# REMARKS ON THE COAHUILAN BOX TURTLE, TERRAPENE COAHUILA (TESTUDINES, EMYDIDAE)<sup>1</sup>

## ROBERT G. WEBB, WENDELL L. MINCKLEY,<sup>2</sup> AND JAMES E. CRADDOCK

Department of Biological Sciences, Texas Western College, El Paso, and Department of Biology, University of Louisville, Louisville

ABSTRACT. Recent field work and collections of Coahuilan box turtles, *Terrapene coahuila*, provide data on the natural history of the species, which is confined to the intermontane basin of Cuatro Ciénegas, central Coahuila, México. Some descriptive comments and the first photographs of the species are included. Box turtles are omnivorous and aquatic to semiaquatic in streams, ponds, and marshes; most turtles were obtained in marshes. The geographic range of *T. coahuila*, as determined by the extent of aquatic habitats, probably covers 300 square miles.

## INTRODUCTION

Published information concerning *Terrapene coahuila* has been scanty since the original description by Schmidt and Owens (1944: 101–103). Our observations, which contribute principally to a knowledge of habitats and the geographic range of the species, were made in five visits to the basin of Cuatro Ciénegas (three by Minckley and others, 3–11 September 1958, 16–23 August 1960, and 4–12 April 1961, and two by Webb and associates, 26 July to 2 August 1959, and 17 August 1962).

Terrapene coahuila is known to occur only in the intermontane basin of Cuatro Ciénegas, central Coahuila, México. A general discussion of the topography and habitats of the basin were given by Gilmore (1947: 148–150). The climatic climax is an arid plain dominated by mesquite (*Prosopis*), creosote bush (*Larrea*), and various cacti, but permanent water in ponds, marshes, and streams supports mesic habitats. The floor of the basin is mostly a surface layer of travertine or marl that is 2 to 8 feet in thickness and is rarely covered by more than 2 feet of overburden. The drainage of the basin is into the Río Grande via the Río Salado de los Nadadores. The major stream in the basin is called the Río Mesquites; it flows eastward to exit from the northeast end of the basin through a canal. The Río Mesquites was referred to as the Río Chiquito and the Río Colorado by Legler (1960) and Webb and Legler (1960). Those names, however, refer

<sup>&</sup>lt;sup>1</sup>Contribution No. 61 (New Series) from the Department of Biology, University of Louisville, Louisville, Kentucky.

 $<sup>^2</sup>$  Minckley's present address—Department of Zoology, Arizona State University, Tempe, Arizona.

to different watercourses, the Puente Chiquito, and the Puente Colorado.

Most ponds, springs, streams, and other sites in the basin are locally known by specific names, but only those place-names mentioned in the text are indicated on the map (Fig. 3). Records of occurrence of *Terrapene coahuila* that represent turtles collected by us are plotted on the distribution map and are represented by live turtles or by one or more specimens deposited in the following institutions: Museum of Natural History, University of Kansas; The Museum, Michigan State University (MSU); Museum of Zoology, University of Michigan; Museum of Zoology, University of Utah (UU).

# ACKNOWLEDGMENTS

We are grateful to John M. Legler and Robert B. Wimmer, who accompanied Minckley in 1958 (all were then of the University of Kansas); to John M. Legler, University of Utah, who provided information based on observations of captive turtles; to J. Keever Greer, Michigan State University, who accompanied Webb in 1959; to Donald R. Tindall and Charles B. Stone, University of Louisville, who accompanied Minckley and Craddock in 1960; to Carl L. Hubbs, Scripps Institution of Oceanography, and Robert R. Miller, University of Michigan, and their families, and Donald R. Tindall, with whom Minckley visited the basin in 1961; and to William W. Milstead, Donald W. Tinkle, Walter Auffenberg and his son, Louis Irwin, and Donald Patten, who accompanied Webb in 1962. The manuscript was read and criticized by John M. Legler and Robert M. Miller.

Other persons who assisted us by collecting turtles and by providing information on the region are: Daniel Rodríguez Villareál, Julio Arredondo, and Ernesto Solíz, all of Cuatro Ciénegas; Fernando Rodríguez Patiño, Torreón; and Luis Islas, foreman of Rancho Orozco. We are especially indebted to Armándo Borrego Moncáda, Presidente Municiple of Cuatro Ciénegas, for a letter of authorization to collect in the basin and other courtesies, and to José Lugo, Jr., who served as guide on visits to many localities. Webb's and Minckley's expenses in 1959 and 1961 were defrayed by Sigma Xi–RESA research grants; Webb's expenses in 1962 were part of National Science Foundation Grant 19421.

