

Milstead

1950

1950
JAMES D. ANDERSON

December 30 1950, No. 4 AMPHIBIANS AND REPTILES OF THE STOCKTON PLATEAU 543

84

THE AMPHIBIANS AND REPTILES OF THE STOCKTON PLATEAU IN NORTHERN TERRELL COUNTY, TEXAS

WILLIAM W. MILSTEAD, JOHN S. MECHAM
AND HASKELL MCCLINTOCK
University of Texas

INTRODUCTION

An ecological survey of the vertebrates of the northeastern part of the Stockton Plateau of Trans-Pecos Texas was made during the period from June 4 to July 9, 1949, under the direction of Dr. W. F. Blair of the University of Texas. The present report concerns the collection of reptiles and amphibians made at that time.

The herpetological collections were made by R. A. Dennison, T. T. Beeman, R. O. Major, and the present authors with the assistance of the other members of the survey party. Preliminary trips were made in April and May by W. F. Blair, W. A. Thornton, A. G. Flury and others to this area, and J. A. Herrmann, Mecham and Milstead obtained additional material in September in southern Pecos County. The results of these other trips have been included in the report.

We would like to express our appreciation, especially to Mr. Blackstone, on whose land most of the work was done, and also to Mr. Hicks, Mr. Dunlap, and Mr. Chandler, who granted us permission to use their property. We are particularly indebted to Mr. Karl P. Schmidt for his loan of four specimens of *Syrrhophus gaigeae* and to Dr. Blair for his invaluable help and advice.

ECOLOGICAL RELATIONSHIPS

CHIHUAHUAN BIOTIC PROVINCE

The Stockton Plateau lies in the northeastern portion of the Chihuahuan biotic province as delimited by Blair (1940, 1950) and Dice (1943). The possibility that northern Terrell County is intermediate between the Chihuahuan and Balconian biotic provinces of Blair (1950) is discussed under the section on biogeographic relationships.

STOCKTON PLATEAU BIOTIC DISTRICT

The Stockton Plateau has been listed by Blair (1950) as a possible biotic district in the Chihuahuan biotic province, and we have considered it as such. It is composed of low limestone mesas, Cretaceous in age, and is separated from the Edwards Plateau by the Pecos River. The Stockton Plateau is similar to the Edwards Plateau in geology, but it has a different erosion pattern due to less rainfall.

The survey of the amphibians and reptiles was made principally on four ranches in northern Terrell County, which is on the northeastern part of the Stockton Plateau. Three of the ranches, the Blackstone Ranch, the Chandler Ranch, and the Hicks Ranch, are drained by Independence Creek, and are located between a point thirteen miles south of Sheffield, Pecos County, and the Pecos River. The fourth locality, the Dunlap Ranch, is located on the Pecos River, twenty-five miles southeast of Sheffield.

Webster (1950) has listed thirteen associations in the area studied, but we have considered only eleven of them in discussing the distribution of the amphibians and reptiles. Two of his smaller associations are considered by us as parts of two other associations. The ecological distribution of the amphibians and reptiles in these associations is indicated in Table I. A brief discussion of the associations follows:

CEDAR SAVANNAH ASSOCIATION

This association occupies the mesa tops. The predominant vegetation is cedar in the center with sotol and lechuguilla around the edges. Webster (1950) recognizes a sotol—lechuguilla association fringing the mesa tops, but we prefer to include this mesa border in the cedar savannah association, since it was very small and its herpetofauna was no different from that of the remainder of the mesa top. The amount of rock coverage in the cedar savannah association was slight, except on the edges near the rimrock. Four species of amphibians and nineteen species of reptiles were found here. The only specimen collected of the milk snake (*Lampropeltis doliata*) was taken in this association. Four species (*Scaphiopus couchii*, *Bufo compactilis*, *Bufo punctatus*, and *Phrynosoma cornutum*) were apparently more abundant here than in any other association of the region.

CEDAR—OCOTILLO ASSOCIATION

The cedar—ocotillo association occupies the mesa slopes from just below the base of the rimrock to the valleys below. There is extensive rock coverage and relatively sparse vegetation. One species of amphibian and twenty species of reptiles were found in this association. No species was limited to it, but four species, *Cnemidophorus grahamii*, *Coleonyx brevis*, *Crotaphytus collaris*, and *Sonora episcopa*, were more abundant here than in any other association.

PERSIMMON—SHINOAK ASSOCIATION

This association occurs on the precipitous rimrock and in a narrow strip adjacent to the base of the outcropping limestone. Nineteen species, three amphibians and sixteen reptiles, were found here. These were found either on the bare limestone of the rimrock, under rocks lying on rock, or under rocks lying on humus. One species, *Sceloporus poinsettii*, was found only in this association, and four species (*Sceloporus merriami*, *Urosaurus ornatus*, *Crotalus lepidus*, and *Crotalus molossus*) were largely restricted to it. Over fifty percent of all the specimens of each of these four species were found in the persimmon—shinoak association.

CEDAR—OAK ASSOCIATION

This association occurs in narrow canyons and canyon heads. It has a high amount of rock coverage and thick vegetation, mostly cedar and shinoak. Three species of amphibians and ten species of reptiles were recorded from this community. Juvenile specimens of *Microhyla olivacea* were abundant here and *Syrrhaptes marnockii* was largely restricted to this association.

MESQUITE—CREOSOTE ASSOCIATION

The mesquite—creosote association occupies all of the broad inter-mesa valleys except the small portions along dry stream beds occupied by the walnut—desert willow association. The vegetation was almost impenetrable in some parts of the mesquite—creosote association, and in other places the brush cover was more open. Rocks were scarce in the alluvial soils of the valleys. Thirty-three species, six amphibians and twenty-seven reptiles, were found here. Five species, *Eumeces obsoletus*, *Opheodrys aestivus*, *Lampropeltis alterna*, *Lampropeltis getulus*, and *Rhinocheilus lecontei*, were taken only in this association. Only one specimen of each of these was collected, however, so it is unknown whether or not they occur in other associations of the region. Four species, *Cnemidophorus gularis*, *Phrynosoma modestum*, *Coluber flagellum*, and *Crotalus atrox*, reached their peak of abundance here. Two amphibians, *Rana pipiens* and *Ambystoma tigrinum*, were abundant in stock tanks of this association.

MESQUITE—SUMAC—CONDALIA ASSOCIATION

The mesquite—sumac—condalia association is found above the banks of Independence Creek at Gravel Springs and at other places on the Blackstone Ranch. At Gravel Springs, there is a narrow strip of this association bounded on one side by the creek bed and on the other by the hackberry association. The vegetation of the mesquite—sumac—condalia association comprises a dense thicket of thorny brush. The small extent of this association probably accounts for the few species and specimens found in it. Only eight species, one amphibian and seven reptiles, were found here (Table I).

WALNUT—DESERT WILLOW ASSOCIATION

The walnut—desert willow association includes all of the dry or flowing streams and their banks. It includes the dry streams of the broad inter-mesa valleys and both the dry and flowing parts of Independence Creek. On the Blackstone Ranch, Independence Creek is dry, except during flash floods. On the Chandler and Hicks ranches, springs provide a continuous flow of water. Two species of amphibians and fifteen species of reptiles were found in the walnut—desert willow association. Of these, three species, *Acris gryllus*, *Pseudemys floridana*, and *Amyda emoryi*, were restricted to this association, and three species, *Holbrookia texana*, *Natrix erythrogaster*, and *Thamnophis sirtalis*, reached their peak of abundance in it. Within the association, *Acris gryllus*, *Pseudemys floridana*, and *Amyda emoryi* were restricted to parts of the stream having water, and *Holbrookia texana* was restricted to the dry stream beds.

