


SPIDERS



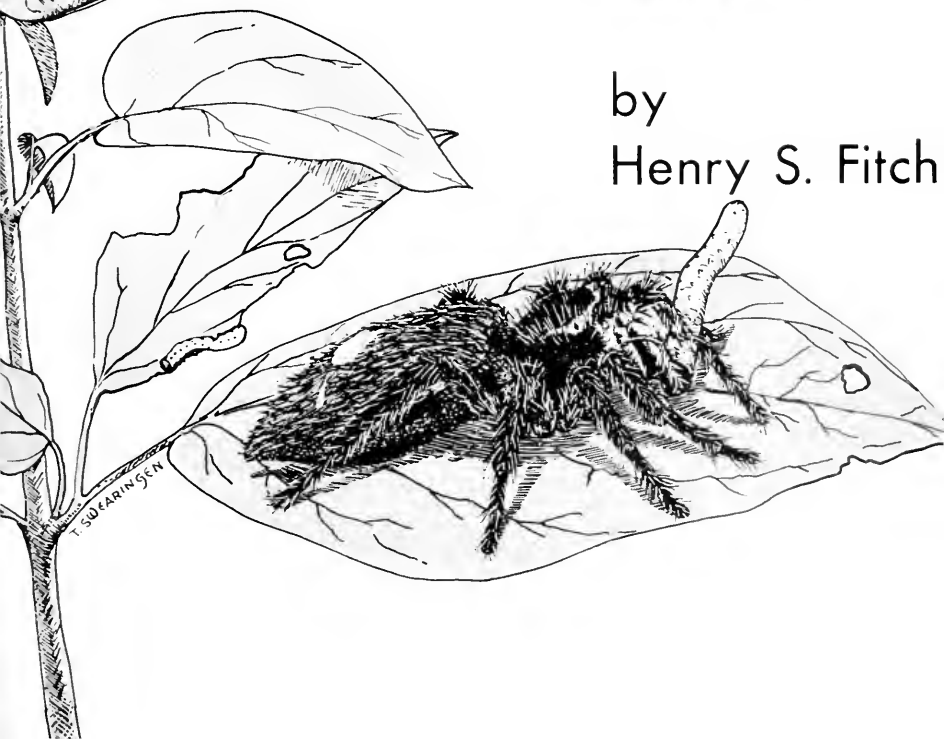
of The University of Kansas
Natural History Reservation
and Rockefeller Experimental Tract

MUS. COMP. ZOOL.
LIBRARY

OCT 28 1972

HARVARD
UNIVERSITY

by
Henry S. Fitch



Spiders of The University of Kansas
Natural History Reservation
and Rockefeller Experimental Tract

BY
HENRY S. FITCH

UNIVERSITY OF KANSAS
Lawrence • Kansas

UNIVERSITY OF KANSAS
MUSEUM OF NATURAL HISTORY

EDITOR: E. RAYMOND HALL

Miscellaneous Publication No. 33, pp. 1-202, 104 figs.
Published December 20, 1963

Lawrence • Kansas

PRINTED BY
JEAN M NEIBARGER, STATE PRINTER
TOPEKA, KANSAS

1963



29-8530

CONTENTS

	PAGE
INTRODUCTION	7
ACKNOWLEDGMENTS	8
METHODS	9
Scientific Names	10
Vernacular Names	10
Synonymies	10
Identifications	11
Ranges	11
Descriptions	12
HABITATS	12
MORPHOLOGY AND CLASSIFICATION	13
GLOSSARY OF TECHNICAL TERMS	14
DISTRIBUTION	16
ECONOMIC IMPORTANCE	18
KEY TO THE FAMILIES OF SPIDERS OCCURRING ON THE RESERVATION	19
ACCOUNTS OF FAMILIES, GENERA AND SPECIES	22
Family Atypidae	22
Genus <i>Atypus</i>	22
Family Ctenizidae	24
Genus <i>Ummidia</i>	24
Family Loxoscelidae	26
Genus <i>Loxosceles</i>	26
Family Pholcidae	28
Genus <i>Pholcus</i>	28
Genus <i>Psilochorus</i>	29
Genus <i>Spermophora</i>	30
Family Theridiidae	31
Genus <i>Achacaranea</i>	32
Genus <i>Crustulina</i>	34
Genus <i>Enoplognatha</i>	35
Genus <i>Euryopis</i>	36
Genus <i>Latrodectus</i>	36
Genus <i>Steatoda</i>	39
Genus <i>Sphyrrotinus</i>	41
Genus <i>Theridion</i>	42
Family Linyphiidae	43
Genus <i>Centromerus</i>	43
Genus <i>Frontinella</i>	44
Genus <i>Lepthyphantes</i>	45
Genus <i>Linyphia</i>	46
Genus <i>Meioneta</i>	47
Family Erigonidae	47
Genus <i>Ceraticelus</i>	49
Genus <i>Ceratinella</i>	49
Genus <i>Cornicularia</i>	50
Genus <i>Eperigone</i>	50
Genus <i>Erigone</i>	51

	PAGE
Genus <i>Origanates</i>	52
Genus <i>Scyllaceus</i>	53
Genus <i>Sisicus</i>	53
Genus <i>Souessoula</i>	54
Genus <i>Spirembolus</i>	54
Genus <i>Tapinocyba</i>	54
Family Argiopidae	55
Genus <i>Acacesia</i>	58
Genus <i>Acanthepeira</i>	59
Genus <i>Araucis</i>	60
Genus <i>Araniella</i>	62
Genus <i>Argiope</i>	62
Genus <i>Colphepeira</i>	66
Genus <i>Conarana</i>	67
Genus <i>Cyclosa</i>	68
Genus <i>Eustala</i>	68
Genus <i>Gea</i>	70
Genus <i>Leucauge</i>	71
Genus <i>Mangora</i>	72
Genus <i>Metepeira</i>	73
Genus <i>Micrathena</i>	74
Genus <i>Mimognatha</i>	78
Genus <i>Neoscona</i>	78
Genus <i>Singa</i>	81
Genus <i>Tetragnatha</i>	82
Genus <i>Verrucosa</i>	85
Family Mimetidae	86
Genus <i>Mimetus</i>	86
Family Agelenidae	87
Genus <i>Agelenopsis</i>	88
Genus <i>Cicurina</i>	92
Genus <i>Coras</i>	93
Genus <i>Tegenaria</i>	94
Family Pisauridae	95
Genus <i>Dapanus</i>	95
Genus <i>Dolomedes</i>	96
Genus <i>Pelopatis</i>	100
Family Lycosidae	101
Genus <i>Arctosa</i>	103
Genus <i>Geolycosa</i>	104
Genus <i>Lycosa</i>	105
Genus <i>Pardosa</i>	112
Genus <i>Pirata</i>	115
Genus <i>Schizocosa</i>	116
Family Oxyopidae	120
Genus <i>Oxyopes</i>	120
Family Gnaphosidae	122

	PAGE.
Genus <i>Callilepis</i>	123
Genus <i>Drassodes</i>	123
Genus <i>Drassyllus</i>	124
Genus <i>Haplodrassus</i>	126
Genus <i>Herpyllus</i>	126
Genus <i>Sergiolus</i>	127
Genus <i>Sosticus</i>	128
Genus <i>Zelotes</i>	129
Family Clubionidae	129
Genus <i>Castianeira</i>	131
Genus <i>Chiracanthium</i>	135
Genus <i>Clubiona</i>	136
Genus <i>Clubionoides</i>	137
Genus <i>Meriola</i>	137
Genus <i>Micaria</i>	138
Genus <i>Phrurotimpus</i>	139
Genus <i>Scotinella</i>	140
Genus <i>Trachela</i>	141
Family Anyphaenidae	142
Genus <i>Anyphaena</i>	142
Genus <i>Aysia</i>	143
Genus <i>Wulfilia</i>	144
Family Thomisidae	145
Genus <i>Coriarachne</i>	146
Genus <i>Misumena</i>	147
Genus <i>Misumenoides</i>	148
Genus <i>Misumenops</i>	149
Genus <i>Oxyptila</i>	150
Genus <i>Philodromus</i>	151
Genus <i>Synema</i>	154
Genus <i>Thanatus</i>	155
Genus <i>Tibellus</i>	155
Genus <i>Tmarus</i>	156
Genus <i>Xysticus</i>	157
Family Salticidae	162
Genus <i>Erarcha</i>	165
Genus <i>Gertschia</i>	165
Genus <i>Habrocestum</i>	166
Genus <i>Habronattus</i>	167
Genus <i>Hentzia</i>	169
Genus <i>Icius</i>	170
Genus <i>Maevia</i>	170
Genus <i>Marpissa</i>	171
Genus <i>Metacyrba</i>	173
Genus <i>Metaphidippus</i>	175
Genus <i>Myrmarachne</i>	176
Genus <i>Paraphidippus</i>	177
Genus <i>Peckhamia</i>	179

	PAGE
Genus <i>Phidippus</i>	180
Genus <i>Sassacus</i>	187
Genus <i>Thiodina</i>	188
Genus <i>Tutelina</i>	189
Genus <i>Zygoballus</i>	190
Family Dictynidae	191
Genus <i>Dictyna</i>	191
Family Uloboridae	193
Genus <i>Uloborus</i>	193
Family Amaurobiidae	194
Genus <i>Titanoeca</i>	194
DISCUSSION AND CONCLUSIONS	195
LITERATURE CITED	200

INTRODUCTION

Soon after field work was begun in 1948 on the newly established University of Kansas Natural History Reservation, spiders attracted special attention because of their conspicuousness and the abundance of individuals and of species. Further field work emphasized the important role of spiders in the area's ecology, and in 1952 I undertook a survey of the spider fauna.

On the Reservation, as in most terrestrial communities, spiders are the dominant predators to such an extent that most instances of predation witnessed by a casual observer involve them. The true abundance of spiders is seldom suspected by the public. Macfadyen (1957:131) after compiling information from various sources, arrived at figures in the range of 175 to 650 per square meter as typical of the population densities of spiders on and in natural soils. Mites, nematode worms, and certain groups of insects are more abundant, but most of these either average much smaller, or are vegetarians or scavengers. In view of the fact that all spiders are of the "consumer 2" class, or of higher trophic levels (making their living entirely as predators), they are extraordinarily numerous, and obviously are a highly successful group. In a study of the five-lined skink (*Eumeces fasciatus*), one of the most abundant vertebrate predators of the Reservation, it was found that spiders were a much more important component of the food than was any other comparable group of animals. Furthermore, spiders are important in the food of many other small vertebrate predators, including lizards of several species, frogs (notably the cricket frog, *Acris crepitans*), shrews, and birds such as the Carolina wren (*Thryothorus ludovicianus*).

Completion of my survey of the spiders on the Reservation and Rockefeller Tract has been long delayed because of my unfamiliarity with the group and preoccupation with other field work. In 1960 and 1961 higher priority was devoted to the study of spiders, and many of the species present were collected and identified for the first time. For a few of the commoner species, a considerable amount of ecological data has been accumulated, but for most little or no such information was obtained.

In the early years of field work collecting was limited to the 590-acre Reservation in the northeastern corner of Douglas County, but in 1957 field work was extended to include the newly acquired 160-acre Rockefeller Experimental Tract adjacent to the Reserva-

tion on the north in Jefferson County. Essentially, collecting and observing was limited to the western half of the Reservation section (exclusive of a 50-acre block of privately owned land in the southwest corner) and to the southern half of the Rockefeller Tract's quarter-section; the collection of 192 species thus represented a continuous block of no more than 350 acres.

Previously little attention has been devoted to the spider fauna of Kansas, or of nearby states, although lists, now much out of date, have been published for Nebraska (Worley and Pickwell, 1931) and Oklahoma (Banks, Newport and Bird, 1932). The spider fauna of the United States is known mostly from studies made in remote parts of the country, such as the northeastern states, the southeastern states, and the West Coast. Studies in the central states are therefore much needed.

The present study was undertaken primarily to attain a better understanding of the ecology of the Reservation, by determining the kinds of spiders present and their numbers, seasonal cycles, food relationships, and natural enemies. The information obtained will provide a basis for further ecological investigations on the same area, and probably will have its greatest usefulness in this role. However, it is hoped that the findings will be of some interest to araneologists also, and will help to clarify problems concerning the life histories and distributions of certain species.

ACKNOWLEDGMENTS

To Dr. Willis J. Gertsch of the American Museum of Natural History, special thanks are due for advice regarding nomenclatural problems, and for providing authoritative identifications of many of the species. Without his help this work would not have been completed. At various stages in the course of my work other araneologists also identified many specimens. To these authorities, Dr. Robert L. Gering, Mr. Wilton Ivie, Dr. Herbert W. Levi, Dr. T. B. Kurata, and Dr. M. H. Muma, who gave unstintingly of their time and effort to identify the specimens sent to them, I offer my most sincere thanks.

In the summer of 1960 Mr. Allen Brady was employed as a research assistant at the Reservation, and his work did much to forward the project. As Director of the Kansas State Biological Survey, Dr. E. R. Hall kindly made available funds needed for completion of certain phases of the project and offered encouragement and assistance in other ways. Dr. A. Byron Leonard gave me help and advice in photographing spiders. Several of my co-workers on the Reservation assisted in collecting specimens and data; Ben E. Kowing, Jr., A. Noel McFarland and Ellen Ordway deserve special mention. As a special student project George W. Silovsky made a collection of 40 species of spiders in the summer of 1959. Members of my family, especially my wife,

Virginia R. Fitch and my son, Chester W. Fitch, likewise added many specimens to the collections. My wife also helped by typing much of the manuscript, and by keeping several kinds of spiders in captivity to observe their feeding and reproduction. Dr. George W. Byers kindly made available for my study the spiders in the Snow Entomological Collections. Dr. Robert E. Beer contributed many minute spiders from the Reservation obtained from Berlese funnels in the course of collecting mites.

METHODS

Spiders were collected in the course of routine field work on the Reservation. I often carried a pair of glass vials, one empty and open, the other corked and half filled with alcohol. Spiders seen that were desired for the collection were caught by causing them to drop into the open vial, or by setting this vial over the spider and turning the vial as the spider tried to climb the side. The spider was then shaken into the second vial, containing alcohol. Many spiders were found when their webs in grass, trees or bushes, or on the ground attracted notice of the observer. Others were found when they were uncovered beneath rocks, logs, boards or strips of bark, often in the course of search for small vertebrates or other animals. Wandering kinds including many salticids, clubionids, gnaphosids and lycosids, were often seen running on the ground surface or on vegetation.

For the kinds of spiders living in open situations, as among grasses and weeds, sweeping vegetation with an insect net provided a particularly effective method of obtaining large numbers. Generally after a few dozen strokes the net contained, along with numerous insects, many spiders of several species; those desired were removed in vials and the remainder discarded. An almost equally effective method that was used in woodland involved use of a large enamel pan. Leaf litter was scooped up, placed in the pan, and shaken thoroughly, and then brushed out, or it was shaken on a coarse screen over the pan. Usually many spiders, especially the more minute kinds, were obtained from each sample.

Sprinkling the lawn, or other vegetation or soil near my residence was found to be an effective method for flushing out spiders, as those concealed in the soil or in low vegetation were disturbed by the water and many of them would climb up the white cement-block wall of the house, where they were easily seen and captured. Also, spiders were often found inside the house, running on the floors or climbing on the walls or ceiling. The bathtub and the kitchen sink were especially favored locations.

Often spiders were caught in traps of different kinds that were used primarily to catch small vertebrates. Cylindrical traps of quarter-inch mesh wire screen, with funnels at each end, caught many of the larger kinds of spiders, especially trap door spiders, purse web spiders and wolf spiders. Pitfalls made of gallon cans sunk in the ground with their tops open and flush with the ground surface, caught many of those kinds that are unable to climb smooth vertical surfaces.

The photographs were nearly all taken of spiders freshly killed with ethyl acetate. This usually caused them to die in a relaxed state. After killing, the spider was posed in what was judged to be a lifelike position and photographed on a glass plate against a black background. A few photographs

were taken of specimens long preserved in alcohol, but ordinarily such specimens were unsuitable for photographing because their legs were tightly folded and could not be extended without breakage. The drawings were made from preserved specimens; most of these had their legs contracted, and often they were shrivelled and mutilated to some extent. In such instances they were drawn not as they actually appeared, but as I judged they would have appeared, freshly killed and relaxed, in a lifelike position. Some of the drawings are composites based on more than one specimen. They are to be regarded as sketches showing the general aspect of the kind of spider shown, rather than being exact likenesses of individuals. Specimens of all species figured are preserved in the collection maintained at the Reservation.

SCIENTIFIC NAMES: Although no recent comprehensive check-list or catalog has been published for the spider fauna included in the area of my study, or any nearby territory, I have found the works of Bonnet (1945), Comstock (1948) and Kaston (1948, 1953) especially useful as an aid in determining the correct scientific names to use. Even for some common and widely distributed species there is lack of unanimity among araneologists as to the correct scientific names. This situation has arisen partly as a result of an important publication by Chamberlin and Ivie (1944) in which it was shown that many of the names then in use were antedated in early descriptions published by Walckenaer (1837, 1841). The latter author based his descriptions on manuscript drawings by John Abbot, an early collector and naturalist of the Georgia region. Since no type material other than the drawings exists, and since these drawings do not always show clearly the critical features that are now used to separate closely related species, there is room for difference of opinion in their interpretation. Dr. Willis J. Gertsch and Mr. Wilton Ivie kindly checked my preliminary list of species, and have advised me concerning needed emendations, which have been subsequently incorporated.

VERNACULAR NAMES: Most kinds of spiders are not sufficiently well known to the general public to have common names that are widely used. Some of the larger and more conspicuous spiders have numerous common names that are used locally, for example, "garden spider," "writing spider," "golden argiope" for *Argiope aurantia*. Conversely, the vernacular "house spider" is used for many different species of several families that inhabit man-made structures as commensals. It is perhaps unrealistic to suppose that vernacular names will ever come into general use for many kinds of spiders. However, these names probably have some usefulness, at least to those persons who have an aversion for scientific names. For a large number of the species here included, vernacular names have been used previously. I have used such names where possible, but for other species I have coined names, either as a free translation of the scientific name or to draw attention to some conspicuous feature of the spider itself or of its habits or habitat. For many of the species included no vernacular names are used.

SYNONYMS: For each species a brief synonymy has been included. The publications here cited include: that of the original description, that of the earliest use of the currently accepted name, and the earliest published mention of the species known to me based on material from Kansas. Actually, little has been published regarding the spiders of Kansas, except for a series of short papers by Theodore H. Scheffer (1904, 1905a, 1905b, 1906). Many American

spiders were originally described in French or German in several classic works that have been the foundation of modern araneology. In compiling these synonymies I have relied to a large extent on those previously published by Bonnet (1945), Petrunkevitch (1911), Kaston (1948), Chamberlin and Ivie (1944), Gertsch (1934, 1939, 1953, 1958), and Levi (1955, 1957a, 1957b, 1959), in some instances without having myself seen the original descriptions.

IDENTIFICATIONS: Specimens were referred to various araneologists for authoritative identifications. Early collections, made in 1948 and 1949 were checked by Dr. T. B. Kurata (TBK), of the Royal Ontario Museum, Canada. Dr. M. H. Muma (MiHM) formerly of the University of Nebraska, identified material collected in 1950. Dr. Robert L. Gering (RLG), formerly of Bethel College, Newton, Kansas, identified material collected in 1952 and 1953. Mr. Allen Brady (AB), graduate student in araneology at Harvard University, checked all material on hand at the Reservation in the summer of 1960; Dr. Herbert W. Levi (HWL) of the Museum of Comparative Zoology, Harvard University, identified all theridiids on hand in 1960. Dr. Willis J. Gertsch (WJG) of the American Museum of Natural History identified much material in 1960 and 1961, including an accumulated residue of problematical specimens. Through Dr. Gertsch, several of the difficult erigonids (a group shunned by most authorities), were forwarded to Mr. Wilton Ivie (WI) of Furlong, Pennsylvania, who provided authoritative determinations for all of them. Although lacking training in the field of arachnology, I have to the best of my ability verified the specific determinations submitted by these several authorities. In a few instances, where specific identities seemed clear cut and unequivocal, the identifications were made only by myself (HSF). In each species account under the heading "Identifications" the initials of one or more of these identifiers are listed. In many instances a species was identified by two or more authorities. In most such instances different specimens were submitted. The generic and specific names provided by the identifiers were sometimes not the same as the names used here. However, when clear cut synonyms were involved, no cognizance of the difference in names was incorporated in the list. In some instances the earlier identifications proved to be erroneous and were corrected by a later reviewer. In such cases only the corrected identification is here noted.

RANGES: The present records from northeastern Kansas constitute substantial extensions of the known ranges of many species. Geographic ranges can be stated with accuracy for relatively few species, since collecting over the country as a whole has been spotty. Excellent range maps showing specific localities of recorded occurrence have been published in a few recent revisions for species of such genera as *Achacarana*, *Theridion*, *Enoplognatha*, *Latrodectus*, *Steatoda* (Levi, 1955, 1957a, 1957b, 1959), *Xysticus*, *Oxyptila*, *Loxosceles* (Gertsch, 1953, 1958) but these are the exceptions. For other species I have had to rely chiefly on the compilations of Bonnet (1945 and 1955) or the more outdated work of Petrunkevitch (1911), and, of necessity, these have been accepted rather uncritically. Therefore for most species my statements of range are necessarily vague, as the records are obviously incomplete, and merely indicate the regions where collecting activity has been relatively concentrated. In many instances further collecting will show ranges to be more extensive than was supposed. In other instances ranges of species as

known at present will prove to be composites each based upon two or more closely related but distinct species.

DESCRIPTIONS: In most instances specimens that were recently collected (often not yet preserved) were used as a basis for descriptions. If many specimens were available, an adult of typical size and appearance was chosen, but for many of the less common species no more than one specimen or only a few specimens were available, and that material might not have been entirely typical. As the females are usually the larger and more conspicuous, and often have the distinctive traits of the species best developed, they were used as the basis for the description in the majority of instances. In species having marked sexual dimorphism, a briefer description of the opposite sex follows the main description. All descriptions are brief and non-technical. They are intended merely to indicate the size, coloration, and general appearance of the spider, and a few diagnostic characters which will aid in identification, especially if used in combination with the characters mentioned in the keys and those in the accounts of genera. The measurements are all recorded in millimeters. "Length" refers to the body. In some spiders it is the sum of the lengths of abdomen and carapace, but in many others it is less than the sum of those two parts because they overlap; the abdomen overhangs the rear of the carapace. In still other spiders the length exceeds the sum of the lengths of carapace and abdomen because there is included the stalk of the pedicel connecting them, or the anteriorly projecting chelicerae, or the posteriorly projecting spinnerets. The last measurement, that of "extended legs" is one that has not been employed by araneologists, but is thought to be useful in conveying an idea of the spider's size. In fact the layman, describing a spider, most often indicates size in terms of the diameter encompassed by the extended legs. The distance is usually that from the tip of the first leg to that of the tip of the fourth leg on the opposite side when both legs are extended full length and aligned with each other, or if one of the other legs is markedly longer than the first or fourth, it is used instead, but in similar fashion. In general, characters of the genitalia have been omitted from these accounts. Although they are useful for diagnosing species, characters of the genitalia are often difficult to observe, and ordinarily some familiarity with the group involved is necessary for their characters to be employed effectively in identifying species.

HABITATS

The habitats on the Reservation have been described in some detail by Fitch (1952:8-22, 1958:82-85, 1960:119-120), Fitch and McGregor (1956), Leonard and Goble (1952:1015-1016), Packard (1956:11-13) and others. Tall-grass prairie and deciduous woodland constitute the two major subdivisions. Seral stages, as represented in old pastures, formerly cultivated fields, corrals, old rock quarry, and artificial pond provide a spectrum of habitat gradations. At any one place there are numerous microhabitats; there is stratification at different levels, especially where there is tall vegetation. In woodland for instance, there are certain burrow-

ing spiders (*Atypus*, *Zelotes*) that spend much of their time underground; many others (*Micaria*, *Castianeria*) are found chiefly in leaf litter; others stay beneath rocks (*Coras*) or on rocks (*Habrocestum*); some wander about on the surface of the ground (*Lycosa*, *Pirata*), some make webs in low vegetation near ground level (*Mangora* sp., *Micrathena sagittata*), some live in bushes (*Anyphaena*), or on tree trunks (*Philodromus*, *Marpissa*) or in hollow logs (*Steatoda*); others live on outer branches and twigs (*Tmarus*), and still others are arboreal, stretching their webs high in the foliage of a tree or between trees. In such a complex community there are many ecological niches and even closely related kinds may not compete much with each other.

MORPHOLOGY AND CLASSIFICATION

The spiders comprise an order, Araneae, within the phylum Arthropoda, which includes a great majority of the species of living animals, and of the Class Arachnida, which includes also, the ticks, mites, scorpions, harvestmen (daddy-long-legs) and other less familiar groups. The characteristic features of the true spiders, distinguishing them from other arthropods and particularly from other arachnids, are as follows: The head and thorax are fused into one continuous piece, the cephalothorax, with a hard dorsal carapace; the abdomen is saclike and at its anterior end is joined to the cephalothorax by a slender pedicel. There is usually no trace of segmentation externally; there are typically four pairs of eyes in two rows, but one or more pairs may be lost, and the rows may be so curved that the original alignment is obscured. The first pair of appendages are the chelicerae, jawlike organs, each with two segments, a stout basal portion housing a poison gland or at least the anterior end of it, and a distal portion, the hollow poison fang. The fang folds inward, like the blade of pocketknife, into a groove in the large basal segment of the chelicera. In many spiders both the promargin and the retromargin of this groove are armed with spiny tubercles, called teeth. The second pair of appendages are the pedipalps; these have six segments, of which the most distal is (in the male) expanded and specialized for the storing of sperm, and as an intromittent organ for copulation. The external genitalia of the female are on the ventral aspect of the abdomen.

The basal segment of each pedipalp forms the endite, an enlarged flattened platelike structure developed as an accessory mouth part. The pedipalps have sensory, grasping, and crushing functions. There are four pairs of legs attached to the cephalothorax, each leg with seven segments. Placed terminally or subterminally on the abdomen are two to four pairs of short appendages, the spinnerets, from which silk of the web originates, in part, but there may be also a sieve-like plate anterior to the spinnerets, from which there issues silk of a different type from that which the spinnerets give forth.

Since the early part of the last century araneologists have striven to construct a natural classification of the spiders. An early classification based on type of web constructed, and upon superficial external resemblances has been greatly altered and revised, but as yet complete agreement has not been

reached concerning the divisions into higher categories and the characters that define them. Petrunkevitch (1933, 1952) has emphasized the significance of characters of internal morphology, which are less readily altered by changing environmental factors in the course of their evolution, and are less liable to show resemblances that are due to convergence and to obscure true relationships. Such characters are the number and arrangement of cardiac ostia, of book lungs and of tracheae and spiracles. External characters commonly used in defining groups of family rank or above are: the mode of articulation of the chelicerae; the arrangement of the eye rows; the presence or absence of a cribellum (seivelike spinning plate producing a special type of silk) and calamistrum (row of curved spines on the terminal segments of the last pair of legs, used in directing the silk from the cribellum); the number of terminal claws on the tarsus; the presence of a brush of stiff hairs, or scopula, on the tarsus; the presence of trichobothria (sensory hairs); and the external genitalia. The type of web, the type of cocoon in which the eggs are enclosed, and the treatment accorded it by the female, the type of courtship and the position assumed in mating also afford important characters that serve in classification. Characters that are useful chiefly at the generic and specific level are: relative sizes of eyes and the details of their arrangement; relative lengths of the legs and of their separate segments; bodily proportions; and structure of genitalia.

The genitalia in almost every instance show differences between closely related species, but the differences often are slight and cannot be clearly explained without resort to figures. Often special treatment is necessary to reveal characters of the genitalia; the male palpus may need to be expanded and the female epigynum may need to be cleared. The characters of the genitalia have been given so much emphasis that immature specimens often cannot be identified, and even adult specimens need to be partly dissected in order to obtain the information needed. For identification in ecological studies this is a serious disadvantage. It would seem that characters of the genitalia have been overemphasized, since in every instance species are recognizably different in other respects, especially when seen alive. In the present report references to structures of the genitalia have been kept to a minimum, and an attempt has been made to substitute insofar as possible, other characters more readily observed and recognized. It is hoped that as a result the report will be more useful to those workers who have had little previous experience with spiders.

In the following accounts the key to the families, and the separate keys to the species of various families are, to a large extent, based upon keys published by Kaston (1948, 1953) and represent simplified versions of these.

GLOSSARY OF TECHNICAL TERMS

Abdomen.—The more posterior of the two major subdivisions of the body.

Anal tubercle.—Tubercle on which the anal orifice is situated.

Apophysis.—A process heavier than a spine.

Boss.—A smooth prominence on the lateral angle of the base of the chelicera.

Bristle.—A long slender extension of the cuticle.

Calamistrum.—A series of curved bristles on the dorsal surface of the metatarsus of the fourth leg in some spiders.

Carapace.—The dorsal wall of the cephalothorax.

Cardiac area.—A dorsal area on the abdomen, overlying the heart.

- Carina.**—A keel, as occurring on the clypeus or chelicerae of certain spiders.
- Cephalothorax.**—The combined head and thorax; the more anterior of the two main divisions of the body.
- Cervical groove.**—A groove separating the cephalic and thoracic parts of the cephalothorax.
- Chelicerae.**—The first pair of appendages, serving as jaws.
- Clypeus.**—The part of the cephalothorax situated between the anterior row of eyes and the edge of the carapace.
- Colulus.**—A short median appendage immediately anterior to the spinnerets in some spiders.
- Coxa.**—The proximal or first segment of a leg or pedipalp.
- Cribellum.**—A platelike spinning organ anterior to the spinnerets in some spiders.
- Cymbium.**—A concavity on the tarsus of the male palp, expanded to house the copulatory organ.
- Dionychous.**—Having two claws at the tip of each tarsus (Fig. 5a).
- Dorsal furrow.**—A median groove or furrow on the carapace, often pigmented.
- Ecribellate.**—Lacking a cribellum.
- Embolus.**—A slender attenuate extension of the male genitalia through which sperm pass to the female in copulation.
- Endite.**—A platelike lateral mouthpart formed by an extension of the basal segment of a pedipalp; the maxilla.
- Epigastric furrow.**—A transverse groove on the ventral aspect of the abdomen.
- Epigynum.**—The sclerotized external genitalia of the female, on the midventral surface of the abdomen.
- Fang.**—The distal segment of the chelicera, developed for piercing the body of the prey and conducting venom into it.
- Femur.**—The third segment of a leg or pedipalp; it is longer than the first two segments combined, and longer than the fourth segment.
- Folium.**—A leaflike dark marking on the dorsum of the abdomen.
- Labium.**—A flattened midventral mouthpart, lying between the endites of the pedipalps.
- Lamella.**—A triangular plate on the promargin of the cheliceral fang furrow.
- Lamina.**—A flattened platelike structure such as occurs on the margins of the cheliceral fang furrows in some spiders.
- Lorum.**—The plates on the dorsal side of the pedicel.
- Median ocular area.**—The area enclosed by the median eyes of the anterior and posterior rows.
- Metatarsus.**—The sixth (counting from the base outward) or next to last segment of a leg.
- Ocular quadrangle.**—Area enclosed by the eyes.
- Orb.**—A web consisting of circular strands and radii, in one plane.
- Palp.**—The pedipalp, exclusive of its basal segment.
- Paracymbium.**—An accessory branch of the cymbium arising from the proximal part of the cymbium in some spiders.
- Pars pendula.**—A membranous structure of the male genitalia, containing the ejaculatory duct, and mostly lying within a groove of the embolus.
- Patella.**—The fourth, or middle, segment of a leg.
- Pedicel.**—The slender stalk connecting the abdomen and cephalothorax.
- Pedipalp.**—The second pair of appendages (behind the chelicerae but anterior to the legs) serving a tactile function and also housing the genitalia of the male.
- Procurved.**—Referring to a row of eyes in which the lateral pair are placed farther anteriorly than the median pair.

Rastellum.—A series of spurs or teeth forming a rakelike organ that is used for digging.

Recurved.—Referring to a row of eyes in which the lateral pair is farther posterior than the medial pair.

Scopula.—A brush of stiff hairs on the underside of the tarsus and metatarsus.

Scutum.—A sclerotized plate on the abdomen.

Spinneret.—One of several short appendages near the posterior end of the abdomen (Fig. 3).

Spiracle.—An opening of the trachea on the ventral surface of the abdomen.

Spur.—A heavy, spinelike cuticular process.

Stabilimentum.—A heavy band of silk in the webs of some spiders.

Sternum.—The central area on the ventral surface surrounded by the legs.

Stridulating organs.—A heavily sclerotized area with numerous parallel ridges.

Sustentaculum.—A heavy curved spine on the ventral surface of the tarsus of the fourth leg.

Tarsus.—The distal segment of a leg or palp.

Thorax.—The portion of the cephalothorax posterior to the head region.

Tibia.—The fifth segment of a leg or pedipalp.

Trichobothrium.—A fine, hairlike structure extending at right angles from the surface of a leg, and based in a socket.

Trionychous.—Having three claws at the tip of the tarsus (Fig. 5b).

Trochanter.—The second segment of a leg or pedipalp.

Truncus.—The hard portion of the embolus.

Tubercle.—A low, rounded process.

Venter.—Underside of the abdomen.

DISTRIBUTION

Geographic ranges of spiders are in general poorly known. Collecting has been spotty and large areas of the United States have not been sampled at all for their spider faunas. In many instances closely related kinds have not yet been distinguished. Spiders are an ancient group. The fossil record is understandably poor for such small and delicate terrestrial animals; but the Oligocene Baltic ambers contain spiders of genera still living (Petrunkévitch, 1946). It is therefore not surprising that some species, having survived great changes in climate, have discontinuous ranges with relict distributions. However, the original ranges of certain species of spiders are now greatly altered and in many instances extended, as a result of man's activities. Artificial, unintentional, and usually unrecorded introductions into new areas have long been occurring, and in recent years the rate has been greatly accelerated. An egg sac on a nursery plant, a piece of lumber, a shipping crate or an article of household furniture may be transported hundreds or thousands of miles by rail, plane or ship, and may give rise to a new colony at a locality remote from the former range of the species. Even without man's aid individual spiders may cover



FIG. 1. Map showing extent of the Deciduous Forest Formation in eastern North America. Many species of spiders have geographic ranges that correspond more or less with this biotic formation. Arrow shows location of The University of Kansas Natural History Reservation and the Rockefeller Experimental Tract.

enormous distances in their natural dispersal by "ballooning." This occurs in the young of many species, and in the adults of some of the smaller kinds. The spider climbs to an elevated perch and spins a long strand of "gossamer" which trails in the wind. Eventually the spider casts off from its perch, and with the still attached strand of gossamer acting as a parachute, it floats to a new spot, or, if it

happens to be caught by rising air currents, it may be carried far above the ground, and may drift for a long time. For an animal that is able to cover long distances so easily, air-borne, geographic range does not have the same significance as for earth-bound terrestrial animals which must travel on foot, and individually, are unable to cross such barriers as rivers, lakes, mountain ranges, or deserts.

Judging from scattered records, many species of spiders occur throughout much of North America wherever their habitat is present. Other species are widely distributed, both in the Americas and in Eurasia. Nevertheless significant patterns of distribution emerge when geographic ranges are studied in detail. Many species of spiders have been recorded chiefly or entirely within the Eastern United States in an area that under original conditions was dominated by deciduous forests. This Deciduous Forest Formation (Braun, 1950) or "Oak-Wild Turkey Biome" (Shelford, 1945), extended from the Gulf of Mexico to northern New England and the Great Lakes, and from the Atlantic Ocean west into the eastern parts of Kansas, Oklahoma, and Texas (see Fig. 1). Many species of plants and animals are limited to this biotic formation, and are more or less coextensive with it. This statement probably applies to spiders, especially to those that are forest dwellers. Therefore, I have in some instances defined ranges in terms of the Deciduous Forest Formation for the sake of brevity, even when records are few, provided the records are sufficiently scattered to suggest occurrence throughout the length and breadth of the Deciduous Forest Formation. The area of my study is near the western edge of the original forests, although a narrow band of forest extended some 80 miles farther west along the flood plain of the Kansas River.

In the statements of range made herein, "The United States" refers to the geographically continuous area of the 48 states existing before 1960—exclusive of Alaska and Hawaii.

ECONOMIC IMPORTANCE

All spiders are predators, and they destroy other animal life in enormous quantity. Among our local kinds some of the largest may, rarely, prey upon small vertebrates such as newly metamorphosed amphibians, or the hatchlings of small lizards or snakes. However, by and large, other arthropods, especially insects, make up the food. Spiders are potential predators on nearly all kinds

of insects. In some instances the prey is several times the bulk of the spider itself, although more typically the victim is smaller than the spider that catches it. Because, at any given time, there are spiders on almost every square foot, constantly seeking out and destroying insect prey during the warm part of the year, their effect on insect populations is important. Without them, outbreaks of insect pests would certainly be both more frequent and more severe. Most spiders are not specialized in their feeding to the degree that they must depend on one or a few kinds of insects, but on the contrary they take various kinds, somewhat in proportion to their abundance and availability, over a fairly wide size range. Grasshoppers, katydids, flies, moths, leafhoppers, caterpillars and ants all are groups abundant in species and individuals, which constitute major food sources for various kinds of spiders. In both forest and prairie these groups include some of the more important herbivores which in part determine the aspect of the biotic community. On croplands where spiders are abundant, they are usually preying to a large extent on agricultural pests.

On the negative side of the ledger, spiders are themselves pests where they make webs on or within buildings, or where the dangerously venomous kinds, such as the black widow and brown spider, constitute a hazard to humans. On occasion, pest control companies are called upon to deal with these kinds of spiders on private premises, with resultant expense and inconvenience, and sometimes without wholly satisfactory results. Both species inflict bites. The bites rarely result in death, but may cause severe pain and/or prolonged illness.

KEY TO THE FAMILIES OF SPIDERS OCCURRING ON THE RESERVATION

1. Chelicerae paraxial—projecting anteriorly, with fangs articulating in a plane more or less parallel to median plane of body ("tarantulas") 2
- 1'. Chelicerae diaxial—projecting downward from anterior end of body, with fangs articulating in a more or less transverse plane.
(typical spiders) 3
2. Chelicerae each bearing a rastellum; thoracic groove transverse and procurved; "trap-door spiders" living in tubular burrows lined with web and capped with hinged stopper Ctenizidae, p. 24
- 2'. Chelicerae lacking a rastellum; thoracic groove a deep transverse pit; "purse-web spiders" living in tubular webs that are partly below ground and partly above Atypidae, p. 22
3. Cribellum and calamistrum present 4
- 3'. Cribellum and calamistrum absent 6
4. Eyes all light; tarsi with a dorsal row of trichobothria,
Amaurobiidae, p. 194

4. Eyes all dark, or if some are light, the anterior medians at least are dark 5
5. Eyes homogeneous, all dark, both rows recurved Uloboridae, p. 193
- 5'. Eyes heterogeneous, anterior medians dark, the remainder light; anterior row straight Dictynidae, p. 191
6. Eyes six, all white, in three diads (Fig. 8) Loxoscelidae, p. 26
- 6'. Eyes normally eight (rarely only six, in two triads) 7
7. Spiracle lacking; labium broader than long; legs extremely long and threadlike as in a harvestman; anterior median eyes minute or absent, remaining six eyes in two triads Pholcidae, p. 28
- 7'. Spiracle present; labium longer than broad; legs usually not extremely long nor threadlike; eyes eight, not arranged in triads 8
8. Tracheal spiracle placed far forward—at least one-third of distance from spinnerets to anterior end of abdomen (Fig. 2a).
Anyphaenidae, p. 142

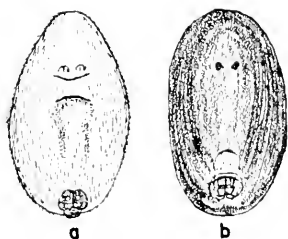


FIG. 2. Ventral aspects of abdomens of *Aysha gracilis* (an anyphaenid) and *Castianeira descripta* (a clubionid) showing difference in position of tracheal spiracle. Both are females; anterior ends are uppermost; $\times 5$.

