

THE SPIDERS AND SCORPIONS OF THE
SANTA CATALINA MOUNTAIN
AREA, ARIZONA

by

Joseph A. Beatty

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SIGNED:

Joseph A. Beatty

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

C. H. Lowe, Jr.

C. H. LOWE, JR.

Associate Professor of Zoology

August 12, 1961

Date

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Further. The preceding paragraph is the problem and the

INTRODUCTION

appearance. Here are relative values for areas of spider

Relative few biologists in the United States have studied the ecology of spiders, but most who have made general surveys of invertebrates included brief mention of them. The major studies of the ecology of spiders in the United States are: Elliott (1930), the spiders of an Ohio beech-maple forest; Lowrie (1942, 1948) the ecology and

succession of spiders in the Lake Michigan dunes near Chicago; Muma and Muma (1949), the spiders of a tract of virgin prairie in Nebraska; and Barnes (1953, 1954, 1955), populations of spiders in the Atlantic maritime communities and in the abstract broomsedge community of the southern Piedmont. The writer is currently preparing for publication a paper dealing with the spiders of Gibraltar Island in Lake Erie. In England, Turnbull (1960) investigated over a period of two years the spiders of a small stand of oak in Berkshire.

All of the above studies were concerned with single plant communities or with a specific succession of communities in restricted geographical areas of relatively uniform climates. Although some of the basic factors governing the distribution of spiders have been discovered,

details concerning how these operate are still unknown. Further, few promising approaches to the problem are yet apparent. More comprehensive studies in areas of wider climatic variation seem to be called for. Species of spiders are known to show stratification in forest communities, although the mechanism controlling the stratification is unclear. The papers mentioned above consider substratum and relative humidity to be major factors, but reach no conclusions concerning their relative importance.

The mountains of the Basin and Range Province, particularly those of southern Arizona and New Mexico, afford an excellent opportunity for study of elevational stratification of spiders. Extremes of climate ranging from desert to cold moist alpine habitats are readily available in a relatively small region. A large subtropical element in the spider fauna, here near the northern limits of its distribution, mingles with the more characteristically Nearctic species. In addition to climatic variation various substrata are concomitantly available.

The Santa Catalina Mountains, just north of Tucson, Pima County, Arizona, were selected as the study area for the present problem. This range reaches an elevation of 9163 feet and is sufficient to show elevational strati-

fication of spiders. Also, a wide variety of plant communities occurs in the Santa Catalinas. Such variety was desirable in the light of earlier work, most of which indicates a definite association of species of spiders with particular plant communities.

The purpose of the investigation was to discover whether spiders show altitudinal stratification and, if they do, to what extent. Accordingly, the approach was qualitative, endeavoring to learn what species of spiders occur in the Santa Catalina Mountains, and at what elevations they may be found. The results have been gratifying. Eventually physiological and quantitative methods should be used, the need for them is clearly shown by the results obtained.

Exchange spiders are the most common species of spider found in the region.

The spiders were collected in 1938 at the Santa Catalina Mountains. The specimens were collected by the following methods: (1) by sweeping; (2) by beating vegetation; (3) by using spider traps; (4) by using spider lures. The specimens were preserved under alcohol. A total of 1000 specimens were collected. The specimens were deposited in the collection of the Department of Zoology, University of Arizona.

METHODS

A variety of standard collecting methods were tried and emphasis was placed on those that were most successful. Handpicking of specimens from overturned rocks and logs or from webs on vegetation often yielded best results. Sweeping with a net over vegetation produced virtually no specimens except in the very highest portions of the range. Pitfall traps, consisting of buried metal cans, proved quite useful in collecting cursorial species. Some interesting small species were obtained by the use of Berlese funnels, but the high percentage of unidentifiable immature spiders in the catch caused eventual abandonment of this method.

The specimens were preserved in 70 percent ethyl alcohol with glycerine added to prevent undue brittleness and destruction of the specimens in case of evaporation of the preservative. The specimens were examined under alcohol with the aid of binocular microscopes. Magnification varied from 7x to 80x depending upon the size of the spider. Most of the specimens were stored in two-dram patent lip vials with cork stoppers. Representative specimens of most species collected are deposited with the Department of Zoology, University of Arizona.

PLANT COMMUNITIES

Several plant communities occur in the Santa

Catalina Mountains and adjacent Santa Cruz River Valley.

These were first treated by Shreve (1915). Lowe (1961) has provided a community classification relative to the Santa Catalina Mountains and other ranges in the Basin and Range Province. The distribution of these communities is primarily governed by available soil moisture, which in turn is determined by the interaction of amount of rainfall and soil type.

Climatological data from weather stations at the University of Arizona, Tucson Magnetic Observatory, Sabino Canyon, Oracle, and Mount Lemmon are presented in Table 1.

On the relatively level desert land at the foot of the mountains a mixed community dominated by creosote-bush (Larrea tridentata) occurs. Depending upon the amount of soil moisture available the creosote-bush may be accompanied by little else than bur-sage (Franseria dumosa), or it may be extensively mixed with white-thorn (Acacia greggii), cat-claw (A. constricta), prickly-pear (Opuntia phaeacantha and O. engelmanni), and cholla (Opuntia fulgida and Opuntia spp.). The soil in this community is a sand, clay, and small rock mixture.

Table 1

CLIMATOLOGICAL DATA OBTAINED FROM WEATHER STATIONS IN THE
 SANTA CATALINA MOUNTAINS AND SANTA CRUZ VALLEY,
 PIMA AND PINAL COUNTIES, ARIZONA¹

STATION	UNIVERSITY OF ARIZONA	TUCSON MAGNETIC OBSERVATORY	SABINO CANYON	ORACLE	MOUNT LEMMON
DURATION OF RECORDS	1896-1953	1912-1916 1934-1953	1941- 1953	1891- 1953	1950- 1953
MEAN ANNUAL RAINFALL, IN INCHES	10.91	11.54	10.78	19.01	27.92
MAX. ANNUAL RAINFALL, IN INCHES	24.71				
MIN. ANNUAL RAINFALL, IN INCHES	5.16				
MEAN ANNUAL TEMPERATURE, FAHRENHEIT	70.2°	66.5°	68.5°	62.0°	49.6°
MAXIMUM TEMPERATURE, FAHRENHEIT	112°	113°	113°	108°	87°
MINIMUM TEMPERATURE, FAHRENHEIT	6°	6°	17°	2°	5°
ELEVATION, IN FEET	2450	2526	2610	4600	7690

1. From the Climate of Arizona, H. V. Smith, Arizona
 Experiment Station Bulletin No. 279, September, 1956.

The foothills and higher portions of the valley characteristically possess a very rocky "soil" with a much lower percentage of clay than the valley soils have. The amount of available soil moisture in this substratum is about twice that in the creosote-bush community (Yang and Lowe, 1956). Dominant plants in the foothills are saguaro (Carnegiea gigantea), and foothill paloverde (Cercidium microphyllum). This community, however, is one of the most varied in its perennial flora of any of the local plant communities.

Just above the paloverde-saguaro belt is an oak-grassland community. Quercus oblongifolia, Q. arizonica, and Q. emoryi, along with various grasses, especially of the genera Bouteloua, Aristida, and Muhlenbergia, dominate this zone. Agave schottii is common in this community, and several other succulent monocots are present in varying numbers.

A rather gradual transition occurs from oak-grassland to oak-juniper-pinon scrub woodland, with juniper (Juniperus deppeana) occurring at somewhat lower elevations than pinon (Pinus cembroides). This scrub woodland itself merges into a predominantly oak-manzanita chaparral in which Quercus hypoleucoides, Arctostaphylos pungens, and A. pringlei are dominants. Above the chaparral is an encinal, a mixed sparse woodland, where the chaparral

vegetation mixes with yellow pine forest. Slightly further up the slopes the chaparral element disappears, leaving a community dominated by yellow pine (Pinus ponderosa).

On the north slopes at still higher elevations, and extending down ravines on all slopes is another conifer-dominated community. Here Douglas-fir (Pseudotsuga menziesii) and white fir (Abies concolor) are the dominants with an understory largely composed of Quercus reticulata and Q. gambeli.

Penetrating the major plant communities along washes and canyon bottoms are at least four distinct riparian communities. Lowe (1961) has outlined the salient features of riparian communities under the designation Riparian Woodland Formation. In the intermontane valleys the dominant riparian trees are mesquite (Prosopis juliflora), and cottonwood (Populus fremonti). The foothill and lower mountain riparian includes mostly ash (Fraxinus velutina), walnut (Juglans rupestris), and willow (Salix spp.). A part of Bear Canyon is a dense riparian woodland of Arizona cypress (Cupressus arizonica), and oak (Quercus spp.). The relatively permanent streams in the Douglas-fir white fir community support a riparian flora largely of dogwood (Cornus sp.), alder (Alnus sp.), maple (Acer sp.), and willow (Salix spp.).

COLLECTING AREAS

LIST OF COLLECTING AREAS WITH ELEVATIONS AND PLANT COMMUNITIES

INDICATION OF TIME PERIODS IN WHICH

Collections of arachnids were made at thirty-five

localities ranging in elevation from 2300 to 9100 feet.

localities ranging in elevation from 2300 to 9100 feet.

All the communities mentioned above were visited, although not all are included in the dozen or so areas where the majority of the collecting was done. Table 2 lists the collecting sites with their elevations and the plant communities they include.

The collecting areas were not selected at random, nor was the collecting in any given locality random. The object was to include all available plant communities, at elevations separated by small enough intervals to define the ranges of the animals rather precisely. Within each community habitats which would most quickly yield the largest number and variety of arachnids were definitely preferred. This preference may have biased the results in favor of the ground-living species which are readily found by overturning rocks and logs. The more moist habitats also received a large share of the time spent in collecting because of the ease with which a large variety of species could be obtained. Certain areas such as the dry rocky hillsides in the paloverde-saguaro community and the

Table 2

LIST OF COLLECTING AREAS WITH ELEVATIONS AND DOMINANT
VEGETATION TYPE, ARRANGED IN ORDER
OF INCREASING ELEVATION

LOCALITY	ELEVATION IN FEET	VEGETATION TYPE
1. West Grant Road, Tucson	2300	<u>Amaranthus-</u> <u>Baccharis</u>
2. Tucson	2400	Mixed horticultural species
3. Santa Cruz River bottom	2500	Low riparian, (<u>Populus</u>)
4. Desert along Catalina Highway	2700	Creosote-bush- acacia
5. Sabino Pond	2700	Riparian and palo- verde-saguaro
6. Lower Bear Canyon	2800	Riparian and palo- verde-saguaro
7. Lower Sabino Canyon	2800	Riparian, (<u>Fraxinus</u>)
8. North Campbell Avenue	3000	Paloverde-saguaro
9. End of Sabino Canyon Road	3200	Riparian and palo- verde saguaro
10. Magee Road	3200	Paloverde-saguaro
11. Molino Basin, lower	4300	Oak-grassland
12. Molino Basin, upper	4600	Oak-grassland
13. Peppersauce Canyon	4650	Riparian, sycamore
14. Cherry Valley Ranch	4650	Oak-grassland
15. Nugget Canyon	4750	Riparian, sycamore
16. Molino Basin, upper	4800	Oak-grassland

Table 2 (cont.)

...

LOCALITY ELEVATION VEGETATION TYPE
IN FEET

17. Rim of Bear Canyon	5500	Yellow pine-juniper
18. Bear Canyon at crossing of Mt. Lemmon Highway	5600	Riparian, (cypress-oak)
19. Hitchcock Picnic Area	6000	Yellow pine-oak
20. Windy Point	6700	Chaparral
21. Rose Lake	6800	Yellow-pine-oak
22. Willow Canyon Road	7000	Yellow pine-oak
23. Rose Canyon Road	7200	Yellow pine-oak
24. San Pedro Vista	7500	Yellow pine-oak
25. Upper Sabino Canyon and Marshall Gulch	7500	Yellow pine-oak and Douglas fir-white fir
26. One mile by road above San Pedro Vista	7850	Yellow pine-oak
27. Bear Wallow	7900	Yellow pine-fir
28. Summerhaven	7900	Yellow pine-fir
29. 1.3 miles by road above Sykes Knob	7900	Yellow pine-fir
30. Ranger Station	8000	Yellow pine-oak
31. Sykes Knob	8000	Yellow pine-oak
32. Ski Lodge	8300	Yellow pine-fir
33. Mount Lemmon Peak	9100	Yellow pine-fir

virtually bare rock of much of the chaparral community either support a very small spider fauna or require a large investment of time and effort for a small return in specimens. Such habitats received relatively little attention.

This report is essentially a qualitative survey of the spiders of the Santa Catalina Mountains. The general habits of the species collected, and the extent to which they are associated with specific plant communities are indicated in Tables 1 and 2. Some quantitative observations by D. Brown and the present author are of some importance in the present study.

The spider fauna of the world is divided by Krombein et al. (1978) into 10 orders and 100 families, and is grouped into 10 suborders, each with its own suborder. The 10 suborders are known in the order to genus of genera, and 6 orders are suborder, genera. Species of the 10 suborders are listed on a list of 1000, and are divided into 10 suborders. The 10 suborders are: 1. Araneae, 2. Theridiidae, 3. Theridiidae, 4. Theridiidae, 5. Theridiidae, 6. Theridiidae, 7. Theridiidae, 8. Theridiidae, 9. Theridiidae, 10. Theridiidae. Of these suborders, 10 are known in the order to genus of genera, and 6 orders are suborder, genera. Species of the 10 suborders are listed on a list of 1000, and are divided into 10 suborders. The 10 suborders are: 1. Araneae, 2. Theridiidae, 3. Theridiidae, 4. Theridiidae, 5. Theridiidae, 6. Theridiidae, 7. Theridiidae, 8. Theridiidae, 9. Theridiidae, 10. Theridiidae.

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SPECIES ACCOUNTS

LIST OF COMMON SPECIES OF SPIDERS IN BIOLOGICAL RESERVES

OF THE SANTA CATALINA MOUNTAINS

This paper is essentially a qualitative faunal list of the spiders of the Santa Catalina Mountains. The elevational ranges of the species collected, and the extent to which they are associated with specific plant communities are indicated in Tables 3 and 4. Some quantitative observations may be based upon the results but they are of minor importance for the present study.

The spider fauna of the world is divided by Kaston (1948, after Gerhardt and Kastner, 1937) into 75 families, which are grouped in two suborders, each with two sections. Of these 75 families 38 are known to the writer to occur in Arizona, and 9 more are probably present. Gertsch (1949), using an arrangement based on that of Simon (1892), lists only 60 families, divided into two suborders. The suborders are in turn further divided; one into two superfamilies and the other into seven superfamilies. Of these 60 families, 33 occur in Arizona, and 5 more may be present.

In this paper the writer adopts a modification of Gertsch's 1949 arrangement, recombining fewer of the established families. Table 5 presents the taxonomic

Table 3

LIST OF COMMON SPECIES OF ARACHNIDS IN BIOTIC FORMATIONS
OF THE SANTA CATALINA MOUNTAINS

<u>Ulocha</u> sp.	Desert	<u>Gnathopoda</u> sp.
<u>Calilena</u> sp.		<u>Phidippus</u> sp.
<u>Aphonopelma chalcodes</u>		<u>Calilena arizonica</u>
<u>Filistata arizonica</u>		<u>Peucetia viridans</u>
<u>Oecobius</u> sp. near <u>texanus</u>		<u>Sosippus californicus</u>
<u>Dictyna calcarata</u>		<u>Arctosa noctuabunda</u>
<u>Plectreurys tristis</u>		<u>Lycosa antelucana</u>
<u>Diguetia albolineata</u>		<u>Lycosa carolinensis</u>
<u>Loxosceles arizonica</u>		<u>Pericuris pallida</u>
<u>Artema atlanta</u>		<u>Piabuna brevispina</u>
<u>Psilochorus papago</u>		<u>Trachelas arizonatus</u>
<u>Latrodectus nactans</u>		<u>Aysa nigrifrons</u>
<u>Micrathena maculata</u>		<u>Olios fasciculatus</u>
<u>Metepeira arizonica</u>		<u>Xysticus lassanus</u>
<u>Neoscona oaxacensis</u>		<u>Thanatus</u> sp.
<u>Tetragnatha versicolor</u>		<u>Thiodina</u> sp.
<u>Tetragnatha laboriosa</u>		<u>Vejovis spinigerus</u>
<u>Frontinella communis</u>		<u>Hadrurus hirsutus</u>
<u>Agelenopsis aperta</u>		<u>Centruroides sculpturatus</u>

Table 3 (cont.)

Table 3 (cont.)

Oak Grassland and Woodland

Arachnida

Uloborus sp. 1Cicurina deserticolaMallos dugesiPeucetia viridansPlectreurys tristisArctosa noctuabundaDiguetia canitiesPardosa sierraLoxosceles arizonicaDrassylus coahuilanusPsilochorus rockefelleriZelotes hentziLatrodectus nactansPiabuna brevispinaTidarren fordumTrachelas arizonatusArgyrodes sp.Syspira sp. 1Metepeira arizonicaMisumeneides aleatoriusTetragnatha versicolorMisumenops coloradensisTetragnatha laboriosaThiodina sp.Frontinella communisPhidippus tyrrelliiAgelenopsis apertaVejovis spinigerusCalilena arizonicaCentruroides sculpturatus

Table 3 (cont.)

Forest

<u>Buagrus ritaensis</u>	<u>Helophora orinoma</u>
<u>Callobius catalinus</u>	<u>Eperigone coahuilana</u>
<u>Titanoeca nigrella</u>	<u>Tarentula kochii</u>
<u>Psilochorus rockefelleri</u>	<u>Arctosa noctuabunda</u>
<u>Theridion arizonense</u>	<u>Pardosa valens</u>
<u>Theridion neomexicanum</u>	<u>Haplodrassus signifer</u>
<u>Steatoda grandis</u>	<u>Phrurolithus schwarzi</u>
<u>Sphyrotinus maderae</u>	<u>Lauricius hooki</u>
<u>Cyclosa turbinata</u>	<u>Amyphaena crebrispina</u>
<u>Epeira displicata</u>	<u>Neon reticulatus</u>
<u>Tetragnatha versicolor</u>	<u>Phidippus tyrrellii</u>
<u>Linyphia catalina</u>	<u>Vejovis vorhiesi</u>

Table 4

LIST OF SPECIES TAKEN IN THE SANTA CATALINA MOUNTAINS
AND ADJACENT SANTA CRUZ VALLEY, ARIZONA

ELEVATION IS GIVEN IN FEET.		
Order Araneae		7500
Suborder Mygalomorphae		3200
Family Dipluridae		2700-8800
<u>Euagrus ritaensis</u> Chamberlin and Ivie		2700-8800
Family Theraphosidae		700-2000
<u>Aphonopelma chalcodes</u> Chamberlin		2300-4500
<u>A. vorhiesi</u> Chamberlin and Ivie		3500-7600
Suborder Araneomorphae		2100-9100
Family Filistatidae		4000
<u>Filistata arizonica</u> Chamberlin and Ivie		2400-7850
<u>Filistatinella</u> sp.		4750-6000
Family Uloboridae		
<u>Hyptiotes gertschi</u> Chamberlin and Ivie		8000-9100
<u>Uloborus</u> sp. 1		2720-4200
<u>Uloborus</u> sp. 2		4650-6000
Family Oecobiidae		
<u>Oecobius annulipes</u> Lucas		2400
<u>O. sp. near texanus</u>		2300-2400
Family Zoropsidae		
<u>Zorocrates pallida</u>		4650-7000
Family Amaurobiidae		
<u>Callobius catalinus</u> (Chamberlin and Ivie)		6800-9100
<u>Titanoeca nigrella</u> (Chamberlin)		4750-7850

Table 4 (cont.)

Family Dictynidae	<u>Elevation</u>
<u>Tricholathys</u> sp. (<u>?reclusa</u> Gertsch and Ivie)	2800
	7500
<u>Lathys delicatula</u> (Gertsch and Mulaik)	3200
<u>Mallos niveus</u> O. P. Cambridge	2800-5600
<u>M. pallidus</u> (Banks)	2750-4200
<u>M. dugesi</u> (Becker)	4200-5500
<u>Dictyna abundans</u> Chamberlin and Ivie	2800
<u>D. calcarata</u> Banks	2300-7200
<u>D. cholla</u> Gertsch and Davis and Davis	3200-4400
<u>D. completa</u> Chamberlin and Gertsch	5500-8000
<u>D. reticulata</u> Gertsch and Ivie	2300-2400
<u>D. mulegensis</u> Chamberlin	2750-6000
? <u>D. piratica</u> Ivie	6000
<u>D. tucsona</u> Chamberlin	2900-3200
Family Plectreuridae	2800-4750
	3100-4500
<u>Plectreurys tristis</u> Simon	2800-4750
<u>Kibramoa</u> sp. (<u>?yuma</u> Gertsch)	4800
	2800
Family Diguetidae	2700
	2800-3100
<u>Diguetia albolineata</u> (O. P. Cambridge)	2700-4800
<u>D. canities</u> (McCook)	3000-4000
	2700-3000
Family Loxoscelidae	6000-8100
	4700-5000
<u>Loxosceles unicolor</u> Keyserling	2400-2700
<u>L. arizonica</u> Gertsch and Mulaik	2700-4750
	4000-5000
Family Scytodidae	4000-5900
<u>Scytodes perfecta</u> Banks	2300-2400
Family Segestriidae	2700
	2800
<u>Ariadna</u> sp.	4650-7100
	2800
Family Caponiidae	7000-8000
	1100-4000
<u>Orthonops gertschi</u> Chamberlin	4400-5900

Table 4 (cont.)

