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REPORT ON A COLLECTION OF REPTILES AND
AMPHIBIANS MADE IN ARIZONA DURING
THE SUMMER OF 1933

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DURING the months of July and August, 1933, my wife and I made a general vertebrate collection in Santa Cruz County, southern Arizona, in the vicinity of Peña Blanca Springs, and also in Miller Canyon, Huachuca Mountains, and in the region of the town of Patagonia. Some specimens were taken as we travelled between these points, and a few were given to us by ranchers.

The first of these localities is in the broken country to the west of the Santa Cruz Valley, about seven miles west of Nogales and three miles north of the international boundary. The elevation is nearly 4000 feet. Three canyons, two of which are rather small, empty into a large, open wash in which is situated Peña Blanca Springs. The water flow is small but constant and has been diverted into a 20' x 20' x 5' tank serving as a reservoir for a cattle trough. There is a slight overflow the year around. A mile or so below the spring, the canyon again "boxes" up. On the United States War Department maps, the name of this spring and canyon is erroneously given as *Piño Blanco*.

The reptile-amphibian collection has been deposited in the Museum of Zoology, University of Michigan (Nos. 75707-815, 75855). An annotated list of the species collected, with the exception of the lizards, follows.

Scaphiopus hammondi Baird

Peña Blanca Springs, 14, July 6-11, Aug. 2.

Spadefoots, probably the predominant frogs in the Peña Blanca region, came out every night to forage, after the start of the rainy season, and were easily found with the aid of a flashlight. In collecting them we noted that some, when handled, emitted a strong odor like that of roast peanuts, in others the odor, though present, was faint. We could not correlate this with age or sex. A specimen, which later escaped, was collected near the Sonoita River several miles south of Patagonia. It emitted the same strong odor.

We did not hear any spadefoot choruses before leaving the area on August 10. On July 20 we found one male croaking in a *Hyla arenicolor* chorus up the canyon from the spring. It was sprawled on the surface of a large pool adjoining the stream. We heard two individuals croaking down the canyon late in the night, on July 26.

While we often found *Bufo punctatus* under rocks during the daytime, we never found any spadefoots there. They probably retreat into burrows.

Bufo alvarius Girard

Peña Blanca Springs, 2, July 5 and 28.

It had been a surprise to collect two specimens near Peña Blanca Springs, August 31, 1931, on a previous trip, for this toad has been considered rather restricted to the low hot valleys. The specimens were found in deep grass just at dark, and were hard to catch, since they can progress with surprising speed for a *Bufo*. When handled, their parotoid glands became slippery with secretion, but no effect of the poison was noticed by the persons handling them.

Three adults, one of which subsequently escaped, were col-

lected at Peña Blanca in 1933; no signs of breeding were found.

Bufo debilis Girard

Miller Canyon, Huachuca Mountains, 5, August 11, 20, and 21.

This little *Bufo* has not been reported before as occurring in Arizona. The five specimens listed above were all collected in the canyon bottom, at an altitude of about 5500 feet, in the daytime.

Bufo punctatus Baird and Girard

Peña Blanca Springs, 11, June 29–July 25; Patagonia, 1, August 24.

These toads were found in abundance each night as they hopped about foraging. It is problematical how much protection they derive from their poison glands for on the evening of July 22 we found a garter snake (*Thamnophis eques*) with a full grown *B. punctatus* in its mouth. In the daytime these toads may be found under large rocks where they hollow out small burrows. Occasionally they may be heard croaking from these retreats.

On the evening of July 20 we found them croaking, both in the water and on the sandy banks of the stream in the box canyon above the spring. One pair on a dry rock was seen in applexation. Their call, which is a high trill, is unpleasantly loud at close range.

The eggs of this species, as has been reported before, are not in the usual Bufonid strings, but are unattached to each other. On July 21 the bottoms of the pools were covered with eggs, some of which floated to the surface where they collected in masses. Those which we brought into camp began to hatch in 36 hours.