- 8'. Tracheal spiracle placed far back on abdomen, adjacent to spinnerets (Fig. 2b) 9
9. Eyes in three distinct rows, namely a front row of four, directed anteriorly, with the median pair greatly enlarged; a second row of two relatively small eyes on the dorsal surface of the carapace, and a third row consisting of two eyes of intermediate size farther posteriorly on top of the carapace Salticidae, p. 162
- 9'. Eyes not arranged as described above 10
10. Metatarsi and tibiae of first two pairs of legs with prolateral row of long spines, and with row of shorter spines in intervening spaces; these shorter spines gradually increase in length from proximal to distal part of the segment, and are curved near their ends.
Mimetidae, p. 86
- 10'. Metatarsi and tibiae lacking arrangement of spines described above. 11



FIG. 3. Ventral aspects of abdomens of (a) *Herpyllus vasifer* (a gnaphosid) and (b) *Micaria longipes* (a clubionid), showing anterior spinnerets well separated in the former, and nearly contiguous in the latter. Both are females, anterior ends are uppermost; approximately $\times 7$.

11. First two pairs of legs large and powerful, laterigrade; body flattened in a horizontal plane Thomisidae, p. 145

- 11'. Legs normal (prograde); body not especially flattened 12
 12. Two claws and a claw-tuft borne on each tarsus (Fig. 5a) 13
 12'. Three claws borne on each tarsus; claw tufts absent (Fig. 5b) 14
 13. Anterior spinnerets well separated; eyes heterogeneous, only the anterior median pair dark (Fig. 3a) Gnaphosidae, p. 122
 13'. Anterior spinnerets contiguous or nearly so, eyes homogeneous (Fig. 3b) Clubionidae, p. 129
 14. Clypeus high; anterior median eyes relatively small, the remaining six eyes arranged to form a uniform hexagonal pattern; legs with prominent spines projecting; abdomen pointed behind (Figs. 4a and 52).
 Oxyopidae, p. 120

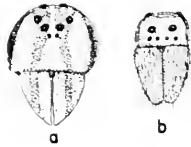


FIG. 4. Faces of adult females of (a) *Oxyopes scalaris* (an oxyopid) and (b) *Lycosa gulosa* (a lycosid), showing high clypeus in the former, and relatively large posterior median eyes in the latter; both from anterior view, approximately $\times 5$.

- 14'. Clypeus relatively low; eyes not in a hexagonal pattern; legs lacking projecting spines, abdomen not noticeably pointed behind (Fig. 4b) 15
 15. Tarsus of fourth leg bearing a comb-like series of six to ten serrated bristles (Fig. 5c) Theridiidae, p. 31

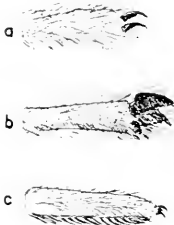


FIG. 5. Tarsi of fourth left legs from lateral views of adult females of (a) *Aysha gracilis* (an anyphaenid) $\times 30$; (b) *Dapanus mirus* (a pisaurid) $\times 10$; and (c) *Latrodectus curacaviensis* (a theridiid) $\times 10$, showing two-clawed condition and claw-tufts in *Aysha*, three-clawed condition and lack of claw-tufts in *Dapanus*, and series of serrated bristles in *Latrodectus*.

- 15'. Tarsus of fourth leg lacking serrated bristles (Figs. 5a and 5b) 16
 16. Tarsi bearing trichobothria 17
 16'. Tarsi lacking trichobothria 19
 17. Tarsi each with a single row of trichobothria; trochanters not notched.
 Agelenidae, p. 87
 17'. Tarsi each with two rows of trichobothria; trochanters each bearing a curved notch on distal edge of ventral side 18
 18. Posterior median eyes much larger than others, and far ahead of posterior laterals (Fig. 4b) Lycosidae, p. 101
 18'. Posterior median eyes enlarged little or none and only a little ahead of posterior laterals Pisauridae, p. 95
 19. Clypeus lower than height of median ocular area; eyes homogeneous.
 Argiopidae, p. 55
 19'. Clypeus higher than height of median ocular area; eyes heterogeneous 20

20. Tibia of fourth leg bearing two dorsal spines or bristles; small to medium-sized spiders, usually more than 2 mm. in length. Linyphiidae, p. 43
- 20'. Tibia of fourth leg bearing a single dorsal spine or none; minute spiders usually less than 2 mm. in length Erigonidae, p. 47

ACCOUNTS OF FAMILIES, GENERA AND SPECIES

Family ATYPIDAE Bertkau

Purse-web Spiders

These medium-sized spiders are orthognathous. The chelicerae are paraxial, much enlarged and projecting forward horizontally from the body, the fangs are articulated so as to move in a plane almost parallel to the median plane of the body. The body is robust; the legs are relatively short and powerful. There are eight eyes of which only the anterior median are diurnal. There are three pairs of spinnerets; the anal tubercle is situated well above the posterior pair. The "purse web" consists of a silken tube in which the spider lives, and which extends several inches underground at one end, and several inches up a tree trunk or similar object at the other end. The spider obtains its prey by rushing to the point of disturbance when any insect comes in contact with the tube, and biting through it to seize the victim. When subdued, the prey is pulled inside through a slit in the tube.

Genus *Atypus* Latreille

The labium is fused to the sternum with no trace of a suture; the sternum bears four pairs of sigillae—impressed clear areas—of which the fourth pair is much the largest. The hind spinnerets are three- or four-jointed, much larger than the others. The genus occurs in Europe as well as in North America.

Atypus niger Emerton

Black Purse-web Spider

Atypus niger Emerton, 1913, Bull. Amer. Mus. Nat. Hist., vol. 32, p. 259.

Identification.—WJG.

Range.—Eastern United States.

Description.—Male, length 11, carapace 4.0, abdomen 5.0 (chelicerae protrude 2.0 at anterior end of body), extended legs 29. Resembles next species but slightly smaller and differently colored; body black; legs chocolate brown.

Habitat and Habits.—All spiders of this kind that were seen were near woodland edge, chiefly near the Reservation headquarters, and at the old rock wall at the south edge of the former quarry site. At this latter location several were caught in pitfall traps. Several old tubular webs attached to the rocks at the base of this wall may have been made by these spiders, but only wandering adult males were seen. Throughout much of its extensive range the species is known only from such wandering adult males according to Dr. W. J.

Gertsch. The purse webs and especially the adult females, are rarely found by collectors.

Atypus sp.

Red-legged Purse-web Spider

Identification.—WJG.

Range.—This species, still unnamed, is known from eastern Texas as well as from northeastern Kansas, according to Dr. W. J. Gertsch.

Description.—Male, length 13, cephalothorax 4.0, abdomen 5.0, chelicerae protrude 2.8 at anterior end of body, extended legs 30. Black on body, coxae, trochanters, and proximal two-thirds of femora; distal ends of femora, patellae, tibiae, metatarsi and tarsi carmine; cephalic area raised and prominent, thoracic area depressed and flattened; one-third of distance from posterior end of the carapace to anterior end is large pit-like depression, wider than long; two shallower depressions along cervical groove on each side; surface of the carapace roughened; legs subequal, moderately short; abdomen oval, with sparse pale pubescence (see Fig. 6).



FIG. 6. *Atypus* sp., female $\times 1\frac{1}{2}$.

Habitat and Habits.—With one exception these large, brightly colored spiders have been observed only in late May and June, and were adult males. All were wandering individuals, which presumably had left their webs in search of mates. All

but one were within 100 feet of the Reservation headquarters, or on the road between there and the entrance gate. The remaining one was in a sumac thicket on the north edge of the Reservation.

When a purse web spider was confined in a jar, open on top, in the laboratory, a jumping spider (*Phidippus variegatus*) that had been climbing on the window sill, approached, climbed down the vertical side of the jar, and pounced upon the other, quickly killing it, although the two were of similar size. The superiority of the jumping spider in acuity of senses, rapidity of movement, and climbing ability was striking and emphasized the unfitness of *Atypus* for life in the open. Mortality must be extremely high in

the adult males when they desert their tubular shelters and wander in exposed situations.

In July, 1961, a purse web occupied by an adult female was found in dense woods of oak, hickory, elm and ash on the upper slope of a north facing hillside. The tube was approximately nine inches long, and the greater part of its length was underground. The female differed from males in her markedly larger size, chunkier build, paler coloration, and lack of red on the legs. She was kept alive for several weeks in a large glass jar filled to a depth of six inches with damp soil, and in this she soon excavated a nearly vertical burrow lined with the tubular web, projecting perhaps three inches above the surface of the soil.

Family CTENIZIDAE Thorell

Trap-door Spiders

These medium-large spiders are orthognathous—belonging to the group of relatively primitive and often giant-sized spiders which, in the United States, are popularly known as tarantulas. The chelicerae are paraxial, enlarged and projecting forward horizontally from the body, the fangs articulated so as to move in a plane almost parallel to the median plane of the body, and there is a well-developed rastellum. Trap-door spiders are dark colored or black, having smooth shiny legs. There is a prominent, strongly recurved transverse thoracic groove. These spiders live in tubular burrows that are lined with silk. The trap door capping the burrow is hinged on one side by silk strands, and has incorporated material from the soil surface, causing it to be well camouflaged. Except for the adult males in the breeding season, trap-door spiders rarely leave their burrows.

Genus *Ummidia* Thorell

Trap-door spiders of this genus have a deep depression on the basal part of the upper surface of the tibia of the third leg and a narrow membranous area on each side of the depression. Members of the genus are found in southern Europe, North Africa and the United States.

Ummidia sp.

Kansas Trap-door Spider

Identification.—WJG.

Range.—Known only from the University of Kansas Natural History Reservation.

Description.—Male, length 10.7, carapace 4.7, abdomen 4.2, chelicerae project anteriorly from carapace 1.8, extended legs 33. Carapace flattened, but with ocular area raised, dark brown, almost black, its surface of coarse granular texture; first row of eyes markedly procurved, with four eyes, black, subequal, and uniformly spaced; eyes of posterior row slightly smaller, placed

in nearly straight line, with medials white, separated by nearly three times their own diameters, but almost in contact with laterals, which are directed posterolaterally; chelicerae coated with short, reddish hairs distally, dark brown, slightly paler than carapace; slightly rugose; abdomen dark grayish brown, less bulky than cephalothorax, its surface showing fine wrinkles and sparse hairs; legs reddish brown; glabrous, with sparse hairs ventrally and with numerous short hairs and spines on metatarsi and tarsi (see Fig. 7).

Female, length 20, abdomen 11. Carapace glabrous, shiny, dark amber, abdomen dark gray with fine pale pubescence, and with integument slightly wrinkled and rugose; cephalic region and chelicerae black; sternum amber; legs relatively short with metatarsi and tarsi thick and powerful, studded with short spines; legs shiny like carapace, with whitish integument noticeable at joints.

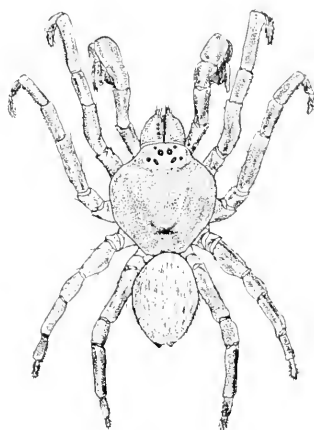


FIG. 7. *Ummidia* sp., male,
× 3.

Habitat and Habits.—No burrows of trap-door spiders have been found on the Reservation. On July 1, 1952, two adult males were caught in pitfall traps at stations 200 yards apart. Another was caught on July 4. A fourth was uncovered beneath a flat rock, at a hilltop limestone ledge on July 9. All were in woodland edge situations. One site was in a large rock pile near a pond. Another was at the base of an old rock wall near an abandoned quarry. The finding of four adult males away from their burrows in early July suggests that this time of year is the breeding season. Males perhaps wander in search of mates at night and seek any available shelter to hide by day. The one female seen in 13 years of field work was caught in a wire funnel trap in a bottomland field of brome grass, in May, 1960. Before being preserved this spider was kept alive till October, in a pint jar two-thirds full of soil. She excavated a trap-door burrow, and kept out of sight underground. Moths and other insects were offered frequently. The spider would emerge from her burrow to seize them only under cover of darkness. An insect captured would be kept in the burrow for several days, then its discarded remains would be cast out. The trap door capping this spider's burrow blended so well with the surrounding soil that it might have been overlooked, and it is obvious that a population of these spiders might remain undetected, even if they were fairly abundant.

Family LOXOSCELIDAE Gertsch
Venomous Six-eyed Spiders

These are medium-sized, dionychous spiders. There are six pearly white eyes in three diads, the median diad a little in advance of the two lateral diads. The chelicerae are fused at their bases; the labium is fused with the sternum. The body is somewhat depressed. There is a conspicuous longitudinal thoracic furrow. The legs are slender, long, and tapered. The coloration is predominantly pale, light brown, yellowish or whitish. These spiders spend much time in the silken sacs that they spin. Also, they construct weak irregular webs forming a sheet over the surface of objects where they stay, but they seem to wander extensively and catch their prey by stalking. Only in recent years has the capacity of these spiders to inflict a dangerously venomous bite been recognized.

Genus *Loxosceles* Heineken and Lowe

The members of this genus are medium-sized, pale yellowish brown spiders that lack conspicuous markings. The body is flattened, in correlation with the secretive habits and the tendency to hide in cracks or crevices. The spiders are of somewhat gregarious habits, and are found in caves, beneath rocks, in piles of boards or debris, in decaying logs, or in or about buildings. The genus is represented in Europe, Africa, North America and South America.

Loxosceles reclusa Gertsch and Mulaik

Brown Spider

Loxosceles reclusa Gertsch and Mulaik, 1940, Bull. Amer. Mus. Nat. Hist., vol. 77, p. 317.

Identifications.—AB, WJG.

Range.—South-central United States; northwestern Alabama, Mississippi, western Tennessee, Missouri, Arkansas, Louisiana, the eastern half of Texas, eastern and central Oklahoma, and eastern Kansas.

Description.—Male, length 9.7, carapace 4.2, abdomen 5.0, chelicerae project .5 anterior to carapace, extended legs 55. Pale yellowish brown, slightly darker on abdomen because of dense pubescence of grayish hairs; legs slightly darker than body, especially on their distal segments and have heavy pubescence of gray hairs; chelicerae and palps chestnut; cephalic portion of carapace darker than remainder, and has dense, short, anteriorly directed hairs; similar but sparser hairs on remainder of carapace, especially on margins; thoracic groove dark brown. Differences between sexes slight; male averages slightly smaller than female, with carapace relatively broad, abdomen narrow, and legs relatively long (see Fig. 8).

Habitat and habits.—Brown spiders were first noticed in the autumn of 1956 in the recently abandoned farmhouse on the Rockefeller Experimental Tract, then newly acquired by the University.

Probably the colony had been long established there. In 1957 the spiders were abundant about board piles, trash, and sheds, as well as in the buildings themselves. Subsequently, as natural vegetation was restored, the colony dwindled, and individuals could no longer be found out of doors, but were still numerous in the

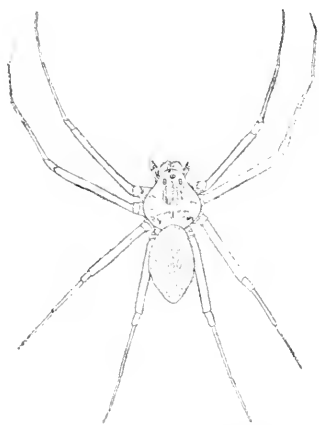


FIG. 8. *Loxosceles reclusa*, immature female, $\times 3$.

house and a large shed. By day they ordinarily remained under cover, but their sloughs and untidy webs were conspicuous on the walls and ceiling. If a shelter such as a board, or piece of loose wallpaper were raised, several might be exposed, and would scuttle for shelter. The brown spider is furtive in its movements, and, to a large extent, nocturnal. Its flattened body form permits it to squeeze into narrow cracks and crevices for shelter. In the dark it hunts prey actively in the open. In spring in several years numerous individuals have been found near together mostly in piles of boards, and each spider

was enclosed in a cocoonlike web.

Before the last decade, the brown spider seems to have been unknown in Douglas and Jefferson counties where my study was made, and it may have invaded this area from elsewhere perhaps gradually extending its range from farther south. Locally it is strictly a household commensal. Its food consists of the common insects that are household pests. Nevertheless, its presence cannot be considered desirable. In the late nineteen fifties the species received much notoriety in the Lawrence area as a result of several bites sustained by local residents. Because of its unusually virulent venom and aggressive disposition, its presence in dwellings entails some danger. Bites are inflicted when a spider, in its hiding place, between the sheets of a bed, or in the folds of clothing, is disturbed by a person using them. The bite is painful, and the wound does not readily heal, but characteristically develops into an ulcer that remains open for months, with sloughing of tissue and systemic effects of varying severity. The brown spider may be abundant in the household and yet escape the attention of the human oc-

cupants because of its moderate size, dull color, and lurking and nocturnal habits.

Young of nearly all sizes and adults were found to be present simultaneously, indicating that there is no well-defined breeding season such as occurs in most other kinds of spiders.

Family PHOLCIDAE Koch

Cellar Spiders

These small or medium-sized cribellate trionychous spiders have weak chelicerae fused at their bases and lacking bosses. The promargin of the fang furrow forms a toothlike structure which opposes the fang to form a kind of chela. There are eight eyes, light except for those of the anterior median pair; the anterior median eyes may be lacking. The other three pairs of eyes are arranged in two triads. The labium is wide, and fused to the sternum. The bodies are small and delicate, the legs thread-like and exceedingly elongate, giving the spider the superficial appearance of a harvestman. There are one or two trichobothria on the tibia, one on the metatarsus and none on the tarsus. The webs are sheetlike or irregular. The egg mass is held together by a few enclosing strands of web, and is carried about by the female, held in her chelicerae.

KEY TO THE SPECIES OF THE FAMILY PHOLCIDAE OF THE RESERVATION

1. Eyes six in two triads, the anterior medians missing.
Spermophora meridionalis, p. 30
- 1'. Eyes eight, the anterior medians relatively small and close together,
the remainder clustered in two triads 2
2. Size larger (body length more than 5 mm.); abdomen somewhat
elongate (twice as long as wide and twice as long as carapace).
Pholcus sp., p. 28
- 2'. Size smaller (body length less than 4mm.); abdomen globose.
Psilochorus pullulus, p. 30

Genus *Pholcus* Walckenaer

The median ocular area is much broader than long. There are eight eyes; the anterior medians which are relatively small, are closer to each other than to the anterior laterals. The abdomen is moderately elongate. The carapace is widened, broader than long. These are relatively large cellar spiders. The genus is cosmopolitan.

Pholcus sp.

Long-bodied Cellar Spider

Identification.—HSF.

Description.—Female, length 4.0, carapace 1.3, abdomen 2.3, extended legs 62. Carapace nearly circular, brownish yellow, with central dark leaflike area;

cephalic area raised, prominent; abdomen several times larger than cephalothorax, somewhat flattened, oval from dorsal view, wider behind, pale brown, with pubescence of same color; legs remarkably slender, tapered and elongate.

The sexes are similar; the male is only slightly smaller. Because of the stiltlike legs, the spider is much like a harvestman in appearance, and could readily be mistaken for one by an uninitiated observer (see Fig. 9).

Habitat and Habits.—This species was long confused by me with the common commensal cellar spider, *Pholcus phalangoides*, but the latter is larger and is usually associated with buildings, whereas the present species has been found by me only in the interstices of old rock walls. In the eighteen-seventies rock walls had been built bisecting the Reservation section from east to west and from north to south. At the time of my study only remnants of the walls remained. The spiders were found at only two places nearly half a mile apart, both on upper slopes in woodland. On various occasions when large boulders in or near the bottom layers of the walls were turned, the spiders were found clinging to them, and were never found in webs. If the latter were present at all they were probably destroyed in moving the boulders. One colony was first noted in 1950 and was still present in 1960. On July 25, 1960, three adult females were collected, each carrying an egg sac. In October 1960 no adults could be found but young between two and three millimeters in length were moderately common. Some of the spiders, when disturbed, made rapid bouncing movements while clinging to the surface of the rock.

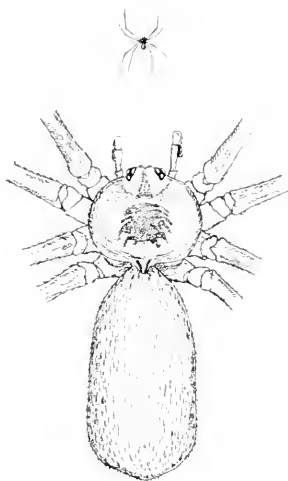


FIG. 9. *Pholcus* sp., female, $\times 10$.

Genus *Psilochorus* Simon

The abdomen is peculiarly humped—much shortened ventrally and elongated dorsally—of oval appearance, but with the spinnerets only a little behind the sternum and pedicel. There are eight eyes in two rows. The posterior row is slightly procurved, with the median eyes slightly the larger, and exceeding the anterior laterals in size. The ocular area of the carapace is prominently elevated. The genus is chiefly neotropical, but occurs in Java and Australia, as well as in the Americas.

Psilochorus pullulus (Hentz)

Humped Cellar Spider

Theridion pullulum Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 280-282; pl. 10, fig. 5.

Psilochorus pullulus; Simon. 1893, Histoire Naturelle des Araignées, vol. 1, p. 482, figs. 474-475.

Identifications.—AB, WJG.

Range.—Eastern United States from Maryland south to Georgia and west to Nebraska, Colorado and Arizona, and southward to Argentina.

Description.—Female, length 3.5, carapace 1.3, abdomen 2.2, extended legs 27. Carapace flattened, nearly circular, but wider posteriorly, pale yellowish brown; cephalic region prominently raised, cervical groove deep and prominent, in form of wide V, continued in midline to posterior part of carapace where considerably widened; area of groove dark brown, contrasting with pale color of remainder of carapace; abdomen approaches spherical shape but slightly longer than broad, yellowish gray with vaguely defined dark markings—broadly V-shaped on anterior end with apex of V at pedicel and four pairs of large, irregular dorsal spots extending in row for length of abdomen; legs of the same yellowish-brown color as carapace but have numerous dark hairs.

Habitat and Habits.—These small spiders were abundant in the vicinity of old abandoned buildings on the Rockefeller Tract but were not found elsewhere. They were never found indoors but usually were seen when boards, stones or trash near the buildings were turned. Often they were associated with *Loxosceles*. They were never in webs, and when exposed would usually run rapidly to find a hiding place on the ground, but sometimes would “freeze.” Crouching motionless they were likely to be overlooked. Five years after abandonment of the buildings, both *Psilochorus* and *Loxosceles* were still present in the area, but both had become less numerous, presumably as a result of successional changes, with rank vegetation shading formerly open areas where the spiders lived.

Genus *Spermophora* Hentz

In spiders of this genus the abdomen is globose. There are only six eyes (in the absence of the anterior medians); eyes form two triads on the dorsal side of the carapace near its anterior end. These are the smallest cellar spiders. The genus occurs in North America, South America, Europe, southern Asia and Africa.

Spermophora meridionalis Hentz

Six-eyed Cellar Spider

Spermophora meridionalis Hentz, 1841, Amer. Jour. Sci., vol. 41, p. 117.

Identification.—AB.

Range.—Eastern United States.

Description.—Female, length 1.8, carapace .7, abdomen 1.0, extended legs 21. Carapace nearly circular, pale yellowish brown, darker near its center; cephalic region only slightly raised, cervical groove not prominent; eyes in pair of triads with intervening space approximating diameter of triad; several fine, anteriorly directed hairs behind ocular region and on clypeus; legs yellowish brown, slightly paler than carapace; legs long and slender, as in other pholcids, giving spider a harvestman-like appearance; abdomen pale grayish brown, almost spherical. Male somewhat smaller than female with narrower abdomen and relatively long legs.

Habitat and Habits.—In June 1959 several of these spiders, including females with egg sacs, were found on the underside of a storm-door, of the cellar at the Rockefeller Tract. None was found elsewhere.

Family THERIDIIDAE Sundevall

Comb-footed Spiders

Size ranges from small to medium-large in these cribellate trionychous spiders. There are eight eyes in two more or less parallel rows, the anterior median pair dark, the others light. The clypeus is relatively high. The legs are relatively long and curved, and have no spines on the tibiae and metatarsi. Trichobothria are arranged in two rows on each tibia. The chelicera has no boss, but a weakly developed scopula may be present. The abdomen is large and swollen, overhanging the carapace. Most comb-footed spiders catch their prey in webs, consisting of dense sheets and viscid strands. These spiders easily overcome relatively large prey which becomes entangled in the web. The family includes one of the two known dangerously venomous spiders in Kansas—the notorious black widow.

The males of some theridiids possess well developed stridulating organs consisting of a roughened area of sclerotized tubercles on the front of the abdomen, and a corresponding area of striae on the rear of the carapace. By movements of the abdomen, these two roughened areas can be brought in contact and rubbed together, producing a faint grinding sound that functions in courtship.

KEY TO THE SPECIES OF THE FAMILY THERIDIIDAE OF THE RESERVATION

1. Carapace and sternum having many small crescentic tubercles and adjacent pits; body shorter than 3 mm. *Crustulina altera*, p. 35
- 1'. Carapace and sternum lacking crescentic tubercles; size variable, body usually longer than 3 mm. 2
2. Abdomen slightly elongated and pointed behind; fourth leg longer than first *Euryopsis limbata*, p. 36
- 2'. Abdomen globose; first leg longer than fourth 3
3. Posterior and anterior lateral eyes on each side well separated, with the intervening space at least equal to their diameters.
Latrodectus curacaviensis, p. 37
- 3'. Posterior and anterior lateral eyes on each side separated by a space of less than half the diameter of one eye 4

4. Median ocular area narrower in front than behind.
Enoplognatha marmorata, p. 35
- 4'. Median ocular area narrower behind than in front, or its sides parallel 5
5. Anterior and posterior lateral eyes separated; legs not annulate 6
- 5'. Lateral eyes on each side contiguous; legs annulate 7
6. Larger (most adults more than 5 mm. long); anchor-shaped white mark on anterior part of abdomen *Steatoda borealis*, p. 40
- 6'. Smaller (usually less than 5 mm. in length); a pair of white spots dorsally on abdomen near its middle *Steatoda americana*, p. 39
7. Anterior median eyes not larger than posterior medians.
Steatoda triangulosa, p. 41
- 7'. Anterior median eyes larger than posterior medians 8
8. First leg less than twice length of body; abdomen not mottled 10
- 8'. First leg more than twice length of body; abdomen having a mottled pattern with no distinct folium (*Achaearanea*) 9
9. Adults usually more than 4½ mm. long. *Achaearanea tepidariorum*, p. 33
- 9'. Usually less than 4½ mm. long *Achaearanea porteri*, p. 32
10. Length less than 2 mm.; no folium *Sphyrrotinus imparatus*, p. 41
- 10'. Length 2 mm. or more; distinct folium 11
11. Length usually more than 2.5 mm. (♂) or 3 mm. (♀); male's carapace and legs orange *Theridion murarium*, p. 42
- 11'. Length less than 2.5 mm. (♂) or 3 mm. (♀); male's carapace yellowish or ivory *Theridion differens*, p. 42

Genus *Achaearanea* Strand

The members of this genus are small to large theridiids that have the anterior eye row slightly procurved, the posterior row straight or slightly recurved, the eyes subequal, the median ocular area approximately square, the legs medium long, with spines and usually many hairs. Females have the first legs longest, fourth next in length, and third shortest, while in males the order is the same except that the second leg is usually longer than the fourth. These are web-spinning spiders. The web is an irregular network of threads and usually is in a sheltered place. The genus is cosmopolitan, but there are few species in the Old World, many in Mexico, Central America and South America.

Achaearanea porteri (Banks)

Porter's Spider

Theridium porteri Banks, 1896, in Blatchley, Ann. Rept. Indiana Geol. Surv., vol. 21, p. 203.

Achaearanea porteri; Levi, 1955, Amer. Mus. Novit., No. 1718, p. 30.

Identification.—HWL.

Range.—Eastern United States, except New England; south to Bahama Islands, Mexico and Panama.

Description.—Female, length 3.5, carapace 1.8, abdomen 2.3, extended legs 19.5. Carapace yellowish brown, slightly darker on cephalic portion; sternum

yellowish brown; abdomen cream colored, heavily mottled with black, having sparse covering of long brown hairs; legs ivory, annulated with pale brown; male much like female in appearance, but only about two-thirds of her length, and with less distinct annulations on legs.

Achaearana tepidariorum (C. L. Koch)

House Spider

Theridium tepidariorum C. L. Koch, 1841, Die Arachniden, vol. 8, p. 75, figs. 646-648.

Theridion tepidariorum; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 15.

Achaearana tepidariorum; Levi, 1955, Amer. Mus. Novit., No. 1718, p. 32.

Identification.—RLG, AB, HWL.

Range.—Cosmopolitan as a commensal associated with man-made structures.

Description.—Female, length 8.7, carapace 3.0, abdomen 5.5, extended legs 36. Carapace glabrous, light chocolate; abdomen cream or pale tan marked with brown and with series of dark chevrons posteriorly; legs tan or cream with darker brown markings at distal end of each segment (see Fig. 10).

Male slightly smaller with longer legs; carapace tan with thoracic groove more dusky; abdomen much less swollen; legs orange or light reddish brown with no dark markings but becoming slightly darker distally.

Habitat and Habits.—This house spider is closely confined to an edificarian habitat; on the Reservation the species has been found only in the immediate vicinity of the four buildings at the headquarters. It seems to require situations that are sheltered from the weather; it has been especially abundant in the garage and in the screen porch of the residence, where insect prey is numerous. Typical sites for a web are: on the ceiling at one corner of a room; at an upper corner of a window; or beneath the seat of a chair. The prey consists chiefly of flying insects, of a great variety of kinds, including some that are relatively large and powerful. The insect blunders into the web and becomes entangled. The spider backs toward the struggling prey, and keeping well out of reach, ensnares it with sticky strands, which are guided by the hind legs. After the prey is sufficiently immobilized, the spider approaches cautiously and delivers a paralyzing bite. Beneath one web I recorded discarded remains of: seven spider wasps (one *Sceliphron*, six *Trypoxylon*, eight flies (six calliphorids, two tab-



FIG. 10. *Achaearana tepidariorum*, female, $\times 2$.

anids); two beetles (staphylinid and lampyrid), and one cockroach, all larger than the spider itself. The large harvestman, *Leiobunum*, was a common prey. Leafhoppers, attracted to the buildings by lights at night, were caught in the webs in great numbers, and perhaps made up the greater part of the food for spiders that had their webs under the eaves.

A male and female often share the same web for long periods. Neighboring females often lived in webs only a few inches apart, under the eaves or on the ceiling of the porch, where the spiders were most common, but each kept to its own web, and they were highly incompatible. On one occasion, in cleaning the laboratory, I swept down many webs, and collected the live spiders, mostly adult females, in a pint jar. Immediately fighting began. There was frenzied activity as each spun a small web and defended it against trespassers, at the same time attempting to entangle its nearest neighbor, by looping strands about it with the rear legs. From time to time one too closely crowded would turn and deliver a quick bite at the joint of its opponent's leg. The bitten spiders were remarkably susceptible to the venom, soon became unsteady in their movements and lapsed into sluggishness or quiescence, whereupon they were ensnared and fed upon by their rivals. After a period of hours only one remained alive.

These house spiders may survive for a year or more after attainment of maturity, hence adults are found at all seasons. Kaston (1948:103) stated that each egg sac contains from 100 to more than 400 eggs, and he mentioned that one female produced 17 egg sacs, and another produced 14, with a total of 3766 eggs. For several days after hatching, the young remain clustered in the mother's web.

The assassin spider, *Mimetus puritanus* is one of the natural enemies, and, on the Reservation, has been found only on the wall of the house where the house spiders are numerous. Jumping spiders, including *Phidippus variegatus* and *Metacryba undata* have also been observed preying upon house spiders, which are highly vulnerable when their webs are broken or removed.

Genus *Crustulina* Menge

In the small and delicate theridiids of this genus the sternum is broadly truncate behind. The cephalothorax is roughened with tubercular elevations which are distinctly crescent-shaped on the carapace, and each elevation has a small pit beside it. The base of the abdomen has a horny ring around the insertion of the pedicel. The genus is cosmopolitan.

Crustulina altera Gertsch and Archer

Crescent Spider

Crustulina altera Gertsch and Archer, 1942, Amer. Mus. Novit., no. 1171, p. 1, fig. 9.

Identifications.—AB, HWL, WJC.

Range.—Eastern United States; seemingly co-extensive with the Deciduous Forest Formation.

Description.—Male, length 2.0, carapace 1.1, abdomen 1.2, extended legs 6.7. Carapace reddish brown, with numerous dark, crescentic tubercles scattered over surface; ocular region raised; eyes large; first row recurved, second nearly straight; sternum and chelicerae have crescentic tubercles similar to those on carapace but smaller; abdomen slightly less bulky than cephalothorax; gray, with several white spots mid-dorsally and on each side, and with coarse reticulations of black. Legs pale yellowish brown. The sexes are similar in size and appearance.

Habitat and Habits.—According to Levi (1957:374) this spider is found under logs and stones, and often in leaf litter in dry woods. Kaston (1948:74) stated that the males overwinter as adults, and that the egg sacs contain only about five eggs.

Genus Enoplognatha Pavesi

The chelicerae are robust, with the retromargins toothed. Both rows of eyes are straight. The anterior and posterior lateral eyes are contiguous. The anterior medians are smaller than the anterior laterals. The median ocular area is narrower in front than behind. The abdomen is spherical or slightly flattened and bears a distinct folium dorsally. In the male the carapace bears a stridulating area on each side of the pedicel. Most of the species occur in North America and Eurasia, but there are a few in South America and Africa.

Enoplognatha marmorata (Hentz)

Marbled Comb-foot

Theridion marmoratum Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 273; pl. 9, fig. 3.

Enoplognatha marmorata; Simon, 1894, Nat. Hist. Araignées, vol. 1(3), p. 578.

Identifications.—AB, HWL.

Range.—Most of United States and southern Canada.

Description.—Female, length 4.5, carapace 1.8, abdomen 2.5, extended legs 16. Carapace light chocolate, darker on margins; abdomen globose, several times bulk of cephalothorax, having white band in front dorsally; dorsum gray, marbled with black and flecked with white; venter mostly chocolate, with scattered white spots; legs amber with dark annulations at distal end of each segment. The sexes are similar in appearance but the male is slightly smaller.

Habitat and Habits.—Kaston (1948:77) stated that this species

was to be found under rock ledges, boards, stones or leaves, or in bushes near the ground; that it overwinters in the penultimate or earlier instars; and that the eggs, produced in May, varied from 37 to 179 in ten different sacs.

Genus *Euryopsis* Menge

The medium-small theridiids of this genus are of aberrant habits and appearance, as they do not make webs but stalk their prey on the ground or on vegetation, and are somewhat like crab spiders in appearance. The abdomen is pointed behind. The anterior median eyes are much wider and farther apart than are the posterior medians. The lateral eyes on each side are nearly contiguous. The sternum is narrowly truncate behind. The colors are dark with silvery markings. The genus is cosmopolitan.

Euryopsis limbata (Walckenaer)

Epeira limbata Walckenaer, 1841, *Histoire Naturelle des Insectes Aptères*, vol. 2, p. 81.

Theridion funebre Hentz, 1850, *Jour. Boston Soc. Nat. Hist.*, vol. 6, p. 277.

Identification.—HWL.

Range.—Southern Canada, most of United States (not northeastern part), and south into Baja California.

Description.—Male, length 3.2, carapace 1.3, abdomen 1.8, extended legs 10.6. Carapace whitish shaded with dark pigment anteriorly and marginally; abdomen white heavily shaded with gray and having conspicuous silvery V-shaped marking beginning laterally about halfway back from anterior end and continuing to point mid-dorsally just anterior to spinnerets; faint silvery marking on each side near base of abdomen; legs white with gray annulations. The sexes are similar in appearance but the female averages slightly larger. (See Fig. 11.)

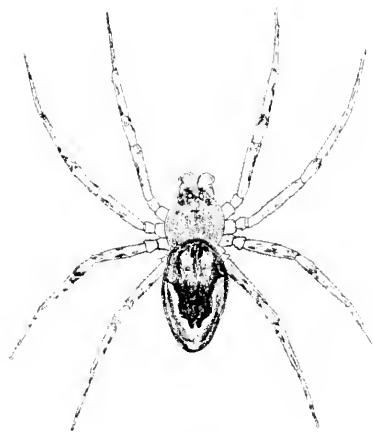


FIG. 11. *Euryopsis limbata*, male, $\times 7$.

Habitat and Habits. — Kaston (1948:97) stated that in Connecticut this spider is found in leaves and moss on the ground, winters in the penultimate or earlier stages, and feeds upon ants.

Only one, an adult male, was found in the course of my study.

Genus *Latrodectus* Walckenaer

The black widows are relatively large theridiids, but the males are much smaller than the females. The anterior and posterior lateral eyes are well

separated, the intervening space usually exceeding the diameter of either eye. The retromargin of the chelicera is unarmed. The sternum is pointed behind and narrowly produced between the coxae of the fourth pair of legs. The first leg is longer than the fourth. The genus is cosmopolitan.

Latrodectus curacaviensis (Müller)

Northern Black Widow

Aranca curacaviensis Müller, 1776, Des Ritters Carl von Linne vollständigen Natursystems, Suppl. Vol., p. 242.

Latrodectus mactans, Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 15.

Latrodectus curacaviensis; Levi, 1959, Trans. Amer. Micr. Soc., vol. 78 (1); p. 38.

Identification.—HWL.

Range.—Southern Canada southward to southern Argentina, but seemingly absent from large areas of Mexico, Central America and the Antilles; more common in the temperate regions of North and South America than in the Tropics.

Description.—Female, length 10.6, carapace 4.6, abdomen 6.6, extended legs 49. Carapace glabrous, dark chestnut, with darker shading in cephalic region and along margins making it nearly black; legs black with chestnut tinge; dorsum black with white and yellow basal band with white and yellow lateral dashes on the sides (extending laterally from the vicinity of the anterior spot) and with conspicuous red spots; posterior spot having stripe thinly connected to it and extending posteroventrally to spinners. (See Fig. 12.) Venter black with "hourglass" marking divided into separate anterior and posterior spots; male only about half length of female; his abdomen relatively much less bulky, streaked with white—retention of juvenal pattern—but lacks red spots.