HACKBERRY ASSOCIATION

This association is very limited in extent at favorable locations on the terraces of Independence Creek. Collecting was done in this association at Gravel Springs on the Blackstone Ranch. Only one species of amphibian and three species of reptiles were found in this community. (Table I). That few species were taken is probably due to the limited extent of the association.

TABLE I

Numbers of specimens of amphibians and reptiles collected in the ecological associations of the Stockton Plateau in northern Terrell County, Texas.

SPECIES RECORDED	RECORDS IN ECOLOGICAL ASSOCIATIONS										
	Cedar Savannah	Cedar—Ocotillo	Persimmon—Shinoak	Cedar—Oak	Mesquite—Creosote	Mesquite—Sumac—Condalia	Walnut—Desert Willow	Hackberry	Live-oak	Salt-cedar	Field
<i>Scaphiopus couchii</i>	14							1			
<i>Scaphiopus hammondii</i>					2						
<i>Bufo compactilis</i>	23		2								
<i>Bufo punctatus</i>	36	1	1	1	4	1	17				
<i>Bufo valliceps</i>									1		7
<i>Acris gryllus</i>							7				
<i>Syrhophus marnockii</i>			1	24					1		
<i>Rana pipiens</i>					25		10				
<i>Microphyla olivacea</i>	12			17	1						
<i>Ambystoma tigrinum</i>					21						
<i>Terrapene ornata</i>					2		1				
<i>Pseudemys floridana</i>									2		
<i>Pseudemys scripta</i>					1		1				
<i>Amyda emoryi</i>							4				
<i>Coleonyx brevis</i>	3	13	12	3	3						
<i>Holbrookia texana</i>		12	2		15		16		8		
<i>Crotaphytus collaris</i>		6			1						
<i>Sceloporus merriami</i>		1	35	3							
<i>Sceloporus poinsettii</i>			7								
<i>Sceloporus olivaceus</i>					1	2	2		3	1	
<i>Sceloporus undulatus</i>	8	2	5		2	1					
<i>Urosaurus ornatus</i>		8	61	8			1		11		
<i>Phrynosoma</i>											
<i>cornutum</i>	15	1			8						
<i>Phrynosoma</i>											
<i>modestum</i>	8	2		1	15	1					
<i>Leiopisma laterale</i>									15		
<i>Eumeces brevilineatus</i>		3		7					6		
<i>Eumeces obsoletus</i>					1						
<i>Cnemidophorus</i>											
<i>gularis</i>	24	2	2		29	1	2				

TABLE 1—continued

SPECIES RECORDED	RECORDS IN ECOLOGICAL ASSOCIATIONS										
	Cedar Savannah	Cedar—Ocotillo	Persimmon—Shinoak	Cedar—Oak	Mesquite—Creosote	Mesquite—Sumac—Condalia	Walnut—Desert Willow	Hackberry	Live-oak	Salt-cedar	Field
<i>Cnemidophorus perplexus</i>	6	1			4						
<i>Cnemidophorus grahamii</i>		32	10		13		3				
<i>Leptotyphlops dulcis</i>	1	1									
<i>Leptotyphlops humilis</i>		1									
<i>Diadophis punctatus</i>	1		1								
<i>Opheodrys aestivus</i>					1						
<i>Coluber flagellum</i>	3				15	3			2		
<i>Coluber taeniatus</i>	1	1				1	1				
<i>Salvadora grahamiae</i>	1	2									
<i>Elaphe bairdi</i>									2		
<i>Elaphe subocularis</i>	1		2								
<i>Pituophis catenifer</i>	1			1	3			1			
<i>Lampropeltis alterna</i>					1						
<i>Lampropeltis getulus</i>					1						
<i>Lampropeltis doliata</i>	1										
<i>Rhinocheilus lecontei</i>					1						
<i>Sonora episcopa</i>	3	9	2	3	2		2				
<i>Ficimia cana</i>			1		1						
<i>Natrix erythrogaster</i>							7		2	2	
<i>Thamnophis eques</i>	1				1						
<i>Thamnophis sirtalis</i>					2		11			8	
<i>Hypsiglena ochrorhyncha</i>					1				1		
<i>Tantilla atriceps</i>	1	2	3		1						
<i>Micrurus fulvius</i>									1		
<i>Agkistrodon contortrix</i>					3	3	2	1	76	5	
<i>Crotalus atrox</i>	4	2	1	1	24	1	1	1	1		
<i>Crotalus lepidus</i>	2	2	14	1			1		1		
<i>Crotalux molossus</i>			5	1	1						

LIVE-OAK ASSOCIATION

The live-oak association is found along the lower reaches of Independence Creek and along the Pecos River in the vicinity of the mouth of the Independence Creek. Along the creek, the association is found only where springs provide a constant source of water. Two species of amphibians and eleven species of reptiles were found in the live-oak association. One species, *Leiopisma laterale*, was restricted to the association, and *Agkistrodon contortrix* reached its highest concentration in it. Both of two specimens of *Elaphe bairdi* collected in the region were from the live-oak association.

SALT-CEDAR ASSOCIATION

This association occurs on the terraces of the Pecos River. Collecting was done in this association on the Dunlap Ranch. The small extent of the association and the barren ground cover probably account for the few species and specimens found in it. One lizard (*Sceloporus olivaceus*) and two snakes (*Agkistrodon contortrix* and *Natrix erythrogaster*) were the only species found here.

FIELD ASSOCIATION

This man-made association includes the tanks, irrigation ditches, and irrigated fields of the Hicks Ranch. In it, we have included the sawgrass-willow association listed by Webster (1950). Only one species of amphibian and two species of reptiles were found here. The one amphibian, *Bufo valliceps*, appears to be limited to this and the live-oak association.

ANNOTATED LIST OF SPECIES

A total of 56 species and 977 specimens was collected between June 4 and July 9, 1949, and on the preceding and subsequent trips. Of these, 10 species (230 specimens) are amphibians and 46 species (747 specimens) are reptiles. Two species, *Scaphiopus hammondii* and *Lampropeltis alterna* were collected near Sheffield in southern Pecos County in September. Although they were not collected in the area intensively studied, they were found in similar ecological conditions on the Stockton Plateau and have been included in this report. With the exception of three specimens, all of the specimens are in the Texas Natural History Collection of the University of Texas.

AMPHIBIA

SALIENTA

Scaphiopus couchii Baird. Fourteen specimens, two adults and twelve juveniles, were collected after heavy rains during the first week of June. The two adults were taken from a tank in the cedar-savannah association and the juveniles were taken from the same association within a few hundred yards of the tank. One adult specimen was collected by Flury from the hackberry association at Gravel Springs in May, and a number of adults was collected from the mesquite-creosote association of southern Pecos County between Fort Stockton and Sheffield in September. The two adults collected in June were active at night, but no calls were heard.