Family	Elevation
Family Oonopidae	
<u>Oonops</u> sp.	3200-5000
<u>Opopaea</u> sp.	4650-5000
<u>Orchestina moaba</u> Chamberlin and Ivie	4400
<u>Scaphiella hespera</u> Chamberlin	3200
Family Pholcidae	
<u>Artema atlanta</u> Walckenaer	2400
<u>Psilochorus papago</u> Gertsch and Davis	2400-3000
<u>P. utahensis</u> Chamberlin	2400-3000
<u>P. rockefelleri</u> Gertsch	2800-9100
<u>Physocyclus</u> sp.	2400-6700
Family Theridiidae	
<u>Latrodectus mactans</u> (Fabricius)	2300-6700
<u>Tidarren fordum</u> (Keyserling)	2700-4650
<u>Achaearanea schullei</u> (Gertsch and Mulaik)	2400-3500
<u>A. chiricahua</u> Levi	7200-8000
<u>Theridion transgressum</u> Petrunkevitch	8000-9100
<u>T. dilutum</u> Levi	2700
<u>T. arizonense</u> Levi	7500-8300
<u>T. neomexicanum</u> Banks	7500-9100
<u>Steatoda fulva</u> (Keyserling)	2400-9100
<u>S. medialis</u> (Banks)	2700-6700
<u>S. grandis</u> Banks	6000-9100
<u>Sphyrotinus maderae</u> (Gertsch and Archer)	4750-8000
<u>S. sp. cf. indicatus</u>	6800-8000
<u>Euryopsis scriptipes</u> Banks	7500
<u>E. spinigera</u> O. P. Cambridge	6000-8000
<u>Argyrodes</u> sp.	4300-5900
Family Argiopidae	
<u>Micrathena maculata</u> (Banks)	2700
<u>Argiope trifasciata</u> (Forskål)	2400
<u>Metepeira arizonica</u> Chamberlin and Ivie	2400-7000
<u>Drexelia directa</u> (Hentz)	2700-9100
<u>Cyclosa turbinata</u> (Walckenaer)	7500-8300
<u>Mangora placida</u> (Hentz)	5600-8000
<u>Neoscona oaxacensis</u> (Keyserling)	2400-2700

Table 4 (cont.)

	<u>Elevation</u>
Family Argiopidae (cont.)	
<u>Neosconella</u> sp.	7900-8000
<u>Metellina mimetoides</u> Chamberlin and Ivie	4300-4750
<u>Araneus gemma</u> (McCook)	9100
<u>A. gemmoides</u> Chamberlin and Ivie	7000
<u>Epeira displicata</u> Hentz	7600-9100
<u>Tetragnatha laboriosa</u> Hentz	2800-9100
<u>T. versicolor</u> (Walckenaer)	2800-7500
Family Mimetidae	
<u>Mimetus</u> sp.	2700-4300
Family Linyphiidae	
<u>Frontinella communis</u> (Hentz)	2700-9100
<u>F. huachuca</u> Gertsch and Davis	6000-7500
<u>Linyphia catalina</u> Gertsch	7500-8300
<u>Pityohyphantes brachygynus</u> Chamberlin and Ivie	7500-8300
<u>Helophora orinoma</u> (Chamberlin)	7500-9100
Genera and species <u>incertae sedis</u>	
No. 1	7500-9100
No. 2	7500-9100
No. 3	4650
No. 4	7500
No. 5	2700-2800
No. 6	7500
No. 7	7500
No. 8	7500
No. 9	2800
Family Micryphantidae	
<u>Eperigone eschatologica</u> Crosby	2400
<u>E. coahuilana</u> Gertsch and Davis	5000-9100
<u>E. sp. 3</u>	5600-9100
<u>E. sp. 4</u>	2800
<u>E. sp. 5</u>	3600
<u>Brigone angela</u> Chamberlin and Ivie	7500
<u>Ceratinopsis</u> sp.	2800-3200

Table 4 (cont.)

Family Micryphantidae (cont.)	<u>Elevation</u>
<u>Ceraticelus</u> sp. 1	5000
<u>C.</u> sp. 2	3000-3200
<u>Wubana ornata</u> Chamberlin and Ivie	7500
? <u>Grammonota</u> sp. 1	7500
? <u>G.</u> sp. 2	3200-4000
? <u>G.</u> sp. 3	7500-8300
Genera and species <u>incertae sedis</u>	5000-6300
No. 1	7500
No. 2	7500-7800
No. 3	8300
No. 4	7200
No. 5	6800
No. 6	7200-7300
Family Agelenidae	
<u>Agelenopsis aperta</u> (Gertsch)	2300-4200
<u>Calilena arizonica</u> Chamberlin and Ivie	2400-7000
<u>Hololena hola</u> (Chamberlin and Gertsch)	4400-9100
<u>Cicurina deserticola</u> Chamberlin and Ivie	4650-8000
<u>Cryphoeca</u> sp. 1	4300-4750
<u>C.</u> sp. 2	8300
Family Hahniidae	
<u>Hahnistea</u> sp.	4650
<u>Hahnia arizonica</u> Chamberlin and Ivie	6000-7500
Family Oxyopidae	
<u>Oxyopes</u> sp. 1	2400-4600
<u>O.</u> sp. 2	2700
<u>Peucetia viridans</u> (Hentz)	2700-4200
Family Pisauridae	
<u>Tinus peregrinus</u> Bishop	4300
Family Lycosidae	
<u>Sosippus californicus</u> Simon	2700-2800
<u>Tarentula kochii</u> Keyserling	7500-9100

Table 4 (cont.)

Family Lycosidae (cont.)	Elevation
<u>Schizocosa celerior</u> Chamberlin	2700-4200
<u>Arctosa littoralis</u> (Hentz)	2800-4200
<u>A. noctuabunda</u> (Montgomery)	2800-8300
<u>Lycosa antelucana</u> Montgomery	2400-2700
<u>L. carolinensis</u> Walckenaer	2700-4500
<u>Trochosa gosiuta</u>	2700-6000
<u>Pardosa yavapa</u> Chamberlin	9100
<u>P. valens</u> Barnes	5600-7500
<u>P. vadosa</u> Barnes	2800-4200
<u>P. sierra</u> Banks	2800-4200
<u>P. utahensis</u> Chamberlin	6800-7850
Family Prodidomidae	
<u>Pericuris pallida</u> Chamberlin and Ivie	3000-4300
Family Gnaphosidae	
<u>Drassodes auriculoides</u> Barrows	6800-4700
<u>Haplodrassus signifer</u> (Koch)	7500-9100
<u>Cesonia trivittata</u> Banks	4400
<u>Drassylus coahuilanus</u> Gertsch and Davis	2800-4300
<u>D. mormon</u> Chamberlin	4300
<u>Zelotes hentzi</u> Barrows	2700-7200
<u>Z. inheritus</u> Kaston	7500
<u>Herpyllus convallis</u> Chamberlin	2400-4300
<u>H. coahuilanus</u> Gertsch and Davis	4650
<u>H. sp.</u>	6000
<u>H. vasifer</u> (Walckenaer)	2400-2500
<u>Poecilochroa montana</u> Emerton	6000
Family Clubionidae	
<u>Phrurolithus catalinus</u> Gertsch	7500
<u>P. schwarzi</u> Gertsch	6000-9100
<u>Chiracanthium inclusum</u> (Hentz)	2400-4300
<u>Castianeira sp.</u>	2400-4300
<u>Liocranoides sp.</u>	4750-4300
<u>Phrurotimpus alarius</u> (Hentz)	7500
<u>Piabuna brevispina</u> Chamberlin and Ivie	2700-4300
<u>P. sp.</u>	3000-4750
<u>Lauricius hooki</u> Gertsch	6000-9100

Table 4 (cont.)

Family Clubionidae (cont.)	<u>Elevation</u>
<u>Trachelas arizonatus</u> Gertsch	2400-4300
<u>Meriola decepta</u> Banks	2400-4300
<u>Micaria</u> sp.	9100
<u>Syspira</u> sp. 1	3200-4400
<u>S.</u> sp. 2	2300
Family Anyphaenidae	
<u>Anyphaena crebrispina</u> Chamberlin	4400-8300
<u>A.</u> sp.	6000-8000
<u>Aysha nigrifrons</u> (Chamberlin and Woodbury)	2400-4300
Family Selenopidae	
<u>Selenops actophilus</u> Chamberlin	4300
Family Sparassidae	
<u>Olios fasciculatus</u> Simon	2400-4750
<u>O.</u> sp. (? <u>bibranchiata</u> Fox)	2400-4750
Family Thomisidae	
<u>Misumenoides aleatorius</u> (Hentz)	2400-5800
<u>Misumenops californicus</u> (Banks)	6000
<u>M. coloradensis</u> Gertsch	4300-4800
<u>M. dubius</u> (Keyserling)	4300
<u>Xysticus apacheus</u> Gertsch	8000
<u>X. lassanus</u> Chamberlin	3200
<u>X. locuples</u> Keyserling	6000
<u>X. montanensis</u> Keyserling	8000-9100
<u>X. paiutus</u> Gertsch	2400
<u>X.</u> sp. cf. <u>quinquepunctatus</u>	4800
<u>X.</u> sp. near <u>apacheus</u>	8000
<u>Titanebo</u> sp.	4000
<u>Thanatus</u> sp.	2300-4650
<u>Apollophanes arizonensis</u> Gertsch	2400-4300
<u>Tibellus chamberlini</u> Gertsch	2400-4300

Table 4 (cont.)

Family: Salticidae	Elevation
<u>Metacryba taeniola</u> (Hentz) Jones	3000
<u>Thiodina</u> sp.	2300-4750
<u>Neon reticulatus</u> Blackwall	6000-7500
<u>Corythalia delicatula</u> Gertsch and Mulaik	2700-8000
<u>Sidusa arizonensis</u> Banks	6000
<u>Habrocestum</u> sp.	4300-6000
<u>Habronattus</u> sp.	2400-4000
<u>Metaphidippus</u> sp. 1	2700-4300
<u>M.</u> sp. 2	7500-7900
<u>Paraphidippus pineus</u> Kaston	6000
<u>Phidippus formosus</u> (Peckham)	4300
<u>P. tyrrellii</u> Peckham	2400-8000
<u>Sassacus papenhoei</u> Peckham	4300
<u>Icius similis</u> Banks	4300
Order Scorpionida	
Family Vejovidae	
<u>Vejovis flavus</u> Marx	2300
<u>V. spinigerus</u> Wood	2700-4400
<u>V. vorhiesi</u> Stahnke	2700-9100
<u>Hadrurus hirsutus</u> Wood	2250-2900
Family Buthidae	
<u>Centruroides sculpturatus</u> Ewing	2700-6700
Family Chactidae	
<u>Superstitionia donensis</u> Stahnke	4300-4650

Table 5.1.1

**TAXONOMIC POSITION OF THE ARACHNIDA, WITH A LIST OF
FAMILIES OF SPIDERS, SCORPIONS, AND SUN SPIDERS**

- Phylum Arthropoda
 Subphylum Chelicerata
 Class Arachnida
- Order Palpigradi
 *Order Pedipalpi
 *Order Ricinulei
 *Order Phalangida
 *Order Acarina
 *Order Pseudoscorpionida
 *Order Scorpionida
- Family Bothriuridae
 Scorpionidae
 Chaerilidae
 *Buthidae
 *Vejoidea
 *Chactidae
- *Order Solpugida
- Family Rhagodidae
 Hexisopodidae
 Galeodidae
 Karschiidae

Table 5 (cont.)

***Order Solpugida (cont.)**Family **Ceromidae**

Solpugidae

Melanoblossidae

Daesiidae

Annotrechidae**Eremobatidae*****Order Araneae*****Suborder Mygalomorphae*****Superfamily Atypoidea**Family **Liphistiidae**

Mecicobothriidae

***Antrodiaetidae**

Atypidae

***Superfamily Ctenizoidea**Family **Paratropididae**

Migidae

Dipluridae**Ctenizidae**

Barychelidae

Theraphosidae**Suborder Araneomorphae****Superfamily Hypochiloidea**Family **Hypochilidae**

Table 5 (cont.)

*Suborder Araneomorphae (cont.)

*Superfamily Filistatoidea

Family *Filistatidae

*Superfamily Dictynoidea

Family Eresidae

*Uloboridae

**Dinopidae

*Oecobiidae

Psecridae

Tengellidae

Acanthoectenidae

*Zoropsidae

*Dictynidae

*Amaurobiidae

*Superfamily Plectreuroidea

Family Thomisoididae

*Plectreuridae

*Diguettidae

*Loxoscelidae

*Scytodidae

**Dysderidae

*Segestriidae

*Caponiidae

*Oonopidae

Table 5 (cont.)

Suborder Araneomorphae (cont.)**Superfamily Argiopeidae****Family Ochyroceratidae*****Pholcidae******Leptonetidae****Telemididae*****Theridiidae*****Argiopidae******Symphytognathidae****Archaeidae*****Mimetidae*****Linyphiidae*****Micryphantidae******Nesticidae*****Superfamily Lycosoidea****Family Urocteidae****Hersiliidae****Senoculidae*****Agelenidae*****Hahniidae*****Oxyopidae*****Pisauridae*****Lycosidae**

position of the spider **Table 5 (cont.)** in the Phylum
Arthropoda and the arrangement of families used in the
present work. The ***Suborder Araneomorphae (cont.)** are
divided with the following ***Superfamily Clubionoidea**

Family Zodariidae

Suborder ***Prodidomidae**

Palpimanidae

***Homalonychidae**

Ammoxenidae

***Gnaphosidae**

***Clubionidae**

***Anyphaenidae**

****Ctenidae**

Toxopidae

***Selenopidae**

Platoridae

***Sparassidae**

***Thomisidae**

***Salticidae**

The present classification is by Gertsch (1943) as the
original classification of the Araneomorphae of the
Arthropoda. The classification of the Araneomorphae was
first given by Simon (1894) and was based on the
position of the spider in the respiratory system and such
characters as the structure of the chelicerae and the
position of the spider in the respiratory system.

position of the spiders and other arachnids in the Phylum Arthropoda, and the arrangement of families used in the present study. The families known to occur in Arizona are marked with an asterisk, and those which may occur are marked with a double asterisk.

Keys for the identification of genera and species of spiders, scorpions, and sun spiders treated in the present study are included in Appendices A, B, and C.

Suborder Mygalomorphae (=Suborder Orthognatha)

This suborder includes the tarantuloid spiders, and is thought to be the more primitive of the two suborders. External characteristics of the suborder are: paraxial

chelicerae which each have a proportionately extremely large basal segment or paturon, two pairs of lungs, and with few exceptions large heavy bodies and stout legs, both thickly clothed with long cuticular hairs.

Superfamily Atypoidea (=Section Mesothelae)

This group, referred to by Gertsch (1949) as the atypical tarantulas, retains definite evidence of the ancestral segmentation of the abdomen which most spiders have lost. The dorsal surface of the abdomen in these spiders bears from one to ten tergites, which are much narrower than the abdomen, but obviously correspond to the

number and position of the abdominal segments. Sternites and internal segmentation are absent.

Family Antrodiaetidae

The Antrodiaetidae, known as folding-door trapdoor spiders, have been recorded from Arizona, but no specimens were found during the present study.

Superfamily Ctenizoidea (=Section Opisthothelae)

This superfamily is composed of the so-called typical tarantulas including the true trapdoor spiders. In this group all trace of abdominal segmentation has been lost. Three families are known in Arizona.

Family Dipluridae

The Dipluridae are small tarantulas which, in contrast with most orthognath spiders, are web-builders. Their web consists of a simple tube or sheet placed under a rock or log.

Euagrus ritaensis Chamberlin and Ivie

Fifteen specimens of this species were taken at eight localities. Elevations of the collecting sites are 2700-7850 feet. Most of the specimens are yellowish immatures. The adults are brown on the carapace and purplish gray on the abdomen.

Family Ctenizidae locality of the
 These are the true trapdoor spiders which build
 deep silk-lined burrows, usually fitting them with a lid of
 wafer or cork-like form. No specimens of this family were
 captured. Sabino Basin, elevation 3800 feet, is cited as
 the type locality of Eutychides arizonicus Gertsch and
 Wallace (1936).

Family Theraphosidae

The members of this family are the spiders to which
 the term tarantula is popularly applied in North America.
 During the breeding season the mature males attract
 attention to themselves by their wanderings in search of
 females. Frequently after summer rains in desert areas
 such large numbers are seen as to suggest a mass migration.

Acquaintances of the writer have described to him such
 "migrations" which took place near Phoenix, and on Ajo Way
 west of Tucson.

The lack of epigyna or complicated palpi in this
 family has resulted in an extremely confused taxonomy. It
 is possible to present here only provisional names for the
 species taken. Until the publication of a comprehensive
 revision of the family, certain identification of North
 American tarantulas will remain virtually impossible.

Aphonopelma chalcodes Chamberlin

This large brown tarantula is very common in the

vicinity of Tucson, which is the type locality of the species. Males are generally captured as they cross highways at night. Females are less often taken, but may be dug or flooded from burrows in the lowlands. Twelve specimens were taken at elevations from 2300 to 4500 feet.

?Aphonopelma vorhiesi Chamberlin and Ivie and Diapne

A medium-sized black tarantula, this species is much less often encountered than the above. The type locality is cited by the authors (1939) as "Tucson" without elevation. None of the specimens in the writer's holding collection was taken at an elevation less than 3500 feet. Seven specimens were collected at elevations from 3500 to 7600 feet. One male was collected during the day under a rock in Peppersauce Canyon.

Suborder Araneomorphae (=Suborder Labidognatha)

The araneomorphs are frequently referred to as the "true spiders" because of their greater number of species, wider distribution, and evolutionary advancement as compared with the mygalomorphs. Externally they are distinguished, with the exception of one family, by the possession of diaxial chelicerae with the paturon relatively small, and no more than one pair of lungs. The body form is quite variable, but rarely has the general aspect of a tarantula. One family in this suborder, the Hypochilidae,

has two pairs of lungs as do the tarantulas. The five species of hypochilids are readily separable from the tarantulas, however, by body form, cheliceral position, and the presence of cribellum and calamistrum, which no mygalomorph has.

The two superfamilies Filistatoidea and Dictynoidea are together equivalent to Kaston's Section

Cribellatae. They are characterized by the presence of a specialized silk-spinning organ, the cribellum, and a comb of specialized bristles, the calamistrum, used for handling the cribellar silk. The cribellum is a flat, sieve-like plate which is anterior to the six spinnerets on the ventral surface of the abdomen. It is homologous with the anterior median spinnerets of the liphistiids. All other araneomorph spiders have lost this pair of spinnerets completely, or possess a vestige of it in the form of a tubercle called the colulus. The calamistrum is located on the dorsal surface of the fourth metatarsus.

Superfamily Filistatoidea

Only one family is included here. It is separated from the other two-lunged cribellate spiders by the simplicity of the external genitalia. The palpus of the male consists of a bulb bearing a simple twisted embolus, borne in a socket at the tip of the palpal tarsus. The

female has no epigynal plate, there is simply a thickened patch of cuticle over the site of the seminal receptacles, which are hidden in the epigastric furrow.

Family Filistatidae

Two members of this family were taken. They represent two genera of divergent appearance and habits, as described below.

Filistata arizonica Chamberlin and Ivie

This is a large, long-legged species in which the females are very dark brown, and the males pale yellowish. They must originally have been inhabitants of holes and crevices in solid substrata such as wood and stone. Since the settlement of North America they have adopted similar locations on buildings where they are abundant. Their web is tubular and hidden in a crevice. From the mouth of the tube many threads of cribellar silk radiate in all

directions for several inches. These threads are in contact with the substratum and anchored at their outer ends. At least the females of this genus appear to live for several years, as sexually mature females range in size from about 6 to 20 millimeters in body length. This species was collected at elevations from 2400 to 7850 feet.

Filistatinella undescribed species

Members of this genus are only about two milli-

meters in body length. The males have the tibia of the palpus incrassated and spiny, the tarsus folded back

against the tibia. They live under rocks and in leaf litter, and spin no web or only a very slight one. Only one specimen of this species was collected. It was found under a rock in Nugget Canyon, elevation 4750 feet, just below the entrance to Peppersauce Cave. This specimen is apparently the only mature male of this species which has been collected. Gertsch says that females have been taken in leaf litter at Marshall Gulch, elevation 7500 feet. Several populations of spiders of this genus have been discovered in the United States. They are thought to belong to about five distinct species, but only one,

Filistatinella crassipalpus (Gertsch), has been described.

Superfamily Dictynoidea

The remainder of the two-lunged cribellate spiders belong to this superfamily. The males have complex palpal organs which have migrated to a ventral cup, the cymbium, on the palpal tarsus. The females have a sclerotized epigynal plate in the midline on the anterior margin of the epigastric furrow. This epigynum has openings which receive the emboli of the male during copulation, connecting ducts which lead to seminal receptacles, and fertilization ducts which conduct the sperm to the oviducts at the time

of oviposition.

This is a dark brown spider with a head to 8

Family Uloboridae

Uloborids are small to medium-sized spiders which

have the abdomen humped or tubercled, the carapace flattened, and the fourth metatarsus compressed and dorsally concave.

The web is aerial and either an orb or a sector of an orb.

Some species add a diffuse irregular network extending a

foot or more from the orb. There is a definite tendency

toward colony formation in this family. Certain species of

Uloborus spin huge irregular communal webs in which many

dozens of individuals live together. Even in the non-

social species there are usually several webs located

within a few yards of each other.

Hyptiotes gertschi Chamberlin and Ivie

This is a dark brown spider, two to three milli-

meters in body length, that has a globose abdomen and a

very flattened carapace. Its web is a sector of a typical

orb web, consisting of four radii with cross-threads of

viscid silk between them. The web has the shape of an

elongate isosceles triangle, and is anchored at the apices.

The spider sits at or near the end of a guy-line attached

to the most acute apex. The web is almost always built

between dead branches of a shrub, and the spider resembles

a dead bud or bit of bark. This species was collected

only at Sykes Knob, elevation 8000 feet.

