TEXAS TECH UNIVERSITY
Natural Science Research Laboratory

SPECIAL PUBLICATIONS
of Texas Tech University
2008

ARACHNIDS ASSOCIATED WITH WET PLAYAS IN THE SOUTHERN HIGH PLAINS (LLANO ESTACADO), U.S.A.

JA[illegible]NON M. TORRENCE, JAMES T. ANDERSON,
W. D[illegible]SSOM [illegible]ÉRRÉ, JAMES D. RAY & LOREN M. SMITH

SPECIAL PUBLICATIONS

Museum of Texas Tech University

Number 54

Arachnids Associated with Wet Playas in the Southern High Plains (Llano Estacado), U.S.A.

JAMES C. COKENDOLPHER, SHANNON M. TORRENCE, JAMES T. ANDERSON, W. DAVID SISSOM, NADINE DUPÉRRÉ, JAMES D. RAY, AND LOREN M. SMITH

Texas Tech University, Oklahoma State University, B&W Pantex, Texas Parks and Wildlife Department, West Texas A&M University, West Virginia University

Layout and Design: Lisa Bradley
Cover Design: James C. Cokendolpher et al.

This book was set in Times New Roman and printed on acid-free paper that meets the guidelines for permanence and durability of the Committee on Production Guidelines for Book Longevity of the Council on Library Resources.

Printed: 10 April 2008

Library of Congress Cataloging-in-Publication Data

Special Publications of the Museum of Texas Tech University, Number 54
Series Editor: Robert J. Baker

Arachnids Associated with Wet Playas in the Southern High Plains (Llano Estacado), U.S.A.

James C. Cokendolpher, Shannon M. Torrence, James T. Anderson, W. David Sissom, Nadine Dupérré, James D. Ray, and Loren M. Smith

ISSN 0169-0237
ISBN 1-929330-16-2
ISBN13 978-1-929330-16-4

Museum of Texas Tech University
Lubbock, TX 79409-3191 USA
(806)742-2442

Front cover: Cover photograph of a playa at sunset by Jo-Szu (Ross) Tsai. Besides being a beautiful and inspiring sight, this picture symbolically represents the sunset of playas in general unless conservation efforts are effective.

Arachnids Associated with Wet Playas in the Southern High Plains (Llano Estacado), U.S.A.

James C. Cokendolpher, Shannon M. Torrence, James T. Anderson, W. David Sissom, Nadine Dupérré, James D. Ray, and Loren M. Smith

Abstract

We documented the occurrence of arachnids (orders Araneae, Ixodida, Opiliones, Prostigmata, Sarcoptiformes, Solifugae) associated with wet playas in the Southern High Plains of Texas, U.S.A. Overall, we found species associated with playas, aquatic and inundated vegetation, emergent vegetation, playa edges, and those occurring only in surrounding grassland habitats. Four state, 41 Southern High Plains, and 63 first county records are documented. At least five species are thought to be undescribed and many others could not be identified with certainty. We found four families of water mites with aquatic stages as predators and parasites as well as one chigger species that has spadefoot toads as a host. Some of the water mites require an invertebrate host to disperse to other playas. Most species found in playa edges and emergent aquatic vegetation can also be found in upland grassland habitats. Therefore, many arachnid species collected within playas are likely grassland species present in dry playas prior to inundation by rains or individuals using playa vegetation as a retreat from harsh conditions of drought or bare soil created from agricultural activities. Given the importance of playas as a possible refuge for arachnids and the primary habitat for some water mite species, conserving the ecological function of playas is important to maintaining the diversity within the arachnids in the Llano Estacado.

Key words: distribution, ecology, fauna, grassland, taxonomy, wetlands

Resumen

Documentamos la ocurrencia de arácnidos (órdenes: Araneae, Ixodida, Opiliones, Prostigmata, Sarcoptiformes, Solifugae) asociados a playas mojadas en las Planícies altas del Sur de Tejas, E.E.U.U. En total, se encontró especies asociada a playas, en la vegetación acuática e inundada, vegetación emergente, los bordes de playa, y están restringidas a habitats de praderas. Se documentan quatro nuevos registros para el estados de Tejas, 41 en los Planícies altas del Sur, y 63 nuevos registros para condados. Se incluyó al menos cinco especies no descritas y otros registros no han sido identificados con certeza. Registramos cuatro familias de ácaros acuáticos con etapas diferenciadas como depredadores y parásitos, así como una especie de nigua fue encontrada parasitando en sapos. Algunos de los ácaros acuáticos requieren a otros invertebrados para dispersarse a otras playas. La mayoría de las especies fueron encontradas en bordes de playa, vegetación acuática, y en habitats de pradera. Por lo tanto, muchos arácnidos colectados dentro de playas en praderas altas probablemente estuvieron presentes en playas secas antes de la inundación de las lluvias, o están usando la vegetación de la playa como refugio de condiciones ásperas de la sequía o del suelo utilizado en actividades

agrícolas. Dada la importancia de playas como un posible refugio para arácnidos y el habitat primario de algunas especies de ácaros acuáticos, es importante la conservación ecológica de playas para mantener la diversidad endémica de estos invertebrados.

Palabras claves: distribución, ecología, fauna, pradera, taxonomía, tierras húmedas

INTRODUCTION

Playas in the Great Plains, U.S.A., are shallow depressional recharge wetlands, with each playa existing in its own catchment (Smith 2003). Conservatively, there are about 25,000 individual playas occurring in the Southern Great Plains (Osterkamp and Wood 1987; Sabin and Holliday 1995; see Figs. 1-3 in Cokendolpher et al. 2007). In the Southern High Plains, or Llano Estacado, they are the most numerous wetland type (Photo. 1; all photographs occur in the center of this document). The Southern High Plains is the largest plateau (Fig. 1) in North America (Sabin and Holliday 1995) and is one of the most intensively cultivated regions in the Western Hemisphere (Bolen et al. 1989). Note that the Southern High Plains is a plateau within the Southern Great Plains, the terms are not synonymous.

The number of playas in the Southern High Plains is about 22,000 (Guthery and Bryant 1982). There are 33 counties in two states in the Southern High Plains (Smith 2003, minimum counts follow county names): *Texas*: Andrews with 298 playas, Armstrong 676, Bailey 598, Briscoe 787, Carson 535, Castro 621, Cochran 395, Crosby 925, Dawson 702, Deaf Smith 451, Donley 114, Floyd 1,783, Gaines 65, Garza 283, Gray 752, Hale 1,383, Hockley 1,171, Howard 185, Lamb 1,280, Lubbock 934, Lynn 842, Oldham 75, Parmer 455, Potter 69, Randall 564, Swisher 210, Terry 532, Wheeler 10, Yoakum 38. *New Mexico*: Curry 524 playas, Lea 1,175, Quay 228, Roosevelt 535. In northern Texas (north of Canadian River), there are an additional eight counties (Dallam with 220 playas, Hansford 345, Hartley 123, Hemphill 9, Hutchinson 167, Lipscomb 18, Moore 195, Ochiltree 590) that also have playas and form with the other counties the High Plains Ecoregion of Texas. In this paper, only the playas in the Southern High Plains are considered, but distributional records are also listed for the High Plains (also called the Panhandle Plains) of Texas.

As recharge wetlands, playas only receive water from precipitation and runoff from the immediate area (Bolen et al. 1989) (Photo. 2). Precipitation in this semi-arid region begins primarily as thunderstorms in spring, occurs more sporadically through summer, and increases again in autumn. Playa hydroperiods (how long a playa holds water) primarily depend on precipitation timing, amounts, and intensity (Photo. 3). Because each individual playa is the terminus of its catchment basin, playas accumulate sediment eroded from surrounding watersheds during precipitation and irrigation events (Luo et al. 1999). Intensive cultivation of surrounding watersheds, and resultant eroded sediments, has decreased the average hydric soil defined volume of playas in cropland by more than 100% (Luo et al. 1997). This decreased holding volume causes shorter hydroperiods (Luo et al. 1997; Gray and Smith 2005) affecting the entire ecological structure of playas (Smith and Haukos 2002).

Playas exist as the primary aquatic habitats within this intensive agricultural landscape, and therefore are the focal points of biodiversity for the entire region (Haukos and Smith 1994). Numerous surveys and studies have been conducted on the flora and fauna of playas, as well as how cultivation of the watershed has influenced those biotic groups (see review in Smith 2003). In addition to use by nonmigratory wildlife, playas provide important habitat for migrating and wintering waterfowl and shorebirds (e.g., Bolen et al. 1989; Davis and Smith 1998), and are also used by breeding waterfowl and shorebirds (Ray et al. 2003; Conway et al. 2005a, 2005b).

Few studies have examined playa invertebrates, many of which serve as food for wildlife species (Anderson and Smith 1998, 2000). There is a paucity of information, especially lower than the family taxonomic

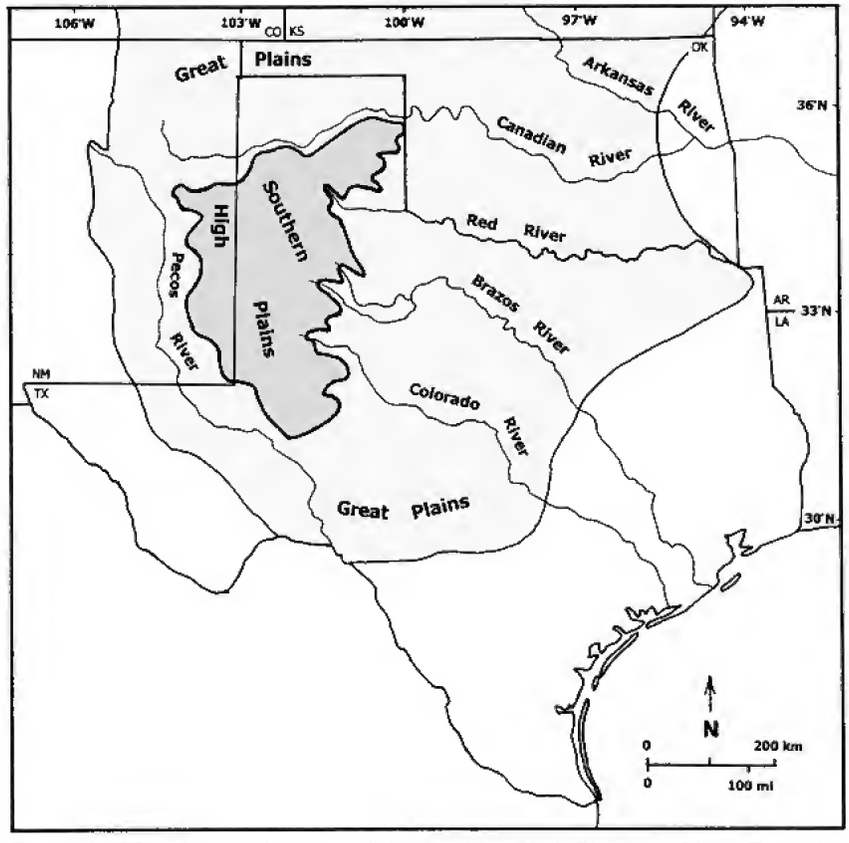

Figure 1. Map showing location of the Southern High Plains, or Llano Estacado, in the Great Plains. [Modified from Smith (2003), courtesy of University of Texas Press, Austin].

level (e.g., Merickel and Wangburg 1981; Hall et al. 1999; Hall et al. 2004), and even fewer have examined playa arachnids. Cokendolpher et al. (2007) recently described a new species of linyphiid spider in playas, and this article reports other new species. Further intensive studies should yield additional undescribed species.

Because playas are being rapidly degraded (Haukos and Smith 2003) (Photo. 4) and little is known about the composition and distribution of arachnids in playas, our objective was to provide a checklist of known arachnids in playas as a result of our previous surveys (Anderson and Smith 2000, 2004; Torrence 2007; Sissom 2003), as well as others (Hall et al. 1999). We also provide information on arachnids, collected in or around wet playas, which exist in the Museum of Texas Tech University and at West Texas A&M University. Arachnids in general from the Southern High Plains of Texas are relatively unknown. Surveying distributional maps published in taxonomic revisions (see papers in literature cited) reveals that either species are absent from this region of Texas or specimens are seldom collected/reported. We suggest the latter. Previous collectors have under-sampled this region of Texas because much of it is very flat and formerly covered by grasses. Generally, arachnologists simply ride/drive through looking for more diverse habitats with an occasional stop and see approach. Now because of the degree of cultivation and private property access, collections are further reduced. Earlier collectors tried to collect as many different habitats as possible, not intensive collections from the same habitat (JCC, pers. obs., over three decades and hearing accounts of previous collectors). Sixty-three of the arachnids recorded herein are new county records and 41 represent the first records from the Southern High Plains of Texas, and four are new state records.

In addition to providing an arachnid checklist, we have included details on identification and distribution that will be useful for future researchers collecting and identifying samples from playas and will serve as

a starting point for studies on the grassland arachnids in the Southern High Plains. For this reason we have also illustrated many of the common species as well as examples of each body type. These illustrations, used in combination with illustrations of the genitalia (noted below in each species account), should serve to identify the species.

METHODS

Playas in Briscoe, Crosby, Floyd, Hale, Lubbock, Swisher Counties.—In 1994, Hall (1997) collected macroscopic invertebrates from surface and subsurface waters of playas in Crosby, Floyd, Hale, and Lubbock Counties during May to July. Terrestrial arachnids were not preserved in her study, and only fully aquatic arachnids (water mites) were enumerated. An aquatic D-net was used to make collections (Hall 1997). Distributional records (counties) were not recorded in her dissertation or the resulting publications (Hall 1997; Hall et al. 2004). Only examples of two water mite species from this study are now housed at the Museum at TTU. Other mites were sent to Ian M. Smith (Canadian National Collection of Insects and Arachnids, Ottawa, Ontario) and the Enns Entomology Museum, University of Missouri–Columbia (Hall, pers. com.).

During July-August 1997 JCC placed rows of pitfall traps along the immediate edge of a small playa (in mud about 10 m apart) near the southeast edge of the city of Lubbock (Playa Cedar Avenue 1997). The traps were drink glasses (250 ml) half-filled with soapy water and without a cover. Traps were checked twice a week, except when rains and rising playa water levels dictated moving the traps. Trapping was conducted to determine species occurrence during the summer, and the data were not statistically analyzed. The area around the playa was sparsely urban, but about 8 ha surrounding the playa was undeveloped and had a black-tailed prairie dog [*Cynomys ludovicianus* (Ord)] town on the south end. Most adult arachnids were deposited in the Museum of Texas Tech University.

Anderson and Smith (2000, 2004) initially collected arachnids and other invertebrates from 12 vegetated playa wetlands located in Floyd County, Texas. Water was absent from the playas for at least six weeks prior to artificial flooding. Groundwater was used to flood six playas on 15 September and the remaining six on 15 November of 1994; this flooding regime was repeated in 1995. Ten to 20 cm of water was maintained in all 12 playas until 15 January of 1995 and 1996. These flood dates correspond to natural precipitation events in the Southern High Plains. Playas were chosen based on a landowners' willingness to participate in the flooding of their playas. Playas were treated in this manner to provide habitat for migratory birds. Each playa was usually dominated by one or two species of plants, so each was divided into one or two strata based on dominant vegetation within that playa (Anderson and Smith 1998). In each stratum, 20 permanently marked transects were established, oriented in the same direction to maximize transect length. During each sampling period, 10 transects were randomly chosen and a random numbers table was used to determine the distance from shore to sample. Ten invertebrate samples from each stratum containing standing water were collected twice weekly. At each sample site, two 5-cm diameter water column samples (Swanson 1978) and one 50X50-cm quadrat of clipped vegetation (DeCoster and Persoone 1970) were collected. Spiders were primarily collected in the quadrat sample but were also captured in the water column sample. Spiders were removed from vegetation or the water column and preserved (70% ethanol) for later identification following Anderson and Smith (1998).

Arachnids were also collected in 2003 and 2004 during an amphibian study (Torrence 2007). Twelve playas were selected in two landuse treatments, six surrounded by cropland and six surrounded by native grassland (i.e., land with no tilling history) from playas that were previously dry but filled via spring rains. Study sites were in Floyd County in 2003, and Floyd and Briscoe Counties (Photo. 5) in 2004. Playas were randomly selected from those meeting the following criteria: they contained water, landowner permission was given to sample, ability to erect a drift fence around them (e.g., not in planted crop rows), and the playa watershed had >75% of the appropriate landuse, which was estimated visually in the field. Periodically (approximately 1/week), arachnids were obtained from

large (19-L) buckets that were part of drift fence/pitfalls used to intercept the movements of amphibians (Corn 1994:114) (Photos 6, 7). All playas had 25% of their circumference enclosed in 60-cm tall silt/drift fencing (after Gray et al. 2004). Circumference to the nearest meter was estimated using a GPS unit and walking the visual edge of the playa. The visual edge was on a boundary of a vegetation change around the playa (Luo et al. 1997). Buckets (see Photo. 39) were placed in 10-m increments and buried flush to the soil surface on each side of the drift fence. Specimens were collected and preserved in 70% ethanol. To avoid risk of bites by widow spiders (*Latrodectus hesperus*), only their presence in buckets was recorded. Because most amphibians are active at night, the pitfall traps were opened in the afternoon and checked the following morning (Corn 1994: 114). Sampling for the first field season began 22 June 2003 after the first spring rains (3 June 2003), and ended 14 August 2003. In 2004, five grassland playas were selected in early spring because rains partly filled some playas in the area. However, by May these playas were dry or contained ≤1-cm water. Sampling in 2004 began on 6 June 2004 after a rain event on 5 June 2004 refilled playas where the drift fences were previously set up. Sampling of arachnids ended 31 August 2004.

In 2005 (28 May-12 July), collections were made as part of a playa food web study (Torrence 2007) focusing on aquatic invertebrates and larval amphibians in Floyd and Swisher Counties. One 5-m sweep net (dimensions: 33 depth x 51-cm width, pore size 500-μm) sample was taken at each of four locations within 12 playas every other day (about three times/week). The bottom of the net remained on the floor of the playa, and at water depths < 33-cm the net breached the surface of the water. Water mites comprised <0.01% of the aquatic invertebrate abundance. The net pushed down emergent vegetation, and consequently collected spiders and other invertebrates occupying the canopy of emergent vegetation. Invertebrate families not identified as "aquatic" in the literature were categorized as "terrestrial," originating from the emergent vegetation. The number of terrestrial invertebrates inhabiting the canopy comprised about 0.6% of the total abundance of invertebrates collected (Torrence 2007). Spiders comprised 9.8% of the terrestrial invertebrate abundance.

Playas in Carson County.—In 2000 and 2001 arachnids were collected as part of a two-year survey of macroinvertebrates at the Pantex Plant (U.S. Department of Energy/National Nuclear Security Administration), Carson County, Texas (Sissom 2003).

Of 10 sites sampled, six were associated with playas (three playa edges and three adjoining grasslands). Sites in edge habitats of the playas are referred to as Playa 1 (Photo. 8), Playa 2 (Photos 8, 9), and Pantex Lake. Details on the vegetation are provided by Sissom (2003). The adjacent grasslands are just above the region that slopes to form the playa basin. These sites, and the adjacent grasslands, were dominated by native grassland plant species and are not as heavily impacted (including industrial sites and mowing for fire protection and security) as other sites at the Plant. Playa edges and adjacent grasslands were monitored for the duration of the study, enabling a comparison of the spider assemblages of the two habitats.

The eastern edge of Playa 1 (Photo. 8) site was a narrow belt plot approximately 10-15 m wide that followed the curvature of the eastern margin of Playa 1. Western edge of Playa 2 site followed the curvature of the western edge of Playa 2. Northwest edge of Pantex Lake site comprised a narrow strip following the curvature of the northwestern edge of Pantex Lake. For geographical coordinates see Table 1.

Almost all arachnids at the study sites were collected by pitfall trapping (Photo. 11) and sweep netting (Photo. 12). These methods were supplemented with some general collecting of spiders as they were encountered.

Sweep netting was effective in short-grass habitats, where vegetation height is 10-30 cm. Sweep netting was used in taller vegetation as well. Main vegetation associations at each site were homogeneous. At each site, 400 vigorous sweeps were taken while steadily walking through the habitat, and the entire catch transferred directly to a 3.8 L sealable plastic bag containing a killing agent, ethyl acetate. Processing the catch in this way prevented the escape of captured specimens. Upon return to the laboratory, the specimens were stored in a freezer for later sorting and identification.

Pitfall traps were constructed using 250 ml plastic cups (Photo. 11). To prevent predation among the invertebrates collected in the trap, the cups were half-

Table 1. Geographic coordinates of collection sites (playas in the Southern High Plains of Texas) listed in species accounts and Table 2.

		Coordinates	
County	Playa name/number	Latitude	Longitude
Briscoe	Playa CP4/D = F20 (2004)	N33°24'0.83"	W101°19'20.12"
	Playa CP6/F = Br59 (2004)	N34°24'43.18"	W101°17'11.17"
	Playa BR1 = GS1 = CR1	N34°29'59.14"	W101°23'51.00"
	Playa BR1A	N34°30'07.85"	W101°23'32.24"
	Playa BR4 = GS4	N34°28'49.51"	W101°9'20.74"
	Playa BR5 = GS5	N34°29'04.92"	W101°9'54.36"
	Playa BR13	N34°32'12.34"	W101°17'37.21"
	Playa BR19	N34°28'19.02"	W101°15'32.62"
	Playa BR25	N34°27'57.49"	W101°9'13.61"
	Playa BR59	N34°24'40.90"	W101°17'16.55"
	Playa BR67	N34°27'50.80"	W101°18'30.71"
Carson	Pantex Playa 1	N35°19'41.57"	W101°33'07.38"
	Pantex Playa 2	N35°19'8.56"	W101°35'22.29"
	Pantex Lake	N35°22'54.40"	W101°30'00.67"
Crosby	playas (1994 Hall)	see Hall (1997)	
Floyd	Playa #10 (Hall)	N33°51'33"	W101°20'13"
	Brett Marble Playa	N35°30'	W101°20'
	Carthel Brothers East Playa	N33°57'	W101°24'
	Mack Howard Playa	N34°00'	W101°32'
	Mitchell Corner Playa (1994)	N33°58'	W101°29'
	Mitchell East Playa (1994)	N33°58'	W101°29'
	Playa CP1	N34°01'14"	W101°11'34"
	Playa CP2	N34°01'22"	W101°11'04"
	Playa CP3	N34°00'58"	W101°11'07"
	Playa CP4	N33°57'09"	W101°10'45"
	Playa CP5	N33°56'51"	W101°11'32"
	Playa CP6	N33°57'10"	W101°07'18"
	Playa GS1 (2003)	N33°56'19.59"	W101°7'8.43"
	Playa GS1/A (2004) = F41	N34°1'18.17"	W101°4'10.32"
	Playa GS3	N33°55'57"	W101°12'10"
	Playa GS5	N33°56'37"	W101°10'12"
	Playa GS6	N34°02'56"	W101°16'34"
Hale	playas (1994 Hall)	see Hall (1997)	
Lubbock	Playa A (1981)	N33°28'	W101°50'
	Playa B (1981)	N33°29'	W101°50'
	Playa Cedar Ave. (1997)	N33°30'	W101°50'
Swisher	Playa S6	N34°32'37.64"	W101°34'14.81"
	Playa S25	N34°29'11.08"	W101°33'5.044"
	Playa S49	N34°34'33.38"	W101°35'19.61"

filled with a 1:1 mixture of 70% isopropyl alcohol and propylene glycol (pet-safe antifreeze). The mixture did not evaporate in the time required for the traps to be open for one sampling period (seven days). To prevent access by small vertebrates, a cover constructed from linoleum floor tiles (30.5 cm square, beige with a woodgrain appearance) was placed over the cup, elevated about 1 cm above the surface by braces at the corners. For the three playa edge transects, 10 traps were spaced 10 m apart in irregular "line" transects following the shore margins. In the adjoining grasslands, rectangular transects consisting of 10 pitfall traps were used. Traps were dug in two rows of five, with the traps in each row lying 10 m apart and the rows set 10 m apart.

Sørenson (Sørenson 1948; Brower and Zar 1984) coefficients (CC_s) were calculated to compare the spider faunas of the playa edges with their corresponding grasslands at the Pantex sites. The calculation is as follows:

$CC_s = 2c/s_1 + s_2$ where,

c = the number of species shared between the two compared communities, and

s_1 and s_2 = count of species found in Community 1 and Community 2, respectively.

Playa vegetation.—Playa vegetation can cover the entire wetland basin or exist only as a fringe. Vegetation composition and density varies with surrounding landuse (e.g., cropland versus native grassland) and the recent hydrologic regime (Anderson and Smith 2000; Smith and Haukos 2002; Smith 2003). Plants common to playas (> 50% occurrence) include western wheatgrass (*Agropyron smithii* Rydb.), saltmarsh aster (*Aster subulatus* Michx.), buffalo grass [*Buchloe dactyloides* (Nutt.) Engelm.], lamb's quarters (*Chenopodium album* L.), narrow-leaved goosefoot [*Chenopodium leptophyllum* (Moq.) Nutt. ex S. Wats.], horse-weed [*Conyza canadensis* (L.) Cronq.], barnyard grass [*Echinochloa crusgalli* (L.) Beauv.], spikerush (*Eleocharis macrostachya* Britt.), curly-top gumweed [*Grindelia squarrosa* (Pursh)], annual sunflower (*Helianthus annuus* L.), Texas blueweed (*Helianthus ciliaris* DC.), little barley (*Hordeum pusillum* Nutt.), summer cypress [*Kochia scoparia* (L.) Schrad.], frog-fruit [*Lippa nodiflora* (L.) Michx.], cheezeweed [*Malvella leprosa* (Oretaga) Krapov.], spotted evening primrose (*Oenothera canescens* Toor. and Frém), vine-mesquite (*Panicum obtusum* H.B.K.), Pennsylvania smartweed (*Polygonum pensylvanicum* L.), spreading yellow cress [*Rorippa sinuata* (Nutt.) Hitcho.], curly dock (*Rumex crispus* L.), silver-leaf nightshade (*Solanum elaeagnifolium* Cav.), and prostrate vervain (*Verbena bracteata* Lag. and Rodr.) (Smith 2003:59).

RESULTS

Results of arachnid collections from playas in Briscoe, Carson, Crosby, Floyd, Hale, Lubbock, and Swisher Counties are listed below in the species accounts. Overall, we found five, 12, 78, and 17 species associated with playas, aquatic and inundated vegetation, emergent vegetation, playa edges, and occurring only in surrounding grassland habitats, respectively. We found four taxa of water mites and one chigger species (*Hannemania* sp.) that has anurans as a host. Arachnida of the playas and associated grasslands from the Pantex Plant, Carson County, are also detailed in Table 2. Because terrestrial mites could not be fully identified, non-acarine arachnid communities are compared below. Seventy-nine non-acarine arachnid species were collected at the playa edges and adjoining grasslands at the Pantex Plant site. Species richness at the three playa edge sites was comparable, ranging from 29-37 species. Similar richness was also observed in the adjoining grasslands (29-42 species). Despite overall similarities in species numbers, the species composition of the playa edges was different from that of the adjoining grasslands. Sørenson coefficients (CC_s) for Playa 1 edge and Playa 1 grassland = 0.50 (= 50% similarity); CC_s for Playa 2 edge and Playa 2 grassland = 0.56, and CC_s for Pantex Lake edge and Pantex Lake grassland = 0.62.

Of the 79 total species from the six sites at the Pantex Plant, 23 (29.5%) were found only in the playa edge habitat and included: *Allocosa* sp., *Ceraticelus* sp., *Drassodes auriculoides*, *Drassyllus depressus*, *Drassyllus notonus*, *Drassyllus* sp., *Eumesosoma roeweri*, *Gnaphosa altudona*, *Habronattus coecatus*, *Haplodrassus* sp., *Hogna helluo*, *Iviella* new species,

Table 2. Arachnids from Pantex Plant, Carson County, Texas. Data from 2-year study on Pantex macroinvertebrates (Sissom 2003). Included are data from playa edge sites and the adjoining grasslands. Collecting methods are general hand collecting (GC), sweep netting (SN), pitfall trapping (PT), where an X is presence and a dash (-) is absence. Abundances indicated are rare (R= 1-5 specimens), uncommon (U= 6-10 specimens), common (C= 11-25 specimens), abundant (A= >26 specimens; total number also recorded), but because of uncertainties of identification, Acari were lumped for counting.