Scaphiopus hammondii hamondii Baird. Two adult specimens were collected from the mesquite—creosote association of southern Pecos County approximately 24 miles west of Sheffield in September. Both specimens were active about midnight. One individual was seen and heard calling at the West Martin tank in the cedar savannah association in May.

Bufo compactilis speciosus Girard. Four adult and 21 juvenile specimens were collected after heavy rains during the first week in June. The four adults and 19 of the juveniles were taken in the cedar savannah association, and two juveniles were taken in the persimmon—shinoak association. Several adult specimens were taken from the mesquite—creosote association of southern Pecos County between Fort Stockton and Sheffield in September. There were no records of breeding in either June or September.

Bufo punctatus Baird & Girard. Sixty-one specimens were collected from seven associations on the Blackstone Ranch. No breeding records were obtained in June, although a large aggregation was found to be breeding in temporary pools in Independence Creek at Gravel Springs in May. The majority of the specimens taken in June were juveniles. Thirty-six specimens, mostly juveniles, were taken in the cedar savannah association, 17 in the walnut—desert willow association in May, four in the mesquite—creosote association, and one from each of the following associations: cedar—ocotillo, persimmon—shinoak, cedar—oak, and mesquite—sumac—condalia. No specimens were taken from stock tanks in any of the above associations.

Bufo valliceps Wiegmann. Eight adult specimens were collected from associations along Independence Creek. They were heard calling from a drainage canal on the Chandler Ranch on the night of June 22, along with *Rana pipiens* and *Acris gryllus crepitans*. One specimen was taken from the live-oak association on the Chandler Ranch, and seven were taken from a tank in the field association of the Hicks Ranch. This eastern species has been recorded from Val Verde County (Brown, 1948), but this is the first record of it in Terrell County and probably its first record west of the Pecos River.

Acris gryllus crepitans Baird. Seven specimens were taken from the stream bed and water of Independence Creek on the Chandler Ranch. One specimen was collected during the daytime, and six were collected at night by tracing their calls. The species was calling in association with *Bufo valliceps* and *Rana pipiens*. The absence of cricket frogs around stock tanks was particularly noticeable, since that is one of their favorite habitats on the Edwards Plateau. The absence of this species possibly might have been due to the presence of a dense population of *Rana pipiens* around most of the tanks and a dense population of Large-mouthed bass (*Huro salmoides*) in one tank.

Eleutherodactylus latrans (Cope). No specimens of the barking frog were actually collected. While hunting *Syrrhophus* at night on June 8, two distinct barks were heard from a distant canyon. These were probably made by a barking frog, since the probability of a dog or coyote in that area is slight. Joe Chandler described "a lizard that barks like a bulldog" and other ranchers also told of barking lizards. These are doubtlessly *Eleutherodactylus*, as the ranchers of the Edwards Plateau ascribe the call of the barking frog to a lizard (*Gerrhonotus liocephalus*)

Syrrhophus marnockii Cope. This species was found to be most predominant in the cedar—oak association, where 24 specimens were collected on humid nights. Two additional specimens were collected in two other associations, one from the persimmon—shinoak and one from the live—oak at the base of the persimmon—shinoak. We were unable to distinguish the calls of these frogs from *marnockii* of the Edwards Plateau.

The identification of the Terrell County specimens created a problem in distinguishing between the eastern species of *Syrrhophus* on the Edwards Plateau and the western species of the Chisos Mountains. *Syrrhophus gaigeae* of the Chisos Mountains was described by Schmidt and Smith (1944) as differing from *marnockii* by having a more vermiculate color pattern and a head width to body length ratio of 40% as opposed to 36% in *marnockii*. Four specimens of *gaigeae*, including the type, the 26 specimens of *Syrrhophus* from Terrell County, and 40 specimens of *marnockii* from the Edwards Plateau were measured and compared. Specimens of *marnockii* could not be distinguished from *gaigeae* on color alone, and the head width to body length ratio was found to be quite variable, and was found to be a growth ratio rather than a specific character. In a series of *marnockii* from Bexar County, two specimens had the following measurements and ratios:

8.0 / 21.7 mm. — 36.8%

9.2 / 21.7 mm. — 42.4%

Measurements and ratios of the specimens of *Syrrhophus* examined are given in Table II.

TABLE II

Head width to body length ratios in three samples of *Syrrhophus* from Texas.

Sample	Number of Specimens	Highest Head Width to Body Length Ratio	Range of Variation in Body Length	Average Head Width to Body Length Ratio
Chisos Mountains	4	42.4% (8.7 / 20.9 mm.)	20.9—26.5 mm.	39.4%
Edwards Plateau	40	43.4% (12.0 / 27.6 mm.)	18.0—32.7 mm.	38.6%
Stockton Plateau	26	42.5% (12.7 / 28.8 mm.)	28.8—37.7 mm.	40.7%

In 1944, when *gaigeae* was described, the range of *marnockii* was not as well known as it is today, and the two species appeared to be geographically isolated. Since 1944, a large gap in the range of the two species has been filled. It does not seem possible, with the considerable amount of material now available, to separate the Chisos Mountains *Syrrhophus* from the Edwards Plateau population, and the two named populations appear to have a fairly continuous range. We therefore consider *Syrrhophus gaigeae* Schmidt and Smith to be a synonym of *Syrrhophus marnockii* Cope.

Rana catesbeiana Shaw. The bullfrog does not naturally inhabit the Trans-Pecos region of Texas. It has been introduced in Terrell County by Joe Chandler and probably other ranchers. Bullfrogs were heard calling at Chandler's Ranch on Independence Creek on the night of June 21.

Rana pipiens Schreber. Twenty-five specimens of the leopard frog were taken from four stock tanks in the mesquite—creosote association of the Blackstone Ranch. All four of these tanks had a dense population of *Rana pipiens*. One tank was well stocked with *Pseudemys scripta*, one with *Ambystoma* and one with large-mouthed bass (*Huro salmoides*). The fourth tank had no turtles, salamanders or fish in it, but a specimen of *Thamnophis eques* was taken from the margin of the tank. All of the tanks were artificial and shallow, with aquatic vegetation, and were margined by mesquite. The highest concentrations of *Rana* were found in the tank that contained *Ambystoma* and in the tank which had no other aquatic vertebrates.

Four specimens of *Rana pipiens* were taken from the stream bed and water of Independence Creek on the Chandler Ranch, where they were heard calling on several nights in June. Six specimens were collected by Thornton from temporary pools in Independence Creek at Gravel Springs in May.

Microbyla olivacea (Hallowell). Thirty specimens were collected in three associations on the Blackstone Ranch. Twelve adults, one of which was collected in May, were taken from a stock tank in the cedar savannah association near West Martin Windmill. One adult was taken from a stock tank in the mesquite—creosote and 17 juveniles were taken from the cedar—oak association. Adults were heard calling throughout June and the first week in July at the West Martin tank.

URODELA

Ambystoma tigrinum mavortium Baird. Twenty-one larvae were seined from a stock tank in the mesquite—creosote association of Little Horsehead Canyon on the Blackstone Ranch. These larvae show a uniform black coloration with no markings and have well developed gills. Three other tanks in the same association contained no *Ambystoma*. One of these tanks had a heavy population of large mouth bass and another had a good number of *Pseudemys scripta*.