Uloborus sp. No. 1 of webs of this spider and a chalcid. This is a long-legged spider with a body 5 to 8 millimeters in length. It builds its combination orb and tangle webs under overhangs and in large crevices in rock outcrops. Usually several specimens share a group of webs.

Comparison with specimens in the collection of the

This species is not Uloborus californicus Banks, and it does not agree well with published descriptions of Uloborus arizonicus Gertsch. Uloborus oweni Chamberlin is described (1924) as being smaller and much darker in color. The present species may be undescribed. It is distinguished from the species described below by its larger size, paler coloration, and habitat. It was collected at elevations from 2720 to 4200 feet.

Uloborus sp. No. 2

This species is smaller than the above, about 3 to 5 millimeters in body length, and dark brown to almost black in coloration with pinkish to yellowish markings on the abdomen of the male. It builds its webs on less solid supports than the other species. Two frequent locations are along the sides of rocks with attachment to the rock and to plants or dead leaves, and among the leaves of yuccas. This species is also somewhat communal. The interior of a privy at the Hitchcock Picnic Area was much

covered by a mass of webs of this spider and a pholcid. In spite of its similar size and coloration this spider is not Uloborus californicus. It may be U. oweni, although it differs somewhat in anatomical details.

Family Oecobiidae

This small family is composed of two genera, one of which occurs in our region. Oecobiids are small spiders, about 2 to 3 millimeters in length, which have virtually abandoned their former habitats for man-made structures. They build oval, slightly convex sheet webs about an inch long when the spider is full grown. The perimeter of the web is attached at several spots to the substratum. The web is always placed so that there is a space about one quarter inch in depth between it and the surface to which it is attached. Favorite spots are in corners of window frames, over the mortar between bricks, or over any sort of small hole. Occasionally a specimen is taken in a similar web on the underside of a rock.

Oecobius annulipes Lucas

O. annulipes is a cosmopolitan species long known in the United States as Oecobius parietalis (Hentz). It may be distinguished from the species described below by its annulate legs and black spots on the whitish carapace. A few specimens of O. annulipes were collected on buildings

on the University of Arizona campus, where they occurred in company with the next species. Oecobius (undescribed species, near texasus) Scholtz.

This is by far the more common of the two species of oecobiids taken, and is probably one of the most abundant species of spider in the Tucson area. No building in the Santa Cruz Valley seems to be completely free of them, and in favorable places their webs number in the hundreds. In size this species averages slightly larger than O. annulipes, and may be readily distinguished by its unbanded legs and unspotted yellowish carapace. A few dozen specimens were captured on the University of Arizona campus, and at a few other localities in Tucson, at elevations of 2300 to 2400 feet.

Family Zoropsidae (Zorocrates pallida)

The members of this family are large spiders very similar in appearance and habits to the members of the family Amaurobiidae. The carapace of adults is dark reddish brown, the abdomen gray, the chelicerae large and powerful. They spin loose tangled webs under rocks and in crevices in logs. The presence of only two claws on the tarsi distinguishes these spiders from amaurobiids. Zorocrates pallida

A typical zoropsid of twelve to seventeen milli-

meters body length. The immatures of this spider have dark median and radial markings on a yellowish carapace. Adults have the carapace nearly uniformly deep reddish-brown. Specimens were collected at elevations of 4650 to 7000 feet.

Callobius catalinus (Chamberlin)

Family Amaurobiidae

Amaurobiids are distinguished from zoropsids by the presence of three tarsal claws instead of two. Otherwise the larger members of the family are scarcely different from zoropsids in general appearance. Amaurobiids build tangled, flocculent webs under rocks and logs. The web is usually dense, often quite large, and usually has a tubular portion in which the spider spends most of its time. Some of the smaller amaurobiids somewhat resemble dictynids, but usually are readily distinguishable by the general body form and the number and arrangement of tarsal trichobothria.

Callobius catalinus (Chamberlin and Ivie)

This is one of the most common and characteristic spiders of the forests in the higher parts of the Santa Catalinas and other mountains. Some specimens were taken at almost every collecting site in the yellow pine and Douglas-fir forests. Its webs are spun under rocks, logs, slabs of bark or pieces of trash, and behind loose bark on standing dead trees and fallen logs. Elevations at which it was collected are from 6800 to 9100 feet. The three

specimens taken at 6800 and 7200 feet were abnormally large females, 15 to 17 millimeters in length. They were solid black in color rather than dark brown with lighter chevrons on the abdomen as is usual for this species. Species that Titanoeca nigrella (Chamberlin) are supposed to diffuse grass

This amaurobiid is five to six millimeters in length when mature, and has a dark gray abdomen and dull orange-red carapace and legs. It is found in thin diffuse webs under rocks. Specimens were collected at five localities from 4750 to 7850 feet in elevation.

Family Dictynidae

The family Dictynidae is by far the largest family of cribellate spiders numbering, as of 1958 (Chamberlin and Gertsch), 371 known species in 34 genera. The genus Dictyna itself is known in all of the major zoogeographical realms in the world. In contrast with many other spider families the dictynids reach the peak of their development in temperate areas. The Holarctic species of the family make up seventy-five percent of the total species.

Dictynids and amaurobiids were formerly included in one family under the name Dictynidae. The dictynids usually have no tarsal trichobothria or at least fewer than the amaurobiids, and the structure of the anterior median eyes differs in the two families. There are also major

differences in body form which are difficult to describe verbally, but are quite distinctive once they have been seen. Dictynids are mostly small sedentary species that build lattice-like webs on various supports. Diffuse grass inflorescences, branching dead weed stalks, and curled surfaces of leaves are favorite locations. In addition many specimens may be taken in crevices on buildings and under rocks and logs. On many substrata the webs have a ladder-like appearance which is quite characteristic of the family. Representatives of four genera were collected.

Tricholathys sp. (?reclusa Gertsch and Ivie)

Two mature males and an immature of this species were taken in Sabino Canyon at 7500 feet. The shape of the palpus, which differs radically from all other known species of the genus except T. ohioensis (Chamberlin and Ivie), strongly suggests that this is the hitherto unknown mature male of Tricholathys reclusa.

Lathys delicatula (Gertsch and Mulaik)

This pale yellowish species is only 1.5 to 2 millimeters in length. Three females were taken from pack rat (Neotoma) dens in the Santa Catalina foothills north of Tucson at an elevation of 3200 feet.

Mallos niveus O. P. Cambridge

The members of the genus Mallos are largely

Neotropical, spreading into western United States. M. niveus varies in length from 1.5 to 3.5 millimeters. In Arizona it is usually dark brown with a white margin on the carapace and white dorsal abdominal markings. In Mexico it is much paler, sometimes snowy white (Chamberlin and Gertsch, 1958). It was collected on foliage from 2800 to 5600 feet.

Mallos pallidus (Banks)

This species is quite similar in coloration to the above, but averages rather larger in size, 2.2 to 5 millimeters in length. It is somewhat more common than niveus and tends to be more abundant at lower elevations.

M. pallidus was taken from webs on plants at elevations from 2750 to 4200 feet. Both niveus and pallidus range to the Canadian border, niveus east of the Sierras, pallidus both east and west of them.

Mallos dugesi (Becker)

The largest of the three species of Mallos collected, M. dugesi varies from 3 to 6 millimeters in length. It is also the most restricted in its geographical range, being known in the United States only from southeastern Arizona. It, too, usually builds its webs on plants, and was taken at elevations of 4200 to 5500 feet.

Dictyna abundans Chamberlin and Ivie

This species and two others, D. annexa Gertsch and

Mulaik and D. tucsona Chamberlin, are very similar, especially in the female. There is a slight size difference, abundans averaging largest at 3.2 to 3.5 millimeters, and annexa smallest at 2 to 3 millimeters. A single female, collected on foliage in Sabino Canyon at 2800 feet, appears to agree best with D. abundans.

Dictyna tucsona Chamberlin

This member of the volucripes group is 2.3 to 3 millimeters in length, falling between abundans and annexa in size. Only two specimens, both females, were collected, both on vegetation in Sabino Canyon at elevations of 2900 and 3200 feet.

Dictyna calcarata Banks

D. calcarata is a member of the longispina group in which the tibia of the male palpus bears an apophysis of varying length. The tibial apophysis of calcarata is proportionately the longest of the entire group, nearly one third longer than the palpal femur and more than twice the length of the palpal tibia itself. The spider is a typical Dictyna in coloration, with dark brown carapace, median dark basal mark on a lighter abdomen, and dark annulations on the legs. Body length varies from 2.5 to 4.5 millimeters.

This species is the most abundant and widely distributed of the eight species of Dictyna collected.

during the study. Its numbers are greatest in the lowlands from 2300 to 2800 feet. Single collections numbering 15 and 14 specimens were made at Sabino Pond and West Grant Road, respectively. Habitats in which it was found in abundance were on buildings, on leaves of Franseria ambrosioides, and on stems of Baccharis sarothroides. It was somewhat less frequently taken from under rocks.

Elevational range is from 2300 to 7200 feet. D. calcarata occurs from the Rocky Mountains west to the Pacific Coast and into Mexico. Dictyna cholla Gertsch and Davis

This is a tiny, pale yellowish species, also a member of the longispina group, with a faint pattern of darker spots on the dorsum of the abdomen. Body length varies from 1.2 to 1.5 millimeters. The spider is very secretive in its habits, so that it appears to be rarer than it actually is. Three females were taken, two from Neotoma nests at 3200 feet, one from manzanita leaf litter at 4400 feet. Its range is the southwestern United States and Mexico.

Dictyna completa Chamberlin and Gertsch

D. completa has the typical dictynid pattern, is 2.3 to 3.8 millimeters in length, and belongs to the borealis group. The borealis group is almost entirely limited in distribution to boreal North America and the

mountains of western United States and Mexico. Although Chamberlin and Gertsch (1958) cite few elevational data, it is evident from distribution maps, statements of distribution, and selected records cited, that relatively few species of the borealis group occur in lowland areas. In this study D. completa was collected on vegetation at elevations of 5500 to 8000 feet.

Dictyna reticulata Gertsch and Ivie

This spider, also a member of the borealis group, is 2 to 4 millimeters in length and pale yellowish marked with white on the abdomen. Except for the tarsal claws and rings around the eyes, dark pigment is almost totally lacking. It is one of the exceptions to the general distribution of the borealis group, being found mostly in lowlands. Two specimens, a male and a female, were collected at 2300 and 2400 feet, respectively. The female was among the spines of a cactus, the male in a building.

?Dictyna piratica Ivie;

A single female of this species of the borealis group was taken. The identification is by no means certain although the epigynum agrees better with that of piratica than any other North American species. The specimen was taken at the Hitchcock Picnic Area in Bear Canyon at an elevation of 6000 feet.

Dictyna mulegensis Chamberlin, 1924, *Ann. Entomol. Soc. Amer.* 17: 105, fig. 10. *D. mulegensis* is 1.8 to 4 millimeters in length and of the usual pattern of the genus. It belongs to the varyna group, only three species of which occur in the United States. These three are distributed from Louisiana to Utah and California, and southward into Mexico. Two females of D. mulegensis were taken from foliage at Sabino Pond, elevation 2700 feet.

Superfamily Plectreuroidea

Except for three families which Gertsch places elsewhere, this superfamily is equivalent to Kaston's ecribellate division Haplogynae. The haplogyne spiders are similar to the cribellate superfamily Filistatoidea in the simplicity of their genitalia. Females of both groups have slightly thickened cuticular patches over the internal genitalia; males have palpal organs consisting usually of a simple bulb with a long spine-like embolus. Haplogynes show slight evolutionary advancement over filistatids in the subterminal or ventral rather than terminal position of the bulb on the palpal tarsus.

In the Plectreuroidea the tracheal spiracles are some distance from the spinnerets. The placement varies from one-sixth the distance between spinnerets and epigastric furrow to immediately behind the lung-slits.

In general the spiders in this group have only six eyes or even fewer instead of the usual eight. The reduction of eyes has reached its limit in the families Caponiidae and Oonopidae, in which genera with four, two, or one eyes occur. (Blind cave-dwelling spiders which completely lack eyes are omitted from consideration, since they may occur in any family.)

Family Plectreuridae

Gertsch (1958) considers this family one of the most generalized of the ecribellate haplogynes. Only the plectreurids retain, as a group, the full number of eight eyes. The family includes only two genera, each made up of moderate-sized to rather large spiders with fairly long, heavy legs. Size of adult specimens varies from about 4 to 17 millimeters in Plectreurys, and 7.5 to 19 millimeters in Kibramoa. The heavy bodies and long but stout legs give the larger species a somewhat tarantula-like appearance.

The plectreurids are apparently a relict group.

They occur only in the southwestern United States and Mexico. Plectreurys is divided into two species groups.

The castanea group occurs exclusively west of the Sierras with eight species in California and one in Baja California. The tristis group is exclusively Mexican with the exception of P. tristis Simon which ranges into southern

Idaho. The genus Kibramoa includes seven species, five found in the United States, two in Mexico.

The members of this family spin tubular to irregular webs under rocks and logs or in crevices. The webs are large and strong with retreats which the spiders rarely leave. Well-built webs are similar to those of segestriids with a fringe of radiating threads around the entrance. The spiders sit at the mouth of the web at night, poised to dart out at passing insects.

Plectreurys tristis Simon

At eleven to twelve millimeters in length this spider is one of the largest in the genus, exceeded only by P. zacateca Gertsch. The legs are moderately long, reaching their greatest length in the male, as is the case with most spiders. The first leg is longest of the four, reaching lengths slightly in excess of 17 millimeters in adults. The color is extreme black on legs and carapace, slightly paler purplish black on the abdomen. Immature specimens are brownish.

This spider is common at low elevations, often being found in creosote-bush communities. In the area studied it was most abundant in Peppersauce Canyon at 4650 feet elevation, where dozens of specimens were taken under rocks. The observed elevational range was from 2900 to 4750 feet.

Kibramoa ?yuma Gertsch

A single penultimate male Kibramoa was collected under a rock in the upper portion of Molino Basin, at 4800 feet. According to Gertsch, who examined the specimen, it is probably Kibramoa yuma.

Family Diguetidae

The diguetids are long-legged, six-eyed spiders that spin large, tangled aerial webs usually located in prickly pears or other cacti, but occasionally found also on shrubs or rock outcrops. Well-developed webs have a shallowly conical sheet near the center. From the apex of this cone is suspended a vertical tubular retreat, open at the bottom, in which the spider hides. When on the web the spider moves about upside down. Only one genus with eight species is included in this family. Distribution of the family is from southwestern United States to southern Mexico.

Diguetia albolineata (O. P. Cambridge)

This species is immediately separable from other Arizona members of the genus by the presence of a distinct, tail-like tubercle above the spinnerets at the posterior end of the abdomen. Its length is 5 to 6.5 millimeters. It was found more abundantly and at lower elevations than the following species. Elevational range is 2700 to 4800 feet.

Diguetia canities (McCook)

D. canities ranges in length from 5 to 10 millimeters, and is both considerably larger and more contrastingly marked than D. albolineata. D. canities was captured over a narrower range of elevation, 3000 to 4000 feet, and seems more disposed to build its webs on rock than does the above species.

Family Loxoscelidae

In his monograph on the genus Loxosceles, Gertsch (1958) placed the genus as a subfamily of the Scytodidae although he had himself first separated them in 1949. The two families are certainly closely related, but certain differences prompt me to maintain them as distinct.

Loxoscelids are found in all the major land-masses of the world except Australia. They are yellowish spiders with elongate slender legs which are often tipped with red, and flattened, almost orbicular carapaces, usually marked with a dark anterior median band. The colulus is unusually long, pointed, and clothed with hairs. Webs are flocculent, white, somewhat adhesive, and are placed under rocks, logs, bark, in decaying cacti, and in other crevices. Of the five species of Loxosceles recorded in the United States two occur in Arizona.

Loxosceles unicolor Keyserling

The general coloration of L. unicolor is a clear yellow with bright reddish on the distal segments of the legs. The legs are longer than in L. arizonica and appear to be more slender. The details of palpus and seminal receptacles are only slightly different. Variations in the shape of the receptacles are great.

This species was found in much smaller numbers than the following. The reason for this may be partly that the two species are difficult to distinguish. The specimens which the author identified as L. unicolor may be only very well-marked examples of the species. In any case these specimens are uniformly different from specimens of L. arizonica in the characters cited above. Spiders identified as L. unicolor were collected between 2400 and 2700 foot elevations.

Loxosceles arizonica Gertsch and Mulaik

If the author's identifications are at least mostly correct, this species of Loxosceles is both more common and more wide-ranging than is L. unicolor. L. arizonica is a duller, more grayish yellow, the red on the legs is less intense, and the length of the legs is much less, both in actual measurement and in proportion to body length. Specimens identified as L. arizonica were collected at elevations from 2700 to 4750 feet.

Family **Scytodidae**

Scytodids have the carapace high-arched with an almost vertical posterior surface, the thoracic furrow obsolete, tracheae opening to the surface at a pair of spiracles just behind the lung slits, sclerotized structures in the epigynal area, and three claws on the tarsi. In all of these characters they differ from loxoscelids. Therefore the author has chosen to maintain them as a separate family.

A unique feature of scytodids is the development of their venom glands. The glands are two-lobed, and the smaller anterior lobe secretes venom as in other species; the larger posterior lobe secretes a mucilaginous, somewhat silk-like substance. This viscid fluid is forcibly ejected from the fangs, tying the spider's prey to the substratum quite as effectively as it might be caught in a web. The general coloration of scytodids is yellow with purplish-black markings.

Scytodes perfecta Banks

This species has the typical yellow and purplish coloration of the family and a pair of large sclerotized pits in the epigynal area. It is a very slender-legged slow-moving spider. **S. perfecta**, in common with other members of the genus, is found in and near human habitations. Seven specimens, comprised of 4 females, 2

males and an immature were collected in Tucson at elevations of 2300 and 2400 feet. The genus is most abundant in the tropics, with several species entering the southwestern United States, especially in southern Texas. One species, Scytodes thoracica (Latreille), extends into New England, where it is almost invariably found inside buildings.

Family Segestriidae

Members of this family are dark-colored and have stocky, heavily-spined legs. They build tubular webs in crevices in rock outcrops and occasionally are found under rocks, logs, or bark. They differ from the Dysderidae, with which they are sometimes united, in having three tarsal claws without claw tufts, and having the third pair of legs directed forward instead of backward.

Ariadna sp.

The published descriptions of species of this genus appear to the author to be inadequate for accurate determination of specimens. Females are usually collected, males seeming to be either rare or short-lived. Because the females lack epigyna, descriptions of new species are usually based on position of the eyes and spination of the legs. Both these characters are subject to considerable variation, especially that of eye position. One Ariadna

was collected in Peppersauce Canyon, elevation 4650 feet. Three more specimens of the same species were taken in Madera Canyon in the Santa Rita Mountains. Careful comparison of these four specimens with a series of twenty specimens of Ariadna bicolor (Hentz) from Ohio shows definite constant differences in three leg-spine characters. It is impossible at present to separate the Arizona specimens from other species of the genus. Probably a revision of North American species will have to be made before accurate identification will be possible.

Family Caponiidae

The American species of the family Caponiidae are distinguished from all other families by the almost uniform presence of only two eyes. One genus with one species, Nopsides ceralbonus Chamberlin, has four eyes. The family occurs primarily in Africa and the tropical Americas, with a few species occurring in the southwestern United States. This family and the next, the Oonopidae, show the greatest range in number of eyes of any spider families, and the extreme in reduction of eye number. In general, African caponiids have eight eyes, American species two or four. Oonopids throughout the world usually have six eyes, some species possessing 4, 2, or even 1. As mentioned above, complete loss of eyes in cave habitats is not

considered part of an evolutionary trend characteristic of any one family, since it occurs in spiders of many families other members of which are normal in eye number.

Orthonops gertschi Chamberlin

This species has a light orange carapace, yellowish sternum and appendages, and grayish abdomen. It is a smallish spider, about five millimeters in length when mature. In general appearance it resembles an immature Dysdera. A single specimen was taken in manzanita leaf litter at Molino Basin, elevation 4400 feet.

Family Oonopidae

Oonopids are mostly six-eyed spiders, some species of which are among the smallest spiders known. Two millimeters is about a maximum body length in the family, some species being as small as one millimeter. Oonopids are characteristically reddish-brown, yellowish, or white, often with abdominal scuta, and are secretive in their habits so that they are not often collected. Four species representing four genera were taken.

Oonops sp. cf. sonora Gertsch and Davis

The genus Oonops is made up of yellowish to whitish spiders 1 to 1.5 millimeters in body length, without abdominal scuta. Three specimens somewhat resembling O. sonora were taken from Neotoma nests at 3200 feet

elevation, north of Tucson. An immature which differs from the others in its orange abdominal coloration was captured under a rock in lower Bear Canyon, elevation 2800 feet. It may represent a different species.

Opopaea sp.

One mature female of this genus was collected under a rock at Cherry Valley Ranch, elevation 4650 feet. It has the heavy abdominal scuta and reddish-brown coloration typical of the genus. In form of the epigynal area and other details it differs from the described species, being apparently closest to O. sedata Gertsch and Mulaik.

Orchestina moaba Chamberlin and Ivie

This is a whitish spider 1.3 to 1.7 millimeters in length, the male of which has a distinct elevation above the eyes with a patch of black hairs on the concave frontal area. A male and female of this species were collected in manzanita leaf litter in Molino Basin, elevation 4400 feet.

Scaphiella hespera Chamberlin

This light reddish-brown spider has a ventral abdominal scutum which extends upward on the sides of the body, leaving an uncovered median area on the dorsum. One female was collected in a Neotoma nest at 3200 feet.