## DESCRIPTION

Terrapene coahuila is known to residents of the basin as "tortuga negra" in allusion to the dark, subdued color; this name is also used, by some, in reference to individuals of *Pseudemys scripta taylori*. Persons most familiar with the fauna recognize *Terrapene* as the "tierra" form, and *Pseudemys* as the "agua" form.

Juveniles of *T. coahuila* have more contrasting patterns on the carapace and head than do adults. The carapace has a fine, yellowish-buff and blackish marbled, or reticulated, or radiating pattern in juveniles. The smallest specimen (UU 3646, plastral length 47 mm) has a pale yellow, postorbital stripe, and the pattern on the carapace is most contrasting on the birth plates (areolae).

As growth proceeds the pattern on the head and carapace is replaced by buff, brown, or dark brown, with obscure-margined pale or dark shadings. Some adult males show remnants of the juvenile pattern (MSU 4103, plastral length 156 mm, Fig. 1, bottom), but it is usually absent on large males and females. The limbs of both sexes are buffyellow, each scale having dark brown-blackish marks; large males seem to have larger dark markings than females. The plastron is usually immaculate pale yellow in both sexes, but is sometimes marked with black laterally and along the sutures. The black plastral markings in the two smallest turtles (UU 3645–46) are less extensive than in some adults.

Males and females are of approximately the same maximal size (plastral lengths of 164 mm in largest male, and 159 mm in largest female). Males seem to have a more conspicuous median notch on the upper jaw. All turtles have four toes on each hind foot.

Terrapene coahuila seems to resemble Terrapene carolina more closely than Terrapene ornata. Milstead (1960: 80) thought that coahuila evolved from remnants of a population of carolina. Williams, Smith, and Chrapliwy (1960: 37) thought that coahuila was primitive in having cloacal bursae (absent in carolina and ornata), and Legler (1960: 81) considered coahuila as the most generalized and primitive of the living box turtles.

## HABITAT

Natural aquatic habitats in the basin of Cuatro Ciénegas are streams, ponds (locally called lagunas or posos), and marshes (also called lagunas). Box turtles were found in all these habitats.

Streams.—A few box turtles were captured in the running-water habitats of canals and streams. Representative is the Río Mesquites, which is 10 to 35 feet wide and up to 6 feet deep, having clear water, a moderate to swift current, and a bottom of soft, marly sediments, marly deposits, and rubble. The stream often enlarges to form coves vegetated by sedges and waterlilies (*Nymphaea*), and sometimes has banks and a bottom of rock; banks are often undercut with large



Fig. 1. Top, unnamed marsh about 1 mile southwest of Anteojo. Box turtles were found in soft mud in thick stands of vegetation on 28 July 1959. Bottom, MSU 4103 ( $\times$   $\frac{5}{3}$ ), adult male from Tío Candido showing remnants of marbled juvenile pattern on carapace and side of head.

grottos. A narrow zone of riparian growth includes bunchgrasses, shrubs, and tamarisk (*Tamarix*). Near its exit (brief description and photograph in Webb, 1962: 554, Pl. 48, Fig. 2) from and just outside the basin (here called the Río Salado de los Nadadores), the bottom consists of sand, gravel, and mostly soft mud, and the riparian vegetation is mostly dense stands of tall reeds (*Phragmites*).

One swimming turtle that seemed to be feeding on overhanging vegetation was caught in the Río Mesquites. Many turtles were found beneath clumps of dirt or marl, or were buried in the soft substrate in the "New Canal" (under construction in summer of 1960 and spring of 1961). John Legler trapped one turtle in a canal having fast-flowing water. A large male that was buried in the soft substrate of another canal was kicked up into flowing water and caught in a seine.