	Playa 1 edge	Playa 1 grassland	Playa 2 edge	Playa 2 grassland	Pantex Lk edge	Pantex Lk grassland	GC	SN	PT	Month
ARANEAE										
Araneidae										
Acanthepeira stellata	-	-	R	-	-	R	X	-	-	VIII
Argiope trifasciata	-	-	R	A, 31	R	R	X	X	-	VII-X
Hypsosinga funebris	R	-	-	R	-	-	-	X	-	IX
Neoscona oaxacensis	R	-	-	R	R	R	X	X	-	VII-VIII
Clubionidae										
Clubiona abbotti	-	R	-	-	-	-	-	-	X	VII-VIII
Corinnidae										
Castianeira descripta	R	-	-	-	R	R	-	X	X	VII-X
Meriola decepta	R	-	R	-	-	-	-	-	-	VII-VIII
Scotinella sp.	R	R	-	R	U	R	-	-	X	VII-VIII, IX
Dictynidae										
Dictyna coloradensis	R	R	R	R	-	R	X	X	X	V, VII-IX
Iviella new species	-	-	R	-	-	-	-	-	X	VII-VIII
Trachylathys new species	-	-	R	-	-	-	-	-	X	V, VII-VIII
Gnaphosidae										
Drassodes auriculoides	R	-	-	-	-	-	-	-	X	VIII
Drassodes gosiutus	-	R	U	A, 27	-	R	-	-	X	V, IX-X
Drassyllus cerrus	-	-	C	-	-	R	-	-	-	V
Drassyllus depressus	R	-	-	-	-	-	-	-	X	V
Drassyllus inanus	-	C	R	R	-	-	-	-	X	V, VII-VIII
Drassyllus lepidus	-	C	C	U	R	C	-	-	X	VII, VIII
Drassyllus notonus	R	-	-	-	-	-	-	-	X	V
Drassyllus sp.	-	-	R	-	-	-	-	-	X	V
Gnaphosa altudona	-	-	R	-	-	-	-	-	X	VII
Haplodrassus sp.	R	-	-	-	-	-	-	-	X	V

Table 2 (cont.)

Micaria sp.	-	R	R	R	R	C	X	-	X	V, VII-IX
Nodocion utus	-	-	-	-	-	R	X	-	X	V, VII
Synaphosus paludis	-	-	-	-	R	-	-	-	X	VII, X
Zelotes aiken	-	-	-	R	-	-	-	-	X	V
Zelotes gertschi	R	R	R	R	R	R	-	-	X	VII-VIII
Zelotes lasalanus	-	-	-	R	-	-	-	-	X	V
Zelotes sp.	R	R	-	R	R	R	-	-	X	VIII-X
Hahniidae										
Hahnia cinerea	-	-	-	R	-	-	-	-	X	V
Neoantistea mulaiki	U	-	R	R	U	-	-	-	X	V, VII-X
Linyphiidae										
Agyneta sp.	R	-	R	R	R	R	-	-	X	V, VII-IX
Ceraticelus sp.	R	-	-	-	-	-	-	-	X	VII
Ceratinella brunnea	-	R	-	R	-	-	-	-	X	V, VII-VIII
Erigone sp.	-	R	-	-	-	-	-	-	X	V
Islandiana sp.	-	R	-	-	R	R	-	-	X	V
Tennesseellum formica	-	-	-	-	R	-	-	-	X	V
undetermined genus & sp.	R	R	-	-	R	-	-	-	X	VII-VIII
Lycosidae										
Allocosa sp.	-	-	-	-	R	-	-	-	X	V, VIII
Alopecosa sp.	-	-	R	R	-	R	-	-	X	V
Hogna antelucana	A, 56	U	A, 48	U	A, 58	R	X	-	X	V, VII-IX, X
Hogna carolinensis	R	-	R	-	R	R	-	-	X	VII-VIII, X
Hogna helluo	R	-	-	-	-	-	-	-	X	V
Pardosa spp. undetermined	C	R	U	-	U	U	-	-	X	VII-VIII, X
Schizocosa mccooki	U	R	C	C	C	C	X	-	X	V, VII-X
Schizocosa sp. 2	-	-	-	-	-	R	-	-	-	V
Trochosa terricola	R	R	-	R	-	-	-	-	X	VIII, X
Miturgidae										
Teminius affinis	-	R	-	R	R	-	-	-	X	V, VIII-IX

Table 2 (cont.)

	Playa 1 edge	Playa 1 grassland	Playa 2 edge	Playa 2 grassland	Pantex Lk edge	Pantex Lk grassland	GC	SN	PT	Month
Oxyopidae										
Oxyopes salticus	C	-	U	R	R	R	-	X	X	VII-VIII
Philodromidae										
Ebo pepinensis	U	A, 41	U	R	U	A, 55	-	-	X	V, VII-X
Philodromus pratariae	R	U	C	A, 158	R	R	X	X	X	VII-IX
Thanatus formicinus	R	R	R	R	-	R	X	X	X	V, VII-X
Tibellus duttoni	R	R	C	C	R	R	X	X	-	V, VII-IX
Salticidae										
Habronattus coecatus	C	-	C	-	-	-	-	X	X	V, VII-X
Habronattus cognatus	-	R	R	-	-	-	-	X	X	VII-VIII
Habronattus texanus	C	C	C	R	A, 28	A, 35	-	X	X	VIII-X
Marpissa pikei	R	-	-	-	-	-	-	-	X	VII-IX
Peckhamia sp.	-	-	-	R	-	-	-	X	-	VIII
Pelegrina galathea	-	-	R	-	-	-	-	X	-	VIII
Pelegrina proterva	-	R	-	-	-	-	-	X	-	V
Pellenes limatus	-	-	R	-	-	-	-	X	-	IX
Phidippus apacheanus	-	-	R	R	-	R	X	X	X	IX-X
Phidippus clarus	-	-	R	-	-	-	X	-	-	VIII
Phidippus pius	-	-	R	-	-	-	-	-	X	VIII
Phidippus texanus	-	-	R	R	-	R	X	-	X	VII-VIII, X
Phidippus spp. immatures	U	C	A, 38	A, 27	R	C	-	-	-	V-X
Poultonella alboimmaculata	-	R	-	-	R	R	X	X	-	VII
Sassacus papenhoei	R	R	C	A, 41	R	R	X	X	-	VII-X
Sitticus sp.	-	R	-	-	-	U	-	-	X	V, VII-VIII
Tetragnathidae										
Tetragnatha laboriosa	U	R	C	R	A, 26	R	X	X	-	V-X
Theraphosidae										
Aphonopelma hentzi	-	C	-	C	R	C	X	-	-	V, VII-X

Table 2 (cont.)

Theridiidae										
Euryopis sp.	-	-	-	-	-	R	X	-	-	VIII
Latrodectus hesperus	-	-	-	R	-	R	X	-	X	V, VII-VIII
undetermined genus & sp.	-	-	-	R	-	-	X	-	-	IX
Thomisidae										
Misumenoides formosipes	-	-	-	R	-	-	-	X	-	IX
Misumenops celer	A, 70	A, 46	A, 69	A, 169	A, 253	A, 340	-	X	-	V, VII-X
Misumenops coloradensis	-	-	-	-	-	R	-	X	-	X
Modysticus modestus	-	-	R	R	-	-	-	-	X	VII-VIII, X
Xysticus pellax	-	C	C	C	R	A, 34	X	X	X	VII-X
Xysticus robinsoni	R	-	-	-	R	-	-	-	X	V, VII, IX
Xysticus texanus	-	-	R	-	R	-	-	-	X	VII
Xysticus sp. immatures	A, 50	C	A, 26	C	A, 28	C	X	X	X	V, VII-IX
Titanoecidae										
Titanoeca americana	-	R	R	R	R	U	X	-	X	V, IX-X
OPILIONES										
Sclerosomatidae										
Eumesosoma roeweri	R	-	-	-	R	-	-	-	X	VIII, X
Trachyrhinus marmoratus	-	-	-	-	-	R	-	-	X	VIII
ACARI (no aquatic taxa)										
all lumped totals	A, 382	A, 173	A, 818	A, 582	A, 198	A, 52	X	X	X	V-X
PARASITIFORMES										
Ixodidae										
Dermacentor variabilis	-	-	-	-	-	R	X	-	-	V, VII
PROSTIGMATA										
Anystidae										
undetermined genus & sp.	-	-	-	-	-	R	-	-	X	VII
Caeculidae										
undetermined genus & sp.	-	-	-	R	-	-	-	-	X	V, VII-VIII
Erythraeidae										
undetermined genus & sp. 1	A	A	A	A	A	A	-	-	X	V, VII-X

Table 2 (cont.)

	Playa 1 edge	Playa 1 grassland	Playa 2 edge	Playa 2 grassland	Pantex Lk edge	Pantex Lk grassland	GC	SN	PT	Month
undetermined genus & sp. 2	R	R	R	R	R	R	-	-	X	VII-VIII
undetermined genus & sp. 4	-	-	-	-	R	-	-	-	X	VII
Trombidiidae										
undetermined genus & sp.	R	R	-	-	-	R	-	-	X	V, VII-VIII
SARCOPTIFORMES										
Galumnidae										
undetermined genus & sp.	-	-	R	R	-	-	-	-	X	V, VII-VIII, X
Number of species	31	29	37	42	29	33				

Marpissa pikei, *Meriola decepta*, *Pelegrina galathea*, *Pellenes limatus*, *Phidippus clarus*, *Phidippus pius*, *Synaphosus paludis*, *Tennesseellum formica*, *Trachylathys* new species, *Xysticus robinsoni*, and *Xysticus texanus*. An undetermined mite (Erythraeidae: genus and sp. 4) was also present but not included in the total. Each playa edge had species that were not recorded at other sites: Playa 1, seven species [*Ceraticelus* sp., *Drassodes auriculoides*, *Drassyllus depressus*, *Drassyllus notonus*, *Haplodrassus* sp., *Hogna helluo*, *Marpissa pikei*]; Playa 2, eight species [*Drassyllus* sp., *Gnaphosa altudona*, *Iviella* new species, *Pelegrina galathea*, *Pellenes limatus*, *Phidippus clarus*, *Phidippus pius*, *Trachylathys* new species]; Pantex Lake, three species [*Allocosa* sp., *Synaphosus paludis*, *Tennesseellum formica*]. Five species were found at two of the three playas [*Eumesosoma roeweri*, *Habronattus coecatus*, *Meriola decepta*, *Xysticus robinsoni*, *Xysticus texanus*].

Ten true grassland species were found in all grasslands and playa edges: Erythraeidae genus and sp. 1, Erythraeidae genus and sp. 2, *Habronattus texanus*, *Hogna antelucana*, *Misumenops celer*, *Philodromus pratariae*, *Sassacus papenhoei*, *Schizocosa mccooki*, *Tetragnatha laboriosa*, *Tibellus duttoni*, *Zelotes gertschi*.

Twenty species were found only in the grasslands above the playas at Pantex: *Ceratinella brunnea*, *Clubiona abbotti*, *Dermacentor variabilis*, *Erigone* sp., *Euryopis* sp., *Hahnia cinerea*, *Latrodectus hesperus*, *Misumenoides formosipes*, *Misumenops coloradensis*, *Nodocion utus*, *Peckhamia* sp., *Pelegrina proterva*, *Schizocosa* sp. 2, *Sitticus* sp., Theridiidae undetermined genus and sp., *Zelotes aiken*, *Zelotes lasalanus*, *Trachyrhinus marmoratus*, undetermined Anystidae genus sp., undetermined Caeculidae genus and sp. Of these, three [*Clubiona abbotti*, *Dermacentor variabilis*, *Latrodectus hesperus*] were found associated with playas in other counties (see species accounts).

Four state, 41 Southern High Plains, and 63 first county distribution records are documented.

SPECIES ACCOUNTS

In addition to providing an arachnid checklist, we have included details that will be useful for future researchers collecting and identifying samples from playas and will serve as a starting point for studies on the grassland arachnids in the Southern High Plains. We have illustrated (gray-scale drawings and color photographs) many of the common species as well as examples of each body type. These illustrations used in combination with illustrations of the genitalia should serve to recognize the particular taxa. Many of the photographs have been rotated 90° so that they could be presented in a larger format. Hopefully, this presentation will not suggest arachnids are always walking up or down slopes. For identifying spiders the starting point is the keys and illustrations in Ubick et al. (2005), Kaston (1981), and Breene et al. (1993); for Opiliones, Edgar (1990); for Solifugae, Muma (1951) and Brookhart and Brookhart (2006); for mites in water, Smith et al. (2001); and for Acari in general, Krantz (1978).

CLASS ARACHNIDA
SUBCLASS ARACHNINA
ORDER ARANEAE
Family Araneidae

Acanthepeira stellata (Walckenaer 1805)
Fig. 2

Identification.—Levi 1976.

Playa record.—Pantex Playa 2 edge, Carson County (first Southern High Plains, county record) (Sissom 2003) (Table 2).

Distribution.—In Texas, it appears (Dean 2007) that *A. stellata* is common in southern and eastern Texas. No records are known from the High Plains, but Levi (1976) maps a few localities on the northeastern edge of the Rolling Plains.

Comment.—Levi (1976) reported this spider from meadows and fields and noted it was common when found. He also relayed that it has been observed ballooning at 300-m height. It is a widely distributed species from Mexico north to Manitoba and east to Florida and Ontario.

Argiope trifasciata (Forskål 1775)
Fig. 3, Photo. 13

Identification.—Levi 1968, 2004; Dondale et al. 2003. Eggsacs are cup-shaped (Photo. 13) and hidden in vegetation next to web.

Playa record.—Pantex Playa 2 edge, Pantex Lake edge, Carson County (first county record), Texas (Sissom 2003).

Distribution.—Dean (2007) listed this spider from throughout Texas, except for the Far West, including three counties from the High Plains (Garza, Lubbock, Oldham). Elsewhere, this orb-weaving spider is recorded (Levi 2004) from southern British Columbia to Nova Scotia, south to Chile (including the West Indies), and numerous localities in the Old World (absent from Europe) and South Pacific Islands.

Comment.—Dondale et al. (2003) reported webs are made among weeds and tall grass in fields and meadows.

Hypsosinga funebris (Keyserling 1892)

Identification.—Levi 1972 (listed as *Hypsosinga singaeformis*), 1975; Dondale et al. 2003.

Playa record.—Pantex Playa 1 edge, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) listed this spider from Howard County on the High Plains, and scattered localities in central and southern Texas. Elsewhere it is recorded from southern Canada, south to California and Texas.

Comment.—Levi (1972) noted that this spider has been collected from grassy fields, meadows, as well as from ground litter.

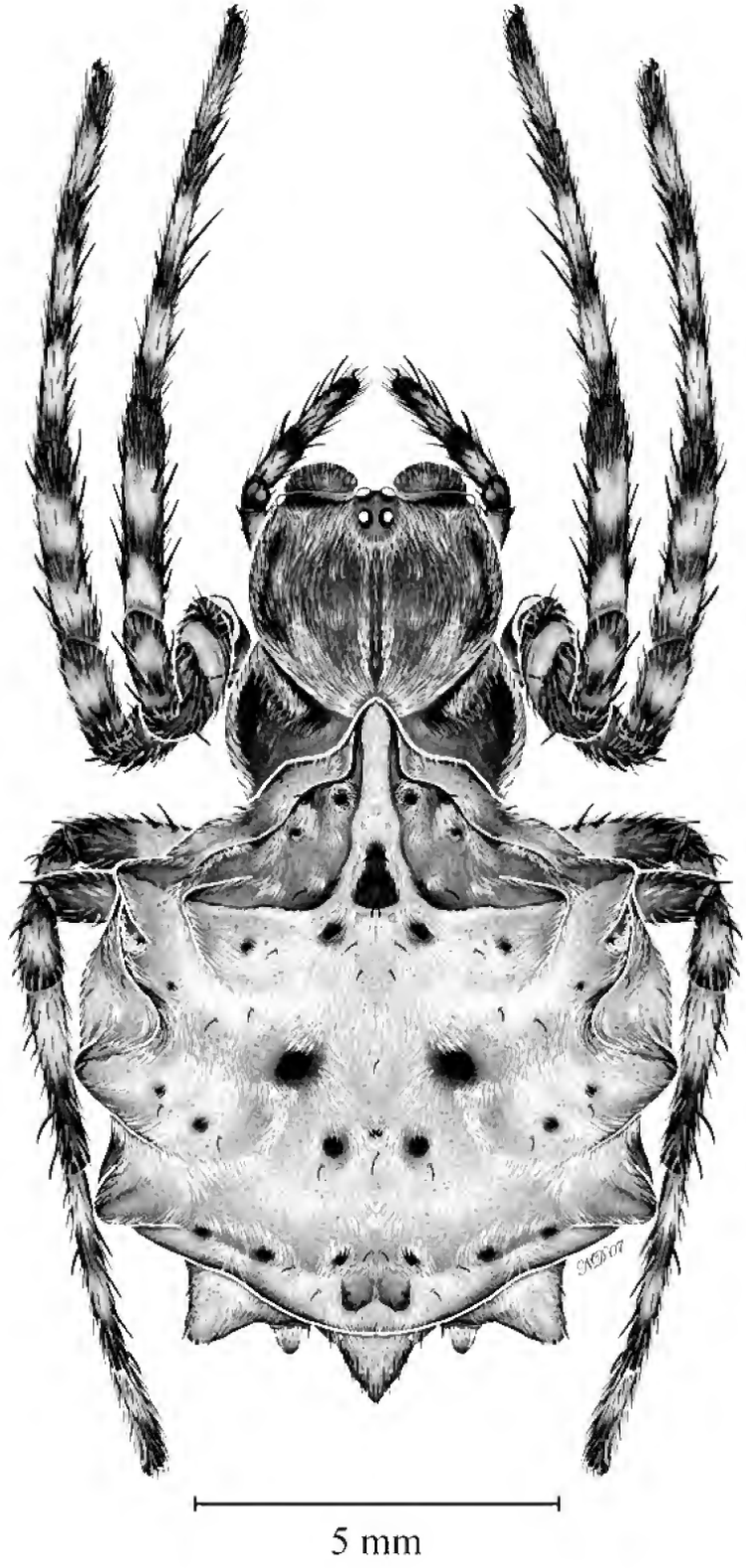

Figure 2. *Acanthepeira stellata* (Araneidae) female.

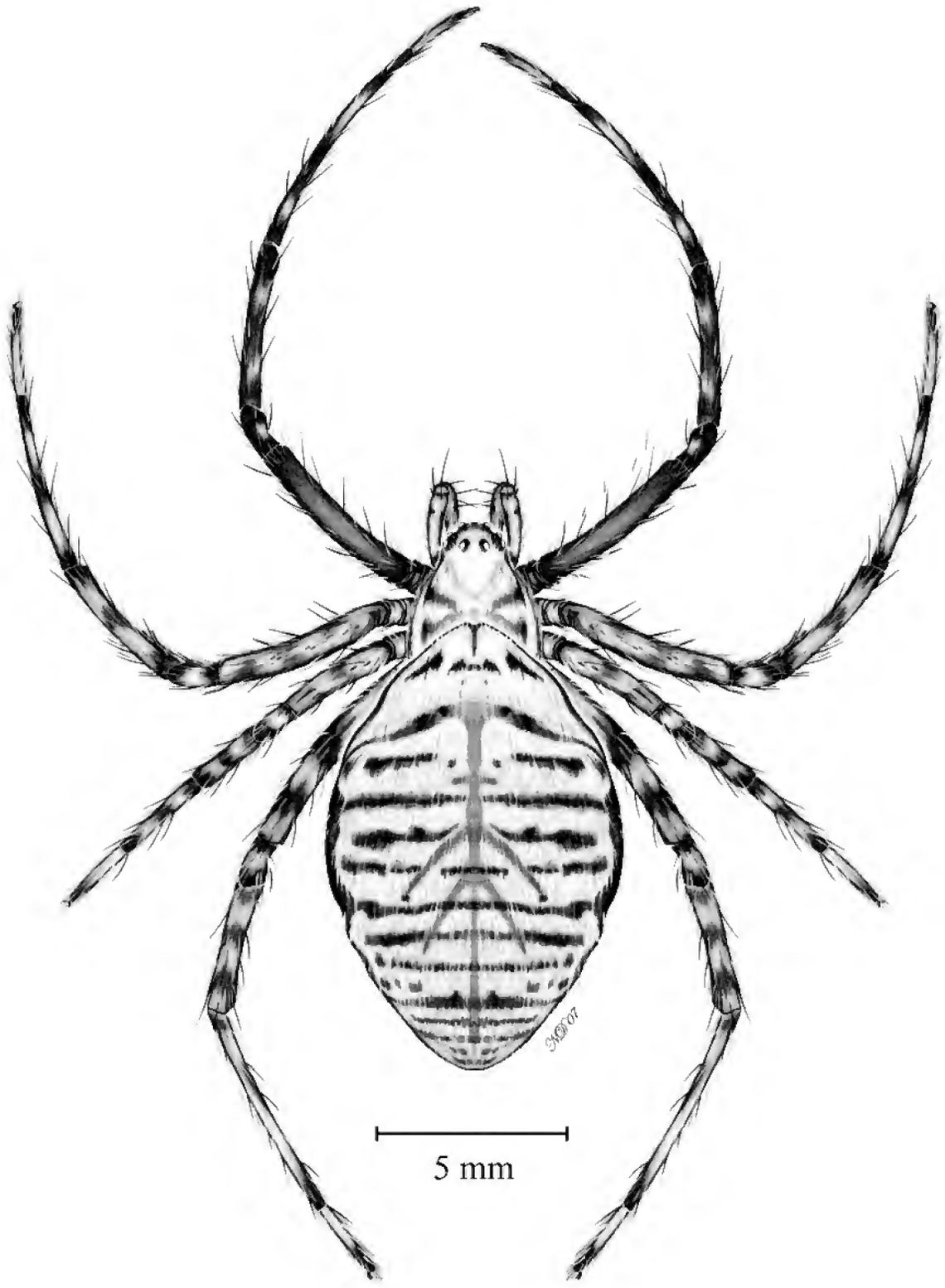

Figure 3. *Argiope trifasciata* (Araneidae) female.

Neoscona oaxacensis (Keyserling 1864)
Photo. 14

Identification.—Berman and Levi 1971.

Playa record.—Pantex Playa 1 edge, Pantex Lake edge, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) listed this orb-weaver from North and Central Texas, as well as Lubbock County on the Southern High Plains.

Family Clubionidae
Clubiona abbotti L. Koch 1866

Identification.—Edwards 1958; Dondale and Redner 1982.

Playa record.—Immatures of what are likely this species were obtained over water in Mitchell East Playa (1994), Floyd County (first Southern High Plains, county record), Texas.

Distribution.—One specimen was collected in the grassland above Pantex Playa 1 and several other males and females were collected in open grasslands, Carson County (first county record), Texas (Sissom 2003) (Table 2). Dean (2007) listed this spider from the eastern half of the Texas, not including the High Plains. Elsewhere it is recorded from southern Canada and much of U.S.A., less common on Pacific Coast and the Southwest (Edwards 1958).

Family Corinnidae
Castianeira descripta (Hentz 1847)
Photo. 15

Identification.—Reiskind 1969.

Playa record.—Pantex Playa 1 edge, Pantex Lake edge, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) listed this species from throughout Texas except for the High Plains and Far West Texas. Dean also listed *Castianeira crocata* (Hentz 1847) from Lubbock County, which is on the High Plains of Texas. These two have often been misidentified because of the striking black and red abdominal patterns that are superficially similar to each other (Reiskind 1969). The genitalia should be examined for a correct identification.

Castianeira longipalpa (Hentz 1847)

Identification.—Reiskind 1969.

Playa record.—Playa Cedar Avenue, Lubbock County (first southern High Plains, county record), Texas.

Distribution.—Dean (2007) listed this spider from central and eastern Texas, without records from the High Plains. Otherwise known from Wisconsin, Maryland to Georgia, west to Texas and Colorado (Reiskind 1969).

Meriola decepta Banks 1895
Fig. 4

Identification.—Platnick and Shadab 1974 (as *Trachelas deceptus*); Platnick and Ewing 1995.

Playa record.—Pantex Playa 1 and 2 edges, Carson County (first Southern High Plains, county record), (Sissom 2003) (Table 2); Carthel Brothers East Playa, Floyd County (new county record), Texas.

Distribution.—Dean (2007) listed this species from the eastern, central and southern parts of Texas. Elsewhere it is recorded from U.S.A. to Guatemala, Colombia, Ecuador, Peru, and Brazil (Platnick 2007).

Comment.—The record from Floyd County was from emergent vegetation.

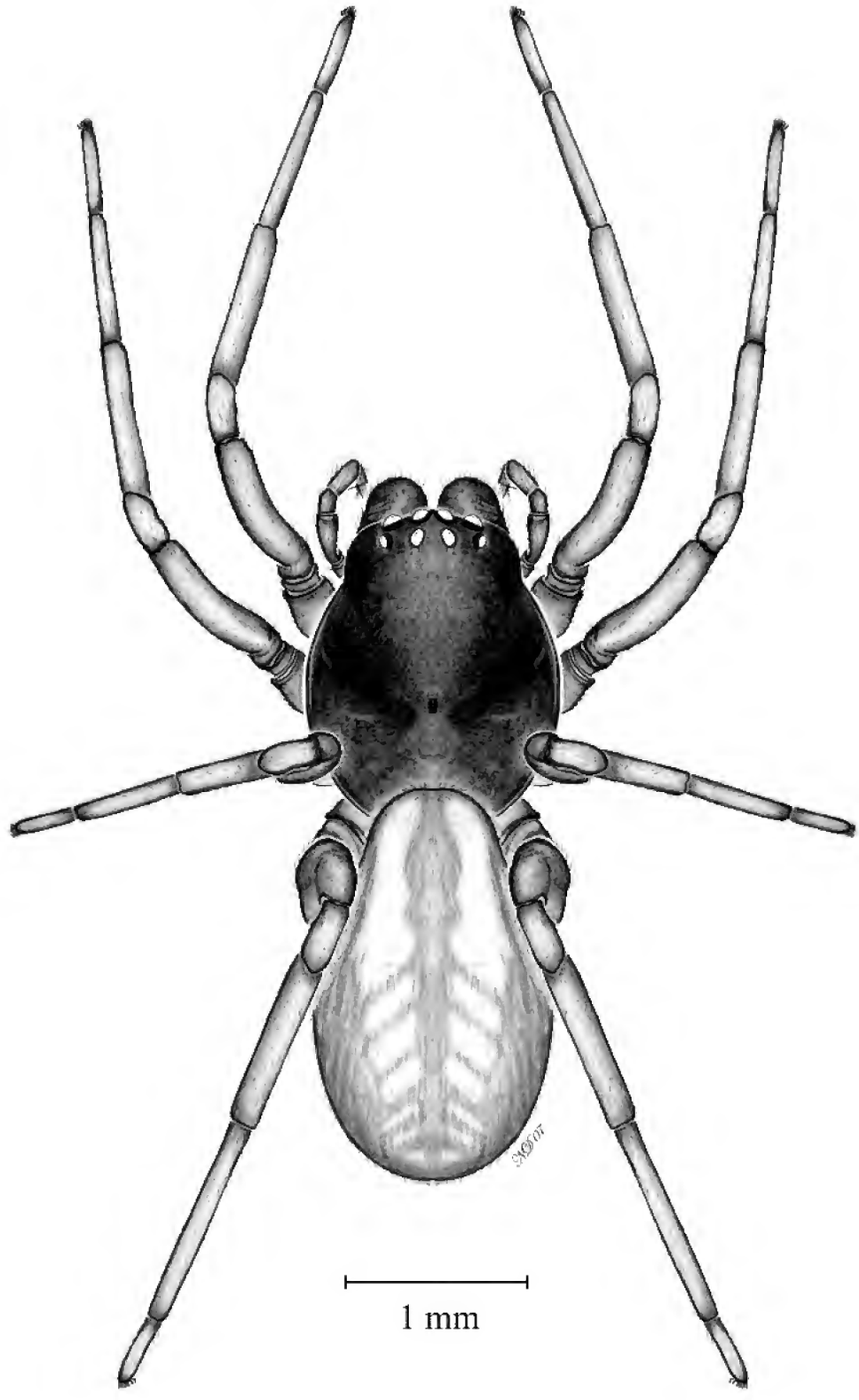

Figure 4. *Meriola decepta* (Corinnidae) female.