Superfamily Argiopoidea

The extremely large and varied superfamily

Argiopoidea includes most of the spiders which spin aerial webs as snares for the animals upon which they feed. They have three tarsal claws and generally a high globose abdomen. Some members of the group have reverted to a wandering existence, but most of them rarely leave their webs unless disturbed. They are very short-sighted, placing

most of their reliance on a delicate sense of touch, and

often are quite awkward out of their webs.

Form of both the body and cephalothorax is highly variable in this superfamily, as are size and habits. Some of the species are among the largest non-tarantuloid spiders, others are the smallest spiders known. Some are widespread, conspicuous, and well-known to the layman; others are rare or limited in their distribution, secretive, and poorly known even to the professional araneologist. Abdomens vary from almost perfectly spherical to elongate and wormlike.

Carapaces vary from a simple somewhat flattened oval to high, angular, and grotesquely ornamented with pits, lobes, tubercles, and protruberances of various other kinds.

Four of the largest families of spiders, the Argiopidae, Theridiidae, Linyphiidae, and Micryphantidae are included here. In temperate regions the latter two

families are especially abundant, making up about one-third of the total spider fauna. Kaston (1948) lists in the New England fauna 47 species of argiopids, 56 of theridiids, 50 of linyphiids, and 144 of micryphantids, for a total of 297 species, or 46 percent of the total known fauna of 644 species. Southward toward the tropics the numbers of species of linyphiids and micryphantids decrease rapidly, while the argiopids increase in variety.

Family Pholcidae

Pholcids have extremely long slender legs, the tarsi of which bear a series of annular creases dividing the segment into many pseudosegments. The tarsi are thus rendered unusually flexible, very much like the legs of phalangids, to which pholcids bear a general resemblance.

Another characteristic of the family is the arrangement of six of the eyes in two triads, with the anterior median eyes usually much reduced in size or absent altogether. The coloration of pholcids is usually grayish with dark markings on the carapace and abdomen and with yellowish legs. Members of the family occur throughout North America, but the number of species is greatest in the southern and southwestern states.

Artema atlanta Walckenaer

This largest of Arizona pholcids is an occasional

inhabitant of buildings as well as caves, mine tunnels, trash-heaps, and other dark places. The body of the spider reaches 10 to 12 millimeters in length, the legs reach several centimeters. The palpi of the male are incrassated and complex. A few specimens were taken in buildings on the campus of the University of Arizona, elevation 2400 feet.

Psilochorus papago Gertsch and Davis

P. papago is a common spider under rocks and other objects, occurring occasionally around buildings, in all lowland habitats except the driest parts of the desert. It is considerably smaller than the next species, with which it occurs. In other respects the two are almost identical in appearance except for details of the genitalia and the cheliceral spurs of the males. Specimens were taken at elevations of 2400 to 3000 feet.

Psilochorus utahensis Chamberlin

This is a larger and much less common species than the preceding, but it occurs in the same habitats. As P. papago, it is restricted to the valleys and low hills. The scarcity of P. utahensis suggests that it either occurs more commonly in some undiscovered habitat or that it is near the limits of its geographical range. Specimens were taken at elevations of 2400 and 3000 feet.

Psilochorus rockefelleri Gertsch

P. rockefelleri replaces the other two species of

Psilochorus at higher elevations. At no time was it collected in company with either of the other two species, although it slightly overlaps their elevational ranges. This spider is one of the most common and most wide-ranging species found during the present study. In virtually any habitat except very wet stream edges it could be found hiding under rocks, logs, cardboard, or other objects on the ground. Specimens were captured at twenty-two collecting sites at elevations of 2800 to 9100 feet, from base to top of the range.

Physocyclus undescribed species

Intermediate in size between Artema and Psilochorus, this spider occupies habitats of the same type as the former genus. It has been collected in buildings, mine tunnels, discarded crates, under overhanging ledges, and occasionally under rocks or boards. The male palpus is thickened as is that of Artema. Physocyclus was collected at elevations of 2400 to 6700 feet.

Family Theridiidae

The comb-footed spiders, family Theridiidae, are world-wide in their distribution and occupy a tremendous variety of ecological niches. One of the best-known spiders, the black widow, is a member of this family. Its shape is typical of the web-building theridiids. An out-

standing feature of the family, from which it derives its vernacular name, is the presence on the fourth metatarsi of a ventral row of curved, serrated bristles. These bristles handle the swathing silk which is secreted by special lobed silk glands found in no other spider family.

The larger theridiids, in this region those of the genera Latrodectus, Tidarren, and Theridion, build rather large, conspicuous, tangled webs on rocks, trees, and shrubs. Steatoda and Achaearanea tend to hide their webs under rocks and logs, or in caves and crevices around buildings. Argyrodes sometimes builds its own web, but is most often a commensal in webs of other spiders. There are, finally, several small to tiny spiders in genera usually found under rocks. Some of these, Sphyrotinus for example, spin small webs against the rock's surface; others such as Buryopsis have given up web-building for a cursorial life. Latrodectus mactans (Fabricius)

The black widow spider is an abundant inhabitant of the Santa Catalina Mountains and the Santa Cruz Valley, as it is in all the warmer parts of the United States. Its habitats are varied, but always include a relatively dark hole or crevice to which it retreats during daylight. Specimens have been found in corners and crevices of buildings, in trash heaps, under rocks and boards, in crevices of rock outcrops, tree-holes, behind bark of trees,

and in webs spun on the ground with a tubular retreat extending underground into rodent burrows.

In the Santa Cruz Valley the black widow is found in a variety of plant communities, and it occurs in large numbers to as high as 4200 feet in the Santa Catalina Mountains. Above approximately 4200 feet its numbers dwindle rapidly. The elevational distribution of the specimens collected by the author is from 2300 feet (desert) to 6700 feet (chaparral). Probably a few individuals may be found even higher. The species has been reported (Gertsch, 1935) at elevations of about 7500 to 8000 feet in the San Francisco Peaks, north of Flagstaff, Arizona.

Until the appearance of Levi's monograph on the genus Latrodectus (1959) black widows collected in the United States were almost universally assigned to L. mactans. In his 1911 catalogue Petrunkevitch listed no other species of the genus as present in North America. Comstock (1913) recorded the presence of L. geometricus Koch, the so-called gray widow, in California, and called all other North American specimens L. mactans. Kaston (1948, 1952) referred New England specimens to L. mactans and omitted L. geometricus, presumably because of its restricted distribution in the United States. Gertsch (1949) mentioned the occurrence of a third species or variety, which he referred to as L. bishopi (nom. nud.), in Florida. This

spider had been described by Kaston (1938) as L. mactans var. bishopi, and was known only from Florida.

Levi's study showed that there are three distinct species of Latrodectus present in the United States. L. geometricus, a cosmopolitan species, occurs in Florida only. L. mactans, instead of occurring throughout the country, is limited almost entirely to the region south of the fortieth parallel. This species has a virtually world-wide distribution, but is largely absent from the cooler portions of the temperate areas. The third species is Latrodectus curacaviensis (Muller), which includes L. bishopi. This is a New World spider which occurs from Canada to Patagonia, but is more common in the temperate parts of its range. With few exceptions records of L. mactans from north of the fortieth parallel actually pertain to this species. L. curacaviensis overlaps the range of L. mactans extensively, but is apparently absent from Mexico, Central America, and the Greater Antilles. It has been taken in New Mexico and Texas, but not in Arizona, Nevada, or southern California.

Tidarren fordum (Keyserling)

Members of the genus Tidarren are similar in appearance to the larger members of the genus Achaearanea, especially the cosmopolitan A. tepidariorum. The males of Tidarren, however, are very much smaller than the females,

and have only one proportionately quite large palpus in the adult stage, the other being pulled off by the spider itself. In both these features they differ from males of Achaearanea.

The large, irregular webs of T. fordum were found on rock outcrops, often partially attached to vegetation, and in hollows of trees. The female builds an upside-down retreat of debris fastened together with silk. During the breeding season the tiny male often may be found sharing this retreat. Specimens were collected at elevations of 2700 to 4650 feet.

Achaearanea schullei (Gertsch and Mulaik)

Three specimens of this small species were taken during the study. Two females were found in webs under window ledges on the University of Arizona campus. One male was taken from a small web on the roof of a mine tunnel at Twin Buttes, a pair of isolated peaks in the Santa Cruz Valley about twenty-one miles southwest of Tucson. The elevations are 2400 and 3500 feet, respectively.

Achaearanea chiricahua Levi

In his monograph on Achaearanea (1955) Levi described this species, then known from only two specimens, both females. These specimens had been collected at Rustler Camp, Chiricahua Mountains, elevation 8400 feet, and Ramsey Canyon, Huachuca Mountains, elevation 7500 feet, both in

Cochise County, Arizona. In his description Levi states: "Bright white spots on the dark venter readily distinguish this species from others in the genus." I collected two specimens showing the characteristic white spots of this species. They were found under a rock in the Rose Canyon Picnic Area at an elevation of 7200 feet. These specimens were thought from their position to be in copula at the time of collection. Microscopic examination, however, showed that one is an immature female. The other, the hitherto unknown male, is mature.

Theridion transgressum Petrunkevitch

This is one of the larger members of the genus, varying in length from 2.2 to 3.8 millimeters. It typically builds its webs on foliage a foot or more from the ground. A single female was taken from a web on bracken fern on Sykes Knob, elevation 8000 feet.

Theridion dilutum Levi

A smaller species than the above, T. dilutum varies in length from 2 to 2.9 millimeters. It is a pale orange to yellowish spider with scarcely any dark markings. T. dilutum is also a builder of webs on foliage. It was taken at only one locality, Sabino Pond, elevation 2700 feet, on curled leaves of Franseria ambrosioides and among the branchlets of Baccharis sarothroides. At this one locality it was not particularly uncommon, a dozen specimens were

taken. It probably occurs in similar numbers in other moist lowland situations.

Theridion arizonense Levi

In his monograph of Theridion (1957) Levi cites only two known localities for this species. The holotype female was collected at Rustler Camp, Chiricahua Mountains, Cochise County, Arizona, at an elevation of 8400 feet. The other record, presumably also of a female or females, since Levi did not describe the male, was: Sandoval County, New Mexico, Las Huertas Canyon Road, Sandia Mountains, 7900 feet.

The two specimens collected by the author, also females, were taken on yellow pine at Marshall Gulch, 7500 feet, and near the Ski Lodge, 8300 feet. They are somewhat similar to T. neomexicanum Banks which shares the same habitat and a similar elevational distribution. T. arizonense, however, has much more pronounced median and marginal dark stripes on the carapace, strongly annulate legs, and less bright and contrasting coloration on the posterior half of the abdomen than neomexicanum. The length of T. arizonense is 3.5 to 3.8 millimeters.

Theridion neomexicanum Banks

T. neomexicanum has indistinctly annulate legs and faintly marked carapace, and two heavy black stripes on the posterior part of the abdomen with a patch of bright orange

between the black areas. The orange coloration was not described by Levi (1957). It may be a regional color variant or Levi may have been working entirely with alcoholic specimens. The orange as usual with this color, fades rapidly in alcohol. The known size range of the present species is 2.4 to 4.6 millimeters, a greater range than that of T. arizonense probably only because so few specimens of arizonense, including no males, have been collected.

Although collected at somewhat higher elevations than the preceding species, T. neomexicanum probably occurs together with T. arizonense throughout the pine and fir forests. Six specimens of neomexicanum, all females or immature, were taken on yellow pine and maple at Marshall Gulch, 7500 feet; Bear Wallow, 7900 feet; and Mt. Lemmon, 9100 feet.

Steatoda fulva (Keyserling)

This species and the following belong to the fulva group of the genus Steatoda, a group which has been the subject of extensive debate. Levi (1957) in his monograph of Steatoda recognized three species in the fulva group, all sympatric over most of the southwestern United States and Mexico. Two of the species, S. pulcher and S. medialis, Levi described as highly variable polytypic species.

Gertsch (1960) in a review of the fulva group divided S. pulcher and S. medialis into four species each, making,

with S. fulva, a total of nine species in the group. Five of these he states are found "in the dry foothill country near Tucson." Of the four species in Gertsch's medialis series, different combinations of two or three occur sympatrically in almost all parts of the Southwest and Mexico. In the fulva series, fulva is sympatric with all eight of the other species of the group. The four species derived from S. pulcher sensu lato show an entirely different picture. They constitute four allopatric taxa distributed from Oregon to Central Mexico. In the present state of knowledge of the group it is a matter of personal preference whether these four taxa are to be called species or subspecies. Much more study of the animals in the field and laboratory will be needed to provide satisfactory information on their relationships. Fortunately for this study, if the author's determinations are correct, the specimens reported here are called by the same names whether Levi's or Gertsch's classification is followed.

A single female of S. fulva was collected under boards in Tucson, elevation 2400 feet.

Steatoda medialis (Banks)

The coloration of S. medialis, as of the rest of the fulva group, is a bright purplish, variably spotted with white on the abdomen, and yellowish on carapace and

legs. The body length varies from 3.0 to 5.5 millimeters. Examples of S. medialis were taken under rocks, and seem to be mature during only a short part of the year. Only two specimens were determined as this species. They were collected at Sabino Pond, elevation 2700 feet, and Windy Point, elevation 6700 feet.

Steatoda grandis Banks

S. grandis is one of the largest members of the genus, 4.3 to 9.0 millimeters in length, and closely resembles the other species of the bipunctata group in coloration. Members of this group are chiefly northern or high elevation in distribution. Gertsch believes more than one species is included by Levi under the name S. grandis.

There is very little overlap in elevational distribution between S. grandis and the members of the fulva group. The few specimens taken in the zone of overlap were in quite distinct habitats. S. fulva was under a rock in hot, dry "chaparral" at well-exposed Windy Point; S. grandis was found under rocks in the much cooler, shaded, and more moist yellow pine-oak community at Hitchcock Picnic Area. Elevational range of S. grandis is 6000 to 9100 feet.

Sphyrotinus maderae (Gertsch and Archer)

S. maderae is a tiny spider, only one millimeter in total length, of a uniform bright yellow-orange color. It is found under rocks in the pine and fir forests, and in

riparian habitats at lower elevations. Mature females were collected in March, May, June, August, October, and November. In August and November they were found with egg sacs. Males appeared in collections only in May and June, and became mature in June. The range of the species is 4750 to 8000 feet.

?Sphyrotinus sp.

An unidentified theridiid of one millimeter length was collected one mile by road above Windy Point at an elevation of 6800 feet. The structure of the epigynum is similar to that of Sphyrotinus indicatus Banks, which has been collected in Nicaragua and Panama. It is almost certainly a different species, however, and may be undescribed.

Euryopsis scriptipes Banks

This species has the typical pointed abdomen and the silver on black coloration of the genus. It is 3 to 4 millimeters in length. Members of this genus are swift runners which have abandoned webs to capture their prey by hunting. They are usually found under rocks, logs, and trash. E. scriptipes is distributed in the Rocky Mountain system and nearby ranges from southern Canada to northern Mexico. A single specimen was collected at Marshall Gulch, elevation 7500 feet.

Buryopsis spinigera O. P. Cambridge

The shape of E. spinigera is typical of the genus, but in coloration it differs from most other species. The specimens which I collected have orange chelicerae and legs, and a uniformly dark gray abdomen. The cuticle of the abdomen is indurate, having the appearance of a scutum in individuals with small abdomens. Two specimens were taken under rocks at elevations of 6000 to 8000 feet. The geographical range of this species is from Panama to Utah.

Argyrodes (undescribed species)

Sixteen specimens of Argyrodes, both mature and immature of both sexes, were collected at elevations of 4300 and 5900 feet. The specimens are at present in the hands of Dr. H. W. Levi, who will describe them as a new species in his forthcoming monograph of Argyrodes. The genera Conopistha, Rhomphaea, and Ariamnes are to be merged under the older generic name. The present species is of the Conopistha type. The author's specimens were found living in the webs of other spiders, usually Tidarrenfordum, but occasionally with Diguettia or Uloborus.

Family Argiopidae

The Argiopidae, including the tetragnathids, are the non-cribellate orb-web building spiders, makers of the typical symmetrical spiders web which is well-known to

almost everyone. Because of the elaborate development of their webs and the complexity of their genitalia members of this and closely related families are often considered the most advanced of living spiders. The orb-weavers vary widely and often grotesquely in body form, but a typical shape is heavy-bodied with large oval abdomen, short spiny legs, low clypeus, and small eyes. The large webs spun by most of these spiders require strong supporting structures, so the spiders are usually found on bushes, trees, buildings, and rock outcrops. In almost all cases the specimens collected by the author were found near water, or at least in a more than usually humid environment. Riparian situations and the higher mountain slopes yielded most of the specimens caught.

Although the number of species of argiopids tends to increase markedly toward the tropics, there were relatively few species taken during this study. Of the fourteen species which were collected five are wide-ranging and common. All but one of the others belong to genera which are well represented in northeastern United States. This lack of Mexican influence in the argiopid fauna is in marked contrast with the situation in most other families.

Micrathena maculata (Banks)

Eleven specimens including both males and females of this small, dark brown and yellow species were taken at

Sabino Pond, elevation 2700 feet. The webs were one to two feet from the ground, attached to stems of Johnson grass (Sorghum halepense).

Argiope trifasciata (Forskål)

The single specimen of A. trifasciata collected during this study is much paler than examples of the species the author has collected in eastern United States. The specimen was contributed by John L. Roberts who collected it in Polo Village, Tucson, elevation 2400 feet.

Metepeira arizonica Chamberlin and Ivie

Unlike most argiopids M. arizonica may often be found in quite dry surroundings. Its webs are often suspended in clumps of prickly-pear cactus or in the top of a small shrub acacia. The spider is frequently seen in the middle of its web in full sun during the hottest part of the day. Specimens were collected at elevations of 2400 to 7000 feet.

Drexelia directa (Hentz)

This is a pale yellowish spider with a few dorsal black markings. The length of a mature female is about six millimeters. Two specimens were swept from foliage at Sabino Pond, at an elevation of 2700 feet.

Cyclosa turbinata (Walckenaer)

C. turbinata is typically a woodland orb-weaver which builds its webs on shrubs and trees a few feet from

the ground. Its cephalothorax is dark brown, its legs are yellowish with brown annulations, the abdomen is whitish with a brown folium. The length of a mature female is 5.5 millimeters, that of a mature male is 3.5 millimeters.

C. turbinata was collected at elevations of 7500 and 8300 feet.

Mangora placida (Hentz)

This species is also restricted to forest habitats, chiefly in riparian situations. The webs are built on shrubbery or trees, usually about three feet from the ground. The mature female is about four millimeters in length. In life the abdomen usually has a definite pinkish tinge, but in alcohol the color fades to yellowish with a prominent brown and white folium. The specimens were collected at elevations of 5600 to 8000 feet.

Neoscona oaxacensis (Keyserling) [= N. vertebrata (McCook)]

This is a fairly common valley species found on shrubbery wherever there is some moisture. It was often collected on ornamental plants in Tucson, as well as near ponds, and in vacant lots on tumbleweed. There is extensive variation in color pattern in the author's specimens of this species. No significant differences can be found between the darker and the paler specimens, and the variation is gradual between the two extremes. In the collection of the Department of Entomology, University of

Arizona, are spiders identified by Gertsch as N. arabesca (Walckenaer), collected in Tucson. It is possible that some examples of N. arabesca have been included here with N. oaxacensis. Specimens were collected between 2400 and 2700 feet.

Neosconella sp.

An undetermined species of Neosconella was captured on pine trees at Sykes Knob, 8000 feet elevation, and on composites (Compositae) at Bear Wallow, elevation 7900 feet.

Metellina mimetoides Chamberlin and Ivie

This is a small argioid with antero-lateral tubercles on the abdomen and long front legs. It bears a remarkable resemblance to the genus Mimetus. Most specimens were collected under overhanging rock ledges. Elevations of collecting sites are 4300 and 4750 feet.

Araneus gemma (McCook)

A. gemma occurs in Canada, northern United States, and in the Rocky Mountain system south to Mexico. It is brown, with humeral tubercles, and one mature female's length is 12 millimeters. This single specimen was taken from behind loose bark of a standing dead tree on Mount Lemmon at an elevation of 9100 feet (summit).

Araneus gemmoides Chamberlin and Ivie

This species is very similar in appearance to the above, but seems to grow larger. It is usually paler brown

than A. gemma. One specimen was collected in a web on rocks at 7000 feet elevation. It is a mature female, measuring 14 millimeters in length. In the author's collection are other specimens up to 22 millimeters in length which were collected in the Sierra Ancha, Gila County, Arizona.

Epeira displicata Hentz

Only one mature specimen of E. displicata was collected. It is a female which was swept from herbaceous vegetation along Sabino stream near Summerhaven at an elevation of 7600 feet. Numbers of immatures were swept at other localities up to 9100 feet on Mount Lemmon. The pattern of black spots on the striking red and yellow abdomen of this species makes identification even of immatures relatively certain.

Tetragnatha laboriosa Hentz

Members of this genus differ greatly in body form from most argiopids. The abdomen is slender, cylindrical, and very long. Both basal segment and fang of the chelicerae are usually quite long and powerful, especially in the male. The carapace is flattened, the legs elongate and usually spiny. Immatures of T. laboriosa were taken by sweeping vegetation, and on one occasion under rocks. A favorite habitat is in a web strung low over the surface of a pool or stream. Specimens were collected at elevations

of 2800 to 9100 feet. Tetragnatha versicolor (Walckenaer) = T. extensa of American authors, not Linnaeus. T. versicolor is much larger than T. laboriosa, reaching, in the specimens taken, 13 to 15 millimeters in length with legs about twice or more the length of the body. Most of the specimens are mature and most were collected in large webs a few inches to a foot above the surface of pools or streams. The elevational range is from 2800 to 7500 feet.