On August 26 we returned to the canyon and found newly metamorphosed toads of this species so abundant that it was difficult to avoid stepping on them. They were hopping about in midday on the hot sand and gravel of the canyon bottom.

Hyla arenicolor Cope

Adults: Peña Blanca Springs, 40, July 5-25.

Eggs and larvae: Peña Blanca Springs, July 20-22; Walker Canyon, August 8; Patagonia, August 25.

This species is very abundant in the rocky canyons in the Peña Blanca area. Though seen at the reservoir in 1931, in 1933 no specimens were found there. On the evening of July 5, while hunting in the gravelly canyon bottom, we found one hopping on the ground. Several more were collected later, after the rains had begun. A chorus from the rocky canyon above the spring proved to be of *Bufo punctatus* and *Hyla arenicolor*; some of the tree frogs were sitting in the stream, the rest were in little potholes in the big boulders along the stream. Eggs and larvae were found in some of the potholes in the rocks, although none of them held more than a quart of water. It appeared that a large percentage of the eggs must be laid in these pools; whether there is much chance for the survival of the eggs so laid we could not determine. Some larvae of fair size were found later, but most of the potholes dried up before the time for metamorphosis came. The normal torrential rains, however, were absent that summer. Had they occurred, many of the larvae would have been washed into the stream. Certainly the bulk of the eggs must be laid in the stream proper, for at the end of the summer astonishing numbers of the tadpoles filled the stream. The heavy rains usually occurring in the summer fill the canyons with water, the velocity of the stream is greatly increased, and large quantities of gravel and silt are carried along so that the water is quite opaque. How the tadpoles survive such rough treatment is a problem; some light may be shed on it by the fact that the grown larvae are often seen feeding on the rocks in the small cascades along the stream where the velocity of the water is great. Not only can the tadpoles swim in such a current, but they are apparently able to cling to the rocks by means of their mouths.

The breeding habits of this tree frog are little known, and we were fortunate in having good opportunities of watching

their courtship. On July 20, at the top of a boulder four or five feet high, there was a small pool of water no more than six inches across. Here a male was singing and had attracted two females. It was late at night, and although we flashed our light on them they seemed not to mind. The male gave the regular call, a low "r-r-r-r." One of the females answered in the same style but in a much higher pitch. In reply the male, instead of the regular croak, swelled out his voice pouch as usual but called "too-eet, too-eet" in a very low pitch. This attracted the females and they went into the water. When they neared him the male leaped towards them and clasped one of them. The female tried to escape and a struggle took place. While we watched, the females always managed to get away. The male did not follow them more than an inch from the pool. They started hopping away but as soon as the male began to croak (the regular call again), they stopped and slowly approached. As they neared they answered in high voices, he again called "too-eet, too-eet," and the whole performance was repeated. The females seemed coy, and we had to leave before the outcome could be determined. Certainly considerable time was consumed in an apparently aimless courtship. On the evening of August 1 the same type of courtship was observed in a large pool. This time it was quickly brought to a close as the female left the vicinity of the pool after escaping from the embrace of the male.

The eggs from this locality tally well with those which I have observed in canyons of the San Gabriel Mountains of Los Angeles County, California. In the large pools they were attached singly to the weeds and brush or to the stones on the bottom; some floated on the surface, probably broken off from their attachments. In the very small potholes in the rocks, the eggs were in large clumps.

On August 26, we returned to this canyon and were amazed to find that the stream was literally full of the tadpoles. They were beginning to hatch, and several newly metamorphosed young were taken.

On two occasions adults of this species were found foraging in the daytime in exposed and dry situations; one was about fifteen feet from the stream, the other nearly a hundred yards away. Two were found clinging to the surface of an enormous boulder near the stream bed, where they matched the prevailing brown color of the rock very well. All of the others we saw were grey, not brown; my wife picked one up in the daytime which was greenish, but it turned grey in a few seconds after she had picked it up.