***Scotinella* sp.**

Identification.—Dondale and Redner 1982; Paquin and Dupérré 2003.

Playa record.—Pantex Lake edge and Playa 1 edge, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—This small spider was also collected in the grasslands above the playas listed above. Otherwise it is unknown until this species is identified. Dean (2007) listed only two species of this genus from Texas (Central and far Southwest), but neither appear to be this species.

Family Dictynidae
Dictyna coloradensis Chamberlin 1919
Fig. 5, Photo. 16

Identification.—Chamberlin and Gertsch 1958.

Playa record.—Pantex Playa 1 and 2 edges and adjacent higher grasslands, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Reported as occurring in Canada and the northern U.S.A., south in the Plains and Rocky Mountains to Arizona, New Mexico, and Texas (Chamberlin and Gertsch 1958). In Texas, this spider is recorded from the east and north-central portions (Dean 2007).

Comment.—There is another unidentified species of *Dictyna* at Pantex Plant but only a single female was collected in a grassland (Site 3, Sissom 2003).

***Iviella* n. sp.**

Identification.—Chamberlin and Gertsch 1958

Playa record.—Pantex Playa 2 edge, Carson County (Sissom 2003) (Table 2).

Distribution.—Known only from above record.

***Tricholathys* n. sp.**

Identification.—Chamberlin and Gertsch 1958.

Playa record.—Pantex Playa 2 edge, Carson County (Sissom 2003) (Table 2). There were two immatures reported as amaurobiids by Anderson (1997) from Floyd County. These are elongated cribellate spiders with entire cribellum and may be this genus and species.

Distribution.—Known with certainty only from Carson County record above.

Comment.—The record from Floyd County was from emergent vegetation.

Family Gnaphosidae
Drassodes auriculoides Barrows 1919

Identification.—Platnick and Shadab 1976.

Playa record.—Pantex Playa 1 edge, Carson County (first state, Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Platnick and Shadab (1976) recorded this ground spider from Arkansas and Tennessee northeast to Wisconsin and Massachusetts.

Drassodes gosiutus Chamberlin 1919

Identification.—Platnick and Shadab 1976.

Playa record.—Pantex Playa 2 edge, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) listed the species at grasslands adjacent to Pantex Playa 1 and 2. Dean (2007) recorded this ground spider from Central and North-central Texas.

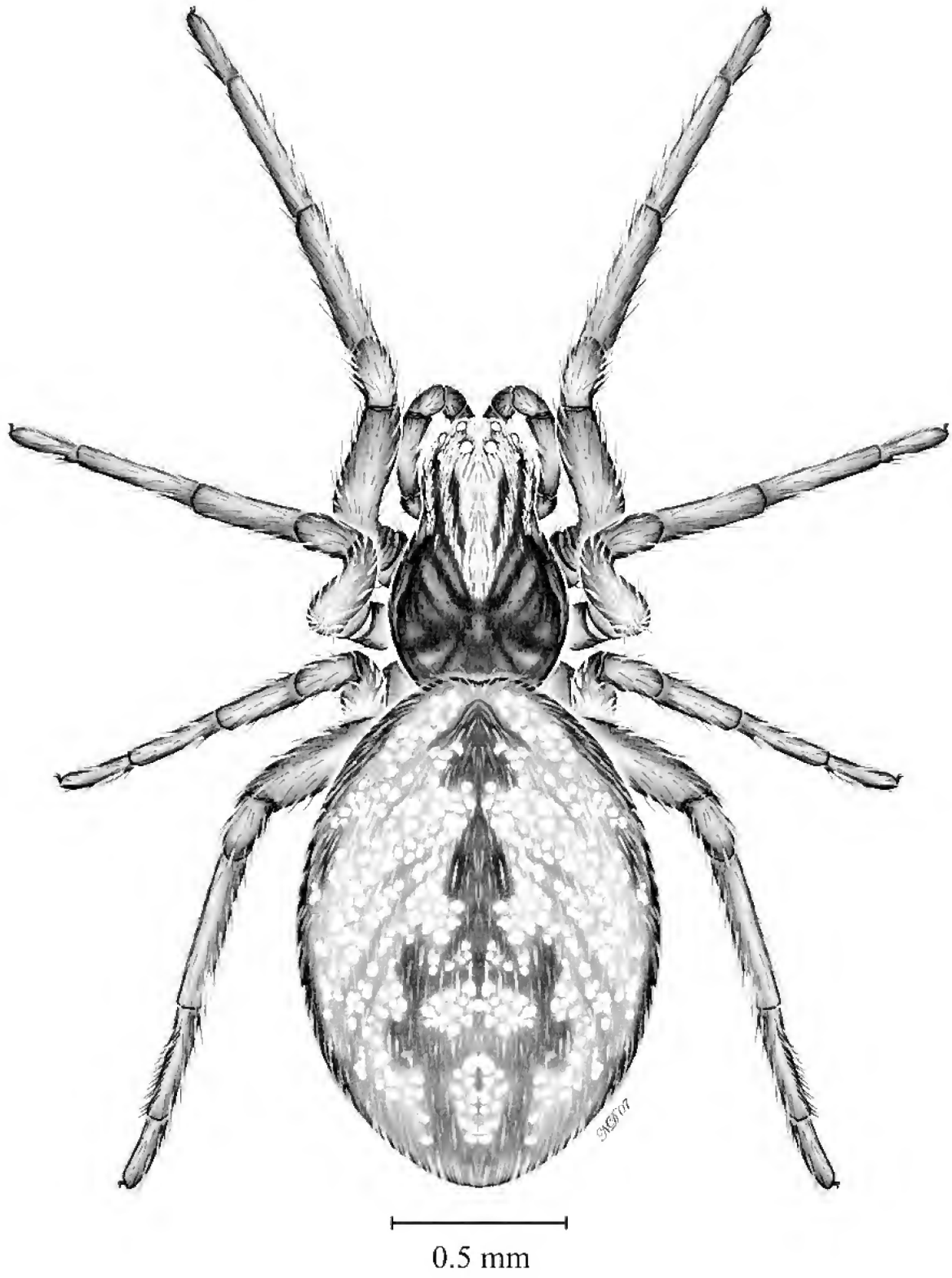

Figure 5. *Dictyna coloradensis* (Dictynidae) female.

Drassyllus cerrus Platnick and Shadab 1982

Identification.—Platnick and Shadab 1982.

Playa record.—Pantex Playa 2 edge, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) listed the species also at grassland adjacent to Pantex Lake. The only other records known are from southwestern Texas: Val Verde County (Platnick and Shadab 1982).

Drassyllus depressus (Emerton 1890)

Identification.—Platnick and Shadab 1982.

Playa record.—Pantex Playa 1 edge, Carson County (first state, Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Platnick and Shadab (1982) listed this spider from southern Canada south to Oregon, New Mexico, Kansas, Arkansas, and Virginia.

Drassyllus inanus Chamberlin and Gertsch 1940

Identification.—Platnick and Shadab 1982.

Playa record.—Pantex Playa 2 edge, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also listed this spider from grasslands above Pantex Playa 1 and 2. Dean (2007) recorded this spider from central and southeastern Texas. Elsewhere, it is recorded from Utah and southeastern Texas (Platnick and Shadab 1982).

Drassyllus lepidus (Banks 1899)
Fig. 6

Identification.—Platnick and Shadab 1982.

Playa record.—Pantex Playa 2 and Pantex Lake edges, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—This spider is also known from grasslands above Pantex Lake, Playa 1 and 2 (Sissom 2003). Dean (2007) listed this spider from central, southern, and eastern Texas. Elsewhere, it is recorded from scattered localities from Utah to South Carolina, south to Florida, Arizona to Jalisco and State of México (Platnick and Shadab 1982).

Drassyllus notonus Chamberlin 1928

Identification.—Platnick and Shadab 1982.

Playa record.—Pantex Playa 1 edge, Carson County (first Southern High Plains, county record), (Sissom 2003) (Table 2); Mack Howard Playa, Floyd County (new county record), Texas

Distribution.—Dean (2007) listed this species from central, and eastern Texas. Platnick and Shadab (1982) recorded this ground spider from Oregon to Louisiana, south to San Luis Potosí.

Comment.—The record from Floyd County was from emergent vegetation.

***Drassyllus* sp.**

Identification.—Platnick and Shadab 1982.

Playa record.—Pantex Playa 2 edge, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Unknown until species is identified.

Gnaphosa altudona Chamberlin 1922

Identification.—Platnick and Shadab 1975a.

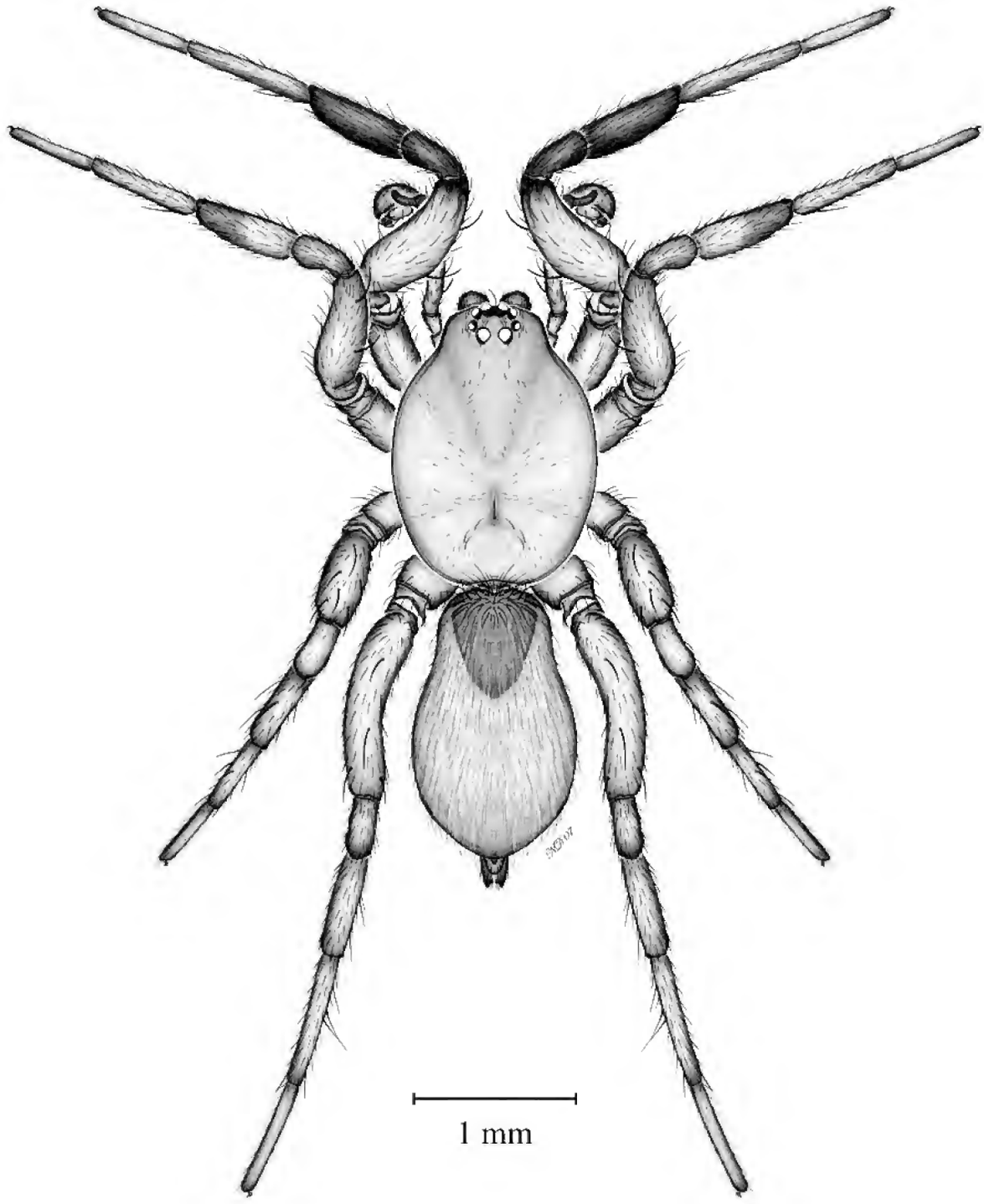

Figure 6. *Drassyllus lepidus* (Gnaphosidae) male.

Playa record.—Pantex Playa 2 edge, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) listed the only known localities for this spider from scattered counties around Texas, except for the High Plains.

***Haplodrassus* sp.**

Identification.—Platnick and Shadab 1975b.

Playa record.—Pantex Playa 1 edge, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Unknown until species is identified. Dean (2007) listed two species of this genus from Texas that range into the Rolling Plains but none are recorded from the Southern High Plains: *Haplodrassus chamberlini* Platnick and Shadab 1975b and *Haplodrassus signifer* (C. L. Koch 1839).

***Micaria* sp.**

Identification.—Platnick and Shadab 1988.

Playa record.—Pantex Lake, Playa 2 edge, Carson County (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also reported it from grasslands above Pantex Lake and Playas 1 and 2. Otherwise the distribution is unknown until species is identified. Dean (2007) listed 16 species of this genus from Texas; two of which are recorded from the High Plains: *Micaria deserticola* Gertsch 1933 (Howard County) and *Micaria pulicaria* (Sundevall 1831) (Lubbock County).

Synaphosus paludis
(Chamberlin and Gertsch 1940)

Identification.—Platnick and Shadab 1980.

Playa record.—Pantex Lake, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) listed this species from the eastern half of the state. Platnick and Shadab (1980) recorded it from Illinois to Georgia to southern Texas.

Zelotes gertschi Platnick and Shadab 1983
Photo. 17

Identification.—Platnick and Shadab 1983.

Playa record.— Playa Cedar Avenue (1997), Lubbock County; Pantex Lake edge, Playa 1 and 2 edges, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also located members of this genus at all grasslands above Pantex playas in Carson County. Dean (2007) listed it from central and southern Texas as well as a record from Lubbock County on the Southern High Plains. Elsewhere, this spider is mapped in Oklahoma, Colorado, and Colima (Platnick and Shadab 1983).

***Zelotes* sp.**

Identification.—Platnick and Shadab 1983.

Playa record.—Pantex Lake and Playa 1 edges, Carson County (Sissom 2003), Table 2.

Distribution.—Sissom (2003) also located members of this species at all grasslands above playa lakes in Carson County. Otherwise, other distribution records are unknown until species is identified.

Comment.—This large black species will key in the above cited resource to near *tuobus/anglo*. It differs from these by the details of the male palpus. It is possibly an undescribed species.

Family Hahniidae
Neoantistea mulaiki Gertsch 1946

Identification.—Opell and Beatty 1976.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County, (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—This spider was also obtained in grassland above Pantex Playa 1. This is the first record of this species from Carson County as well as the High Plains of Texas; otherwise it is known from southern and eastern Texas (Dean 2007), and northwestern Arizona and southeastern Mexico (Opell and Beatty 1976).

Family Linyphiidae
Agyneta sp.

Identification.—Saaristo 1973.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also collected this small spider from grasslands above Pantex Lake and Playa 2. Otherwise, distribution is unknown until species is identified. Dean (2007) listed three *Agyneta* spp. (two in the old combination with the genus *Meioneta*: see Buckle et al. 2001) from Texas: *Agyneta* sp. from Rolling Plains, *A. llanoensis* (Gertsch and Davis 1936) from central Texas, and *A. micaria* (Emerton 1882) from eastern Texas.

***Ceraticelus* sp.**

Identification.—This species is likely undescribed. It is unlike any species previously recorded from Texas. It differs from other *Ceraticelus* by not having a dorsal sclerite on the male and lacking modifications to the head of the male (Crosby and Bishop 1925). The chelicerae are not recurved like *Ceratinella*. The female is thus far unknown.

Playa record.—So far only obtained from the Playa 1 edge, Pantex Plant, Carson County, Texas (Sissom 2003).

Distribution.—Distribution is unknown until species is identified. Dean (2007) listed four species of this genus from Texas, but none from the Southern High Plains.

Ceratinella playa Cokendolpher et al. 2007
Fig. 7

Identification.—Cokendolpher et al. 2007.

Playa record.—Described from spiders collected over water in Playas BR13 and BR59, Briscoe County, Texas.

Distribution.—Known from Briscoe County, Texas (Cokendolpher et al. 2007)

Comment.—Cokendolpher et al. (2007) reported that this spider was collected in emergent plants in the playa.

Erigone denticulata Chamberlin and Ivie 1939
Fig. 8, Photos. 18, 19

Identification.—Crosby and Bishop 1928; Cokendolpher et al. 2007.

Playa record.—Playas BR5, BR13, BR19, Briscoe County; Playa S6, Swisher County, Texas (Cokendolpher et al. 2007).

Distribution.—Cokendolpher et al. (2007) recorded this spider from central and northwestern U.S.A.; in Texas only from the Southern High Plains in Lubbock, Briscoe, and Swisher Counties.

***Islandiana* sp.**

Identification.—Ivie 1965.

Playa record.—Pantex Lake, Carson County (Sissom 2003) (Table 2).

Distribution.—Also known from grasslands adjacent to Pantex Lake and Playa 1, Carson County (Table 2). Otherwise, distribution is unknown until species is identified.

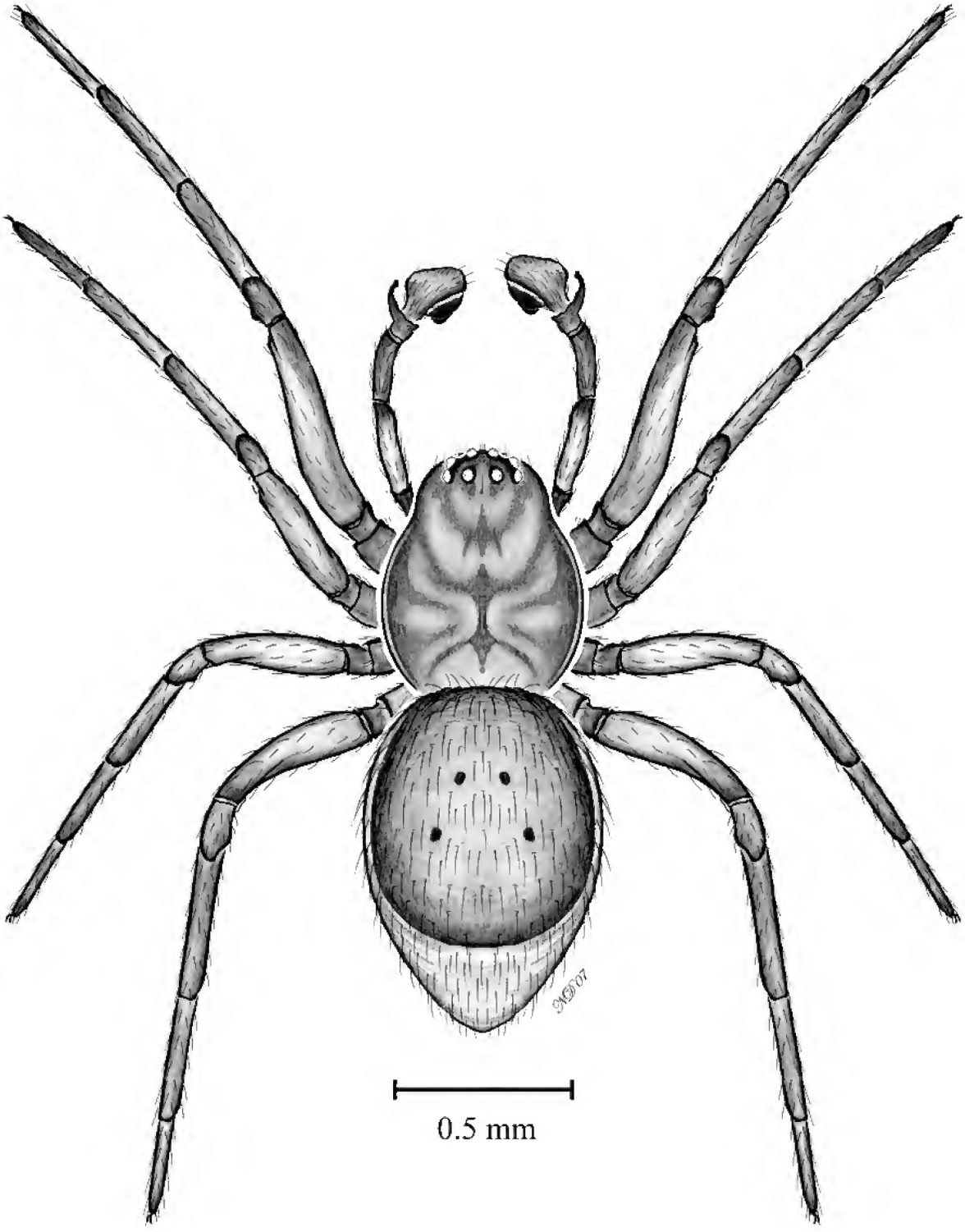

Figure 7. *Ceratinella playa* (Linyphiidae) male.

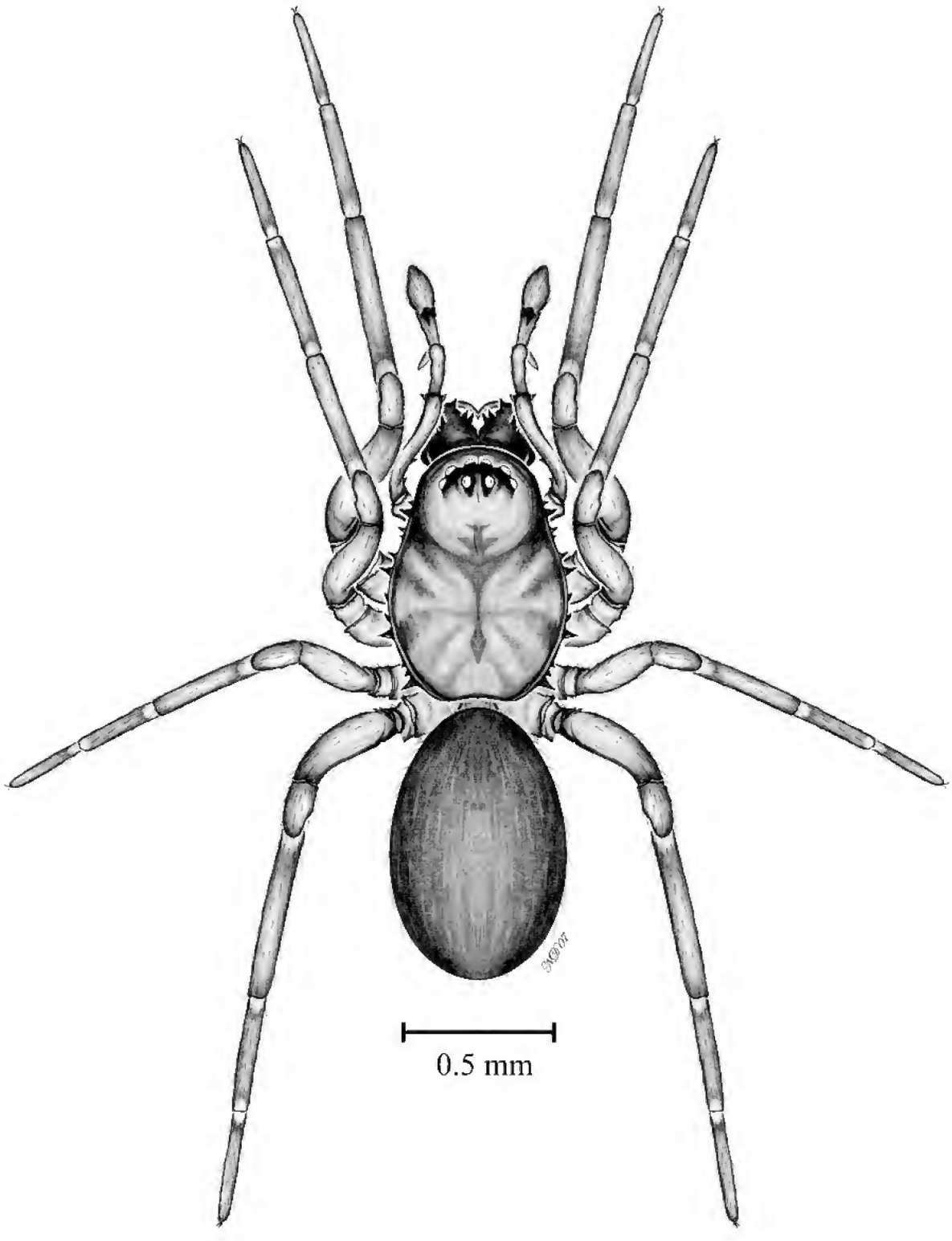

Figure 8. *Erigone denticulata* (Linyphiidae) male.

Mermessus denticulatus (Banks 1898)

Identification.—Crosby and Bishop 1928; Millidge 1987 (= *Eperigone eschatologica*); Miller 2007.

Playa record.—Mitchell East Playa, Floyd County, Texas (Cokendolpher et al. 2007).

Distribution.—Dean (2007) listed this small spider from Potter County on the Southern High Plains and otherwise scattered through much of Texas. Platnick (2007) listed the range of this spider as U.S.A. to Colombia, introduced to Europe.

Comment.—Cokendolpher et al. (2007) reported that this spider was collected in Floyd County on emergent plants in the playa.

Tennesseellum formica (Emerton 1882)
Photo. 20

Identification.—Ubick et al. 2005; Paquin and Dupérré 2003.

Playa record.—Pantex Lake edge, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) reported this spider from southern and eastern Texas. It is also found occasionally around a man-made pond in Lubbock, Lubbock County (first county record), Texas.

undetermined genus and sp.

Playa record.—Pantex Lake, Playa 1 edges, Carson County (Sissom 2003) (Table 2).

Distribution.—Also known from grassland above Pantex Playa 1 (Sissom 2003). Otherwise, distribution is unknown until species is identified.

Family Lycosidae
***Allocosa* sp.**
Photo. 21

Identification.—Dondale and Redner 1983.

Playa record.—Pantex Lake, Carson County (Sissom 2003), Table 2.

Distribution.—Otherwise, distribution is unknown until species is identified.

***Alopecosa* sp.**

Identification.—Dondale and Redner 1979.

Playa record.—Pantex Playa 2 edges, Carson County (Sissom 2003) (Table 2).

Distribution.—This wolf spider is also known from grasslands above Pantex Playa 2 and Pantex Lake (Sissom 2003). Otherwise, distribution is unknown until species is identified.

Hogna antelucana (Montgomery 1904)
Figs. 9, 10, Photos. 22-24

Identification.—Montgomery 1904; Gertsch and Wallace 1935 (reported as *Lycosa antelucana*).

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first county record), (Sissom 2003) (Table 2); Playa CP1, Playa CP2, Playa CP3, Playa CP4, Playa CP5, Playa CP6, Playa GS1, Playa GS3, Playa GS5, Playa GS6, Floyd County (first county record), Texas.

Distribution.—Sissom (2003) also found this spider in the grasslands of Carson County, but in much fewer numbers than around playas (Table 2). Dean (2007) listed this wolf spider from scattered localities throughout the state, with Lubbock County being the only record from the High Plains. Elsewhere known (Gertsch and Wallace 1935) from the southern U.S.A., from Florida to California and north to Utah and Kentucky.