Habitat and Habits.—This more colorful species, long confused with the common black widow, *L. mactans*, is seemingly the only member of its genus occurring on the Reservation. Where the two are sympatric elsewhere, habitat differences have been noted. *L. curacaviensis* occurs several hundred miles farther north than does *mactans* (known from Kansas only in the southern part), and *curacaviensis* has a less virulent venom. In most instances of recorded bites the two species have not been distinguished. If such sorting were possible, the records might reveal a somewhat higher incidence of mortality than

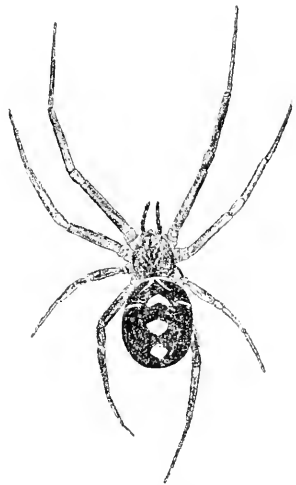


FIG. 12. *Latrodectus curacaviensis*, female, $\times 2$.

previously recognized for bites of *mactans*, and little or no mortality from bites of *curacaviensis*. However, *mactans* is more domestic in habits and probably is the usual culprit when persons are bitten.

On the Reservation *L. curacaviensis* is primarily a woodland spider, and has a definite preference for rocky places. The web consists of a broad, more or less horizontal sheet, many irregular vertical strands and a funnel leading down into a retreat which, typically, is under a flat rock. In some instances the web extends as much as five feet above ground level, but in other instances extends up only a few inches, and is relatively small and inconspicuous. The web is remarkably tough, and by this means may readily be distinguished from the webs of any other local spiders. The web must afford substantial protection against certain small predators such as lizards. At an alarm, the spider runs back into its retreat and huddles with its legs drawn up.

From year to year the numbers of these spiders on the Reservation fluctuated widely. In 1960, intensive field work disclosed only a single individual, whereas in 1952, 1953, 1954, and 1955, the species was abundant. In late June, 1955, the population was estimated to be approximately 100 per acre in the more xeric type of woodland judging from the spacing of the webs.

Although rocks provided the favorite retreats, the spiders often had their webs away from such substantial shelters and depended upon thick leaf litter for hiding places. On a few occasions the webs were noted in tall grass near the edge of the woods. Those summers when black widows were abundant were unusually dry. Humid weather may be a limiting factor. On two occasions after periods of heavy summer rains, small adult females were found dead in their webs, coated with a dull white layer of mold, and they may have died prematurely from disease or parasitism.

Several times black widows, all but two immature, were found in the mud nests of the wasp, *Sceliphron*, or were found lying paralyzed in the garage or on the concrete stoop of the laboratory, where they had been dropped by the wasps.

On many occasions young of these spiders were found in the nest boxes attached to the traps that were used to catch small mammals, especially when these traps were in woodland. Both adult and immature spiders were noted in every month from May through September. In October, 1957, a penultimate female was found in a decaying log, where probably it would have hibernated, as it was

not associated with a web. On June 28, 1961, an adult male was found clinging to the underside of a leaf, not associated with a web.

Genus *Steatoda* Sundevall

The sternum is pointed behind and produced between the coxae of the fourth pair of legs. The median ocular area is slightly wider in front than behind. The anterior median eyes are the largest, much larger than the anterior laterals. The anterior row of eyes is procurved. The carapace lacks a transverse furrow. The genus is cosmopolitan.

Steatoda americana (Emerton)

Twin-spotted Comb-foot

Asagena americana Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 23, pl. 4, fig. 6.

Steatoda americana; Levi, 1957, Bull. Mus. Comp. Zool., vol. 117(3), p. 400, figs. 66-69.

Identifications.—AB, HWL.

Range.—Most of United States, but not recorded from the northern parts of the Great Plains or Rocky Mountains, nor from California or Nevada; also recorded in Mexico in Sonora and Hidalgo.

Description.—Female, length 4.0, cephalothorax 2.0, abdomen 2.5, extended legs 10.5. Carapace dark chestnut, legs paler chestnut, abdomen oval, slate-colored with pale pubescence; overlaps posterior edge of cephalothorax and is several times its bulk; cephalothorax somewhat depressed; carapace roughened, with minute pits; legs moderately short, stocky and covered with fine hairs like those on abdomen.

The sexes are much alike in size and appearance, but the males are slightly smaller. Some individuals seen were relatively small, and lacked white spots on abdomen or had only faint spots—grounds for questioning whether all material pertains to single species.

Habitat and Habits.—This is an abundant species, but because of its small size and secretive habits it ordinarily escapes attention. On various occasions, when the lawn at the Reservation headquarters was watered, these spiders, along with various other species, were found crawling on the wall of the building, having been flushed from their hiding places. On other occasions they have been sifted from leaf litter in oak-hickory woodland. On July 4, 1952, July 4, 1953, and July 17, 1954, mud cells of the wasp *Sceliphron* removed from buildings at the headquarters, and opened, were found to be crammed with these spiders. Kaston (1948:74) also has noted the affinity of *Sceliphron* for this spider. He stated that the spiders attain maturity in spring and have eggs in July; there were 22, 27, and 33 eggs, respectively, in three different sacs.

Steatoda borealis (Hentz)

Boreal Comb-foot

Theridion boreale Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 274, pl. 9, fig. 4.

Steatoda borealis; Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 19, pl. 4, fig. 1.

Steatoda borealis; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 14.

Identifications.—AB, HWL.

Range.—Throughout approximately the northern half of the United States.

Description.—Male, length 6.6, carapace 2.5, abdomen 3.6, extended legs 26. Carapace dull chestnut, its surface of granular texture; abdomen globose, many times larger than cephalothorax, plumbeous, having gray pubescence and white anchor-shaped marking, arms of anchor bordering dorsum on its anterior edge with break in mid-dorsal mark that is shank of anchor; legs pale chestnut with gray pubescence and faint gray annulations; first row of eyes recurved, second row approximately straight (see fig. 13).

Sexes much alike in appearance; female averages slightly larger.

Habitat and Habits.—This spider is uncommon, and of secretive habits. Most of those found were in dense woods. Typical situations were beneath massive boulders, or in cavities on the undersides of decaying logs. Others were found about buildings at the

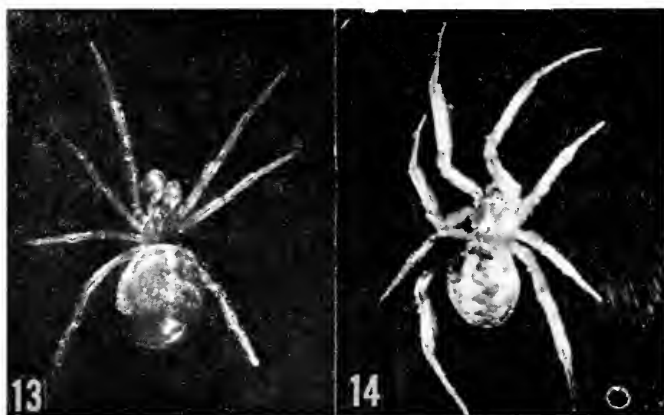


FIG. 13. *Steatoda borealis*, penultimate male, $\times 22\frac{1}{2}$.

FIG. 14. *Steatoda triangulosa*, female, $\times 22\frac{1}{2}$.

Reservation headquarters, several were in a pile of old boards beside the garage. All were in stringy, formless webs. Several times in early spring those of a pair were found together in the same web. On several occasions individuals were found in the house, always

in well-concealed situations—in a closet, behind the books on a bookcase, or in air vents beneath the floor. Kaston (1948:85) stated that in Connecticut eggs are laid in July, and he recorded sacs with 37, 47, 76 and 95 eggs.

Steatoda triangulosa (Walckenaer)

Triangulate Comb-foot

Aranca triangulosa Walckenaer, 1802, Faune Parisienne, vol. 2, p. 207.

Steatoda triangulosa; Thorell, 1873, Remarks on synonyms of European spiders, p. 505.

Teutana triangulosa; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 15.

Identifications.—HWL, WJG.

Range.—North Africa, Europe, and Asia; Canada; the United States, chiefly in the eastern half, and in Colorado.

Description.—Female, length 5.6, carapace 1.8, abdomen 3.7, extended legs 22. Carapace yellowish brown, with H-shaped marking of faint pigmentation in thoracic and cervical grooves; abdomen pubescent, pale gray, on each side of dorsum series of approximately five black blotches, mostly contacting those adjacent and not entirely distinct; area around blotches has large, closely spaced flecks of white; legs yellowish brown, paler than carapace, with gray pubescence and faint gray annulations (see Fig. 14). Male slightly smaller.

Habitat and Habits.—Few individuals have been found on the Reservation, and all were associated with edificarian habitats. In the summer of 1960 several were found, associated with *Loxosceles reclusa* and *Theridion tepidariorum*, in closets and crannies of the farmhouse on the Rockefeller Tract, then unoccupied by humans for nearly four years. In the late winter of 1961 several half-grown individuals were found in air-vents beneath the floor of my residence. The species is reported to feed upon ants.

Genus *Sphyrotinus*

Spiders of this genus are minute, orange colored, and resemble various species of the closely related *Theridion*, but the legs are markedly shorter in *Sphyrotinus*. The eyes of the anterior row are in a straight line, and are equal and equidistant. Those of the posterior row are also in a straight line, the median separated by its radius and a little more from the lateral. The height of the clypeus is three diameters of an anterior eye. The femur of the male palp has a dorsal series of long spines, and the patella is subglobular. The genus is North American.

Sphyrotinus imparatus Bishop and Crosby

Theridion imparatum Bishop and Crosby, 1926, Jour. Elisha Mitchell Sci. Soc., vol. 41, p. 182.

Sphyrotinus unimaculatus; Levi, Levi and Kaspar, 1958, Trans. Wisconsin Acad. Sci. Arts and Letters, vol. 47, p. 45.

Identification.—WJG.

Range.—Eastern United States in the Deciduous Forest Formation.

Description.—Male, length 1.4, carapace .6, abdomen .9, extended legs 5.2. Carapace flattened, approximately as broad as long, orange, with black in ocular area; abdomen oval, grayish orange; legs of approximately equal length, orange, paler than carapace.

Female like male in most respects, but with legs relatively shorter.

Habitat and Habits.—This minute spider has been found in leaf litter of deciduous forest.

Genus *Theridion* Walckenaer

Size medium-small to small (one to five millimeters in length); carapace usually slightly longer than wide; anterior eye row straight or procurved, posterior row straight; eyes usually subequal; colulus absent; genus cosmopolitan.

Theridion murarium Emerton

Wall Spider

Theridion murarium Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 11, pl. 1, fig. 5.

Theridion murarium; Scheffer, 1905, Trans. Kansas Acad. Sci., vol. 19, p. 192.

Identification.—HWL.

Range.—Southern Canada, entire United States, and much of Mexico.

Description.—Female, length 3.8, carapace 1.5, abdomen 2.3, extended legs 17. Carapace ivory, with dark margins and with dark middorsal band, broad anteriorly and tapering posteriorly; abdomen having narrow, elongate, pale brown folium middorsally, bordered laterally by dark area heavily mottled with brown and black; sides cream-colored; legs ivory, with irregular dark annulations and spots, and with dark hairs. Sexes much alike except that male averages smaller.

Theridion differens Emerton

Theridion differens Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 9.

Theridion differens; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 127.

Identifications.—WJG.

Range.—Most of United States except for desert regions of the southwest, northward into the southern provinces of Canada.

Description.—Male, length 2.3, carapace 1.1, abdomen 1.2, extended legs 14.4. Carapace dull orange; sternum orange; abdomen having gray middorsal band with scalloped edges, bordered by white, dark brown on sides, gray ventrally and ventrolaterally; eyes of posterior row almost equidistant in spacing.

Male averages slightly smaller than female and slightly darker.

Habitat and Habits.—Only one specimen has been collected in the study area. Levi (1957:33-34) stated that the species can be

collected on grass, low bushes and small trees. The web includes an irregular spreading network of lines, and a tentlike shelter not much larger than the spider itself. Kaston (1948:104) counted 38, 39, and 40 eggs in three different sacs.

Family LINYPHIIDAE Blackwall

Sheet-web Weavers

These are mostly small cribellate and trionychous spiders. The eight heterogeneous eyes are arranged in two rows. The clypeus is relatively high. The chelicerae have a scopula but no boss, and are moderately powerful. The lateral surfaces are often provided with lateral striae as a stridulating organ. The margins of the fang furrow are oblique and armed with teeth. The labium is free. There are no trichobothria on the femora and tibiae. The legs are long and thin and provided with fine spines. These are chiefly woodland spiders which depend upon their sheet webs, usually in trees or in low vegetation, for the capture of their prey.

KEY TO THE SPECIES OF THE FAMILY LINYPHIIDAE ON THE RESERVATION

1. Length more than 3 mm. *Linyphia marginata*, p. 46
- 1'. Length less than 3 mm. 2
2. Abdomen having middorsal broad black band.
Frontiella pyramitela, p. 44
- 2'. Abdomen not having middorsal broad black band. 3
3. Abdomen uniform, plumbeous *Centromerus latidens*, p. 43
- 3'. Abdomen having conspicuous markings 4
4. Abdomen having broad, whitish, transverse dorsal band.
Meioneta micaria, p. 47
- 4'. Abdomen lacking broad, whitish, transverse dorsal band 5
5. Abdomen having three pairs of fairly distinct dark blotches.
Lepthyphantes sabulosa, p. 45
- 5'. Abdomen lacking distinct dark blotches. *Lepthyphantes appalachia*, p. 45

Genus *Centromerus* Dahl

The metatarsus of the fourth leg lacks a trichobothrium. The chelicerae have three or four teeth on the promargin. The male lacks a mastiodon. The cymbium is not angulate.

Centromerus latidens (Emerton)

Microneta latidens Emerton 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 76.
Centromerus latidens; Kaston 1948, Spiders of Connecticut, p. 136.

Identification.—WI.

Description.—Female, length 2.0, carapace 1.0, abdomen 1.5, extended legs 8.0. Carapace greenish brown, narrowly rimmed with black; abdomen much broader than carapace and overhanging its posterior half, somewhat pointed anteriorly, plumbeous; legs pale yellowish brown.

Habitat and habits.—Two adult females were sifted from oak-hickory leaf litter on February 28, 1962.

Genus *Frontinella* Cambridge

The abdomen has a broad middorsal longitudinal black band, and is relatively narrow anteriorly and coarsely serrate along its lateral margins posteriorly. The sides of the median ocular area are almost parallel; the anterior median eyes are approximately equal in size to the posterior medians. The promargin of the cheliceral fang furrow has four to six teeth and the retromargin has three to five. The genus is North American, with many species occurring in Mexico and Central America.

Frontinella pyramitela (Walckenaer)

Bowl and Doily Spider

Linyphia pyramitela Walckenaer, 1841, Histoire Naturelle des Insectes Apteres, vol. 2, p. 261.

Linyphia communis; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.) vol. 30, p. 8.

Frontinella pyramitela; Chamberlin and Ivie, 1944, Bull. Univ. Utah, Biol. Ser., vol. 8 (5), p. 81.

Identifications.—RLG, AB.

Range.—Entire United States, north into southeastern Canada, south to Costa Rica.

Description.—Female, length 3.8, carapace 1.3, abdomen 1.8, extended legs 14.8. Carapace chocolate colored; broad median chocolate stripe on abdomen, with white area on each side extending downward on posterior half; venter mostly chocolate; legs pale cream with faint greenish tinge. Male averages smaller; carapace and legs yellowish brown or tan; abdomen dull white, brownish at posterior end; venter chocolate. (See Fig. 15.)

Habitat and Habits.—This is one of the most abundant spiders of the Reservation, and occurs in a variety of habitat conditions. Its characteristic "bowl and doily" webs are made in weeds or bushes, usually within a few feet of the ground. Habitats at the edge of woodland are favored but the species is also abundant in woodland. It is less common in open situations. Coralberry (*Symphoricarpos orbiculatus*) bushes provide favorite sites; fleabane (*Erigeron philadelphicus*) and sweet clover

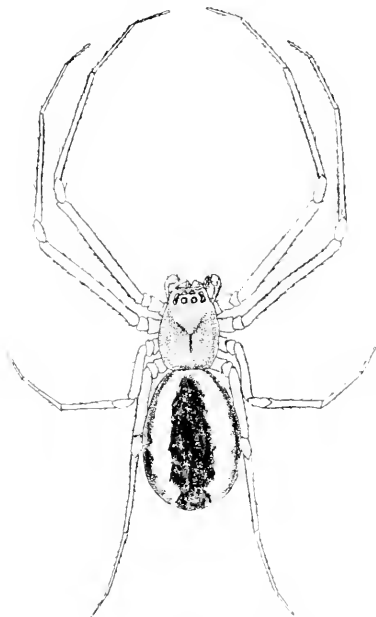


FIG. 15. *Frontinella pyramitela*, female, $\times 9$.

(*Melilotus alba*) are much used. This spider matures in late spring, and the members of a pair often are found together sharing the web. Leafhoppers make up a major portion of the food.

The ballooning habit is especially characteristic of the young bowl and doily spider, which, because of its small size, may cover great distances in this manner. There are records of it being found as much as 1000 feet above the ground.

Genus *Lepthyphantes* Menge

The members of this genus resemble those of *Linyphia* but are more slender and have thinner legs. The anterior median eyes are smaller than the anterior laterals, and are about twice as far from the latter as from each other. The posterior row of eyes is recurved, with the posterior medians as large as the posterior laterals or larger. The many species of this genus are primarily holarctic in distribution but a few reach the tropics in both the Old World and the New World, and others occur on remote oceanic islands, even including New Zealand. Many of the species are cavernicolous.

Lepthyphantes appalachia

Chamberlin and Ivie

Bathypantes sabulosus; Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 45.

Lepthyphantes appalachia Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8 (5), p. 81.

Identification.—WJG.

Range.—Eastern United States from Connecticut to Florida and west to Utah.

Description.—Female, length 2.2, carapace 1.0, abdomen 1.6, extended legs 9.7. Carapace brown, clouded with dark pigment except in cephalic region; abdomen oval, dark gray, faintly blotched with yellowish gray, and having small white flecks; legs yellowish brown; eyes large, rimmed with black, anterior row directed forward, anterior and posterior laterals in contact, posterior medians much larger than anterior medians, oblique, extended anteriorly; venter slaty gray, unmarked (see Fig. 16).

Lepthyphantes sabulosa (Keyserling)

Linyphia sabulosa Keyserling, 1886, Die Spinnen Amerikas, Theridiidae, vol. 2, p. 70.

Lepthyphantes sabulosa Zorsch, 1937, American Midland Nat., vol. 18, p. 890.

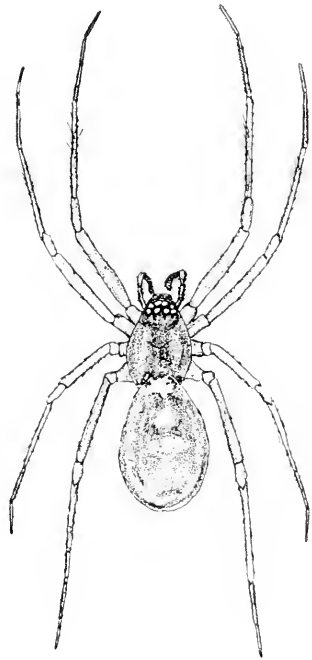


FIG. 16. *Lepthyphantes appalachia*, female, $\times 13$.

Identification.—VI.

Description.—Female, length 2.6, carapace 1.0, abdomen 1.8, extended legs 12.5. Carapace amber, dark along margins; abdomen gray with scalelike white flecks, and with three pairs of large black blotches; each blotch somewhat wider than long and tending to merge with adjacent blotches; legs amber, paler than carapace; venter black, epigynum amber brown.

Habitat and Habits.—The only specimen obtained, an adult female, was sifted from oak-hickory leaf litter of a north slope on February 28, 1962.

Genus *Linyphia* Latreille

The abdomen is marked with a contrasting pattern, and is high at the posterior end. The median ocular area is narrower in front than behind; the anterior median eyes are smaller than the posterior medians. The epigynum lacks a scape. The genus is cosmopolitan in distribution.

Linyphia marginata C. L. Koch

Filmy Dome Spider

Linyphia marginata C. L. Koch, 1834, Herr. Schaeff. Deutsch. Ins., vol. 127, p. 21.

Linyphia marginata; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 8.

Identifications.—MHM, RLG, AB.

Range.—Europe, Asia, southern Canada, and most of the United States.

Description.—Female, length 4.0, carapace 1.8, abdomen 2.3, extended legs 24. Carapace dark grayish brown with conspicuous white marginal stripes; abdomen with wide median dark brown (almost black) stripe having scalloped edges and enclosing series of six pairs of light spots; dark middorsal area flanked by whitish areas on each side, each of which has three stripelike extensions ventrally; venter black with white markings along lateral edges; abdomen broader posteriorly than anteriorly; legs dull yellow, tinged with green.

Male averages slightly smaller; carapace amber, with dark gray areas laterally; abdomen more slender and more nearly cylindrical than in female, gray on dorsum, white on sides; legs yellow.

Habitat and Habits.—The filmy dome spider is one of the most abundant kinds on the Reservation, and is conspicuous at all seasons. Even in midwinter, on unseasonably warm days, individuals may be seen in their webs carrying on normal activities. Although the species occurs in edge habitats, and rarely in open situations away from trees, it is most characteristic of woodland. The webs are abundant along rock clefts and old stone walls, under the edges of logs and in low, dense vegetation such as bushes of coralberry (*Symphoricarpos*) or gooseberry (*Ribes*). At any season individuals are often found in pairs in the webs; seemingly the members of a pair share the web amicably. Often three or more of the spiders

have been seen in the same web; usually the excess individuals were males. Of prey seen in the webs, leafhoppers were in the majority, but various small dipterous insects also were well represented, and several halictid bees have been noted. These spiders have often been noticed in copulation, especially in July and August, but also in all months from April to September inclusive. At any disturbance, such a pair would separate, but within a few minutes they would approach each other and resume mating. In several instances the female of a pair in a web appeared to be immature. In one such instance observed on July 3, 1955, the male, which was larger, kept approaching the female, and occasionally lunging at her, while she avoided each advance by darting away out of reach.

Genus *Meioneta* Hull

The legs are elongate and slender, their metatarsi each bearing a trichobothrium on the first, second and third pairs but not on the fourth. The chelicerae of the male often have mastidia—small denticles on their anterior faces. The cymbium is usually angular and often has one or more horns. The epigynum is protuberant, with a broad median lobe bounded laterally by oval or crescentic areas.

Meioneta micaria (Emerton)

Bathypantes micaria Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 71.

Erigone zonaria; Keyserling, 1886, Die Spinnen Amerikas, Theridiidae, II p. 196, pl. 18, fig. 256.

Identification—WI.

Description.—Male, length 1.8, carapace .8, abdomen 1.0, extended legs 7.5. Carapace yellowish brown, darkening toward edges; abdomen elliptical, with broad transverse whitish band, concave behind, and occupying somewhat more than middle one-third, posterior part plumbeous, anterior part brown, darker medially; legs yellowish brown.

Habitat and Habits.—The single specimen recorded was an adult male sifted from leaf litter.

Family ERIGONIDAE Gerhardt

Dwarf Spiders

The characters separating this family from the closely related Linyphiidae are somewhat arbitrary. All the erigonids are small, rarely as much as three millimeters in length, and typically between one millimeter and two millimeters. In many genera the heads of the males are curiously modified, bearing horns, lobes, or humps, or having grooves or pits. The tibia of the fourth leg has a single dorsal spine or none in the erigonids whereas in the linyphiids there are usually two such spines. Both in number of species and in number of individuals, the erigonids are probably the most abundant group of spiders.

Unlike most other spiders, many of them can be found as adults at any season. Many kinds inhabit leaf litter.

KEY TO THE SPECIES OF THE FAMILY ERIGONIDAE OF THE RESERVATION

1. Color predominantly coppery or orange; body flattened, with large dorsal abdominal scutum 2
- 1'. Color not predominantly coppery or orange; body not notably flattened; no abdominal scutum 4
2. Cheliceral fang having a double curve, convex and then concave. *Ceratinella brunea*, p. 50
- 2'. Cheliceral fang having a single curve 3
3. Length less than 1.2 mm.; posterior lateral angles of epigastric scutum narrowly united and amount of soft integument enclosed is about as long as sclerotized portion behind it in male . *Ceraticelus minutus*, p. 49
- 3'. Length more than 1.2 mm.; posterior lateral angles of epigastric scutum broadly united, enclosed soft integument much shorter than the length of the joined sclerotized portion in male. *Ceraticelus micropalpis*, p. 49
4. Length 1.9 mm. or less 7
- 4'. Length 2.0 mm. or more 5
5. Cephalic pits present in male *Tapinocyba* sp., p. 54
- 5'. No cephalic pits present in male 6
6. Dark triangular mark anterior to lateral eyes on each side; no hornlike protuberance of cephalic region *Spirembolus* sp., p. 54
- 6'. No dark triangular mark anterior to lateral eyes on each side; hornlike protuberance of cephalic region present in male. *Cornicularia indirecta*, p. 59
7. Length less than 1.2 mm. *Sisicus penifusiferus*, p. 53
- 7'. Length more than 1.2 mm. 8
8. Cephalic region in male protruding in hornlike extension, with cavities opening in each side of its base *Organates rostratus*, p. 52
- 8'. Cephalic region not protruding in hornlike extension, lacking cavities in both sexes 9
9. Tibia of male palpus bearing long process on dorsomesal angle. *Scylaceus pallidus*, p. 53
- 9'. Tibia of male palpus lacking long process on dorsomesal angle . . 10
10. Anterior row of eyes strongly recurved; posterior median eyes more widely separated from each other than from posterior laterals. *Souessoula parva*, p. 54
- 10'. Anterior row of eyes slightly recurved; posterior row of eyes not more widely separated from each other than from posterior laterals . . 11
11. Patella of male palp bearing terminal ventral process; tip of tibia excavated dorsally, forming a pit to receive patellar process; abdomen unicolor; epigynum not trilobate 12
- 11'. Patella of male palp lacking process and tibia lacking dorsal excavation; abdomen having faint dark dorsal transverse marks; epigynum trilobate *Eperigone maculata*, p. 51
12. Anterior part of carapace dark brown *Erigone praeversa*, p. 51
- 12'. Anterior part of carapace pale yellowish brown. *Erigone autumnalis*, p. 51

Genus *Ceraticelus* Simon

The members of this genus are minute spiders, predominantly yellowish-orange, but usually having the ocular area dark colored or black. The median ocular area is usually longer than broad. The cephalothorax and abdomen are both short and broadly oval. The genus is holarctic in distribution.

Ceraticelus micropalpis (Emerton)

Ceratinella micropalpis Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 36, pl. 8, figs. 5-5b.

Ceraticelus micropalpis; Simon, 1884, Les Arachnides de France, Tome 5, p. 596.

Identification.—WJG.

Range.—Recorded chiefly from the northeastern part of the United States.

Description.—Female, length 1.3, carapace .6, abdomen .8, extended legs 3.1. Carapace and abdomen coppery brown, unmarked except for two pairs of small black spots on anterior half of abdomen, those of second pair more widely separated than first; abdomen flattened, almost round when viewed from above, much more bulky than cephalothorax, eyes relatively large, rimmed with black; legs yellowish brown, with many short, pale hairs.

Male similar in most respects; slightly smaller.

Ceraticelus minutus (Emerton)

Minute Spider

Ceratinella minuta Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 36, pl. 7, figs. 4, 4b.

Ceraticelus minutus; Crosby and Bishop, 1925, New York State Mus. Bull. no. 264, p. 34, pl. 8, figs. 72-78.

Identification.—WJG.

Range.—Northeastern United States and adjacent Canada, south to Virginia, west to Wisconsin, Missouri and Kansas.

Description.—Female, length 1.1, carapace .5, abdomen .6, extended legs 2.5. Carapace and abdominal scuta orange brown; intervening areas of soft integument on abdomen yellowish gray; inframammillary scutum encircles spinnerets; legs pale yellowish brown.

Habitat and Habits.—Kaston (1948:154) recorded this small spider from under leaves and from a peat bog in Connecticut. Levi, Levi and Kaspar (1958:46) recorded it from herbs and leaf litter in Wisconsin. On the Reservation it was also obtained from leaf litter.

Genus *Ceratinella* Emerton

Members of this genus resemble those of *Ceraticelus* in most respects, but differ in that the cheliceral fang has a double curve, first concave and then convex. The genus is holarctic in distribution.

***Ceratinella brunnea* Emerton**

Ceratinella brunnea Emerton 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 36, pl. 8, figs. 3-3b.

Identification.—WJG.

Range.—Southern Canada; Labrador; eastern United States; Antilles.

Description.—Female, length 1.3, carapace .6, abdomen .9, extended legs 3.5. Carapace dark reddish brown; abdomen slaty, its dorsal surface slightly rugose; its bulk much greater than that of cephalothorax, and its width almost twice that of carapace. Anterior row of eyes slightly recurved and posterior row slightly procurved; median ocular area longer than wide, and wider posteriorly than anteriorly; legs pale reddish yellow set with abundant short hairs (see Fig. 17).

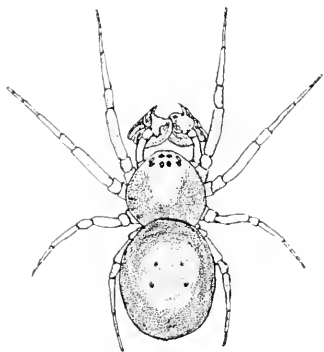


FIG. 17. *Ceratinella brunnea*, male, $\times 20$.

Habitat and Habits.—Of the various small spiders that live in leaf litter, this species seems to be one of the most abundant. It has been collected by sifting, in each month of summer, and has been found chiefly in oak-hickory woodland.

Genus *Cornicularia* Menge

Males have a hornlike protuberance bearing stiff hairs or bristles, between the eyes. The tibia of the male palpus has a long apophysis either single or double, with a deep rounded emargination on the lateral side. The cephalothorax is somewhat elongated. The epigynum is wide, with the openings on either side of a broad median lobe.

***Cornicularia indirecta* (Cambridge)**

Erigone indirecta Cambridge 1874, Proc. Zool. Soc. London, p. 440.

Cornicularia indirecta Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 41.

Identification.—WL.

Description.—Male, length 2.5, carapace 1.25, abdomen 1.25, extended legs 6.0. Carapace chestnut, having short, inconspicuous hornlike protuberance in interocular region; palps dark gray; abdomen plumbeous; legs pale orange.

Habitat and Habits.—The only specimen found was an adult male sifted from oak-hickory leaf litter on February 28, 1962.

Genus *Eperigone* Crosby and Bishop

Members of this genus resemble those of *Erigone* in most respects, but lack the ventral process on the male patella, and denticles on the chelicerae and

margins of the carapace are less developed. The epigynum is trilobate. The known members of this genus are confined to the United States and Mexico.

Eperigone maculata (Banks)

Tmetiscus maculatus Banks 1892, Proc. Acad. Nat. Sci. Philadelphia, vol. 44, p. 41, pl. 4, fig. 23.

Eperigone maculata: Crosby and Bishop, 1928, New York State Mus. Bull., vol. 278, p. 54.

Identification.—WI.

Range.—United States: perhaps confined to northeastern one-fourth of country.

Description.—Female, length, 1.4, carapace .8, abdomen .8, extended legs 3.7. Carapace and legs amber, legs paler, and sparsely haired; abdomen about as large as cephalothorax, bluntly pointed behind, widest near its middle, gray with exceedingly faint pattern of darker transverse and middorsal markings; anterior row of eyes recurved, having eyes directed forward; posterior row nearly straight.

Habitat and Habits.—Like the other erigonids collected, this minute spider was obtained from leaf litter by sifting. Kaston (1948:194) mentioned ballooning by this species in autumn.

Genus *Erigone* Audouin

In males of this genus the patella of the palp is provided with a terminal ventral process, and the tip of the tibia is deeply excavated to form a deep pit. The chelicerae have a lateral row of teeth, and sometimes additional teeth. Usually there are teeth on the margins of the carapace. The many species of this genus mostly conform to a holarctic distribution pattern, but some reach the tropics in South America, Africa and Asia.

***Erigone praeursora* Chamberlin and Ivie**

Erigone praeursora Chamberlin and Ivie, 1939, Studies of North American Spiders of the Family Micryphantidae, Siebente Internat. Kongr. Ent., Berlin, vol. 1, p. 58.

Identification.—WI.

Range.—Known from Nebraska and Kansas.

Description.—Female, length 1.6, carapace .8, abdomen .7, extended legs 4.2. Carapace pale brown, darker in cephalic region, eyes black; abdomen grayish brown; legs pale amber sparsely haired.

***Erigone autumnalis* Emerton**

Ballooning Spider

Erigone autumnalis Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 58, pl. 17, figs. 8-Sc.

Identification.—WI.

Range.—Northern United States.

Description.—Male, length 1.5, carapace .8, abdomen .7, extended legs 4.1. Carapace orange-brown, suffused with gray posteriorly, abdomen gray, almost

round; legs pale brownish yellow, pedipalps darker, grayish, chelicerae projecting prominently beyond anterior end of carapace (see Fig. 18).

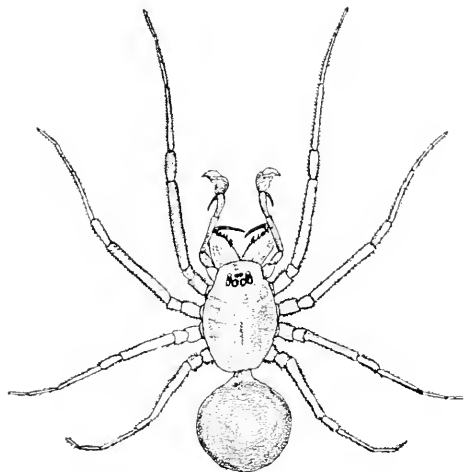


FIG. 18. *Erigone autumnalis*, male, $\times 19$.

Habitat and Habits.—Kaston (1945:192) mentioned occurrence of this species in leaf litter, and its habit of ballooning.

Genus *Origanates* Crosby and Bishop

In the male the dorsal surface of the head bears a hornlike extension projecting forward and upward, and having the posterior median eyes on its upper surface. There are cavities in the head, with a pair of large, oval openings at the posterior base of the "horn." The palpal tibia is armed with a long dorsal apophysis. The embolus is styloform, making one turn around the tip of the bulb, and there is a large oblique tooth at its base. The genus is North American.

Origanates rostratus (Emerton)

Unicorn Spider

Lophocarenum rostratum Emerton, 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 49, pl. 14, figs. 1 and 1e.

Origanates rostratus; Crosby and Bishop, 1933, Ann. Ent. Soc. Amer. vol. 26, p. 154, figs. 181-185.

Identification.—WI.

Range.—Northeastern United States.

Description.—Male, length 1.6, carapace .8, abdomen .8, extended legs 5.6. Carapace chocolate brown, with paler, shield shaped area in center, and with dark transverse streak at base of raised cephalic portion; openings of cephalic cavities immediately behind posterior lateral eyes on each side, slitlike when viewed from above; legs yellowish brown; abdomen slaty gray finely mottled with brownish yellow (see Fig. 19).

Habitat and Habits.—In the winter of 1961-1962 several adult males were obtained from leaf litter, from beneath thickets of dogwood and blackberry, and from oak-hickory forest.

Genus *Scylaceus* Bishop and Crosby

Characters of the male genitalia have been used to separate this genus from its near relatives. The tibia of the male palpus has a long process on the dorso-mesal angle. The embolic division has an elongate "tail-piece." The ejaculatory duct opens in the mesal branch of the embolus.

Scylaceus pallidus (Emerton)

Tmetiscus pallidus Emerton 1882, Trans. Connecticut Acad. Sci., vol. 6, p. 58.

Scylaceus pallidus Bishop and Crosby 1938, Jour. New York Ent. Soc., vol. 46, p. 91.

Identification.—WI.

Description.—Male, length 1.5, carapace .7, abdomen .8, extended legs 3.7. Carapace grayish yellow, oval; abdomen pale gray; legs pale yellow.

Habitat and habits.—Seven adults of this minute spider were collected in February and March 1962; one was in a Berlese sample from an old quarry, others were sifted from leaf litter from a blackberry thicket and from oak-hickory woodland.

Genus *Sisicus* Bishop and Crosby

In the minute spiders of this genus the body is approximately one millimeter long. The genus is distinguished by characters of the male genitalia. The tibia of the male's palp is produced into a rounded lobe. The tail-piece of the embolic division of the palp is broad, flat and rounded. The embolus is long and slender, coiled, with an extraordinarily elongate median apophysis. The genus is known from northeastern North America and northwestern Europe.

Sisicus penifusiferus Bishop and Crosby

Sisicus penifusiferus Bishop and Crosby, 1938, Jour. New York Ent. Soc., vol. 46, p. 61.

Identification.—WI.

Range.—Northeastern states (New York, Maine, Ontario) west to Wisconsin and Kansas.

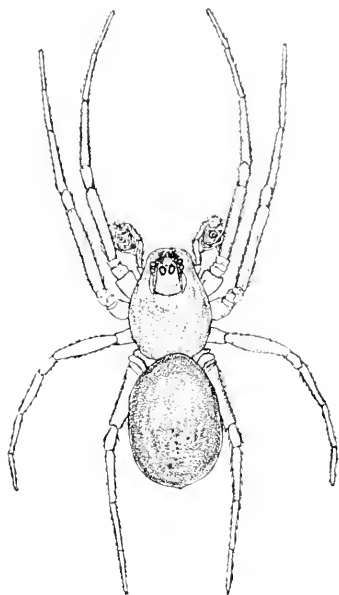


FIG. 19. *Origanates rostratus*, male, $\times 20$.

Description.—Female, length, .9, carapace .5, abdomen .4, extended legs 2.3. Carapace pale yellowish amber; legs of almost same color, but slightly paler; abdomen oval, yellowish gray; first row of eyes slightly recurved, medians in contact with each other, laterals slightly larger and only slightly separated from medians; posterior row straight, medians larger than laterals; all eyes relatively large and crowded close together, directed upward.

Genus *Souessoula* Crosby and Bishop

This genus is closely related to *Tmeticus*, from which it is distinguished by characters of the genitalia. It is known from the eastern and northern parts of North America.

Souessoula parva Banks

Tmeticus parvus Banks, 1899, Proc. Ent. Soc. Washington, vol. 4, pp. 189 and 192.

Souessoula parva; Crosby and Bishop, 1936, Festschrift zum 60 Geburtstag von Professor Dr. Embrik Strand, vol. 2, p. 62.

Identification.—WJG.

Range.—Eastern United States.

Description.—Male, length 1.4, carapace .7, abdomen .7, extended legs 4.1. Carapace somewhat flattened, bluntly pear-shaped, amber, slightly clouded with black; abdomen slaty with pale hairs; legs pale amber, nearly equal in length, with abundant short hairs; anterior row of eyes strongly recurved, directed forward, posterior row nearly straight, with medians more widely separated from each other than from laterals.

Genus *Spirembolus* Chamberlin

The head is elevated and conical, but with no extreme modifications; the clypeus is four or five eye diameters in height; the palpal femur is relatively long; the palpal tibia bears a long, slender curved process which has a small hook at the tip; the embolus is spiral shaped, the spiral increasing in diameter distally; the epigynum has a transverse piece behind.