An adult *Hyla arenicolor* was removed from the stomach of a garter snake (*Thamnophis eques*).

Hyla eximia Baird

One and one-half miles northwest of Miller Peak, Huachuca Mountains, 1, August 16.

This specimen was taken at 10 A. M. on the very summit of Huachuca Crest, at the head of Miller Canyon, at an elevation of about 8500 feet. The day was warm and sunny, and the grass was dry. The tree frog was brilliant green, matching well the knee-deep grass and composites in which it was found. There was no water in the vicinity.

Gastrophryne olivacea (Hallowell)

Adults: Peña Blanca Springs, 15, July 11 and 20.

Larvae: Peña Blanca Springs, August 2.

After one of the first heavy rains of the season at Peña Blanca Springs, we heard strange noises coming from a boggy spot at the overflow of the reservoir. We stalked the source with a flashlight and were surprised to find narrow-mouth toads, which have been reported but once (Sonora, Mexico¹) west of Texas. They were squatting in the half inch or so of water between the hillocks of grass, and calling at approximately twelve-second intervals, mostly in unison. One was heard from a pool down the canyon but was not collected.

¹ Morrow J. Allen, "Report on a Collection of Amphibians and Reptiles from Sonora, Mexico, with the Description of a New Lizard," *Occ. Pap. Mus. Zool., Univ. Mich.*, 259, 1933: 3.

On the evening of July 20, we went up the canyon to investigate a chorus of *Hyla arenicolor* which we had heard for several nights. A number of *Gastrophryne* were found in the pools, croaking. Curiously enough, they seemed to be limited to the pools at the bases of trees; possibly they remained among the roots in the daytime. Several pairs were found in ap-plexation, both in the pools and just out of the water. The males have round blackish voice pouches which swell, in croaking, to the size of a small marble. Some males were sprawled out on the water after the manner of *Scaphiopus*, but most of them were standing upright in the water next to the roots of trees or near the bases of large rocks, with their heads emerging. These toads were heard in a small pool in a gully near the top of the canyon wall on the evening of July 22. About seven miles east and somewhat north of Patagonia, at a little station named Vaughan, I heard them croaking on the evening of August 23.

We found no eggs of this species, but collected the larvae from the canyon pools at Peña Blanca Springs.

Rana pipiens Schreber

Adults: Peña Blanca Springs, 10, June 29, July 18; Miller Canyon, Huachuca Mountains, 1, August 12.

Larvae: Peña Blanca Springs, June 30.

Grass frogs outnumbered the *Rana tarahumaræ* in the Peña Blanca area. They were also more widely distributed and, after the rainy season had begun, were seen up and down the stream, even far up the very small tributaries. The habit of foraging takes them far afield; how they find their way back to the water holes is problematical, but before the rains started we found them concentrated in numbers about the few small pools in which water stood the year round. At one permanent pool about a mile north of the springs, we found fifty or more of these frogs sitting at the very edge of the water. They seemed never to stray away until the grass had started to grow.

There were large larvae in the pools when we arrived late in June, and in a short time we saw them metamorphosing. A certain amount of adaptation to this area is shown in the fact that the larvae metamorphose just at the beginning of the rainy season. The very young frogs were found in the grass, outnumbering their elders. Though we heard them in chorus on one cloudy afternoon, no eggs or other signs of breeding could be discovered.

The species was seen in the valley to the east of Peña Blanca Springs in the Nogales Creek, and along the Sonoita River several miles south of Patagonia.

The specimen collected in Miller Canyon was foraging near the stream in the vicinity of the 6000 foot contour.

Rana tarahumaræ Boulenger

Adults: Peña Blanca Springs, 6, June 20, July 22, August 26.

Larvae: Peña Blanca Springs, June 30.

