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NOTES ON REPTILES AND AMPHIBIANS FROM ARIZONA

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ARIZONA, especially the southern part, has long been an attractive place to the herpetologist. The isolated mountain ranges, providing mesic conditions, surrounded by hot deserts offer a variety of habitats for amphibians and reptiles. Stejneger (1902), Ruthven (1907), Van Denburgh and Slevin (1913), Campbell (1934), Gloyd (1937), Kauffeld (1943), Woodin (1953), and others have greatly increased our knowledge of the herpetofauna. Nevertheless, there remain many puzzling problems, which concern not only the uncommon species but even those that are represented by large numbers on museum shelves.

In 1950 two parties from the University of Michigan Museum of Zoology engaged in field work in Arizona. Drs. Robert R. Miller and Howard E. Winn worked there from March 21 to June 1. Although primarily engaged in collecting fish, they assembled over 500 herpetological specimens. Albert Schwartz, Raymond Porter, and I spent the month of July in the southern tier of counties. The abundant rainfall afforded an excellent opportunity to study amphibians and reptiles, and over 400 specimens were obtained.

The following account of species is not a complete record of all specimens collected. Only those that represent the less common species, extend known ranges, add to the knowledge of variation, or aid in clarification of intraspecific relationships are recorded. All specimens are in the University of Michigan Museum of Zoology (UMMZ).

I wish to thank Robert R. Miller for the use of his field books and photographs; Charles F. Walker, Howard K. Gloyd, and Charles H. Lowe, Jr., for reading the manuscript and offering helpful suggestions; and Albert Schwartz and Raymond Porter for their valuable and stimulating companionship in the field.

ACCOUNT OF SPECIES

Ambystoma tigrinum subsp.

Miller and Winn collected 35 larvae from a clear pool in Big Bug Creek above Mayer, Yavapi County, on May 31. The largest individual has a total length of 90 mm. and a body length of 52 mm. Corresponding measurements for the smallest specimen are 32 mm. and 18 mm. Dorsally, the caudal fin extends anteriorly to the posterior edge of the head; ventrally, to the vent. The ground color (in alcohol) is light brown above. Upon this are small, irregular blotches of dark brown, the blotches becoming more numerous and larger on the tail. The ventral surface is cream. The specimens more closely resemble the northern race, *nebulosum*, than *velasci*, the one on the Mexican Plateau. The fact that these larvae were in a stream may be significant of the role of water courses in the distribution and dispersal of salamanders in arid regions.

Scaphiopus bombifrons Cope

On the night of July 4, 1950, a considerable number of specimens of *S. bombifrons* were found in chorus in an extensive flooded flat 14 miles south of Willcox, Cochise County. Many *Scaphiopus couchi*, *S. hammondi*, and a few *Bufo cognatus* were also calling there. *S. bombifrons* has not been thought to be a member of the herpetofauna of Arizona, because it has been confused with *S. hammondi*, but it is probably common and well distributed in the eastern Plains area (Gloyd, 1937: 96), the western border of which is the southwestern terminus of its range. Shannon (1953: 127) reported this species from three localities in southern Arizona.

Scaphiopus couchi Baird

Although abundant in the eastern part of the state, records for *S. couchi* from the Arizona upland desert and, especially, from the lower Colorado Desert are few. Two specimens were taken in Pima County between 25 and 26.5 miles north of Sonoyta, Sonora, on the road to Ajo on July 17 and 19.

Bufo debilis insidiosus Girard

One specimen was obtained near Pearce, Cochise County, on July 3. It is a male with a snout-vent length of 43.5 mm. and shows no trend toward the western race, *retiformis*. When found it was with a large chorus of *Bufo cognatus* on a flooded mesquite flat at night after a

heavy afternoon rain. The species has been reported previously from a few localities in southeastern Arizona.