Spirembolus sp.

Identification.—WJG.

Description.—Female, length 2.2, carapace .9, abdomen 1.3, extended legs 3.7. Carapace tan, dusky along margins; eyes of anterior row directed forward; anterior lateral and posterior lateral eye in contact on each side, with small triangular black area immediately anterior to their contact; legs pale yellowish brown; dorsum of abdomen oval, olive, with exceedingly fine, dark reticulations, having four narrow, pale brown chevrons on posterior three-fifths; venter pale, uniform olive (epigynum amber), bordered with irregular pale streak on each side.

Genus *Tapinocyba* Simon

Males have cephalic pits. In the male, the short, stout embolus arises directly from a thin, flat, oval tail-piece. The genus is holarctic.

Tapinocyba sp.

Identification.—WI.

Description.—Female, length 2.0, carapace .8, abdomen 1.4, extended legs

4.2. Carapace uniform light chestnut brown, abdomen pale, uniform yellowish gray, several times more bulky than cephalothorax, legs pale brownish gray, intermediate in color between carapace and abdomen.

Family ARGIOPIDAE Simon

Typical Orb Weavers

Size ranges from small to large in these ecribellate, trionychous spiders. There are eight homogeneous eyes, arranged in two rows. The chelicerae have scopulae and a boss (sometimes rudimentary). The legs are strongly curved. The abdomen is much enlarged and swollen, sometimes of irregular shape, with its anterior end overlapping the carapace. For the capture of their prey these spiders construct the highly specialized vertical orb web, consisting basically of many concentric rings and a series of radii. Characteristically, the spider hangs head down in the center of the web. In its web the spider is graceful and quick, and it easily overcomes relatively large prey that becomes entangled in its strands, but on the ground some are slow and clumsy.

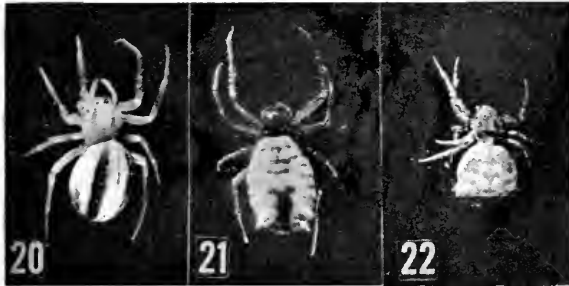


FIG. 20. *Singa pratensis*, female, $\times 3$.

FIG. 21. *Micrathena mitrata*, female, $\times 3$.

FIG. 22. *Colphepeira catawba*, female, $\times 3$.

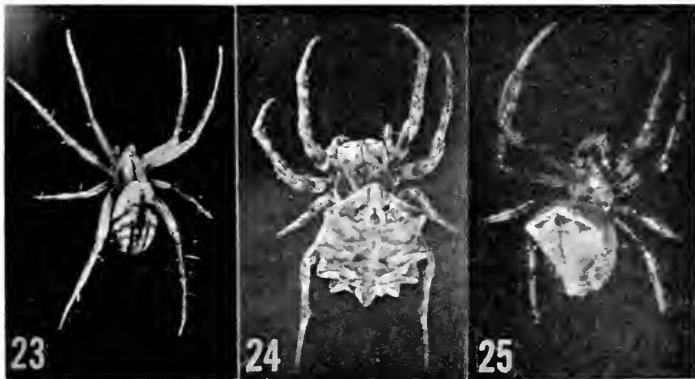


FIG. 23. *Mangora ornata*, female, $\times 3$.

FIG. 24. *Acanthepeira stellata*, female, $\times 2$.

FIG. 25. *Verrucosa arenata*, female, $\times 2$.

KEY TO THE SPECIES OF THE FAMILY ARGIOPIDAE OF THE RESERVATION

1. Femora bearing trichobothria; chelicera large and powerful, lacking a well defined boss 2
- 1'. Femora lacking trichobothria; chelicera of normal proportions; bearing a boss 5
2. Smaller (less than 3 mm. in length); tracheal spiracle about one-fourth distance from spinnerets to epigastric furrow.
Mimognatha foxi, p. 78
- 2'. Larger (more than 3 mm. in length); tracheal spiracle immediately in front of spinnerets 3
3. Body form not elongate; anterior and posterior lateral eyes contiguous; a red spot on middle of venter *Leucauge venusta*, p. 71
- 3'. Body form elongate; lateral eyes not contiguous; no red spot on middle of venter 4
4. Larger (usually more than 7 mm.); chelicerae markedly elongate, almost as long as carapace (females), or longer than carapace (males); anterior eye row curved more strongly than posterior.
Tetragnatha elongata, p. 83
- 4'. Smaller (usually less than 7 mm.), chelicerae markedly shorter than carapace; anterior and posterior eye rows equally curved, approximately parallel *Tetragnatha laboriosa*, p. 84
5. Abdomen drawn out posteriorly into an elongate caudal tubercle.
Cyclosa caroli, p. 68
- 5'. No elongate caudal tubercle 6
6. Spinnerets on a tuberclelike elevation, surrounded by a thick, sclerotized ring; abdomen of irregular shape, bearing sharp spines in females (*Micrathena*) 7
- 6'. Spinnerets not surrounded by a sclerotized ring; abdomen of more normal shape and not spiny (except in *Acanthepeira*, in which the spines are blunt) 9
7. Abdomen of female arrowhead-shaped, the posterior pair of spines enlarged and forming widely spread lateral barbs; abdomen of male widest at caudal end *Micrathena sagittata*, p. 77
- 7'. Abdomen of female not arrowhead-shaped, abdomen of male not widest at caudal end 8
8. Abdomen of female having five pairs of spiny tubercles; abdomen of male three times as long as wide; widest at middle.
Micrathena gracilis, p. 75
- 8'. Abdomen of female having only two pairs of spiny tubercles, both posteriorly situated, one below the other on each side; abdomen of male less than three times as long as wide; widest a little behind middle *Micrathena mitrata*, p. 76
9. Abdomen starlike—with blunt cone-shaped protuberances extending anteriorly, posteriorly, and (several) on each side.
Acanthepeira stellata, p. 59
- 9'. Abdomen lacking protuberances as above 10
10. Abdomen subtriangular 11
- 10'. Abdomen globose or ovate 12
11. Length more than 5 mm.; abdomen hard and glossy dorsally, white, pale pink or yellow *Verrucosa arenata*, p. 85

- 11'. Length less than 5 mm.; abdomen soft and dull colored dorsally, mottled with gray *Colphepeira catawaba*, p. 66
12. Abdomen brown or gray, with a conspicuous darker dorsal folium, sharply defined, and scalloped along its edges, lighter mediad to its edge 13
- 12'. Abdomen not bearing distinctive folium as described above 15
13. Folium enclosing a similar but smaller dark-edged marking. *Acacesia hamata*, p. 58
- 13'. Folium not enclosing a smaller dark-edged marking 14
14. Length more than 4.5 mm. *Eustala anastera*, p. 69
- 14'. Length less than 4.5 mm. *Eustala cepina*, p. 70
15. Posterior row of eyes strongly procurved 16
- 15'. Posterior row of eyes straight or recurved 18
16. Eyes of anterior row uniformly spaced *Gea heptagon*, p. 70
- 16'. Median eyes of anterior row nearer together than they are to anterior laterals 17
17. Abdomen having irregular broad dorsal longitudinal black band, having lateral extensions which may connect with black marks on sides. *Argiope aurantia*, p. 63
- 17'. Abdomen in female having series of transverse black bands, most of them discontinuous; abdomen in male, white except for small black spots posteriorly *Argiope trifasciata*, p. 65
18. Tibia of third leg bearing on its prolateral surface a double series of thin feathery hairs (*Mangora*) 19
- 18'. Tibia of third leg bearing no feathery hairs 21
19. Abdomen bearing a pair of parallel black lines on its posterior half; carapace has a thin middorsal black line; femora of first and second legs each have ventral black line *Mangora gibberosa*, p. 72
- 19'. Black lines lacking on abdomen, carapace and femora 20
20. Abdomen pale colored, without markings, except for three pairs of black dots near its posterior end *Mangora ornata*, p. 72
- 20'. Abdomen pale colored with a dark brown middorsal stripe, narrow anteriorly, irregular along edges, and enclosing whitish spots. *Mangora placida*, p. 73
21. Venter having a median white band; combined length of tarsi and metatarsi exceed combined length of patella and tibia in all legs of both sexes; lateral eyes not on tubercles *Metepeira labyrinthica*, p. 73
- 21'. Venter lacking white median band; combined length of tarsi and metatarsi exceeded by combined length of patella and tibia on most legs of most specimens; lateral eyes on tubercles 22
22. Thoracic groove longitudinal 23
- 22'. Thoracic groove transverse 25
23. Abdomen having a middorsal longitudinal brown band bordered by yellowish bands *Neoscona pratensis*, p. 81
- 23'. Abdomen lacking longitudinal bands 24
24. Larger (length usually more than 8 mm.) and darker; scape of epigynum longer and more slender *Neoscona benjamina*, p. 79
- 24'. Smaller (length usually less than 8 mm.) and paler; scape of epigynum shorter and more robust *Neoscona arabesca*, p. 79
25. Smaller, less than 9 mm. in body length 26
- 25'. Larger, more than 9 mm. in body length 29

26. Abdomen with green and white longitudinal bands.
Conarana juniperi, p. 67
- 26'. Abdomen without green and white longitudinal bands 27
27. Abdomen whitish, with three pairs of black dots on posterior part.
Araniella displicata, p. 62
- 27'. Abdomen yellow with black marks 28
28. Abdomen having pair of dark longitudinal dorsal bands.
Singa pratensis, p. 81
- 28'. Abdomen having transverse dark band posteriorly . . . *Singa truncata*, p. 82
29. Abdomen grayish brown with darker markings, and with a pair of low humplike protuberances on anterior part of dorsum.
Araneus solitarius, p. 61
- 29'. Abdomen orange yellow with darker markings, lacking protuberances.
Araneus marmoreus, p. 60

Genus *Acacesia* Simon

In the medium-sized orb-weavers of this genus the abdomen is elongate oval to rhomboidal with a characteristic pattern. The predominant color is dark gray or brown. The order of length of the legs is 1, 2, 4, 3. The legs bear few spines. The posterior row of eyes is strongly recurved, and the median ocular area is but little wider in front than behind. The anterior median eyes are larger than the anterior laterals. The median ocular area and the clypeus are vertical. The cephalothorax is highest in front at the posterior median eyes. Members of this genus are confined to North America and South America.

Acacesia hamata (Hentz)

Difoliate Orbweaver

Epeira hamata Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 474, pl. 31, fig. 10.

Acacesia hamata; Kaston, 1948, Spiders of Connecticut, p. 235, pl. 33, fig. 705, pl. 34, figs. 725, 726.

Acacesia foliata; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 125.

Identifications.—TBK, MHM, AB.

Range.—Widely distributed in North America, but found chiefly in the Deciduous Forest Formation of the eastern United States; occurs southward through Central America and into South America.

Description.—Female, length 6.3, carapace 2.8, abdomen 4.0, extended legs 31.5. Carapace darkest anteriorly; median ocular area light orange followed in the cephalic region by yellow that fades to cream in thoracic region; anterior median and posterior median eyes on raised tubercles; body glabrous; abdomen distinctly marked with thin black lines forming elongate V beginning at base of abdomen and converging to point mid-way of abdomen; on each side of dorsum another undulating black line begins at base and extends toward mid-line as it continues posteriorly, these two lines ending caudad of anal tubercle; background color of abdomen dirty cream, shaded with olive green; anterior median and posterior median eyes on raised prominence directed forward and posterior median eyes in front of anterior median eyes; legs pale yellow, darker terminally, with only few scattered spines, and with faint annulations on those of first and second pair (see Fig. 26).

Male, length 4.0. Carapace lemon shaded with gray at rear of cephalic region and at thoracic groove; abdomen darker than in female with characteristic markings same as in female; these markings enclose dark gray, almost black areas, and narrowly margined by white; large, stout spine on ventral surface of tibia of second leg; spine approximately half length of tibia.

Habitat and Habits.—This slender, long-legged orbweaver is relatively uncommon, and was seen chiefly in late summer, usually in grassland with some shrubby growth, or at woodland edge. The spiders were never seen in orb webs, but characteristically, were on a twig or weed stem, with the legs drawn up tightly against the body in a manner that rendered them remarkably inconspicuous. When touched, such a spider would drop from its perch on a strand of web, and would run rapidly to find shelter. Kaston (1948:235) stated that in Connecticut spiders of this species attain maturity in late June and July.



FIG. 26. *Acacesia hamata*, female, $\times 3$.

Genus *Acanthepeira* Marx

In the medium-large, grass-living spiders of this genus the abdomen has blunt spiny tubercles around its entire margin. The cephalic region is elevated, and set off by a well marked cervical groove. The anterior row of eyes is strongly procurved, and the anterior median eyes are twice as far as the anterior lateral eyes from the clypeal margin. The clypeus is relatively high (about equalling the height of the median ocular area). The genus is North American.

Acanthepeira stellata (Walckenaer)

Star-bellied Orbweaver

Epeira stellata Walckenaer, 1805, Tableau Aran., p. 65, pl. 54.

Araneus stellatus: Scheffer, 1904, Industrialist (Kansas State Agr. Coll.) vol. 30, p. 9.

Identifications.—MHM, RLC.

Range.—Seemingly occurs throughout most of the United States (records chiefly from the eastern half of the country), and southward at least to Panama; southeastern Canada.

Description.—Female, length 11.0, carapace 3.5, abdomen 8.0, extended legs 31. Carapace dark reddish brown with black along sides of thoracic regions, entire carapace clothed with light colored downy hairs; cephalic region quadrangular in outline and raised prominently above thoracic region; dark

three-pronged mark pointing anteriorly on cephalic portion; legs ringed with brown and yellow, brown predominating; abdomen heavily spined in following manner: single median dorsal spine at base of abdomen; pair of double spines on each side near basal region; three pairs of spines along lateral dorsal region; large median dorsal spine at posterior end; three subterminal spines beneath prominent median dorsal spine at posterior end; dorsum of abdomen brown with spines accented by lighter cream colors; venter uniformly brown. Male only slightly more than half length of female. (See Fig. 24.)

Habitat and Habits.—These large spiny orbweavers were found in open sunny situations where there was rank herbaceous vegetation. They were most common in bluestem prairie but also were found occasionally in meadows of brome grass, and even in weedy fields in an early stage of succession. No adult males were found. Only a few adult females were seen each year, in late July, August and September. In autumn the young were common in bluestem prairie, and usually several could be obtained in a few minutes of sweeping.

The webs are low, usually within four feet of the ground, and attached to slender stalks and leaves. The spider hangs, head down, in the hub of the web; at any disturbance it drops into the ground litter and, remaining motionless, with legs drawn up, is difficult to see.

The prey consists of medium-sized insects, especially immature grasshoppers. On July 4, 1955, a half-grown *Acanthepeira* was found with other spiders in the nest of a mud dauber (*Sceliphron*).

Although this is a fairly large spider, the young may be air borne, and may drift for long distances on floating strands of gossamer. One was obtained 1000 feet above the earth at Tallulah, Louisiana, on December 13, 1930 (Crosby and Bishop, 1936:47).

Genus *Araneus* Clerck

The members of this genus are medium-sized or large orbweavers that have the median ocular area wider in front than behind, not much longer than wide, and the posterior eyes are not larger than the anterior medians. The lateral eyes on each side are contiguous or nearly so and widely removed from the median eyes. The clypeus is narrower than the median ocular area. The abdomen may be ovate or may have humps or prominences in an anterolateral position. The genus is cosmopolitan.

Araneus marmoreus Clerck

Marbled Orbweaver

Araneus marmoreus Clerck, 1757, *Aranei Suecici*, p. 29, pl. 7, fig. 3.

Araneus conspicillatus; Scheffer, 1904, *Industrialist* (Kansas State Agr. Coll.) vol. 30, p. 9.

Identifications.—RLG, AB.

Range.—This large spider has a holarctic distribution, and is found throughout the United States.

Description.—Female, length 12.5, carapace 6.5, abdomen 6.5, extended legs 45. Carapace light orange, darkest in cephalic region and along margins; femora and patellae orange, other segments lighter similar to lightest parts of carapace; distal end of tibiae, metatarsi, and tarsi ringed with dark brown or black; dorsum of abdomen yellow marked with black, wide central band having scalloped edges with lateral points of scallops darkened; band narrows and darkened lateral regions fuse just in front of spinnerets; venter has large dark central spot flanked by two yellow half-moon-shaped marks, pale pubescence on both carapace and abdomen; legs armed with many spines and bristles, especially on their distal segments. Male about two-thirds length of female; having all leg segments yellow basally and dark distally.

Habitat and Habits.—This large, brightly colored orbweaver is only moderately common on the Reservation. Its young, like those of *Neoscona benjamina* are favorite prey of the common mud-dauber wasps. In dozens of samples from the wasps' nests, the ratio is estimated to have been at least 20 to one in favor of *Neoscona*—perhaps providing a rough index to the relative abundance of the two kinds.

Marbled orbweavers have been found chiefly in woodland or woodland edge. Adults have been found only in September and October, and all were females. The webs are usually three to ten feet above the ground. Where an upper corner of the web is attached to a twig, the spider has a retreat, a cone-shaped shelter of leaves woven together, open on the underside. By day it spends most of its time huddled with legs drawn up, in this retreat, where it is not likely to be noticed. The prey consists of the larger kinds of flying insects that are present in the spider's habitat; cicadas, katydids and large beetles, especially have been noticed in the webs.

Araneus solitarius (Emerton)

Solitary Orbweaver

Epeira solitaria Emerton, 1884, Trans. Connecticut Acad. Sci., vol. 6, p. 299.

Araneus solitarius; Bryant, 1908, Occas. Papers Boston Soc. Nat. Hist., vol. 7, p. 54.

Identifications.—MHM, AB.

Range.—Throughout the United States and southern Canada, north to Alaska.

Description.—Female, length 20, carapace 8.0, abdomen 14, extended legs 60. Carapace mostly dark brown, almost black with reddish markings in cephalic region at rear of ocular quadrangle; reddish hawthorn-leaf-shaped mark in center of carapace; fan-shaped lighter mark immediately behind

cephalic pit; legs orange, ringed heavily with black; two large tubercles, "shoulder humps" at base of abdomen on dorsal surface; faint median basal black mark extends to region of two tubercles and faintly outlined black folium on dorsum; abdomen otherwise uniformly brown; sternum black with central orange stripe, latter two segments of which resemble arrow with arrow head pointed forward. Male not found; approximately two-thirds length of female according to measurements listed by Kaston (1948).

Habitat and Habits.—This large orbweaver is rare on the Reservation; only four individuals have been found in 13 years of field work. All were adult females and were in dense woods having climax species of oaks and hickory. The spiders themselves were inconspicuous, clinging to bark of tree trunks at the sides of their webs, and were discovered only after careful search when their webs had been noticed. All were found in June, whereas Kaston (1948:251) stated that in Connecticut maturity is attained in August and September.

Genus *Araniella* Chamberlin and Ivie

The spiders of this genus are small and delicate, pale colored orbweavers. The median ocular area is as wide behind as in front, and the posterior median eyes are slightly larger than the anterior medians. The dorsum has a series of paired dark spots along the posterior edge. The abdomen is ovate. The genus is cosmopolitan.

Araniella displicata (Hentz)

White-bodied Orbweaver

Epeira displicata Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 476, pl. 31, fig. 17.

Araneus displicatus; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 125.

Araniella displicata; Chamberlin and Ivie, 1942, Bull. Univ. Utah, Biol. Ser., vol. 7(1), p. 76.

Identification.—AB.

Range.—Throughout the United States.

Description.—Female, length 5.8, carapace 2.6, abdomen 3.5, extended legs 16. Carapace and legs amber, with black spines on legs; abdomen cream colored dorsally, with pair of prominent pits near middle, each about one-third of distance from mid-line to lateral margin; two pairs of dark dots, one behind each pit and one ahead, and separated from them by distance approximating that between pits themselves; three more pairs of prominent black dots on posterior part of abdomen, near its lateral margin; ventral surface of abdomen dark brown. Male resembles female in most respects but slightly smaller.

Habitat and Habits.—The few individuals seen on the Reservation were obtained by sweeping brome grass and saplings near the headquarters in early June.

Genus *Argiope* Audouin

The abdomen is oval, overhanging the carapace anteriorly and overhanging the spinnerets posteriorly. The cephalothorax is relatively flat, covered with

silvery white hairs. All of the eight eyes are dark. Both rows of eyes are procurved, but the curvature is much greater in the posterior row. The males are much smaller than the females. The legs of the first pair are the largest. The genus is cosmopolitan.

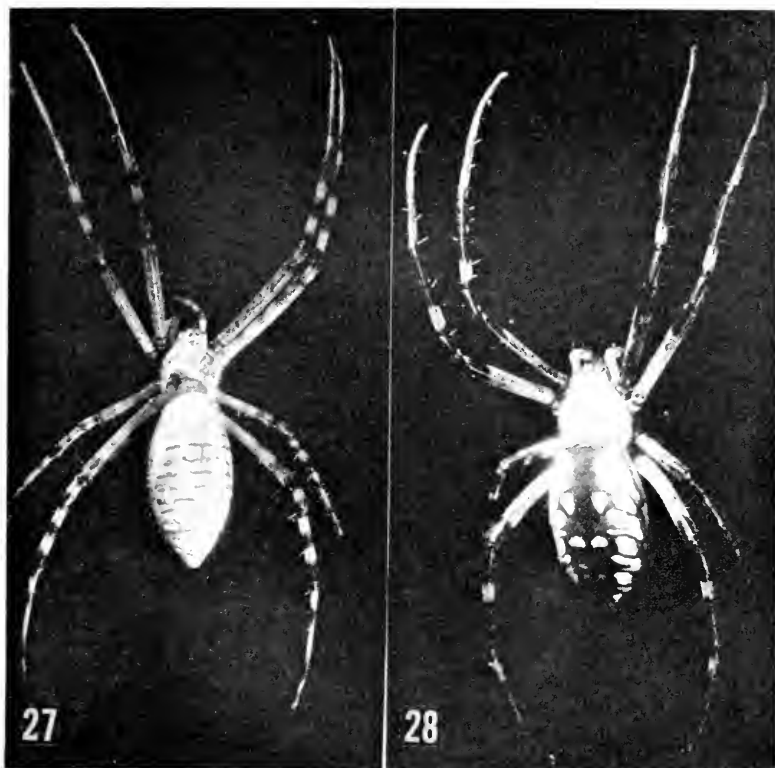


FIG. 27. *Argiope trifasciata*, female, $\times 1\frac{1}{2}$.

FIG. 28. *Argiope aurantia*, female, $\times 1\frac{1}{2}$.

Argiope aurantia Lucas

Black and Yellow Garden Spider

Argiope aurantia Lucas, 1833, Ann. Soc. Ent. France, vol. 2, p. 86, pl. 5, fig. 1.

Argiope aurantia; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 11.

Identifications.—TBK, MHM, RLC, AB.

Range.—Most of the United States, and southward into the Neotropical Region (Costa Rica).

Description.—Female, length 18, carapace 6.0, abdomen 12, extended legs 54. Carapace silvery white; thin central gray stripe and three pairs of darker marks radiating from cephalic pit through which median line extends; eye

region marked with black; anterior legs almost entirely black with yellow annulations; remainder of legs have femora yellow-orange with distal part black, and remaining leg segments black with yellow annulations; dorsum black and yellow; broad median area of black with three pairs of yellow spots, lateral areas yellow with bands of black crossing from ventral direction and connecting with broad median black stripe; two humps tipped with white at base of abdomen; venter black, marbled with yellow; pair of stripes extending from lateral areas of scape backward to about middle of abdomen enclosing series of paired yellow spots on field of black (see Fig. 27).

Male one-fourth to one-third length of female, carapace with broad median area of pale yellow or cream color bounded on each side by submarginal brown bands, narrow marginal cream colored bands beginning behind cephalic region and extending to posterior end of carapace, longitudinal thoracic groove accented with brown, abdomen with broad central scalloped band of rusty orange outlined with brown along part of its length, bounded on each side near latero-dorsal surface of abdomen by bands of white that show heavy opaque pigmentation, near base of abdomen white bands cover two prominent tubercles, sternum dark brown with median band of white.

Habitat and Habits.—This garden spider occurs chiefly in grassland, especially where grass is tall, and where there are tall herbaceous plants or shrubs. The spider hangs head down in the hub of its large orb web, which is supported by stiff stems of grass or weeds. From time to time this species has been found in thickets and in open woodland, usually near its edge. It is more tolerant of shade than is *A. trifasciata*, but less tolerant of exposed situations with sparse vegetation.

In 1949 the spiders were remarkably abundant in an old field dominated by giant ragweed and sunflower, and in the fall of 1948, they were even more numerous in a *Typha* marsh at the edge of a small pond. In both years the spiders were near peak abundance; several webs might be found within a square yard. In the following period of years there was drastic and progressive reduction in numbers; in late summer of 1952 it was estimated that the population amounted to less than one per cent of the numbers present at the same season in 1949, and in 1953 and 1954 there were even fewer. In 1955 the spiders were again moderately abundant, but in 1956 the numbers reached their lowest level; only about a dozen were seen in a month of field work in late summer at the time when they are usually most conspicuous. Although the course of plant succession doubtless affected habitat conditions to the benefit or detriment of the local population at different times, there was no evident reason for the great changes in numbers that were observed from year to year. In the different years when populations were low, weather conditions varied from drought to rainfall somewhat above average.

Prey of the garden spider consists chiefly of the larger kinds of jumping or flying insects that occur in its habitat. Cicadas (*Tibicen pruinosus*) and June beetles (*Phyllophaga* sp.) have often been noticed in the webs, but grasshoppers are probably the staple food—especially the common red-legged grasshopper (*Melanoplus femur-rubrum*). Rarely, small vertebrates such as young garter snakes become entangled in the web and are eaten. An adult female garden spider that was under observation for a month in July and August, 1954, had its web among elm saplings directly in front of a nest of paper wasps (*Polistes* cf. *canadensis*). There were almost always some of the wasps enshrouded in the web or discarded beneath it, and they seemed to provide most of the food of this individual. However, the wasps seen leaving or approaching their nest adroitly avoided the web.

The mud dauber, *Sceliphron*, is one of the chief natural enemies of the garden spider. Young of both *A. aurantia* and *A. trifasciata*, stung and paralyzed, are used in great numbers to provision the cells in which the wasp leaves its eggs.

The female garden spider produces her egg sac, with from 400 to 1200 eggs, in late August or September. The sac is firmly anchored to weedy vegetation near the web. The spiderlings emerge from the eggs in autumn, but overwinter in the sac and leave it in April or May. Their growth is rapid in the spring and early summer. Some females mature in early July but most are later; there is much variation in time of maturity from year to year, as well as between individuals. Even before attainment of maturity the male and female may be closely associated, in adjoining webs, the male's relatively small and simple. In its seasonal schedule, locally, *A. aurantia* is two to three weeks ahead of *A. trifasciata*.

***Argiope trifasciata* (Forskäl)**

Banded Garden Spider

Aranea trifasciata Forskäl, 1775, Descr. Animal. Hauniae, p. 86.

Argiope trifasciata; Thorell, 1873, Remarks on synonyms of European spiders, part 4, Upsala, p. 519.

Argiope trifasciata; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 11.

Identifications.—TBK, MHM, RLG.

Range.—Cosmopolitan in warmer regions throughout the world.

Description.—Female, length 21, earapace 7.0, abdomen 16, extended legs 63. Body color predominantly whitish dorsally, earapace suffused with gray; 12 transverse black bands on abdomen, some broken, others narrowed in dorsolateral area; abdomen increasingly suffused with yellow on posterior half;

on posterior third, four longitudinal black lines form grid with transverse bands; legs amber with black annuli; first pair of legs have black femora; palps amber; ventrum black, with bright yellow longitudinal area mid-ventrally on sternum, and parallel stripes of same color on abdomen, each broken near its posterior end; three pairs of white dots on black mid-ventral area of abdomen (see Fig. 28).

Series of transverse grooves on posterior part of abdomen, corresponding in position with black bands, and giving abdomen appearance of being segmented; abdomen ovate, overhanging carapace.

Male one-fourth to one-fifth of female's length, with abdomen relatively much less bulky and almost entirely white dorsally.

Habitat and Habits.—This common large orbweaver is confined to grassland habitats and was seen in greatest numbers in bluestem prairie. It is common also in meadows dominated by the introduced brome grass. On the average, the webs are a little lower than those of the black and yellow garden spider, and are in more open situations—attached to leaves or stems of grasses. Through the spring and early summer all the spiders are young and are still small and inconspicuous. In July they are subject to heavy predation by the black and yellow mud-dauber (*Sceliphron coementarium*). In the latter half of August the more advanced young attain sexual maturity, but some are as much as a month behind others in the same location. In late August and September a male and female are often seen together in the same web. The much more bulky females are shy, and will drop from the web to the ground at any disturbance, whereas the relatively inconspicuous males usually remain in the web. Usually in September the large egg cocoon is attached by tough strands of web in the top of a weed or bush. Even before the advent of cold weather many adults die, and most of those remaining die at the time of the first frost. A few survive several periods of freezing before they finally succumb.

Genus *Colphepeira* Archer

The abdomen is expanded from the base to the caudal portion, with posterolateral lobes, the surface having numerous raised points; males are markedly smaller than females; leg formula 1, 2, 4, 3, the first leg of male notably elongated; spines on legs distal patellar, distal, and prolateral tibial. The genus is North American.

Colphepeira catawba (Banks)

Catawba Orbweaver

Epeira catawba Banks, 1911, Proc. Acad. Nat. Sci. Philadelphia, vol. 63, p. 450.

Colphepeira catawba; Archer, 1941, Alabama Mus. Nat. Hist., Mus. Paper no. 18, pp. 5-6, 13-14, pl. 1, figs. 3-4, pl. 2, figs. 1-3.

Identification.—WJG.

Range.—Southeastern United States; the present record constitutes a substantial extension of the known range westward and northward.

Description.—Female, length 1.0, carapace 1.5, abdomen 2.5, extended legs 7.0. Carapace dark brown, almost black, faintly mottled with yellowish near posterior end and lateral margins; abdomen many times bulk of carapace, bulging, roughly triangular, widened posteriorly; three prominent horny tubercles at each posterolateral corner of abdomen; dorsally abdomen dull yellow, mottled with gray, which predominates posteriorly; anterior lateral and posterior lateral eyes almost in contact but relatively far removed from median eyes; anterior row of eyes recurved (from dorsal view); ocular quadrangle slightly longer than wide and slightly wider anteriorly than posteriorly; anterior median eyes largest (see Fig. 22).

Habitat and Habits.—The only specimen obtained was an adult female found in early September, 1961, in a small web in a cavity on the underside of a decaying log in oak-hickory woodland.

Genus *Conaranaea* Archer

The members of this genus are medium-small orbweavers in which the abdomen is subtriangular to widely ovate, with or without a prominent cone on each shoulder. There is at least one spine on the cephalic region. The carapace is pilose, the abdomen is not pilose dorsally. There are no ventral femoral spines. The genus occurs in temperate Eurasia, from western Europe to Japan, and in Western North America, south as far as Mexico.

Conaranaea juniperi (Emerton)

Juniper Spider

Epeira juniperi Emerton, 1884, Trans. Connecticut Acad. Sci., vol. 4, p. 313, pl. 24, fig. 6, pl. 36, figs. 14-16.

Conopeira juniperi; Archer, 1951, Amer. Mus. Novit. no. 1502, p. 25.

Identification.—WJG.

Range.—Eastern United States in New Hampshire, Massachusetts, New York, New Jersey, and Georgia, and probably west through the Deciduous Forest Formation as indicated by the present record from Kansas.

Description.—Female, length 5.6, carapace 2.3, abdomen 3.2, extended legs 16.1. Carapace and legs ivory yellow, with heavy dark spines conspicuous on the tibiae and metatarsi; abdomen much bulkier than cephalothorax, almost round seen from above, mostly white, but with faint greenish markings, and with long white hairs (see Fig. 29).

Male two-thirds to three-fourths length of female.

Habitat and Habits.—The only specimen recorded from the Reservation was an adult female found in the mud nest of

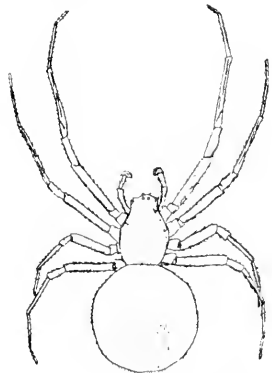


FIG. 29. *Conaranaea juniperi*, female, $\times 4$.

a wasp (*Sceliphron*) on July 28, 1960. Kaston (1948:261) noted that the species is rare in Connecticut and has been found chiefly on coniferous trees.

Genus *Cyclosa* Menge

In the medium-small woodland orbweavers of this genus the cephalothorax has a well-defined U-shaped cervical groove and the cephalic region is elevated. Both rows of eyes are recurved, especially the anterior one. The median ocular area is widest anteriorly and is longer than wide. The eyes are somewhat elevated on tubercular prominences, especially in the males. The abdomen has a conical taillike protuberance in females, but this is scarcely developed in the males. The order of length of the legs is 1, 2, 4, 3. The genus is cosmopolitan.

Cyclosa caroli (Hentz)

Caudate Orbweaver

Epeira caroli Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 24, pl. 3, fig. 15.

Cyclosa caroli; Marx, 1890, Proc. U. S. Nat. Mus., vol. 12, p. 548.

Identifications.—MHM, AB.

Range.—Much of the United States, southward to the Antilles and Guiana.

Description.—Male, length 6.5, carapace 2.8, abdomen 3.7, extended legs 14. Entire cephalothorax and legs (except for yellow-amber proximal halves of femora) dark amber, abdomen mottled with white and gray, darker ventrally, eyes unusually prominent, raised on low pedicels; abdomen relatively small (for orbweaver), its posterior third produced into fingerlike projection.

Female larger by about one-third, with taillike projection of abdomen (see Fig. 30).



FIG. 30. *Cyclosa caroli*, female, $\times 2$.

Habitat and Habits—This little orbweaver lives in forests. The web is usually within a few feet of the ground, and is peculiar in that the spider collects debris such as leaf fragments, twigs, and remains of prey, in a mass from the hub of the web to the lower edge. When at rest, the spider clinging to this mass is effectively concealed. On one occasion when a spider was disturbed in its web, it climbed to a nearby twig and clung with its legs drawn up, effectively mimicking a leaf bud. Mature individuals have been found only in spring and early summer. In late April and May this is one of the most conspicuous kinds of spiders on the Reservation.

Genus *Eustala* Simon

Members of this genus are medium-sized; the coloration is dark and the abdomen is roughly triangular as seen from above. The posterior row of

eyes is slightly procurved. The scape of the epigynum is directed forward. The genus is best represented in the American Tropics, but occurs northward throughout the United States.

***Eustala anastera* (Walckenaer)**

Hump-backed Orbweaver

Epeira anastera Walckenaer, 1841, Histoire Naturelle des Insectes Apteres, tome II, p. 33.

Eustala anastera; Simon, 1895, Histoire Naturelle des Araignees, vol. 1, part 4, pp. 766, 789, 795.

Araneus eustalus; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 9.

Identifications.—MHM, RLG, AB, WJC.

Range.—Throughout the United States and southeastern Canada, south to Brazil and the Galapagos Islands.

Description.—Female, length 9, carapace 3.5, abdomen 5.5, extended legs 32.5. Carapace light brownish orange with gray pubescence; legs with coxae and basal part of femora light orange; distal portion of femora black, remainder of leg segments orange with black annulations; abdomen broadly triangular in outline with distinct caudal tubercle; pair of black lines forming foliated pattern on dorsum and enclosing white pigmented area; white areas more prominent outside black folium; venter marked by median white oblong spot enclosed by two broad black rectangles (see Fig. 31).

Male approximately three-fourths the length of female; carapace dark olive drab with similarly colored legs and definite abdominal pattern; basal portion of abdomen has two prominent white areas on each side enclosed by foliated pattern; annulations on legs not so distinct as in female.

Habitat and Habits.—These orbweavers are common, living chiefly in woodland and edge habitat. Their webs are usually from two feet to eight feet above the ground and are relatively small and inconspicuous as compared with those of some other orbweavers. The adult spiders have often been found in the mud nests of the wasp, *Trypoxylon politum*, along with larger numbers of similarly sized *Neoscona benjamina*, about one-fourth grown. Kaston (1948:233) stated that in Connecticut the species winters in the penultimate instar and matures in April. On the Reservation adults have been found in June, July and August.



FIG. 31. *Eustala anastera*, female, $\times 3$.

Eustala cepina (Walckenaer)

Little Hump-backed Orbweaver

Epcira cepina Walckenaer, 1841, Histoire Naturelle des Insectes Apteres, vol. 2, p. 37.

Eustala cepina; Chamberlin and Ivie, 1944, Bull. Univ. Utah, vol. 35(9), p. 103.

Identification.—WJG.

Range.—Eastern United States.

Description.—Female, length 4.0, carapace 1.9, abdomen 2.8, extended legs 16.8. Carapace dull yellow, increasingly clouded with gray anteriorly, but with white area in V of cervical groove and with only a few short hairs; abdomen mainly white—white flecks separated by narrow dark areas in reticulate pattern; legs whitish basally, dark on distal parts of femora, and on tibiae, annulated with light and dark on metatarsi and tarsi.

Habitat and Habits.—An adult female was found stored in the nest of a mud-dauber wasp, with other spiders, on August 12, 1960. No others were seen.

Genus **Gea** Koch

Members of this genus resemble spiders of the genus *Argiope* in most respects, but are, on the average, much smaller, and have the four eyes of the anterior row almost uniformly spaced, whereas in *Argiope* the median eyes are much nearer to each other than to the laterals. The genus is cosmopolitan.

Gea heptagon (Hentz)

Ground Orbweaver

Epcira heptagon Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 20, pl. 3, figs. 5 and 6.

Gea heptagon; Marx, 1890, Proc. U. S. Nat. Mus., vol. 12, p. 541.

Identification.—WJG.

Range.—Eastern United States from Maryland and Wisconsin south through Mexico and Central America into Brazil.

Description.—Female, length 5.2, carapace 2.6, abdomen 3.6, extended legs 17.5. Eyes relatively large and prominent; both laterals protrude on conspicuous tubercle; cephalothorax flattened, relatively wide behind; pair of humeral tubercles on anterior part of abdomen, wide blunt cones which barely reach edge of abdomen as seen in outline from above; farther posteriorly, on sides of abdomen, two pairs of lower and less conspicuous protuberances; carapace yellow,

with poorly defined red markings in cephalic region, and with clouding or stippling of black marks laterally in thoracic region; abdomen yellowish and whitish on its anterior one-fourth and chocolate colored on its posterior one-fourth, somewhat intermediate in between, but with numerous silvery white flecks over its dorsal surface, bright red flecks and streaks superimposed on

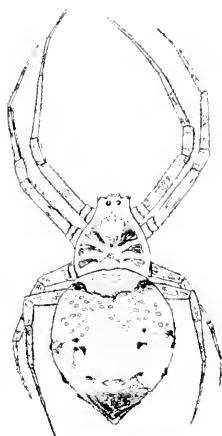


FIG. 32. *Gea heptagon*, female, $\times 6$.

these, especially on anterior part of abdomen; three pairs of eyelike dark markings, bordered by paler areas, linearly arranged, almost equally spaced; those of first pair on humeral tubercles; legs pale yellow, with dull red annulations averaging somewhat wider than interspaces (see Fig. 32).