REPTILIA

CHELONIA

Terrapene ornata (Agassiz). Only three specimens of the box turtle were collected. Two were taken from the mesquite—creosote association on the Blackstone Ranch, and one was taken from the dry stream bed of Independence Creek at Gravel Springs. They seem to agree with other Texas *ornata* in coloration.

Pseudemys floridana texana Baur. Two specimens were taken from the waters of Independence Creek on the Chandler Ranch. This species is probably more limited to natural waters than *Pseudemys scripta*.

Pseudemys scripta elegans (Holbrook). One specimen was taken from the waters of Independence Creek on the Chandler Ranch, and another was taken from a stock tank in the mesquite—creosote association on the Blackstone Ranch. A number of individuals inhabited the tank, but only one was taken. The tank supported a moderate population of *Rana pipiens* and a great amount of aquatic vegetation. Three other tanks in the same association had *Rana pipiens* and aquatic vegetation but contained no *Pseudemys scripta*.

Amyda emoryi (Agassiz). Four specimens of the soft-shelled turtle were taken from flowing water. Three were from Independence Creek on the Chandler Ranch, and one was from the Pecos River on the Dunlap Ranch.

LACERTILIA

Coleonyx brevis Stejneger. This lizard was most common in the cedar—ocotillo association of the rocky mesa slopes and in the persimmon—shinoak of the rimrock. The species is nocturnal, and most of our specimens were found beneath rocks. A single active specimen was observed in the walnut—desert willow association near Gravel Springs about 9:00 PM. Specimens were taken in the following associations: cedar savannah, three; cedar—ocotillo, 13; persimmon—shinoak, 12; cedar—oak, three; mesquite—creosote, three.

Crotaphytus collaris (Say). We have not been able to assign our specimens definitely to either of the two subspecies *collaris* or *baileyi* on the basis of the few specimens available. Four specimens were collected. Three came from the cedar—ocotillo association, and one came from the mesquite—creosote association. Three additional specimens, also from the cedar—ocotillo associations, were obtained on a preliminary trip in May of the same year to this area.

Holbrookia texana (Troschel). Although these lizards were most common in the dry stream beds and rocky areas at the base of the mesa slopes, they were also present in the liveoak woods along Independence Creek. Fifty-three specimens were taken in the following associations: cedar—ocotillo, 12; persimmon—shinoak, two; mesquite—creosote, 15; walnut—desert willow, 16; live-oak, eight.

Sceloporus m. merriami Stejneger. This was one of the more common lizards of the rimrock, being second in abundance only to *Urosaurus ornatus*. Its local distribution, however, was spotty, and there were entire canyons where the species did not seem to occur at all. Thirty-nine specimens were collected. Of these, one was from the cedar—ocotillo, three from the cedar—oak, and 35 from the persimmon—shinoak association.

Sceloporus poinsettii Baird and Girard. We found this species only upon the bare rock cliffs of the persimmon—shinoak association, where they were extremely difficult to approach. Seven specimens were collected.

Sceloporus olivaceus Smith. In this region the species is largely restricted to trees found along streams and dry water courses. Nine specimens were collected from the following associations: mesquite—sumac—condalia, two; walnut—desert willow, two; mesquite—creosote, one; live-oak, three; salt-cedar, one.

Sceloporus undulatus consobrinus Baird and Girard. Eighteen specimens were taken. Eight of these were collected in the cedar savannah, two in the cedar—ocotillo, five in the persimmon—shinoak, two in the mesquite—creosote, and one in the mesquite—sumac—condalia association. These lizards were always found upon the ground near clumps of cedar, sotol, or cat-claw in which they took refuge when frightened.

Urosaurus o. ornatus (Baird and Girard). It will be noted that *o. ornatus* is the Balconian subspecies, as opposed to *o. schmidti*, a more western subspecies. An important diagnostic feature separating the two

forms is the comparatively smaller size of the outer row of enlarged dorsal scales in *o. ornatus*. Our specimens show variation of this character to such an extent that some individuals would seem to be typically *schmidti*, although most are assignable to *o. ornatus*.

We found these lizards to be most plentiful upon the bare rimrock where they took refuge in rock crevices when molested. They were not limited to this habitat, however, and were quite common on the live oak trees along Independence Creek. Eighty-nine specimens were collected from the following associations: cedar—ocotillo, eight; persimmon—shinoak, 61; cedar—oak, eight; walnut—desert willow, one; live-oak, 11.

Phrynosoma cornutum (Harlan). We found this species, together with *Phrynosoma modestum*, to be most common on the mesa tops and in the mesquite—creosote association. Of 24 specimens collected, 15 came from the cedar savannah, eight from the mesquite—creosote, and one from the cedar—ocotillo association.

Phrynosoma modestum Girard. This species is usually regarded as being strictly diurnal, and most of our specimens were found active during the day. However, in two instances, a specimen was found crossing a road at night. We obtained 27 specimens from the following associations: cedar savannah, eight; cedar—ocotillo, two; cedar—oak, one; mesquite—creosote, 15; mesquite—sumac—condalia, one.

Cnemidophorus grabamii Baird and Girard. We took most of our specimens in the cedar—ocotillo association at the base of the mesa slopes, and although some were obtained in the mesquite—creosote, they were never far from the line of merger of the two associations. Forty-five specimens were collected. Of these 32 came from the cedar—ocotillo, 10 from the persimmon—shinoak, 13 from the mesquite—creosote, and three from the walnut—desert willow association.

Cnemidophorus g. gularis Baird and Girard. This species was by far the most abundant reptile of the mesa tops and of the mesquite—creosote association. Here it occurred in direct association with the rarer *Cnemidophorus perplexus*, and the two species populations occupied overlapping ranges. Sixty specimens were taken in the following associations: cedar savannah, 24; cedar—ocotillo, two; persimmon—shinoak, two; mesquite—creosote, 29; mesquite—sumac—condalia, one; walnut—desert willow, two.

Cnemidophorus perplexus Baird. The behavior of these lizards, in addition to slight differences of pattern and color, distinguished them from *Cnemidophorus gularis*. We found them to be easier to approach, and more reluctant to run for any distance. Eleven specimens were collected. Of these, six came from the cedar savannah, one from the cedar—ocotillo, and four from the mesquite—creosote association.

Leiopisma laterale (Say). Fifteen specimens were collected in the live-oak association along Independence Creek. This establishes a new county record and extends the known range of the species at least 50 miles.

Eumeces brevilineatus Cope. Sixteen specimens were collected. Six of these came from the live-oak association along Independence Creek, three from the cedar—ocotillo of the mesa slopes, and seven from the cedar—oak association of the canyon heads.

Eumeces obsoletus (Baird and Girard). Our only specimen was caught in a mouse-trap set in the mesquite—creosote association.

SERPENTES

Leptotyphlops d. dulcis (Baird and Girard). Two specimens were collected from two associations on the Blackstone Ranch. One was collected from under a rock in the cedar savannah association at West Martin Windmill, and the other was taken from the stomach of a Roadrunner (*Geococcyx*) which was killed in the cedar—ocotillo association at Gravel Springs.

Leptotyphlops humilis segregus Klauber. A single specimen was collected in the cedar—ocotillo association at Gravel Springs. It was taken from under a rock during the morning hours.