Bufo microscaphus microscaphus Cope

Six specimens from Burro Creek, on the Mojave-Yavapai county line, and 17 from the canyon of the Agua Fria River near Rock Springs, Yavapai County, are typical of the race. The six from Burro Creek are subadult, 32 to 50 mm. in snout-vent length. They are dusty gray dorsally and have no middorsal light stripe and no black mottling on the posterior surface of the thigh. The 17 from Rock Springs include both transforming and juvenile specimens. All lack the middorsal light stripe, ventral spotting, and reticulations on the posterior surface of the thigh. Thirteen have a light interorbital bar and 14 have light patches in the sacral region. The ventral surfaces are milky white, the feet are cream. All 17 have, below the eye, a vertical white bar, bordered on either side by a dark-brown bar. In six individuals the dorsum is light gray, with scattered chocolate-brown spots; in the other 11 it is a darker gray and the brown spots are not so prominent. The warts, especially in the paratoid region, are reddish. No crests are discernible. Measurements for the smallest individual in which the tail is completely absorbed are: snout-vent length, 16.7 mm.; tibia length, 5.8 mm.; foot length, 6.4 mm.; head length, 5.5 mm.; head width, 5.2 mm. One, with a snout-vent length of 14.2 mm., still retained a tail 13.3 mm. long.

A series of 35 toads from the Santa Clara River, 6.5 miles below Gunlock, Washington County, Utah, also belong to this species. The only two adults have pale, very diffuse middorsal stripes; one has a light interorbital bar and light sacral blotches.

Bufo woodhousei woodhousei Girard

Of four specimens, two are from the Verde River at the mouth of Beaver Creek above Camp Verde and two are from West Clear Creek, 6 miles southeast of Camp Verde, Yavapai County. Three have spotted venters, black throats and distinct middorsal stripes. One of the West Clear Creek specimens (UMMZ 105730) has no ventral markings and only a faint middorsal line, a variation not uncommon in the species. All four are adults with mottled thighs.

Hyla arenicolor Cope

A specimen from Trout Creek, Hubbard Ranch, Mojave County, is from the western edge of the range for the species in Arizona. It was

found on April 8 among granite boulders about 50 feet from the creek. The dorsal ground color is light gray upon which are scattered black reticulations. It is a gravid female, 42 mm. in snout-vent length. A large female (UMMZ 105687) from Grant Creek, north of Grant, Graham County, measured 52.5 mm. in snout-vent length.

Rana catesbeiana Shaw

An adult female, 103 mm. in snout-vent length, and 23 tadpoles were taken from spring-fed ditches on the San Bernardino Ranch, 18 miles east of Douglas, Cochise County. The adult is dark brownish-black above with brown reticulations on the throat and under surfaces of the hind limbs. The largest tadpole has a total length of 140 mm. and a snout-vent length of 52 mm. The 22 smaller tadpoles average 65 mm. in total length and 25 mm. in body length.

Rana pipiens Schreber

Nearly 100 specimens of this common frog were collected throughout southern and western Arizona. Wright and Wright (1949) pointed out the remarkable variation of this species in southern Arizona. Several large specimens from Santa Cruz and Cochise counties are very dark. The dorsum is dark brown, with barely distinguishable black spots; the transverse limb bands are incomplete and narrower than the interspaces. The venter is brownish or grayish, darker under the thighs and throat than on the belly. The posterior surface of the thighs is black, the pustules tipped with cream. There are large pustules dorsally and smaller but more numerous ones laterally. The lips are mottled with black and cream. One specimen (UMMZ 105702), 125 mm. in snout-vent length, is black above with no visible dorsal pattern, except on the hind limbs. Under surfaces of the throat and hind limbs are dark gray. Juveniles and small adults are not so dark and have a more distinct pattern. The juveniles may have a dorsal ground color varying from light tan to chocolate brown above with darker brown spots, and a cream-colored venter. Small adults are typically chocolate brown above with darker brown spots; the venter is cream as in juveniles, but dusky markings are present on the throat and thighs. Specimens that fit the above description come from several localities in southeastern Arizona. For the most part they were collected from springs and streams in the Santa Rita and Chiricahua mountains at the following localities: *Cochise Co.*, near Turkey Creek Ranger Station, UMMZ 105673 (8), 105702; San Pedro River at Fairbank, 105772; mouth of Joaquin and Bear creeks, 105749; 18 miles

east of Douglas, 105783. *Pima Co.*, Arivaca Creek at Arivaca, 105744. *Santa Cruz Co.*, Shehe Springs, 6 miles NE of Lochiel, 105695-6 (14); Peck Canyon, 105662 (6); Sycamore Canyon, 105683 (10).