Habitat and Habits.—The only specimen found was an adult female that was in a small orb web in brome grass, two inches from the ground, near the edge of woodland on August 28, 1960.

Genus *Leucauge* White

Members of this genus are medium-small, delicate woodland orbweavers in which there are iridescent colors, with green, silver-white, and bronze. The femora of the fourth pair of legs have a double fringe of long hairs on the prolateral surface of the basal half. The chelicerae have a rudimentary boss. The genus is cosmopolitan.

Leucauge venusta (Walckenaer)

Orchard Spider

Epeira venusta Walckenaer, 1841, Histoire Naturelle des Insectes Apteres, vol. 2, p. 90.

Leucauge venusta; Cambridge, 1903, Biol. Centr. Amer., vol. 2, p. 441, pl. 42, figs. 1, 2.

Argyropeira hortorum; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 11.

Identifications.—MHM, RLC, AB.

Range.—Asia, North America, Central and South America; United States chiefly within the Deciduous Forest Formation.

Description.—Female, length 6.8, carapace 2.0, abdomen 4.8, extended legs 34. Carapace pale yellow or cream with thin median dark line beginning in back of posterior median eyes and continuing to posterior edge; pair of dark thin stripes along lateral edges of carapace; background of abdomen silvery; dark central stripe running length of abdomen and having side branches extending laterally that tend to turn and run posteriorly along sides; orange metallic or bronze stripes on side of abdomen; venter silvery white with yellow and bronze metallic markings; coxae and femora pale yellow, more distal segments darker (see Fig. 33).

Habitat and Habits.—This species is characteristic of woodland, usually where the leaf canopy is heavy and the soil is damp. The webs are of the orb type, and are usually situated among dense low vegetation such as green dragon, lopseed, or pellitory, where they are partly concealed and inconspicuous. The

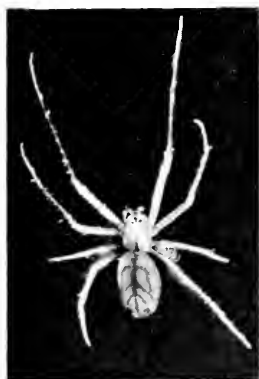


FIG. 33. *Leucauge venusta*, female, $\times 2$.

spiders are shy, and at any disturbance they drop from their webs into the ground litter. Prey of the orchard spider includes a variety of small low-flying insects, especially leafhoppers. The species is most in evidence during June and July.

Genus *Mangora* Cambridge

Spiders of this genus are medium-small, woodland orbweavers in which the posterior median eyes are larger than the laterals, the median ocular area is narrower in front than behind, the anterior row of eyes is recurved and the posterior row straight or procurved. There is a prominent longitudinal thoracic furrow. The tibia of the third leg has on its prolateral surface two oblique rows of long thin feathery hairs set in large sockets. The genus is cosmopolitan but mainly neotropical.

Mangora gibberosa (Hentz)

Lined Orbweaver

Epeira gibberosa Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 457, pl. 31, fig. 20.

Mangora gibberosa; Simon, 1895, Histoire Naturelle des Araignees, vol. 1, p. 793.

Araneus gibberosus; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 10.

Identifications.—RLG, AB.

Range.—Eastern United States, chiefly in the Deciduous Forest Formation, and southward into Mexico.

Description.—Female, length 4.7, carapace 1.9, abdomen 2.8, extended legs 18.5. Carapace pale cream colored with thin median black line beginning in back of posterior eye row and extending just beyond thoracic furrow; legs pale yellow or cream with many prominent black spines; longitudinal midventral black lines on femora of first and second legs; abdomen oblong, marbled with white; pair of black lines on the posterior half of dorsum and series of black lines running laterally and slanting posteriorly.

Male three-fourths of female's length or slightly less; lacks lateral lines on abdomen.

Mangora ornata (Walckenaer)

Green-legged Orbweaver

Theridion ornatum Walckenaer, 1841, Histoire Naturelle des Insects Apteres, tome II, p. 229.

Mangora ornata; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5):105.

Identifications.—MHM, RLG, AB.

Range.—Deciduous Forest Formation of the eastern United States.

Description.—Female, length 5.0, carapace 2.3, abdomen 3.2, extended legs 20. Carapace pale yellow or cream colored without darker markings; abdomen oblong-ovoid, cream colored impregnated with white; series of black transverse bars on dorsum near posterior end; venter with white pigmentation reduced; legs pale green with many stout black spines (see Fig. 23).

Male resembles female and is three-fourths of her length or slightly more.

Habitat and Habits.—In late summer this small orbweaver is one of the most numerous spiders in some woodland habitats. It has been found only in deep shade, and was exceptionally abundant along the rocky bed of a small intermittent stream. The small webs were usually within a few inches of the ground, and often were situated where they were sheltered from above, by dense brush or by an overhanging log or stump.

***Mangora placida* (Hentz)**

Tuft-legged Orbweaver

Epeira placida Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 475; pl. 31, fig. 12.

Mangora placida; Simon, 1875, Histoire Naturelle des Araignees, vol. 1, p. 786.

Mangora placida; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 125.

Identifications.—MHM, RLG, AB.

Range.—Eastern United States, south into the Neotropical Region.

Description.—Female, length 3.5, carapace 1.5, abdomen 2.3, extended legs 15. Carapace pale yellow or cream colored with distinct dusky median stripe beginning in eye region and not quite reaching posterior edge; dusky marks along lateral margins of thoracic region; dorsum of abdomen has broad brown median stripe extending from base to spinnerets and surrounded by heavily pigmented white areas on each side; brown stripe scalloped along its edges and has series of five transverse black bars beginning midway of abdomen; venter brown; legs pale yellow or cream colored.

Male two-thirds to three-fourths of female's length, having only indistinct median line on carapace; black bars across median brown stripe on abdomen reduced to series of black paired dots.

Habitat and Habits.—These spiders mature earlier in the season than do *M. ornata* and *M. gibberosa*; they are found commonly in woodland and edge during May.

Genus *Metepeira* Cambridge

The abdomen is oval, with a median white band ventrally. In each leg the combined length of the metatarsus and tarsus exceeds that of the tibia and patella. The genus occurs in both North and South America.

***Metepeira labyrinthea* (Hentz)**

Labyrinth Orbweaver

Epeira labyrinthea Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 471, pl. 31, fig. 3.

Metepeira labyrinthea; Cambridge, F. 1903, Biol. Centr. Amer. Zool., vol. 2, pp. 457-458.

Araucus labyrinthicus; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 9.

Identifications.—RLG, AB.

Range.—Most of the United States, southward through the Neotropical Region to Argentina.

Description.—Female, length 5.3, carapace 2.3, abdomen 3.3, extended legs 18.4. Carapace brown; folium of abdomen mainly white anteriorly but with enclosed dark marks; folium tapering and becoming dark posteriorly, having large white area on anterior part dorsally; folium enclosing anteriorly and margined with bright red areas; red marks not distinct but suffusing into surrounding areas; legs faintly annulate, with alternate pale brown and dark brown; venter having narrow longitudinal whitish bar, bordered on either side by broader black area; sternum dark brown with longitudinal yellow mid-ventral mark (see Fig. 34). Male three-fourths of female's length or a little more with darker carapace and with greater contrast between dark and light areas of legs; on first and second legs distal two-thirds of tibiae and all of patellae chocolate colored contrasting with whitish areas more proximally and distally.



FIG. 34. *Metepeira labyriuthca*, female, $\times 4$.

Habitat and Habits: These small orb-weavers are locally common in certain situations of open woodland or woodland edge. The webs are usually from

three to eight feet above the ground. Osage orange trees, which have many of the lower branches dead and bare, provide favorite sites for the webs in thorny clusters of twigs. The spiders seem to be somewhat gregarious, and many may live in the same tree, sometimes with their webs only a few inches apart. The web is highly characteristic; besides the orb, it consists of a "labyrinth" of threads in many directions. Males have been sifted from leaf litter. Kaston (1948:227) stated that after attainment of maturity the male makes no orb web. The same author recorded five cocoons with 47 to 63 eggs (average 55) and stated that a single female produces five or six such sacs.

Genus *Micrathena* Sundevall

The cuticle is hard and glossy, the abdomen bearing conical tubercles that terminate in spiny points. The carapace and the sternum are longer than wide. There is a distinct cervical groove. There is a sclerotized ring around the base of the spinnerets separating them from the remainder of the abdomen. The legs are relatively slender; their order of length is 4, 1, 2, 3. They bear short spines and bristles. The spinnerets are placed well forward from the posterior end of the abdomen. The males are much smaller than the females, and less spiny. The genus is predominantly neotropical.

Micrathena gracilis (Walckenaer)

Spiny-bellied Orbweaver

Epeira gracilis Walckenaer, 1806, Nat. Hist. Araneides, pl. 3, fig. 5.

Micrathena gracilis; Simon 1895, Histoire Naturelle des Araignees, vol. 1, pp. 851, 857-859.

Micrathena gracilis; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 11.

Identifications.—TBK, MHM, AB.

Range.—Eastern United States in the Deciduous Forest Formation, and southward into the Neotropical Region as far as Brazil.

Description.—Female, length 11.5, carapace 3.3, abdomen 7.5, extended legs 15. Carapace glossy black, finely granulated, with margins translucent yellow; two faint light markings of tear drop shape on each side of carapace near its posterior edge; legs glossy black with distal segments somewhat lighter, brownish; joints yellow on underside; abdomen white with ten spines tipped with black; scattered black spots also present; two anterior dorsal spines; two lateral dorsal spines; paired spines on each side at the posterior end of abdomen; and one pair of sub-terminal spines on the venter; venter marbled with yellow and black; epigastric plates shiny chocolate brown (see Fig. 35). Male, length 5.0, carapace 1.5, abdomen 3.5, extended legs 7.5. Carapace pale yellow to amber colored in cephalic region with thoracic portion dark brown or gray; dorsum generally entirely white without spines. Male differs radically from female in size and appearance; abdomen flattened, squared at posterior end forming elongate rectangle twice length of carapace; legs amber colored with reddish brown shading.

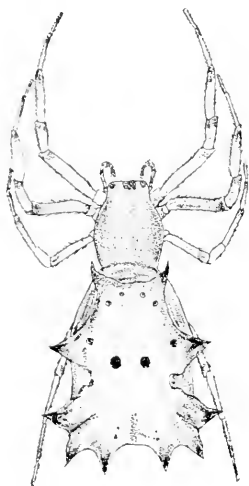


FIG. 35. *Micrathena gracilis*, female, $\times 4$.

Habitat and Habits.—This small orb-weaver is typical of a forest habitat. The webs are complex and delicate with many

concentric circles and radii, obviously adapted for catching relatively small prey. Leafhoppers have been noticed in greatest abundance in the webs, which are usually from three to seven feet off the ground. In spring and early summer the spiders are all young, and are so small that they ordinarily escape notice. In different years adults have first been noted as early as June 25 (1955), or as late as July 14 (1954). In late July, August, and early September the adult females are much in evidence; their webs, stretching across every open space are a continual annoyance because a person brushes into one at almost every step. The

males are relatively small and have seldom been noticed. During September the population undergoes progressive reduction. Surviving individuals are mostly slow and sluggish, and appear spent and emaciated, having laid their eggs. With the first heavy frost most of the survivors disappear but a few linger on into late October.

Micrathena mitrata (Hentz)

Mitred Orbweaver

Epeira mitrata Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 22, pl. 3, fig. 11.

Micrathena reduviana; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 11.

Micrathena mitrata; Cambridge, 1904, Biol. Centr. Amer., vol. 2, p. 538.

Identifications.—TBK, MHM, AB.

Range.—Eastern United States in the Deciduous Forest Formation, and southward to Cuba and Central America.

Description.—Female, length 5.2, carapace 2.0, abdomen 3.6, extended legs 9.5. Carapace glossy black with marginal stripes of translucent gray in thoracic region; abdomen white with black tree-shaped mark near anterior end, tree has its trunk directed anteriorly with white spot in center of crown; at posterior end white color encloses black "Mickey Mouse" face with ears directed anteriorly; pair of spines, one on each side, near distal end of abdomen; this black mark part of black coloring on caudal tip of abdomen; venter mostly black; legs translucent gray with dusky markings near the joints (see Fig. 21).

Male about three-fourths of female's length, with conelike spines only slightly developed.

Habitat and Habits.—This is the smallest and the most abundant of the woodland orbweavers. The habitat is the under-story stratum of bushes and low trees in the forest. Hence, the spiders are more numerous in open woodland, with an under-story of such tall shrubs as dogwood and redbud, than they are in more heavily shaded forest of climax type. Along trails and over creeks the webs are especially numerous. They are usually three to seven feet off the ground, in situations to me indistinguishable from those used by *M. gracilis*. Often many individuals of both species can be seen simultaneously from the same spot. As with the other two species of *Micrathena*, leafhoppers seem to make up the most important component of the diet. On the average, *M. mitrata* matures a little later than does *gracilis*, in summer, and survives a little later in autumn.

Micrathena sagittata (Walckenaer)

Arrow-bellied Orbweaver

Plectana sagittata Walckenaer, 1841, Histoire Naturelle des Insectes Apteres, vol. 2, p. 174.

Micrathena sagittata; Simon, 1895, Histoire Naturelle des Araignees, vol. 1, pp. 853, 857, 858, 861.

Micrathena sagittata; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 11.

Identifications.—MHM, AB.

Range.—Eastern United States in the Deciduous Forest Formation, southward into the Neotropical Region.

Description.—Female, length 8.3, carapace 2.8, abdomen 5.5, extended legs 20.3. Carapace with cephalic region amber with translucent yellow marginal stripes along thoracic portion and dusky submarginal shading in thoracic region also; abdomen has six spines; on each side near basal region spine directed slightly forward; pair of small lateral spines about mid-way of length of abdomen, and two large spines at caudal end of abdomen, directed posterolaterally; dorsum chiefly bright yellow with red around bases of spines and black at tips; legs dark amber with little shading of darker color (see Fig. 36). Male, length 5.0, carapace 2.2, abdomen 2.7, extended legs 11.5. Carapace glossy black usually lighter anteriorly; first and second pair of legs black (especially femora) with third and fourth pair much paler; abdomen truncate without spines; distal end broadest; abdomen mostly glossy black with cloudy white band across posterior half and two white dots inside band.

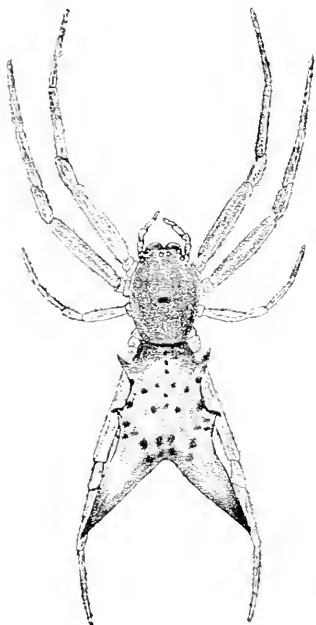


FIG. 36. *Micrathena sagittata*, female, $\times 4$.

Habitat and Habits.—These small but conspicuous orbweavers are confined to forest, and forest edge habitat. They require mesic situations having dense herbaceous ground vegetation. The webs are ordinarily near ground

level, seldom more than two feet off the ground. Favorite sites are in dense stands of green dragon (*Arisaema dracontium*), pellitory (*Parietaria pennsylvanica*) and lopseed (*Phryma leptostachya*). The webs are inconspicuous, and the spiders are quick to drop to

the ground at the slightest disturbance. So far as observed, the prey consists largely of leafhoppers. Spiderlings have been taken in sweepings from grass and brush in late May and early June. These individuals were relatively minute, mostly two to three millimeters long. The spiders mature by early July, and are seen chiefly in July and August; relatively few survive until late September, but some live up to the time of frost in October. These late survivors are sluggish and emaciated.

Genus *Mimognatha* Banks

This genus is a near relative of the long legged and slender bodied tetragnathine orbweavers, but has more nearly normal body form, with an oval abdomen. The chelicerae are subparallel, their margins being set with small teeth. The posterior spiracle is set immediately anterior to the spinnerets. This is a small genus, confined to North America and the West Indies.

Mimognatha foxi (McCook)

Fox's Orbweaver

Theridium foxi McCook, 1894, American Spiders, vol. 3, pl. 29, fig. 1.

Mimognatha foxi; Banks, 1929, Bull. Mus. Comp. Zool., vol. 69, p. 90.

Identification.—WJG.

Range.—Most of United States except northernmost parts, and southward into Mexico and Central America.

Description.—Male, length 1.8, carapace .8, abdomen 1.0, extended legs 6.4. Carapace pale orange brown; eyes dark except for posterior lateral pair; abdomen lemon yellow; legs dull yellow, with grayish hairs arranged in regular longitudinal rows; cymbium much enlarged, grayish brown, its diameter exceeding width of cephalic region.

Female similar in most respects but slightly larger; lacking epigynal plate.

Habitat and Habits.—Only one specimen has been collected on the Reservation and the circumstances of its capture were not recorded. Barrows (1919:210) found the species abundant in Ohio in meadows and wasteland. It makes a delicate web in low grass or weeds in hot dry situations. The spider remains at the center of the web on its underside till disturbed; then it drops to the ground and runs swiftly. Crosby and Bishop (1936:47) recorded males of this species ballooning 3000 feet and 200 feet above ground at Tallulah, Louisiana, in April and March.

Genus *Neoscona* Simon

The members of *Neoscona* are medium-sized to large; the median furrow of the thorax is longitudinal in both sexes. Adult males have a spur on the coxa of the first leg, and groove on the femur of the second, and two dorsal spines on the palpal patella. The genus is found in North America, South America, Europe, Africa, and southern Asia.

Neoscona arabesca* (Walckenaer)*Arabesque Orbweaver**

Epeira arabesca Walckenaer, 1805, Tableau des Aranéides, p. 63.

Neoscona arabesca; Simon, 1864, Nat. Hist. Araignées, Paris, vol. 1, p. 261.

Araneus trivittatus; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 10.

Identifications.—MHM, RLG, AB.

Range.—Widely distributed in the United States, chiefly in the eastern part, but recorded also from Colorado, New Mexico, and Washington, and occurring also southward into the Neotropical Region.

Description.—Female, length 7.2, carapace 3.0, abdomen 5.0, extended legs 21. Carapace pale translucent gray with broad brown marking narrowing to line at thoracic groove where it ends; thoracic region has submarginal brown stripes; chelicerae brown with boss dark brown; abdomen cream colored at base, this color extending length of dorsum in form of broad wavy stripe; on each side of this light stripe areas of olive green color; series of five paired black spots superimposed on green on the posterior half of abdomen; venter having characteristic velvety black rectangle with pair of opposed "7"-shaped white marks on either side; sternum brown with broad yellow-white stripe; legs translucent gray with brown annulations.

Male much like female in coloration and proportions, averaging slightly smaller.

Habitat and Habits.—This spider is much less common than *N. benjamina* and occurs in relatively open habitat such as woodland edge or weedy and brushy fields. Its webs are small and inconspicuous as compared with those of the larger species. Upon being disturbed in its web, the spider climbs rapidly to the twig or branch supporting the web from above on one side, and settling upon this support, with its legs adpressed, becomes extremely inconspicuous. Like *N. benjamina*, *N. arabesca* is adjusted to an annual cycle, but matures a little earlier—in late July.

Neoscona benjamina* (Walckenaer)*Arboreal Orbweaver**

Epeira benjamina Walckenaer, 1841, Histoire Naturelle des Insectes Aptères, vol. 2, p. 42.

Araneus benjamini; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 9.

Neoscona benjamina; Cambridge, 1904, Biol. Centr. Amer., pp. 467, 468, 470.

Identifications.—MHM, AB.

Range.—Eastern United States, chiefly in the Deciduous Forest Formation, but recorded also in Utah, and southward into the Neotropical Region.

Description.—Female, length 15.5, carapace 6.5, abdomen 10.0, extended legs 50.0. Carapace light orange with darker shades in eye region and

accenting thoracic groove; dorsum cloudy cream color with hardly any indications of darker pattern; four darker dots near center of dorsum indicating points of muscle attachments; four thin, faint lines crossed by a bow-shaped line near posterior region of dorsum; venter with characteristic pattern formed by two white marks shaped like "7's" facing each other each with white dot at base against a chocolate colored background; stemum orange with darker spots near origin of coxal segments and median white band; abdomen clothed with long white hairs; front pairs of legs orange with other segments of lighter yellow lacking distinct annulations; third and fourth pairs of legs colored similarly but with darker brownish annulations (see Fig. 37).



FIG. 37. *Neoscona benjamina*, female, $\times 1\frac{1}{2}$.

Male, length 8, carapace 3.6, abdomen 4.2, extended legs 33.

This spider is extremely variable in color.

Habitat and Habits.—This large orb-weaver is the dominant spider of its size in woodland habitat. It is abundant also in brushy situations, and is present in greater numbers along woodland edge than in deep woods. In the grove of large elms at the Reservation headquarters conditions were perhaps near the optimum, and in autumn it was not unusual to see a dozen or more spiders at one time. Some live high in the trees, and others remain a few feet from the ground.

The strand forming the upper foundation of the web is often more than 20 feet long. The insects preyed upon are in general those of the largest size groups. The common large cicada (*Tibicen pruinosa*) is a favorite prey, as are various large katydids. Large hemipterans including the wheel bug and tabanid flies, also have been noted in the webs frequently.

This orbweaver is the favorite prey of both the common species of large mud-dauber wasps on the Reservation. This predation occurs mostly in July when the young spiders are considerably less than half-grown.

The life cycle is adjusted to the annual cycle. In spring and early summer the young spiders are so small and inconspicuous that they are rarely noticed, but in September and October the webs, stretched across every open place, obtrude themselves on the notice of anyone walking through the woods. Throughout the summer the young cover a wide range of sizes, and some mature in July.

At the first frost, in fall, there is a drastic reduction in numbers, but some may live on into November, surviving several periods of subfreezing weather.

***Neoscona pratensis* (Hentz)**

Prairie Orbweaver

Epeira pratensis Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 475, pl. 31, fig. 11.

Neoscona pratensis; Comstock, 1912, Spider Book, p. 502, fig. 537.

Identification.—HSF.

Range.—Occurs over most of the United States.

Description.—Female, length 6.7, carapace 3.0, abdomen 4.0, extended legs 20. Carapace yellowish brown with dark brown middorsal and submarginal bands; abdomen yellowish brown, relatively pale anteriorly and dark posteriorly, and having broad, dark brown middorsal band which is narrowed posteriorly and more markedly narrowed anteriorly, bordered on either side by narrower yellow band; six small black spots in longitudinal series on each side of dorsal area, each spot rimmed with yellow; legs yellowish brown, unmarked.

Habitat and Habits.—This species was rarely seen, and all those noticed were adult females, living in tall-grass prairie habitat. On several occasions two or more of the spiders were found within a few yards of each other, perhaps indicating that there is some tendency to gregariousness.

Genus *Singa* Koch

Spiders of this genus are small, with relatively short legs. The posterior median eyes are closer to each other than to the posterior lateral eyes. The abdomen is ovate. The tibiae of the first and second pair of legs are armed with spines on the upper surfaces. The genus is cosmopolitan.

***Singa pratensis* Emerton**

Meadow Orbweaver

Singa pratensis Emerton, 1884, Trans. Connecticut Acad. Sci., vol. 6, p. 332, pl. 34, figs. 15, 15a; pl. 37, figs. 14-17.

Identification.—HSF.

Range.—Throughout the United States.

Description.—Female, length 5.0, carapace 2.0, abdomen 3.0, extended legs 15. Carapace amber; abdomen dorsally pale yellow with three longitudinal chocolate colored marks running its full length; one mid-dorsal, only about half width of yellow areas on either side; other two, dorsolateral, slightly wider than yellow areas; sternum dark brown; center of abdomen ventrally dark brown, with pale yellow lateral margins to brown area; eyes black; legs amber, of same shade as carapace, with black bristles (see Fig. 20).

Male averages only slightly smaller than female and much like her in appearance.

Habitat and Habits.—This is one of the most abundant spiders on the Reservation. It is restricted to grassland habitats, and is perhaps equally abundant in tall-grass prairie and in fields of the introduced pasture grass, awnless brome. Adults have been collected chiefly in late summer, autumn and spring and early summer. Kaston (1948:240) stated that in Connecticut it overwinters in the mature state and mature individuals can be found until mid-June, while young are found through the late summer and fall.

The webs are small and inconspicuous, as they are often constructed in the lower stratum of grass. At any vibration or other disturbance, the spider drops from its web to the ground, and, remaining motionless with legs drawn up, is not readily seen. However, a few minutes spent in sweeping the grass with a net will usually yield more than a hundred *Singa*.

Minute insects comprise the prey, and probably leafhoppers make up the greater part of it. On one occasion a *Singa* that had just been caught in a sweep net pounced upon a nymphal aphid that was also in the net, and fed upon it. Grasshopper nymphs also have been noted in the webs.

Singa truncata Banks

Truncate Orbweaver

Singa maculata Emerton, 1884, Trans. Connecticut Acad. Sci., vol. 6, p. 323, pl. 37, fig. 18.

Singa truncata; Banks, 1901, Jour. New York Ent. Soc., vol. 9, p. 188 (in place of *S. maculata* Emerton preoccupied by Thorell, 1875).

Identification.—AB.

Range.—Throughout the United States.

Description.—Male, length 3.5, carapace 1.5, abdomen 2.0, extended legs 13. Amber dorsally, but with carapace slightly reddish, abdomen yellowish; on dorsal aspect of abdomen two pairs of sclerotized areas appearing as shallow depressions; surface of abdomen pitted dorsally; heavy transverse fold on dorsal surface of abdomen near posterior end; sides of abdomen slightly rugose, chocolate colored, with band of yellowish; ventral surface amber except for posterior part of abdomen, which is chocolate colored.

Genus *Tetragnatha* Latreille

Spiders of this genus are remarkably slender and elongate; most of them live in riparian habitats. The abdomen is at least twice as long as broad. The anterior and posterior eyes are not contiguous. All the eyes are surrounded by black areas. The endites are parallel and more or less dilated at their distal ends. The spider is usually not seen suspended in its web, but clings flattened against a nearby stem, with the first and second pair of legs extended parallel anteriorly and the fourth pair of legs extended posteriorly. In this position it is well concealed. The genus is cosmopolitan.

Tetragnatha elongata Walekenaer

Elongate Stilt Spider

Tetragnatha elongata Walekenaer, 1805. Tableau des Aranéides, p. 69.
Tetragnatha elongata; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.)
 vol. 30, p. 11.

Identification.—AB.

Range.—Canada southward throughout the United States, to Brazil.

Description.—Female, length 12.2, carapace 3.8, abdomen 8.3, extended legs 66. Carapace dark amber-brown, darker near its margins and in cephalic region; legs paler amber; carapace flattened, with prominent V-shaped cervical groove having at its apex large, prominent depression; eyes all directed forward; abdomen elongate, tapering posteriorly, expanded and humped anteriorly, overhanging posterior fourth of carapace; abdomen having reticulate pattern of many small light areas with dark edges, superficially resembling fish scales; legs remarkably slender, elongate, and tapering, imparting harvest-manlike appearance, except for elongate abdomen and chelicerae; both cheli-

cerae and fangs approximate or exceed carapace in length; elongate, dark folium with large T-shaped marking in anterior part of folium (see Fig. 38).

Male, length 10, carapace 3.3, abdomen 7, extended legs 82. Resembling female in most respects, but legs even more elongate, and abdomen cylindrical, dark grayish brown, with faint reticulations and no other discernible pattern; male's chelicerae and fangs both markedly exceed length of carapace; anterior face of each chelicera near its lower end bearing horn-like, down-curved process, forked near tip.

Habitat and Habits.—These peculiar, slender spiders were always found near water, chiefly along the margins of the pond. In some years they were found in marshy places along the intermittent creek between the pond and the Reservation boundary, but in other years conditions were unfavorably dry, and none was in evidence there. The larger creek in the southeastern part of the Reservation supported a permanent population. The spiders were always found on low

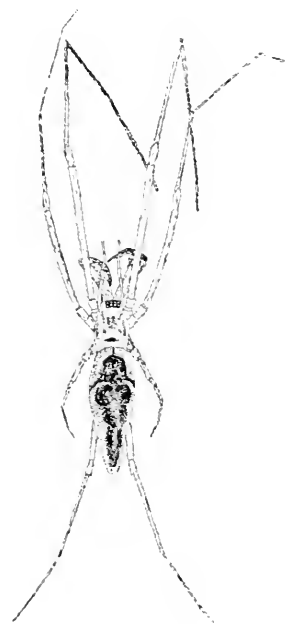


FIG. 38. *Tetragnatha elongata*, female, $\times 2$.

vegetation such as sedges or small willows, typically in situations overhanging the water. In 1960, when muskrats had consumed most of the riparian vegetation at the pond, and the water had receded, the only available sites for the spiders were on dead and

barren willows girdled by the muskrats. Even in these exposed situations the spiders were readily overlooked because of the habit of resting flattened against a stem. Certain small shrubs were found to be occupied by colonies of the spiders, with a dozen or more individuals, including adults of both sexes, and a larger number of young, of various sizes. Often on a branch where many of the spiders were present, there was no web at all, or only tattered remnants that showed none of the original orb structure. Judging from the remains in such old webs, the prey consists largely of minute dipterous insects such as gnats and midges, that are abundant in moist places. Intact webs were found mainly along the small creeks in places sheltered by dense vegetation. Frogs, especially the bullfrog, were the chief natural enemies at the pond. An effective means of collecting was to shake the vegetation where spiders were suspected to be. Those present usually dropped to the surface of the water and ran over it rapidly to the shoreline, but sometimes they were snapped up by voracious bullfrogs in the vicinity before the collector could intervene.

The abundance of these spiders fluctuated from year to year according to the extent of the riparian habitat, as determined by the amount and distribution of precipitation. Adults, and young of various sizes were found throughout the summer and autumn.

***Tetragnatha laboriosa* Hentz**

Prairie Stilt Spider

Tetragnatha laboriosa Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 27; pl. 4, fig. 3.

Tetragnatha extensa; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 14.

Identifications.—MHM, RLG, AB.

Range.—North America from Alaska through Canada and the United States, to Cuba and Puerto Rico.

Description.—Female, length 9.5, carapace 2.8, abdomen 6.8, extended legs 35.5. Carapace brownish amber, flattened, with prominent cervical groove, and with pair of oblique slitlike depressions behind apex of V; with darker and lighter areas alternating in irregular, mottled pattern; abdomen shape of stout sausage, silvery white dorsally and laterally, with many small scalelike areas separated from each other by dark grooves; scalelike areas irregular in size and shape, and grooves separating them also vary in distinctness; dark lines in pattern resembling those of veins of leaf diverge from central stalk on mid-dorsal aspect of abdomen; carapace rounded at its anterior end; eyes of anterior row directed forward, those of posterior row directed forward and upward; sternum and ventral aspect of abdomen dark brown; chelicerae moderately elongate, little more than half length of carapace.

Male, length 4.5, carapace 2.0, abdomen 3.0, extended legs 30.5. Resembles female in most respects but carapace paler; abdomen cylindrical, brownish yellow, similar to carapace, but with scalelike flecks of brighter yellow; venter brown; chelicerae relatively long, and curved outward.

Habitat and Habits.—This is a typical grass spider. It is abundant in bluestem prairie, and even more numerous in fields of brome grass. Adults can be found throughout the growing season. Despite its abundance the species is not especially conspicuous. The elongate spiders clinging closely to stems or blades of grass are not often noticed. The orb webs being small and fragile, readily escape attention. Large numbers of these spiders are taken in sweepings of grass; otherwise its abundance would not have been realized. Small flying or jumping insects, including leafhoppers and the nymphs of katydids and grasshoppers, make up the food.

Genus *Verrucosa* McCook

In the medium-sized, woodland spiders of this genus the abdomen viewed from above is roughly triangular with two pairs of lateral tubercles and a medium tubercle on the posterior part. There is a deep cervical groove. The head region is elevated. The genus occurs in the Neotropical Region and Australia, as well as in the United States.

Verrucosa arenata (Walckenaer)

Triangulate Orbweaver

Epeira arenata Walckenaer, 1841, *Histoire Naturelle des Insectes Aptères*, vol. 2, p. 133.

Verrucosa arenata; McCook, 1888, *Proc. Acad. Nat. Sci.*, Philadelphia, 1888, p. 79.

Araneus arenatus; Scheffer, 1904, *Industrialist* (Kansas State Agr. Coll.), vol. 30, p. 9.

Identifications.—TBK, MHM, RLG, AB.

Range.—United States chiefly in Deciduous Forest Formation of eastern part; also California and Utah; southward to Panama; New Zealand (introduced?).

Description.—Female, length 8.0, carapace 3.0, abdomen 5.2, extended legs 25. Carapace brown, abdomen wide anteriorly with prominent lateral projections or shoulders, and tapering abruptly posteriorly to blunt point; row of four tubercles on each side of abdomen, of progressively larger size posteriorly; abdomen dark chocolate brown, with bright yellow folium (white in most individuals) lightly reticulated with chocolate; legs dull yellow with black annuli of about same width as light interspaces; tarsi dull red; ventrum black; ventrolateral area of abdomen having longitudinal corrugations (see Fig. 25).

Habitat and Habits.—Three woodland orbweavers are remarkably similar in habits, habitats, and appearance: *Micrathena mi-*

trata, *M. gracilis* and the present species. Their webs are similar except for size, and the three take about the same kind of food. However, competition between them is reduced by difference in size. *M. gracilis* is, on the average, several times the bulk of *M. mitrata*, whereas *V. arenata* is correspondingly larger than *M. gracilis*. Although all three are abundant, the small *M. mitrata* is normally most numerous and the large *V. arenata* least so. Numbers of each undergo notable fluctuation from year to year. In years of heavy precipitation the numbers of orbweavers is generally greater, but all three species fluctuate independently, in unpredictable patterns. *Verrucosa arenata* matures in late June or early July and is conspicuous up until the time of frost in autumn. It is one of the species of which webs are so abundant as to be a nuisance to anyone walking through the woods in late summer.

Family MINETIDAE Simon

Assassin Spiders

These are medium-sized ecribellate trionychous spiders. The eight eyes are heterogeneous and arranged in two rows. The chelicerae are long and slender, fused at the base, without a boss, and provided with a series of long bristles on the promargin of the fang furrow. Both fang margins are toothed. The labium is free. The first and second tibiae and metatarsi have a promarginal row of long, curved spines, with a row of much shorter spines between them, of which the more distal are longer than the more proximal. There are two rows of trichobothria on the tibiae and one row on the metatarsi. The members of this group make no webs but prey chiefly on other kinds of spiders, which are quickly subdued by the exceptionally potent venom.

Genus *Mimetus* Hentz

Spiders of this genus are pale-colored, medium-small, and the body is flattened and the first two pairs of legs are enlarged. The height of the clypeus is from one-third to one-half the length of the median ocular area. Each chelicera has a conspicuous heavy bristle on the inner margin about two-thirds of the distance from the base to the fang furrow. The genus is cosmopolitan.

Mimetus puritanus Chamberlin

Mimetus puritanus Chamberlin, 1923, Jour. Ent. and Zool., vol. 15, p. 5; pl. 1, figs. 1-6.

Identification.—AB.

Range.—Eastern United States in the Deciduous Forest Formation.

Description.—Female, length 8.0, carapace 3.0, abdomen 4.5, extended legs 38. Carapace translucent gray, having dark line on each side extending from posterior lateral eyes on each side joined at cephalic declivity by dark, broad

median stripe; broad median stripe and two lateral stripes have cross stripe joining them about midway from posterior lateral eyes to point where they meet; abdomen gray-green with folium of white and black; reddish-orange spots irregularly spaced over dorsum; white markings chiefly confined to anterior region and black markings most abundant on posterior half of abdomen; abdomen widest and highest at about midpoint of its length, with ridge at this point; venter dirty yellow splashed with white; sternum translucent gray with four pairs of black spots near lateral margins; labium has basal black band; legs also translucent gray, spotted with black; spotting heaviest on undersurface of femora; distal end of each femur black ventrally (see Fig. 39).

Habitat and Habits.—The only individual of this species found was an adult female, clinging to the outside wall of the Reservation residence, on the south side, on August 12, 1960. House spiders (*Achaearenea tepidariorum*) were abundant under the eaves nearby and probably provided the food for this individual, as they are known to be a favorite prey elsewhere. Spiders of the genus *Mimetus* are known to prey chiefly or exclusively on other spiders, living a wandering life, and invading the webs of their victims. They are said to favor warm and dry situations. The winter is passed in an immature stage.

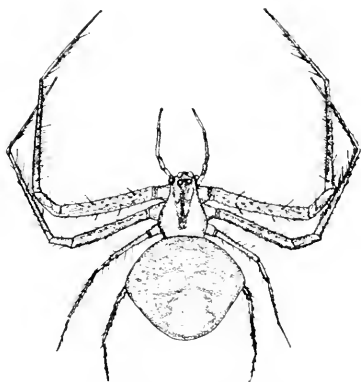


FIG. 39. *Mimetus puritanus*, female, $\times 3$.

Family AGELENIDAE Koch

Funnel-web Weavers

These ecribellate-trionychous spiders typically make platform webs with a tube or funnel leading from the center or one edge. They have eight eyes arranged in two rows; the chelicerae are provided with boss and scopula, and have toothed, oblique fang margins. The legs are spinose, lack scopulae, but have numerous trichobothria, in two rows on the tibiae, one row on the metatarsi and tarsi. The integument has plumose hairs.

KEY TO THE SPECIES OF THE FAMILY AGELENIDAE OF THE RESERVATION

1. Posterior spinnerets elongate, extending behind the abdomen as tail-like appendages, their distal segments about twice as long as basal segments (*Agelenopsis*) 2
- 1'. Posterior spinnerets not conspicuously elongate, their distal segments not longer than basal segments 4

2. Larger (length usually exceeding 15 mm. in adults); no well defined V-shaped mark on sternum; no well defined median black band on venter *Agelenopsis naevia*, p. 88
- 2'. Smaller (length usually less than 15 mm.); distinct V-shaped dark mark on sternum; a well defined dark band on venter 3
3. Epigynal orifice nearly round; dark band on venter not much paler in central area *Agelenopsis pennsylvanica*, p. 91
- 3'. Epigynal orifice much wider than long; dark band on venter markedly paler in center, thus appearing as two narrow bands with indistinct inner margins *Agelenopsis oklahoma*, p. 91
4. Labium at least as wide as long; posterior spinnerets having apical segments much shorter than basals (*Cicurina*) 6
- 4'. Labium longer than wide; posterior spinnerets having apical segments at least as long as basals 5
5. Larger (adults usually more than 10 mm. in length); chelicerae geniculate and robust; retromargin of fang furrow with three teeth.
Coras lamellosus, p. 93
- 5'. Smaller (usually less than 10 mm. in length); chelicerae not geniculate, not especially robust; retromargin of fang furrow with four or more teeth *Tegenaria domestica*, p. 94
6. Smaller (length less than 7 mm.) *Cicurina arcuata*, p. 92
- 6'. Larger (length more than 7 mm.) *Cicurina ludoviciana*, p. 92

Genus *Agelenopsis* Giebel

The large funnel weavers of this genus are of less secretive habits than the smaller agelenids. The conspicuous webs are made on the outside of buildings, in tall grass, and in woodlands; sometimes they are several feet above ground level. Members of this genus are distinctive in having elongated hind spinnerets which project taillike, behind the abdomen. Both rows of eyes are strongly procurved so that the posterior laterals and the anterior medians form a nearly straight line. The colors are chiefly dull brown and gray, with a pair of broad dark bands extending for the length of the carapace and with a thin dark marginal line on each side. The abdomen has a broad light middorsal band with irregular edges. The genus is North American with many species in the tropics.