Family Mimetidae

The mimetids are an interesting and unique family which, in form, general appearance, and complexity of their genitalia, are similar to some of the smaller argiopids. A distinctive feature of the family is the presence on the first two pairs of legs of long erect spines in the spaces between which are rows of shorter hooked spines, graduated in length.

Unlike other spiders the mimetids are sharply selective in their diet, apparently feeding entirely upon other spiders. Attempts to induce a starved captive mimetid to eat Drosophila were repeatedly unsuccessful. The same individual immediately after refusing the Drosophila promptly seized and devoured a small spider.

The mimetids are sedentary, sitting by the hour in one spot ready to attack the instant another spider comes near. They are able to kill spiders of considerably more than their own bulk. In most cases they build no web except for a few random strands which provide them with a foothold.

Mimetus sp.

Two specimens, one male and one female of an undetermined species of Mimetus were collected. They may belong to M. hesperus Chamberlin. They were taken on rock outcrops and foliage; range 2700 feet to 4300 feet.

Family Linyphiidae

Largely as a matter of convenience the Linyphiidae and Micryphantidae are treated as separate families in this paper. Many arachnologists, especially in the United States, feel that the two families grade into each other so gradually that there is no logical point of separation. Certainly no single morphological feature has yet been found to constitute a uniform point of difference.

In general, however, the majority of species show characters which permit their easy separation. A large amount of literature has been published under the assumption that the two families are distinct. Both Roewer (1942) and Bonnet (1955) in their catalogues of the spiders of the

world list the Linyphiidae and Micryphantidae (or Erigonidae) as separate families.

Careful studies of the morphology and natural history of these spiders must be made before definite conclusions on their relationship will be possible. At present, reference to the literature dealing with the two families is facilitated by treating them separately.

The linyphiids are small, the largest reach only 5 to 7 millimeters in length, and most fall in the 2 to 4 millimeter range. They build sheet webs which many, especially the larger species, place one to several feet above the ground. Smaller species build webs an inch or two above the ground, in leaf litter, or under rocks, logs, or trash.

Anatomical features that separate linyphiids from the Micryphantidae include generally larger size and longer, spinier legs, absence of an apophysis on the male palpal tibia, presence of a tarsal claw on the female palp, and the absence of abdominal scuta and male head ornamentation.

Being primarily temperate to sub-arctic in distribution, the linyphiids are usually found at high elevations in the southwestern United States. Of the 14 species listed below, only 4 were collected at elevations below 6000 feet. Moreover, the large, aerial-web building types, so conspicuous in the northeastern United States,

are much less common than are the smaller ground-dwelling forms. Since few taxonomic studies have been made on linyphiids in North America, particularly in the West, identification, even to the generic level, is extremely difficult. Of the fourteen species herein reported, only five are identified to species, and most are not certainly identified even to genus.

Frontinella communis (Hentz) The web of F. communis is usually placed a foot or more above the ground in a cactus, yucca, or deciduous shrub. It is of the so-called bowl-and-dooly form, consisting of a flat sheet with a concave sheet suspended just above it. The spiders run over the undersides of the sheets in an upside down position.

F. communis occurs throughout eastern North America, west to South Dakota, Arizona, and Mexico. In keeping with this extensive geographic range it shows one of the widest elevational ranges of any spider collected by the author. Specimens were taken from 2700 to 9100 feet.

Frontinella huachuca Gertsch and Davis The specimens determined as F. huachuca are larger, more brightly colored, and somewhat differently shaped than F. communis. They occurred only at higher elevations and were much scarcer than communis. Two specimens, both

female, were taken at elevations of 6000 and 7500 feet. Bear Wallow, elevation 7900 feet, is the type locality of the species, which is known from the Santa Catalina, Santa Rita, Huachuca, and Chiricahua Mountains. A subspecies, Frontinella huachuca benevola Gertsch and Davis, occurs in Mexico.

Linyphia catalina Gertsch

Many species of Linyphia build conspicuous aerial webs, but L. catalina hides its web under rocks and in or under logs. In general appearance it is very similar to L. clathrata Sundevall, but it differs in details of the genitalia. Specimens were taken at elevations of 7500 to 8300 feet.

Pityohyphantes brachygynus Chamberlin and Ivie

This is a rather uncommon species which builds an aerial web on shrubs, trees, and buildings. Only a few mature specimens were taken. The coloration is typical of the genus. Range is from 7500 to 8300 feet.

Helophora orinoma (Chamberlin)

Members of the genus Helophora build a flat web an inch or two above the ground. The spiders are generally found among leaf litter or under rocks. In the female the genus is characterized by a long, nearly parallel-sided epigynal scape, wider than the scapes found in many other linyphiids. Specimens were collected at elevations of

7500 to 9100 feet.

Genera and Species Incertae Sedis

The following species are the nine of the fourteen in the family Linyphiidae collected in the present study for which generic and specific names cannot be presented, as explained above. Some of them undoubtedly represent new taxa.

Undetermined No. 1

The general appearance and form of the genitalia of this species suggest that it is a member of the genus Lepthyphantes, but specific identification was impossible.

Many specimens were collected under rocks and logs at elevations of 7500 to 9100 feet.

Undetermined No. 2

This is a small micryphantid-like form, close to the genus Meioneta. A few specimens were collected under rocks at elevations of 7500 to 9100 feet.

Undetermined No. 3

This is another of the Meioneta-Microneta group. It was collected once under a rock at 4650 feet in a riparian situation.

Undetermined No. 4

This species is a third that is similar to Meioneta. One specimen was collected among leaf litter at 7500 feet.

Undetermined No. 5

The coloration, male palpus, and epigynum of this species ally it with the preceding three in the genus Meioneta or a closely related one. Three specimens were collected under rocks at 2700 to 2800 feet.

Undetermined No. 6

The epigynum of this species has a rounded pair of receptacles laterally with a long median scape, suggesting the genus Selenyphantes. One specimen was collected under a rock at 7500 feet.

Undetermined No. 7

The epigynum of this species shows a pair of lateral flaps, under which are a pair of round seminal receptacles, and a long median scape with a rounded end. This structure is like that of the genus Linyphantes, originally proposed in 1942 by Chamberlin and Ivie for their Linyphia ephedra and sixteen new species. The epigynal scape of the present species is much longer than the scape of any described species of Linyphantes. One female was collected under a rock at 7500 feet.

Undetermined No. 8

Only two of this species were taken, both of which are immature. Their form and coloration are very close to Bathyphantes pallida (Banks) with which they are probably at least congeneric. Both of the specimens were collected

in leaf litter at 7500 feet.

Undetermined No. 9 is the farthest removed in the family.

Although in size and general appearance this spider is most like the linyphiids, it does not match any one

genus well. It may belong to the micryphantid genus

Eperigone. One; collected under a rock among grass in a riparian situation at 2800 feet.

Family Micryphantidae

This family contains some of the smallest known spiders, although there is one species of linyphiid which is even smaller. The average size of members of the family is only one to two millimeters. Reddish and black are common colors, as in many animals which spend much of their lives in near darkness. As with the linyphiids, these spiders are mostly temperate to sub-arctic in distribution, with the number of species falling off rapidly in warmer regions. Nineteen species were collected, seven of them below 5600 feet.

The features of small size, few leg spines, presence of apophyses on the male palpal tibia, absence of a tarsal claw on the female palp, and frequent presence of abdominal scuta in either sex or head ornamentation in the male all serve to separate most micryphantids from most linyphiids. The characteristic male head sculpturing is

one of the most typical and distinctive features of micryphantids, although it is far from universal in the family. The variety of lobes, tubercles, horns, pits, and other ornamentation in the males is truly astonishing.

Eperigone eschatologica Crosby (in Chamberlin, 1924)

The members of the genus Eperigone collected during this study show strong affinities with the Mexican species. E. eschatologica was first collected on the islands in the Gulf of California. One specimen, collected on the outside of a building on the campus of the University of Arizona, elevation 2400 feet, agrees with this species.

Eperigone coahuilana Gertsch and Davis

This species was first described from specimens taken near Saltillo, Coahuila, Mexico. It is rather common in the Santa Catalinas in leaf litter and under objects on the ground. About a dozen specimens were collected from 5000 to 9100 feet, often in company with Eperigone sp. no. 3.
Eperigone sp. no. 3

This spider shows similarities in epigynal structure to E. taibo Chamberlin and Ivie. E. taibo has been reported from the Raft River Mountains of Utah (Chamberlin and Ivie, 1933) and from the San Francisco Mountains in Arizona (Gertsch, 1935). The male of the present species is quite close to E. tepejicana Gertsch and Davis from Tepeji, Hidalgo, Mexico. It was collected in the same habitats as

E. coahuilana at elevations of 5600 to 9100 feet.

Eperigone sp. no. 4

One specimen was collected under rocks at 2800 feet.

Eperigone sp. no. 5

A single specimen was collected under a rock at an elevation of 3600 feet.

Erigone angela Chamberlin and Ivie

A mature male and female of this species were collected under wood at 7500 feet. The elongate male palpi and marginal cephalothoracic teeth of both sexes are distinctive of the genus Erigone.

Ceratinopsis sp.

Three specimens were collected under rocks at elevations of 2800 to 3200 feet.

Ceraticelus sp. no. 1

One specimen was taken in manzanita leaf litter at an elevation of 5000 feet.

Ceraticelus sp. no. 2

Two specimens were collected under rocks and in nests of Neotoma, elevations 3000 and 3200 feet.

Wubana ornata Chamberlin and Ivie

A single mature male of this distinctive genus was taken under a rock at San Pedro Vista, elevation 7500 feet. It differs from published descriptions of W. ornata only in very minor details which are probably within the range of

Hydrophilidae No. 2

variation of the species.

Genera and Species Incertae Sedis

?Grammonota sp. no. 1

One specimen was collected under rock at 7500 feet.

?Grammonota sp. no. 2

One specimen was taken from a Neotoma nest at an elevation of 3200 feet.

?Grammonota sp. no. 3

This species differs from all but one described species of Grammonota in having a dorsal abdominal scutum in both sexes. It was collected under rocks and logs at 7500 to 8300 feet. Seven specimens were taken.

Undetermined No. 1

A single specimen was taken in leaf litter at an elevation of 7500 feet.

Undetermined No. 2

One specimen was collected under a rock at an elevation of 7500 feet.

Undetermined No. 3

One specimen collected under slabs of wood, at an elevation 8300 feet.

Undetermined No. 4

One specimen was taken under a rock, elevation 7200 feet.

Undetermined No. 5

One specimen was collected under a rock at an elevation of 6800 feet.

Undetermined No. 6

A single specimen was collected under a rock at an elevation of 7200 feet.

Superfamily Lycosoidea

The Lycosoidea are intermediate in habits between the other two superfamilies of entelegyne spiders. Many of the lycosoids, especially the agelenids, spin sheet webs over which they run actively. These webs are of dry silk and serve only to impede insects which encounter the strands. The rapid dash of the spider from its retreat prevents the escape of the prey. A large number of other species in the Lycosoidea have forsaken the web to varying degrees. The webs of hahnids are small flat sheets of delicate construction. Oxyopids do little web-building, although the drag-lines they constantly spin as they move about may form a moderate-sized network. Pisaurids are roving hunters which carry their eggs with them until they are near hatching. Then the female suspends the egg sac in a plant, surrounding the sac with an extensive nursery web on which she sits until the young have hatched. Almost all lycosids have abandoned webs completely, and capture their

prey instead by stalking. The vision of these active hunters is acute, the chelicerae are powerful, and the body is usually quite robust. In the United States a single genus of lycosid, Sosippus, builds a large sheet web over which it runs as does an agelenid. Some species of the family burrow and some are semi-aquatic.

In general, spiders which build webs possess a third tarsal claw inferior to the large paired claws. The presence of the third claw greatly facilitates movement on a web. Its complete absence is an almost certain indication of active hunting habits. Argiopoids have a well-developed third claw which is used as a hook to grasp and hold firmly the strands of the spider's web. In the clubionoids the third claw is lost completely, and often replaced by adhesive tufts of flattened hairs. These "claw tufts" enable the spiders to climb smooth surfaces with ease. The lycosoids are intermediate in the structure of the third claw as well as in habits. The third claw is present but it is much reduced in size and probably is too small to function efficiently as a grasping organ. Some lycosoids have developed scopulae, or pads of hair on the ventral surfaces of the tarsi. These scopulae, present also in many clubionoids, apparently serve the same purpose as claw tufts.

... ..

Family Agelenidae

Agelenids are often referred to as grass spiders because they often thickly cover grassy areas with their large sheet webs. Many of them are large, strong, active spiders, very similar to wolf spiders in general appearance. Their vision is not so keen as that of wolf spiders, and they have a different arrangement of eyes and of tarsal trichobothria. Most of the smaller agelenids conceal their webs under rocks or logs. The family Hahniidae is very close to the agelenids, but is kept separate for reasons detailed in the discussion of the Hahniidae below.

A complex of dozens of species of funnel-web builders was formerly referred to the genus Agelenopsis. As more and more species were discovered in western North America it became evident that there are several sub-groups which are distinct in genital structure. These sub-groups were recognized by Chamberlin and Ivie (1941, 1942) as six new genera. The genus Agelenopsis was retained for one group of species, and Cambridge's genus Melpomene was used for several Mexican and Central American species. Thus there are at present eight North American genera in this complex, each distinguishable from the others by very minor morphological characters, except for the genitalia. If it were not for the facts that one hundred species of the complex are known, and that genitalic characters seem to

define the genera rather sharply, it would probably be better to group this aggregation as a series of sub-genera of Agelenopsis. Should it turn out eventually that many of the described species are actually well-marked subspecies, combination of the genera would certainly be the logical course.

Agelenopsis aperta (Gertsch).

This is the largest and lightest colored member of the Ageleneae found in the Santa Catalinas. It reaches a length of 14 to 15 millimeters, and has a more flattened, suborbicular carapace than members of the other genera. Placement of the webs is variable. They may be found on buildings, in deep grass, partly under logs, on the ground with the funnel entering a rodent burrow, on yuccas, and even on trees with the funnel inside a rolled leaf. Specimens were collected from 2300 to 4200 feet. Many more Calilena arizonica Chamberlin and Ivie. Calilena arizonica is smaller and darker in coloration than the above species. The shape of the carapace is distinctive, also, being high and narrow anteriorly. This species is more restricted to terrestrial habitats than is A. aperta. In the Santa Catalinas, C. arizonica is the commonest species of large agelenid. Its range is from 2400 to 7000 feet.

Next species, all return to the same place to belong

Hololena hola (Chamberlin and Gertsch)

This species is in the same size range as C. arizonica, but is darker in coloration. Its webs are built in the same kinds of places as the above species, and the two overlap in elevational range. H. hola, however, ranges much higher than does C. arizonica. The range of H. hola is 4400 to 9100 feet.

Cicurina deserticola Chamberlin and Ivie

The genus Cicurina is a large, morphologically homogeneous group of species which differ from each other mainly in details of the genitalia and leg spination. Chamberlin and Ivie (1940) described twenty-seven new species of Cicurina and revived several which had previously been synonymized. Their key to the species is based largely on spination, which, in the author's series of specimens, shows the usual tendency to vary rather widely. Many more specimens must be examined before sound conclusions may be reached on the validity of the present taxonomy.

Although they show some variation in spine count, all the author's specimens of Cicurina from the Santa Catalina Mountains seem to be C. deserticola. This pale species builds a fragile web under rocks and logs. It was collected from 4650 to 8000 feet.

Cryphoeca sp. no. 1

Four specimens, all mature females, appear to belong

to this genus. Details of epigyna, spination, and coloration indicate that the four include two separate species. This species (no. 1) was collected under rocks from 4300 to 4750 feet. In the Agassiz side the holotype Cryphoecca sp. no. 2 was taken under rocks at 8300 feet. This second species was taken under wood at 8300 feet.

Family Hahniidae

The hahniids are here maintained as a separate family because of a combination of differences. Although some araneologists object that none of the differences is individually important enough to warrant familial rank, the author feels that the combination of differences indicates a wide degree of divergence which deserves to be recognized as a separate family. In fact, it is debatable whether the internal differences in particular are of less than familial value individually.

Hahniids are immediately distinguishable from all other spiders by the arrangement of their spinnerets in a slightly curved transverse row which is almost the width of the abdomen. They differ further from the agelenids in having the tracheal spiracle displaced anteriorly from its normal position close to the spinnerets, in lacking plumose body hair, in having two instead of three pairs of cardiac

ostia, and in having the tracheae extending into the cephalothorax, rather than being limited to the abdomen. The family is of moderate size. Roewer (1954) lists eighty-five species. As in the Agelenidae the hahniids generally place their webs near the ground or under rocks or logs.

Hahnistea sp. A female Hahnistea, probably an undescribed species, was taken under a rock in oak grassland at 4650 feet. The spider is pale yellowish, unmarked, and larger than the following species.

Hahnia arizonica Chamberlin and Ivie

Two specimens of this species, a male and a female, were collected. Both are dark brown on cephalothorax and abdomen, with light dorsal abdominal chevrons. Elevations of the collecting sites are 6000 and 7500 feet.

Family Oxyopidae

The lynx spiders of the family Oxyopidae comprise a distinctive group of hunting spiders. The eyes are unique in the hexagonal arrangement of the posterior row with the anterior laterals; the anterior medians are placed below and anterior to the hexagon. The carapace is deep and the clypeus very high, the abdomen is pointed posteriorly, and the legs are long and set with numerous long black spines.

In general the sedentary forms have the greater tendency to spin a disorderly mass of silk over the surfaces where they sit.

Oxyopes sp. no. 1 Two specimens of a yellowish oxyopid with dark brown cephalothoracic and abdominal stripes were captured. A male was found sitting on a building in Tucson, elevation 2400 feet, and a female running on ground with a sparse grass cover at 4600 feet. The bodies of the spiders are covered with a coat of white and black scales which rub off readily. There are no longitudinal lines under the femora.

Neither this species nor the following agrees with the species of Oxyopes listed by Chamberlin (1929) or with O. compactus Banks. They may be O. pictipes or O. tanneri Chamberlin, described from New Mexico and Utah, respectively.

Oxyopes sp. no. 2 This is a larger spider than the above, without conspicuous brown stripes, and without lines under the femora. Coloration is yellow with brown abdominal markings and yellow and brown scales on carapace and abdomen. These two specimens were taken on the base of a tree surrounded by grass in a riparian community in the desert at 2700 feet. Peucetia viridans (Hentz)

P. viridans is a very large oxyopid, reaching 18 millimeters in body length, with legs twice the length of

the body. The carapace and abdomen are predominantly jade green with red or white markings. The legs are yellow or white, usually with a red ventral stripe on each femur, bright yellow articular membranes, and a black spot at the base of each spine and hair.

The spider sits usually on prickly pear or cholla over which it often spins an extensive tangled mass of silk. This "web" appears to be more a result of the spider's repeated running over a small area rather than a snare for insects. The green lynx spider, or leopard spider as it is often called because of the leg spotting, is an active, alert animal. Catching one in a dense mass of Opuntia presents a prickly problem to the collector. When disturbed the spider dodges rapidly from one surface of the cactus pad to the other.

This species was captured on prickly pear, cholla, and occasionally on deciduous shrubbery at elevations of 2700 to 4200 feet.

Family Pisauridae

Pisaurids, often called fishing spiders, are closely related to lycosids, which they resemble in general appearance. The chief difference between the two families is that the pisaurids have their eyes arranged in two rows rather than in three as in the wolf spiders. The fishing

spiders in general, as their name implies, are frequenters of water. They run over the surface picking up insects, and often dive below the surface to capture aquatic animals. The semiaquatic wolf spiders are similar in habits except that they rarely go below the surface of the water. Most species of pisaurids are quite persistent and efficient subsurface hunters. A few kinds are not ordinarily found on water, but in moist wooded areas.

Tinus peregrinus Bishop was found on the surface of water, and a single immature specimen of this species was taken among rocks in a wash at an elevation of 4300 feet.

Family Lycosidae

The lycosids or wolf spiders are the culmination of the group of three-clawed hunters. Their vision is keener than that of any of the other members of their line, and is probably surpassed in the order only by the salticids.

Wolf spiders inhabit all the zoogeographical realms and have diversified to occupy a wide range of habitats.

Speciation in some widespread genera of the family has been extensive and seemingly rapid, so that large homogeneous groups of species are known.

In contrast with the pisaurids, wolf spiders have the eyes in three rows, rather than in two. Extreme recurving of the posterior eye row has resulted in the

posterior lateral eyes' being located some distance behind the posterior medians. These four posterior eyes are considerably larger than the four eyes of the anterior row, and are of greater visual acuity.

The lycosids of the Santa Catalinas fall into four groups with respect to their ecological niches. Two of these groups are sedentary, either in burrows in the ground or on large sheet webs. The other two are roving hunters, one group along washes and on the surface of water, the other on the open ground of desert or woodland. The sedentary forms are fewer; only one species of each is represented in the author's collections.

Sosippus californicus Simon

This is a large sedentary lycosid which builds a terrestrial web of typical agelenid form. A riparian species, S. californicus is found at varying elevations depending upon the amount of moisture and vegetation present. In the Santa Catalinas it was collected only in the desert between 2700 and 2800 feet.

Tarentula kochii Keyserling

T. kochii is an abundant and widely distributed spider of woodlands in western North America, where it runs actively over the ground, taking cover among fallen leaves and under logs. In general appearance it is similar to the larger species of the genus Schizocosa. Its elevational

range in the Santa Catalina Mountains is from 7500 to 9100 feet.

Schizocosa celerior Chamberlin

A single example of this small (5 to 6 millimeters) Schizocosa was captured in a riparian habitat at 2700 feet.

The specimen, a male, is yellowish with dark brown stripes on the cephalothorax and a brush of dark hairs on the first tibiae.