No large specimens from the western part of the state are available. The smaller ones obtained appear to be much lighter in dorsal ground color than those from southeastern Arizona, some having a light gray dorsum. Specimens that fit this description are from: *Mojave Co.*, Trout Creek, Hubbard Ranch, UMMZ 105671 (5), 105701 (3); Burro Creek at Yavapai county line, 105716. *Yuma Co.*, Williams River, 30 miles NE of Bouse, 105706 (3), 105790 (5).

Small and intermediate-sized individuals from Yavapai and Gila counties were bright orange to yellow on the under surface of the thighs. This condition was not observed in any from the southeastern or western part of the state.

Large black individuals not unlike those from southeastern Arizona live on the Florida Keys. They differ more strikingly from the populations on the adjacent mainland than do those in Arizona from one another. This ontogenetic change in the color of *Rana pipiens* in southeastern Arizona, from a more or less "typical" pattern to dark brown or even black, suggests that the coloration may be an expression of the environmental conditions. Whether or not there is an embryological predisposition for this ontogenetic change must await testing by laboratory experimentation.

Wright and Wright (1949: 516) suggested that the large, dark "*Rana pipiens*" from southeastern Arizona may be related to *Rana montezumae* Baird of the southern half of the Mexican Plateau. The Mexican species is similar in general body proportions, but it does not show the extreme pustulate condition possessed by the Arizona *R. pipiens*. There are minor color differences between the two. The subarticular tubercles are quite different: those of *R. montezumae* are minute and round, whereas those of *R. pipiens* are comparatively large and elliptical, which indicates that the former is the more aquatic species. The absence of any *R. montezumae*-like frogs on the northern part of the Mexican Plateau (Chihuahua, Durango, Sonora) does not necessarily invalidate the Wrights' suggestion that the Arizona frogs and *R. montezumae* are related. Climatic conditions of the northern part of the plateau were formerly more equable than at present and the now disjunct ranges may well have been continuous or contiguous. The structural characters, especially the subarticular tubercles, however, ally the Arizona frogs more closely to *Rana pipiens* (*sensu auctorum*) than to *R. montezumae*.

Rana tarahumare Boulenger

This species appears to be much less abundant than *R. pipiens* in the canyons along the Arizona-Mexico border. Three subadults and eight tadpoles were collected in Sycamore Canyon, 1/2 mile southwest of Yank Springs, Santa Cruz County, on April 16. One large tadpole, 88 mm. in total length and 32 mm. in body length, showed no trace of limb buds.

Holbrookia maculata thermophila Barbour

This lizard was taken in Sycamore and Peck canyons, Santa Cruz County. The individuals collected so closely resembled *H. m. pulchra* Schmidt that additional specimens were studied in an attempt to define the two subspecies if they exist in southern Arizona. One hundred thirty-nine specimens from Cochise and Santa Cruz counties, Arizona and from Sonora, México, were examined for variation in the following characters: number of femoral pores, distinctness of dorsal dark spots, and presence of lateral and dorsal white flecks. The results are given in Table I. In addition, the specimens from the Huachuca Mountains and from Guaymas, Sonora, were compared in respect to head scutellation, but no distinctive difference between the two series was noted. The type locality of *Holbrookia m. pulchra* Schmidt is Carr Canyon, Huachuca Mountains, Cochise County; that of *Holbrookia m. thermophila* Barbour is San José de Guaymas, Sonora. There appears to be a northeast-southwest cline in the number of femoral pores, with the count lowest in the Huachuca Mountains and highest at Guaymas. To distinguish two forms on the basis of color pattern is impossible. Presence of white flecks on the sides and dorsum, which tend to obscure the dorsal spots, is supposedly characteristic of *Holbrookia m. thermophila*, but this is the condition in most specimens. Since Barbour's description is the earlier (May 6, 1921), his name *thermophila* has priority over *H. m. pulchra* Schmidt (date of publication, December 1, 1921). In the light of the evidence obtained, it seems necessary to relegate *Holbrookia maculata pulchra* Schmidt to the synonymy of *Holbrookia maculata thermophila* Barbour, a race ranging from southern Santa Cruz and western Cochise counties, Arizona, southward and westward to southern Sonora.