Diadophis punctatus arnyi (Kennicott). Two specimens were collected about mid-morning. Both were active at the time they were taken. One was collected in the cedar savannah association at West Martin Windmill, and the other was caught in the persimmon—shinoak association of Ligon Canyon. This species is probably limited to the associations which have a large amount of rock coverage.

Opheodrys aestivus (Linnaeus). One specimen was collected in May from the mesquite—creosote association of the Blackstone Ranch by Mr. Blackstone. This is a species that is generally associated with the southeastern United States and, although it has been reported from as far west as New Mexico (Schmidt and Davis, 1941), it is probably very scarce in Trans-Pecos Texas.

Coluber flagellum testaceus Say. This species is probably restricted to the less rocky associations. Jameson and Flury (1949) reported it as being most common in the Plains life belt in the Sierra Vieja region of Presidio County. In Terrell County, three specimens were collected in the cedar savannah, 15 in the mesquite—creosote, three in the mesquite—sumac—condalia, and two in the live-oak association. Stomach analysis of the specimens yielded the following animals: 1 young cottontail (*Sylvilagus floridanus*), 1 ground squirrel (*Citellus mexicanus*) about half grown, and 2 lubber grasshoppers (*Brachystola magna*).

Coluber taeniatus girardi Stejneger and Barbour. This species does not appear to be as limited to the less rocky associations as the preceding one. Four specimens were collected and there were two additional sight records. The four specimens collected were from the following four associations: cedar savannah, cedar—ocotillo, mesquite—sumac—condalia, and walnut—desert willow. One of the sight records was in the persimmon—shinoak association and the other was in the walnut—desert willow association.

Salvadora grabamiae Baird and Girard. Two specimens were collected on the Blackstone Ranch. One was from the cedar savannah and one was from the cedar—ocotillo association. Blair collected an additional specimen in May from the cedar—ocotillo association near Gravel Springs. This animal, a female, laid nine eggs soon after capture, and two of these were hatched in the laboratory during the summer.

Elaphe bairdi (Yarrow). Two specimens were collected in the live-oak association on the Hicks Ranch. One was active shortly after dawn and the other was active about noon. Both specimens had typical *bairdi* coloration, but their supralabial counts seem to indicate that future work may prove *Elaphe bairdi* to be a western subspecies of *Elaphe obsoleta*. One individual was a male with a supralabial count of 8-8 and the other was a

female with a supralabial count of 9-8. Typically, *bairdi* has nine supralabials and *obsoleta* has eight. A specimen of *bairdi* from the Carmen Mountains, Coahuila, (Smith, 1938) agreed with our female specimen in that it has a supralabial count of 9-8. Three specimens from Kerr County, Texas, (Mulaik and Mulaik, 1941) had supralabial counts of 8-8, 9-8, and 8-8.

Elaphe subocularis (Brown). This species appears to prefer the associations which have a large amount of rock coverage. Three specimens were collected: two males from the persimmon—shinoak and one female from the cedar savannah association. One male was collected in the afternoon and the other at night. The female was found dead on the road. The two males had the following scale counts: ventrals 281 and 271, subcaudals 71 and 75, and DSC 31-34-23 and 33-34-23. The scale counts of the female were: ventrals 282, subcaudals 73, and DSC 32-33-23.

Pituophis catenifer sayi (Schlegel). Six specimens were collected from four associations. Thornton collected one from the hackberry association at Gravel Springs in May. Three were from the mesquite—creosote, one was from the cedar savannah, and one was from the cedar—oak association. All of the specimens were active when taken. Four individuals were collected in the morning and two were collected at night. The species is probably, for the most part, diurnal and is probably limited to the less rocky associations. There were several morning sight records from the mesquite—creosote association.

Lampropeltis alterna (Brown). A single specimen was collected from the mesquite—creosote association of southern Pecos County approximately 15 miles west of Bakersfield. It was found DOR about midnight. A description of the specimen has been published separately (Mecham and Milstead, 1949). This specimen extends the range of *alterna* eastward onto the Stockton Plateau.

Lampropeltis doliata annulata (Kennicott). One specimen was collected from the cedar savannah association in camp on the night of June 6. It was an adult with twenty-three narrow, white dorsal rings. The specimen escaped before it could be preserved and no others were collected.

Lampropeltis getulus splendida (Baird and Girard). A single specimen was collected by Blair as it was coiled in the road in the early morning. It was taken from the mesquite—creosote association of the Blackstone Ranch.

Rhinocheilus lecontei tessellatus Garman. A single specimen was taken in the mesquite—creosote association of Fifty-Six Canyon. This individual was active at dusk.

Sonora episcopa (Kennicott). Our Terrell County specimens show a noticeable color variation in that, while many have the usual uniform tan to brown dorsal coloration, a number show a reddish median dorsal stripe of variable width. This marking is very apparent in some, but barely discernible in others. Twenty-one specimens were taken in the following associations; cedar—savannah, three; cedar—ocotillo, nine; persimmon—shinoak, two; cedar—oak, three; mesquite—creosote, two; walnut—desert willow, two.

Ficimia cana (Cope). One of these snakes, partially digested, was removed from the stomach of a *Crotalus lepidus* collected on the rimrock. Another specimen was found in September DOR on highway 290, 22 miles west of Sheffield, Pecos County, in the mesquite—creosote association.

Natrix erythrogaster transversa (Hallowell). Eleven specimens were collected from three associations. Two came from the salt—cedar association of the Dunlap Ranch, two from the field association of the Hicks Ranch, and seven from the walnut—desert willow association of the Chandler and Hicks ranches. Our specimens from Terrell County were more pale in coloration than specimens of *transversa* from the Edwards Plateau, and were found to be most active in the early morning and the late afternoon. In Central Texas, *transversa* is most active after dark. The difference in the time of activity is probably due to the cooler nights of West Texas. One female from the Chandler Ranch contained fifteen well developed embryos.

Thamnophis eques cyrtopsis (Kennicott). One specimen was taken from near a tank in the mesquite—creosote association. Another was taken from a dry rain pool in the cedar—savannah association. The tank was in East Martin Canyon on the Blackstone Ranch and contained a dense population of *Rana pipiens*. The dry rain pool had no apparent life other than the one snake; however, young individuals of *Bufo punctatus* and *Bufo compactilis* were abundant in the adjacent cedar—savannah association.

Thamnophis sitalis proximus (Say). Twenty-one specimens were collected on the Chandler and Hicks ranches. Eleven specimens were from the stream bed and water of Independence Creek. Eight were from the field association, and two were from the mesquite—creosote association near Independence Creek. This species agrees with Terrell County specimens of *Natrix* in pale coloration and crepuscular habits.

Hypsiglena ochrorhyncha texana Stejneger. We have two specimens from Terrell County. One of these was collected in April in the mesquite—creosote association of the Blackstone Ranch during the early morning. The other was found during the summer, and was taken at night in the live—oak association. The snake was caught at the base of a cliff along the Pecos River, three miles above the mouth of Independence Creek.

Tantilla atriceps (Gunther). This species does not appear to prefer any particular association. It does not seem to be limited by the amount of rock coverages, although five of the seven specimens were taken under rocks. These seven specimens were collected from four associations. Two specimens were collected in May from under rocks in the cedar—ocotillo association; three were taken under rocks in the persimmon—shinoak association; one was found in a gopher (*Cratogeomys*) burrow in the mesquite—creosote association; one, taken in September, was found under a sotol stump in the cedar—savannah association. The remains of a half grown millipede were in the stomach of one individual.