Agelenopsis naevia (Walckenaer)

Dark Funnel Spider

Agelena naevia Walckenaer, 1841, Histoire Naturelle des Insectes Apteres, tome II, p. 24.

Agelena naevia; Scheffer, 1905, Kansas U. Sci. Bull. vol. 3; p. 118.

Agelenopsis naevia; Chamberlin and Ivie, 1941, Ann. Ent. Soc. Amer., vol. 34, p. 597, pl. 2, fig. 9; pl. 3, fig. 25; pl. 5, fig. 36.

Identifications.—MHM, RLG, AB.

Range.—Eastern United States chiefly within the Deciduous Forest Formation.

Description.—Male, length 16, carapace 6.0, abdomen 10, extended legs 85. Carapace yellowish brown with two dusky submarginal stripes beginning in region of posterior lateral eyes as thin line and broadening considerably immediately behind this region and continuing caudad, to edge of carapace; legs and abdomen covered with many fine, elongate hairs; carapace relatively devoid of these hairs; abdomen with broad median reddish brown stripe outlined by lighter somewhat cream colored stripe and bordered on each side by dark brown areas; venter with broad light reddish brown stripe (as wide as spinnerets), enclosed at lateral edges with lighter yellowish brown speckled with dark brown; legs with coxae of pale cream color and femora dusky gray; distal ends of tibiae and metatarsi also darkened with remainder of legs segments yellowish brown (see Fig. 40).

Female resembles male in most respects, averaging a little larger, with plumper abdomen and relatively shorter legs.

Habitat and Habits.—This extremely abundant large spider is most numerous in woodland, but occurs also in a variety of other habitats, including grassland. In fact, the accepted vernacular name is "grass-spider" but in Kansas this name is not entirely appropriate. In late August, 1953, it was calculated, from the average spacing between adult individuals of this species, that there were from 300 to 400 per acre in the woodlands of the Reservation. Where ground litter and low vegetation were abundant the spiders were more numerous than they were in situations where the forest floor was relatively open and barren. The web typically consists of a sheet two feet or more across, slightly inclined and sloping back to the funnel shaped opening of the tube. The latter is often a foot or more in length, open at both ends, and extending into leaf litter, grass, a thorny bush, a rock crevice or some other situation providing shelter. Above the web sheet there is a maze of strands, running in all directions, some of them anchored to points several feet higher. The minute, dark colored young have been found in spring as early as March 10; their small webs were found in abundance on dried



FIG. 40. *Agelenopsis naevia*, male, $\times 1\frac{1}{2}$.

barren soil that had been recently dredged from the bottom of a pond. Presumably they had reached this place by ballooning. Growth is exceptionally rapid. By late June, in some years, but not until late July in others, the more accelerated young have reached sexual maturity. The spiders are most in evidence during July, August and early September.

On September 3, 1952, a pair was found copulating in a web 30 inches above the ground. The spiders were facing in opposite directions, the male above, the female turned partly on her side. When the web was jarred, they immediately separated and the female ran back into the shelter of the tube. The male was less disturbed, and moved about the web twitching his pedipalps, seemingly searching for the female. As he moved up to the tube where she was hiding, she made a sudden violent lunge at him, causing him to spring back. When first seen the male lacked one of his legs, which lay on the web surface near the pair, and probably had been lost in a preliminary encounter with the female before she was sufficiently subdued to tolerate his advances.

In September and October the webs fall into disrepair, becoming tattered and compacted as the spiders become sluggish and fail to patch or extend them. With the advent of cold weather, the remaining spiders die off rapidly, but one was found still alive in the remnants of its web on November 6, 1960, after several 'cold fronts' with freezing nights.

The webs of these spiders were most typically within a few inches of the ground, but some were several feet above ground in bushes or trees. Each year many of the spiders made their webs beneath the wide eaves of my residence at the Reservation. Flies of various kinds were the most frequent victims, but butterflies (especially *Speyeria*) were also caught in large numbers. Beetles, bugs, and other medium-large insects, some as bulky as the spiders themselves, were fed upon. On one occasion a newly metamorphosed toad (*Bufo americanus*) became entangled in one of the webs and was fed upon by the spider. Occasionally large wasps were caught in the webs. In July, 1954, mud daubers were building their nests in a web under the eaves of the house. The spider usually covered in its funnel when the wasps were active nearby, but occasionally it darted out to menace them. One nest, based on the outer edge of the web sheet, finally became so heavy that part of the web collapsed under its weight. In one web, at the corner of the garage, remains of harvestmen (*Leiobunum vittatum*) were numerous.

Agelenopsis oklahoma (Gertsch)

Oklahoma Funnel Spider

Agelena oklahoma Gertsch 1936 Amer. Mus. Novit. no. 852, p. 12.

Identification.—WJC.

Range.—Parts of Oklahoma and Kansas, and perhaps neighboring states.

Description.—Female, length 8.0, carapace 3.5, abdomen 4.5, (plus posteriorly projecting spinnerets, 1.0 mm.), extended legs 29.5. Carapace narrow in cephalic region, wide in thoracic region, pale yellowish brown narrowly margined with black and with pair of broad dorsolateral bands extending its entire length; abdomen oval-elongate, little bulkier than cephalothorax, light brown mottled with black, and having pair of narrow, well separated yellowish brown longitudinal bands extending most of its length but broken into spots posteriorly; legs yellowish brown, mottled with gray and dark brown which tends to form obscure annulations; legs armed with numerous black spines; sternum yellowish brown with dark lateral areas forming V-shaped mark; epigynal area swollen, reddish brown; epigynal orifice a transverse slit markedly broader than long; venter with broad longitudinal dark band that pales to yellowish brown in middle, thus imparting impression of pair of dark bands.

Habitat and Habits.—Because of its similarity to the young of *A. naevia* and, especially to *A. pennsylvanica* this species was overlooked until the late summer of 1961. It is relatively uncommon. An adult female was found in a web on the concrete base of a shed at the Rockefeller Tract. Several others were found under large flat rocks of a hilltop limestone outcrop in a woodland browsed by cattle, adjacent to the Reservation on the west.

Agelenopsis pen[n]sylvanica (Koch)

Pennsylvania Funnel Spider

Agelena pensylvanica Koch, 1843, Die Arachniden, p. 111.

Agelenopsis pennsylvanica; Chamberlin and Ivie, 1941, Ann. Ent. Soc. Amer., vol. 34, p. 588; pl. 1, fig. 1; pl. 3, fig. 16; pl. 6, fig. 40.

Identification.—AB.

Range.—Across United States from New England to Oregon and Washington, south to Tennessee and Kansas.

Description.—Female, length 15, carapace 5.4, abdomen (exclusive of spinnerets) 9, extended legs 70. Body pale brown with pair of broad, dark longitudinal bands on carapace and abdomen; on abdomen dark bands invaded on their medial sides by wedge-shaped extensions of middorsal pale area, and faintly speckled with pale brown; legs reddish brown with black bristles.

Male resembling female in most respects, slightly smaller, on average, with slenderer abdomen and relatively longer legs.

Habitat and Habits.—This species is so similar in general habits and appearance to *A. naevia* that usually the two species were not distinguished in the field. The larger individuals, however, were

recognized as *naevia*. *A. pennsylvanica* has been found in woodland, in brushy fields, and about buildings. Its seasonal schedule follows the same pattern as that of *naevia*. On September 25, 1952, two mating pairs were noticed. One pair was in the funnel of their web near its inner end. They seemed little disturbed by my presence; the male at intervals continued his quivering and vibrating movements. When part of the web sheet was torn away, the male lifted the quiescent female and carried her about an inch farther down the funnel.

The prey of this funnel web weaver includes a wide variety of insects, especially hemipterans, homopterans, coleopterans, hymenopterans, dipterans and orthopterans.

Genus *Cicurina* Menge

The spiders of this genus are small, pale orange or brown, and have the apical segment of each hind spinneret much shorter than the basal segment. The width of the labium equals or exceeds its height. The height of the clypeus equals or exceeds the diameter of the anterior lateral eye. The chelicerae are robust and usually somewhat geniculate. The genus occurs in the United States, Europe, Asia and South America.

Cicurina arcuata Keyserling

Arcuate Funnel Spider

Cicurina arcuata Keyserling, 1887, Verh. Zool.-bot. Ges. Wien, vol. 37, p. 460; pl. 6, fig. 25.

Cicurina arcuata; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 126. *Identifications*.—MHM, AB, WJG.

Range.—Southeastern Canada, and eastern and central United States, west to Colorado and New Mexico.

Description.—Female, length 6.9, carapace 2.8, abdomen 3.3, extended legs 18. Carapace yellowish orange darkest in anterior region which is same color as chelicerae; latter geniculate and having series of minute denticles on each side on retromargin of fang furrow; abdomen pale yellowish gray or cream marked heavily with lead-gray reticulations which occupy more space than intervening areas; legs uniformly yellowish orange with distal segments darker.

Male resembles female, averaging slightly smaller.

Cicurina ludoviciana Simon

Louisiana Spider

Cicurina ludoviciana Simon, 1898, Ann. Soc. Ent. Belguique, vol. 42, p. 9.

Identifications.—MHM, AB, WJG.

Range.—Probably the entire United States, as it has been recorded from

the southeastern states and from Washington, but few records have been published.

Description.—Female, length 11.0, carapace 4.5, abdomen 6.0, extended legs 27.5. Carapace brownish orange, glabrous; thoracic groove shows as dark middorsal streak, abdomen slightly more bulky than cephalothorax, tends toward oval shape but much narrower anteriorly; has pale pubescence yellowish gray with pair of widely separated wartlike black prominences approximately one-third of distance from anterior end to posterior end; chelicerae strongly geniculate, and of same color as carapace; legs paler, especially on their proximal portions, hairy and spiny (see Fig. 41).

Habitat and Habits.—These spiders are not especially common, and have been found chiefly under rocks and boards in early summer.

Genus *Coras* Simon

The spiders of this genus are medium-sized, long-legged, and live in well sheltered places, as beneath rocks and logs.

The color is pale; the cephalothorax darkens to brown at the anterior end. The chelicerae are robust and geniculate; the retromargin of the fang furrow usually has three teeth (rarely four). The genus is holarctic.

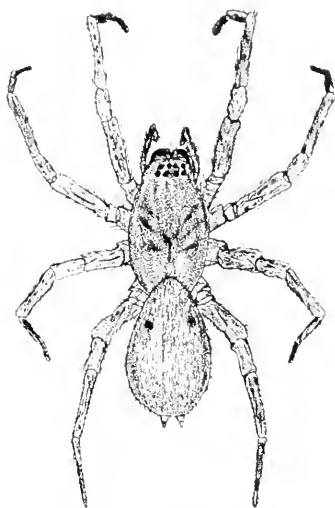


FIG. 41. *Cicurina ludoviciana*, female, $\times 3$.

Coras lamellosus (Keyserling)

Slab Spider

Caelotes lamellosus Keyserling, 1887, Vehr. Zool.-bot. Ges. Wien, p. 469, pl. 6, fig. 30, 30a, 30b.

Coras medicinalis; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 14.

Coras lamellosus; Muma, 1946, Amer. Mus. Novit., no. 1329, p. 6.

Identifications.—MHM, RLG.

Range.—Perhaps most of United States; recorded chiefly from eastern half of the country but also from California and Oregon.

Description.—Female, length 12.2, carapace 5.8, abdomen 6.2, extended legs 37. Carapace narrows abruptly from thoracic region to cephalic region, yellowish brown, darkening to chestnut at anterior end, having three pairs of gray marks in form of elongate triangles with their apices toward midline on thoracic part; dark thoracic groove prominent; abdomen pale yellowish gray, mottled with dark gray, and clothed with grayish pubescence; legs brownish yellow, with barely discernible gray annulations, clothed with gray

hairs and armed with dark spines; chelicerae strongly geniculate, chestnut (see Fig. 42).

Habitat and Habits.—This large funnel web weaver has been found only in woodland, and only when exposed beneath massive flat rocks. When such a rock was turned the spider was most often clinging to the underside enclosed in a fine, filmy, bluish web. Usually the spider was reluctant to leave the shelter of its web, but clung with legs drawn up. Upon being further disturbed it would dart out and over the rock surface, not pausing until it found a well concealed hiding place. The spiders have been found in such situations in every month from March to November, inclusive. At all times of year there are young of various sizes.



FIG. 42. *Coras lamellosus*, female, $\times 2$.

Genus *Tegenaria* Latreille

The spiders of this genus are medium-sized, slender, long-legged, dull-colored, and live in sheltered places. The posterior row of eyes is slightly procurved, and the posterior median eyes are only slightly smaller than the posterior laterals. The chelicerae are not geniculate. The retromargin of the fang furrow generally has four, five, or six teeth. The genus is cosmopolitan.

Tegenaria domestica (Clerck)

Barn Spider

Araneus domesticus Clerck, 1757, Svenska Spindlar, p. 76, pl. 2, fig. 2.

Tegenaria domestica; Simon, 1837, Les Arachnides de France, vol. 6, p. 1008, 1041, figs. 1558, 1559.

Identifications.—AB, WJG.

Range.—Cosmopolitan as a house spider.

Description.—Female, length 10, carapace 5.0, abdomen 5.5, extended legs 44. Carapace amber, darkening to mahogany in cephalic region; abdomen pale yellow, mottled with gray, and sparsely covered with pale hairs; legs long, slender and tapering; sternum deep amber, chelicerae mahogany; lateral spinnerets about twice as long as others.

Male resembles female in most respects; smaller by one-fourth.

Habitat and Habits.—This species is typically a house spider. One was found in a kitchen cupboard at the Reservation residence on June 7, 1953, another in early June, 1961, and another in a small pump-house more than 100 yards from the residence in July, 1960. Kaston (1948:280) stated that individuals may survive several or many years, and that the male and female may live together in the same web in late spring and early summer.

Family PISAURIDAE Simon

Nursery web Weavers

Size ranges from medium to large in these cribellate, trionychous spiders. The legs are long and tapered. There are eight dark homogeneous eyes, in two rows, the posterior somewhat recurved. The powerful chelicerae have toothed margins and are provided with boss and scopula. There are numerous trichobothria irregularly distributed on the tibiae, metatarsi and tarsi. These spiders are active wanderers and do not construct a web to catch their prey, but they build a nursery web about the egg sac and guard it until the spiderlings leave. Before hatching the female carries the egg sac in her chelicerae, holding it against her sternum.

KEY TO THE SPECIES OF THE FAMILY PISAURIDAE OF THE RESERVATION

1. Anterior row of eyes recurved, the laterals near (less than a diameter from edge of) clypeus *Pelopatis undulata*, p. 100
- 1'. Anterior row of eyes straight, the laterals at least two diameters removed from edge of clypeus 2
2. Height of clypeus less than length of median ocular area; three teeth on retromargin of cheliceral fang furrow *Dapanus mirus*, p. 96
- 2'. Height of clypeus greater than length of median ocular area; four teeth on retromargin of cheliceral fang furrow 3
3. Sternum marked with three pairs of black dots. *Dolomedes sexpunctatus*, p. 97
- 3'. Sternum not marked with black dots 4
4. Femur of fourth leg in male having a ventral spinose hump near distal end; median lobe of female epigynum much longer than broad. *Dolomedes urinator*, p. 100
- 4'. Femur of fourth leg in male lacking ventral spinose hump; median lobe of female epigynum broader than long. *Dolomedes tenebrosus*, p. 98

Genus *Dapanus* Hentz

Spiders of this genus are large, long-legged wanderers, usually found in grassy or weedy places or occasionally in woodland. The median ocular area is a little longer than wide. The anterior row of eyes is slightly procurved, and the eyes are subequal. The clypeus is higher than the diameter of the anterior median eyes. The retromargin of the cheliceral fang furrow has three teeth. The genus occurs in southeastern Canada and the United States.

Dapanus mirus (Walckenaer)**Scallop-banded Spider**

Dolomedes mirus Walckenaer, 1837, Histoire Naturelle des Insectes Aptères, vol. 1, p. 357.

Pisaurina mira; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 15.

Dapanus mirus; Bryant, 1941, Psyche, vol. 48.

Identifications.—MHM, RLC, AB.

Range.—Eastern United States in the Deciduous Forest Formation; recorded also from Colorado.

Description.—Female, length 18, carapace 6.0, abdomen 12.0, extended legs 62. Carapace reddish brown with fine streaking and reticulation of darker brown; ocular area relatively dark, eyes rimmed with black; chelicerae reddish brown with coating of long gray bristles; abdomen yellowish brown with broad middorsal darker area, with faint dark streaks on sides, and with pubescence of pale gray hairs. Both rows of eyes recurved, posterior more strongly; legs reddish brown with paler streaks.

Male resembles female in most respects but slightly smaller.

Habitat and Habits.—This large, slender spider is found in both woodland and grassland; probably its preferred habitat is "edge," with brush and tall weeds. The species is not common on the Reservation and in some years (for example 1954) none was seen. A pair of adults was found together in a trap on May 30, 1958, suggesting breeding activity. Nursey webs have been seen chiefly in the latter half of June, a few in early July. Kaston (1948:296) stated that in Connecticut the spider hibernates in the penultimate or earlier instars, matures in April and may survive through the summer in the adult state. When her eggs begin to hatch, the female encloses the young and the egg sac in a nursery web, and the young remain there nine or ten days before dispersing. Observers in the eastern states have noted that the terminal leaflets of poison ivy provided a favorite site for the support of the nursery web. On the Reservation I have never seen the webs on poison ivy, despite the prevalence of this plant, but ironweed (*Vernonia interior*) and awnless brome seem to be favored.

Genus *Dolomedes* Latreille

These spiders are large and dark colored, and usually stay near water or in damp places. They are long-legged, running spiders in which the cephalothorax is broadened and the abdomen is oval and relatively small. The eyes of the posterior row are larger than those of the anterior row and are uniformly spaced. The anterior row is slightly recurved, and the medians are larger than the laterals. The median ocular area is wider posteriorly, and its maximum width exceeds its length. The clypeus exceeds the length of the

median ocular area. The retromargin of the cheliceral fang furrow has four teeth. The genus is cosmopolitan.

Dolomedes sexpunctatus Hentz

Six-dotted Dolomedes

Dolomedes sexpunctatus Hentz, 1845, Jour. Boston Soc. Nat. Hist., vol 5, p. 191, pl. 16, figs. 5-6.

Identifications.—AB, WJG.

Range.—Southeastern Canada and eastern United States west to Kansas and Texas; Puerto Rico.

Description.—Female, length 16, carapace 9.0, abdomen 9.0, extended legs 68. Carapace dark brown, with pale yellow submarginal band except at posterior end, and with narrow, faint, pale discontinuous mid-dorsal streak; abdomen dark brown dorsally, slightly paler than carapace, and having dorsum rimmed with pale band, constituting extension of submarginal band of carapace.



FIG. 43. *Dolomedes sexpunctatus*, female,
× 1.

pace, but broader and duller; four pairs of minute white spots on dorsum, each narrowly rimmed with black; three pairs of black spots on sternum; legs long, powerful, and tapered, dark brown proximally, paling distally, with irregular white flecks (see Fig. 43).

Male averages approximately half female's size, similarly marked.

Habitat and Habits.—These large spiders have been seen chiefly at or near the pond on the Reservation, the diversion ditch leading from it and the smaller pond on the Rockefeller Tract. The species is partly aquatic in habits; it runs over the surface of the water easily, and dives, retaining a layer of air in its hairy covering. It can remain submerged for several minutes.

On December 3, 1954, an individual in the penultimate instar was seen running rather slowly and heavily over the surface of the water at the middle of the pond on the Reservation when air temperature was 39°F. Kaston (1948:301) stated that in Connecticut the species winters in the antepenultimate instar, that the males mature in late May, and that the females do so in early June. A female captured on July 24, 1961, produced an egg sac on the following day. For the following two weeks she remained in a characteristic position grasping the sac in her chelicerae and often holding it in contact with the water surface. On August 6 she moved higher on a stick several inches above the water. On August 7 spiderlings had hatched and were enclosed in a nursery web, which was kept taut by the weight of the female. She had fasted throughout the period of incubation, but began to take food after hatching. A second egg sac was produced on August 28. On September 13 the female with her sac was noticed on the netting at the top of the jar, though previously she had stayed in the lower part near the water. On September 14 the eggs had hatched and the many spiderlings were enclosed in a nursery web with the egg sac. A third sac was produced in October.

At the pond, the bullfrog is seemingly the chief natural enemy; the spiders have been noticed mainly at times when the bullfrog population was low and they would seem to have little chance of survival when the shore is lined with bullfrogs each ready to lunge and gulp down any small animal of the spider's size that ventures into the vicinity.

Dolomedes tenebrosus Hentz

Dark Dolomedes

Dolomedes tenebrosus Hentz, 1844, Jour. Boston Soc. Nat. Hist., vol. 4, p. 396; pl. 19, figs. 10-13.

Identifications.—TBK, RLC, AB.

Range.—Known chiefly from the eastern United States, but has been recorded as far west as North Dakota and Arizona.

Description.—Female, length 21, carapace 9.6, abdomen 12.0, extended legs 92. Carapace pale brown, darker at margin, with pale submarginal band;

pale, yellowish brown area just behind posterior row of eyes and extending as narrow band to posterior part of carapace; abdomen with pale median band dorsally enclosed in black area, with lateral pale marginal bands enclosing, on anterior part; farther posteriorly are several faint dark chevrons; legs yellowish brown with dark gray annulations (see Fig. 44).



FIG. 44. *Dolomedes tenebrosus*, female, $\times 1\frac{1}{4}$.

Male averages little more than half female's length, marked much like her, but with more sharply defined pattern, with contrasting darker and lighter areas; chelicerae each marked with wide black band medially.

Habitat and Habits.—These large dull-colored spiders have been found near water in most instances, but the species is not aquatic like *D. sexpunctatus*. Dark and damp situations, such as those beneath bridges or culverts, or in rock piles, are preferred. On December 6, 1954, when the air temperature was 30 F, one was found huddled beneath a leaf at the edge of a rock pile near a pond. When it was touched, it made barely perceptible movements, drawing up its legs more tightly. In warm weather the spiders lurk in corners and crevices by day and emerge after dark. An

adult female found in mid-July, clinging to the top of a concrete culvert, was menacing in demeanor and struck viciously without yielding ground when she was poked with a stick. Kaston (1948:300) stated that these spiders in Connecticut hibernate as penultimates, mature in May, and are to be found as adults through July.

Dolomedes urinator Hentz

Diving Dolomedes

Dolomedes urinator Hentz, 1845, Jour. Boston Soc. Nat. Hist., vol. 5, p. 190; pl. 16, fig. 3.

Identification.—AB.

Range.—Eastern United States, chiefly in the Deciduous Forest Formation.

Description.—Female, length 20, carapace 9.1, abdomen 12.5, extended legs 91. Carapace velvety brown, with faint paler markings behind posterior lateral eyes and with pair of triangular black marks near center, anterior to thoracic groove; chelicerae dark brown, with reddish-orange boss; dorsum dark brown with three pairs of distinct white dots on posterior half, each pair connected by dusky chevronlike mark; venter reddish brown, with two paler longitudinal bands from corner of epigastric furrow to spinneret on each side, narrowing posteriorly; legs dark brown with faint darker markings, having undersides of femora densely covered with black hair making them appear dark gray.

Habitat and Habits.—Only a single specimen of this large spider has been collected on the Reservation. It was found at night beside a wall on a concrete gully crossing. Earlier in the evening it had been seen lying in the same spot. Kaston (1948:302) stated that in Connecticut it is an uncommon species, found in ravines. Kaston (*loc. cit.*) recorded an egg sac with 1,480 spiderlings, and Bishop (1924:36) recorded a sac with 1,457 eggs.

Genus **Pelopatis** Bishop

These are medium-sized nursery web spiders having elongate bodies and long slender legs. The anterior row of eyes is strongly procurved and the posterior row of eyes is strongly recurved; consequently each of the four pairs is on a different level and seems to comprise a separate row. The anterior lateral eyes are removed from the edge of the clypeus by not more than their own diameters. The genus is monotypic and is known only from the United States.

Pelopatis undulata (Keyserling)

Undulate Spider

Tetragonophthalma undulata Keyserling, 1887, Verh. Zool.-bot. Ges. Wien, 37:486.

Pelopatis undulata; Bishop, 1924, New York State Mus. Bull., 252:21.

Identification.—WJG.

Range.—Southeastern United States, from South Carolina and Florida west to Oklahoma and Kansas.

Description.—Female, length 11, carapace 4, abdomen 7, extended legs 49. Carapace markedly longer than broad, having narrow black middorsal line; sternum longer than wide, projecting posteriorly between coxae of fourth pair of legs; abdomen more than twice as long as wide, grayish tan with darker middorsal band; three teeth on retromargin of cheliceral fang furrow; tibiae of first and second pair of legs each armed with five pairs of long ventral spines; metatarsi of same legs each armed with four pairs of long spines.

Male resembles female but somewhat smaller.

Habitat and Habits.—This is a relatively rare spider locally. On July 31 an adult female carrying her egg sac was found in a weedy barnyard area of the Rockefeller Tract, beside the concrete foundation of the building.

Family LYCOSIDAE Sundevall

Wolf Spiders

Size ranges from small to large in these cribellate trionychous spiders. The wolf spiders are ground-living and are well adapted for running. The abdomen is oval and usually not much more bulky than the cephalothorax. The legs are long and tapered. The eight eyes are homogeneous and dark; the posterior row is so strongly recurved as to form two rows of two eyes each. The posterior median eyes (situated between the anterior row and the posterior laterals) are by far the largest. The chelicerae are powerful, with a boss, scopula, and toothed margins. The labium is free. The colors are usually dull, with grays, browns and blacks predominating. There are numerous trichobothria irregularly arranged on the tibiae, metatarsi and tarsi. Wolf spiders with the exception of a few sedentary southern types do not spin webs to catch their prey. Most are wanderers, but a few live in burrows. The eggs are enclosed in a silken sac attached to the posterior end of the abdomen. For a period after hatching the young ride about on the abdomen of the female.

KEY TO THE SPECIES OF THE FAMILY LYCOSIDAE OF THE RESERVATION

1. Dark V-shaped marking present on anterior part of carapace; cephalic region not conspicuously higher than remainder of carapace.
 - (*Pirata*) 2
- 1'. Dark V-shaped marking absent; cephalic region conspicuously higher than remainder of carapace 4
2. Submarginal bands of carapace sharply set off from gray area mesad to them 3
- 2'. Submarginal bands of carapace not sharply set off from adjacent gray areas, with extensions branching into them *Pirata maculatus*, p. 116
3. A thin gray marginal band on carapace *Pirata insularis*, p. 116
- 3'. No thin gray marginal band on carapace *Pirata arenicola*, p. 115
4. Labium usually wider than long; sides of face vertical . . (*Pardosa*) 5
- 4'. Labium longer than wide; sides of face slanting 7
5. Length in adults more than 6 mm.; color predominantly gray.
 - Pardosa lapidicina*, p. 112
- 5'. Length in adults less than 6 mm.; spotted with dull yellow 6
6. Abdomen mottled with yellow; no white hairs on palpal patella of male *Pardosa milvina*, p. 113

- 6'. Abdomen finely dotted with yellow; white hairs on palpal patella of male *Pardosa saxatilis*, p. 114
7. Carapace dark and shiny *Arctosa funerea*, p. 103
- 7'. Carapace with dark and light markings; not shiny 8
8. Cephalothorax high in front, sloping gradually to rear; size large. *Gecolycosa missouriensis*, p. 104
- 8'. Cephalothorax not so high in front, with a thoracic declivity; size variable 9
9. Lanceolate dark mark middorsally on anterior part of abdomen. *Schizocosa avida*, p. 117
- 9'. No such mark present 10
10. Abdomen pale brown with a broad median light band for its entire length 11
- 10'. Abdomen not marked as above 12
11. Dorsal abdominal band in adults encloses, on each side, a series of small, oblique, light spots; venter not spotted with black. *Lycosa rubida*, p. 111
- 11'. Dorsal abdominal band not enclosing light marks; venter spotted with black *Lycosa punctulata*, p. 110
12. Carapace having broad light colored dorsal stripe; size smaller (length less than 18 mm. in adult females) 15
- 12'. Carapace having narrow light colored dorsal stripe or none; size larger (length more than 18 mm. in adult females) 13
13. Carapace without a distinct median light stripe; ventral surface all black *Lycosa carolinensis*, p. 107
- 13'. Carapace with a distinct median light stripe; ventral surface not all black 14
14. Size larger (length usually more than 21 mm. in females and more than 16 mm. in males); middorsal light line on carapace largely limited to ocular area; legs faintly annulate; venter mostly dark. *Lycosa aspersa*, p. 105
- 14'. Size smaller (length less than 22 mm. in females and less than 13 in males); middorsal light lines extending for most of length of carapace; legs not annulate; venter pale, dotted with black *Lycosa helluo*, p. 109
15. Epigynum has lateral arms of guide deeply bifurcate; embolus of palp bent in an angle 16
- 15'. Lateral arms of epigynal guide not bifurcate; embolus of palp evenly curved 18
16. Color pale yellowish brown, with dark markings. *Schizocosa bilincata*, p. 117
- 16'. Color dusky, grayish brown with dark markings 17
17. Legs faintly annulate; tibia of first leg in adult males has conspicuous brush of black hairs *Schizocosa crassipes*, p. 118
- 17'. Legs not annulate (except sometimes those of first pair); no brush of black hairs on tibia *Schizocosa saltatrix*, p. 119
18. Tibiae of third and fourth legs each having basally stout and apically attenuate bristle at base 19
- 18'. Tibiae of third and fourth legs lacking bristle (but bearing spine) at base 20

19. Carapace marked with black; legs distinctly annulate.

Arctosa noctuabunda, p. 104

19'. Carapace reddish brown, immaculate; legs with faint annulations or none

Arctosa sublata, p. 104

20. Abdomen heavily marked with black anteriorly

Lycosa gulosa, p. 108

20'. Abdomen uniformly colored, or with faint longitudinal mark anteriorly

Lycosa atara, p. 107

Genus *Arctosa* Koch

Members of this genus are relatively small. The carapace is glabrous or nearly so, sometimes shiny and of polished appearance. The third and fourth tibiae each lack a true spine, but have instead an elongate bristle at the base dorsally. The genus is almost cosmopolitan but is absent in the Australasian region.

Arctosa funerea (Hentz)

Lycosa funerea Hentz, 1844, Jour. Boston Soc. Nat. Hist., vol. 4, p. 393; pl. 8, fig. 11.

Arctosa funerea; Gertsch, 1934, Amer. Mus. Novit., no. 693, p. 9.

Identifications.—RLG, AB.

Range.—Eastern United States in the Deciduous Forest Biome.

Description.—Female, length 4.4, carapace 1.8, abdomen 2.3, extended legs

16.5. Carapace glabrous, dark reddish brown, darkest in eye region; dorsum of abdomen yellowish gray, marbled with black; venter tan clouded with gray pubescence; legs reddish brown with faint, dark annulations, paling to lighter brown on distal segments, having pale pubescence and dark spines (see Fig. 45).

Male resembles female in appearance, smaller by one-fourth.

Habitat and Habits.—

These small and somewhat secretive lycosids were often seen running on or near the sidewalks at the Reservation headquarters, but they were rarely found elsewhere. Kaston (1948:321) stated that in Connecticut the species is found under stones in fields, along paths and



FIG. 45. *Arctosa funerea*, female, $\times 8$.

sidewalks, on shores and in saltmarshes, and that maturity is attained sometime in early summer—June or July.

Arctosa noctuabunda Montgomery

Trochosa noctuabunda Montgomery, 1904, Proc. Acad. Nat. Sci. Philadelphia, p. 301, p. xviii, figs. 9 and 10.

Arctosa noctuabunda; Gertsch, 1934, Amer. Mus. Novit. no. 693, p. 7.

Identification.—WJG.

Range.—Southeastern United States from Texas to Florida, and north to Kansas.

Description.—Female, length 7.5, carapace 3.5, abdomen 4.0, extended legs 22.5. Dorsal coloration pale, yellowish brown and dark brown, nearly black, former color in irregular middorsal area of carapace, constricted behind cervical groove, and with five pairs of relatively small lateral spots, in middorsal area of abdomen—chiefly its anterior half; and on legs between dark annulations; ventral surface paler, with little dark pigmentation.

Arctosa sublata Montgomery

Lycosa sublata Montgomery, 1902, Proc. Acad. Nat. Sci. Philadelphia, p. 539.

Identification.—WL.

Range.—Eastern United States.

Description.—Female, length 6.0, carapace 3.5, abdomen 3.0, extended legs 15.5. Carapace reddish brown, flattened, eyes small, median groove dark; abdomen pale yellowish gray, spotted and reticulated with plumbeous, legs yellowish brown, paler than carapace.

Habitat and Habits.—On July 10, 1952, three females with egg sacs were found near together in small cavities in a decaying log. When exposed the spiders remained motionless with legs drawn up. No others of this species were found in the course of my field work.

Genus Geolycosa Montgomery

Spiders of this genus are medium-large and are specialized for digging, and spend nearly all their time in their burrows. The anterior row of eyes is shorter than the posterior, and the ocular area occupies about half the width of the head. The first pair of legs is heavy and powerful. The undersides of the first and second legs have extensive black areas. The combined tibia and patella of the fourth leg exceed the length of the cephalothorax in males, but are somewhat shorter than the cephalothorax in females. This genus occurs in the United States and southern Canada.

Geolycosa missouriensis (Banks)

Missouri Earth Spider

Lycosa missouriensis Banks, 1895, Ent. News, vol. 6, p. 206.

Geolycosa missouriensis; Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, vol. 60, p. 242.

Identification.—MHM.

Range.—South-central United States.

Description.—Male, length 15.0, carapace 7.5, abdomen 7.5, extended legs

34. Brown dorsally; posterior median eye row slightly wider than anterior row; posterior eye quadrangle wider than long; lower margin of furrow of chelicera bearing three teeth; abdomen having faint dark chevrons dorsally; ventral surfaces of body and legs buffy orange except that most of tibiae, tarsi, and metatarsi are black.

Genus *Lycosa* Latreille

The wolf spiders of this genus are medium-sized to large. Many are wanderers but others make temporary or permanent retreats. The retreat may consist of a natural cavity beneath a rock or log, which may be enlarged and lined with silk, or the spider may excavate a deep, tubular burrow. The colors are usually grays, browns, or tans with black markings. The first row of eyes is shorter than the second. The tibia of the first leg is armed with three pairs of ventral spines. The genus is cosmopolitan.



FIG. 46. *Lycosa gulosa*, female, $\times 2$.



FIG. 47. *Lycosa punctulata*, female, $\times 2$.

Lycosa aspersa Hentz

Tiger-wolf Spider

Lycosa aspersa Hentz, 1844, Jour. Boston Soc. Nat. Hist., vol. 4, p. 389, pl. 17, figs. 11-12.

Identifications.—TBK, RLG, AB.

Range.—Eastern United States in the Deciduous Forest Formation; south-eastern Canada.

Description.—Female, length 19.2, carapace 8.2, abdomen 11, extended legs 69. Anterior eyes in straight row, directed anteriorly; clypeus not much wider than eyes; posterior median eyes nearly twice as large as others, and

directed anteriorly; posterior lateral eyes almost behind posterior median, and directed upward; carapace dark brown with darker markings, black in eye region; pale yellowish hairs forming narrow median stripe from between pos-



FIG. 48. *Lycosa aspersa*, female, $\times 1\frac{1}{2}$.

terior lateral eyes to clypeus; faint traces of pale stripe farther posteriorly, in thoracic region; sternum and ventral parts of coxae black; abdomen dark brown dorsally, almost black, thickly clothed with black hairs; venter dark brown, paling to yellowish brown anterior to epigastric furrow; legs dark brown, with faint darker annulations, joints between segments of legs pale yellowish, contrasting with dark colors (see Fig. 48).

Male averages slightly smaller than female, and much paler; carapace yellowish tan along mid-line and lateral margins, elsewhere heavily marked with black; abdomen pale brown with black spotting and stippling; legs pale brown proximally but with black bristles and darkening to black on terminal portions; coxae, labium and ventral parts of chelicerae black.

Habitat and Habits.—These large, stocky dark colored wolf spiders have been found in all habitats on the Reservation but are most common in woodland and woodland edge situations. The greatest concentration noted was in the willow grove at the pond, where, on warm and humid summer nights in 1956, a continual rustling could be heard, as the numerous heavy-bodied spiders foraged through the leaf litter. Activities are chiefly nocturnal. In foraging, the movements are rather slow and elephantine. Normally foraging is terrestrial, but on one occasion in early June a female carrying a brood was seen climbing to the top of a three-foot elm sapling. The prey presumably consists of the larger terrestrial insects. The spiders have often been found by day beneath large flat rocks, sometimes in natural depressions, and sometimes in cavities of their own construction. Also, the spiders often live in burrows away from sheltering objects. The entrance may have a turret—an elevation of soil, straws or twigs, which probably helps to prevent water from draining into the burrow during heavy rains. Females have

often been found in burrows with their egg sacs in May and June, and many females carrying broods of young have been caught in traps in May, June and July. Kaston (1948:324) stated that in Connecticut mating occurs in fall. He recorded a female with a brood of spiderlings in early June and another with an egg sac in mid-August, and ventured the opinion that perhaps two egg sacs are produced in one season by a female; he thought also that the young overwinter in a half-grown stage, and that individuals may survive as long as three years.

The Great Plains skink is known to prey on these spiders, but on the Reservation it is not sufficiently abundant to affect their numbers appreciably. The five-lined skink (*Eumeces fasciatus*) preys upon the young but cannot cope with the adult spiders. A large wasp (*Pepsis*?) has been seen preying upon these spiders as well as upon *L. rabida*.

Lycosa avara (Keyserling)

Little Wolf Spider

Trochosa avara Keyserling, 1877, Verh. Zool.-bot. Ges. Wien, vol. 26, p. 661; pl. 8, figs. 38-39.

Lycosa avara; Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 1892, p. 66.

Lycosa rufiventris; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 126.

Identification.—AB.

Range.—Eastern United States.

Description.—Female, length 7.6, carapace 3.8, abdomen 3.8, extended legs 30. Carapace dull amber brown, with thin, dark brown marginal stripes, and pale, yellowish brown middorsal stripe; dorsum uniformly grayish brown; venter amber; legs light yellowish brown with no dark markings; male similar in most respects, but averages smaller by approximately one-third.