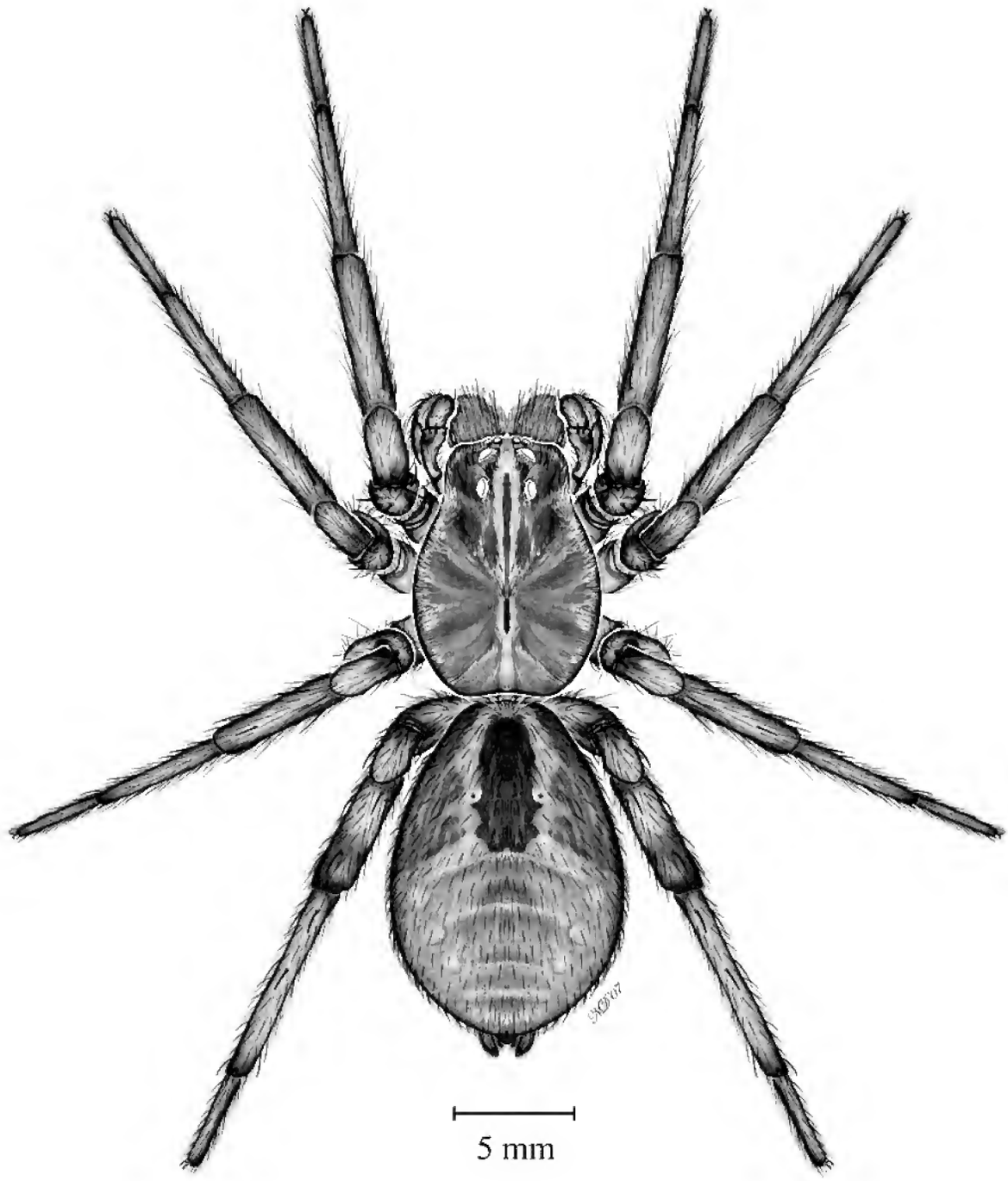

Figure 9. *Hogna antelucana* (Lycosidae) female.

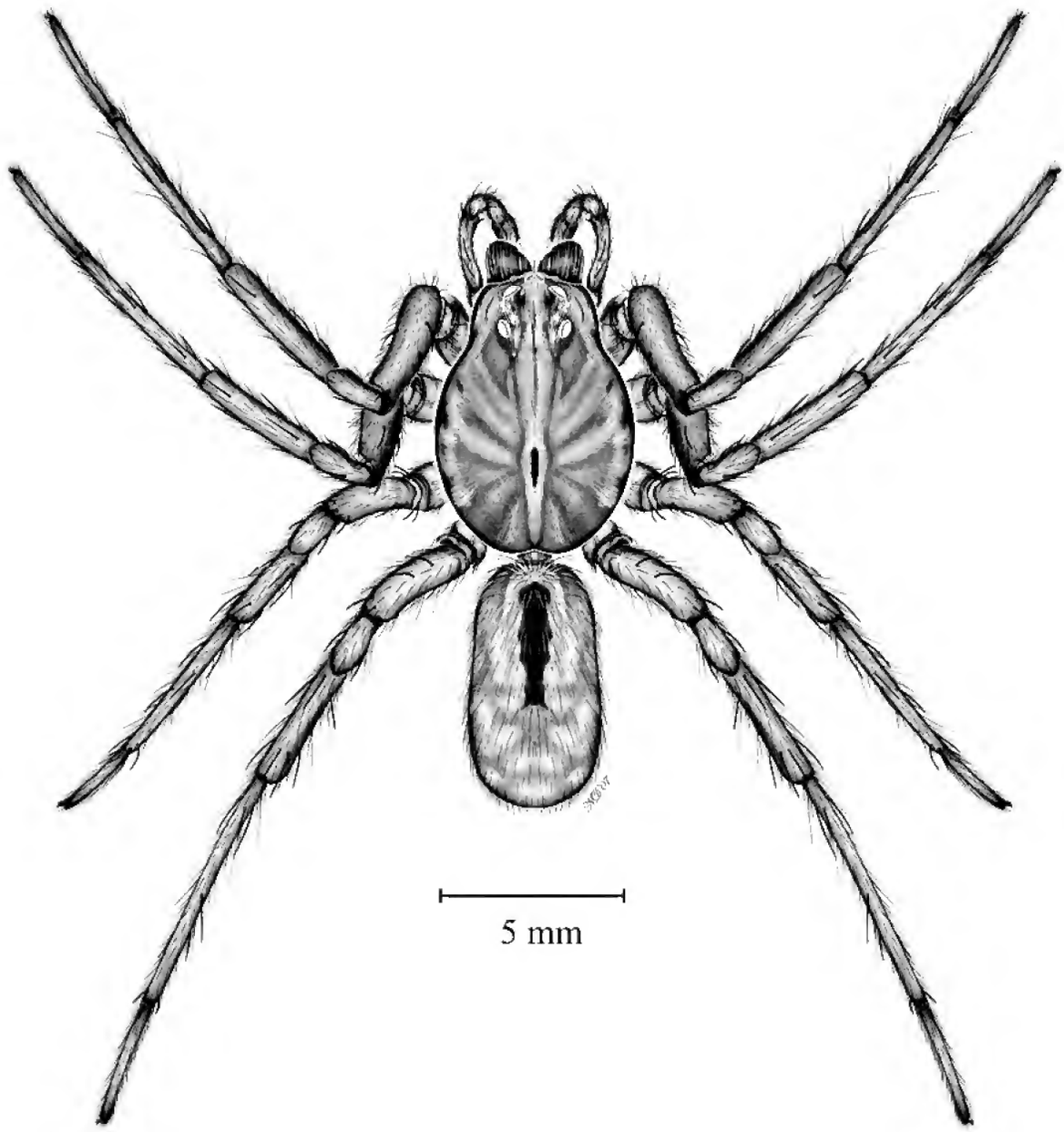

Figure 10. *Hogna antelucana* (Lycosidae) male.

Comment.—This is the most abundant large ground spider associated with playa edges. It is readily recognized by the black ventral surface of the spider.

Hogna carolinensis (Walckenaer 1805)

Identification.—Chamberlin 1908; Dondale and Redner 1990.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also recorded this wolf spider from grassland above Pantex Lake. Dean (2007) reported this wolf spider from southern and southwestern Texas, but no records from the High Plains.

Hogna helluo (Walckenaer 1837)

Identification.—Chamberlin 1908; Dondale and Redner 1990.

Playa record.—Pantex Playa 1, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) recorded this spider from much of the state, but none from the Rolling or High Plains.

Pardosa pauxilla Montgomery 1904
Photo. 25

Identification.—Dondale and Redner 1984.

Playa record.—Playa BR5, Briscoe County (first county record); Clapp Park Playa, Lubbock County (first county record), Texas.

Distribution.—Dean (2007) listed this wolf spider from throughout much of the state, but only listed Hale County for the High Plains. Otherwise it is known from Kansas to New Jersey south to Florida and west to New Mexico (Dondale and Redner 1984).

Comment.—Dondale and Redner (1984) listed the most common habitat as grassy pastures, but many were also at stream or pond margins.

Pardosa sternalis (Thorell 1877)
Photos. 26, 27

Identification.—Vogel 1970.

Playa record.— Playa BR19, Briscoe County (first county record); Clapp Park Playa, Lubbock County (first county record), Texas.

Distribution.—Dean (2007) listed this species from primarily southwestern Texas, but also in the High Plains in Castro and Floyd Counties. Otherwise it is recorded from northern Mexico and western U.S.A. to Montana.

Rabidosa rabida (Walckenaer 1837)
Photo. 28

Identification.—Dondale and Redner 1990; Brady and McKinley 1994.

Playa record.—Playa CP6, Floyd County (first county record), Texas.

Distribution.—Dean (2007) reported this spider from throughout the state (52 counties) of which Lubbock being the only county on the Southern High Plains. Brady and McKinley (1994) mapped the distribution as the south tip of Texas to Minnesota to southern Ontario and south to Florida.

Schizocosa mccooki (Montgomery 1904)

Identification.—Dondale and Redner 1978a.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also collected this species from all grasslands above the playas mentioned above, Carson County. Dean (2007) only listed this

wolf spider from central Texas. Otherwise, Dondale and Redner (1978a) mapped it throughout western portions of North America.

Trochosa terricola Thorell 1856

Identification.—Brady 1979; Dondale and Redner 1990.

Playa record.—Pantex Playa 1, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also found this species in the grasslands above Pantex Playa 1 and 2. Dean (2007) listed this species only from Jefferson and Travis Counties of Texas. Otherwise it is recorded from Europe, Canada, Alaska, and northern U.S.A., south to Indiana, Texas, and west to California (Brady 1979).

Family Miturgidae
Teminius affinis Banks 1897
Photo. 29

Identification.—Platnick and Shadab 1989.

Playa record.—Pantex Lake, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Also found by Sissom (2003) in grassland above Pantex Lake and Playa 1. Dean (2007) listed it from central and eastern Texas, no records from the High Plains. Platnick and Shadab (1989) recorded this spider from Oklahoma south to northeastern Mexico, but only in the eastern portion of Texas.

Family Oxyopidae
Oxyopes salticus Hentz 1845

Identification.—Brady 1964.

Playa record.— Pantex Lake, Playa 1 and 2 edges, Carson County (first county record), Texas (Sissom 2003) (Table 2). Playa BR13 and BR25, Briscoe County (first county record), Texas.

Distribution.—Also found by Sissom (2003) in the grassland above Pantex Lake and Playa 2. Dean (2007) listed the species from central, eastern, and southern Texas and eight counties from the High Plains: Crosby, Floyd, Gaines, Hale, Hockley, Howard, Lubbock, and Terry.

Comment.—The record from Floyd County was from emergent vegetation. This lynx spider is the most commonly collected spider on the High Plains; elsewhere it is recorded (Brady 1964) from the U.S.A., but apparently rare or absent in Rocky Mountain states, most northern states, and northern Mexico.

Family Philodromidae
Ebo pepinensis Gertsch 1933

Identification.—Sauer and Platnick 1972.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first county record) (Sissom 2003) (Table 2).

Distribution.—Also found by Sissom (2003) in grassland above each playa listed above. Dean (2007) also listed it from Dallam, Lubbock, and Potter Counties on the High Plains Ecoregion and counties along the northeastern portion of Texas. Elsewhere, Sauer and Platnick (1972) mapped the distribution to include southern Canada and U.S.A., south to California, east to Texas and the Great Lakes.

Philodromus pratariae (Scheffer 1904)
Fig. 11

Identification.—Dondale and Redner 1969.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Also found by Sissom (2003) in grassland above each playa listed above. Dean (2007) listed records from across northern, central and eastern Texas, with Donley County being the only record from the Southern High Plains.

Photo. 1. Playas are the most numerous wetland type in the Southern High Plains, or Llano Estacado. Conservatively, 25,000 individual playas occur in the Southern Great Plains.

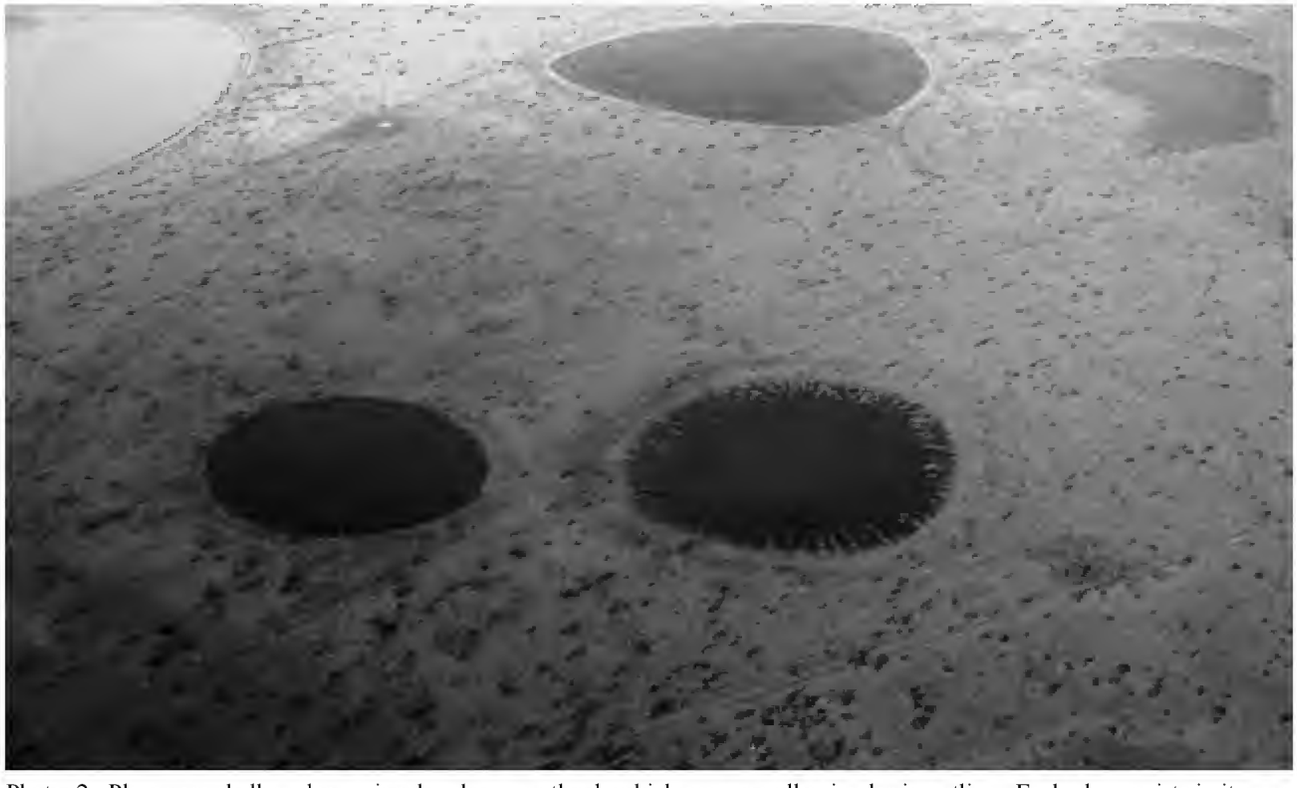

Photo. 2. Playas are shallow depressional recharge wetlands which are generally circular in outline. Each playa exists in its own catchment.

Photo. 3. Heavy rains from thunderstorms in this semi-arid region fill playas with water in the spring, sporadically in summer, and increase again in autumn.

Photo. 4. Playas in urban settings receive runoff containing pollutants (lawn, auto, and road chemicals, etc.). Such sites provide valuable habitat for migrating wildlife and have recreation uses, but no longer support invertebrates normally associated with playas.

Photo. 5. Playa Br13 in Briscoe County; a known locality for *Ceratinella playa* (Linyphiidae).

Photo. 6. Playas are shallow and water levels are dependent on seasonal rains. *Coreopsis tinctoria* Nutt. (Asteraceae) is a common plant observed in and around playas during spring and summer.

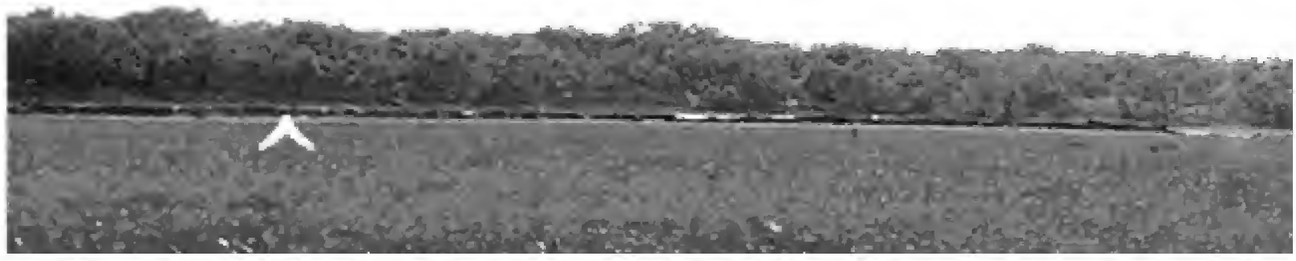

Photo. 7. Close-up of Photo. 6 (top portion); arrow-head pointing to black drift fence used with bucket pitfall traps.

Photo. 8. Edge of Pantex Playa 1 in Carson County.

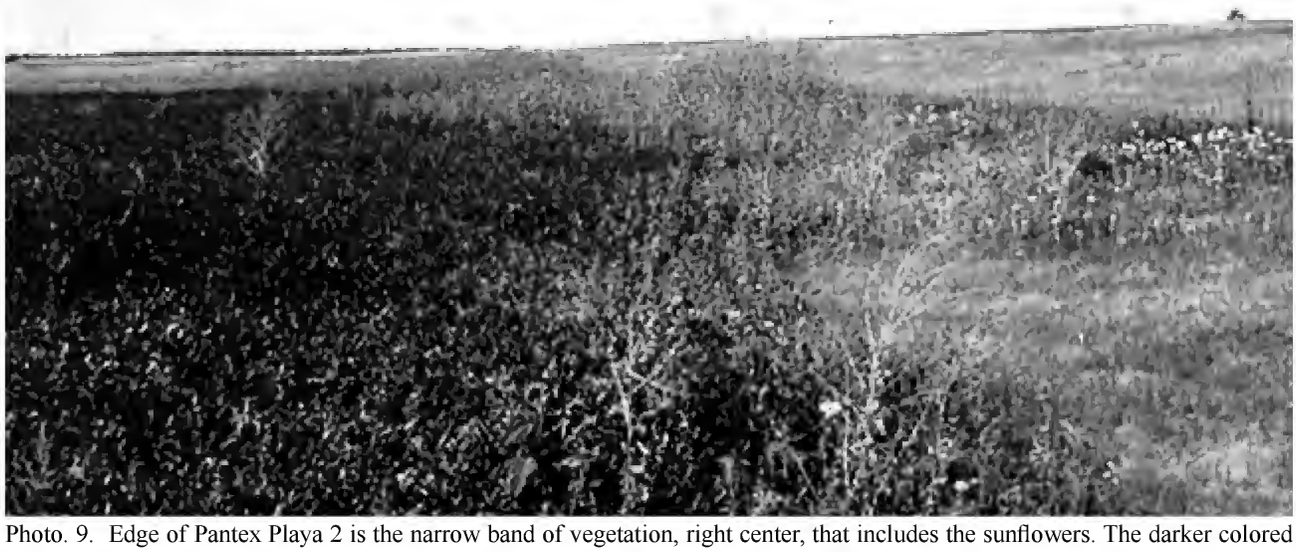

Photo. 9. Edge of Pantex Playa 2 is the narrow band of vegetation, right center, that includes the sunflowers. The darker colored area to the left is playa vegetation; the grassland begins at the right.

Photo. 10. Close-up of sunflower patch in edge of Pantex Playa 2, Carson County. The collector is Shelly Cox of WTAM.

Photo. 11. Pitfall trapping in Carson and Lubbock Counties consisted of plastic drink glasses buried level with the ground and filled with a collection fluid. A square cover was placed over traps at Pantex. The collector is W. David Sissom.

Photo. 12. Sweep netting produces large catches of terrestrial arachnids; whereas flat bottomed nets are used for aquatic sampling. The collector is W. David Sissom.

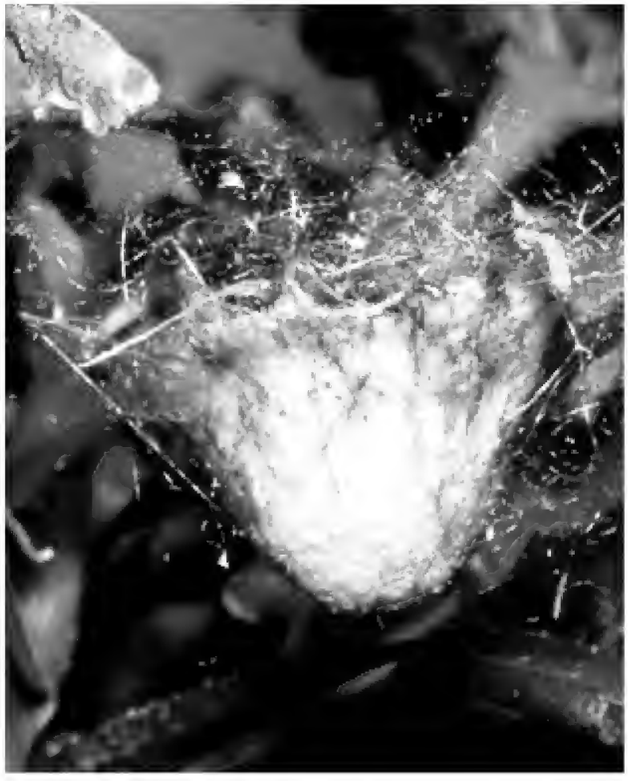

Photo. 13. *Argiope trifasciata* (Araneidae) cup-shaped eggsac produced in vegetation at side of main spider web.

Photo. 14. *Neoscona oaxacensis* (Araneidae) is a large spider that builds its orb-web at night, female.

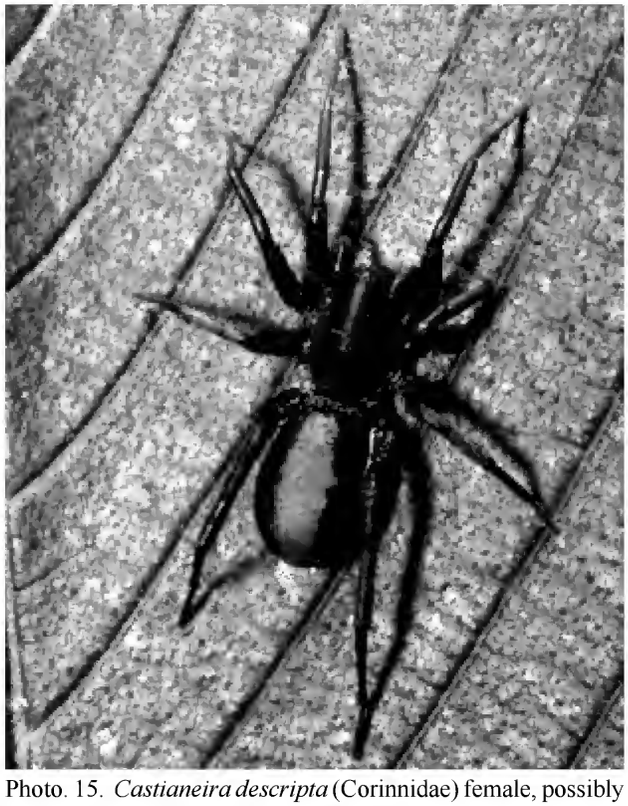

Photo. 15. *Castianeira descripta* (Corinnidae) female, possibly mimics a velvet ant.

Photo. 16. *Dictyna coloradensis* (Dictynidae) female in web with eggsac and spiderlings.

Photo. 17. *Zelotes* sp. probably *gertschi* (Gnaphosidae) immature.

Photo. 18. *Erigone denticulata* (Linyphiidae) female on finger-tip.

Photo. 19. Close-up of *Erigone denticulata* (Linyphiidae) female.

Photo. 20. *Tennesseellum formica* (Linyphiidae) on ground, possibly mimicking a small ant.

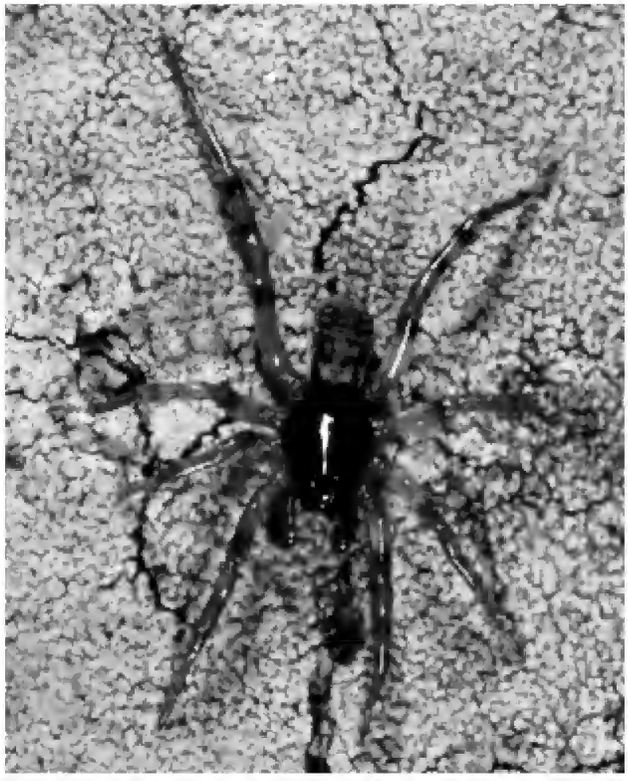

Photo. 21. *Allocosa* sp. (Lycosidae) male from Lubbock County.

Photo. 22. *Hogna antelucana* (Lycosidae) female; a larger female can be confused by the non-specialist with a tarantula.

Photo. 23. Ventral aspect of *Hogna antelucana* (Lycosidae) female; body and coxae of legs usually much more darkly colored than dorsal surfaces.

Photo. 24. *Hogna antelucana* (Lycosidae) female carrying her young.

Photo. 25. *Pardosa pauxilla* (Lycosidae) male.

Photo. 26. *Paradosa sternalis* (Lycosidae) female.

Photo. 27. *Paradosa sternalis* (Lycosidae) male.

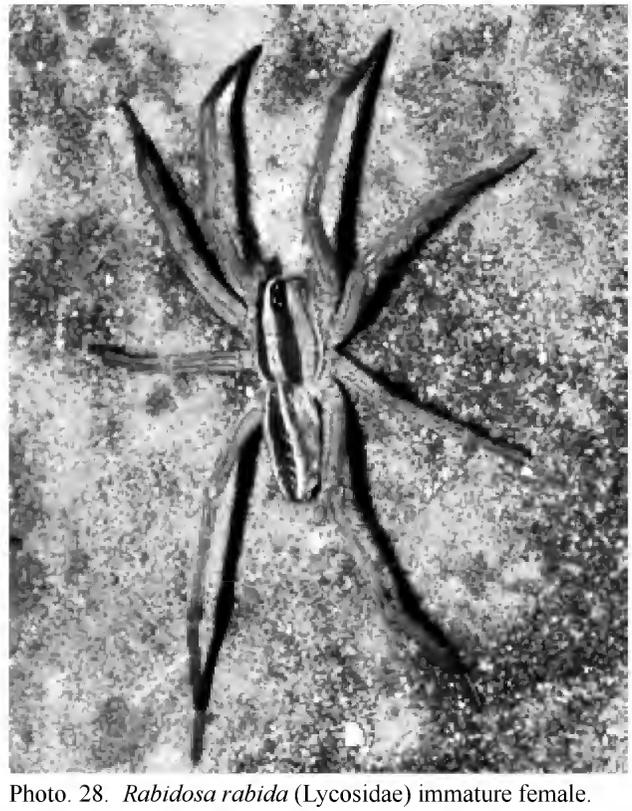

Photo. 28. *Rabidosa rabida* (Lycosidae) immature female.