Micrurus fulvius tenere (Baird and Girard). One specimen was collected on the Chandler Ranch in the liveoak association bordering Independence Creek. The snake was found in the open about 5:30 AM and attempted to escape into a pile of driftwood. This specimen extends the known range of the species at least 125 miles from the previous most western record in Kerr County, as given by Brown (1948). Mr. Chandler informed us that he had killed one of these snakes about a year before in the same locality.

Agkistrodon contortrix pictigaster Gloyd and Conant. Eighty-nine specimens of the copperhead were collected from five associations on the Blackstone, Chandler, Dunlap, and Hicks ranches. Three specimens were

taken from the mesquite—creosote association, three from the mesquite—sumac—condalia, two from the walnut—desert willow, 76 from the live oak, and five from the salt cedar association. One additional specimen was collected by Blair in the hackberry association at Gravel Springs in May. The copperhead was most active at night and the dense population in the live—oak association along Independence Creek constituted some danger to campers and stock. One fisherman was given first aid at our camp for a snake bite which was received at night in that association.

The 90 specimens of *Agkistrodon contortrix* from Terrell County have a variable color pattern. Sixteen have the coloration of *A. c. laticinctus*, 44 have the coloration of *A. c. pictigaster*, and 30 have coloration that might be considered intermediate between the two subspecies. The subcaudal counts of the Terrell County specimens and nine specimens of *laticinctus* from central Texas were compared with the subcaudal counts of *pictigaster* and *laticinctus* given by Gloyd and Conant (1943). The results are shown in Fig. 1. It is seen from the comparison that the subcaudal counts of the Terrell County specimens are closer to the counts given by Gloyd and Conant for *pictigaster* than they are to the counts given for *laticinctus*. If more specimens of *pictigaster* were available from the Davis Mountains, the average subcaudal count would possibly be lowered to about the position of our specimens. We therefore consider the Terrell County specimens to be *A. c. pictigaster*.

Crotalus atrox (Baird and Girard). The diamondback was very common, and was recorded from a wider variety of associations than any other species. However in this area they do not seem to reach a very large size. Out of 35 specimens collected, the largest measured only 114 cm in length. Unidentifiable bird remains were found in the stomachs of two of the specimens. Three contained small mammal remains, one recognizable as a *Perognathus merriami*. Two lizards (*Sceloporus* sp. and *Coleonyx brevis*) were found respectively in two others. The diamondback was collected in the following associations: cedar savannah, four; cedar—ocotillo, two; persimmon—shinoak, one; cedar—oak, one; mesquite—creosote, 24; mesquite—sumac—condalia, one; walnut—desert willow, one; live-oak, one; hackberry, one.

Crotalus I. lepidus (Kennicott). These small rattlesnakes were almost entirely restricted to rocky areas, principally the persimmon—shinoak association of the rimrock. Our specimens are much paler than the typical form, a variation which Gloyd (1940) mentions as occurring in specimens from the limestone canyons of the Pecos and Devils River.

This snake exhibits food habits unusual for a rattlesnake. We found evidence that they feed to some extent upon *Syrrhophus* at least among the amphibia, and on other snakes, although lizards form the majority of their food. In an examination of food contents of the stomachs of twenty-one specimens, four *Cnemidophorus gularis*, one *Urosaurus ornatus*, one adult *Phrynosoma cornutum*, one *Ficimia cana*, and one *Syrrhophus marnockii* were found. A specimen which was brought back to Austin alive ate several *Haldea striatula*.

Our specimens were collected in the following associations: cedar savannah, two; cedar—ocotillo, two; persimmon—shinoak, 14; cedar—oak, one; live-oak, one; walnut—desert willow, one.

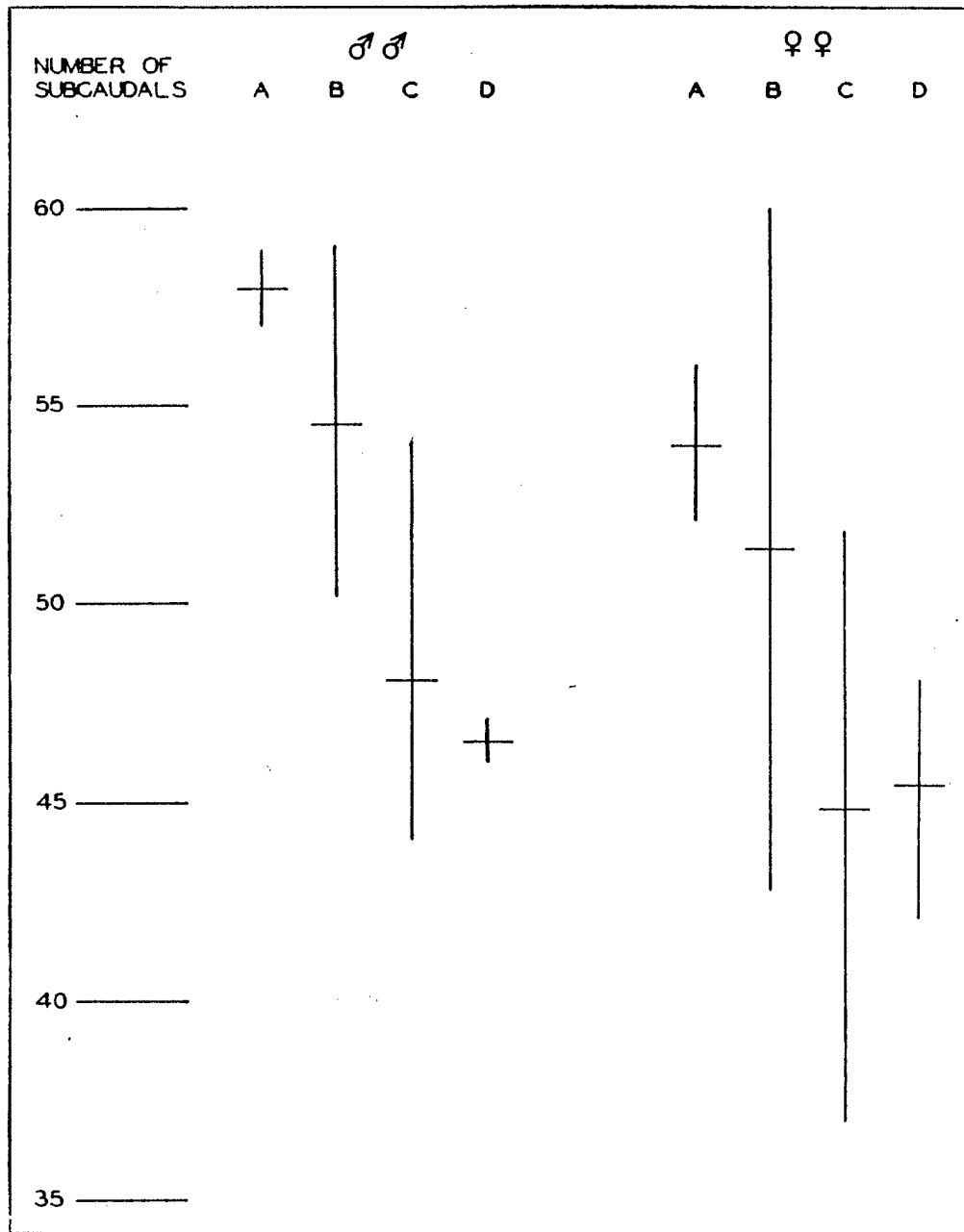


Fig. 1. Means and ranges of subcaudal counts in *Agkistrodon contortrix laticinctus* and *A. c. pictigaster*. (A) *pictigaster* after Gloyd and Conant (1943); (B) 40 males and 42 females from Terrell County; (C) *laticinctus* after Gloyd and Conant (1943); (D) 2 male and 8 female *laticinctus* from central Texas. Gloyd and Conant (*loc. cit*) do not indicate numbers of individual male and female specimens for their 5 *pictigaster* and 126 *laticinctus* for which means and ranges are computed.