Specimens from the San Pedro Valley to the east of the Huachuca Mountains have much shorter tails than *H. m. thermophila* and are considered members of the race *approximans*. An account of the re-

TABLE I
Variation in Femoral Pore Count and Color Pattern of Five Series of *Holbrookia maculata*
from Arizona and Mexico

Locality	Specimens	Femoral Pores	Dorsal Dark Spots			White Flecks		
			Distinct	Indistinct	Absent	Absent	Lateral	Dorsal
Arizona Huachuca Mts. Cochise Co.	16	11.13 (9 - 14)	69.0%	25.0%	6.0%	44.0%	31.0%	25.0%
Ruby, Santa Cruz Co.	52	11.67 (9 - 15)	61.5	27.0	11.5	35.0	46.0	19.0
Mexico Pilares, Sonora	8	11.40 (9 - 13)	62.5	25.0	12.5	12.5	37.5	50.0
Hermosillo, Sonora	54	12.70 (10-16)	74.0	20.0	6.0	20.0	52.0	28.0
Guaymas, Sonora	9	12.90 (10-16)	67.0	33.0	0.0	11.0	67.0	22.0

relationships of *H. m. thermophila* to *H. m. approximans* to the north and east and to *H. m. elegans* to the south in Sinaloa is beyond the scope of this discussion.

Specimens examined were from the following localities: ARIZONA: Cochise Co., Huachuca Mts., UMMZ 56048-56050, 70678 (3); Fort Huachuca, 76853 (2), 92075; Carr Peak, 71041, 71042 (2); Carr Canyon, 69784, 69786; Montezuma Canyon, 69785; Miller Canyon, 72617. Santa Cruz Co., Ruby, 91588 (19), 91601 (8), 91602 (9), 91603 (6); Peck Canyon, 105664 (7); Sycamore Canyon, 105656-7, 105686. SONORA: Guaymas, 53025, 72106 (2), 72107; 2 mi. S. of Guaymas, 72105 (4); San José de Guaymas, 107611 (paratype of *H. thermophila*, formerly No. 14284 in the Museum of Comparative Zoology); 5 mi. SE of Hermosillo, 72108 (6), 72109 (4); 15 mi. SE of Hermosillo, 72110 (19), 72111 (25); Pilares, 78357-64.

Holbrookia texana scitula Peters

Ten from the Hubbard Ranch, Trout Creek, Mojave County, and one from the Aquarius Cliffs (Pl. I, Fig. 1), Mojave County, extend the known range of this species slightly to the west.

Callisaurus draconoides ventralis Hallowell

Two were collected in San Simon Valley, Cochise County, approximately 1 mile west of the Arizona-New Mexico state line. Specimens were recently taken in this area by C. M. Bogert and C. H. Lowe, Jr. in the San Simon Valley of Cochise County, Arizona, and in Hidalgo County, New Mexico. These localities are cited by Lowe (1955: 344) in a discussion of the eastern limit of the Sonoran Desert in the United States.

Sceloporus undulatus tristichus Cope

Twenty from the Aquarius Cliffs, Mojave County, extend the range of this subspecies slightly to the west.

Sceloporus undulatus virgatus Smith

Four were collected near Turkey Creek Ranger Station in Cochise County.

Uta ornata linearis Baird

Fifty-two from Cochise, Greenlee, Pima, and Santa Cruz counties support the evidence given by Murray (1953) that *U. o. chiricahuae* Mittleman is an unrecognizable race. Several specimens from the vicinity of the type locality of *chiricahuae* have characters typical of *linearis*.

Phrynosoma cornutum Harlan

One from 4 miles east of Pearce, Cochise County, near the western limit of the range of this species.

Phrynosoma douglassi hernandesi Girard

This subspecies was collected at Yank Springs, Sycamore Canyon, Santa Cruz County, 26 miles south of Seligman, at Big Bug Creek above Mayer in Yavapai County, and at Fort Apache in Navajo County.

Phrynosoma platyrhinos calidarum Cope

One from 17 miles north of Ajo, Pima County, on the eastern edge of the range of the subspecies in Arizona.