Photo. 29. *Teminius affinis* (Miturgidae) female in webbing beneath a piece of bark.

Photo. 30. *Tibellus duttoni* (Philodromidae) female, is easier to see when not stretched along-side a stalk of grass.

Photo. 31. *Habronattus coecatus* (Salticidae) male.

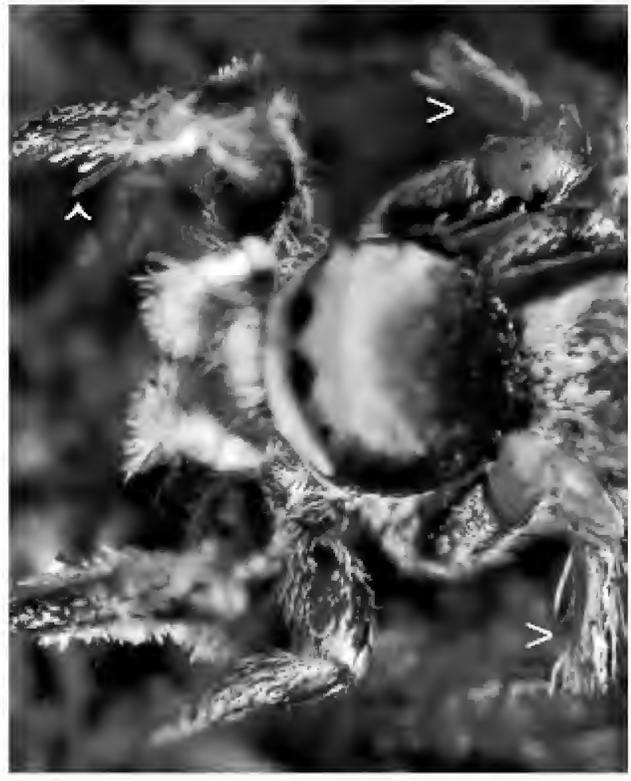

Photo. 32. *Habronattus coecatus* male; ^ indicates spatulate setae tibia I; > indicates greenish-colored tibiae III (leg II right-side missing). Note orangish-colored patellae III with central dark spot.

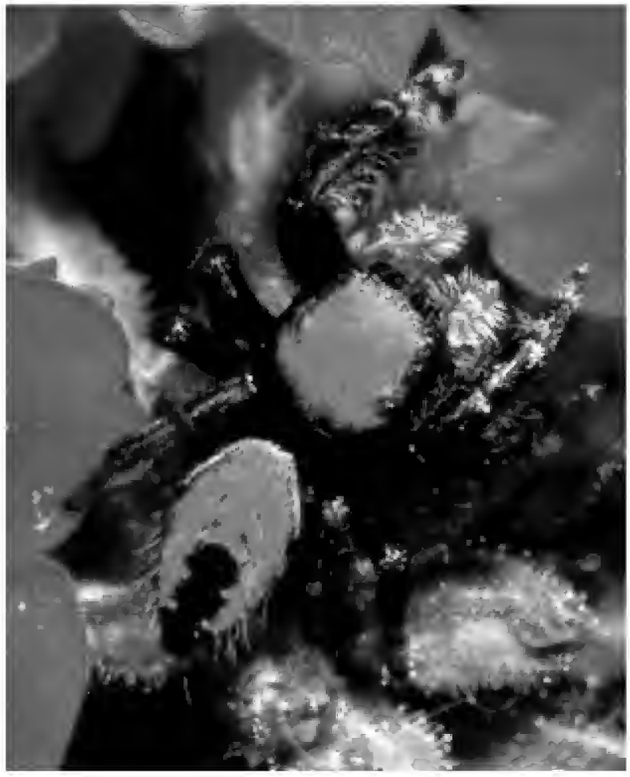

Photo. 33. *Phidippus apacheanus* (Salticidae) male.

Photo. 34. *Phidippus pius* (Salticidae) female.

Photo. 35. *Phidippus texanus* (Salticidae) female. The male has a darkly colored cephalothorax and red abdomen.

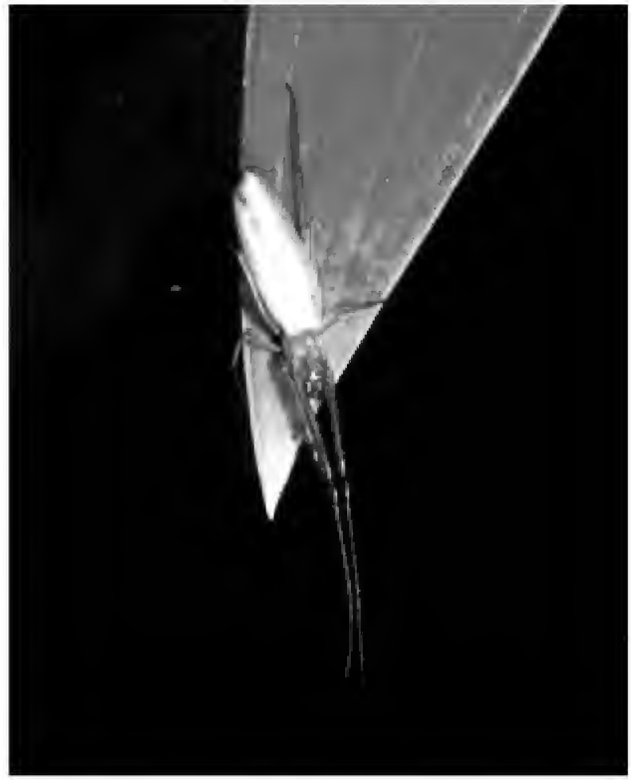

Photo. 36. *Tetragnatha laboriosa* (Tetragnathidae) female. A conspicuous spider during most hours of the day, but especially at night.

Photo. 37. *Aphonopelma hentzi* (Theraphosidae) male; adult males wander in search of females which generally remain in their burrows.

Photo. 38. *Aphonopelma hentzi* (Theraphosidae) female.

Photo. 39. Soaked tarantula male *Aphonopelma hentzi* (Theraphosidae) which was removed from a bucket pitfall trap, blue bucket lid is shown for scale.

Photo. 40. Ventral aspect of *Latrodectus hesperus* (Theridiidae) female with eggsac in web; note red hour-glass mark is slightly broken in center

Photo. 41. *Latrodectus hesperus* (Theridiidae) female; not the famed black widow, but rather the western widow. Its habits and venom appear to be the same and should be considered a dangerous species.

Photo. 42. *Latrodectus hesperus* (Theridiidae) female and eggsac in typical *Latrodectus* webbing. Note hour-glass mark is indistinct and not as brightly red colored as in Photo. 41.

Photo. 43. Ventral view of male *Latrodectus hesperus* (Theridiidae); note hour-glass mark is less distinct in shape and color. The abdomen is white and orange patterned, not black.

Photo. 44. Dorsolateral view of *Latrodectus hesperus* (Theridiidae) male; note the lack of black on dorsal surface.

Photo. 45. Dorsal view of *Latrodectus hesperus* (Theridiidae) female. Note the red stripe on the abdomen; an hourglass mark is also ventral on this animal. The prey item is a beetle.

Photo. 46. Posteriodorsal view of *Latrodectus hesperus* (Theridiidae) immature with a prey (cicada); note interesting color pattern on the dorsum and lateral sides of the abdomen.

Photo. 47. *Misumenops celer* (Thomisidae) females often sit and wait for prey to come to flowers, where they grab them and hold on until their poison subdues the prey.

Photo. 48. *Misumenops celer* (Thomisidae) male waiting on flower buds for unwary prey.

Photo. 49. *Xysticus texanus* (Thomisidae) female; one of the prettiest crab spiders in the region; sometimes front legs are bright orange.

Photo. 50. *Titanoeca americana* (Titanoecidae) are generally found under covering objects (rocks, dead plants, etc.).

Photo. 51. *Eumesosoma roeweri* (Sclerosomatidae) females.

Photo. 52. Close-up view of the cephlalothorax and massive chelicerae of *Eremobates pallipes* (Eremobatidae) male; a scary looking beast, but not poisonous to humans.

Photo. 53. Anterior aspect of *Piona floridana* (Pionidae) in water.

Photo. 54. *Hannemania* sp. (Trombiculidae) immature on a microscope slide. Note the 3rd leg is missing on the right side. Adult mites are 8-legged.

Photo. 55. *Hannemania* sp. (Trombiculidae) immatures (red-orange colored dots around base of front leg) parasitizing a spadefoot toad.

Photo. 56. *Hadrozetes lemnae* (Hydrozetidae) crawling on string algae.

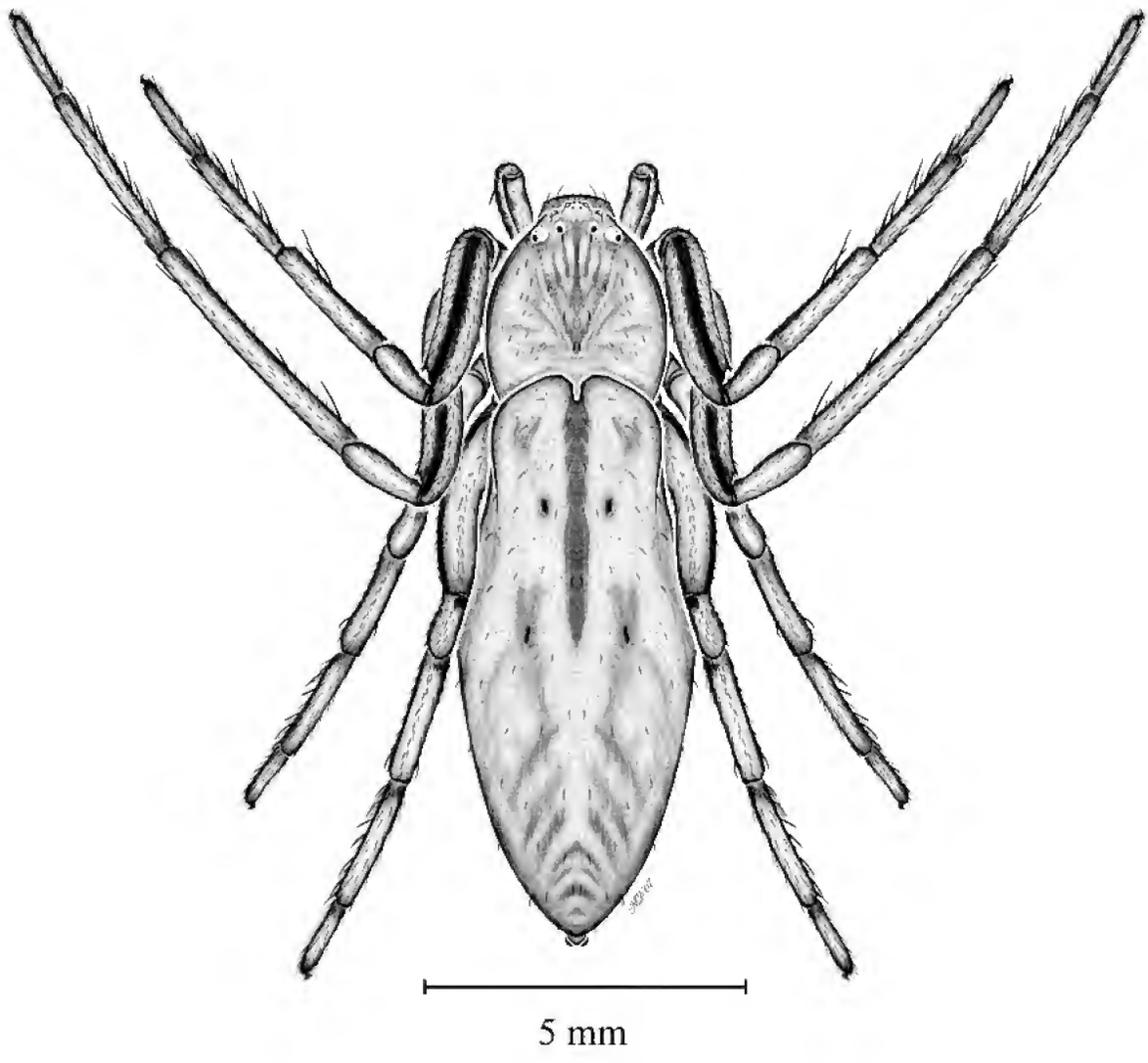

Figure 11. *Philodromus pratariae* (Philodromidae) female.

Comment.—Dondale and Redner (1969) noted Fitch recorded the habitat as tall-grass prairies from Kansas. Cokendolpher et al. (1979) also noted the association of this crab spider with grasses, including *Panicum* and *Sorghum*. It is known from Tamaulipas, Texas, and Arkansas, north to Illinois and Nebraska.

Thanatus formicinus (Clerck 1757)

Identification.—Dondale et al. 1964.

Playa record.—Pantex Playa 1 and 2 edges, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also reported this spider from grassland above Pantex Lake and Playa 1 and 2. Dean (2007) listed species from central and eastern Texas. Dondale et al. (1964) listed this spider from Europe and North America from Alaska and Nova Scotia south to California, Texas, and Virginia.

Comment.—According to Dondale et al. (1964) this spider is a generalist occurring in dry sandy localities to debris on lakeshores and ocean beaches, as well as pine, fir, and aspen stands up to 3,000 m elevation. Cokendolpher et al. (1979) relayed how this species is active at night and occurred in tall grass prairies near *Bison* wallows in south-central Oklahoma.

Tibellus duttoni (Hentz 1847)
Photo. 30

Identification.—Dondale and Redner 1978b.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Also found by Sissom (2003) in grassland above each playa listed above. Dean (2007) listed records from central, southern and eastern Texas, none from the High Plains. Elsewhere, it is known from Mexico to Florida, north to New England and North Dakota (Dondale and Redner 1978b).

Comment.—Dondale and Redner (1978b) listed the habitat as tall grass. Cokendolpher et al. (1979) stated this crab spider preferred habitats of grasses and forbs in open fields and pastures in North-central Texas.

Family Salticidae
Habronattus cognatus
(Peckham and Peckham 1901)

Identification.—Griswold 1987; Proszynski 2006.

Playa record.—Pantex Playa 2 edge, Carson County (first Southern High Plains, county record), Texas (Table 2).

Distribution.—Also found by Sissom (2003) in grassland above Pantex Playa 1. Dean (2007) listed it from west and central Texas, but not on the High Plains.

Habronattus coecatus (Hentz 1846)
Photos. 31, 32

Identification.—Griswold 1987; Proszynski 2006.

Playa record.—Pantex Playa 1 and 2 edges, Carson County (first Southern High Plains, county record); Clapp Park Playa, Lubbock County (first county record), Texas (Table 2).

Distribution.—No example of this spider was collected in the grasslands above the Pantex playas, but collecting on other nearby grasslands proved the presence of this jumping spider. Dean (2007) reported this spider from localities around the state, but none on the High Plains of Texas.

Habronattus texanus (Chamberlin 1924)

Identification.—Griswold 1987; Proszynski 2006.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first Southern High Plains, county record), Texas (Table 2).

Distribution.—Also found by Sissom (2003) in grassland above each playa listed above. Dean (2007) reported this spider from central and eastern Texas. Otherwise it is known from Great Plains of northern Mexico to southern Canada, east to Georgia and southern New England (Griswold 1987). The only habitat notes are from grasses, oats, and peanuts.

Marpissa pikei (Peckham and Peckham 1888)

Identification.—Barnes 1958; Proszynski 2006. Even immatures of this spider are easily recognized by the long body and the same color pattern as adult females.

Playa record.—Mitchell Corner Playa (1994), Floyd County (first Southern High Plains, county record), Texas. Pantex Playa 1 edge, Carson County (first county record), Texas (Table 2).

Distribution.—Dean (2007) listed this long-bodied jumping spider from much of Texas except for the High Plains. Elsewhere, Proszynski (2006) listed it from Cuba and U.S.A: New Mexico and Arizona, east to Florida and Connecticut.

Comment.—The record from Floyd County was from emergent vegetation.

Pelegrina galathea (Walckenaer 1837)

Identification.—Maddison 1996; Proszynski 2006.

Playa record.— Pantex Playa 2 edge, Carson County (first Southern High Plains, county record), Texas. An immature colored like this species was collected on plants over water at Brett Marble Playa, Floyd County, Texas.

Distribution.—Based on the distribution maps in Maddison (1996), *P. galathea* is primarily eastern North American in distribution ending in New Mexico and Colorado. Dean (2007) listed records from the eastern half of Texas.

Comment.—Maddison (1996) reported collections from old fields and sorghum fields.

Pellenes limatus Peckham and Peckham 1901

Identification.—Proszynski 2006.

Playa record.— Pantex Playa 2 edge, Carson County (first Southern High Plains, county record); Playa GS6, Floyd County (first county record), Texas.

Distribution.—Dean (2007) recorded widely spread localities in southwestern, central and eastern Texas. Proszynski (2006) listed it from California and Texas.

Phidippus apacheanus
Chamberlin and Gertsch 1929
Photo. 33

Identification.—Edwards 2004.

Playa record.—Pantex Playa 1, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also located this spider in grassland above Pantex Lake and Playa 1. Dean (2007) listed this jumping spider from much of the state, except for Far West Texas; with Southern High Plains records from Floyd, Gaines, Lubbock, Potter, and Randall Counties. Found outside of Texas widespread in U.S.A., except Pacific Northwest and New England, western Mexico and Cuba.

Comment.—Edwards (2004) stated that this jumping spider preferred desert grasslands and xeric fields where it has been found on shrubs, woody perennial herbs, and cacti.

Phidippus clarus Keyserling 1885

Identification.—Edwards 2004.

Playa record.—Pantex Playa 2 edge, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) listed this spider from north-central and eastern Texas, no records from the High Plains. Found throughout southern Canada and most of U.S.A. except for the desert Southwest.

Comment.—Edwards (2004) reported this jumping spider from old fields and weedy areas on tall woody herbs.

Phidippus pius Scheffer 1905
Photo. 34

Identification.—Edwards 2004.

Playa record.—Pantex Playa 2 edges, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) records this spider from a few scattered localities throughout the state except for the extreme southwestern portion of the state. It has already been recorded from Carson County, where our collection was from. Platnick (2007) recorded it from U.S.A. to Costa Rica.

Comment.—Edwards (2004) reported this jumping spider from old fields, prairie, and desert grasslands.

Phidippus texanus Banks 1906
Fig. 12, Photo. 35

Identification.—Edwards 2004.

Playa record.—Pantex Playa 2 edge, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—Edwards (2004) listed the range as the Great Plains region from Nebraska to northeastern Mexico. In Texas it is found throughout the central portions of the state with a few records on the High Plains of Texas: Crosby, Garza, Hemphill, Howard, Lipscomb, and Wheeler Counties (Dean 2007).

Comment.—Edwards (2004) reported that this jumping spider is found on cacti, yuccas, mesquite [*Prosopis glandulosa* (Torrey)], and assorted herbs in wild rangeland and open prairie.

Poultonella alboimmaculata
(Peckham and Peckham 1883)

Identification.—Cokendolpher and Horner 1978; Proszynski 2006.

Playa record.—Female from Pantex Lake edge, Carson County, (first county record), Texas (Table 2).

Distribution.—One female from the grassland above Pantex Playa 1, Carson County. Dean (2007) listed Donley County on the High Plains and three other counties in the Rolling Plains. Cokendolpher and Horner (1978) recorded this jumping spider from the above localities in Texas and unspecified localities (from over 100 years ago) from New York and Iowa.

Comment.—Most specimens have been found associated with mesquite trees and flowering plants. Other biological notes are recorded by Cokendolpher and Horner (1978). Interestingly, Sissom (2003) recorded a single small mesquite shrub in this grassland; the only mesquite from sampled plots in Carson County.

Sassacus papenhoei
Peckham and Peckham 1895

Identification.—Maddison 1996; Proszynski 2006.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—This jumping spider was also encountered in the grasslands above each of the mentioned playas (Sissom 2003). Dean (2007) listed this

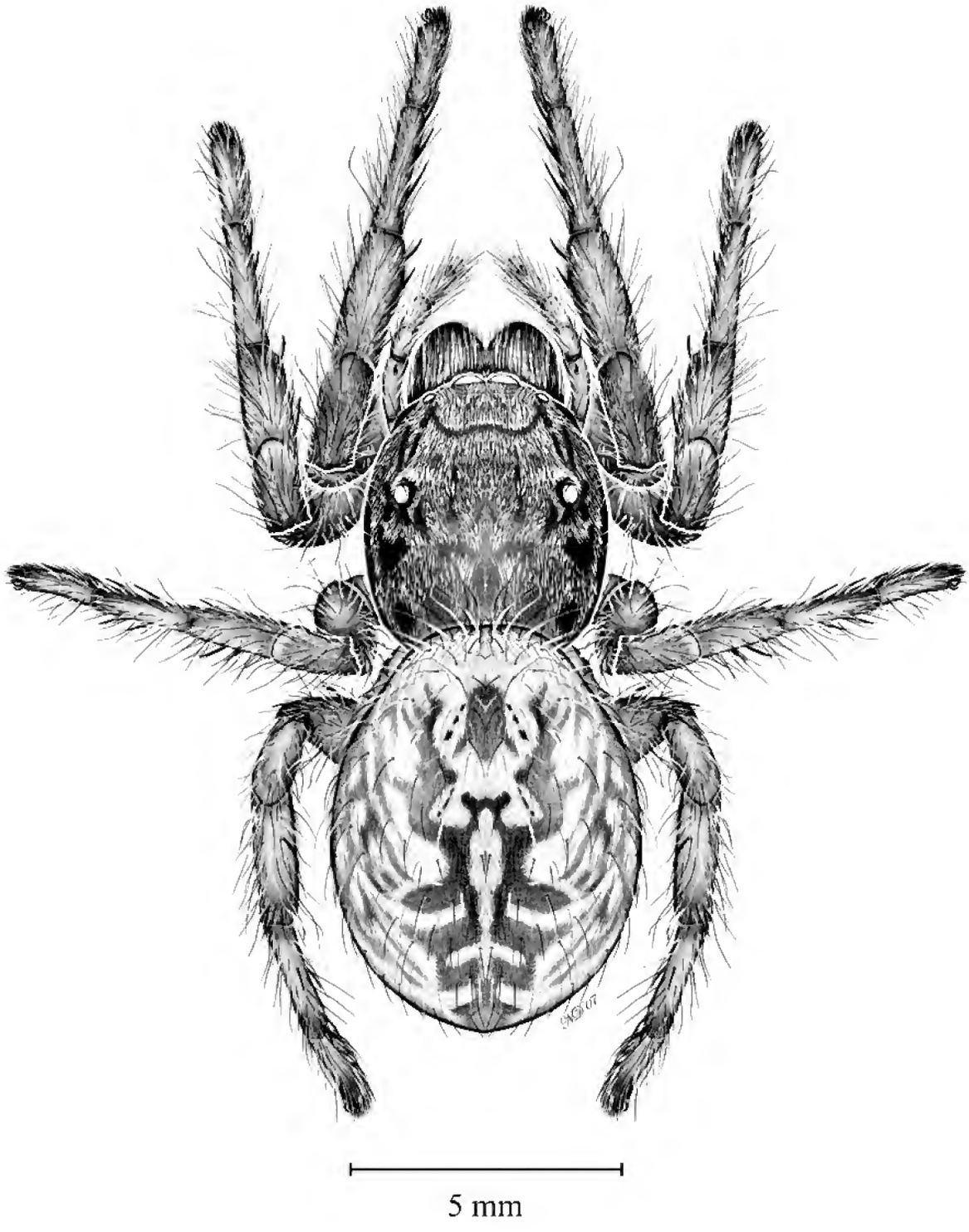

Figure 12. *Phidippus texanus* (Salticidae) female.

jumping spider from central and southern Texas and three counties on the High Plains of the state: Floyd, Hale, Howard.

Family Tetragnathidae
Tetragnatha laboriosa Hentz 1850
Fig. 13, Photo. 36

Identification.—Levi 1981. In the field, specimens of early instars of *Argiope* look like *Tetragnatha*. They can be separated by looking at the position of the spinnerets. *Tetragnatha* have them at the end of the abdomen, and *Argiope* have them much more forward ventrally on the abdomen.

Playa record.— Pantex Lake, Playa 1 and 2 edges, Carson County (first county record), (Sissom 2003) (Table 2); Mitchell East Playa, Floyd County; Playa BR1, BR5, BR13, BR19, BR25 and BR67, Briscoe County (first county record), Texas.

Distribution.—Dean (2007) reported this spider from the High Plains of Texas in Castro, Floyd, Hale, Hockley, Howard, Lubbock, Martin, and Terry Counties. Elsewhere, this spider has a very large distribution from Alaska to Panama (Levi 1981).

Comment.—The records from Briscoe and Floyd Counties were from emergent vegetation. Dondale et al. (2003) stated that the "silver longjawed orbweaver" spiders occur in great numbers in "fields, roadsides, and crops, even some distance from water, but also found in bogs, meadows, and marshes." They often remain outstretched over a branch or sitting in the web over water. Their webs are often built horizontal to the water's surface to catch emerging aquatic insects.

Family Theraphosidae
Aphonopelma hentzi (Girard 1852)
Photos. 37-39

Identification.—Smith 1995.

Playa record.—Pantex Lake, Carson County (first county record), Texas (Sissom 2003) (Table 2).

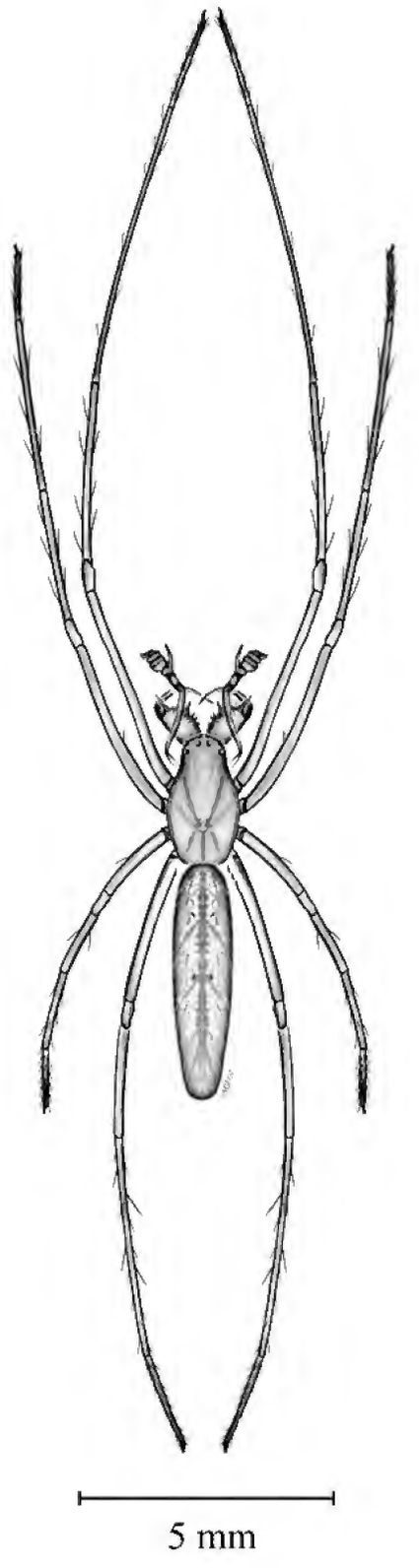

Figure 13. *Tetragnatha laboriosa* (Tetragnathidae) male.

Distribution.—This tarantula has also been recorded by the presence of burrows and wandering males in the grassland above each of the three playas sampled in Carson County (Sissom 2003). Dean (2007) listed the species from Potter County on the Southern High Plains and scattered other counties in north-central and eastern Texas.

Comment.—Specimens reported from the playa edge (Sissom 2003) were small immatures. Apparently, this species only hunts or travels the playa edges because burrows that might be made there would flood during high water.

Family Theridiidae
Latrodectus hesperus Chamberlin and Ivie 1935
Fig. 14, Photos. 40-46

Identification.—Kaston 1970.