Crotalus m. molossus (Baird and Girard). We took seven of these rattlesnakes, of which five came from the persimmon—shinoak, one from the cedar—oak, and one from the mesquite—creosote association. An en-cinal mouse (*Peromyscus pectoralis*) was found in the stomach of one specimen.

BIOGEOGRAPHIC RELATIONSHIPS

The amphibians and reptiles of the Stockton Plateau are representative of seven major faunal elements, five of which were listed by Jameson and Flury (1949) for the Sierra Vieja Mountains of southwestern Texas. The relations of the seven faunal elements are as follows:

Six species are widely distributed over a number of biotic provinces in North America. These species include:

<i>Rana pipiens</i>	<i>Coluber flagellum</i>
<i>Ambystoma tigrinum</i>	<i>Lampropeltis getulus</i>
<i>Sceloporus undulatus</i>	<i>Lampropeltis doliata</i>

Nine species have their center of distribution in western North America and range east at least onto the Edwards Plateau. Included in the western species are:

<i>Scaphiopus hammondi</i>	<i>Pituophis catenifer</i>
<i>Amyda emoryi</i>	<i>Rhinocheilus lecontei</i>
<i>Crotaphytus collaris</i>	<i>Hypsiglena ochrorhyncha</i>
<i>Urosaurus ornatus</i>	<i>Crotalus atrox</i>
<i>Coluber taeniatus</i>	

Seven species have their center of distribution in the Great Plains and are widely distributed in Trans-Pecos Texas and on the Edwards Plateau. The Great Plains species are:

<i>Microhyla olivacea</i>	<i>Leptotyphlops dulcis</i>
<i>Terrapene ornata</i>	<i>Sonora episcopa</i>
<i>Eumeces obsoletus</i>	<i>Tantilla atriceps</i>
<i>Pbrynosoma cornutum</i>	

Eleven species have their center of distribution in Mexico and range northward into or beyond the Stockton Plateau region. These are:

<i>Scaphiopus couchii</i>	<i>Leptotyphlops humilis</i>
<i>Bufo compactilis</i>	<i>Ficimia cana</i>
<i>Bufo punctatus</i>	<i>Thamnophis eques</i>
<i>Cnemidophorus gularis</i>	<i>Crotalus lepidus</i>
<i>Eumeces brevilineatus</i>	<i>Crotalus molossus</i>
<i>Holbrookia texana</i>	

Three species have their center of distribution in the Balconian biotic province and approach their western limit of range in Trans-Pecos Texas. The Balconian species include:

<i>Eleutherodactylus latrans</i>	<i>Sceloporus olivaceus</i>
<i>Syrrhobus marnockii</i>	

Eleven species have their center of distribution in the eastern United States and reach or approach their western limits in Trans-Pecos Texas. These include:

<i>Bufo valliceps</i>	<i>Opheodrys aestivus</i>
<i>Acris gryllus</i>	<i>Natrix erythrogaster</i>
<i>Pseudemys floridana</i>	<i>Thamnophis sirtalis</i>
<i>Pseudemys scripta</i>	<i>Micrurus fulvius</i>
<i>Leiopisma laterale</i>	<i>Agkistrodon contortrix</i>
<i>Diadophis punctatus</i>	

Ten species have their center of distribution in the Chihuahuan biotic province. Several of these species (x) range onto the Edwards Plateau. The Chihuahuan species are:

<i>Cnemidophorus grabamii</i> ^x	<i>Sceloporus poinsettii</i> ^x
<i>Cnemidophorus perplexus</i>	<i>Salvadora grabamiae</i>
<i>Coleonyx brevis</i> ^x	<i>Elaphe bairdi</i> ^x
<i>Phrynosoma modestum</i>	<i>Elaphe subocularis</i>
<i>Sceloporus merriami</i>	<i>Lampropeltis alterna</i>

The proportions of the seven major faunal elements of the Stockton Plateau in northern Terrell County are: six species (10.5%) widely distributed in North America, nine species (15.9%) western North America, seven species (12.3%) Great Plains, eleven species (19.3%) Mexican, three species (5.2%) Balconian biotic province, eleven species (19.3%) eastern North America, and ten species (17.5%) Chihuahuan biotic province.

The herpetofauna of two other areas of Trans-Pecos Texas have been studied extensively. Jameson and Flury (1949) described the species of the Sierra Vieja region and Strecker (1909), Murray (1939), and Schmidt and Smith (1944) described the species of the Big Bend region in Brewster County, Texas. A comparison of these two areas with the area studied by us shows a considerable difference in species. Twenty-two species recorded from the two Big Bend regions were not recorded from the Stockton Plateau. These include:

<i>Bufo cognatus</i>	<i>Diadophis regalis</i>
<i>Bufo insidiosus</i>	<i>Heterodon nasicus</i>
<i>Bufo woodhousii</i>	<i>Salvadora hexalepis</i>
<i>Hyla arenicolor</i>	<i>Elaphe laeta</i>
<i>Kinosternon flavescens</i>	<i>Arizona elegans</i>
<i>Holbrookia maculata</i>	<i>Sonora semiannulata</i>
<i>Sceloporus magister</i>	<i>Natrix rhombifera</i>
<i>Uta stansburiana</i>	<i>Thamnophis marcianus</i>
<i>Cnemidophorus tessellatus</i>	<i>Trimorphodon wilkinsonii</i>
<i>Gambelia wislizenii</i>	<i>Crotalus scutulatus</i>
<i>Gerrhonotus infernalis</i>	<i>Crotalus viridis</i>

Eight species recorded by us from the Stockton Plateau were not recorded from either of the two Big Bend areas. These eight species are:

<i>Bufo valliceps</i>	<i>Opheodrys aestivus</i>
<i>Eleutherodactylus latrans</i>	<i>Lampropeltis doliata</i>
<i>Leiopisma laterale</i>	<i>Thamnophis sirtalis</i>
<i>Diadophis punctatus</i>	<i>Micrurus fulvius</i>

Two species previously recorded from the Big Bend are questionable, one as to its occurrence there, and the other as to its synonymy. Strecker

(1909) listed one specimen of *Eumeces tetragrammus* from Brewster County. Since this record is not supported by previous or subsequent work, we have omitted it from our list of Big Bend species that were not recorded from the Stockton Plateau. The *Sceloporus clarkii* of Bailey (1905) and the *Sceloporus spinosus clarkii* of Strecker (1909) probably refer to *Sceloporus olivaceus*, rather than to *Sceloporus clarkii* of the western United States, and we have considered them as such.