Arctosa littoralis (Hentz)

A. littoralis occurs throughout the United States on sea beaches, lake shores, stream edges, washes, and various other habitats in which the combination of moisture and a sandy or rocky substratum is available. It is a large species, reaching 11 to 15 millimeters in length in both sexes. In keeping with its habitat it is pale in coloration, with scattered dark markings. Specimens were collected in riparian habitats in the Santa Catalinas at elevations of 2800 to 4200 feet.

Arctosa noctuabunda (Montgomery)

This species belongs to the Allocosa group of the genus Arctosa. Members of this group, sometimes segregated as a genus, are smaller in size than the above species, and have the carapace dark brown to black, shining, and hairless or almost so. The abdomen is brown, often with yellow markings. Some members of the group are woodland

species, others are primarily riparian. A. noctuabunda in the Santa Catalinas was collected in riparian habitats from 2800 to 8300 feet.

Lycosa antelucana Montgomery

At lower elevations L. antelucana is a common cursorial lycosid in a variety of habitats. It occurs in the mixed low desert valley community, in riparian situations, in paloverde-saguaro, and in the cities where it frequently enters houses during the summer. The ventral surface of cephalothorax and abdomen are entirely black in this species. Its range is from 2400 to 2700 feet.

Lycosa carolinensis Walckenaer

L. carolinensis is a burrowing species which occurs in desert habitats at lower elevations. It digs a vertical or slightly slanted burrow about a foot deep, usually with a silk collar about the entrance. This spider is the only one which is at all frequent in the driest creosote-bush-bur-sage communities. It is also the largest of the wolf spiders of the Santa Catalinas, reaching a body length of 25 millimeters. Only the tarantulas among the local spiders exceed it in size. L. carolinensis was collected at elevations of 2700 to 4500 feet.

Trochosa gosiuta

This medium-sized brown lycosid is an inhabitant of riparian communities where it is sometimes rather common.

It is a member of the group of genera which grade into the genus Lycosa. Specimens were collected from 2700 to 6000 feet.

Pardosa yavapa Chamberlin

This is a small Pardosa which was collected only on

Mt. Lemmon at 9100 feet in fir forest.

Pardosa valens Barnes

P. valens is a large Pardosa, ranging in size from 6.5 to 9.3 millimeters. In the Santa Catalinas it is the common species of the genus in washes, streambeds, and woodlands at higher elevations. Specimens were collected from 5600 to 7500 feet.

Pardosa sierra Banks

P. sierra, also a member of the lapidicina group, is the common Pardosa in washes at low to middle elevations, (2800 to 4200 feet).

Pardosa vadosa Barnes

This species is very similar to the above in appearance, both being members of the lapidicina group of the genus Pardosa. P. vadosa was collected only once, in Lower Sabino Canyon, elevation 2800 feet.

Pardosa utahensis Chamberlin

P. utahensis belongs to a different species group than the preceding three species, and it differs in habits also. At higher elevations utahensis is a spider of the

open forest floor, away from washes, where it runs over and hides among fallen leaves and pine needles. It was collected at elevations of 6800 to 7850 feet.

Superfamily Clubionoidea

The Clubionoidea are non-web-building, ecribellate spiders which have two tarsal claws, usually with claw tufts, and often have extensive scopulae on the legs. Most of them are cursorial, but some, notably the large family Thomisidae, are sedentary. From the generalized body form of the cursorial types two specialized lines have developed.

In one of these the anterior two pairs of legs have been rotated backward so that the former dorsal surface is posterior. This condition is referred to as laterigrade, and the distinctive appearance of laterigrade spiders has given rise to the name crab spiders for the best-known family of this line. The other specialized form is that of the jumping spiders, family Salticidae. Salticids characteristically have short stocky legs, a squarish carapace with a straight high front, and four enormous eyes in the anterior row.

Except for the sedentary species the clubionoid spiders are active, swift-running spiders which may be found in a variety of habitats. The majority of them are terrestrial, but a number hunt over vegetation, walls of

Buildings, or rock outcrops. Frequently they build cocoon-like retreats in which they molt or deposit egg sacs, but they spin no snares for prey. At one time the salticids were considered the most advanced of the spiders, but this position is now accorded to the argiopids because of their complex genitalia and webs. It is still questionable whether specialization of general body form and courtship behavior, versus genitalia and web-building behavior, is a better criterion of evolutionary advancement.

Family Prodidomidae

The members of this family are rare and little-known spiders which appear to be closely related to the gnaphosids. Their eyes are arranged in three rows, and they usually have four of the spinnerets much enlarged. Most species are African, a smaller number occur in South and Central America, Mexico and southern United States. Almost nothing is known of their habits.

Pericuris pallida Chamberlin and Ivie

Six specimens of this unusual species were collected during the present study. P. pallida is a pale yellowish-white spider about 2 to 3 millimeters in length. It was found twice under rocks, and four specimens were taken from Neotoma nests. The plant communities at the collecting sites were paloverde-saguaro desert in two instances, and

oak-grassland in the third. Localities and their elevations are at the end of North Campbell Avenue, Tucson, 3000 feet; on Magee Road north of Tucson, 3200 feet; and at Molino Basin, Santa Catalina Mountains northeast of Tucson, 4300 feet.

Family Homalonychidae

A few specimens of the species Homalonychus selenopoides Marx were collected in washes in paloverde-saguaro desert in the Tucson Mountains. This range is closely adjacent to the Santa Catalinas (ca. 10 miles distant). Although not collected in the Santa Catalinas H. selenopoides probably occurs there.

Family Gnaphosidae

Gnaphosids are generalized cursorial spiders which are probably very similar to the stock from which the other clubionoid families evolved. They are close to the clubionids in structure, but the two families are readily distinguishable in nearly every case. The anterior spinnerets of the gnaphosids are peculiar in being long, one-segmented, heavily sclerotized, with the result that they have a distinctive "gun-barrel" appearance. The members of this pair of spinnerets are also separated rather widely from each other. Differences in spinneret structure are the most easily described differences

between gnaphosids and clubionids. The differences in carapace shape, eye arrangement, and general bodily proportions are distinctive, also, but difficult to describe.

The gnaphosids are almost invariably found under rocks, logs, or trash on the ground. Some of them are very tolerant of dry habitats. Unfortunately, they seem never to be very abundant, usually only one or two are collected at a time. Several genera are large and, because the male and female are rarely taken together, the taxonomy of these genera is extremely confused. The identifications of gnaphosids in this paper should be regarded as tentative.

Drassodes auriculoides Barrows

Individuals of this species were taken under rocks where they had spun large transparent retreats. These retreats may have built as a place in which to lay eggs.

D. auriculoides was collected at two localities in the Santa Catalinas, at elevations of 6800 and 8000 feet.

Haplodrassus signifer (Koch)

This is the only species of gnaphosid which was found in rather large numbers in the Santa Catalinas. It is limited to the relatively moist, forested upper slopes of the mountains, where it was collected from 7500 to 9100 feet.

Cesonia trivittata Banks

Members of this genus are conspicuously marked with longitudinal black and white stripes on the dorsum of the carapace and abdomen. The present species has three black abdominal stripes. A few examples were collected in leaf litter at 4400 feet.

Drassylus coahuilanus Gertsch and Davis

The genus Drassylus is a large one which is very similar to Zelotes. Some araneologists feel that the two genera are not sufficiently distinct to be kept separate. Unfortunately both are such large groups that uniting them would produce an even greater taxonomic confusion than now exists. Pending revision of the family it is best to maintain them as separate genera.

D. coahuilanus was collected at two localities, at elevations of 2800 and 4300 feet.

Drassylus mormon Chamberlin

This species was collected at Molino Basin, elevation 4300 feet, where it occurred in company with

D. coahuilanus.Zelotes hentzi Barrows

Z. hentzi is a typical member of its genus, ranging in size from 5 to 7 millimeters, and in color from dark brown to black. It was collected under rocks at elevations of 2700 to 7200 feet.

Zelotes inheritus Kaston

This spider is almost identical in appearance with the preceding. It was collected only once at an elevation of 7500 feet.

Herpyllus convallis Chamberlin

The species of Herpyllus in general range in size from 6 to 13 millimeters and often have an urn-shaped white marking on the dorsum of the abdomen. Those which lack this mark are uniform light brown in color. As is usual with gnaphosids, the species which do not have distinctive color markings are nondescript in appearance and are scarcely distinguishable to the naked eye from other genera of similar size. H. convallis is one of the unmarked brown species. It was collected among leaves and under boards in Tucson, elevation 2400 feet.

Herpyllus coahuilanus Gertsch and Davis

Another brown species, this Herpyllus was collected under stones in oak-grassland at an elevation of 4650 feet.

Herpyllus sp.

This species is like the two above in appearance, but differs in the genitalic structure. It does not agree with any descriptions of Herpyllus to which the author has access. It was collected under rocks at 6000 feet.

Herpyllus vasifer (Walckenaer)

The single specimen placed here is immature so

certain identification is almost impossible. However the color pattern is typical of the white-striped vasifer group. The specimen was collected under a log in the Santa Cruz River bottom, elevation 2500 feet.

Poecilochroa montana Emerton

Two specimens of this contrastingly marked species, both females with egg sacs, were collected under rocks in a wash at an elevation of 6000 feet.

Family Clubionidae

Clubionid spiders may be distinguished from gnaphosids by the structure of the anterior spinnerets, which are two-segmented, not heavily sclerotized and usually are contiguous at their bases. Many clubionids live under rocks or in leaf litter, but a number of species hunt over vegetation above the ground. Terrestrial species are generally brown to black in coloration, while those which live on plants tend to be yellowish, greenish, or whitish. A few kinds are somewhat ant-like in appearance and behavior.

Phrurolithus catalinius Gertsch

This is a small brown species which occurs under rocks. It is typical of the smaller members of the subfamily Liocraninae, all of which range from about 2 to 4 millimeters in length, have a double row of long spines

under the first tibiae, and usually have the claw tufts much reduced or lacking. P. catalinius was collected at an elevation of 7500 feet. It is much less common in the Santa Catalinas than the next species.

Phrurolithus schwarzi Gertsch

P. schwarzi is a small ant-like black spider with yellowish legs. It is common under rocks and logs in the yellow pine and fir forests. When disturbed it often runs in short dashes, pausing frequently to elevate the tip of the abdomen. Specimens were collected at eight localities from 6000 to 9100 feet in elevation.

Chiracanthium inclusum (Hentz)

One immature specimen of this widespread species was collected in Tucson, elevation 2400 feet.

Castianeira sp.

A number of specimens of this genus were collected at elevations of 2400 to 4300 feet in a variety of habitats. Unfortunately even the largest of them is not fully mature. There may be more than one species represented. The subadult specimens resemble Castianeira descripta (Hentz) in color pattern.

Liocranoides sp.

A single mature male Liocranoides was collected in a leaf-covered pile of rocks in Nugget Canyon, elevation 4750 feet. According to Dr. Gertsch, who was with the

when the specimen was taken, this is the first male of the Santa Catalina Mountain population which has been collected. The specimen was given to Dr. Gertsch who is currently revising the genus, most species of which are found in California.

Phrurotimpus alarius (Hentz)

The genus Phrurotimpus is similar in structure to Phrurolithus and Piabuna, differing in coloration and in having black anterior tibiae and iridescent scales on the abdomen. Two specimens of P. alarius were collected under rocks at an elevation of 7500 feet.

Piabuna brevispina Chamberlin and Ivie

Species of Piabuna differ from other small liocranine spiders in their very pale coloration, and the large size of the anterior median eyes. They are found under rocks, often in much drier habitats than related genera. P. brevispina was collected at elevations of 2700 to 4300 feet.

Piabuna sp.

This species, collected more often than its congener P. brevispina, may be an undescribed species. It was taken at similar habitats at somewhat higher elevations (3000 to 4750 feet).

Lauricius hooki Gertsch

L. hooki is a very large, flat-bodied clubionine

spider which is common in the coniferous forests in the Santa Catalinas. It reaches a body length of twenty millimeters, and is brown with a yellowish abdominal pattern. For some time this spider was identified as L. hemicloeinus Simon, a Mexican spider with which it may be conspecific. L. hooki was collected under rocks, logs, and loose bark from 6000 to 9100 feet.

Trachelas arizonatus Gertsch

This is a typical Trachelas with bright red-brown cephalothorax and legs, and gray abdomen. Members of this genus exhibit very minute specific differences. Specimens were collected in houses, among leaf litter, and in retreats spun in curled leaves on oak trees, at elevations of 2400 to 4300 feet.

Meriola decepta Banks

Members of the genus Meriola are similar to Trachelas in general appearance, but have the posterior row of eyes narrower, and straight instead of recurved. Collected in houses and under rocks at elevations of 2400 to 4300 feet.

Micaria sp.

A single immature specimen belonging to this genus was taken from beneath a rock at 9100 feet.

Syspira sp. no. 1

A brown clubionid which keys to this genus in Comstock (1948) was collected at elevations of 3200 and

4400 feet. The author has been able to locate no descriptions of species of this genus.

Syspira sp. no. 2

A single mature male of a different species from the above was collected on the outside of a building at an elevation of 2300 feet.

Family Anyphaenidae

Anyphaenids are very similar to clubionids, the chief distinction being the anterior position of the tracheal spiracle in the present family. They have often been regarded as a subfamily of the Clubionidae.

Anyphaena crebrispina Chamberlin

This is a very common species in the yellow pine and fir forests, where it usually is found under rocks. Specimens taken at elevations below the yellow pine forest are slightly different in appearance and may represent a different species. A few specimens were taken from retreats in rolled leaves on oak trees. Elevational range is 4400 to 8300 feet.

Anyphaena sp.

A few specimens of a somewhat larger species of Anyphaena were collected under rocks at elevations of 6000 to 8000 feet. They may belong to an undescribed species.

Aysha nigrifrons (Chamberlin and Woodbury)

A. nigrifrons is a pale greenish-yellow spider with

dark brown ocular area and chelicerae. The chelicerae of the male are long, narrow, and flattened. Specimens were collected on the outside of buildings and on plants at elevations of 2400 to 4300 feet.

Family Selenopidae

The family Selenopidae consists of a single genus of extremely flattened laterigrade spiders with sub-orbicular carapaces and long legs. Only a few species occur in the United States, the others being mainly tropical in distribution. These are difficult and exasperating animals to collect; their flat bodies, brittle legs, agility, and wariness make the capture of a whole specimen almost impossible. In addition they are mature for only a short season, so the collector has the choice of taking only one identifiable specimen in a dozen, or capturing them all alive and rearing the immature ones.

Selenops actophilus Chamberlin

This spider lives under loose rocks and in crevices of large rock outcrops over which it hunts at night. A single mature and several immature specimens were taken at 4300 feet. Others, probably of this species, were seen on rocks at 2800 feet.

Family Sparassidae

Sparassids, or huntsman spiders, are large, long-

legged laterigrade spiders of primarily tropical distribution. A few species occur in the United States in southern Florida and the Southwest. During the summer these spiders frequently enter houses and are often mistaken for tarantulas because of their size.

Olios fasciculatus Simon

This is the larger of the two species of Olios found in the Santa Catalinas. It reaches a body length of 25 millimeters, with the longest of the legs measuring about 35 millimeters. It is often captured in houses in Tucson during the summer. A female was taken under a rock in Nugget Canyon where she had constructed a tough parchment-like retreat about three inches long and an inch in diameter. Inside the retreat the spider was sitting on an egg sac 14 millimeters in diameter which contained several dozen eggs each 2 millimeters across, an unusually large size for spider eggs. Elevations of the collecting sites are 2400 to 4750 feet.

Olios sp. (?bibranchiata Fox)

A few specimens of a smaller yellowish sparassid with pale instead of dark brown chelicerae were collected at elevations of 2400 to 4750 feet. When collected, Dr. Gertsch indicated that they may be O. bibranchiata.

Family Thomisidae

The family Thomisidae is an important group of moderate sized laterigrade spiders of world-wide distribution. Two distinct subfamilies are recognizable. One, the subfamily Misumeninae or typical crab spiders, consists of short-bodied, stocky spiders with powerful front legs. Members of this subfamily are usually sedentary, sitting in many cases on flowers where they capture insects which are attracted by the nectar and pollen. The other subfamily, the Philodrominae or running crab spiders, have long legs, and often rather long narrow abdomens. These spiders hunt actively over grass, other herbaceous vegetation, and foliage of trees. Occasional individuals of either subfamily, more often the Misumeninae, may be found under rocks and logs, particularly during the egg-laying season or during the winter.

Misumenoides aleatorius (Hentz)

M. aleatorius is a large bright yellow crab spider, with a white or yellowish clypeal carina, and usually with reddish-brown markings on carapace, abdomen, and legs. It is most often found on inflorescences of yellow-flowered composites, especially goldenrod. It may also be swept from herbaceous vegetation or tree foliage in suitable habitats.

Misumenops californicus (Banks)

Members of the genus Misumenops are small misumenine thomisids clothed with numerous long erect spines over the entire body. Males are usually much smaller than females. Three species of the genus were identified in the author's collection. A single specimen of M. californicus was collected on foliage at 6000 feet.

Misumenops coloradensis Gertsch

This species was collected on inflorescences of Agave schottii at elevations of 4300 and 4800 feet.

Misumenops dubius (Keyserling)

M. dubius also was taken on Agave schottii at 4300 feet. In addition to the specimens referred to above the author has several unidentified female Misumenops which were collected at elevations of 2700 to 5600 feet on foliage, and on flowers of Agave schottii and Cephalanthus.

Xysticus apachecus Gertsch

A single specimen somewhat doubtfully referred to this species was taken from under a rock in pine-oak forest at 8000 feet.

Xysticus lassanus Chamberlin

X. lassanus was collected in Neotoma nests in palo-verde-saguaro desert at 3200 feet.

Xysticus locuples Keyserling

A single individual of this species was taken under

a rock in a riparian situation in a yellow pine-oak ecotone woodland at 6000 feet.

Xysticus montanensis Keyserling

The specimens of this species of Xysticus were found under rocks and loose bark at elevations of 8000 and 9100 feet.

Xysticus paiutus Gertsch

One female was collected under a doghouse in Tucson, elevation 2400 feet.

Xysticus sp. cf. quinquepunctatus

A female collected under a rock at 4800 feet bears a resemblance to X. quinquepunctatus, but is probably of a different species. Lack of the more distinctive male prevents exact placement of the specimen.

Xysticus sp. near apachecus

Several large, strikingly marked female Xysticus were collected with their egg sacs under rocks at 8000 feet. The epigynum is very similar to that of the specimen referred to above as X. apachecus. The color pattern is so radically different, however, that the two collections must represent distinct species.

Titanebo sp.

One individual of the philodromine genus Titanebo was collected among rocks at 4000 feet in paloverde-saguaro desert. It does not appear to belong to any of the

described species of the genus. Titanebo is scarcely different from Ebo, with which it should probably be united.

Thanatus sp.

This species was collected in buildings and under rocks at elevations of 2300 to 4300 feet.

Apollophanes arizonensis Gertsch

One female was swept from Melilotus in a riparian habitat at 4300 feet. An immature, possibly of this species was taken in a building in Tucson, elevation 2400 feet.

Tibellus chamberlini Gertsch

Two adult females were taken in buildings and an immature was swept from herbaceous vegetation at elevations of 2400 and 4300 feet respectively.

Family Salticidae

This large family of highly specialized hunting spiders is world-wide in distribution, but occurs in greatest variety in tropical regions. The jumping spiders, as salticids are commonly called, are the most sharp-sighted of all spiders. The square high front of the cephalothorax bears a row of four eyes, the medians extremely large. With these eyes the large species are reputed "capable of receiving a sharp image at a distance of ten or twelve inches," (Gertsch, 1949).

Coincident with the development of acute vision many salticids have abandoned the tactile methods of hunting characteristic of most other spiders. The possibility of visual recognition of sexes has permitted the development of striking color patterns, elaborate ornamentation, and complex courtship rituals, which occur in virtually all the keener-eyed salticids. The result of this development, especially in the tropics, is that the jumping spiders occur in a bewildering variety of brilliant color patterns, with often quite small differences between species in the same genus. Apparently courtship behavior, perhaps in conjunction with ecology, is an efficient enough isolating mechanism to permit rapid speciation with a minimum of morphological divergence. Miss Jocelyn Crane of the New York Zoological Society has published (1948) an excellent study of the courtship behavior of members of the Salticidae.

Jumping spiders inhabit a wide variety of habitats. Many of them may be swept from vegetation, others live under rocks and in leaf litter, still others wander about over the soil surface, on rocks, or on tree trunks. As with most other spiders, the low relative humidity of most habitats in the Santa Catalinas forces many of the jumping spiders to live in protected microhabitats where the rate of evaporation is slowed. During the season of bloom

of various plants, individuals of the phidippid genera are often found on the inflorescences.

Metacyrba taeniola (Hentz)

M. taeniola is a dark gray jumping spider, often having two rows of small white spots on the dorsum of the abdomen. It was collected under rocks at 3000 feet.

Thiodina sp.

This species is a distinctively marked yellow and brown spider. The overall color of the female is yellow with brown abdominal markings and a dark brown ocular area. The male has a yellow abdomen with brown markings, wide brown annulations on yellow legs, and a brown carapace. On the carapace of the male are three conspicuous patches of yellowish scales. One of these patches is in the ocular area, the other two are lateral to it. Gertsch has indicated that this is probably an undescribed species. The specimens were collected in and on buildings, under rocks, and in retreats under ledges on rock outcrops. Elevations of the collecting sites are 2300 to 4750 feet.

Neon reticulatus Blackwall

N. reticulatus is rather common under rocks in the yellow pine and fir forests in the Santa Catalinas. It is a quite small, dark gray and brown spider with a large ocular quadrangle. Specimens were collected from 6000 to 7500 feet.

Gorythalia delicatula Gertsch and Mulaik

C. delicatula is a black spider with transverse white bands on the abdomen. It is about two millimeters in length. Specimens were collected under rocks from 2700 to 8000 feet.