Playa record.—Torrence (2007) encountered examples of this widow spider in her bucket traps on the edge of playas in Floyd County (county record), Texas. Because of the potential for bites of this toxic spider, only sight records were noted.

Distribution.—Sissom (2003) found this species in the grassland above Pantex Lake and Playa 2, Carson County (first county record), Texas. Dean (2007) recorded this spider from Bastrop, Culberson, Johnson, Kent, and from the Southern High Plains in Lubbock and Garza Counties. It is a common spider in Lubbock County and the only species present based on casual observations (JCC pers. obs.). Studies by Zhang et al. (2004) suggest to us that *Latrodectus* from east of about the 100th Meridian are *Latrodectus mactans* (Fabricius 1775) and those west are *L. hesperus* in Texas. Kaston (1970) noted *L. hesperus* was the only widow spider occurring from about the middle of Texas, Oklahoma, and Kansas west and north to the Canadian provinces. *Latrodectus* are notorious for being transported by commerce and therefore it is possible both species might overlap ranges. Dean (2007) listed *L. mactans* from the High Plains of Texas in Lubbock and Randall Counties, but it is possible those were based upon old records that need to be reexamined. Our records from Floyd and Carson Counties are new High Plains records for *L. hesperus.*

Comment.—There are volumes written on widow spiders (see citations in Kaston 1970). As illustrated in Fig. 14, immatures of this spider do not have the solid black body that so many people believe is characteristic for widow spiders, but like adults immatures do have an hour-glass mark of orange or red on the ventral surface of the abdomen. Numerous specimens of adult females observed in western Texas have red/orange patterns retained along the dorsum of the abdomen (especially posteriorly) (JCC pers. obs.; Photo. 45).

Family Thomisidae
Misumenops celer (Hentz 1847)
Fig. 15, Photos. 47, 48

Identification.—Gertsch 1939.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County (first county record), Texas (Sissom 2003) (Table 2). Brett Marble Playa, Fawver Playa, Floyd County, Texas.

Distribution.—Sissom (2003) also found this species abundant in the grassland above the three playas recorded above. Dean (2007) listed records from throughout Texas including counties on the Southern High Plains: Castro, Crosby, Floyd, Gaines, Hale, Hockley, Howard, Lubbock, Milam, and Terry. Gertsch (1939) recorded collections from British Columbia, U.S.A., Mexico, Central America, and West Indies.

Comment.—The records from Floyd County were from emergent vegetation.

Modysticus modestus (Scheffer 1904)

Identification.—Dondale and Redner 1975 (as *Ozyptila modesta*); Platnick 2007.

Playa record.—Pantex Playa 2 edge, Carson County (first state, Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Further specimens were obtained in grassland above Playa 2 (Sissom 2003) (Table 2). Otherwise it is recorded from Kansas, north to Michigan and south to Arkansas and Georgia (Dondale and Redner 1975).

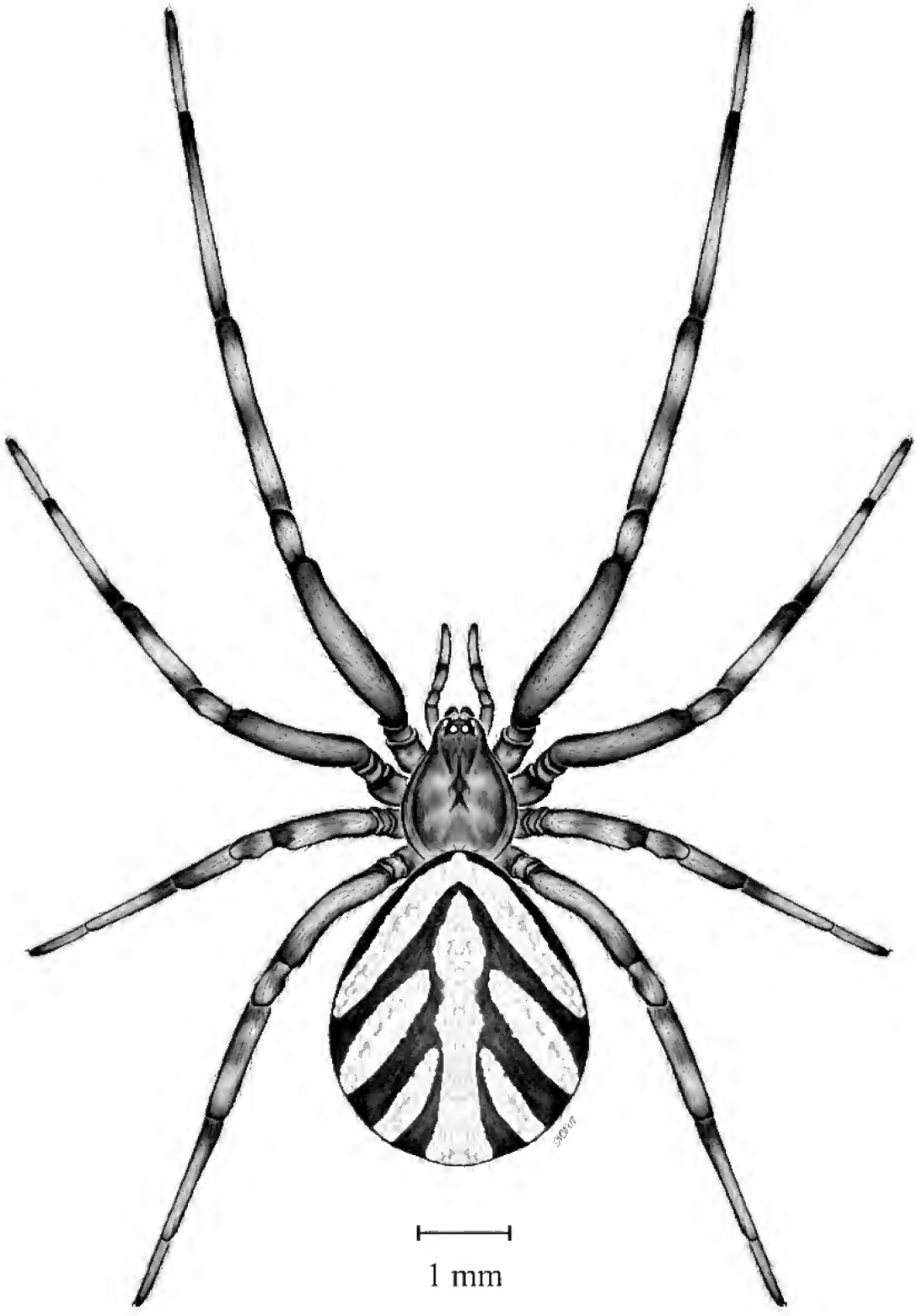

Figure 14. *Latrodectus hesperus* (Theridiidae) immature.

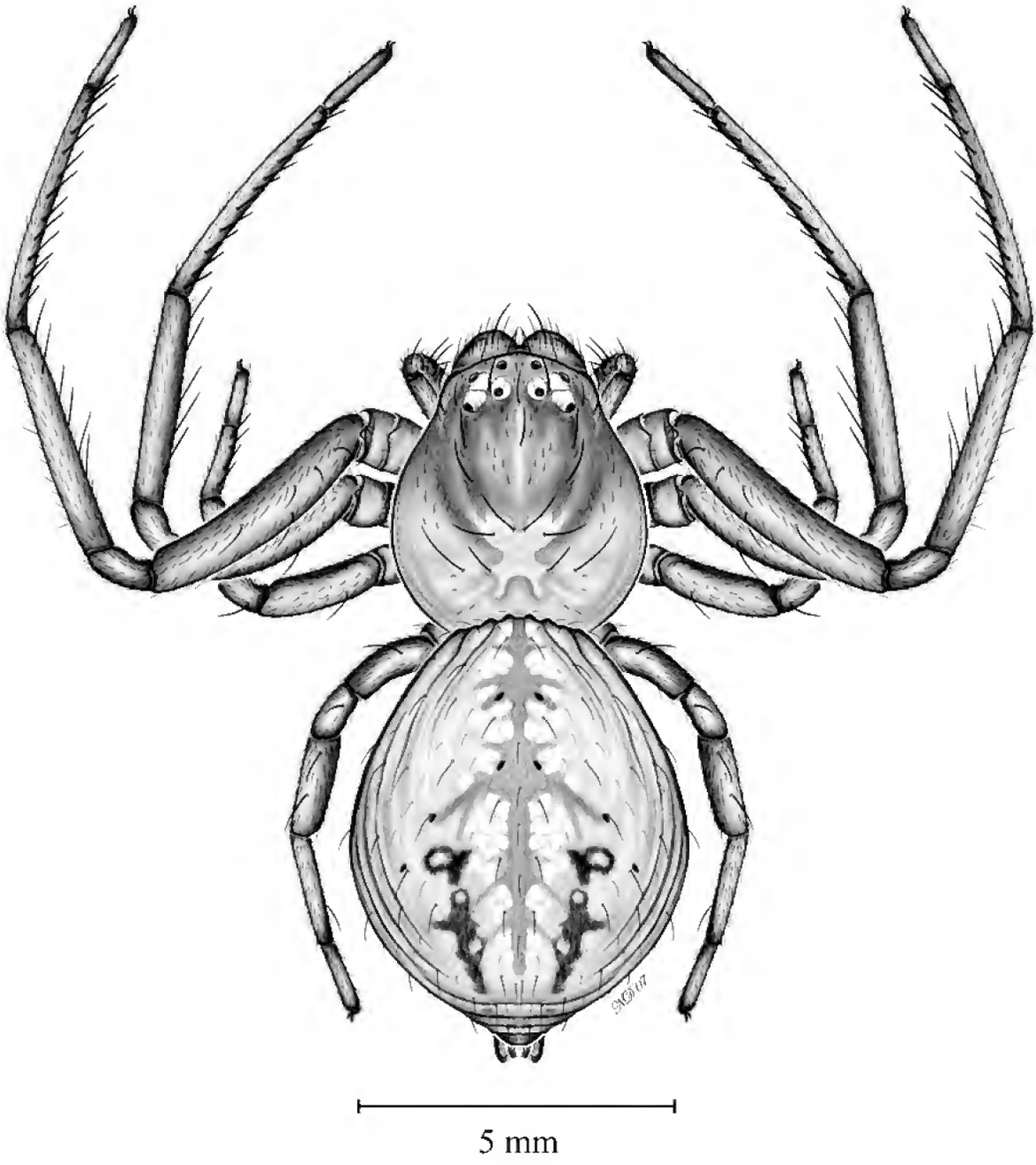

Figure 15. *Misumenops celer* (Thomisidae) female.

Comment.—The only recorded habitats are litter in Missouri and under rocks in Kansas.

Xysticus pellax O. P-Cambridge 1894

Identification.—Gertsch 1939, 1953.

Playa record.—Pantex Lake and Playa 2 edges, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.—Also located at grassland above the three playas sampled in Carson County. Dean (2007) listed it from a few widely spaced records across the state except for the High Plains.

Xysticus robinsoni Gertsch 1953
Fig. 16

Identification.—Gertsch 1953; Cokendolpher and Horner 1980.

Playa record.— Playa GS5, Floyd County (first county record), Texas. Pantex Lake and Playa 2 edges, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—Dean (2007) listed records from Castro and Lubbock Counties from the High Plains of Texas and across the state except for the Far West. The only other records are from shortgrass prairie of western Kansas (Guarisco et al. 2007).

Xysticus texanus Banks 1904
Photo. 49

Identification.—Gertsch 1939, 1953.

Playa record.—Pantex Lake and Playa 2 edges, Carson County (first county record), Texas (Sissom 2003) (Table 2). Playa Cedar Avenue, Lubbock County, Texas.

Distribution.—Dean (2007) listed this spider from East and Central Texas and Lubbock County in the Southern High Plains. Gertsch (1939) recorded this crab spider from Florida to Texas, Colorado and Kansas.

Family Titanoecidae
Titanoeca americana Emerton 1888
Photo. 50

Identification.—Leech 1972.

Playa record.—Pantex Lake and Playa 2 edges, Carson County (Sissom 2003) (Table 2).

Distribution.—Sissom (2003) also listed this spider from grassland above the three sampled playas in Carson County (first county record), Texas. Dean (2007) recorded it from southern and central Texas, with one record (Lubbock County) from the Southern High Plains. Elsewhere, Leech (1972) maps the distribution from New Hampshire south and west to Nebraska, Colorado, and New Mexico, east to Texas and Virginia.

Comment.—Leech (1972) found his specimens under logs, bark, and rocks on the ground.

ORDER OPILIONES
Family Sclerosomatidae
Eumesosoma roeweri
(Goodnight and Goodnight 1943)
Fig. 17, Photo. 51

Identification.—Cokendolpher 1980a.

Playa record.—Pantex Lake and Playa 1 edges, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—Cokendolpher (1980a: Fig. 5) shows the range to be the central grasslands of the U.S.A. from North Dakota to southern Texas, with only two records from the Southern High Plains (Randall and Lubbock Counties).

Comment.—The specimen from Randall County was collected (1973) at Canyon Lake (Cokendolpher 1980b). No details on locality are available with the specimen (1975) from Lubbock County.

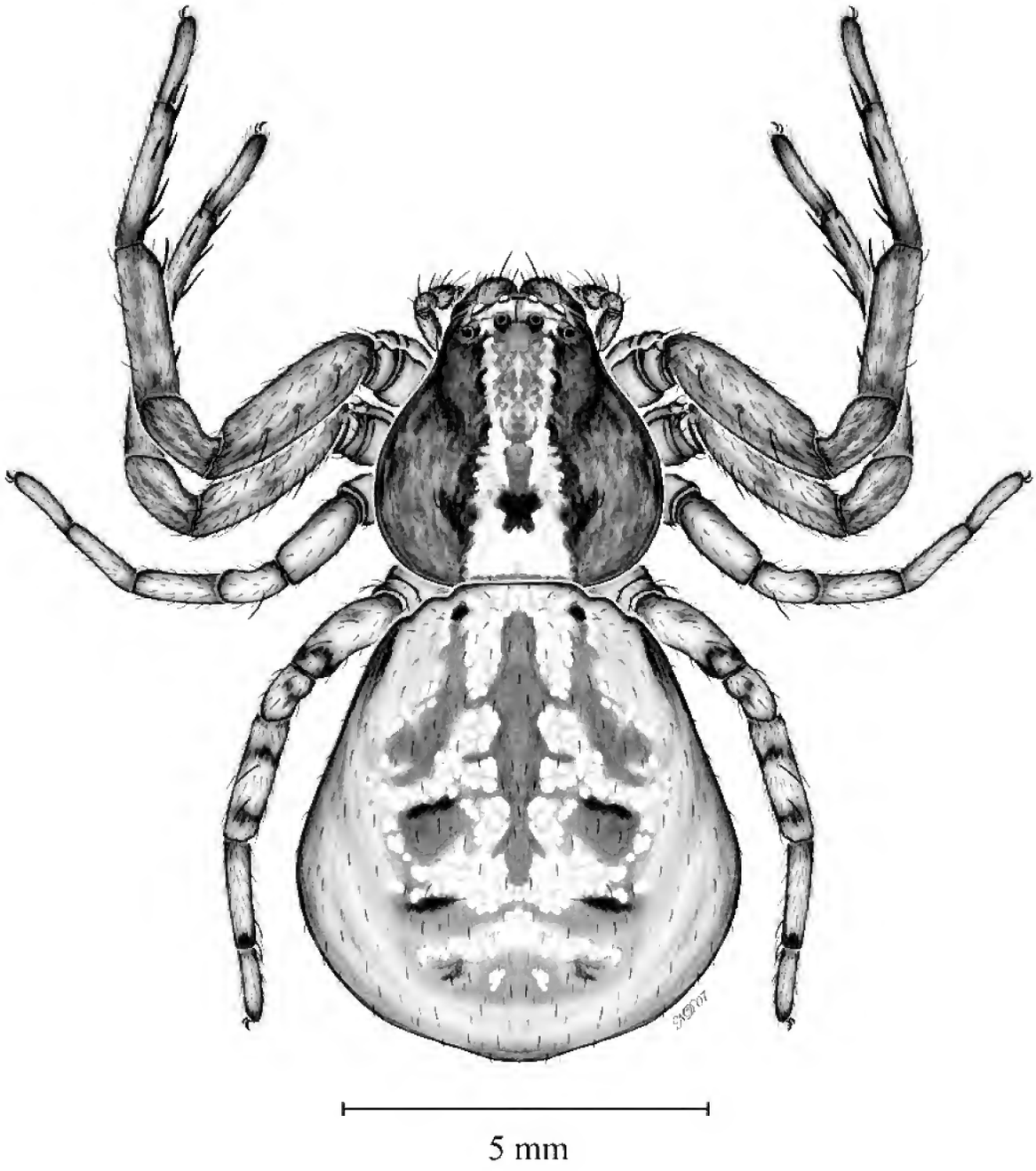

Figure 16. *Xysticus robinsoni* (Thomisidae) female.

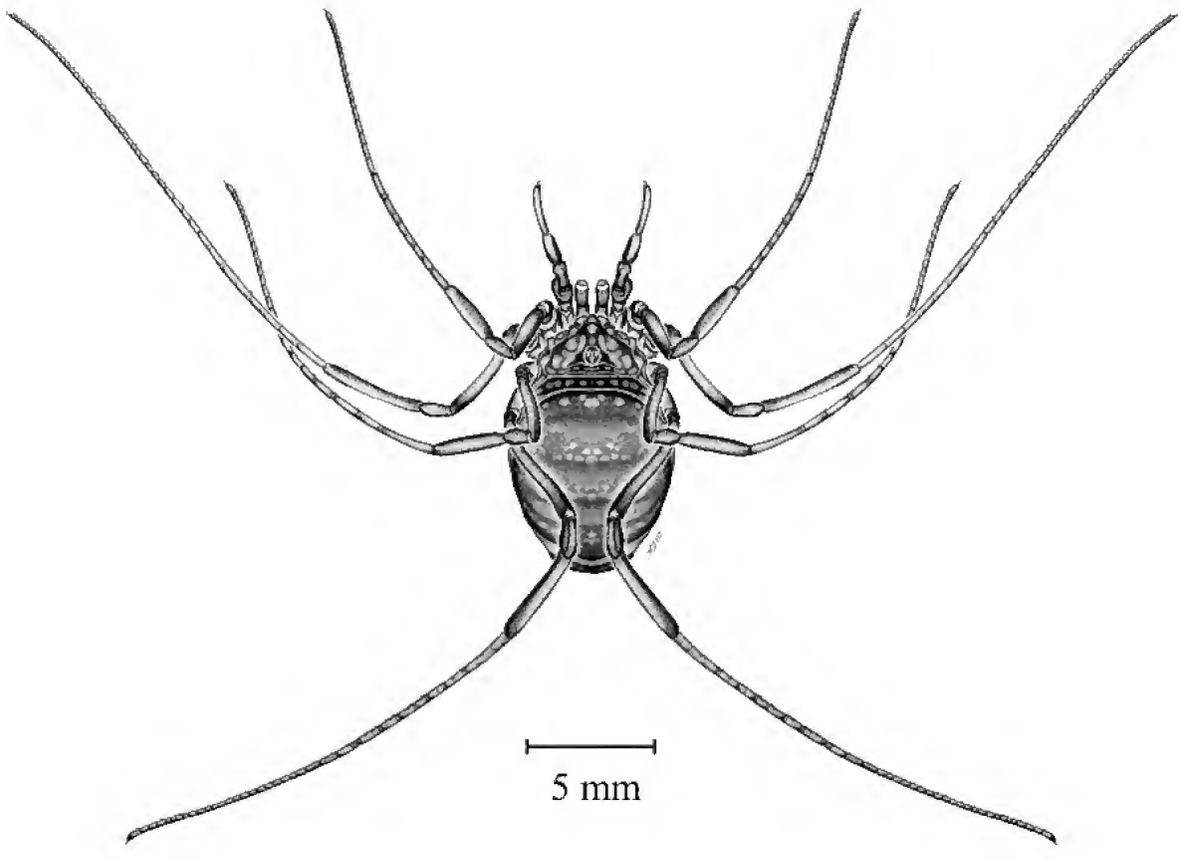

Figure 17. *Eumesosoma roeweri* (Sclerosomatidae) female.

ORDER SOLIFUGAE
Family Eremobatidae
Eremobates pallipes (Say 1823)
Fig. 18, Photo. 52

Identification.—Brookhart and Muma 1981; Muma and Brookhart 1988. *Pallpies* is the only *Eremobates* from the northwestern portion of Texas with pale coloration, no dusky or shaded areas on appendages.

Playa record.— Playa CP3 and GS6, Floyd County (new county record), Texas.

Playa record.—Brookhart and Muma (1981) listed this species from Palo Duro Canyon, and Mitchell County, Texas, north to Montana. Palo Duro Canyon is on the Southern High Plains.

Comment.—Muma and Muma (1988) reviewed the known biology of this dry plains Solifugae. Those from playas were collected on the edges.

SUBCLASS ACARI
SUPERORDER PARASITIFORMES
ORDER IXODIDA
Family Ixodidae
Dermacentor variablilis (Say 1821)

Identification.—http://www.discoverlife.org/20/q?search=Dermacentor+variabilis

Playa record.— Found on humans after visiting playas (L. Smith, pers. comm.). It is possible these attached outside of the playa edge as researchers returned to vehicles over higher ground.

Distribution.—Grasslands above Pantex Lake, Carson County (Sissom 2003) (Table 2). Although dog ticks are apparently found on dogs on the Southern High Plains (JCC pers. obs.), the Centers for Disease Control (http://www.phppo.cdc.gov/ncidod/dvrd/rmsf/Natural_Hx_img1.htm) only recognize them in the U.S.A. from east of the Rocky Mountains and High Plains and along the Pacific Coast of California.

Comment.—The dog is the preferred host, but it readily feeds on larger mammals including humans.

SUPERORDER ACARIFORMES
ORDER PROSTIGMATA

Comments.—The basic biology of water mites is provided by Smith et al. (2001). Water mites inhabiting temporary waters like playas are adapted to either avoid (*Elylais*, *Hydracha*) or endure (*Arrenurus*, *Piona*) the dry periods. The species avoiding drying are generally poor swimmers and those of the enduring type are good swimmers. Those enduring dry periods apparently do this in the substrate. Water mites have parasitic larvae and predaceous deutonymphs and adults. The vast majority of species are parasitic on imaginal insects which provide nutrition as well as a means of dispersal. Predation is primarily on small crustacea and aquatic insect eggs and larvae.

Family Arrenuridae
Arrenurus dentipetiolatus Marshall 1908
Figs. 19, 20

Identification.—Smith et al. 2001.

Playa record.—Playa A and B, Lubbock County (1981), Playas BR1, BR4, BR19, BR59, Briscoe County (Torrence); S49, S6, Swisher County (Torrence) Texas.

Distribution.—This water mite is reported as a resident species in playas of the Southern High Plains (Hall 1997; Hall et al. 1999).

***Arrenurus* n. sp.**

Identification.—I. M. Smith (pers. comm.).

Playa record.—Playa 10, Floyd County, Texas.

Comment.—This undescribed water mite species is known by a single specimen collected 20-28 June 1994 (Hall 1997).

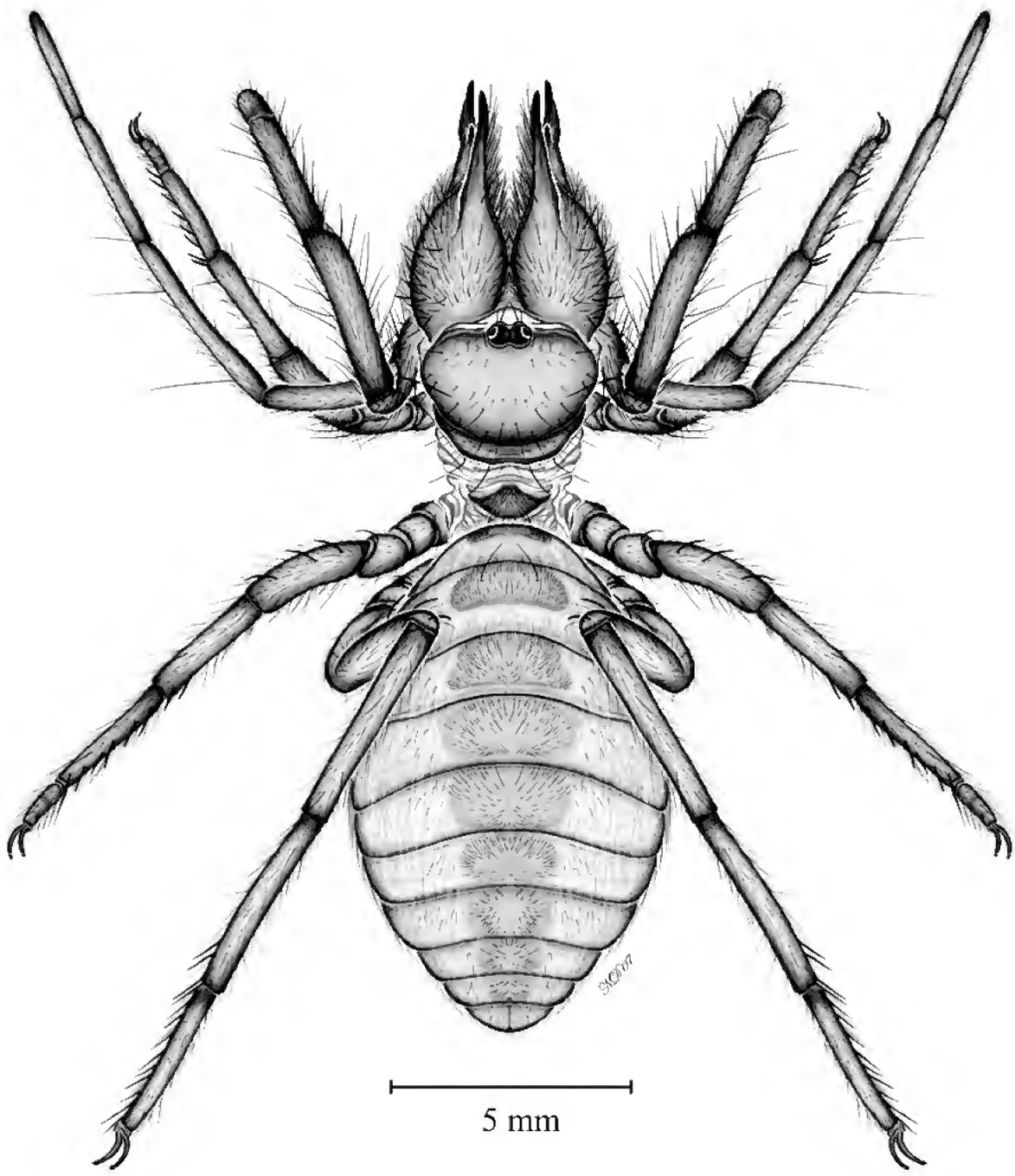

Figure 18. *Eremobates pallipes* (Eremobatidae) male.