Ponds.--Most ponds resemble Tío Candido, which was described by Webb and Legler (1960: 26) and photographed by Webb (1962: Pl. 49, Fig. 2). The large ponds in the basin seem to result from subsurface solution and subsequent foundering of the basin floor. Hot springs and extensive travertine deposits are associated with many ponds. The small ponds tend to be circular, whereas large ones vary from subcircular to linear to "bean-shaped." Shallow areas, about 2 feet deep, and large, deep, circular holes, some exceeding 20 feet in depth, sometimes occur in the same pond. The bottoms are usually covered by a soft, pale gravish-blue, silty marl, up to 3 feet deep. Often there are large caverns and grottos beneath the banks. Waterlilies and stoneworts (*Chara*) are common aquatic plants. Cattails (*Tupha*) and sedges, as well as different kinds of herbs and shrubs (mint, sunflower, a Liatris-like composite, and Rhus are common), line the edges of the ponds. A grass zone, composed principally of a tall bunchgrass and the halophytic Distichlis, usually surrounds and interdigitates with the herb-shrub zone. Many ponds are tapped by man-made canals or linear, meandering marshes.

At Anteojo a male was found by grubbing in the marl and debris of a dense stand of cattails that fringed the pond (Fig. 2, top). Minckley observed a turtle about 5 PM in the same pond that was floating at the surface with its legs outstretched and its head above water; when startled, it swam rapidly into the base of a clump of cattails; another turtle was obtained here in a submerged trap. Williams, Smith, and Chrapliwy (1960: 37) also obtained one turtle in a submerged trap at Anteojo.

Marshes.—The marshes are often overgrown by thick stands of herbs, cattails, grasses, and sedges, and have soft substrates of mud or marly constituents and sometimes decaying organic matter; a few have black, malodorous water. Most of the marshes are small and isolated, and some dry up in summer, often leaving deposits of salts. The largest marsh observed did not exceed an area of about 500 square yards. Some marshes are linear, resembling shallow stream channels. The depth of water in the marshes usually does not exceed 2 feet.



Fig. 2. Top, Anteojo. Box turtles were obtained in shallow water in soft marl and debris among the stands of cattails fringing the pond on 28 July 1959. Bottom, MSU 4102 ( $\times$  5%), young female from marshy area shown in Fig. 1.

Some marshy places are present in all parts of the basin that have been observed by us.

Most box turtles were collected in marshes. Several individuals were found about 1 mile southwest of Anteojo in an area having scattered, mostly isolated marshes (Fig. 1, top). The turtles were collected by grubbing in soft muddy substrates in open areas, in vegetated places, or at the bottom of a small, malodorous pool, which was almost filled with partially decomposed vegetation. Williams (1960: 102) also collected five turtles in a marshy area at or near this locality.

#### HABITS

*Terrapene coahuila* is aquatic to semiaquatic in the marshes, ponds, and streams. The species was most frequently taken in quiet, shallow water, having soft substrates and stands of vegetation. Turtles were rarely seen in open water; most were collected by hand, and a few were taken in traps. The presence of algae on the shells of some turtles (Legler, in litt.) indicates an essentially aquatic habit.

Behavior.—Box turtles bury themselves in soft mud and were found partly exposed or buried up to a depth of 6 inches. An individual that was placed in soft mud just after capture buried itself in a matter of seconds; after a short period the head was extended above the surface, but rapidly withdrawn below the surface of the mud if the turtle was startled. Two turtles, which were collected from beneath matted debris and silt along the banks of the Puente Chiquito, also buried themselves when placed on mud. Individuals in a large enclosure in a greenhouse at the University of Louisville displayed the same behavior.

Captive turtles in aquaria remained underwater for lengthy periods, sometimes with the eyes shut, but would sometimes bask on wire-mesh supports. Legler (in litt.) found that captives fared as well in deep (10 inches) water with no provision for basking as in shallow (2 inches) water with a basking site provided. Turtles that were crowded in small enclosures rapidly became accustomed to captivity and did not fear handling, but undisturbed turtles reverted to their feral behavior after 2 days in the large greenhouse enclosure.

The remarks in this paragraph were provided by John M. Legler. Mating behavior was observed repeatedly in shallow water as well as at the bottom of a deeper aquarium; once, a female was drowned, presumably because she was held too long underwater by the male, which was able to breathe. Eggs have been laid on the bottom of the aquarium. Movement.—Some charred carapaces suggest terrestrial movements and mortality from fire; burning of grasses is practiced in the basin of Cuatro Ciénegas. Turtles move on land in "runways," which resemble those of small mammals (2–3 inches wide), and can be recognized (with difficulty) by small openings at the landward edges of stands of vegetation. Many turtles were found in shallow depressions in clumps of matted debris at the end of runways, sometimes 50 feet from water (San Marcos). Such depressions seem to correspond to the constructions of *Terrapene carolina carolina* that were termed "forms" by Stickel (1950: 358). In dry periods box turtles remain unnoticed in their aquatic habitats, and movements are probably limited on land by the extent of dense vegetation that is suitable for the maintenance of runways.