Sidusa arizonensis Banks

This species is probably more abundant and much more widespread in the Santa Catalinas than my records indicate. Several immature specimens from various localities are probably S. arizonensis. The single site at which mature individuals were taken is at 6000 feet.

Habrocestum sp.

Two specimens of a species of Habrocestum were collected among rocks at elevations of 4300 and 6000 feet.

In this and the following two genera (Habronattus and Metaphidippus) a great many very similar species are known. Identification of even the widespread and common species is an uncertain matter in many cases, and in the West, where undescribed forms are of frequent occurrence, the task is even more difficult. Therefore, I prefer at present only to list the genera.

Habronattus sp.

Two females and one male, apparently all referable to one species of Habronattus, were collected under rocks and on grass at elevations of 2400 to 4000 feet. This

genus is quite close to Pellenes, with which it possibly should be combined.

Metaphidippus sp. no. 1

A female and a male with similar abdominal color patterns were collected under rocks at elevations of 2700 and 4300 feet. The abdomen is yellow with four pairs of distinct reddish-brown spots arranged in two longitudinal rows.

Metaphidippus sp. no. 2

Several females collected under rocks and logs are referred to a second species of Metaphidippus. In these the abdomen shows a typical pattern of the genus, *i. e.*, a series of whitish chevrons on a reddish-brown background. Elevations of the collecting sites are 7500 and 7900 feet.

Paraphidippus pineus Kaston

Two females of this large salticid were collected under rocks at an elevation of 6000 feet.

Phidippus formosus (Peckham)

Only one specimen of P. formosus was collected in the Santa Catalinas. It was taken under a rock at an elevation of 4300 feet. The species is probably more common in agricultural land at low elevations. There are a number of specimens in the collection of the Department of Entomology at the University of Arizona. Most of these were swept from alfalfa.

There is wide variation in coloration in this species and the next, which are very similar in appearance. In the more highly colored males of both species the entire dorsum of the abdomen is bright orange, the cephalothorax, legs, and underside are black. In females and some males there are variable black or white markings on the dorsum of the abdomen, and the ground color may be pale orange to an odd orangish-green. The principal mark of distinction between the two species is the presence of a pair of white lateral stripes on the carapace of P. tyrrellii. The carapace of P. formosus is solid black.

Phidippus tyrrellii Peckham

This is the common, large, black and orange salticid of the Santa Catalina Mountains. It is usually found in closely-woven retreats attached to the lower sides or under surfaces of rocks. Specimens were collected in almost all habitats at elevations of 2400 to 8000 feet.

Sassacus papenhoei Peckham

One female of this species was collected on vegetation in oak grassland at an elevation of 4300 feet.

Icius similis Banks

The single female specimen of this species is a very distinctive spider. The cephalothorax and legs are dark reddish-brown, the entire dorsum of the abdomen is clothed with brilliant, bronze-yellow, iridescent scales. It was

taken from a retreat spun in a rolled leaf of Quercus oblongifolia at an elevation of 4300 feet.

Order Scorpionida

The scorpions are large, non-pedicellate arachnids in which both chelicerae and pedipalps are chelate, and the pedipalps are enlarged into a conspicuous pair of claws. The abdomen is segmented and the postabdomen is narrow and elongate, bearing at its tip a bulbous sting. On the ventral surface of the second abdominal segment is a pair of unique organs called pectines or combs. The combs are believed to be sense organs, but their specific function is quite unknown. Most scorpions have eight eyes, a median pair and a group of three on each anterolateral margin of the carapace. In the family Chactidae there are only two eyes in each of the marginal groups. Six species of scorpions from the Santa Catalina Mountains and the Santa Cruz Valley are discussed here.

Family Vejovidae

Vejovis flavus Marx

One specimen of V. flavus was collected in a building, on West Grant Road, Tucson, elevation 2300 feet. It is similar to V. spinigerus in appearance, but lacks

black stripes on the ventral surface of the tail.

Vejovis spinigerus Wood

This species is probably the most common scorpion in the Tucson region. It may be collected in large numbers in the paloverde-saguaro desert and in oak-grassland. Specimens were taken under rocks and boards, and in pitfall traps at elevations of 2700 to 4300 feet.

Vejovis vorhiesi Stahnke

V. vorhiesi is considerably smaller than the above two species of Vejovis, and is heavily mottled with dark brown. It was collected in greatest numbers at 6000 feet in a yellow pine-oak ecotone along a wash. Specimens were taken at many localities from the base to the peak of the Santa Catalinas (elevations 2700 to 9100 feet).

Hadrurus hirsutus Wood

This is the giant hairy scorpion of the lowlands. The posterior part of the carapace and the mesosoma are brown to black, the rest of the body and the legs are a greenish yellow. Four inches is not an uncommon length for this animal. Specimens were collected on roads at night, and in pitfall traps at elevations of 2250 to 2900 feet.

Family Buthidae

Centruroides sculpturatus Ewing (including Centruroides gertschi Stahnke)

Scorpions of the genus Centruroides are distinguishable from all other species included here by their very long, slender tails and claws. Individuals of C. sculpturatus sensu stricto are pale yellowish to orange. The form C. gertschi has a double row of dark markings on the dorsum. This seems to be merely a polymorphism, rather than a species difference. Centruroides is the only Arizona scorpion whose sting may prove dangerous under normal circumstances.

C. sculpturatus was collected under rocks, boards, and trash from 2700 to 6700 feet. Above approximately 4800 feet, however, the species is uncommon.

Family Chactidae

Superstitionia donensis Stahnke

This is an attractive small scorpion which has three longitudinal black dorsal stripes on a yellow body. The name is rather inappropriate since the species occurs over most of Arizona, and into California and Mexico. It is rather uncommon in the Santa Catalinas. Two specimens were taken from under rocks in oak-grassland at elevations of 4300 and 4650 feet.

SUMMARY AND CONCLUSIONS

Detailed information is set forth on the ecology, taxonomy, and distribution of spiders and scorpions of the Santa Catalina Mountains and the adjacent Santa Cruz Valley in Pima and Pinal Counties, Arizona. The data were gathered during a period of two years extending from September, 1959 through August, 1961.

The results of the study support three main conclusions. First, at least three rather distinct spider faunas inhabit the Santa Catalina Mountains and adjacent Santa Cruz Valley, a lowlands fauna, a lower mountain fauna, and a high mountain fauna. The boundary distinction between these faunas is, as usual in faunal studies, chiefly one of relative abundance of particular species. One group of species occupies the desert valleys as well as the lower riparian habitats and the lowest hills. A second is distributed from the desert foothills at about 3000 feet through evergreen woodland to about 6000 feet at the lower edge of ponderosa pine forest. This group gradually changes in character from partly Mexican to mostly North-eastern in character with increasing elevation. The third group begins at about 6000 feet and extends through

the coniferous forest to the summit. This latter group is at least partially boreal in character. Roughly these groups of species may be said to occupy respectively, the Lower Sonoran (desert), Upper Sonoran (desert) to Lower Transition (woodland), and Upper Transition (ponderosa pine) to Canadian (fir) Life-zones.

The second major conclusion is that spiders appear to be little, if at all, affected by the specific floristic make-up of a plant community. The distinctions among different species of oak, or among species of conifers, for example, seem to be of little or no importance to them. This seemed at first rather surprising since other investigations indicated that particular plant communities did possess particular assemblages of spiders, different from those of adjoining communities. Even separate strata within a community are known elsewhere to have different dominant species.

The third conclusion is that spiders definitely do appear to respond to the plant life-forms present in a community, rather than to the floristic composition (i. e., to the structure rather than the kind of plant). Moreover, other things being equal, the more life-forms present the more species of spiders the community will support. This point has been made for the Chicago Dunes area by Lowrie (1948), and it is clearly supported by the present

investigation. Response to microclimate, plant life-form, amount and character of soil and rock, and inherent behavior patterns together appear to determine the composition of spider communities.

In general, it may be said that faunas of spiders show a gradual change with elevational or geographical changes in macro climate, and that species of spiders show definite adaptation to microclimates and substrata, whether the latter be soil and rock or vegetation.

The factors governing the distribution of scorpions appear to be the same as those which affect spiders, with the exception that plant life-form has little influence over scorpions.

Much work is needed to determine how climate and substrata operate upon spiders to produce stratified communities and geographical or elevational differences in communities. Are these factors, for instance, the important ones in the success or failure of range extension by migration? Many spiders balloon on strands of silk at certain seasons of the year, and at least a few reach great altitudes and travel long distances. Why should their ranges not be even more extensive than they are? Are climate and substrata major limiting factors here, or is competition more important?

By presenting at least a partial picture of the distribution of spiders and scorpions in one range of mountains in the Southwest, this study has attempted to single out and call attention to the factors which govern the distribution of these animals generally. Further work here and elsewhere in the Southwest should be carried out to fill in distributional details and to test experimentally the effects of microclimate and substratum on the ecological distribution of spiders and scorpions.

[The following text is extremely faint and largely illegible. It appears to be a list of references or a detailed list of specimens, possibly including names of authors and titles of works.]

Appendix A¹

A KEY TO THE GENERA OF SPIDERS WHICH
OCCUR IN THE TUCSON AREA

- 1a. Chelicerae paraxial. Two pairs of lungs. 2
 1b. Chelicerae diaxial. Never more than one pair of lungs; usually with one or two tracheal spiracles. 3
- 2a. Tarsi with three claws, without claw tufts. Euagrus
 2b. Tarsi with two claws, with claw tufts. Aphonopelma
- 3a. With cribellum and calamistrum. 4
 3b. Without cribellum or calamistrum. 15
- 4a. With three tarsal claws. 5
 4b. With two tarsal claws. Zorocrates
- 5a. Anal tubercle large, two-jointed, fringed with long hairs. Posterior median eyes triangular or irregular. Small, flattened spiders. Oecobius
 5b. Anal tubercle normal, without fringe of hairs. PME round. 6
- 6a. Chelicerae fused at base and provided distally with a tooth which with the fang forms a sort of chela. Tracheal spiracle considerably in advance of the spinnerets. 7
 6b. Chelicerae not fused, tooth absent. Tracheal spiracle in normal position close to spinnerets. 8
- 7a. Very small spiders (to 2 mm.). Tibia of male palpus thickened. Filistatinella
 7b. Large spiders (to 20 mm.). Tibia of male palpus not thickened. Filistata

-
1. This key is based upon material collected by the author during the period 1959-61. A total of 126 genera are included in the key. A small number (less than 10) of the genera which occur in the Tucson area are omitted. The omitted genera all belong to the families Linyphiidae and Micryphantidae.

Appendix A (cont.)

- 8a. Tarsi with several dorsal trichobothria (sometimes quite short). Cribellum divided. 8 eyes all light in color. 9
- 8b. Tarsi with no trichobothria or one to four. Cribellum rarely divided. 8 eyes all dark, or AME alone dark, or 6 eyes. 10
- 9a. Calamistrum composed of two rows of bristles. Typically large spiders with a chevron pattern on dorsum of abdomen. Callobius
- 9b. Calamistrum a single row of bristles. Smaller spiders with orange carapace and black abdomen. Titanoeca
- 10a. Eyes all dark, both rows recurved. Metatarsus IV compressed and concave above. 11
- 10b. 8 eyes, AME alone dark; or 6 eyes all light. Metatarsus IV not compressed and concave above. 12
- 11a. Abdomen globose; cephalothorax angular, wide in the middle and narrowed in front. Legs short; small black spider (2-3mm.). Hyptiotes
- 11b. Abdomen elongate; cephalothorax oval, with rather evenly curved sides. Legs long; larger spiders with abdominal patterns. Uloborus
- 12a. Tarsi with one to four dorsal trichobothria. Clypeus narrow. Lower margin of cheliceral furrow with 3-6 teeth. 13
- 12b. Tarsi without dorsal trichobothria. Clypeus wider. Lower margin of cheliceral furrow with 1-3 teeth. 14
- 13a. AME greatly reduced or absent; posterior eye row clearly procurved. Lower margin of fang furrow with a file of 3-6 teeth. Lathys
- 13b. AME at least 2/3 the diameter of an ALE. Posterior eye row straight or very slightly procurved. Lower margin of fang furrow with four teeth. Tricholathys
- 14a. Lower margin of cheliceral furrow with two or three teeth. Mallos
- 14b. Lower margin of fang furrow with a single tooth. Dictyna
- 15a. With 2 or 6 eyes. 16
- 15b. With 8 eyes. 24

Appendix A (cont.)

- 16a. With 2 eyes. Orthonops
16b. With 6 eyes. 17
- 17a. Chelicerae fused at base, with a distal tooth-like lamella, which with the fang makes a sort of chela. 18
17b. Chelicerae separate at the base. Without such a lamella. 20
- 18a. Two tarsal claws. Thoracic furrow conspicuous and longitudinal. Carapace flat and broad. Loxosceles
18b. Three tarsal claws. Thoracic furrow and carapace not as above. 19
- 19a. Anterior row of eyes (4) in a nearly straight line. Coxae IV close together. Abdomen with a white-edged folium, a large black patch, or entirely white. Diguettia
19b. Eyes in 3 widely separated diads, one anterior, two lateral. Coxae IV widely separated. Abdomen yellowish with purplish markings. Carapace high-arched behind. Scytodes
- 20a. Tiny spiders 1-2.5 mm. in length. Coloration ranging from whitish to orange or reddish-brown. Leg 3 directed backward as usual. 21
20b. Large dark purplish-brown spiders. Leg 3 directed forward with legs 1 and 2. Ariadna
- 21a. Abdomen with dorsal or ventral scuta or both. 22
21b. Abdomen without scuta. 23
- 22a. Abdomen with complete dorsal and ventral scuta. Opopaea
22b. Abdomen with a ventral scutum which extends up the sides leaving the middle of the dorsum uncovered. Scaphiella
- 23a. Abdomen high and rounded, carapace high. Hind femora larger than femora of other legs. Orchestina
23b. Abdomen and carapace low. Hind femora of about same size as others. Oonops
- 24a. Tarsi with two claws, with or without claw tufts. (If claw tufts are present it is safe to assume that there are only two claws.) 25
24b. Tarsi with three claws, never with claw tufts. 72

Appendix A (cont.)

- 25a. Eyes in three rows. 26
 25b. Eyes in two rows. 40
- 26a. Tarsal claws smooth. 27
 26b. Tarsal claws toothed. First row of four large eyes
 on a nearly vertical face. 28
- 27a. Eyes heterogeneous, only the anterior medians dark.
Pericuris
 27b. Eyes homogeneous, all dark. Humalonychus
- 28a. Tibia plus patella of the third leg as long as or
 longer than tibia plus patella of the fourth leg. 29
 28b. Tibia plus patella of the third leg shorter than
 tibia plus patella of the fourth leg. 32
- 29a. Quadrangle of eyes wider in front than behind.
Habrocestum
 29b. Quadrangle of eyes with sides parallel or wider
 behind than in front. 30
- 30a. First tibiae with four bulbous-based setae on the
 ventral surface. Thiodina
 30b. First tibiae without such setae. 31
- 31a. Cymbium and palpal organ of male circular in outline;
 epigynum of female with a single opening at the
 posterior end of a median tube. Habronattus
 31b. Cymbium and palpal organ elongate; epigynum not
 as above. Pellenes
- 32a. Small eyes about midway between the ALB and the PLE. 35
 32b. Small eyes much closer to the ALB than to the PLE. 33
- 33a. Cephalothorax with a depression immediately behind
 and between the posterior eyes. Thoracic furrow
 distinct short groove at the bottom of the depression. 34
 33b. Cephalothorax without such a depression; forming a
 gently sloping plane from anterior eyes to posterior
 declivity. Thoracic furrow not a groove, reduced to
 a short dark line some distance from the posterior
 eyes. Sassacus

Appendix A (cont.)

- 34a. Cephalothorax from above with strongly curved sides, about $7/8$ as wide as long. Small eyes twice as far from the PLE as from the ALE. Male chelicerae normal. Phidippus
- 34b. Cephalothorax not so strongly curved, greatest width only about $4/5$ the length. Small eyes not so near the ALE. Males with chelicerae often quite large, projecting forward, with a tooth on the basal segment. Paraphidippus
- 35a. Sternum strongly narrowed anteriorly. First coxae separated by much less than the length of one of them. 36
- 35b. Sternum not strongly narrowed anteriorly. First coxae separated by about the length of one of them or more. 37
- 36a. Tibiae one and two each with three pairs of long ventral spines. Abdomen with iridescent scales. Icius
- 36b. Tibia one with two pairs of ventral spines, tibia two with two ventral spines only, one behind the other. Abdomen without iridescent scales. Metacyrba
- 37a. Ocular quadrangle more than half the total length of the carapace. Neon
- 37b. Ocular quadrangle half or less the total length of the carapace. 38
- 38a. Abdomen with transverse white bands on a black background. Corythalia
- 38b. Abdomen not marked as above. Coloration mostly gray, brown, reddish-brown, or yellow. 39
- 39a. Tibia II with a distal pair of ventral spines followed by a row of two unpaired spines. Ocular quadrangle slightly broader than long and about half the length of the carapace. Metaphidippus
- 39b. Tibia II with two pairs of ventral spines followed by an unpaired spine. Ocular quadrangle considerably broader than long and less than half the length of the carapace. Sidusa

Appendix A (cont.)

- 40a. Tracheal spiracle in advance of the spinnerets by at least $\frac{1}{3}$ the distance between spinnerets epigastric furrow. 41
- 40b. Tracheal spiracle in the usual place just in front of the spinnerets. 42
- 41a. Tracheal spiracle about midway between spinnerets and epigastric furrow. Anyphaena
- 41b. Tracheal spiracle much closer to epigastric furrow than to spinnerets. Aysha
- 42a. Legs I and II laterigrade (rotated backward and curved toward mid-line in a crab-like fashion). 43
- 42b. All legs of the usual prograde type. 52
- 43a. Retromargin of cheliceral fang furrow toothed. 44
- 43b. Retromargin of cheliceral fang furrow without teeth. 45
- 44a. Six eyes in first row. Body extremely flattened. Selenops
- 44b. Four eyes in first row. Body not particularly flattened. Olios
- 45a. Hair over the body simple and erect. Legs III and IV usually much shorter than I and II. Claw tufts reduced or absent, tarsi I and II not scopulate. Promargin of chelicera toothless. Body often very spiny. 46
- 45b. Hair of the body feathery or scaly and prone, not erect. Legs I, III, and IV about equal in length. Claw tufts distinct, tarsi I and II scopulate (at least in females). Promargin of chelicerae with one or two teeth. 49
- 46a. Tubercles of lateral eyes confluent. 47
- 46b. Tubercles of lateral eyes discrete, usually well separated. 48
- 47a. Eyes of anterior row subequal in size. Abdomen and often carapace devoid of strong spines. With a distinct white or yellow clypeal carina. Misumenoides
- 47b. ALB larger than AME. Carapace and abdomen spinose. Without a clypeal carina. Misumenops

Appendix A (cont.)

- 48a. Carapace rather high, the cephalic sutures almost obsolete, the first row of eyes moderately recurved. Xysticus
- 48b. Carapace very flat, the cephalic sutures well indicated, the first row of eyes nearly straight. Coriarachne
- 49a. Leg II twice as long as leg I. Titanebo
- 49b. Leg II very little longer than leg I. 50
- 50a. Posterior eyes about equidistant from each other, in a strongly recurved line. Carapace slightly wider than long. Apólllophanes
- 50b. Posterior eyes with the medians further from the laterals than from each other. 51
- 51a. Carapace almost as wide as long. Abdomen from one and a fourth to twice as long as wide. Thanatus
- 51b. Carapace no more than $\frac{4}{5}$ as wide as long. Abdomen two and one half to five times as long as wide. Usually a median dark stripe on both carapace and abdomen. Tibellus
- 52a. Anterior spinnerets contiguous or almost so and not more heavily sclerotized than the posteriors. 53
- 52b. Anterior spinnerets cylindrical; longer, and more heavily sclerotized than the posteriors, and separated by a distance about equal to the diameter of one. 64
- 53a. Apical segment of the posterior spinnerets conical, often very short but usually distinct. This segment may be difficult to distinguish in some small species which have a double row of long spines on the ventral surface of tibia I. 54
- 53b. Apical segment of the posterior spinnerets always very short, flattened or rounded, usually indistinct. 61
- 54a. Labium usually much longer than broad, exceeding half the length of the endites; endites narrow at the middle or at least no broader there than at apex. 55
- 54b. Labium not or scarcely longer than broad, at most half as long as endites. Endites broadest toward middle. First tibia usually with a ventral double row of spines. 57

Appendix A (cont.)

- 55a. Posterior row of eyes procurved. 56
 55b. Posterior row of eyes recurved. Large flat
 spiders. Lauricius
- 56a. First legs longer than fourth. Chiracanthium
 56b. First legs equal to or shorter than fourth. Clubiona
- 57a. First tibiae with at most 3 pairs of ventral spines.
 Posterior row of eyes recurved. Syspira
 57b. First tibiae with 4 or more pairs of ventral spines. 58
- 58a. Sternum prolonged behind between the posterior
 coxae. 59
 58b. Sternum not prolonged behind between the posterior
 coxae, which are contiguous or nearly so. AME not
 larger than ALB, lower margin of fang furrow with
 three teeth. Liocranoides
- 59a. AME considerably larger than the ALB. Piabuna
 59b. AME smaller than or equal to ALB. 60
- 60a. Carapace yellow to brown, with black margin and dark
 median markings. Eye rows subequal in width. Tibia of
 male palpus with a single spur. Phrurotimpus
 60b. Carapace without conspicuous contrasting markings, at
 most mottled with slightly darker shade. First eye
 row distinctly narrower than second. Tibia of male
 palpus with a double spur. Phrurolithus
- 61a. Posterior row of eyes straight or slightly
 procurved. 62
 61b. Posterior row of eyes strongly recurved. Trachelas
- 62a. Posterior row of eyes straight. Meriola
 62b. Posterior row of eyes at least slightly procurved. 63
- 63a. Retromargin of fang furrow with two teeth. Castianeira
 63b. Retromargin with one tooth. Micaria
- 64a. Lower margin of fang furrow with a single keel. Gnaphosa
 64b. Lower margin of chelicerae unarmed or with one to
 several ordinary teeth. 65

Appendix A (cont.)