This frog, upon which I have reported previously,² seems to be of rather common occurrence in the permanent water holes of the region, though it is not as abundant as *Rana pipiens*. *R. tarahumaræ* is more dependent upon the water supply than is *pipiens*, and does not stray far from the streams. Before the rainy season began we found a number of specimens under a very big rock at the edge of a large, permanent pool; they had retreated far out of sight under the edge of the rock; when poked with a stick they came out with a squawk and leaped into the water. Others at the same pool were in niches in a perpendicular rock wall, within one jump of the water. A few were found at the reservoir at Peña Blanca; they came out of the water at night and sat on the concrete edge until the sunlight reached them the next morning.

There were large larvae in the cattle trough into which the reservoir drained. Later in the season, August 20, we found several half grown specimens in the stream in the canyon

² *Copeia*, 3, 1931: 164.

above Peña Blanca Springs, where the water was not permanent. These tree frogs resembled *Rana boylei* in their habit of stationing themselves in the midst of the riffles of the stream. We did not hear them croak, nor did we find any eggs, hence it is probable that they breed during the spring.

Diadophis regalis arizonae Blanchard

An eight-inch ring-neck snake was removed from the stomach of a juvenile *Otus asio cinereceus*. Because of the poor condition of the specimen it was not preserved.

Rhinocheilus lecontei Baird and Girard

Sonoita, 1, August 24.

This snake was found dead on a gravelled highway several miles east of the town; it had been run over during the night. The surrounding terrain was open grassland.

Hypsiglena ochrorhynchus Cope

Peña Blanca Springs, 1, July 6.

This specimen was caught at 9 P. M. as it crossed a sandy place in the canyon bottom.

Thamnophis eques (Reuss)

Peña Blanca Springs, 9, July 6–August 2; Miller Canyon, Huachuca Mountains, 1, August 19.

This is by far the most abundant snake in the Peña Blanca area. It is not limited to the vicinity of water but in the rainy season, at least, may be found almost anywhere. One was found with a *Bufo punctatus* in its mouth; dissection revealed a *Hyla arenicolor* in its gut.

Oxybelis microphthalmus Barbour and Amaral

Peña Blanca Springs, 1, July 24.

According to the residents, these snakes are not uncommonly seen in the Peña Blanca area. Our specimen was brought to us by a rancher who found it on the top of a ridge. As he rode up on horseback, the snake became alarmed and climbed an adjacent oak tree with astonishing rapidity. It is a female

with four eggs in the oviduct, the largest measuring 5.5 cm. in length. On the right side of the head the eighth and ninth upper labials are fused, otherwise the scutellation is normal; the ventrals number 201, the subcaudals 166.

Trimorphodon lyrophanes (Cope)

Peña Blanca Springs, 1, August 1; Patagonia, 1, August 17.

The specimen from Peña Blanca was found trying to enter our tent about 11:30 P. M. I sat down with it in my lap to examine it. While I was doing so it vibrated its tail very rapidly against my trouser leg, making rather a loud noise.

The Patagonia specimen was found dead in the road several miles southeast of the town. We picked it up about 7 P. M. and found that it had probably been dead for several hours. There had been light showers in the vicinity that afternoon.

Crotalus lepidus (Kennicott)

Miller Canyon, Huachuca Mountains, 3, August 11 and 15.

The first two specimens of this diminutive species, a male and a female, were found under a stone near the trail at about 6500 feet elevation. They did not appear to be mating. The female had a large *Sceloporus jarrovi* in its stomach, and the remains of another one nearly completely digested. The third specimen was collected early in the forenoon at an elevation of about 7000 feet. It also had a *Sceloporus* in its stomach.

Kinosternon sonoriense Le Conte

Peña Blanca Springs, 2 (1 represented by the carapace only), July 6 and 11.

This turtle is abundant in Peña Blanca Canyon. In the dry season it congregates in the permanent water holes, but when the first rain starts the stream it spreads along the canyon. One was seen in the Sonoita River below Patagonia.

Terrapene ornata (Agassiz)

Nogales, 1, August 17.

This specimen was found crossing the road in the Santa Cruz Valley a short distance east of Nogales.