Much of Trans-Pecos Texas remains to be studied. However, from the work done in the Big Bend, the Sierra Vieja, and on the Stockton Plateau, some conclusions as to the distribution of the amphibians and reptiles in the various biotic districts may be reached. The eastern faunal element represented in northern Terrell County by eleven species and the Balconian biotic province represented by three species is very poorly represented in the Big Bend and Sierra Vieja regions. Nine species of the western faunal element and ten species of the Chihuahuan biotic province were found in northern Terrell County, but several characteristic western species, such as *Sceloporus magister*, *Trimorphodon wilkinsonii*, and *Crotalus scrutalus* were not recorded. Five species (*Bufo valliceps*, *Leiopisma laterale*, *Diadophis punctatus*, *Thamnophis sirtalis*, and *Micrurus fulvius*) of the eastern faunal element reach their western limit of range on or about the Stockton Plateau, and an equal number of species of the Chihuahuan biotic province (*Cnemidophorus perplexus*, *Sceloporus merriami*, *Salvadora grahamiae*, *Elaphe subocularis*, and *Lampropeltis alterna*) apparently reach their eastern limit of range here.

The absence of several western species of the Chihuahuan and western faunal elements and the intrusion of eleven species of the eastern faunal element into northern Terrell County indicate that this northeastern area of the Stockton Plateau is near the boundary between the Chihuahuan and Balconian biotic provinces. The Pecos River is considered as the eastern boundary of the Chihuahuan province by Dice (1943) and Blair (1950). An intermingling of the Chihuahuan and Balconian fauna is to be expected in the Pecos River Valley. Because of the high number of species characteristic of the Chihuahuan, Mexican, and western faunal elements, and because of the more characteristic western vegetation and physiography, we consider northern Terrell County to be a part of the Chihuahuan biotic province.

SUMMARY

An ecological survey of the herpetofauna in northeastern Terrell County, Texas was made during the period from June 4 to July 9, 1949, and 56 species and 977 specimens were collected. This area is in the eastern part of the Stockton Plateau, which is the Trans-Pecos extension of the Comanchean Cretaceous Edwards Plateau of Central Texas. An analysis of the herpetofauna shows that it contains seven major faunal elements, and evidence is presented that northern Terrell County should be placed in the Chihuahuan biotic province, although it is intermediate in some respects between that province and the Balconian. On the basis of our material *Syrrhophus gaigeae* is considered a synonym of *Syrrhophus marnockii*, and range extensions are recognized for *Bufo valliceps*, *Leiopisma laterale*, and *Micrurus fulvus teneris*.

LITERATURE CITED

- Bailey, Vernon—1905—Biological survey of Texas. No. Amer. Fauna 25: 38-51
25: 38-51.
- Blair, W. Frank—1940—A contribution to the ecology and faunal relationships of the mammals of the Davis Mountain region of southwestern Texas. Univ. of Mich. Misc. Pub. Mus. Zoo. 46: 7-39, 3 pls., 1 map.
- 1950—The biotic provinces of Texas. Tex. J. Sci. 2(1): 93-117, 1 fig.
- Brown, Bryce—1948—An annotated check list of the reptiles and amphibians of Texas. Unpub. M.S. thesis, Tex. A. and M. Coll: 1-419 (typewritten), 109 maps.
- Conant, Roger—1949—Two new races of *Natrix erythrogaster*. Copeia 1941 (3): 1-15, 1 pl.
- and Coleman J. Goin—1948—A new subspecies of soft-shelled turtle from the central United States, with comments on the application of the name *Amyda*. Univ. of Mich., Occ. Pap. Mus. Zoo. 510: 11-19.
- Dice, Lee R.—1943—The biotic provinces of North America. Univ. Mich. Press. v-viii, 3-78, 1 map.
- Gloyd, Howard K.—1940—The rattlesnakes. Chi. Acad. Sci. Spec. Publ. 4: iii-viii, 1-266, 3 pls., 5 figs. 22 maps.
- and Roger, Conant—1943—A synopsis of the American forms of *Agkistrodon*. Bull. Chi. Acad. Sci. 2: 147-170, 16 figs., 2 maps.
- Jameson, David L., and Alvin G. Flury—1949—The reptiles and amphibians of the Sierra Vieja Range of southwestern Texas. Tex. J. Sci. 1(2): 54-77.
- Klauber, L. M.—1941a—The long-nosed snakes of the genus *Rhinocheilus*. Trans. San Diego Soc. Nat. Hist. 9(29): 289-332, 3 pls., 1 map.
- 1941b—Reviews and comments. Copeia 1941: (1): 60.
- 1942—The status of the black whip snake. Copeia 1942 (2): 93.
- 1948—Some misapplications of the Linnaean names applied to American snakes. Copeia 1948 (1): 1-14.
- Mecham, John S. and William W. Milstead—1949—*Lampropeltis alterna* from Pecos County, Texas. Herpetologica 5 (6): 140.
- Mulalk, Stanley and Dorothea Mulaik—1941—*Elaphe bairdi* from Kerr County, Texas. Copeia 1941 (4): 263-264.
- Murray, Leo T.—1939—Annotated list of amphibians and reptiles from the Chisos Mountains. Contr. Baylor Univ. Mus. 24: 1-16, 1 pl.
- Pope, Clifford H.—1939—Turtles of the United States and Canada. New York. Alfred A. Knopf. vii-xviii, 1-343, 99 figs.
- Schmidt, Karl P. and Dwight Davis—1944—Field book of snakes. New York. Putnam i-xii, 1-365, 35 pls., 103 figs.
- and David W. Owens—1944—Amphibians and reptiles of northern Coahuila, Mexico. Publ. Field Mus. Nat. Hist. Zoo. Ser. 29 (6): 97-115.
- and Tarleton F. Smith—1944—Amphibians and reptiles of the Big Bend region of Texas. Field Mus. Nat. Hist. Zoo. Ser. 29 (5): 75-96.
- Smith, Hobart M.—1938—Additions to the herpetofauna of Mexico. Copeia 1938 (8): 149-150.
- 1942—The synonymy of the garter snake (*Thamnophis*) with notes on Mexican and Central American species. Zoologica 27(3/4): 97-123.
- 1946—Handbook of lizards. Ithaca. N. Y. Comstock. vii-xxi, 1-557, 135 pl., 136 figs., 41 maps.
- 1947—Subspecies of the Sonoran toad (*Bufo compactilis* Wiegman). Herpetologica 4: 7-13, 1 map.
- and Edward H. Taylor—1945—An annotated check list and key to the snakes of Mexico. Bull. U. S. Nat. Mus. 187: ii-iv, 1-239.
- Stickel, William H.—1938—The snakes of the genus *Sonora* in the United States and Lower California. Copeia 1938 (4): 182-190.
- Strecker, J. K. Jr.—1909—Reptiles and amphibians collected in Brewster County, Texas. Baylor Bull. 12 (1): 11-16.
- Webster, G.—1950—Observations on the vegetation and summer flora of the Stockton Plateau in northeastern Terrell County, Texas. Tex. J. Sci. 2 (2): 234-242.