Habitat and Habits.—This is a relatively uncommon species recorded on few occasions. On March 19, 1953, two adult females were collected from leaf litter under the edge of a log, in thick woods at the foot of a north slope. On July 18, 1960, one was found carrying an egg sac. Kaston (1948:329) recorded egg sacs with 78 and 32 eggs.

Lycosa carolinensis (Walckenaer)

Carolina Wolf Spider

Lycosa tarantula carolinensis Walckenaer, 1837, Histoire Naturelle des Insectes Aptères, vol. 1, p. 285.

Lycosa carolinensis; Hentz, 1842, Jour. Boston Soc. Nat. Hist., vol. 4, p. 230.

Lycosa pilosa; Craigin, 1885, Bull. Washburn Coll. Lab. Nat. Hist., vol. 1, p. 146.

Identifications.—TBK, MHM.

Range.—Much of the United States; recorded chiefly from the eastern half, but also from Colorado, New Mexico and California.

Description.—Female, length 29, carapace 12, abdomen 17, extended legs 81. Carapace dark reddish brown with fine grayish pubescence; abdomen dark brown, with obscure darker brown irregular middorsal band on anterior half; abdomen with dense brownish pubescence; legs dark brown, unmarked; ventral surface on sternum, coxae and abdomen black.

Male similar in most respects, smaller by approximately one-third.

Habitat and Habits.—This largest local spider is restricted to open situations such as eroded fields and heavily grazed pastures. In the late winter and spring of 1949 burrows were numerous in the pasture on the west edge of the Reservation near the entrance gate. In freezing weather of February and March, several of the spiders, of different sizes, were dug out of open burrows that were ten inches or more in depth. The spiders were dormant and were capable of only feeble movements. In the following growing season, with the removal of livestock and the production of a crop of rank vegetation, this pasture no longer provided suitable habitat and the spiders disappeared from there and from similar areas. A formerly cultivated and heavily eroded upland field on the north edge of the Reservation remained sparsely vegetated through 1960 and a colony of the spiders survived there. Crickets (*Gryllus*) are abundant in the habitat preferred by the spiders and may be one of the chief food sources. Kaston (1948:323) stated that these spiders lay their eggs in May or June, the young emerge in June or July and are about half grown when they overwinter. Mating occurs in fall and the mature males then die off, but the females may survive for as long as three years.

Lycosa gulosa (Walckenaer)

Forest Wolf Spider

Lycosa gulosa Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. I, p. 338.

Lycosa kochii; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 12.

Identifications.—TBK, MHM, RLC, AB.

Range.—United States, chiefly eastern states in Deciduous Forest Formation, but recorded also from Utah and New Mexico, and south through Mexico to Brazil and Peru.

Description.—Female, length 17, carapace 8, abdomen 10, extended legs 45. Carapace dark grayish brown with tan dorsal stripe broad and faint anteriorly in ocular area but becoming narrower and more distinct posteriorly; with two faint constrictions near middle, bordered by dark brown zone; carapace has

sparse pale gray pubescence; abdomen brown with pair of irregular black marks at its anterior margin and two less distinct irregular black marks behind them; dappled on sides with pale gray, and dorsally on its anterior half has two pairs of yellowish gray spots, anterior pair closer together; legs brown, with covering of pale brown hairs and with numerous large black spines (see Fig. 46).

Male slightly smaller than female, having black markings more extensive on abdomen.

Habitat and Habits.—These medium-sized wolf spiders are typical of woodland habitat and forage in leaf litter of the forest floor. They abound in all types of woodland on the Reservation, mature late in fall, are active on exceptionally warm days, even in winter, and mate in early spring. On the warm, humid evening of April 3, 1955, one was seen in the act of laying eggs. In the following two weeks many others were seen with egg sacs, in their silk-lined nest cavities beneath flat rocks. In 1957 females with egg sacs were first found on April 10, the first warm springlike day of the season. Females have been seen carrying young in early May. Kaston (1948:328) stated that in Connecticut adult males were found through the fall, winter, and spring to June, implying that they die off by midsummer, but he thought it probable that females survive through two years.

The five-lined skink (*Eumeces fasciatus*) is abundant in some parts of the woodland, and ground-living spiders of this type are known to make up a major part of its food.

Lycosa helluo Walckenaer

Lycosa helluo Walckenaer, 1837, Histoire Naturelle des Insectes Aptères, vol. 1, p. 338.

Lycosa nidicola; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 12.

Identifications.—TBK, MHM.

Range.—New England south to Florida and west into New Mexico, southward through Mexico to Brazil and Peru.

Description.—Female, length 17.5, carapace 7.8, abdomen 10.3, extended legs 53. Carapace dark brown, black in region of posterior eyes; thin yellow line extending from clypeus to posterior edge of carapace and pair of submarginal stripes, which extend from beside posterior lateral eyes to posterior end of carapace; sternum and coxae dark brown; dorsum grayish brown; venter gray, with thick layer of black hairs over lighter ground color; legs yellowish-brown, lighter on undersurfaces, having grayish annulations.

Male little more than one-half female's length, lighter colored, with dense black hairs on tarsus and metatarsus of legs of first pair.

Habitat and Habits.—Except for its smaller size this species resembles *L. aspersa* in appearance and is much like it in habits also.

L. helluo is less common than *L. aspersa*, and perhaps more restricted in habitat. Many individuals were found on damp soil in weedy vegetation at the margin of the pond. In late summer females often were found with egg sacs. Usually they were under logs, boards, or tar paper strips, in nestlike depressions lined with silk.

Lycosa punctulata Hentz

Dotted Wolf Spider

Lycosa punctulata Hentz, 1844, Jour. Boston Soc. Nat. Hist., vol. 4, p. 340, pl. 17, figs. 16-17.

Lycosa punctulata; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 126.

Identifications.—TBK, AB.

Range.—Eastern United States, chiefly in Deciduous Forest Formation, but west to the Rocky Mountains, and south into the Antilles.

Description.—Female, length 15, carapace 8.0, abdomen 6.9, extended legs 47. Dorsal coloration pale, yellowish-brown, but with longitudinal black areas, one extending for length of abdomen middorsally and pair on carapace, separated by slightly narrower area of ground color medially, each bordered by lateral area of same color slightly broader than middorsal area; legs become darker distally; chelicerae black; ventral surface somewhat like dorsal ground color, but sternum deeper brown and abdomen paler, spotted with black (see Fig. 47).

Male slightly smaller than female; otherwise similar in appearance.

Habitat and Habits.—Because these spiders were long confused with the much commoner *Lycosa rabida* on the Reservation relatively little was learned concerning their habits. They were found chiefly in grassland but in relatively open or barren situations as compared to *L. rabida*, which prefers a tall-grass habitat.

On September 11, 1960, when weedy vegetation was removed from a small enclosure near the Reservation headquarters, many adults and penultimates of these spiders were found to be present. They exploited the opportunity to catch insects flushed out by the activity of the persons; several wolf spiders were carrying prey, mostly small grasshoppers. One adult spider pounced upon another and grasped it at the base of one leg. The spider seized did not struggle or retaliate. At first this behavior was mistaken for predation, but later it was recognized as sexual behavior.

In late November, 1960, several adults were found active in a pasture dominated by perennial tall-grasses, but having also patches of bare ground and weedy vegetation. In late April and early May, 1961, several of these spiders were active after dark, preying on insects that had been attracted to lights at the headquarters building. On June 7, 1954, a female was seen carrying an egg sac.

Lycosa rabida Walckenaer

Rabid Wolf Spider

Lycosa rabida Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. I, p. 320.

Lycosa scutulata; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 12.

Identifications.—MHM, RLC.

Range.—Known chiefly from the eastern United States, but recorded west as far as Arizona and south as far as Panama.

Description.—Female, length 19, carapace 8.7, abdomen 10, extended legs 73. Carapace yellow with pair of broad dorsal brown stripes, enclosing posterior eyes and extending to posterior edge; abdomen with dark brown median stripe, flanked by two yellow stripes; dark brown median lanceolate stripe encloses faint paired lighter spots on posterior half; venter yellow with few brown spots laterally; legs yellow, with faint longitudinal gray stripes; body and legs slender and elongate (see Fig. 49); male averages slightly smaller than female with first pair of legs mostly black.



FIG. 49. *Lycosa rabida*, female,
× 1½.

Habitat and Habits.—This is one of the most conspicuous and common large spiders on the Reservation. Although characteristic of grassland habitats, it is found also in open woodlands where there is low herbaceous vegetation including grass. It is about equally abundant in tall-grass prairie and in fields dominated by the introduced pasture grass, awnless brome. For a spider of such large size it is an exceptionally rapid runner. In open situations one of these spiders that has been alarmed may abandon the running

gait and progress with a series of long hops.

In general the life-cycle is synchronized with the seasonal cycle but individuals deviate from the main trend. Each year adults were first noted in abundance in the latter half of July, when many were caught in reptile traps, having grown too large to squeeze through the quarter-inch mesh of the traps. Most females were carrying egg sacs in August and early September (earliest record August 5, 1960), and were carrying young in late September

and early October. On September 10, 1955, a female with her egg sac was under a flat rock in a web-lined nest cavity. The egg sac was 16 mm. in diameter and contained 259 hatchling spiders. In March and April most of the spiders of this species seen are young, two to three millimeters long, but a few are adults or penultimates.

On numerous occasions these spiders have been seen carrying prey, often small grasshoppers. Several times they have been seen feeding on smaller members of their own species. The species is a favorite prey of certain large wasps. The jumping spider, *Phidippus variegatus* has been recorded preying upon half-grown individuals. The Great Plains skink (*Eumeces obsoletus*) preys upon both young and adults.

Genus *Pardosa* Koch

Members of this genus are medium to small slender-legged, wandering terrestrial wolf spiders. The colors are predominantly dull gray or brown, marked with black. The width of the labium equals or exceeds its length, and there is a basal articular notch about one-fourth of its length. The metatarsus of the fourth leg usually exceeds the combined length of the tibia and patella. The tibia of the first leg bears three pairs of spines, of which the distal pair is by far the shortest. The anterior row of eyes is shorter than the second row. The chelicerae are relatively small. The genus is cosmopolitan, occurring even on New Zealand and several remote Pacific islands. A large number of species conform to a holarctic distribution pattern. The genus is remarkable in that many of the species occur in arctic regions or above timber line in high mountain ranges.

Pardosa lapidicina Emerton

Stone Spider

Pardosa lapidicina Emerton, 1885, Trans. Connecticut Acad. Sci., vol. 6, p. 494.

Pardosa lapidicina; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 14.

Identifications.—MHM, RLG, AB.

Range.—Northeastern United States from Maine to North Carolina, west to Minnesota, Nebraska, Kansas and northwestern Arkansas.

Description.—Female, length 7.0, carapace 3.5, abdomen 3.8, extended legs 35. Carapace grayish brown with lighter colored broad median band from behind posterior lateral eyes to posterior edge, with several sharp indentations along its borders, narrowing to about half its maximum width on posterior part; submarginal light blotches on carapace; sternum pale brown, palest at edge; dorsum orange-brown, spotted with dark gray; legs pale yellow with dark gray annulations; legs long, powerful, and evenly tapered (see Fig. 50).

Male slightly smaller than female, otherwise much like her in appearance.

Habitat and Habits.—These wolf spiders are most characteristic of rocky shores of lakes. They were abundant at several places on the Reservation, but these were separate colonies well isolated from each other; at the old rock quarry, the rock fill below the pond, along a rocky stretch of a diversion ditch draining from the pond, and along the rocky margins of the small creek in the southeastern part of the Reservation.

These are unusually hardy spiders and may be active even in winter. For instance on February 24, 1954, when air temperature was approximately 50 F, one was seen darting about rapidly among rocks in the sunshine. In May most females are carrying egg sacs. By late summer the young are well grown.

The movements are so swift that these spiders may be able to escape most predators, especially as they live in places where shelter is readily available. At the rock fill below the pond, five-lined skinks were abundant and were seen to try unsuccessfully to catch the spiders. On one occasion an adult spider was seen to dart at another and drive it from a basking place on a rock. Presumably both were males as they lacked egg sacs, which were being carried by most of the females.

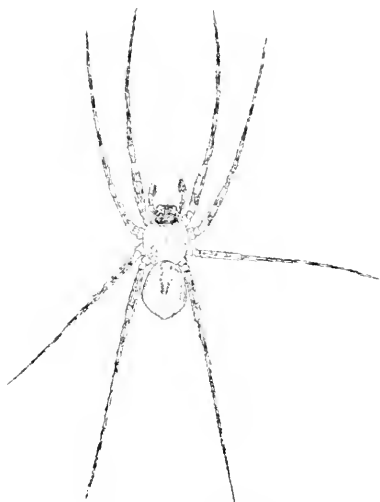


FIG. 50. *Pardosa lapidicina*, male, $\times 2$.

***Pardosa milvina* (Hentz)**

Shore Spider

Lycosa milvina Hentz, 1844, Jour. Boston Soc. Nat. Hist., vol. 4, p. 392, pl. 18, fig. 8.

Pardosa milvina; Marx, 1890, Proc. U. S. Nat. Mus., vol. 12, p. 562.

Pardosa nigripalpis; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 14.

Identification.—AB.

Range.—Eastern United States and Mexico, southern Canada.

Description.—Female, length 5.3, carapace 2.2, abdomen 3.0, extended legs 27.5. Carapace black in cephalic region and with broad, curved, black

band on each side extending posteriorly to rear edge, joining there on midline; remainder of carapace—marginal areas on each side and middorsal bandlike area—yellowish brown; abdomen slightly less bulky than cephalothorax, oval, pubescent, black, mottled with yellowish brown; latter color forms broad middorsal band on anterior two-fifths, and four transversely widened spots on posterior three-fifths, each spot contacting its counterpart on midline, and having black dot in its center; legs powerful, long, and tapered, yellowish brown with many irregular faint gray annulations, and having long, slender dark spines.

Habitat and Habits.—These small active wolf spiders occur in a variety of habitats; they have been sifted from leaf litter in thick woods, seen running on exposed rock face at the abandoned quarry, and climbing on the outside wall of my residence. However, the optimum habitat is the bare area left by receding water at the edge of a pond. In such situations, both at the pond on the Reservation, and the smaller one on the Rockefeller Tract, the spiders were abundant at all seasons. Often the population density averaged several per square foot.

The spiders feed upon small insects such as grouse locusts, young gelasticorids, various coleopterans and dipterans. Their movements are quick and darting. When alarmed, one may travel even more rapidly, in a series of long hops. Adults are present at all times of year, and perhaps breeding occurs throughout the entire growing season. As in other wolf spiders, the egg sac is carried about by the female attached to her spinnerets. Abundant egg carrying adults have been recorded on such widely separated dates as April 30, July 9 and September 24. The cricket frog (*Acris crepitans*) is similar in its habitat preference, and is one of the chief natural enemies, taking the spiders in large numbers.

Kaston (1948:335) stated that at least two cocoons per season are produced, and he recorded numbers of eggs in six cocoons, ranging from 32 to 93 and averaging 58.

Pardosa saxatilis (Hentz)

Boulder Spider

Lycosa saxatilis Hentz, 1844, Jour. Boston Soc. Nat. Hist., vol. 4, p. 392, pl. 18, figs. 9-10.

Pardosa saxatilis; Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, vol. 60, p. 174, pl. 13, figs. 1 and 2.

Identification.—AB.

Range.—Eastern United States, west to the Rocky Mountains.

Description.—Male, length 4.7, carapace 2.5, abdomen 2.2, extended legs 30. Carapace dark brown, with middorsal brownish yellow band strongly

notched on each side, midway between eyes and median furrow; obscure broad dull yellow stripe on each side near lateral margin of carapace; abdomen dark grayish brown above, with, on basal half of dorsum, indistinct pale lanceolate mark, and, on posterior half, series of faint, irregular, dark transverse marks formed by confluence of several spots; legs yellowish brown, armed with many long dark spines.

Habitat and Habits.—This species was not distinguished in the field from the similar and more abundant *P. milvina*. While the latter was exceedingly abundant about the margins of ponds, and was also in various drier situations, *P. saxatilis* may have been the dominant species in upland habitats. Kaston (1948:335) and others have noted such habitat differences between the two. Only one specimen of *saxatilis*, an adult male, has been recorded from the area of my study.

Genus *Pirata* Sundevall

The members of this genus are small active ground living wolf spiders usually found in damp places, especially along edges of ponds and streams. The carapace has a characteristic pattern, with a light yellow band extending from the ocular region to the posterior edge, and enclosing a dark V-shaped mark which extends from between the third eye row to the dorsal groove. The anterior row of eyes is approximately the same length as the posterior row. The labium is longer than wide. The posterior spinnerets are from 1½ times to twice as long as the anterior, with the apical segment distinct and conical. The retromargin of the chelicera is armed with two teeth, and the promargin with three. The genus is cosmopolitan.

Pirata arenicola Emerton

Sand Spider

Pirata arcuicola Emerton, 1909, Trans. Connecticut Acad. Sci., vol. 14, p. 208, pl. 6, fig. 9.

Identification.—AB.

Range.—Eastern United States.

Description.—Female, length 3.3, carapace 1.5, abdomen 1.8, extended legs 12. Carapace pale brown with black in area immediately adjacent to eyes, and with narrow, dark brown V-shaped mark each branch of which begins on medial side of posterior lateral eye; pair of dark brown longitudinal bands originating lateral to posterior lateral eyes and running to posterior end of carapace; abdomen slaty, mottled with pale brown mostly in small round spots, but includes middorsal longitudinal mark anteriorly, and several broken chevron-shaped marks farther posteriorly; legs pale brown with barely discernible dusky annulations, and with occasional long black bristles and sparse covering of fine hairs.

Male like female in most respects but slightly smaller.

Habitat and Habits.—This minute lycosid, like *Pardosa milvina*, is

most abundant along margins of ponds, but has often been found also in leaf litter of oak and elm woods.

***Pirata insularis* Emerton**

Insular Spider

Pirata insularis Emerton, 1885, Trans. Connecticut Acad. Sci., vol. 6, p. 492; pl. 48, fig. 8.

Identification.—AB.

Range.—Eastern United States in the Deciduous Forest Formation.

Description.—Female, length 4.9, carapace 2.1, abdomen 2.8, extended legs 12. Carapace pale brown, with dark brown covering anterior third and with longitudinal extensions to posterior edge; these longitudinal dark markings bordered medially and laterally by somewhat narrower pale areas; ocular region and thoracic groove black; abdomen oval, slaty brown, with broad middorsal pale brown band, bordered with black, stippled with pale brown dots; legs pale brown, with rather faint annulations, and with large dark spines.

Habitat and Habits.—This small wolf spider has been found in leaf litter in woodland. One was carrying an egg sac on June 23, 1952.

***Pirata maculatus* Emerton**

Spotted Wolf Spider

Pirata maculatus Emerton, 1909, Trans. Connecticut Acad. Sci., vol. 14, p. 209, pl. 6, figs. 10-10b.

Identification.—AB.

Range.—Eastern United States.

Description.—Female, length 5.5, carapace 3.0, abdomen 2.5, extended legs 28.3. Carapace with narrow marginal black band and pale reddish-brown sub-marginal band, and with dark brown V-shaped mark on anterior half bordered by pale reddish brown area; dorsum dark brown with many irregular reddish brown spots and having pale reddish-brown band on anterior half; venter light brown with dark brown dashes; legs pale brown with faint gray annulations on femora and tibiae.

Genus *Schizocosa* Chamberlin

The ground-living wolf spiders of this genus resemble members of the genus *Lycosa* in most respects, and they resemble also members of the genus *Pardosa*. The carapace has a median light band almost as wide as the space between the posterior eyes, and with nearly straight margins. The abdomen has a median light band for almost its entire length and usually has a lanceolate mark on its anterior half. The combined tibia and patella of the fourth leg exceed the metatarsus in length, and also exceed the carapace. Members of this genus are known chiefly from the United States and southern Canada, but one species occurs in British Guiana, another in Central America, and the widespread *S. arida* has been recorded from northeastern Asia.

Schizocosa avida (Walckenaer)

Lance Spider

Lycosa avida Walckenaer, 1837, *Histoire Naturelle des Insectes Aptères*, vol. 1, p. 322 (in part).

Lycosa communis; Scheffer, 1904, *Industrialist* (Kansas State Agr. Coll.), vol. 30, p. 12.

Schizocosa avida; Gertsch and Wallace, 1937, *Amer. Mus. Novit.*, no. 919, p. 10.

Identifications.—TBK, AB.

Range.—Occurs throughout the United States and southern Canada; also recorded from the Kurile Islands.

Description.—Female, length 14, carapace 6.1, abdomen 8.1, extended legs 42. Carapace dark reddish brown, black in eye region, with broad pale brown middorsal stripe from behind posterior lateral eyes to posterior edge and with pale submarginal stripes; abdomen brown dorsally, with two yellowish stripes converging posteriorly and enclosing dark brown lanceolate mark, pointed behind; legs dark brown, with faint, pale, gray annulations.

Male resembles female in most respects but smaller by approximately one-fourth.

Habitat and Habits.—This large wolf spider is characteristic of barren fields in open places. On a few occasions it was found along the edges of the pond, and on the road or nearby trampled areas at the headquarters, but most of its population was limited to an upland area of barren eroded fields ("High Field," "Slope Field," "Low Field") in the northeastern part of the Reservation, and similar old-field areas on the Rockefeller Tract. *S. bilineata* and *Lycosa carolinensis* are similar in their habitat preferences locally. On March 9, 1955, a series averaged 6 millimeters in length—a little less than half the adult size. Kaston (1948:326) stated that males mature in late May and are found through June, whereas the adult females are found throughout the summer. He recorded four clutches of eggs averaging 159 and ranging from 119 to 201. Scheffer (1904:12) stated that in Kansas maturity is attained in June. On one occasion I was bitten on the finger by an adult; there was a sharp prick from the fangs and a sensation of numbness that lasted only momentarily.

Schizocosa bilineata (Emerton)

Two-lined Spider

Pardosa bilineata Emerton, 1885, *Trans. Connecticut Acad. Sci.*, vol. 6, p. 496, pl. 49, figs. 4-4b.

Schizocosa bilineata; Chamberlin, 1908, *Proc. Acad. Nat. Sci. Philadelphia*, vol. 60, p. 218, pl. 16, fig. 3.

Identification.—WJG.

Range.—Eastern United States.

Description.—Male, length 4.4, carapace 3.0, abdomen 1.6, extended legs 20. Thorax almost all chocolate brown, but with, on each side, arcuate pale amber brown band, on posterior half, broader middorsal band of same pale color; eyes rimmed with black; legs pale amber, with many large dark spines; tibia of first leg bears brush of dark bristles; abdomen slaty brown, and much less bulky than cephalothorax, and has grayish pubescence.

Habitat and Habits.—These small wolf spiders are uncommon, and restricted in habitat. They have been noticed chiefly on bare gully banks in an eroded upland old-field area near the northern edge of the Reservation. Adult males have been seen in May and early June. No females have been noted.

Schizocosa crassipes (Walckenaer)

Brush-legged Spider

Lycosa crassipes Walckenaer, 1837, *Histoire Naturelle des Insectes Aptères*, vol. 1, p. 323.

Lycosa ocreata; Scheffer, 1904 *Industrialist* (Kansas State Agr. Coll.), vol. 30, p. 12.

Schizocosa crassipes; Petrunkevitch, 1910, *Ann. New York Acad. Sci.*, vol. 19, p. 222.

Identifications.—MHM, RLG, AB.

Range.—Chiefly eastern United States within the Deciduous Forest Formation; recorded also from Nevada.

Description.—Female, length 7.9, carapace 3.9, abdomen 4.0, extended legs 29. Carapace has wide middorsal light reddish-brown band, narrow marginal brown stripes, and wider submarginal bands having darker brown blotches; abdomen brown dorsally with darker spots; venter brown with darker brown spots at sides; legs faintly annulated with black.

Male resembles female, but has conspicuous brush of black hairs on tibia of first leg, and smaller brush on patella (see Fig. 51).

Habitat and Habits.—This medium-small wolf spider is characteristic of woodland habitats and lives in leaf litter of the forest floor. It is perhaps the most abundant spider of its size group on the Reservation. It is one of the few spiders that may be regularly seen

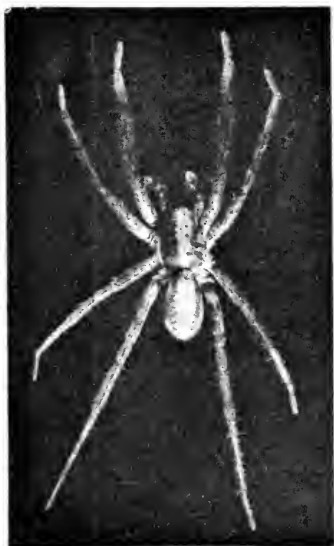


FIG. 51. *Schizocosa crassipes*, male, $\times 2$.

active in midwinter. For instance, on December 26, 1954, at an air temperature of 56° F with intermittent sunshine, the halfgrown spiders were noted in abundance, foraging in leaf litter. On January 31, 1955, one was seen running through dry grass in sunshine when air temperature was only 40° F and patches of snow remained on the ground, which was still frozen after two weeks of severely cold weather. Kaston (1948:315) stated that in Connecticut spiders of this species overwinter in the antepenultimate instar, mature in late April or May, and are carrying egg sacs in July and August. The adult males, easily recognized because of the conspicuous tuft of black hairs on the tibia of the first leg, have been noticed in large numbers on the Reservation in early June, which seems to be the breeding season. These males are especially active, continually exploring, with quivering motions of the pedipalps. On July 22, 1954, many adults of these spiders, intact except for having their rear legs clipped off, were found in the mud cells of a small wasp.

Schizocosa saltatrix (Hentz)

Hopping Spider

Lycosa saltatrix Hentz, 1844, Jour. Boston Soc. Nat. Hist., vol. 4, p. 387; pl. 17, fig. 7.

Lycosa gracilis; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 30, p. 126.

Schizocosa saltatrix; Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 215; pl. 16, figs. 2, 4.

Identifications.—TBK, MHM, AB.

Range.—Chiefly eastern United States; recorded also from Nevada.

Description.—Female, length 9.2, carapace 5.2, abdomen 4.0, extended legs 31. Carapace chocolate brown with wide golden brown stripe from posterior median eyes to posterior edge; lateral edges having pale yellow hairs; sternum shiny light reddish brown; abdomen light brown dorsally, with faint dark brown dots and with dark brown areas on each side near base, formed by abundant dark hairs; venter brownish yellow spotted with dark brown, paler in area anterior to epigastric furrow.

Male similar to female in size and appearance.

Habitat and Habits.—This medium-small wolf spider resembles *S. crassipes* and *Lycosa gulosa* in its preference for woodland habitats, and like them usually forages in leaf litter. Because the chief characters separating *S. saltatrix* and *S. crassipes* are evident only in the adults, the species were not distinguished in the field on most occasions. *S. saltatrix* is slightly the larger, and perhaps tends to prefer drier situations. In May, 1949, hundreds of adults of *saltatrix*, mostly males, were caught in pitfall traps along the base of an old rock wall near the top of a south-facing slope. Kaston

(1948:315) stated that this species overwinters in the penultimate instar, matures in April, and is found in the adult state in late spring and early summer. In eight cocoons there was an average of 95 eggs (71 to 142).

Family OXYOPIDAE Thorell

Lynx Spiders

These are medium-sized ecribellate, trionychous spiders. The eight eyes, all dark, are arranged in a hexagonal pattern. The anterior lateral eyes are the largest. The clypeus is relatively high. The chelicerae have both boss and scopula, are flattened on their anterior faces and the fang margins are short and smooth (or with a single small tooth). The abdomen is relatively small and tapers to a point posteriorly. The legs are spiny, and have trichobothria in two irregular rows on tibiae, metatarsi and tarsi. These are remarkably active spiders, which make no webs but stalk and catch their prey by running and jumping on low vegetation.

Genus *Oxyopes* Latreille

Members of this genus are exceedingly active and fast-moving spiders that run and jump on vegetation. The colors are predominantly pale, with prominent dark spines on the legs. The posterior row of eyes is strongly procurved, with eyes equally spaced; the posterior lateral eyes are as far from the anterior laterals as from the posterior medians. The lower margin of the chelicera has one tooth. The genus is cosmopolitan.



FIG. 52. *Oxyopes salticus*, female,
× 2%.

Oxyopes salticus Hentz

Striped Lynx Spider

Oxyopes salticus Hentz, 1845, Jour. Boston Soc. Nat. Hist., vol. 5, p. 196; pl. 16, fig. 10.

Oxyopes salticus; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 14.

Identifications.—MHM, RLG.

Range.—Recorded chiefly from the eastern United States, but known also from Utah and California, and south to Argentina.

Description.—Female, length 6.0, carapace 2.6, abdomen 3.4, extended legs 20. Carapace bright yellow with four dusky stripes on thoracic region, those of one pair on each side of thoracic groove, those of other pair situated farther laterally; black dots in eye region; black streak with spot beneath it on antero-lateral cephalic region on each side; edge of clypeus with black dot above cheliceral boss on each side; black line from each anterior median eye to

antero-lateral cephalic region on each side; edge of clypeus with black dot above cheliceral boss on each side; black line from each anterior median eye to

cheliceral fang; abdomen silvery white dorsally, with dark lanceolate mark anteriorly; two indistinct dark lines behind lanceolate mark, tapering off and disappearing anterior to spinnerets; abdomen pointed behind; venter having broad median black stripe bordered by silvery white; legs yellow with conspicuous long black spines and with conspicuous black midventral line on each of femora except those of fourth pair (see Fig. 52).

Male approximately two-thirds of length of female, with similar color and markings except that tarsi of palps are clothed with dense black hairs and abdomen is slaty with golden or purplish iridescence.

Habitat and Habits.—This lynx spider is one of the most abundant grassland spiders of the Reservation. It seems to be somewhat more numerous in pastures dominated by brome grass than in tall-grass prairies. It is scansorial and saltatorial, climbing rapidly and jerkily among stems and leaves, and jumping from time to time. In movements it resembles some salticids, but is more slender and even more active and catlike. No web is constructed; the spider is a wanderer, and obtains its prey by stalking and pouncing. Adults are present in abundance in May. A pair was found copulating on June 9, 1953. Jumping spiders (*Phidippus variegatus*) have been seen to prey upon lynx spiders.

Oxyopes scalaris Hentz

Gray Lynx Spider

Oxyopes scalaris Hentz, 1845, Jour. Boston Soc. Nat. Hist., vol. 5, p. 196; pl. 17, fig. 4.

Identification.—AB.

Range.—Eastern United States.

Description.—Female, length 7.3, carapace 3.5, abdomen 4.0, extended legs 27.4. Carapace tan with wide reddish brown stripe from ocular area posteriorly along thoracic groove and another along each side; black markings in ocular area; reddish brown stripe extending from posterior part of ocular area anteriorly to distal part of chelicera on each side; sternum dark brown with pair of paler lateral stripes; abdomen pointed behind, yellowish brown dorsally with anterior pale diamond-shaped mark outlined in dark brown and followed by series of reddish-brown chevrons; venter dark brown with pair of lighter stripes; legs yellow with pair of ventral reddish brown stripes on each of femora.

Male smaller by one-third than female, with stripes less distinct, with whitish scales in thoracic groove, indistinct chevrons on posterior part of abdomen, and black hairs on palp.

Habitat and Habits.—This lynx spider is less abundant than the smaller *O. salticus*. Records do not show clear cut habitat differences; *scalaris* has been collected from grass sweepings, but has been found especially on broad-leaved weeds, such as the milkweed (*Asclepias kansana*).

Family GNAPHOSIDAE Pocock

Running Spiders

Size ranges from small to medium in these ecribellate dionychous spiders. There are eight heterogeneous eyes in two rows. The chelicerae have a boss and scopula. The labium is longer than broad. There are numerous trichobothria on the tibiae, one row on the metatarsi and two rows on the tarsi. The body is somewhat depressed, the abdomen oval, flattened, and not much larger than the carapace. The legs are tapered, and moderately short, spinose; their order of length is 4, 1, 2, 3. The tarsi have scopulae. The anterior spinnerets are cylindrical, longer and more heavily sclerotized than the posterior and separated from each other by a distance about equal to the diameter of one. Dark colors predominate. These are predominantly ground-living spiders, nocturnal in their activities, hunting by stealth. Gnaphosids do not spin webs for the capture of their prey, but they spin delicate sacs for molting, hibernating or mating.

KEY TO THE SPECIES OF THE FAMILY GNAPHOSIDAE OF THE RESERVATION

1. Uniformly dark colored or black 2
- 1'. Not uniformly dark colored or black 3
2. Tibiae of third and fourth legs each with two median dorsal spines,
Sosticus insularis, p. 128
- 2'. Tibiae of third and fourth legs each usually with only one dorsal spine
Zelotes hentzi, p. 129
3. Abdomen having distinct pattern of transverse white bands, the more posterior having a mushroom shaped extension. *Sergiolus capulatus*, p. 127
- 3'. Abdomen lacking transverse white bands 4
4. Abdomen having broad, dull white or pale gray longitudinal band, sometimes discontinuous posteriorly
Herpyllus casifer, p. 126
- 4'. Abdomen not longitudinally banded 5
5. Retromargin of cheliceral fang furrow having a keeled lamina but no denticles
Callilepis imbecilla, p. 123
- 5'. Retromargin of cheliceral fang furrow having denticles but no keeled lamina 6
6. Length more than 10 mm. *Drassodes auriculoides*, p. 124
- 6'. Length less than 10 mm. 7
7. Median ocular area wider behind than in front; anterior median eyes smaller than anterior laterals; carapace conspicuously narrowed anteriorly 8
- 7'. Median ocular area as wide in front as behind; anterior median eyes larger than anterior laterals; carapace not conspicuously narrowed anteriorly
Haplodrassus bicornis, p. 126
8. Abdomen pale grayish brown with no dark markings.
Drasyllus gynosaphes, p. 125
- 8'. Abdomen gray clouded with slaty markings posteriorly.
Drasyllus aprilinus, p. 124

Genus *Callilepis* Westring

Members of this genus are small, secretive, stocky, and rather short-legged. The retromargin of the chelicera has a narrow keeled lamina, not serrated; the posterior row of eyes is but little longer than the anterior, with eyes equidistant or the posterior medians farther from each other than from the posterior laterals. The genus has an almost cosmopolitan distribution.

Callilepis imbecilla (Keyserling)

Velvet Spider

Pythouissa imbecilla Keyserling, 1887, Verh. Zool.-bot. Ges. Wien, vol. 37, p. 427; pl. 6, fig. 5.

Callilepis imbecilla; Banks, 1895, Jour. New York Ent. Soc., vol. 3, p. 78.

Identifications.—RLG, AB.

Range.—Southeastern Canada, and United States chiefly in eastern half but recorded from Colorado and Washington.

Description.—Female, length 7.0, carapace 2.3, abdomen 5.0, extended legs 18. Body stocky; carapace shiny brownish orange; legs approximately same color, but suffused with dusky; abdomen oval, much more bulky than cephalothorax, dark purplish brown, posterior median eyes well separated from each other, and almost contiguous with posterior lateral eyes (see Fig. 53).

Male smaller than female by about one-fifth or one-sixth, but otherwise resembling her.

Habitat and Habits.—This species is by far the most common gnaphosid in the area of my study. In nearly all instances the spiders were found on the undersides of large flat rocks in cottony cocoonlike webs. Upon being disturbed the spider would desert its web and run over the rock surface, with a rather slow and clumsy gait. The rocks beneath which the spiders were found were in most instances along hilltop outcrops, especially in open woods dominated by chestnut oak. In a few instances the spiders were sifted from leaf litter.

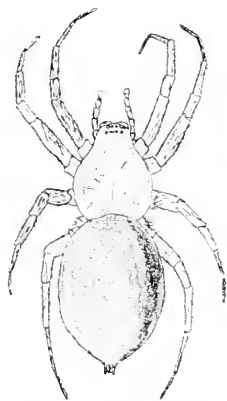


FIG. 53. *Callilepis imbecilla*, female, $\times 4\frac{1}{2}$.

Genus *Drassodes* Westring

Members of this genus are medium-sized, long-legged, and pale-colored. The posterior row of eyes is slightly procurved. The median ocular area is wider in front than behind and the posterior median eyes are oval, oblique, closer to each other than to the posterior laterals. The genus is cosmopolitan.

Drassodes auriculoides Barrows

Drassodes auriculoides Barrows, 1910, Ohio Naturalist, vol. 19, p. 355, pl. 15, figs. 4a-b.

Identifications.—RLG, AB.

Range.—North-central United States: known from Ohio, Wisconsin, and Kansas.

Description.—Male, length 11.0, carapace 4.5, abdomen 6.0, extended legs 37. Carapace shiny pale reddish-brown, with fine pubescence of yellowish-brown hairs; abdomen pale gray with dense pubescence of yellowish hairs on its anterior half, becoming sparser and almost lacking posteriorly; abdomen elongate-oval, approximately twice as long as broad, with two pairs of faint longitudinal ridges; legs pale orange-brown; scopula extends for length of tarsus and metatarsus of first two pairs of legs; anterior eye row faintly recurved, and posterior eye row faintly procurved (see Fig. 54).



FIG. 54. *Drassodes auriculoides*, female, $\times 1\frac{1}{2}$.

Habitat and Habits.—This species has been noted on the Reservation on only a few occasions. On May 21, 1953, a pair was found together under a flat rock in grass at the edge of woodland. The male escaped from the web and ran rapidly; the female remained quiescent. Another pair was found under a board in late May, 1961, the female enclosed in a delicate cocoon.

Genus Drassyllus Chamberlin

Members of this genus are medium-sized, and have the cephalothorax of dark brown or dull orange coloration, with no contrasting markings; the abdomen gray to black, the posterior eye row procurved, the posterior median eyes large, oval and oblique, much closer to each other than to the posterior laterals, with three to six teeth on the promargin of the cheliceral fang furrow, and two to four teeth on the retromargin. The many species known are all indigenous to the United States, but at least one has become established in Europe.

Drasyllus aprilinus (Banks)**April Spider**

Zelotes aprilinus Banks, 1904, Jour. New York Ent. Soc., vol. 12, p. 110, pl. 5, fig. 7.

Identification.—WJG.

Range.—Northeastern United States.

Description.—Female, length 5.0, carapace 2.3, abdomen 2.9, extended legs 14. Carapace and chelicerae pale orange tan; anterior eye row faintly recurved

and posterior row faintly procurved; abdomen elongate, oval, little less than twice as long as wide, well clothed with gray hairs, pale brownish gray anteriorly, darkening to slate on posterior two-fifths, and having three pairs of widely separated pale streaks, spinnerets protruding prominently at posterior end; legs pale brown with grayish suffusion, bearing abundant pale hairs (see Fig. 55). Male resembles female in size and appearance.

Habitat and Habits.—Several adults of both sexes were collected from Berlese funnels in a large sample of leaf litter from the top of a south slope at the edge of an abandoned limestone quarry, on February 8, 1962. In March, 1962, a single adult was sifted from leaf litter in oak-hickory woods.

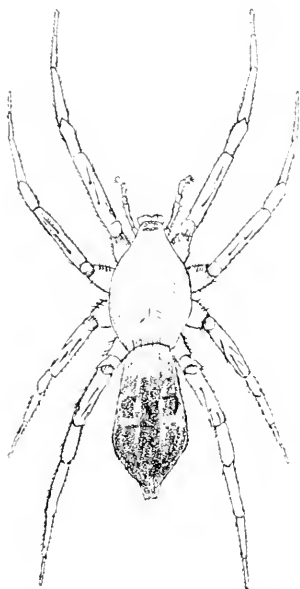


FIG. 55. *Drassyllus aprilius*, female, $\times 7$.

