. Also in 1994, Susan Piper found *Contia tenuis* near Leavenworth in Chelan County. This secretive and nondescript snake will likely be discovered at other new locations. Hopefully, these maps will help stimulate interest in conducting surveys in under-studied regions. One thing is certain, these maps will quickly become out-of-date. They are, after all, a reflection of current knowledge and there is much left to learn.



Tiger Salamander (Ambystoma tigrinum)



Northwestern Salamander (Ambystoma gracile)



Long-toed Salamander (Ambystoma macrodactylum)



Cope's Giant Salamander (Dicamptodon copei)

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Pacific Giant Salamander (Dicamptodon tenebrosus)



Cascade Torrent Salamander (Rhyacotriton cascadae)



Columbia Torrent Salamander (Rhyacotriton kezeri)



Olympic Torrent Salamander (Rhyacotriton olympicus)



Roughskin Newt (Taricha granulosa)



Dunn's Salamander (Plethodon dunni)



Larch Mountain Salamander (Plethodon larselli)



Van Dyke's Salamander (Plethodon vandykei)

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Western Redback Salamander (Plethodon vehiculum)



Ensatina (Ensatina eschscholtzii)



Tailed Frog (Ascaphus truei)



Great Basin Spadefoot (Scaphiopus intermontanus)



Western Toad (Bufo boreas)



Woodhouse's Toad (Bufo woodhousii)



Pacific Treefrog (Hyla regilla)



Red-legged Frog (Rana aurora)



Cascades Frog (Rana cascadae)



Spotted Frog (Rana pretiosa, Species A)1

¹Taxonomic revision from Green et al. (in press)



Spotted Frog (Rana pretiosa, Species B)1



Northern Leopard Frog (Rana pipiens)

'Taxonomic revision from Green et al. (in press)



Bullfrog² (Rana catesbeiana)



Green Frog² (Rana clamitans)

²Species introduced to State of Washington

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Pond Slider² (Trachemys scripta)



Western Pond Turtle (Clemmys marmorata)

²Species introduced to State of Washington



Painted Turtle (Chrysemys picta)



Northern Alligator Lizard (Elgaria coerulea)



Southern Alligator Lizard (Elgaria multicarinata)



Short-horned Lizard (Phrynosoma douglassii)



Sagebrush Lizard (Sceloporus graciosus)



Western Fence Lizard (Sceloporus occidentalis)



Side-blotched Lizard (Uta stansburiana)



Western Skink (Eumeces skiltonianus)



Rubber Boa (Charina bottae)



Racer (Coluber constrictor)



Sharptail Snake (Contia tenuis)



Ringneck Snake (Diadophis punctatus)

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Night Snake (Hypsiglena torquata)



California Mountain Kingsnake (Lampropeltis zonata)
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Striped Whipsnake (Masticophis taeniatus)



Gopher Snake (Pituophis catenifer)



Western Terrestrial Garter Snake (Thamnophis elegans)



Northwestern Garter Snake (Thamnophis ordinoides)



Common Garter Snake (Thamnophis sirtalis)



Western Rattlesnake (Crotalus viridis)

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