Cnemidophorus sacki stictogrammus Burger

Specimens were collected in mesic environments in the canyons of the Huachuca, Chiricahua, and Santa Rita mountains. Four adults from 11 miles west of Willcox, Cochise County, lack the light spots in the dark fields between the dorsal light stripes that are characteristic.

Cnemidophorus sacki xanthonotus Duellman and Lowe

This represents a relict western race of *C. sacki* that is known only from the Ajo and Puerto Blanco mountains (Duellman and Lowe, 1953: 5) and the Dripping Springs Mountains, where a specimen was recently collected by H. K. Gloyd. All localities are in Organ Pipe Cactus National Monument, Pima County, Arizona.

Cnemidophorus tigris aethiops Cope

According to Burger (1950) the race of *Cnemidophorus tigris* that occurs throughout southern Arizona is *gracilis*, the type locality of which is Yuma, Yuma County, Arizona. Burger did not recognize as distinct the strikingly different race east of the lower Colorado Desert. The specimens from the Tucson area west to Ajo, Pima County, have jet-black chests. Formerly, this population was assigned to *aethiops* Cope, described from Hermosillo, Sonora, which Burger (1950) restricts to the population in southern Sonora.

Specimens from southern Arizona have a black ventral color similar to those in the vicinity of Hermosillo. They should, therefore, be considered members of the race *aethiops*, the range of which extends from southern Sonora to southeastern Arizona. Although specimens from

the lower Colorado Desert do not have the black ventral coloration, intermediate specimens with black-bordered ventral scales occur in the area where the lower Colorado Desert meets the Arizona upland desert. More material is needed from southwestern New Mexico, in order to delimit the range of the subspecies in the east.

Most workers have used the name *aethiops* for this black-bellied race of *Cnemidophorus tigris*. Cope (1863: 104), however, described *Cnemidophorus melanostethus* as having a black thorax. He gave the locality as the "Region of the Colorado of California," and the single specimen was collected by H. B. Möllhausen of the Ive's Expedition. Since the Ive's Expedition did not enter the area in which the black-bellied *Cnemidophorus* occurs, the specimen may be mislabeled, or it may be an unusual variant. Under the circumstances it seems best to continue to apply the name *aethiops* and to regard *melanostethus* as a *nomen dubium*.

Salvadora hexalepis hexalepis Cope

One from Aravaipa Creek, Graham County, has 193 ventrals, 72+ caudals, upper labials 9-9 (6 in orbit), lower labials 11-10, loreal divided, and the lateral stripe on the third and fourth scale rows. The top of the head is yellowish tan.

Salvadora hexalepis deserticola Schmidt

A specimen from the San Bernardino Ranch, 18 miles east of Douglas, Cochise County, is typical of this race, with 184 ventrals, 78 caudals, upper labials 9-9 (5 and 6 in orbit), lower labials 10-10, and loreal single. The lateral dark stripe is centered primarily on the fourth scale row but extends slightly onto the third. The top of the head is gray.

Phyllorhynchus browni browni Stejneger

A female was found crossing the road to Ajo, Pima County, 8.5 miles north of Sonoyta, Sonora. It has 175 ventrals, 21 caudals, 13 dark bands on the body and 2 on the tail.

Lampropeltis getulus subsp.

Two juveniles, one from 2.5 miles east of Pearce, and the other from 4 miles northeast of Chiricahua, Cochise County, have 36 and 31 body blotches, respectively. The blotches extend ventrally to the third dorsal scale row. The interspaces are bright yellow. One adult with 27 black body blotches that extend onto the ventrals is from 5.5 miles

southeast of Ajo, Pima County. These three specimens have the characters of the race *yumensis*. An adult specimen from 4 miles north of Sahuarita, Pima County, has 59 dorsal black bands that extend laterally only to the seventh dorsal scale row. The interspaces are bright yellow. This specimen is characteristic of the race *splendida*. Another individual from 5 miles north-northwest of Pearce, Cochise County, has 36 dorsal body bands extending ventrally to the fifth dorsal scale row. It combines the color-pattern characters of both *yumensis* and *splendida*, resembling the former in the low number of bands and the latter in their involvement of dorsal scale rows. At the present time it is impossible to delimit the ranges of the two subspecies in southern Arizona.