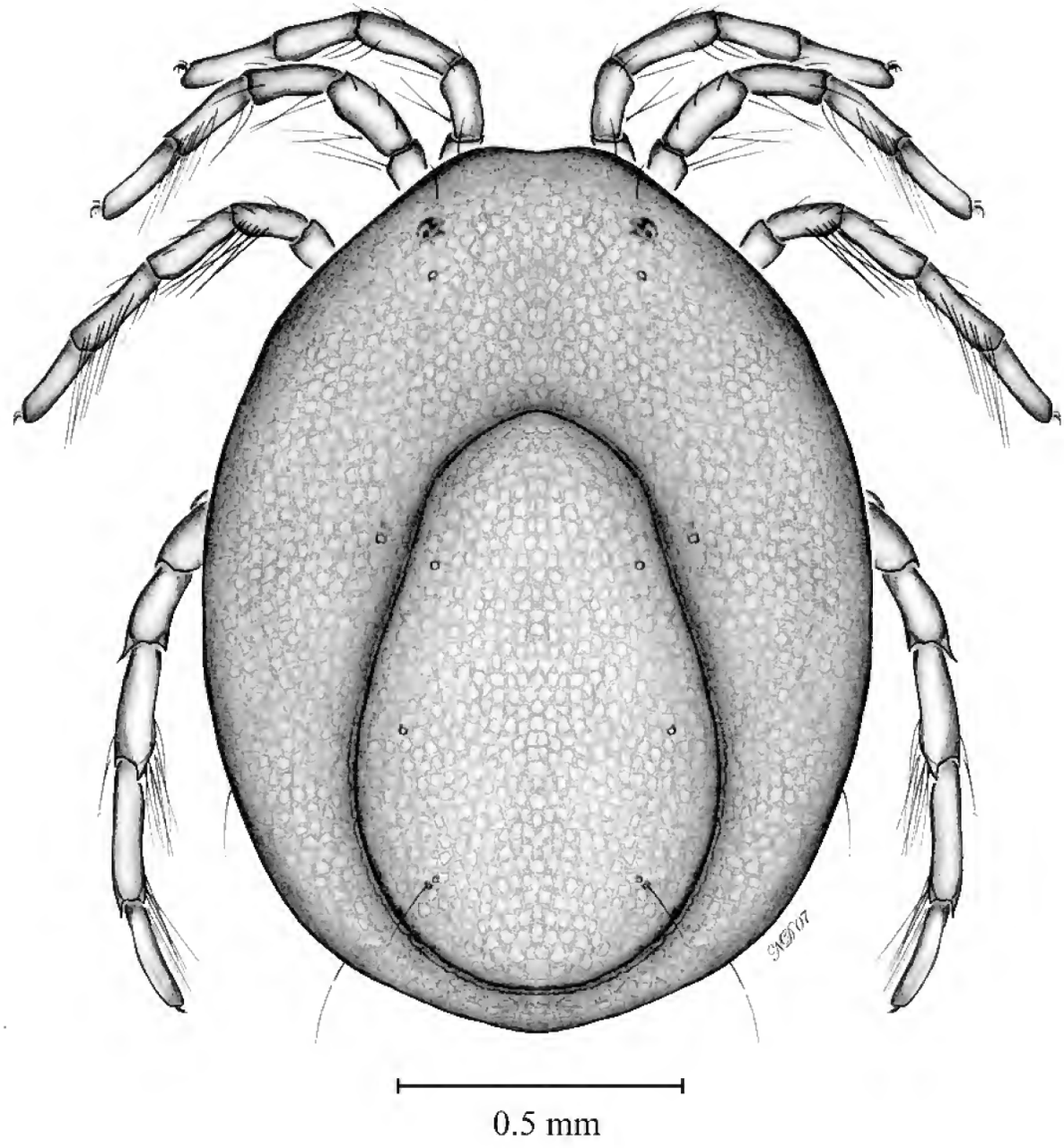

Figure 19. *Arrenurus dentipetiolatus* (Arrenuridae) female; green colored when alive.

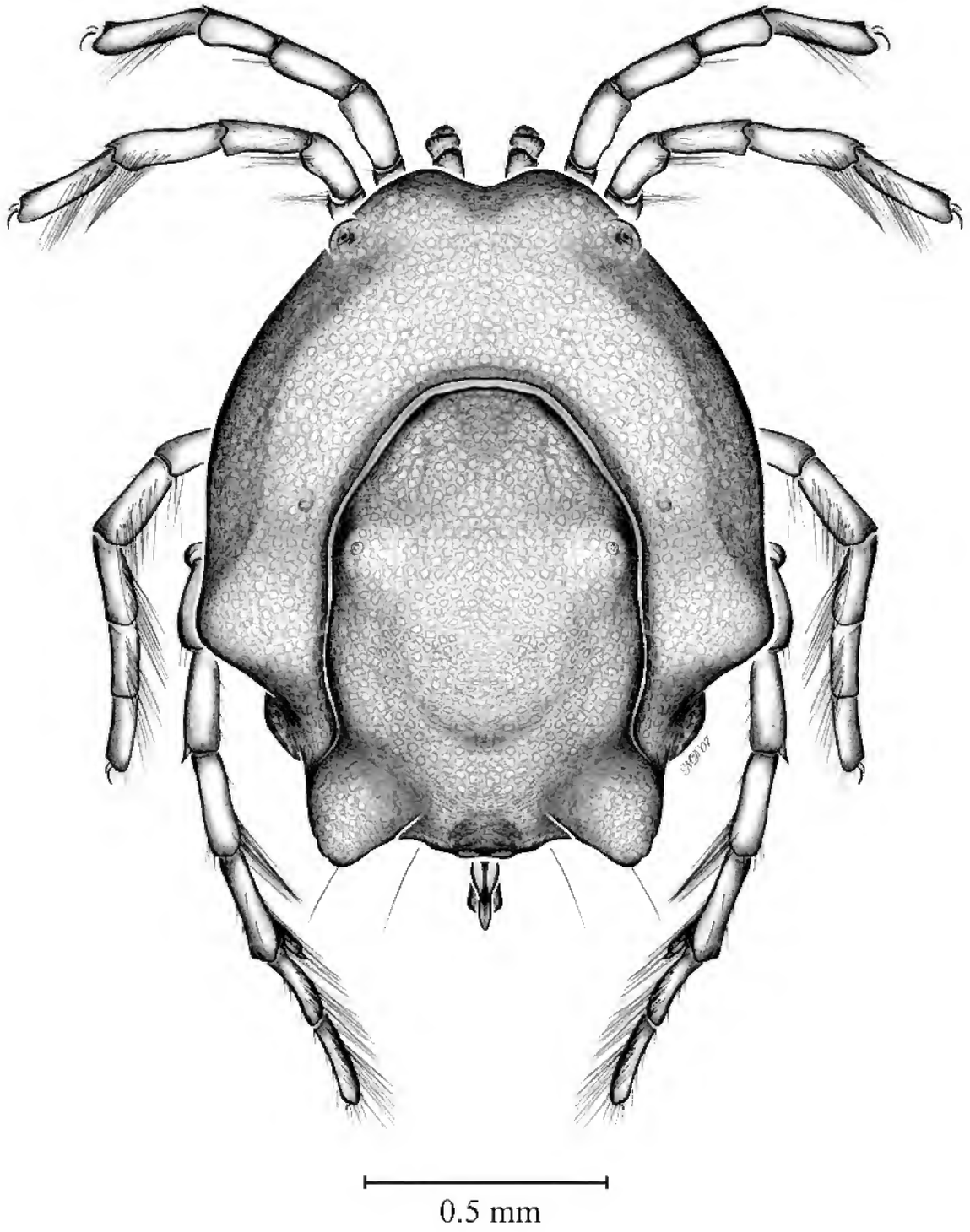

Figure 20. *Arrenurus dentipetiolatus* (Arrenuridae) male; green colored when alive.

Family Eylaidae
***Eylais* sp.**
Fig. 21

Identification.—Smith et al. 2001.

Playa record.—Playa A and B, Lubbock County (1981); Playa BR19, Briscoe County; Playas S6, S25, S49, Swisher County, Texas.

Distribution.—Until the species is identified or described the known distribution cannot be detailed for these water mites.

Family Hydrachnidae
***Hydrachna* sp.**
Fig. 22

Identification.—Smith et al. 2001.

Playa record.—Playas BR1, BR19, BR59, Briscoe County; Playas S6, S26, S49, Swisher County, Texas.

Distribution.—Until the species is identified or described the known distribution cannot be detailed for these water mites.

Family Pionidae
***Piona floridana* Cook 1960**
Fig. 23, Photo. 53

Identification.—Smith et al. 2001.

Playa record.—Playa BR1, Briscoe County; Playa S6, Swisher County, Texas.

Distribution.— This water mite is reported as a resident species in playas of the Southern High Plains (Hall 1997; Hall et al. 1999). It has been found in a man-made pond in Lubbock.

Family Erythraeidae
undetermined genus and sp. 1

Identification.—Sissom 2003.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Found in grassland above the three playas listed above, Carson County. Otherwise, distribution is unknown until species is identified.

undetermined genus and sp. 2

Identification.—Sissom 2003.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Also found in grassland above the three playas listed above, Carson County. Otherwise, distribution is unknown until species is identified.

undetermined genus and sp. 4

Identification.—Sissom 2003.

Playa record.—Pantex Lake edge, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.— Unknown until species is identified.

Family Trombiculidae
***Hannemania* sp.**
Photos. 54, 55

Identification.—Torrence et al. 2007.

Playa record.—Playa CP4/D (= F20) (2004), Playa CP6/F (= Br59) (2004), Briscoe County, Texas. Playa GS1 (2003), Playa GS1/A (= F41) (2004), Floyd County, Texas (Torrence et al. 2007).

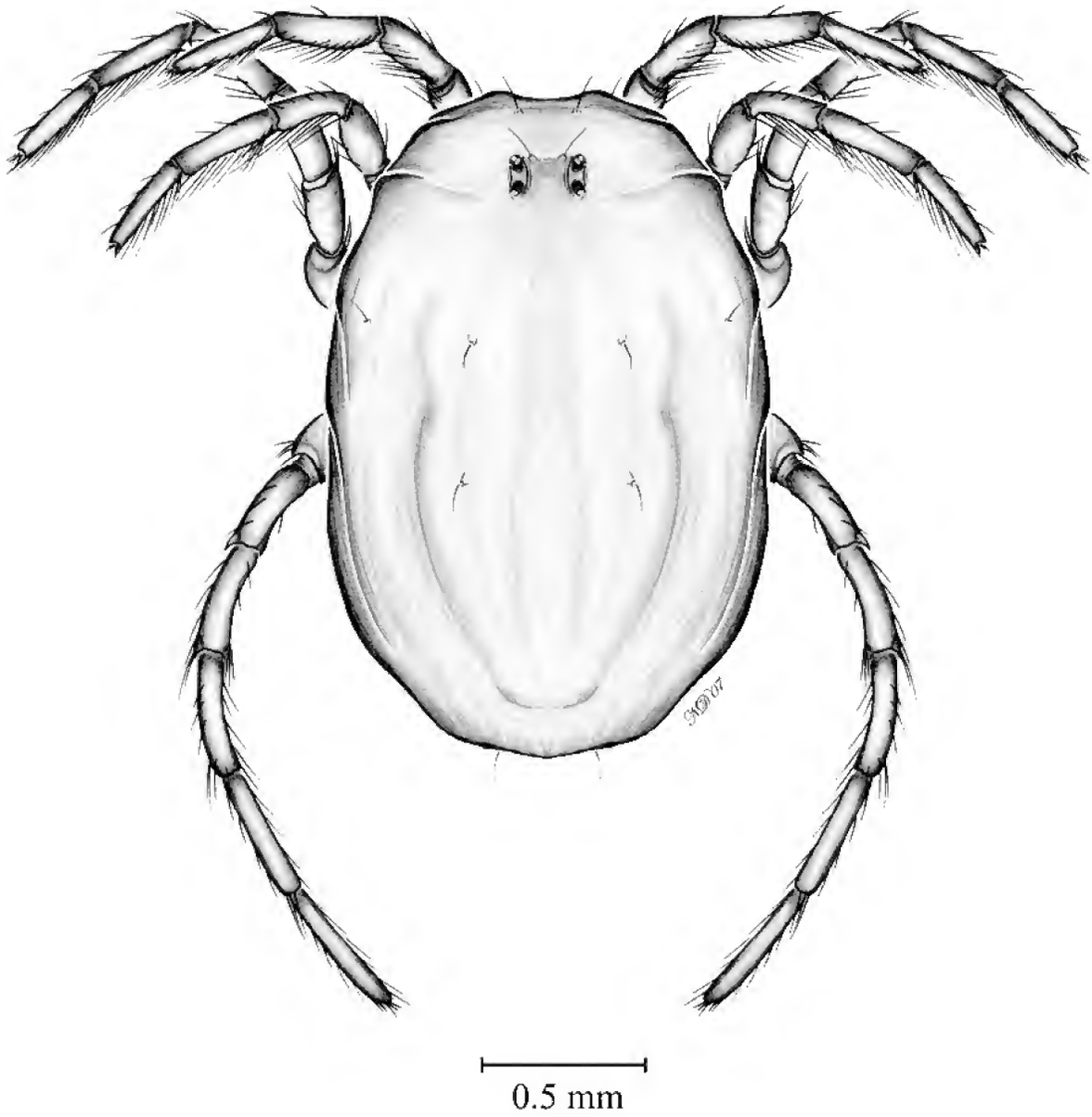

Figure 21. *Eylais* sp. (Eylaidae) female.

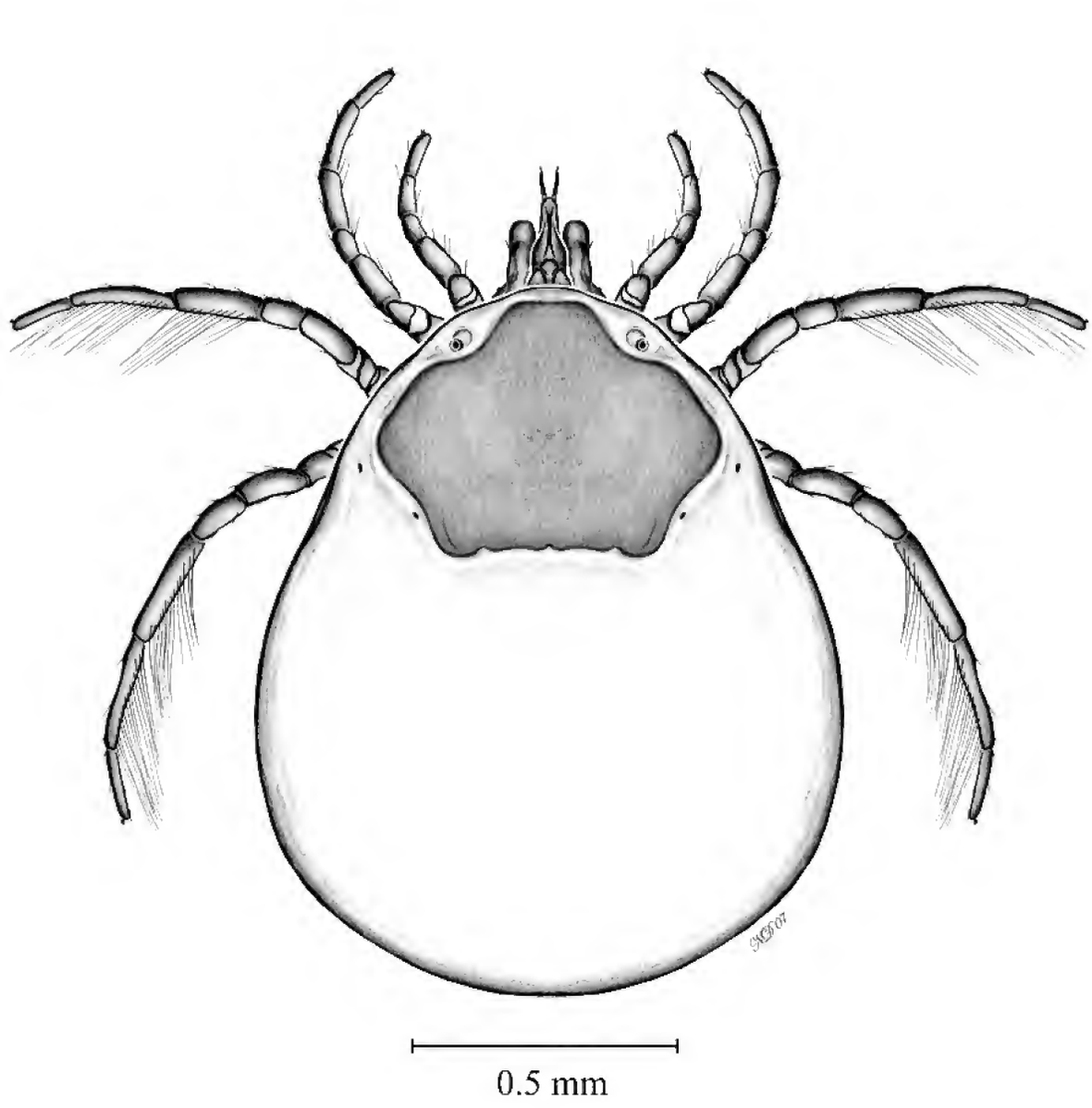

Figure 22. *Hydrachna* sp. (Hydrachnidae) female.

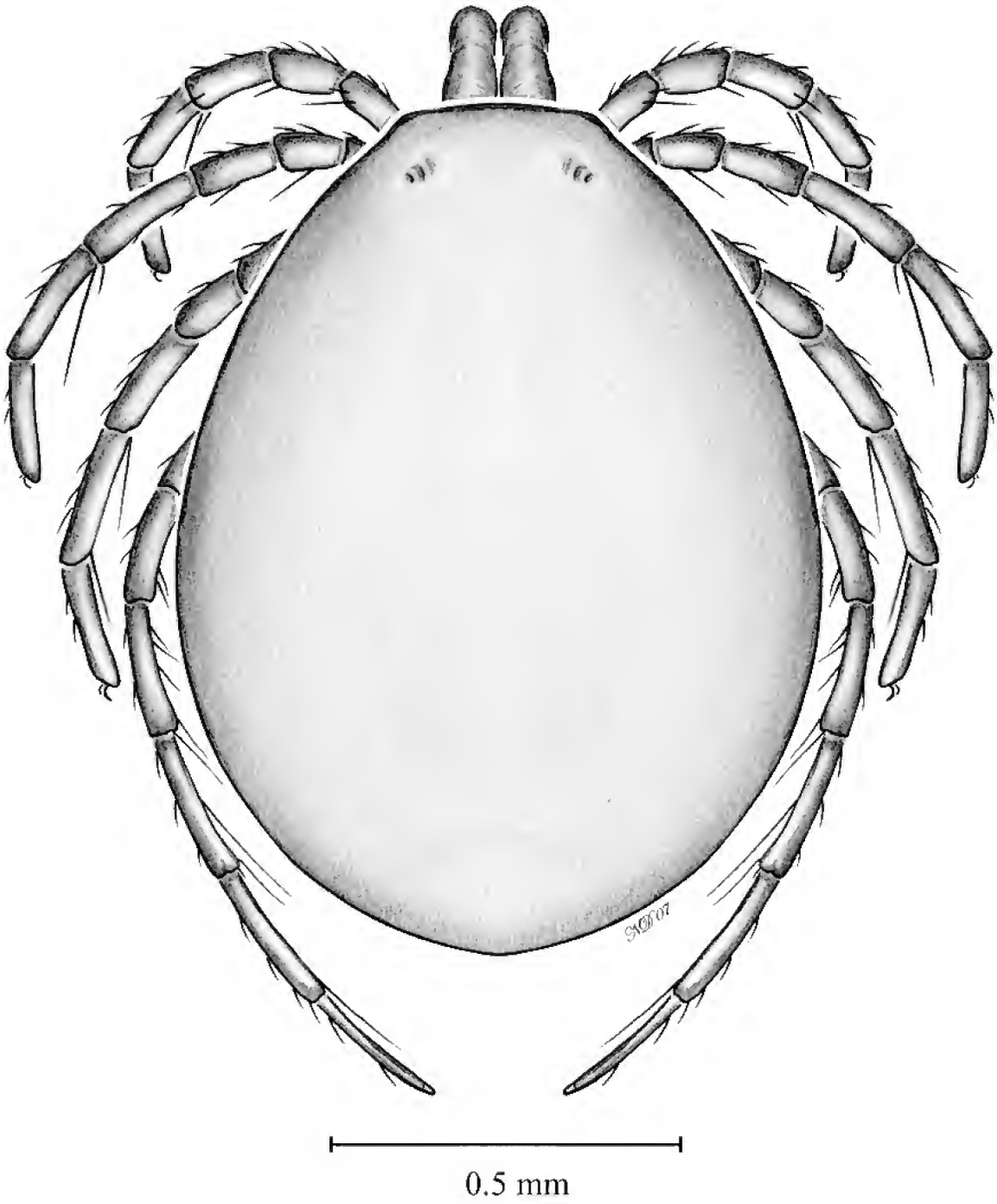

Figure 23. *Piona floridana* (Pionidae) female.

Distribution.—Unknown until species is identified.

Comment.— This chigger has a parasitic larval stage that feeds on toads of the genus *Spea* (Torrence et al. 2007).

Family Trombidiidae
undetermined genus and sp.

Identification.—Sissom 2003.

Playa record.—Pantex Lake, Playa 1 and 2 edges, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Unknown until species is identified.

ORDER SARCOPTIFORMES
SUBORDER ORIBATIDA
Family Galumnidae
undetermined genus and sp.

Identification.—Sissom 2003.

Playa record.—Playa 2 edge, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Unknown until species is identified.

Family Hydrozetidae
Hydrozetes lemnae (Coggi)
Photo. 56

Identification.—Norton (pers. comm).

Records.—Lubbock, Lubbock County, Texas (first county record). Two records are from man-made ponds in the city, and one record is from a highly modified playa inside South Loop 289.

Distribution.—This mite is parthenogenetic and recorded from localities from around the globe. They eat and reproduce under water on decomposing or soft-bodied aquatic plants.

Arachnids found in grasslands above playas, not closely associated with playas

Family Gnaphosidae
Nodocion utus (Chamberlin 1936)

Identification.—Platnick and Shadab 1980.

Record.— Grassland above Pantex Lake, Carson County, Texas (first state, Southern High Plains, and county record).

Distribution.—Previously recorded only in the southwestern U.S.A. and northeastern Mexico (Platnick and Shadab 1980).

Zelotes aiken Platnick and Shadab 1983

Identification.—Platnick and Shadab 1983.

Record.—From grassland above Playa 2, Carson County (first Southern High Plains, county record), Texas.

Distribution.—Dean (2007) listed this spider from North-central and eastern Texas. Platnick and Shadab (1983) reported it further east to Missouri and South Carolina.

Zelotes lasalanus Chamberlin 1928

Identification.—Platnick and Shadab 1983.

Record.—Sissom (2003) collected a specimen of this species in grassland above Pantex Playa 2, Carson County (first county record), Texas.

Distribution.—Dean (2007) listed this spider in western and central Texas, with a record from Bailey County, Southern High Plains. Otherwise widespread in western North America (Platnick and Shadab 1983).

Family Hahniidae
Hahnia cinerea Emerton 1890

Identification.—Opell and Beatty 1976.

Record.—Spider was collected in grasslands (not playa edges) at Pantex Plant, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2).

Distribution.— This is the first record of this species from Carson County as well as the High Plains of Texas; otherwise it is known from southern and eastern Texas (Dean 2007).

Family Linyphiidae
Ceratinella brunnea Emerton 1914

Identification.—Crosby and Bishop 1925; Paquin and Dupérré 2003.

Record.—Found in grasslands above Pantex Playa 1 and 2, Carson County (first state, Southern High Plains, county record), Texas.

Distribution.—Reported elsewhere from eastern North America west to Oklahoma and New Mexico.

***Erigone* sp.**

Identification.—Crosby and Bishop 1928.

Record.— Grassland above Pantex Playa 1, Carson County, Texas.

Distribution.—Unknown until species is identified.

Family Lycosidae
***Schizocosa* sp. 2**

Identification.—Dondale and Redner 1978a.

Record.—This undetermined species was found in the grasslands above Pantex Lake, Carson County, Texas (Sissom 2003).

Distribution.—Unknown until species is identified.

Family Theridiidae
undetermined genus and sp.

Record.—Found on grassland above Pantex Playa 2, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Unknown until species is identified.

***Euryopis* sp.**

Identification.—Levi 1954, 1963.

Record.—Found on grassland above Pantex Lake, Carson County, Texas (Sissom 2003) (Table 2).

Distribution.—Unknown until species is identified. Dean (2007) listed five species of this genus from Texas, but only *Euryopis texana* Banks 1908 is recorded from the Southern High Plains (Wheeler County).

Family Thomisidae
Misumenoides formosipes (Walckenaer 1837)

Identification.—Gertsch 1939.

Record.—Grassland above Pantex Playa 2, Carson County, Texas.

Distribution.—Found in grassland above Playa 2, Carson County (first Southern High Plains, county record), Texas (Sissom 2003) (Table 2). Dean (2007) listed it from across the state, except from the Rolling and High Plains.

Misumenops coloradensis Gertsch 1933

Identification.—Gertsch 1939; Schick 1965.

Record.—Grassland above Pantex Lake, Carson County (first Southern High Plains, county record), Texas.

Distribution.—Dean (2007) listed the species only from the central and southwestern portions of Texas. Elsewhere it is recorded from southwestern U.S.A. and northern Mexico (Schick 1965).

Comment.—Only a single male was collected in Carson County.

Family Salticidae
***Peckhamia* sp.**

Identification.—Proszynski 2006.

Record.— Grassland above Pantex Playa 2, Carson County, Texas.

Distribution.—Unknown until species is identified.

Pelegrina proterva (Walckenaer 1837)

Identification.—Maddison 1996; Proszynski 2006.

Record.— Grassland above Pantex Playa 1 as well as other more distant grassland, Carson County (first Southern High Plains, county record), Texas.

Distribution.—Dean (2007) listed records from the eastern half of Texas, but none from the High Plains. Maddison (1996) recorded this jumping spider from across Canada and the northeastern U.S.A., south to Florida and eastern Texas.

***Sitticus* sp.**

Identification.—Proszynski 2006. The tibial apophysis of the male palp is very elongate and thin throughout like *Sitticus juniperi* Gertsch and Reichert 1976, but not curved at distal end.

Record.—Grassland from above Pantex Lake and Playa 1, Carson County, Texas.

Distribution.—Unknown until species is identified.

Family Sclerosomatidae
Trachyrhinus marmoratus Banks

Identification.—Cokendolpher 1981.

Record.—Grasslands above Pantex Lake, Carson County (first county record), Texas (Sissom 2003) (Table 2).

Distribution.—This is a new county record and the third for the High Plains, being previously known from Potter and Lubbock Counties (Cokendolpher 1981).

Family Anystidae
undetermined genus and sp.

Identification.—Sissom 2003.

Record.— Grassland above Pantex Lake, Carson County, Texas (Sissom 2003).

Distribution.—Unknown until species is identified.

Family Caeculidae
undetermined genus and sp.

Identification.—Sissom 2003.

Record.— Grassland above Playa 2, Carson County, Texas (Sissom 2003).

Distribution.—Unknown until species is identified.

DISCUSSION

Most arachnids found to be unique to the playa edge habitat are not specifically adapted to live there. Many of these species (e.g., *Eumesosoma roeweri*, *Philodromus pratariae*, *Tetragnatha laboriosa*, *Tibellus duttoni*, *Xysticus robinsoni*, *Xysticus texanus*) are known from grassland sites elsewhere (e.g., Cokendolpher 1980a, Cokendolpher et al. 1979), although some have an affinity for moist habitats, such as playas and creek edges. We suggest that the majority of species collected within playas are grassland species that initially became established along the wet playa edges. It is also likely species adapted to grasslands are present when rains inundate playas. In much of the region, the remaining shortgrass prairie is associated with playa slopes. Individual arachnids that can survive in the emergent vegetation or borders, slowly retreat in the terrestrial habitat as it is submerged and return again as it dries (Lubbock County, JCC pers. obs.). Alternatively, arachnids may retreat to vegetation within playas during harsh conditions. Historically, arachnids may have used playa habitats when prey was scarce (e.g., during drought). Today, because agriculture is the main upland landcover type, playa vegetation may be the only native habitat for these spiders.

As suggested by Cokendolpher et al. (2007), ballooning may be the best means by which spiders more closely associated with wetlands can travel between wetlands. Of course this genetically-directed behavior may be risky when prevailing winds do not pass over wetlands (which are disappearing from the landscape). The same is true for water mites that disperse by riding (as a parasite larva) on a winged insect. The fitness of the host and water mites decreases if the host fails to find suitable habitat. Likewise, if the host lands in waters that are artificially permanent, host and riders will possibly be preyed upon by introduced fish or other predators common to permanent waters.