Movements overland occur in the rainy seasons (late spring and late summer and fall) when intervening arid regions are wet. At this time some marshes may interconnect ponds and streams, facilitating aquatic dispersal. Many tracks of *Terrapene* were seen in 1958 and 1960 after heavy rains. In 1958, individuals were foraging overland near the Puente Colorado in daylight after a heavy rain. However, in 1961, although rains had occurred shortly before the period of field work, no tracks of turtles or foraging turtles were seen. The absence of turtles may have resulted from the relatively low temperatures at that time, when the temperature at night rarely exceeded 50°F. In the greenhouse enclosure, activity of turtles was markedly reduced at 60°F, and they seemed torpid at temperatures below 50°F.

On 30 July 1959 at sunrise, a male was found foraging about 30 yards from the pond Tío Candido. The suggested crepuscular movements were substantiated by observations of captive turtles at Louisville where turtles moved most often at dawn and dusk. Captive individuals also move in daylight, but could not be induced to move, even by offering food, in darkness.

Food and feeding behavior.—Judging from the kinds of food eaten, Terrapene coahuila is omnivorous and a scavenger. Live box turtles defecated large amounts of rhomboidal seeds. Captives ate various fruits (apples, peaches, and grapes), lettuce, cabbage, raw hamburger, prepared dog and cat foods, and various cooked meat scraps (lean and fat). June beetles, grasshoppers, crickets, and roaches were taken from the surface of the water. Recently killed fishes and ranid frogs were also eaten. Williams (1960: 102) also recorded fish in the diet of captives. After feeding on relatively dry foods, the turtles tended to drink copiously. Turtles kept in sacks for transportation also drank copiously when placed in water every 3 to 6 days.

Food was taken from a dry surface or from the bottom of a waterfilled aquarium. Box turtles that were fed meat until offerings were refused showed marked hunger in 4 to 5 days as evidenced by snapping at, and following, a finger around the edge of a glass aquarium. An individual having food in its mouth excited others to pursue and snap in an attempt to obtain the morsel. Minckley observed that recent captives, or turtles that were relatively isolated from human activity in the large greenhouse enclosure and fed only twice a week, showed a stereotyped approach behavior to food. The turtle first approached food with the head held high and the gular region moving rapidly, then dropped the head and pressed the nose against the food. The head was then withdrawn to a distance of 1 to 15 mm. For 10 to 60 seconds, the head, with continued movement of the gular region, was moved from side to side in a short arc. The food was then taken with an upward, forward, and then downward movement of the head. This behavior seems to correspond to the "dirolent" type defined by Eglis (1962: 4) and was absent in turtles that were fed daily and handled to any great extent, or placed in a small cage or aquarium.

# **GEOGRAPHIC DISTRIBUTION**

The Coahuilan box turtle probably occurs throughout most of the basin of Cuatro Ciénegas, having a distributional pattern that is determined by the extent of aquatic habitats. On the west side of the Sierra de San Marcos the southernmost records of the species are at San Marcos. East of that uplift, turtles have been taken at Tío Candido, but probably range south to Santa Tecla, where the "tortuga negra" was said to occur. No turtles were seen at that locality, although the area was examined thoroughly one afternoon in 1961. Aquatic habitats along the eastern edge of the basin are separated from the more western waters by a low sill that may be a barrier to Terrapene. The canalization of the Río Mesquites may afford a means of dispersal of the species to the east out of the basin, and suitable habitats for T. coahuila seem to occur there. Just north of Cuatro Ciénegas a small stream called the Río Cañon (Cañon del Agua) flows southward through a narrow canvon for about 6 miles, and this riparian area is said to be inhabited by the "tierra" form of "tortuga negra." On the basis of the known extent of mesic habitats in the basin, we estimate the geographical range of T. coahuila to cover approximately 300 square miles.