- 65a. Fourth tibia with two or more median dorsal spines. Drassodes
- 65b. Fourth tibia with one median dorsal spine or none. 66
- 66a. Lower margin of fang furrow with a single tooth or unarmed. Bulb of male palpus with no apophyses. 67
- 66b. Lower margin of fang furrow with 2-3 teeth, rarely only one. Bulb of male palpus with one or more apophyses. 70
- 67a. Posterior row of eyes somewhat recurved. Poecilochroa
- 67b. Posterior row of eyes procurved or straight. 68
- 68a. Lower margin of fang furrow unarmed. AME equal to or larger than ALE. Liodrassus
- 68b. Lower margin of fang furrow with one tooth. Eyes of first row subequal. 69
- 69a. PME further from each other than from the PME. Carapace and abdomen with conspicuous black and white stripes. Cesonia
- 69b. PME not or slightly further from each other than from PLB. Carapace not and abdomen usually not black and white. Herpyllus
- 70a. Upper margin of fang furrow with 3 teeth, the lower with 2. PME large, oblique, close together. Haplodrassus
- 70b. Upper margin of fang furrow with 4-6 teeth, the lower with 1-3. 71
- 71a. Posterior eyes nearly equidistant in a straight or slightly procurved row. PME round, smaller than to slightly larger than the PLB. Body usually very dark. Zelotes
- 71b. PME close together, oblique, usually larger than PLB. Posterior eye row procurved. Body usually brown. Drassylus
- 72a. Tibia and metatarsus I and II with a prolateral row of long spines in the intervals between which are rows of much shorter hooked spines, each row increasing in length distally. Mimetus
- 72b. No such arrangement of spines. 73

Appendix A (cont.)

- 73a. The six spinnerets in a curved transverse row.
Tracheal spiracle removed from spinnerets at least 1/3
the distance to the epigastric furrow. 74
- 73b. Spinnerets in a cluster as usual. 76
- 74a. AME about as large as or larger than ALE. Spiracle
twice as far from the median spinnerets as from the
genital furrow. Neoantistea
- 74b. AME considerably smaller than the ALE. 75
- 75a. Spiracle twice as far from epigastric furrow as from
median spinnerets. Hahnia
- 75b. Spiracle about midway between epigastric furrow and
median spinnerets. Hahnistea
- 76a. Eye group hexagonal. Clypeus high, abdomen pointed
behind. Legs with many long black spines. 77
- 76b. Eye group not hexagonal. 79
- 77a. Posterior row of eyes slightly procurved, lower margin
of fang furrow unarmed. Large jade green spiders.
Peucetia
- 77b. Posterior row of eyes strongly procurved, lower margin
of fang furrow with one tooth. Not jade green. 78
- 78a. Four posterior eyes equidistant. Oxyopes
- 78b. Four posterior eyes not equidistant. Hamataliwa
- 79a. Tarsus IV with a ventral row of 6 to 10 curved
serrated bristles forming a comb. 80
- 79b. Tarsus IV without such a comb. 87
- 80a. Abdomen elongated a considerable distance beyond
spinnerets, sometimes very high and conical or
triangular. Thoracic furrow a deep transverse pit.
Head of male lobed. Argyrodes
- 80b. Abdomen oval to subspherical. Thoracic furrow and
head of male not as above. 81
- 81a. Colulus large. 82
- 81b. Colulus absent. 83
- 82a. Lateral eyes separated from each other by at least a
diameter. Body of female black with variable red
markings. Latrodectus
- 82b. Lateral eyes contiguous or less than a diameter apart.
Body purplish. Steatoda

Appendix A (cont.)

- 83a. Lateral eyes contiguous or nearly so. 84
 83b. Lateral eyes separated by 2/3 to one diameter. Achaearanea
- 84a. Gray to silver-and-white abdomen. Abdomen somewhat flattened and pointed behind. Swift-running, non-web-building spiders found under rocks. Euryopsis
 84b. Not so colored, abdomen rounded. Medium-sized to minute web-building spiders. 85
- 85a. No cheliceral teeth. Mature male with only one palpus. Tidarren
 85b. One or two promarginal cheliceral teeth at least in female. Male with two palpi. 86
- 86a. Tiny, short-legged spiders (1-2mm.) found under rocks. Sphyrotinus
 86b. Larger, long-legged, often aerial spiders. Theridion
- 87a. Chelicerae fused at base, with a lamella. 88
 87b. Chelicerae free from each other at base, without lamella. 92
- 88a. Tarsi without pseudosegments. Large, mahogany to yellow-brown spiders with strong legs. AME not much smaller than others, remaining eyes not in triads. 89
 88b. Tarsi long and flexible with many pseudosegments. Pale spiders with very long weak legs. AME usually much reduced, other eyes in two triads. 90
- 89a. First femur robust, curved, usually shorter than carapace, lacking dorsal spines except occasionally at base. First tibia of male with a stout retrolateral process distally, the process bearing a heavy spine. Plectreurys
 89b. First femur more slender, nearly straight, much longer than carapace, with a dorsal series of spines the whole length. First tibia of male without process and spine. Kibramoa
- 90a. Posterior row of eyes slightly procurved. Psilochorus
 90b. Posterior row of eyes slightly recurved. 91
- 91a. Anterior eye row straight. Physocylus
 91b. Anterior eye row recurved. Artema

Appendix A (cont.)

- 92a. Tarsi with trichobothria. 93
 92b. Tarsi without trichobothria. 106
- 93a. Tarsi with a single row of trichobothria which increase in length toward distal end of tarsus. Trochanters usually not notched. 94
 93b. Tarsi with trichobothria numerous, but irregularly distributed. All trochanters notched. 98
- 94a. Labium as wide as long or longer. Hind spinnerets with apical segment much shorter than basal. 95
 94b. Labium longer than wide. Hind spinnerets with apical segment at least as long as basal. 96
- 95a. Retromargin of fang furrow with three teeth. Cryphoeca
 95b. Retromargin of fang furrow with a series of minute denticles. Cicurina
- 96a. Embolus of male flat, coiled in at least one full circle, which is usually of larger diameter than the cymbium. Epigynum a deep transverse pit in which two openings are visible, with no median scape or lateral teeth. Agelenopsis
 96b. Embolus of male thin to thick, curved, but never making a complete circle. Epigynum with lateral teeth or median scape. 97
- 97a. Tip of embolus of male enclosed by a short conductor. Epigynum with a scape or stylus extending posteriorly from the anterior rim; no lateral teeth at posterior corners of openings. Calilena
 97b. Tip of embolus not held by conductor, but contained in a large, thin, usually transparent fulcrum. Epigynum without stylus, but with a tooth at each postero-lateral corner of openings. Hololena
- 98a. Eyes in two rows, somewhat recurved. Tinus
 98b. Eyes in three rows. 99
- 99a. Apical segment of posterior spinnerets at least half as long as the basal segment. Lower margin of fang furrow usually with four teeth. The only web-building wolf spider in Arizona. Sosippus
 99b. Apical segment of posterior spinnerets very short. Lower margin of fang furrow with at most three teeth.

Appendix A (cont.)

- 100a. Distal pair of ventral spines of anterior tibiae never apical in position. Pirata
- 100b. Distal pair of ventral spines of anterior tibiae apical in position, sometimes small. 101
- 101a. Lower margin of fang furrow with two teeth. Tarentula
- 101b. Lower margin of fang furrow with three teeth. 102
- 102a. No true stout spine dorsally at base of fourth tibiae, replaced by a slender bristle. 103
- 102b. Fourth tibiae with stout spine at base. 104
- 103a. Carapace not glabrous, with a median light stripe surrounding a dark streak on each side in front of thoracic groove. No long slender dorsobasal bristle on tarsus I. Trochosa
- 103b. Carapace glabrous to hairy, without stripe described above. Tarsus I usually with a very long, fine, dorsobasal bristle. Arctosa
- 104a. Labium longer than wide, articular notches about 1/3 length of labium. Sides of face slanting. Metatarsus IV shorter than or equal to tibia plus patella IV. 105
- 104b. Labium wider than long, articular notches about 1/4 the length of labium. Sides of face vertical or nearly so. Metatarsus IV usually longer than tibia plus patella IV. Pardosa
- 105a. Cross-piece of epigynum divided at ends. Embolus of palpus elbowed. Schizocosa
- 105b. Cross-piece of epigynum undivided at ends. Embolus of palpus evenly curved. Lycosa
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Appendix A (cont.)

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- 111b. Tarsus plus metatarsus not longer than tibia plus patella except on legs I and II of some males. 113
- 112a. Abdomen triangular ovate, not narrowed to a blunt point in front. Venter with a median white longitudinal band. Metepeira
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- 113a. Abdomen with a caudal tubercle (reduced in males). Abdomen quite high above the spinnerets. Cyclosa
- 113b. Abdomen without caudal tubercle, sloping evenly downward to spinnerets. 114
- 114a. Small spiders with pronounced humeral tubercles on abdomen and a row of long fine spines on tarsus and metatarsus of legs I and II. Metellina
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Appendix A (cont.)

- 117a. Abdomen without humeral tubercles; white, yellow or pink with 3 or 4 pairs of black spots posteriorly. Epeira
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- 118a. Tibia of male palp without apophyses. Palp of female usually with a single tarsal claw. Tibia IV usually with two dorsal spines or bristles. 119
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- 119a. MOA with the sides practically parallel and the AME about equal in size to the PME. Abdomen chocolate brown with white or pinkish bands on sides or dorsum. Frontinella
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- 120a. Stridulating file on lateral surface of chelicerae conspicuous in both sexes. PME separated at most by hardly more than a diameter. Epigynum a long narrow straight-sided scape. Helophora
- 120b. Stridulating file inconspicuous and difficult to see. PME separated by at least one and a half times a diameter. Epigynum not as above. 121
- 121a. Abdomen with a brown herringbone central band. Epigynum with a short scape between two large openings. PME not particularly conspicuous. Pityohyphantes
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- 122a. Palpi of male long, with a large patellar process. Margin of carapace in both sexes with a series of small teeth. Erigone
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- 123a. Abdomen with at least small inframammillary or epigastric scuta. Reddish-orange spiders. Ceraticelus
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Appendix A (cont.)

- 124a. Head of male elevated, forming a peak or horn just behind the eyes. A light chevron pattern on a dark abdomen. Wubana
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- 125a. Anterior surface of male chelicerae with a spur. Epigynum of female trilobate. Eperigone
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Appendix B

A KEY TO THE SPECIES OF SCORPIONS OF THE TUCSON REGION

- 1a. With three lateral eyes on each anterior corner of carapace. 2
- 1b. With only two lateral eyes on each side. Body yellow with longitudinal dark brown or black stripes. Superstitionia donensis
- 2a. Tail segments with high lateral keels on the dorsal surface, so that the cross-section of the segment is a deep U-shape. Claws and tail stocky. No tooth at base of sting. 3
- 2b. Tail segments shallowly grooved dorsally or nearly smoothly oval in cross-section. 5
- 3a. No median keels on ventral surface of first caudal segment, their position merely indicated by black lines. Three parallel black lines extending the length of the tail ventrally. Vejovis spinigerus
- 3b. With at least a few tubercles of median keel present on ventral surface of first caudal segment. No black lines on ventral surface of tail. 4
- 4a. Color uniform pale yellowish, fingers long. Found at low elevations. Vejovis flavus
- 4b. Color yellowish brown, heavily mottled with dark brown. Fingers short. Low canyons to peaks. Vejovis vorhiesi
- 5a. Very large stocky scorpion with dark brown body, greenish legs and tail, no tooth at base of sting, hairy. Hadrurus hirsutus
- 5b. Smaller, very slender, pale yellowish to orange scorpions, sometimes with a double dorsal row of dark spots on body. A tooth at base of sting, conspicuous in small specimens, almost obsolete in large old ones. Centruroides sculpturatus

Appendix C

A KEY TO THE GENERA OF SUN SPIDERS OF ARIZONA

- 1a. Carapace truncate, anterior margin straight. Tarsi of first legs with one or two claws. Tarsi of second and third legs with a dorsal terminal spine. 2
- 1b. Propeltidium not truncate, anterior margin recurved. Tarsi of first legs with no claw. Tarsi of second and third legs without a dorsal terminal spine. Distal segment of posterior tarsi with two pairs of ventral spines. Ammotrechula
- 2a. One claw on first leg. 3
- 2b. Two claws on first leg. 5
- 3a. Fixed finger of chelicerae style-like. 4
- 3b. Fixed finger sculptured, not style-like. Eremothera
- 4a. Mesoventral groove of fixed finger extending to base of finger. Small to moderate-sized species. Eremobates
- 4b. Mesoventral groove of fixed finger not extending to base of finger. Large species. Eremorhax
- 5a. Dorsal bristles of flagellum simple and tubular. Therobates
- 5b. Dorsal bristles of flagellum plumose, striate, or otherwise modified. 6
- 6a. Fixed finger distinctly sinuate. Chanbria
- 6b. Fixed finger straight, or at most weakly curved or undulate. Hemerotrecha

Appendix D

GLOSSARY

Abridged from *Spiders of Connecticut* by Kaston, 1948

ALE: Anterior lateral eye or eyes.

AME: Anterior median eye or eyes.

Anal tubercle: The small projection at the end of the abdomen, above the spinnerets, and bearing the opening of the alimentary canal.

Anterior lateral eyes: Those eyes which are the more forwardly placed ones of the second somite, and appear at each end of the first row.

Anterior median eyes: The "direct" eyes. They develop on the first cephalic somite and are usually dark in those spiders having heterogeneous eyes. They are the two middle eyes of the first row.

Apophysis: Usually applied to a process (heavier than a spine) arising from one or more of the segments of the male palp, or on the legs.

Book lungs: Respiratory organs, one pair of which lies in the second abdominal somite, one lung on each side, the ventral wall covered by the epigastric plates, and opening by slits along the epigastric furrow. In some

Appendix D (cont.)

spiders another pair is present posterior to this first pair.

Calamistrum: In the cribellate spiders there is present a one or two rowed series of curved spines on the dorsal surface, or dorsal retrolateral edge, of metatarsus IV.

Carapace: The hard integument forming the dorsal wall of the cephalothorax, not including the appendages. It represents the fused tergites of the prosoma.

Cephalothorax: The prosoma, or anterior of the two major divisions into which the body of a spider is divided.

Cervical groove: The furrow or groove, which extends forward and laterad from the center of the cephalothorax, marking the boundary between head and thorax. It is sometimes indistinct or even lacking.

Chelicerae: The first pair of appendages of the head; used as jaws and consisting of a rather stout basal segment, or paturon, and a terminal claw, or fang which usually fits into a groove on the paturon.

Claw: There are always at least two at the distal end of the leg tarsi. If a third is present, it is median and ventral to the paired or superior ones, and usually smaller than them. In females the pedipalp may have a claw, or not.

Appendix D (cont.)

Claw tufts: The bunches of hairs at the tips of the tarsi in some dionychous spiders; (not to be confused with leg scopulae).

Clypeus: The space between the anterior eyes and the anterior edge of the carapace.

Colulus: A slender or pointed appendage somewhat simulating a diminutive spinneret immediately in front of the spinnerets of certain spiders.

Conductor: In the palpal organ of most spiders, a structure paralleling or associated with the embolus for all or part of its length.

Coxa: That segment of the pedipalp or legs which is nearest the body.

Cribellate: Referring to a spider possessing a cribellum and calamistrum.

Cribellum: A transverse plate in front of the spinnerets in certain families of spiders. It is the spinning organ from which issues the so-called hackled-band threads.

Diaxial: When the paturon of the chelicera projects more or less downward (as in the Labidognatha) and with the fangs so articulated as to be movable in a more or less transverse plane, it is spoken of as diaxial.

Appendix D (cont.)

- Dionychous:** Having two claws on the tarsi.
- Dorsum:** The upper side of the body; in particular, of the abdomen.
- Ecribellate:** Not provided with a cribellum or calamistrum.
- Embolus:** The intromittent portion of the male copulatory organ, containing the terminal portion of the ejaculatory duct.
- Endite:** One of the mouthparts, ventral to the mouth opening and lateral to the labium, so that in chewing it opposes the chelicera. It is not homologous with the maxillae of insects.
- Epigastric furrow:** A furrow separating the epigastrium from the more caudal portion of the abdomen on the ventral side. It marks the posterior limit of the second abdominal somite, at the edge of which are the lung slits and the gonopore. The latter is in the midline and in females is just behind the epigynal plate.
- Epigynum:** A sclerite associated with the gonopore of females, containing openings through which in copulation the sperm is passed into the spermathecae.
- Fang groove:** A groove or furrow at the distal end of the paturon, in which the fang fits when not in use.

Appendix D (cont.)

Fang of chelicera: The distal, smaller, segment of the chelicera articulating with the basal segment or paturon.

Folium: The dorsal aspect of the abdomen in many spiders is marked by an area with scalloped margins, which on account of its leaflike outline is termed the folium.

By extension, any type of regular pattern on the dorsum.

Labium: The sclerite on the ventral side of the cephalothorax between the endites and anterior to the sternum.

It forms the floor of what might be considered the mouth cavity.

Lateral eyes: Those eyes which are at the ends of the row in which they lie.

Laterigrade: A sideways type of locomotion, as in the crab spiders. Also the way the legs are turned so that the morphologically dorsal surface is posterior and the prolateral surface appears to be dorsal.

Lung slits: The openings at the posterior end of the book lungs. One pair is located along the epigastric furrow to the sides of the gonopore. If another pair of lungs is present the slits are posterior to the epigastric furrow.

Mandibles: An incorrect term for chelicerae.

Median eyes: The two middle eyes of each row.

Appendix D (cont.)

Median ocular area: The space limited by the four median eyes, including the eyes themselves.

Metatarsus: In the leg, the sixth segment counting from the nearest the body.

MOA: Median ocular area.

Ocular area: That part of the head over which the eyes are distributed.

Ocular quadrangle: The area included by all the eyes in the Salticidae.

Palp, palpus: Those segments of the pedipalp distal to the coxa (or endite).

Paracymbium: An accessory branch of the cymbium arising from near the proximal end of the latter, in the males of many of the web spiders.

Paraxial: When the paturon of the chelicera projects forward horizontally (as in the Orthognatha) and the fang is articulated so as to be movable in a plane more or less parallel to the median plane of the body, it is spoken of as paraxial.

Patella: The fourth segment of leg or pedipalp, counting from the proximal end.

Paturon: The basal segment of the chelicera to which the claw is articulated apically.

Appendix D (cont.)

Pectine: In scorpions, one of a pair of comb-like organs attached to the ventral surface of the second abdominal segment. Believed to be a sense organ.

Pedipalp: The second appendage of the cephalothorax, posterior to the chelicerae, but anterior to the legs.

PLE: Posterior lateral eye or eyes.

PME: Posterior median eye or eyes.

Postabdomen: The rearmost portion of the abdomen. In spiders it forms the anal tubercle, in scorpions the "tail".

Posterior lateral eyes: The eyes at the ends of the second row.

Posterior median eyes: The two middle eyes of the second row.

Procurved: An arc curved so that its ends are nearer than its center to the anterior end of the body. In the case of eye rows when the lateral eyes are farther forward than the medians.

Prolateral: The surface of a leg nearest the anterior end of the spider's body.

Promargin: That margin of the cheliceral fang furrow away from the endite (the so-called "upper" margin).

Recurved: An arc curved so that its ends are nearer than its center to the posterior end of the body. In the

Appendix D (cont.)

- Case of eyebrows** when the median eyes are farther forward than the laterals.
- Retrolateral:** The surface of a leg nearest the posterior end of the spider's body.
- Retromargin:** That margin of the cheliceral fang furrow nearer the endite (the so-called "lower" margin).
- Scopula:** A brush of hairs as on the promargin of the chelicera, the distal end of the endites, or on the lower surface of tarsus and metatarsus in some spiders. (The leg scopulae are not to be confused with claw tufts.)
- Scuta:** Sclerotized plates on the abdomen of certain spiders.
- Spine:** A cuticular appendage, considerably heavier than a bristle (but not as heavy as a spur).
- Spinnerets:** The appendages near the caudal end of the abdomen below the anal tubercle. There are three pairs, the anterior or ventral are lowermost, the posterior or dorsal uppermost, and the median (which are small and often hidden) between them.
- Spiracle:** Same as tracheal spiracle.
- Sternum:** The plate forming the ventral wall of the pars thoracica, lying between the coxae and posterior to the labium.

Appendix D (cont.)

Sting: The bulb-like terminal portion of the tail in a scorpion, with the long sharp spine attached to it.

It is believed to be a modified telson. The word sting is improperly used for the bite of a spider.

Tarsus: The last segment of the leg or palpus.

Thoracic groove: A depression, variously developed (sometimes lacking) on the outer surface of the carapace at about its center, where muscles are attached on the inner surface.

Tibia: Counting from the proximal end, the fifth segment of leg or pedipalp.

Tracheal spiracle: The opening of the tubular tracheae on the ventral surface of the abdomen.

Trichobothrium: A very fine hair of variable length arising from a hemispherical socket and extending out at right angles from the surface of the leg.

Trionychous: Having three claws on the tarsi.

Trochanter: Counting from the proximal end, the second segment in a leg or pedipalp.

Venter: The under side, particularly the lower surface of the abdomen.

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