Rhinocheilus lecontei lecontei Baird and Girard

One from 2.4 miles north of Willcox, Cochise County, and another from 16.8 miles north of Sonoyta, Sonora, on the road to Ajo, Pima County, have 31 and 25 body blotches and 10 and 10 tail blotches, respectively. The specimen from Pima County shows a tendency towards *clarus* in having nearly unmarked interspaces laterally.

Rhinocheilus lecontei clarus Klauber

Two specimens were collected, one from the mouth of Miller Canyon, Huachuca Mountains, Cochise County, and the other from 5 miles west-northwest of Winkleman, Pinal County. Individuals referable to *lecontei* and to *clarus* have been taken in the San Pedro Valley to the east of the Huachuca Mountains (Woodin, 1953: 290).

Ficimia cana Cope

One specimen was found at night crossing a dirt road 3 miles west of the park headquarters, Chiricahua National Monument, Cochise County (Pl. I, Fig. 2). It is a male with a total length of 298 mm. and a tail length of 44 mm. There are 30 body blotches and 9 on the tail, 133 ventrals, 32 caudals, 7-7 upper labials, 7-6 lower labials. The gyrations of the body and the popping sound from the partly extruded cloaca were observed as reported by Taylor (1931: 4) and Woodin (1953: 291).

Thamnophis angustirostris Kennicott

Although Van Denburgh and Slevin (1913: 422) reported specimens of this species from Oak Creek, Coconino County, and Van Denburgh (1922: 858) recorded one from Tonto Creek, Gila County,

Arizona, Schmidt (1953: 167) gave the range of this snake in the United States as southeastern Arizona and southwestern New Mexico. A juvenile collected by Miller and Winn at the mouth of the East Fork of the White River near Fort Apache, Navajo County, provides another locality near the northern edge of the range of the species. This specimen (UMMZ 105650) has 176 ventrals, 81 caudals, and a creased anal plate. The dorsum is light brown with six longitudinal rows of alternating blackish or dark-brown spots. A male (UMMZ 84429) from Oak Creek Canyon, Coconino County, has 170 ventrals, 80 caudals, and a divided anal.

Thamnophis cyrtopsis cyrtopsis Kennicott

Several specimens collected in the western part of the state provide an extension of the known range of this species as defined by Milstead (1953). Four were taken in Yavapai County from Ash Creek, 5 miles east of Dewey (1), Agua Fria River at Rock Springs (2), and Walnut Creek on the Prescott-Seligman road (1). Two others are from Cave Creek, 5 miles north of the town of Cave Creek, Maricopa County, and the North Fork of Alamo Canyon, Ajo Mountains, Pima County. Hensley (1950: 284) also reported the species from Alamo Canyon. These records indicate that the species may be rather abundant in canyons and along water courses in the west-central part of the state and in mesic habitats of isolated mountain ranges in the southwestern part.

Thamnophis marcianus nigrolateris Brown

Four were collected on a rainy night in July. They were on the road between Chiricahua and Apache, Cochise County.

Kinosternon sonoriense Le Conte

Ten were collected: *Cochise Co.*, near Turkey Creek Ranger Station, UMMZ 105675. *Gila Co.*, Salt River, 41 miles NNE of Globe, 105791; San Carlos River, N of San Carlos, 105821; Spring Creek, 10 miles W of Young, 105756. *Graham Co.*, Bonita Creek, NE of Safford, 105792; 6 mi. S of Safford, 105765, 105793. *Santa Cruz Co.*, Ruby, 107480. *Yavapai Co.*, Sycamore Creek E of Dugas, 105822; Verde River above Camp Verde, 105823.

Trionyx ferox emoryi Agassiz

A young individual with a carapace length of 92 mm. was collected in the San Pedro River about a mile above its confluence with the Gila River, Pinal County.

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 PLATE I

FIG. 1. Aquarius Cliffs west of Francis Creek, Mojave County, Arizona. On the tableland *Sceloporus undulatus tristichus*, *Holbrookia texana scitula*, *Crotaphytus collaris baileyi*, and *Uta stansburiana stejnegeri* were found. Photograph by Robert R. Miller.

FIG. 2. *Ficimia cana*, an adult male from Chiricahua National Monument, Cochise County, Arizona.

PLATE I



FIG. 1



FIG. 2