The Coahuilan box turtle seems rather abundant in the basin, but its proclivity for concealment and burrowing in the densely vegetated



Fig. 3. Sketch map of basin of Cuatro Ciénegas, showing localities where box turtles were observed or collected (solid circles). Dotted lines indicates canals and arrows indicate direction of flow of water. Numbers correspond to the following place-names mentioned in the text:

- 1. Cuatro Ciénegas
- 2. Río Cañon (Cañon del Agua)
- 3. Anteojo
- 4. Puente Chiquito
- 5. Río Mesquites
- 6. Puente Colorado

- 7. "New Canal"
- 8. Río Salado de los Nadadores
- 9. Tío Candido (Rancho Orozco)
- 10. Santa Tecla
- 11. Sierra de San Marcos
- 12. San Marcos

areas of the marshes and large ponds causes it to remain unnoticed on casual observation. Prolonged and intensive collecting, as well as deterioration of habitat through the construction of irrigation canals and agrarian development, could endanger the species because of the isolation of some habitats.

## LITERATURE CITED

EGLIS, A. 1962. Tortoise behavior: a taxonomic adjunct. Herpetologica 18(1): 1-8.

GILMORE, R. M. 1947. Report on a collection of mammal bones from archelogic cave-sites in Coahuila, Mexico. J. Mamm. 28(2): 147-165.

LEGLER, J. M. 1960. A new subspecies of slider turtle (*Pseudemys scripta*) form Coahuila, Mexico. Univ. Kansas Publ. Mus. Nat. Hist. 13(3): 73-84.

MILSTEAD, W. W. 1960. Relict species of the Chihuahuan Desert. South-western Nat. 5(2): 75-88.

SCHMIDT, K. P., and D. W. OWENS. 1944. Amphibians and reptiles of northern Coahuila, Mexico. Zool. Ser. Field Mus. Nat. Hist. 29(6): 95-115.

STICKEL, L. F. 1950. Populations and home range relationships of the box turtle, *Terrapene c. carolina* (Linnaeus). Ecol. Monogr. 20: 351-378.

WEBB, R. G. 1962. North American Recent soft-shelled turtles (family Trionychidae). Univ. Kansas Publ. Mus. Nat. Hist. 13(10): 429-611.

WEBB, R. G., and J. M. LEGLER. 1960. A new softshell turtle (genus *Trionyx*) from Coahuila, Mexico. Univ. Kansas Sci. Bull. 40(2): 21-30.

WILLIAMS, K. L. 1960. Captive boxturtles, *Terrapene coahuila*. Herpetologica 16(2): 102.

WILLIAMS, K. L., H. M. SMITH, and P. S. CHRAPLIWY. 1960. Turtles and lizards from northerm Mexico. Trans. Ill. St. Acad. Sci. 53(1-2): 36-45.

http://www.jstor.org

# LINKED CITATIONS - Page 1 of 1 -



You have printed the following article:

Remarks on the Coahuilan Box Turtle, Terrapene coahuila (Testudines, Emydidae) Robert G. Webb; Wendell L. Minckley; James E. Craddock *The Southwestern Naturalist*, Vol. 8, No. 2. (Jul. 31, 1963), pp. 89-99. Stable URL: http://links.jstor.org/sici?sici=0038-4909%2819630731%298%3A2%3C89%3AROTCBT%3E2.0.CO%3B2-H

This article references the following linked citations. If you are trying to access articles from an off-campus location, you may be required to first logon via your library web site to access JSTOR. Please visit your library's website or contact a librarian to learn about options for remote access to JSTOR.

# **Literature Cited**

Report on a Collection of Mammal Bones from Archeologic Cave-Sites in Coahuila, Mexico Raymond M. Gilmore *Journal of Mammalogy*, Vol. 28, No. 2. (May, 1947), pp. 147-165. Stable URL: http://links.jstor.org/sici?sici=0022-2372%28194705%2928%3A2%3C147%3AROACOM%3E2.0.CO%3B2-K

# **Relict Species of the Chihuahuan Desert**

William W. Milstead *The Southwestern Naturalist*, Vol. 5, No. 2. (Aug. 10, 1960), pp. 75-88. Stable URL: http://links.jstor.org/sici?sici=0038-4909%2819600810%295%3A2%3C75%3ARSOTCD%3E2.0.CO%3B2-X

# **Populations and Home Range Relationships of the Box Turtle, Terrapene c. carolina** (Linnaeus)

Lucille F. Stickel *Ecological Monographs*, Vol. 20, No. 4. (Oct., 1950), pp. 351-378. Stable URL: http://links.jstor.org/sici?sici=0012-9615%28195010%2920%3A4%3C351%3APAHRRO%3E2.0.CO%3B2-%23