Playas face many threats, of which loss of playa volume due to sedimentation is the greatest (Luo et al. 1997). An ecologically-functioning playa cycles through wet and dry periods; this cycling sustains populations of amphibians, invertebrates, and plant taxa by eliminating predators common to permanent waters (Smith 2003). However, increased sedimentation may reduce the time playas contain water to the point that playa taxa cannot complete the aquatic portion of their life cycle (Smith 2003). Sedimentation can also alter plant community composition (Smith and Haukos 2002); the plant community is the primary habitat or canopy for most taxa listed here (except for some hunting lycosids and gnaphosids that appear to prefer open grounds, JCC pers. obs.). Other studies have focused on the importance of aquatic vegetation to amphibians (Anderson et al. 1999, Venne 2006, Torrence 2007) and waterbirds (Anderson and Smith 1998, Smith et al. 2004). These studies highlight the need to implement playa management strategies that conserve the natural ecological function of playas, including germination of the seed bank.

Conserving numerous viable playas is further supported by the fact that aquatic insects and their parasitic mites require larger volumes of water to complete their life-cycles and to persist in regions where smaller playas dry early. The quality of the water is also of concern because the levels of acceptable contaminants are currently unknown for numerous aquatic insect larvae and water mites. Efforts for mosquito abatement in urban playas and pesticide use in agricultural areas may exterminate some water mites which normally ride on newly emerged insects with aquatic life-stages. We collected arachnids as parts of larger studies; therefore, the purposeful collection of arachnids will yield even higher diversities. Except for agricultural pests and medically-important species, there is a lack of basic natural history knowledge of known arachnids in general and specifically with taxa in playa wetlands in the Southern High Plains. Current diversity levels, the lack of natural history knowledge of known species, and the real possibility of discovering additional new species of arachnids within these wetlands highlights the need for conservation of geographically isolated wetlands not protected under the Clean Water Act of the U.S.A. (Haukos and Smith 2003).

The Pantex Plant serves as an example where playa management has been initiated. An extensive historical record base exists for wildlife species observed at this site, and a commitment to continue monitoring has been established. The Plant's four playas are buff-

ered from industrial areas and cultivated agriculture by native grassland. These grasslands are managed through a rest-rotation grazing system, and are inhabited by a diverse community of native wildlife. With over 25,000 playas in the Southern Great Plains of Texas and most on private property, it is not surprising that most have not been sampled. There are playas in 34 of 42 counties in Texas that have not been sampled for arachnids.

ACKNOWLEDGMENTS

Funding for individual studies as well as the manuscript portion of this project was provided by the U.S. Fish and Wildlife Service (Region 2) and the National Science Foundation Grant DMS-0201105. LMS was funded by the Caesar Kleberg Foundation for Wildlife Conservation. Funding for sampling at Pantex was provided by the U.S. Department of Energy/National Nuclear Security Administration, in cooperation with Babcock and Wilcox Technical Services Pantex, LLC, Monty Schoenhals, Mike Keck (B&W Pantex), Douglas P. Bingham, James Hallmark (West Texas A&M University) are acknowledged for support and contributions to this project. We also thank Dianne Hall (St. Johns River Water Management District, Palatka, Florida) and Ian M. Smith (Canadian National Collection of Insects and Arachnids, Ottawa) for their discussions on water mites and especially about the new species. Roy A. Norton (SUNY College of Environmental Science and Forestry) provided the identification of the hydrozetid mite. Allen Dean (Texas A&M University, College Station) kindly provided access to his (unpublished) database of spiders and distributions within Texas. Norman V. Horner (Midwestern State University, Wichita Falls) and Allen Dean served as reviewers and their comments helped to improve the manuscript. Jo-Szu (Ross) Tsai (Texas Tech University) kindly allowed us to use his inspiring and beautiful photograph as the background for the cover of this book. We thank him also for the use of other photographs of playas appearing inside this publication. University of Texas Press, Austin, gave permission for the reprinting with modifications to the map. Funding for printing this volume was provided by Oklahoma State University, Texas Parks and Wildlife Department, Texas Tech University, West Texas A&M University, and West Virginia University. This is scientific article No. 3004 of the West Virginia University Agricultural and Forestry Experiment Station.

ILLUSTRATION CREDITS

Cover photograph by Jo-Szu (Ross) Tsai; Figure 1 by Loren M. Smith; Figures 2-23 by Nadine Dupérré; Photos. 1-3, 5 by Jo-Szu (Ross) Tsai; Photos. 4, 13-35, 37-56 by James C. Cokendolpher; Photos. 36, 67 by Shannon M. Torrence; Photos. 8-12 by B&W Pantex.

LITERATURE CITED

Anderson, A. M., D. A. Haukos, and J. T. Anderson. 1999. Habitat use by anurans emerging and breeding in playa wetlands. Wildlife Society Bulletin 27:759-769.

Anderson, J. T. 1997. Invertebrate communities in vegetated playa wetlands. Ph.D. dissertation, Texas Tech University, Lubbock, Texas. 446 pp.

Anderson, J. T., and L. M. Smith. 1998. Protein and energy production in playas: implications for migratory bird management. Wetlands 18:437-446.

Anderson, J. T., and L. M. Smith. 2000. Invertebrate response to moist-soil management of playa wetlands. Ecological Applications 10:550-558.

Anderson, J. T., and L. M. Smith. 2004. Persistence and colonization strategies of playa wetland invertebrates. Hydrobiologia 513:77-86.

Barnes, R. D. 1958. North America jumping spiders of the subfamily Marpissinae (Araneae, Salticidae). American Museum Novitates No. 1867. 50 pp.

Berman, J. D., and H. W. Levi. 1971. The orb-weaver genus *Neoscona* in North America (Araneae: Araneidae). Bulletin of the Museum of Comparative Zoology 141:465-550.

Bolen, E. G., L. M. Smith, and H. L. Schramm, Jr. 1989. Playa lakes: prairie wetlands of the Southern High Plains. BioScience 39:615-623.

Brady, A. R. 1964. The lynx spiders of North America north of Mexico (Araneae, Oxyopidae). Bulletin of the Museum of Comparative Zoology 131:432-518.

Brady, A. R. 1979. Nearctic species of the wolf spider genus *Trochosa* (Araneae: Lycosidae). Psyche 86:167-212.

Brady, A. R., and K. S. McKinley. 1994. Nearctic species of the wolf spider genus *Rabidosa* (Araneae: Lycosidae). Journal of Arachnology 22:138-160.

Breene, R. G., D. A. Dean, M. Nyffeler, and G. B. Edwards. 1993. Biology, predation ecology, and significance of spiders in Texas cotton ecosystems with a key to the species. Texas Agricultural Extension Station, College Station, B-1711. 115 pp.

Brookhart, J. O., and I. P. Brookhart. 2006. An annotated checklist of continental North American Solifugae with type depositories, abundance, and notes on their zoogeography. Journal of Arachnology 34:299-329.

Brookhart, J. O., and M. H. Muma. 1981. The *pallipes* species-group of *Eremobates* Banks (Solpugida: Arachnida) in the United States. Florida Entomologist 64:283-308.

Brower, J. and J. Zar. 1984. Field and laboratory methods for general ecology. 2nd ed. Wm. C. Brown, Dubuque, Iowa. 226 pp.

Buckle, D. J., D. Carroll, R. L. Crawford, and V. D. Roth. 2001. Linyphiidae and Pimoidae of America north of Mexico: checklist, synonymy, and literature. Fabreries, Supplément 10:89-191.

Chamberlin, R. V. 1908. Revision of North American spiders of the family Lycosidae. Proceedings of the Academy of Natural Sciences, Philadelphia 60:158-318.

Chamberlin, R. V., and W. J. Gertsch. 1958. The spider family Dictynidae in America north of Mexico. Bulletin of the American Museum of Natural History 116:1-152.

Cokendolpher, J. C. 1980a. Replacement name for *Mesosoma* Weed, 1892, with a revision of the genus (Opiliones, Phalangiidae, Leiobuninae). Occasional Papers, The Museum of Texas Tech University 66:1-19.

Cokendolpher, J. C. 1980b. Unpublished list of specimens examined for Cokendolpher (1980a). Southwest Collection, Texas Tech University. 10 pp.

Cokendolpher, J. C. 1981. Revision of the genus *Trachyrhinus* Weed (Opiliones, Phalangioidea). Journal of Arachnology 9:1-18.

Cokendolpher, J. C., and N. V. Horner. 1978. The spider genus *Poultonella* (Araneae: Salticidae). Journal of Arachnology 6:133-139.

Cokendolpher, J. C., and N. V. Horner. 1980. The female of *Xysticus robinsoni* (Araneae: Thomisidae). Southwestern Naturalist 25:109-111.

Cokendolpher, J. C., N. V. Horner, and D. T. Jennings. 1979. Crab spiders of North-Central Texas (Araneae: Philodromidae and Thomisidae). Journal of the Kansas Entomological Society 52:723-734.

Cokendolpher, J. C., S. M. Torrence, L. M. Smith, and N. Dupérré. 2007. New Linyphiidae spiders associated with playas in the Southern High Plains (Llano Estacado) of Texas (Arachnida: Araneae). Zootaxa 1529:49-60.

Conway, W. C., L. M. Smith, and J. D. Ray. 2005a. Breeding biology of shorebirds nesting in wetlands of the Playa Lakes Region. Waterbirds 28:129-138.

Conway, W. C., L. M. Smith, and J. D. Ray. 2005b. Shorebird habitat use and nest-site selection in the Playa Lakes Region. Journal of Wildlife Management 69:174-184.

Corn, P. S. 1994. Standard techniques for inventory and monitoring: straight-line drift fences and pitfall traps. Pp. 109-117 in Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians (W. R. Heyer, M. A. Donnelly, R. W. McDiarmid and M. S. Foster, eds.). Smithsonian Institution Press, Washington, D.C.

Crosby, C. R., and S. C. Bishop. 1925. Studies in New York spiders. Genera: *Ceratinella* and *Ceraticelus*. New York State Museum Bulletin 264: 1-71.

Crosby, C. R., and S. C. Bishop. 1928. Revision of the spider genera *Erigone*, *Eperigone* and *Catabrithorax* (Erigoneae). Bulletin of the New York State Museum 278:3-74.

Davis, C. A., and L. M. Smith. 1998. Ecology and management of migrant shorebirds in the Playa Lakes Region of Texas. Wildlife Monographs 140:1-45.

Dean, D. A. 2007. Catalogue of Texas Spiders. unpublished computer file, Texas A&M University, College Station.

DeCoster, W., and G. Persoone. 1970. Ecological study of gastropoda in a swamp in the neighbourhood of Ghent (Belgium). Hydrobiologia 36:65-80.

Dondale, C. D., and J. H. Redner. 1969. The *infuscatus* and *dispar* groups of the spider genus *Philodromus* in North and Central America and the West Indies (Araneida: Thomisidae). Canadian Entomologist 101;921-954.

Dondale, C. D., and J. H. Redner. 1975. The genus *Ozyptila* in North America (Araneida: Thomisidae). Journal of Arachnology 2:129-181.

Dondale, C. D., and J. H. Redner. 1978a. Revision of the Nearctic wolf spider genus *Schizocosa* (Araneida: Lycosidae). Canadian Entomologist 110:143-181.

Dondale, C. D., and J. H. Redner. 1978b. The crab spiders of Canada and Alaska (Araneae: Philodromidae and Thomisidae). In: The insects and Arachnids of Canada, part 5. Canadian Department of Agriculture, Publication No. 1663. 225 pp.

Dondale, C. D., and J. H. Redner. 1979. A revision of the wolf spider genus *Alopecosa* Simon in North America (Araneae: Lycosidae). Canadian Entomologist 111:1033-1055.

Dondale, C. D., and J. H. Redner. 1982. The sac spiders of Canada and Alaska, (Araneae: Clubionidae and Anyphaenidae). In: The Insects and Arachnids of Canada, Part 9. Canadian Department of Agriculture, Publication No. 1724. 194 pp.

Dondale, C. D., and J. H. Redner. 1983. The wolf spider genus *Allocosa* in North and Central America (Araneae: Lycosidae). Canadian Entomologist 115:933-964.

Dondale, C. D., and J. H. Redner. 1984. Revision of the *milvina* group of the wolf spider genus *Pardosa* (Araneae: Lycosidae). Psyche 91:67-117.

Dondale, C. D., and J. H. Redner. 1990. The wolf spiders, nurseyweb spiders, and lynx spiders of Canada and Alaska (Araneae: Lycosidae, Pisauridae, and Oxyopidae). In: The Insects and Arachnids of Canada, Part 17, Canadian Department of Agriculture, Publication No. 1856. 383 pp.

Dondale, C. D., J. H. Redner, P. Paquin, and H. W. Levi. 2003. The orb-weaving spiders of Canada and Alaska (Araneae: Uloboridae, Tetragnathidae, Araneidae, Theridiosomatidae). In: The Insects and Arachnids of Canada, Part 23. NRC Research Press, Ottawa. 371 pp.

Dondale, C. D., A. L. Turnbull, and J. H. Redner. 1964. Revision of the Nearctic species of *Thanatus* C. L. Koch (Araneida: Thomisidae). Canadian Entomologist 104:35-60.

Edgar, A. L. 1990. Opiliones (Phalangida). Pp. 529-581 in Soil biology guide (D. L. Dindal, ed.). John Wiley and Sons, Inc., New York.

Edwards, G. B. 2004. Revision of the jumping spiders of the genus *Phidippus* (Araneae: Salticidae). Occasional Papers of the Florida State Collection of Arthropods 11: i-viii, 1-156.

Edwards, R. J. 1958. The spider subfamily Clubioninae of the United States, Canada and Alaska (Araneae: Clubionidae). Bulletin of the Museum of Comparative Zoology 118:365-436.

Gertsch, W. J. 1939. A revision of the typical crab-spiders (Misumeninae) of America north of Mexico. Bulletin of the American Museum of Natural History 76:277-442.

Gertsch, W. J. 1953. The spider genera *Xysticus*, *Coriarachne*, and *Oxyptila* (Thomisidae, Misumeninae) in North America. Bulletin of the American Museum of Natural History 102:417-482.

Gertsch, W. J., and H. K. Wallace. 1935. Further notes on American Lycosidae. American Museum Novitates No. 794. 22 pp.

Gray, M. J., and L. M. Smith. 2005. Influence of land use on postmetamorphic body size of playa lake amphibians. Journal of Wildlife Management 69:515-524.

Gray, M. J., L. M. Smith, and R. Brenes. 2004. Effects of agricultural cultivation on demographics of Southern High Plains amphibians. Conservation Biology 18:1368-1377.

Griswold, C. E. 1987. A revision of the jumping spider genus *Habronattus* F.O.P.-Cambridge (Araneae; Salticidae), with phenetic and cladistic analysis. University of California Publications in Entomology 107:1-344.

Guarisco, H., W. M. Cook and K. R. Nuckolls. 2007. New additions to the spider fauna of Kansas discovered near black-tailed prairie dog towns in shortgrass prairie. Transactions of the Kansas Academy of Science 107:175–178.

Guthery, F. S., and F. C. Bryant. 1982. Status of playas in the Southern Great Plains. Wildlife Society Bulletin 10:309-317.

Hall, D. L. 1997. Species diversity of aquatic macroinvertebrates in playa lakes: Island biogeographic and landscape influences. Ph.D. dissertation, Texas Tech University, Lubbock, Texas. 127 pp.

Hall, D. L., R. W. Sites, E. B. Fish, T. R. Mollhagen, D. L. Moorhead, and M. R. Willig. 1999. Playas of the Southern High Plains: the macroinvertebrate fauna. Pages 635-665 in Invertebrates in freshwater wetlands of North America: ecology and management (D. P. Batzer, R. B. Rader and S. A. Wissinger, eds.). John Wiley and Sons, New York, New York.

Hall, D. L., M. R. Willig, D. L. Moorhead, R. W. Sites, E. B. Fish, and T. R. Mollhagen. 2004. Aquatic macroinvertebrate diversity of playa wetlands: the role of landscape and island biogeographic characteristics. Wetlands 24:77-91.

Haukos, D.A., and L. M. Smith. 1994. The importance of playa wetlands to biodiversity of the Southern High Plains. Landscape and Urban Planning 28:83-98.

Haukos, D. A., and L. M. Smith. 2003. Past and future impacts of wetland regulations on playa ecology in the Southern Great Plains. Wetlands 23:577-589.

Ivie, W. 1965. The spiders of the genus *Islandiana* (Linyphiidae, Erigoninae). American Museum Novitates No. 2221. 25 pp.

Kaston, B. J. 1970. Comparative biology of American Black Widow Spiders. Transactions of the San Diego Society of Natural History 16(3):33-82.

Kaston, B. J. 1981. Spiders of Connecticut. State Geological and Natural History Survey of Connecticut, Bulletin 70, revised edition. 1020 pp.

Krantz, G. W. 1978. A manual of acarology, 2nd ed. Oregon State University Book Stores, Corvallis, Oregon. 502 pp.

Leech, R. 1972. A revision of the Nearctic Amaurobiidae (Arachnida: Araneida). Memoirs of the Entomological Society of Canada No. 84. 182 pp.

Levi, H. W. 1954. Spiders of the genus *Euryopis* from North and Central America (Araneae, Theridiidae). American Museum Novitates No. 1666. 48 pp.

Levi, H. W. 1963. American spiders of the genera *Audifia*, *Euryopis* and *Dipoena* (Araneae: Theridiidae). Bulletin of the Museum of Comparative Zoology 129:121-185.

Levi, H. W. 1968. The spider genera *Gea* and *Argiope* in America (Araneae: Araneidae). Bulletin of the Museum of Comparative Zoology 136:319-352.

Levi, H. W. 1972. The orb-weaver genera *Singa* and *Hypsosinga* in America (Araneae: Araneidae). Psyche 78:229-256.

Levi, H. W. 1975. Additional notes on the orb-weaver genera *Araneus*, *Hypsosinga*, and *Singa* north of Mexico (Araneae, Araneidae). Psyche 82:265-274.

Levi, H. W. 1976. The orb-weaver genera *Verrucosa*, *Acanthepeira*, *Wagneriana*, *Acacesia*, *Wixia*, *Scoloderus* and *Alpaida* north of Mexico (Araneae: Araneidae). Bulletin of the Museum of Comparative Zoology 147:351-391.

Levi, H. W. 1981. The American orb-weaver genera *Dolichognatha* and *Tetragnatha* north of Mexico (Araneae: Araneidae, Tetragnathinae). Bulletin of the Museum of Comparative Zoology 149:271-318.

Levi, H. W. 2004. Comments and new records for the American genera *Gea* and *Argiope* with description of new species (Araneae: Araneidae). Bulletin of the Museum of Comparative Zoology 158:47-66.

Luo, H. R., L. M. Smith, B. L. Allen, and D. A. Haukos. 1997. Effects of sedimentation on playa wetland volume. Ecological Applications 7:247-252.

Luo, H. R., L. M. Smith, D. A. Haukos, and B. L. Allen. 1999. Sources of recently deposited sediments in playa wetlands. Wetlands 19:176-181.

Maddison, W. P. 1996. *Pelegrina* Franganillo and other jumping spiders formerly placed in the genus *Metaphidippus* (Araneae: Salticidae). Bulletin of the Museum of Comparative Zoology 154:215-368.

Merickel, F. W., and J. K. Wangburg, 1981. Species composition and diversity of macroinvertebrates in two playa lakes on the Southern High Plains, Texas. Southwestern Naturalist 26:153-158.

Miller, J. A. 2007. Review of erigonine spider genera in the Neotropics (Araneae: Linyphiidae, Erigoninae). Zoological Journal of the Linnaean Society 149(Suppl. 1):1-263.

Millidge, A. F. 1987. The erigonine spiders of North America. Part 8. The genus *Eperigone* Crosby and Bishop (Araneae, Linyphiidae). American Museum Novitates No. 2885. 75 pp.

Montgomery, T. H. 1904. Descriptions of North American Araneae of the families Lycosidae and Pisauridae. Proceedings of the Academy of Natural Sciences, Philadelphia 56:261-323.

Muma, M. H. 1951. The arachnid order Solpugida in the United States. Bulletin of the American Museum of Natural History 97:31-142.

Muma, M. H., and J. Brookhart. 1988. The *Eremobates palpisetulosus* species-group (Solpugida: Eremobatidae) in the United States. Cheery Creek School District, Englewood, Colorado. 65 pp.

Muma, M. H., and K. E. Muma. 1988. The arachnid order Solpugida in the United States (Supplement 2, A biological review). Printed by the authors, Silver City, New Mexico. 35 pp.

Opell, B. D., and J. A. Beatty. 1976. The Nearctic Hahniidae (Arachnida: Araneae). Bulletin of the Museum of Comparative Zoology 147:393-433.

Osterkamp, W. R., and W. W. Wood. 1987. Playa-lake basins on the Southern High Plains of Texas and New Mexico: Part 1. Hydrologic, geomorphic, and geologic evidence of their development. Geological Society of America 99:215-223.

Paquin, P., and N. Dupérré. 2003. Guide d'identification des araignées (Araneae) du Québec. Fabreries, Supplément 11:1-251.

Platnick, N. I. 2007. The world spider catalog, version 8.0. American Museum of Natural History. (accessed 28 July 2007, http://research.amnh.org/entomology/spiders/catalog/index.html).

Platnick, N. I., and C. Ewing. 1995. A revision of the tracheline spiders (Araneae, Corinnidae) of southern South America. American Museum Novitates No. 3128. 41 pp.

Platnick, N. I., and M. U. Shadab. 1974. A revision of the *tranquillus* and *speciosus* groups of the spider genus *Trachelas* (Araneae, Clubionidae) in North and Central America. American Museum Novitates No. 2553. 34 pp.

Platnick, N. I., and M. U. Shadab. 1975a. A revision of the spider genus *Gnaphosa* (Araneae, Gnaphosidae) in America. Bulletin of the American Museum of Natural History 155:1-66.

Platnick, N. I., and M. U. Shadab. 1975b. A revision of the spider genera *Haplodrassus* and *Orodrassus* (Araneae, Gnaphosidae). American Museum Novitates No. 2583. 40 pp.

Platnick, N. I., and M. U. Shadab. 1976. A revision of the spider genera *Drassodes* and *Tivodrassus* (Araneae, Gnaphosidae) in North America. American Museum Novitates No. 2593. 29 pp.

Platnick, N. I., and M. U. Shadab. 1980. A revision of the North American spider genera *Nodocion*, *Litopyllus*, and *Synaphosus* (Araneae, Gnaphosidae). American Museum Novitates No. 2691. 26 pp.

Platnick, N. I., and M. U. Shadab. 1982. A revision of the American spiders of the genus *Drassyllus* (Araneae, Gnaphosidae). Bulletin of the American Museum of Natural History 173:1-97.

Platnick, N. I., and M. U. Shadab. 1983. A revision of the American spiders of the genus *Zelotes* (Araneae, Gnaphosidae). Bulletin of the American Museum of Natural History 174:97-192.

Platnick, N. I., and M. U. Shadab. 1988. A revision of the American spiders of the genus *Micaria* (Araneae, Gnaphosidae). American Museum Novitates No. 2916. 64 pp.

Platnick, N. I., and M. U. Shadab. 1989. A review of the spider genus *Teminius* (Araneae, Miturgidae). American Museum Novitates No. 2963. 12 pp.

Proszynski, J. 2006. Monograph of the Salticidae (Araneae) of the World. Part II. Diagnostic drawings. (accessed 21 July 2007, http://salticidae.org/salticid/diagnost/salticid.htm.)

Ray, J. D., B. D. Sullivan, and H. W. Miller. 2003. Breeding ducks and their habitats in the High Plains of Texas. Southwestern Naturalist 48:241-248.

Reiskind, J. 1969. The spider subfamily Castianeirinae of North and Central America (Araneae, Clubionidae). Bulletin of the Museum of Comparative Zoology 138:163-325.

Saaristo, M. I. 1973. Taxonomical analysis of the type species of *Agyneta*, *Anomalaria*, *Meioneta*, *Aprolagus*, and *Syedrula* (Araneae, Linyphiidae). Annales Zoologici Fennici 10:451-466.

Sabin, T. J., and V. T. Holliday. 1995. Playas and lunettes on the Southern High Plains: morphometric and spatial relationships. Annals Association American Geographers 85:286-305.

Sauer, R. J., and N. I. Platnick. 1972. The crab spider genus *Ebo* (Araneida: Thomisidae) in the United States and Canada. Canadian Entomologist 104:35-60.

Schick, R. X. 1965. The crab spiders of California (Araneida, Thomisidae). Bulletin of the American Museum of Natural History 129:1-180.

Sissom, W. D. 2003. A macroinvertebrate study of the Pantex Plant. Technical report prepared for the U.S. Department of Energy.

Smith, A. M. 1995. Theraposid spiders of the New World. Vol. 2. Tarantulas of the USA and Mexico. Fitzgerald Publishing, London. 196 pp.

Smith, I. M., D. R. Cook, and B. P. Smith. 2001. Water mites (Hydrachnida) and other arachnids. Pp. 551-659 in Ecology and classification of North American freshwater invertebrates, 2nd ed. (J. H. Thorp and A. P. Covich, eds.). Academic Press, San Diego, California.

Smith, L. M. 2003. Playas of the Great Plains. University of Texas Press, Austin. 257 pp.

Smith, L. M., and D. A. Haukos. 2002. Floral diversity in relation to playa wetland area and watershed disturbance. Conservation Biology 16:964-974.

Smith L. M., D. A. Haukos, and R. M. Prather. 2004. Avian response to vegetative pattern in playa wetlands during winter. Wildlife Society Bulletin 32:474–480.

Sørenson, T. 1948. A method of establishing groups of equal amplitude in plant sociology based on similarity in species content. det Kongelige Danske Videnskabernes Selskabs, Biologiske Skrifter (Copenhagen) 5(4): 1-34.

Swanson, G. A. 1978. A water column sampler for invertebrates in shallow wetlands. Journal of Wildlife Management 42:670-672.

Torrence, S. M. 2007. Landuse and hydroperiod influences on amphibian community structure and the role of larval amphibians in the playa food web. Ph.D. dissertation, Texas Tech University, Lubbock. 189 pp. (accessed 2 July 2007, http://etd.lib.ttu.edu/theses/available/etd-06122007-083804/).

Torrence, S. M., L. M. Smith, and S. T. McMurry. 2007. Larval *Hannemania* sp. infestations of *Spea* spp. in the Southern High Plains, Texas, USA. Journal of Wildlife Diseases 43:742-746.

Ubick, D., P. Paquin, P. E. Cushing, and V. Roth (eds). 2005. Spiders of North America: an identification manual. American Arachnological Society. 377 pp.

Venne, L. S. 2006. Effect of land use on the community composition of amphibians in playa wetlands. M.S. Thesis, Texas Tech University, Lubbock. xi + 88 pp. (accessed 29 July 2007, http://dspace.lib.ttu.edu/bitstream/2346/1323/1/VenneThesis.pdf).

Vogel, B. R. 1970. Taxonomy and morphology of the *sternalis* and *falcifera* species groups of *Pardosa* (Araneida: Lycosidae). Armadillo Papers, Austin 3:1-31.

Zhang, D., W. B. Cook, and N. V. Horner. 2004. ITS2 rDNA variation of two black widow species, *Latrodectus mactans* and *Latrodectus hesperus* (Araneae, Theridiidae). Journal of Arachnology 32:349-352.

Addresses of authors:

JAMES C. COKENDOLPHER

Natural Science Research Laboratory
Museum of Texas Tech University
Lubbock, Texas 79409-3191
james.cokendolpher@ttu.edu

SHANNON M. TORRENCE

Texas Parks and Wildlife Department
Coastal Habitat Program
1502 FM 517 East
Dickinson, Texas 77539
Shannon.Torrence@tpwd.state.tx.us

JAMES T. ANDERSON

Division of Forestry and Natural Resources
P.O. Box 6125
West Virginia University
Morgantown, West Virginia 26505-6125
wetland@wvu.edu

W. DAVID SISSOM

Dept. of Life, Earth, and Environmental Sciences
West Texas A&M University
Canyon, Texas 79016
dsissom@mail.wtamu.edu

NADINE DUPÉRRÉ

12 Chemin Saxby sud
Shefford, Québec
J2M 1S2 Canada
duperre.nadine@videotron.ca

JAMES D. RAY

BWXT Pantex LLC
Pantex Plant, Bld. T-9061
Amarillo, Texas 79120-0020
jdray@pantex.com

LOREN M. SMITH

Department of Zoology
Oklahoma State University
Stillwater, Oklahoma 74078
loren.smith@okstate.edu