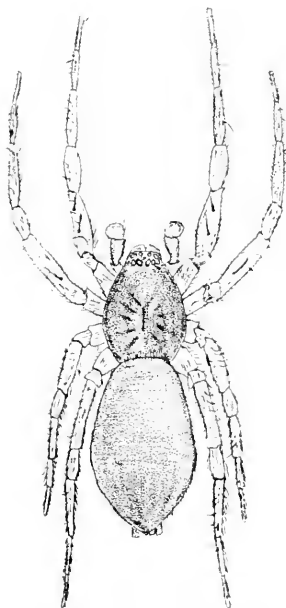


FIG. 56. *Drassyllus gynosaphes*, female, $\times 7$.

***Drassyllus gynosaphes* Chamberlin**

Rio Grande Spider

Drassyllus gynosaphes Chamberlin, 1936, Amer. Mus. Novit., no. 853, p. 16.

Identification.—WJG.

Range.—Known from lower Rio Grande Valley of Texas and from Kansas.

Description.—Female, length 4.5, carapace 1.7, abdomen 2.8, extended legs 13.3. Carapace glabrous, shiny yellowish brown, clouded with faint black markings radiating from thoracic groove; sternum glabrous light brown; legs of approximately same color, but with tibia of first nearly black, and tibia of

second somewhat darkened; abdomen pale grayish brown with faint iridescence, having fringe of anteriorly directed black hairs at anterior end, paler ventrally (see Fig. 56).

Genus *Haplodrassus* Chamberlin

The members of this genus are medium-sized and uniformly colored; the posterior median eyes are oval and oblique, much larger than the posterior laterals and much closer together; the promargin of the cheliceral fang furrow has two or three distinct teeth, and the retromargin usually has two teeth. The genus is holarctic.

Haplodrassus bicornis (Emerton)

Two-horned Spider

Drassus bicornis Emerton, 1909, Trans. Connecticut Acad. Sci., vol. 14, p. 218, pl. 9, figs. 2 and 2b.

Haplodrassus bicornis; Chamberlin 1922, Proc. Biol. Soc. Washington, vol. 35, p. 161.

Identification.—WJG.

Range.—Northeastern United States, southwest at least to northeastern Kansas.

Description.—Female, length 5.0, carapace 2.6, abdomen 2.6, extended legs 13. Carapace yellowish brown, darker in cephalic region; chelicerae dark reddish brown; abdomen tan, of furry appearance because of abundant short fine hairs; legs light yellowish brown, near color of carapace but slightly paler, without markings but heavily clothed with gray hairs, powerful and robust, 4, 1, 2, 3 in order of decreasing size.

Genus *Herpyllus* Hentz

Members of this genus are medium-sized, stocky, flattened, and fast moving, of secretive habits. The gait is jerky and erratic. Usually the spider is seen only when flushed from under cover, and within a few seconds, at most, it has found a new hiding place. The cephalothorax is much narrowed anteriorly. The clypeus is low, approximating in height the diameter of an anterior median eye. The eyes of the posterior row are equidistant or the median eyes are slightly nearer to the laterals than to each other. The posterior medians are smaller than the posterior laterals. The dorsum of the abdomen is marked with a light colored band. The genus is best represented in North America but occurs also in South America.

Herpyllus vasifer (Walckenaer)

Parson Spider

Drassus vasifer Walckenaer, 1805, Tabl. Aran., p. 46.

Herpyllus vasifer; Simon, 1893a, Histoire Naturelle des Araignées, vol. 1 (2), pp. 341, 373.

Herpyllus vasifer; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 5.

Identifications.—RLG, AB.

Range.—Chiefly eastern United States, west to Montana, Colorado, Utah and Arizona; southeastern Canada.

Description.—Female, length 8.0, carapace 3.0, abdomen 4.0, extended legs 22. Carapace dark mahogany, black in eye region; sternum amber, lighter than carapace; abdomen dark brown, with broad cream-colored middorsal stripe extending from anterior end for about three-fifths of length with notch near its distal end, dorsal white spot near posterior end; venter pale brown; legs dark mahogany, similar to carapace (see Fig. 57).



FIG. 57. *Herpyllus varifer*, female, $\times 3$.

Habitat and Habits.—The parson spider has been found in a variety of habitats and often indoors. However, its favorite habitat seems to be in open woods on large dead trees having bark loosened but still clinging. On many occasions the spiders have been found beneath such slabs of bark, often enclosed in a fine, silky cocoon-like web. For a gnaphosid this species is remarkably swift. It

progresses in darting, jerky fashion with a swaying pause after each forward motion. Kaston (1948:349) stated that in Connecticut adults could be found almost throughout the year, and that hibernation is passed both in the adult state and in earlier instars; he recorded 130 spiderlings in an egg sac.

Genus *Sergiolus* Simon

Spiders of this genus are ground living, active, medium-sized, having bright colors and striking patterns. Dorsal spines are lacking on the tibiae of the third and fourth legs; the median ocular area is wider behind than in front; posterior row of eyes is straight or slightly recurved. The posterior median eyes are round. The fang margins of the chelicerae are unarmed, or there may be a small tooth on one or both. The genus is widely distributed, occurring in Australia and the Neotropical Region as well as in the United States.

Sergiolus capulatus Walckenaer

Variegated Spider

Sergiolus capulatus Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1.

Sergiolus variegatus; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30(24), p. 4.

Sergiolus capulatus; Chamberlin and Ivie, 1944, Bull. Univ. Utah, vol. 8 (5), p. 174.

Identifications.—TBK, MHM, AB.

Range.—Eastern United States in the Deciduous Forest Formation, also recorded from Colorado, and from the Antilles.

Description.—Female, length 8.0, carapace 3.0, abdomen 5.0, extended legs 15.5. Carapace brownish orange; abdomen black with three broad white transverse bands, having irregular edges; middle band has mushroom-shaped median extension from its anterior edge; palps and legs of first pair mostly black; other legs have black annulations on distal parts of each segment; abdomen oval, with spinnerets prominent at posterior end (see Fig. 58).



FIG. 58. *Sergiolus capulatus*, female, $\times 3$.

Habitat and Habits.—This brightly patterned gnaphosid has been found chiefly in leaf litter in oak-hickory woods, usually in the more open situations. In size and pattern it bears a strong resemblance to certain small mutilid wasps, and the similarity is heightened by the spider's antlike movements. The spiders have also been found under flat rocks in cocoon like webs. Several times they have been found climbing on the outside walls of my residence and have even been found indoors. Adults have been found chiefly in the latter half of the summer. Kaston (1948:362) stated that in Connecticut the species winters in the mature and penultimate stages.

Genus *Sosticus* Chamberlin

Spiders of this genus are medium-small, dark colored, and lack conspicuous markings. There are two middorsal spines on the third tibia, and also on the fourth. The promargin of the cheliceral fang furrow is armed with three teeth, the retromargin with two (occasionally three). The posterior eye row is straight. The median ocular area is about the same width in front and behind, and slightly longer than broad. The posterior median eyes are slightly oval. The few species are known only from the United States.

Sosticus insularis (Banks)

Prosthesima insularis Banks, 1895, Jour. New York Ent. Soc., vol. 3, p. 78.

Sosticus insularis; Chamberlin, 1922, Proc. Biol. Soc. Wash., vol. 35, p. 160.

Identification.—AB.

Range.—Eastern states.

Description.—Female, length 5.6, carapace 2.3, abdomen 3.3, extended legs 21. Carapace dark chestnut brown; legs same color proximally but pale to light brown on their distal segments; abdomen oval, but slightly truncate at both ends, and slate-colored.

Genus *Zelotes* Gistel

Members of this genus are medium-small, dark, flattened, short-legged spiders of secretive habits. The anterior row of eyes is procurved with eyes nearly equidistant. In both rows the eyes are subequal. The posterior median eyes are circular or only slightly oval. The genus is cosmopolitan.

Zelotes hentzi Barrows

Zelotes hentzi Barrows, 1945, Ann. Ent. Soc. Amer., vol. 38, p. 75; pl. 2, figs. 5-6.

Identifications.—AB, WJG.

Range.—Eastern, southern and central United States.

Description.—Female, length 6.2, carapace 2.8, abdomen 3.7, extended legs 14. Body black or dark brown, legs paling to amber on their terminal segments; pubescence, sparse on carapace, where hairs are directed forward, and heavy on abdomen; legs hairy and having also many heavy spines; carapace narrow anteriorly, much wider posteriorly; abdomen oval, and much bulkier than cephalothorax; median bristles on anterior faces of the chelicerae (see Fig. 59).

Male resembles female in appearance, but slightly smaller.

Habitat and Habits.—These small, black shiny spiders are adapted for a subterranean existence. They have been found chiefly in the course of excavating burrows such as those of the mole (*Scalopus aquaticus*) and vole (*Microtus ochrogaster*). Also, they have often been found in the soil beneath embedded rocks when the latter were overturned. Numbers are especially difficult to judge in such secretive animals, but presumably these spiders attain high population densities as they have been seen often. On two occasions in September they have been found climbing on the outside wall of the house after adjacent vegetation was sprinkled. On May 11, 1955, one was found wandering on the surface of bare ground beneath an elm.

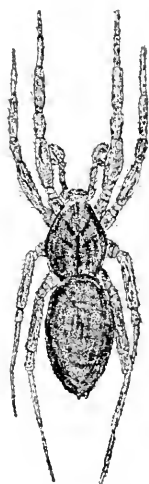


FIG. 59. *Zelotes hentzi*, male, $\times 5\frac{1}{2}$.

Family CLUBIONIDAE Wagner

Sack Spiders

These are medium-sized to small ecribellate dionychous spiders. They are slender, lightly built and fast-moving. Some are pale and ghostlike in appearance, and others are shiny and iridescent. They construct no webs, but live on the ground, often in surface litter, or on vegetation. The eyes are

relatively small and homogeneous, arranged in two rows of four each. The cheliceral margins are oblique and toothed. The anterior spinnerets are contiguous or almost so, and are not more heavily sclerotized than the posterior.

KEY TO THE SPECIES OF THE FAMILY CLUBIONIDAE OF THE RESERVATION

1. Pallid or cream-colored with no contrasting markings 2
- 1'. Not predominantly pallid, but with dark colors and/or contrasting markings 4
2. First leg longer than fourth *Chiracanthium inclusum*, p. 135
- 2'. Fourth leg longer than first 3
3. Carapace and abdomen uniformly pallid *Clubiona kastoni*, p. 136
- 3'. Abdomen speckled with rows of faint dark dots.
Clubionoides excepta, p. 137
4. First leg longer than fourth 5
- 4'. Fourth leg longer than first 6
5. Posterior row of eyes straight, only a little (less than one-fourth) wider than anterior row; size smaller (length less than 4.5 mm.).
Meriola decepta, p. 137
- 5'. Posterior row of eyes recurved, markedly (more than one-third) broader than anterior row; size larger (length more than 4.5 mm.).
Trachelas tranquillus, p. 141
6. Tibia of first leg having four or more pairs of ventral spines 7
- 6'. Tibia of first leg having less than four pairs of ventral spines 9
7. First eye-row slightly narrower than second; carapace uniform chestnut *Scotinella redempta*, p. 140
- 7'. Eye rows subequal; carapace yellowish brown with dark marginal and medial markings 8
8. Third and fourth legs having dark spots; male having no brush of hairs beneath tibia of first leg *Phrurotimpus alarius*, p. 139
- 8'. Third and fourth legs having no dark spots; male having a brush of hairs beneath tibia of first leg *Phrurotimpus borealis*, p. 139
9. Endites each with slight depression on ventral face; posterior row of eyes slightly recurved (or nearly straight); first and second legs lack spines; smaller (length usually less than 5.5 mm.).
Micaria longipes, p. 138
- 9'. Endites with no ventral depressions; both eye rows procurved; tibiae of first two pairs of legs each having two to three pairs of ventral spines; larger (length usually more than 5.5 mm.) 10
10. Extremely dark, appearing velvety black, with broad longitudinal bright red band on dorsal aspect of abdomen.
Castianeira descripta, p. 132
- 10'. Brown, with light transverse bars on dorsal aspect of abdomen 11
11. Femora of first and second legs striped longitudinally with black and white *Castianeira cingulata*, p. 131
- 11'. Femora uniform brownish 12
12. Paler, brownish orange *Castianeira trilineata*, p. 133
- 12'. Darker, deep chestnut, almost black 13

13. Pale transverse markings on abdomen sharply defined.

Castianeira variata, p. 131

13'. Pale transverse markings on abdomen obscure.

Castianeira longipalpis, p. 133

Genus *Castianeira* Keyserling

Members of this genus are medium-sized, fast moving and antlike. They live on the ground in surface litter, especially in leaf litter of deciduous forests. The carapace is convex, about $1\frac{1}{2}$ times as long as broad, uniformly colored (orange, dark brown or nearly black). The thoracic groove is well marked. The median eyes of each row are slightly larger than the laterals, and slightly nearer to them than they are to each other. The tibiae of the first and second pairs of legs each have two or three pairs of ventral spines. The labium is wider than long. The genus is cosmopolitan.

Castianeira cingulata (Koch)

Banded Ant Spider

Corinna cingulata C. L. Koch, 1842 Die Arachniden, vol. 9, p. 22, pl. 294, fig. 706.

Castianeira cingulata; Simon, 1897, Histoire Naturelle des Araignées, vol. 2, pt. 1, pp. 167-172.

Castianeira bivittata; Scheffer, 1904, Industrialist, (Kansas State Agr. Coll.), vol. 30, p. 4.

Identification.—AB.

Range.—United States chiefly from the eastern part in the Deciduous Forest Formation; southeastern Canada.

Description.—Female, length 7.5, carapace 3.3, abdomen 4.2, extended legs 26. Carapace glabrous, dark chestnut (almost black); abdomen dark reddish brown, becoming darker distally; two white transverse bands mark the abdomen approximately into thirds; venter paler reddish brown; femora with alternating longitudinal pale orange, and black stripes; legs otherwise pale yellow, except those of fourth pair, which are dark chestnut (see Fig. 60).

Male like female in most respects, but averaging slightly smaller.

Habitat and Habits.—This antlike clubionid has been found chiefly in oak-hickory woodland, in leaf litter or beneath logs or rocks. On September 25, 1952, one was caught on the outside wall of the house when adjacent vegetation was sprinkled. Kaston (1948:395) stated that in Connecticut these spiders pass the winter as adults. He recorded sacs containing 22, 30 and 24 eggs, and stated that the eggs hatch in late April.



FIG. 60. *Castianeira cingulata*, immature female, $\times 2$.

Castianeira descripta (Hentz)

Red-banded Ant Spider

Herpyllus descriptus Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 456, pl. 24, fig. 7.

Castianeira descripta; Simon, 1897, Histoire Naturelle des Araignées, Tome 2, fascicule 1, Paris, pp. 158-160.

Castianeira crocata; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 123.

Identifications.—MHM, RLG, AB.

Range.—Throughout most of the United States, southeastern Canada and the West Indies.

Description.—Female, length 9.2, carapace 4.0, abdomen 5.2, extended legs 27.5. Carapace elongate, almost twice as long as wide, blue-black and glabrous dorsally; abdomen black dorsally with broad, bright red, middorsal stripe beginning about one-third of distance posteriorly from base and extending back to spinnerets, widening posteriorly; venter black, paling to reddish brown in front of epigastric furrow; legs mostly black, but coxae pale to amber, tarsi and metatarsi chestnut (see Fig. 61).

Male like female in most respects, but averages slightly smaller.

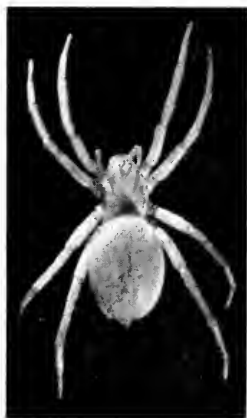


FIG. 61. *Castianeira descripta*, female, $\times 2$.

Habitat and Habits.—These fast-moving antlike spiders are more frequently seen than any other clubionids on the Reservation, and usually are in fairly open situations such as edge of the rocky flat at the old quarry site, or edge of the gravelled road in the vicinity of the headquarters. They have been found also in grassland (usually where the stand is sparse, with open spaces) and in open type of woodland. Normal progression consists of a series of jerky, darting movements, interspersed with brief pauses.

During these pauses, the spider keeps up a nervous swaying motion of its palps. The course is devious and the gait is slinking, the spider tending to keep close to the ground, follows depressions, and squeezes beneath any object such as a stone or leaf which allows sufficient space. Much of the time the foraging spider is out of sight beneath such concealing objects. The adult spiders have been seen in greatest abundance in June, which seems to be the breeding season. Gravid females have been collected in late June and early July. In 1961 a female kept in confinement produced an egg sac on July 11, a second on July 22, and a third on July 30. The second and third sacs contained 26 and 19 eggs respectively; the first sac contained fully developed spiderlings when it was

opened on August 1. No count of them was obtained as they scattered in all directions, but this brood was larger than those produced subsequently. In Connecticut Kaston (1948:396) mentions finding mature males in July and August and mature females in August and September, implying a later breeding season there. Because of the spider's light build and shy disposition, relatively minute animals probably constitute the prey. Individuals of *C. descripta* kept in confinement panicked at any disturbance and were liable to escape when the container was opened to offer food. They were seen to feed upon small insects on several occasions. Always the prey was taken with a sudden rush, dazzling in its swiftness.

Castianeira longipalpus (Hentz)

Long-palped Ant Spider

Herpyllus longipalpus Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 457, pl. 24, fig. 4.

Castianeira longipalpus; Banks, 1910, Bull. U. S. Nat. Mus., vol. 72, p. 11.

Castaneira pinnata; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 4.

Identifications.—RLG, AB.

Range.—Eastern United States, chiefly in the Deciduous Forest Formation; recorded also from Montana.

Description.—Male, length 7.7, carapace 4.0, abdomen 4.2, extended legs 17. Body velvety, dark purplish gray, almost black; legs of same color on their proximal parts, but first and second pale to light brown on their terminal segments; less paling distally on third and fourth legs; abdomen approximately twice as long as broad, its sides nearly parallel; eyes minute; front row recurved, its eyes directed forward; rear row recurved, its eyes on top of carapace, directed upward.

Female larger by one-fourth, otherwise resembling male.

Habitat and Habits.—This antlike spider resembles other members of its genus in habits, and usually has been found in leaf litter of oak-hickory woodland. Kaston (1948:396) recorded three cocoons with nine eggs each, and two cocoons with eight eggs each in Connecticut, implying a remarkably low reproductive potential in this species as compared with that in most other kinds of spiders.

Castianeira trilineata (Hentz)

Three-lined Ant Spider

Herpyllus trilineatus Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 460, pl. 24, fig. 18.

Castianeira trilineata; Banks, 1910, Bull. U. S. Nat. Mus., vol. 72, p. 11.

Identifications.—RLG, AB.

Range.—United States, chiefly in the Deciduous Forest Formation.

Description.—Female, length 8.2, carapace 3.3, abdomen 4.6, extended legs 25. Carapace shiny, orange-amber, dusky near margins; abdomen slightly darker—reddish brown, with two distinct pale transverse dorsal bands and with less distinct, shorter band behind them; venter amber; legs amber, unmarked, but paling terminally (see Fig. 62).



FIG. 62. *Castianeira trilineata*, immature female, $\times 2$.

Male resembling female except for slightly smaller size and minor differences in proportions.

Habitat and Habits.—This spider is moderately abundant in leaf litter of oak-hickory woods, but has not been found in other habitats. In size, coloration and behavior it resembles the carpenter ant, *Campanotus castaneus*, which is common in the same habitat, but whether actual mimicry is involved is uncertain. The spider has never been observed in definite association with the ants. It is exceptionally difficult to catch because of its rapid and elusive movements, and the abundant shelter providing easy escape in the situations where it lives. The adult spiders have been seen chiefly in May, June and July.

Castianeira variata Gertsch

Swaying Ant Spider

Castianeira variata Gertsch, 1942, Amer. Mus. Novit., no. 1195, p. 6, fig. 21.

Identification.—RLG, AB.

Range.—Recorded from New York, Connecticut, Tennessee and Kentucky in addition to the present record from Kansas.

Description.—Male, length 6.8, carapace 3.2, abdomen 3.5, extended legs 20. Carapace dark chestnut, almost black, with whitish pubescence; abdomen dark chestnut, with minute white hairs arranged in broad transverse bands; on venter white hairs more abundant and generally distributed—not arranged in bands (see Fig. 63).

Female much like male but slightly larger.

Habitat and Habits.—This spider has been found in drier types of woodland, in woodland edge, and about the headquarters area on the porch of my residence, on the gravelled road, the sidewalks, and about logs and board piles. Like other species of



FIG. 63. *Castianeira variata*, immature female, $\times 2$.

Castianeira it runs rapidly and jerkily. In momentary pauses, as it runs, it has the peculiar habit of pumping the abdomen up and down with a rhythmic, swaying motion.

Genus *Chiracanthium* Koch

The form is slender; the coloration is pale, greenish, the first pair of legs being longer than the fourth; a thoracic groove is lacking; the eyes are subequal; the posterior medians are nearer to each other than to the posterior laterals; the chelicerae are long and powerful. The genus is cosmopolitan.

Chiracanthium inclusum (Hentz)

Winter Spider

Clubiona inclusa Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 451, pl. 23, fig. 18.

Cheiracanthium inclusum; Simon, 1897, Histoire Naturelle des Araignées, 2 (1):79-80.

Identification.—HSF.

Range.—Most of United States; southeastern Canada; Mexico; West Indies.

Description.—Male (penultimate), length 6.2, carapace 2.3, abdomen 3.9. Extended legs 20; slender, pale-colored, grayish-tan spider with black chelicerae; abdomen, viewed from above nearly oval, but bluntly pointed posteriorly, somewhat flattened in horizontal plane; abdomen more grayish than carapace or legs, having many indistinct dark dorsal marks of variable size, arranged in longitudinal series; carapace having pair of broad, dark arcuate markings, each beginning just behind posterior lateral eye, and extending longitudinally, bowed outward, to near posterior end; smaller dark marks behind posterior median eyes; anterior row of eyes straight; posterior row wider and slightly procurved; legs having many conspicuous black bristles, and faint traces of dark annulations (see Fig. 64).

Habitat and Habits.—On December 10, 1960, one of these spiders was found wandering about on newly fallen snow, when air temperature was 30°F. The spider's movements were slow and mechanical. This was a penultimate male. Kept at room temperature this spider molted and emerged as an adult on January 3. In early December an antepenultimate male was found on the wall of a bedroom and young about one-third grown have been found in late summer. Kaston (1948:369) stated that the winter is passed in the penultimate instar and maturity is attained in May or June. At least one member of this genus, *C. diversum* of the southwest Pacific region, is known to be

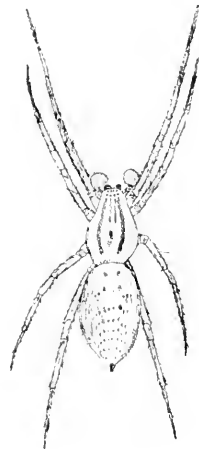


FIG. 64. *Chiracanthium inclusum*, penultimate male, $\times 4$.

dangerously venomous. Kaston (1948:42) stated that the bite of *C. inclusum* “. . . is said to be no worse than the sting of a bee or a wasp.”

Genus *Clubiona* Latreille

Members of this genus are small or medium-sized, having the colors generally white, cream, or pale gray, grading into dark brown in the cephalic region and on the chelicerae. The body is covered with short hairs that give it a silky appearance. The posterior row of eyes is longer than the anterior row, with eyes more or less equidistant in both rows, or with the posterior medians farther from each other than from the posterior laterals. On the first two pairs of legs the tibiae each bear two pairs of ventral spines and the metatarsi each bear one pair. The genus is cosmopolitan.

Clubiona kastoni Gertsch

Kaston's Night Spider

Clubiona kastoni Gertsch, 1941. Amer. Mus. Novit., no. 1148, p. 14, figs. 37-39.

Identification.—WJG.

Range.—Recorded on the east coast from Maine, Connecticut and New York, and in northwestern Oregon; perhaps occurs throughout the northern half of the United States.

Description.—Male, length 3.7, carapace 2.1, abdomen 1.8, extended legs 10. Carapace uniform yellowish-brown, oval; legs pale amber; abdomen oval, uniform yellowish-gray.

Female like male in appearance but slightly larger (see Fig. 65).

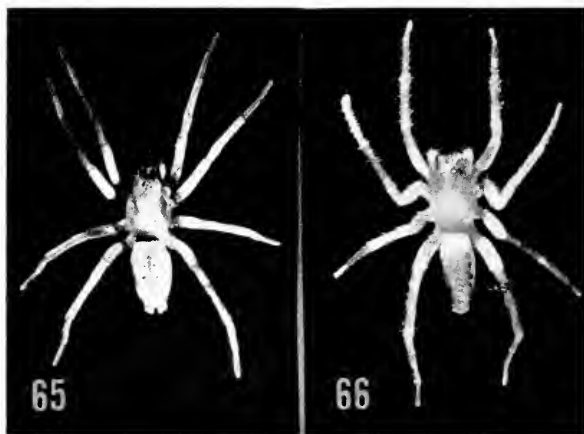


FIG. 65. *Clubiona kastoni*, female, $\times 4\frac{1}{2}$.

FIG. 66. *Clubionoides excepta*, female, $\times 3$.

Genus *Clubionoides* Edwards

In most respects the members of this genus resemble those of the genus *Clubiona*, but the male palp has a single flat retrolateral apophysis, the embolus and conductor are relatively short, often hidden from view, and the epigynum has a free anterior median scape. The genus has many representatives in South America and Central America, and occurs northward across the United States into southeastern Canada.

Clubionoides excepta (Koch)

Pallid Sack Spider

Clubiona excepta Koch, 1866, Die Arachniden-Familie der Drassiden, Heft 6, pp. 293, 300.

Clubionoides excepta; Edwards, 1958, Bull. Mus. Comp. Zool., vol. 118, p. 375.

Identification.—WJG.

Range.—Eastern North America in the Deciduous Forest Formation; West Indies.

Description.—Male, length 6.0, carapace 2.7, abdomen 3.6, extended legs 15. Carapace shiny, pale yellowish brown, darkening slightly in ocular region; chelicerae light reddish brown; legs and abdomen similarly colored, abdomen tan with salmon tinge, with fine pubescence, legs bearing heavy black or dark brown spines; five pairs of faint, dark markings dorsally on posterior third of abdomen forming incomplete chevrons, broken in midline and more distinct distally; series of smaller and fainter dark marks on each side of chevrons (see Fig. 66).

Female slightly larger, more robust, with broader abdomen than male.

Habitat and Habits.—The only notes taken on this species of spider on the Reservation pertain to one found crawling on the ceiling of the porch on the night of April 30, 1955. Kaston (1948: 373) stated that in Connecticut this kind of spider is found under dead leaves, stones, and loose bark, and that it winters in the mature and penultimate stages. He recorded counts of 95, 85, 56 and 35 eggs in different sacs.

Genus *Meriola* Banks

This genus is closely related to *Trachelas*, which it resembles except in its smaller size, and in having the posterior row of eyes straight. Members of this genus are known only from the United States.

Meriola decepta Banks

Lesser Broad-faced Sack Spider

Meriola decepta Banks, 1895, Jour. New York Ent. Soc., vol. 3, p. 81.

Identification.—AB.

Range.—From Long Island and Florida west to Utah and Texas.

Description.—Female, length 4.0, carapace 2.0, abdomen 2.0, extended legs 8.0. Carapace dark chestnut, legs amber—first and second pairs with slight reddish tinge; carapace almost oval, widened in front; slightly smaller than abdomen, which is grayish brown, with fine yellowish hairs on sides; in most respects a small replica of *Trachela tranquillus*.

Male resembling female in size and appearance.

Genus *Micaria* Westring

Members of this genus are small, slender, and fast-moving. They resemble members of the genus *Castiancira*, and live on the ground, especially in leaf litter of deciduous forests. The abdomen has a constriction near its anterior end. The endites each have a slight oblique depression on their ventral faces. The posterior row of eyes is generally recurved, and the median ocular area is wider posteriorly than anteriorly. The median thoracic groove is lacking or only faintly developed. The labium is longer than wide. The first pair of legs lack spines. The retromargin of the cheliceral fang furrow bears a single small tooth. Iridescent scales are present on the dorsal surface, especially on the abdomen. This large genus is of cosmopolitan distribution, but predominantly holarctic.

Micaria longipes Emerton

Long-legged Sack Spider

Micaria longipes Emerton, 1890, Trans. Connecticut Acad. Sci., vol. 8, p. 167; pl. 3, figs. 1-1h.

Identifications.—RLG, AB.

Range.—Eastern United States, chiefly in the Deciduous Forest Formation; also recorded from Utah and southeastern Canada.

Description.—Male, length 5.3, carapace 2.2, abdomen 3.1, extended legs 12. Slender and delicately built of somewhat antlike aspect; carapace and legs amber; cephalic portion of carapace somewhat iridescent and flattened, so that eyes of both rows are directed both forward and upward; abdomen yellowish-gray, with constriction near anterior end and more prominent constriction slightly forward from middle; partial transverse band of scalelike white hairs in each constriction, but each band broken in middorsal region; posterior band more extensive; coating of pale brown, scalelike hairs on sides of abdomen, few present on dorsal part, scarce except in region immediately behind posterior constriction, where iridescent scales reflect brilliant colors.

Female resembles male but slightly larger (see Fig. 67).

Habitat and Habits.—These minute, fast-moving clubionids have

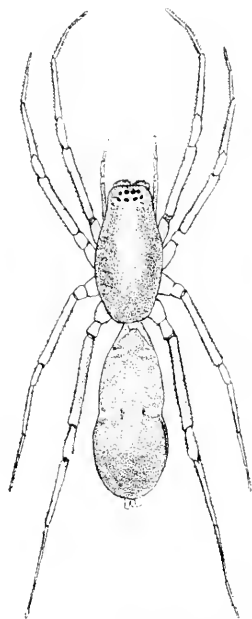


FIG. 67. *Micaria longipes*, female, $\times 6$.

been found chiefly in leaf litter in oak-hickory woodland. Also, from time to time, they have been found climbing on the walls of the residence building after the adjacent lawn had been sprinkled. Because of their small size they are easily overlooked, but the technique of sifting from dry leaves through a screen into an enamel pan often revealed their presence in large numbers.

Genus *Phrurotimpus* Chamberlin and Ivie

Members of this genus are small, secretive, and fast moving. The carapace is brown or yellowish with dark median stripes or spots and a black marginal stripe. The anterior and posterior eye rows are subequal, the posterior row straight or slightly procurved. The tibia of the first leg has four or more pairs of ventral spines. The labium is wider than long, and not more than half as long as the endites. The few species are known only from the United States and southern Canada.

Phrurotimpus alarius (Hentz)

Leaf Litter Sack Spider

Herpyllus alarius Hentz, 1847,
Jour. Boston Soc. Nat. Hist.,
vol. 5, p. 461, pl. 24, fig. 20.

Phrurotimpus alarius; Chamberlin
and Ivie, 1935, Bull. Univ.
Utah, vol. 2 (8), p. 34.

Identification.—AB.

Range.—Eastern United States,
chiefly in the Deciduous Forest For-
mation; also in Utah.

Description.—Female, length 2.9,
carapace .9, abdomen 2.0, extended
legs 7.5. Carapace remarkably small
in proportion to legs and abdomen,
dark amber colored with a black
rim; legs paler amber; ocular region
dark brown, nearly black; both rows
of eyes straight, eyes relatively large;
abdomen grayish-brown; third and
fourth legs spotted with black; tibia
of first leg having five pairs of ventral spines (see Fig. 68).



FIG. 68. *Phrurotimpus alarius*, male,
× 10.

Phrurotimpus borealis (Emerton)

Boreal Sack Spider

Phrurolithus alarius Emerton, 1890, Trans. Connecticut Acad. Sci., vol. 8,
p. 189 (in part), pl. 6, fig. 5.

Phrurotimpus borealis; Kaston, 1938, Bull. Connecticut Geol. Nat. Hist.
Surv., vol. 60, p. 194.

Identification.—AB.

Range.—United States, chiefly east of the Mississippi River and north of the Gulf States, and southern Canada.

Description.—Female, length 3.4, carapace 1.0, abdomen 2.4, extended legs 11. Predominant color of carapace and appendages pale brownish yellow, but carapace edged with black and clouded with black in indistinct broad longitudinal band on each side; first row of eyes slightly recurved, directed forward and upward; thoracic groove black; first leg of tibia black, except for its pale yellow distal end; black overlaps onto patella, narrow black annulation near distal end of metatarsus; legs of second, third and fourth pairs each having faint black annulation on distal part of tibia and similar annulation on metatarsus; abdomen grayish brown, finely stippled with dark dots, and mottled with paler brown; tibia of first leg having on its underside series of seven large spines, each about one-third length of tibia, and directed almost parallel to it; five somewhat smaller spines on underside of metatarsus.

Male like female in most respects but averaging slightly smaller.

Habitat and Habits.—These small spiders have been found mainly on rocky slopes in woodland dominated by chestnut oak. Many have been taken from siftings of dry leaf litter. Many others have been seen on the undersides of large flat rocks that were turned. The quick and erratic darting movements of the spiders made them difficult to capture.

Genus *Scotinella* Banks

Spiders of this genus resemble those of the genus *Phrurotimpus* in most respects. The carapace is shiny, black or dark chestnut, with no contrasting markings. The first row of eyes is slightly shorter than the second row. The carapace is narrowed more sharply in the head region than is that of *Phrurotimpus*. This is a small genus known only from the United States

Scotinella redempta (Gertsch)

Shiny Sack Spider

Phrurolithus redemptus Gertsch, 1941, Amer. Mus. Novit., 1147, p. 2, figs. 15, 16, 18.

Identification.—WJG.

Range.—Recorded from southeastern and central United States; Washington, D. C., Virginia, Alabama, Tennessee, and Illinois in addition to the present record from Kansas.

Description.—Female, length 3.6, carapace 1.2, abdomen 2.2, extended legs 8.5. Carapace chestnut with no markings; abdomen pale yellow with pair of large gray spots on its anterior half, and with six transverse gray bands on posterior half, widened in middorsal region and merging into each other; minute red dots scattered over dorsum but concentrated at its anterior end; two pairs of well separated larger red dots near middle; legs slender, reddish yellow, with heavy procumbent pale spines on underfaces—six pairs on tibia I, four pairs on metatarsus I, five pairs on tibia II, and three pairs on metatarsus II.

Genus *Trachelas* Cambridge

Members of this genus are secretive; they are medium-sized, and have shiny dark reddish brown carapace and pale grayish or yellowish abdomen. The sternum has a thickened edge. The retromargin of the cheliceral fang furrow has two teeth. The posterior row of eyes is recurved. The genus is cosmopolitan.

Trachelas tranquillus (Hentz)

Broad-faced Sack Spider

Clubiona tranquilla Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 450; pl. 23, fig. 16.

Trachelas tranquillus; Marx, 1892, Proc. Ent. Soc. Washington, vol. 2 (2), p. 155.

Trachelas tranquilla; Scheffer, 1905, Trans. Kansas Acad. Sci., vol. 20, p. 123.

Identification.—AB.

Range.—Most of United States; Cuba.

Description.—Female, length 9.0, carapace 3.8, abdomen 5.2, extended legs 24. Carapace finely pitted, with fine pubescence, and with more conspicuous, yellowish hairs in ocular region; legs shiny with fine pubescence; first and second brownish red, third and fourth pink, darker at joints; abdomen oval, pale grayish brown; anterior row of eyes straight; posterior row recurved, with eyes about equidistant in their spacing (see Fig. 69).

Male markedly smaller than female, but otherwise resembles her.

Habitat and Habits.—Little was learned concerning this species, as most of those seen were in the residence building at the Reservation headquarters. They were often found indoors in September and October. Several were obtained by sweeping with a net in tall grass. Two were found in rolled up leaves, and when flushed from these shelters they ran swiftly and hid in surface litter. Both were found in a field dominated by awnless brome, on a south slope. In the late summer of 1961, two were collected in sweeping from tall grass and bushes. In freezing weather, on November 28, 1960, after most kinds of spiders had disappeared, a large female was found beside the kitchen sink. When placed in a vial with the dried remains of two smaller

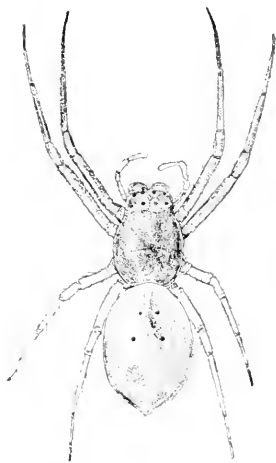


FIG. 69. *Trachelas tranquillus*, female, $\times 3\frac{1}{2}$.

spiders, this one fed upon the remains, suggesting possible scavenging habits. Females have been reported as laying their eggs, numbering 30 to 48, enclosed in a lenticular sac, in October and November, in Connecticut (Kaston, 1948:381) and September and October in Kansas (Scheffer, 1905:123). The species' habit of entering buildings in autumn has been reported by several observers.

Family ANYPHAENIDAE Bertkau

Ghost Spiders

These medium-small, cribellate, dionychous spiders are close relatives of the clubionids, which they resemble in most of their characters. The differences between the two groups involve mainly characters of the internal anatomy, but in the anyphaenids the claw tufts consist of a double series of lamelliform hairs instead of broom-shaped hairs as in the clubionids.

KEY TO THE SPECIES OF THE FAMILY ANYPHAENIDAE OF THE RESERVATION

1. Spiracular furrow much nearer to epigastric furrow than to spinnerets; eyes subequal *Ayscha gracilis*, p. 143
- 1'. Spiracular furrow approximately midway between epigastric furrow and spinnerets; anterior median eyes smaller than posterior medians. 2
2. First pair of legs notably elongated, with tibiae longer than carapace *Wulfilia saltabunda*, p. 144
- 2'. First pair of legs normal in length, with tibiae shorter than carapace *Anyphaena fraterna*, p. 142

Genus *Anyphaena* Sundevall

These are medium-small, pale colored, long-legged woodland spiders. The posterior row of eyes is straight or slightly procurved, with eyes approximately equidistant. The median ocular area is as long as broad. The spiracular furrow is midway between the epigastric furrow and the spinnerets. The metatarsi of the first and second legs each have two pairs of ventral spines. The many species of this genus occur chiefly in North America and South America. However, there are others in the West Indies, Europe, Asia and Madagascar.

Anyphaena fraterna (Banks)

Pallid Spider

Gayenna fraterna Banks, 1896, Trans. Amer. Ent. Soc., vol. 23, pl. 63.

Anyphaena fraterna Simon, 1897, Histoire Naturelle des Araignées, vol. 2, pl. 96.

Identifications.—AB, WJG.

Range.—Eastern United States.

Description.—Male, length 4.6, carapace 2.3, abdomen 2.5, extended legs 22. Carapace dull white with a pair of faint gray longitudinal bands extending for most of its length; abdomen cream colored, with several rows of faint

gray dots and with a few long gray hairs and bristles; legs cream colored, tinged with orange on tibiae, tarsi and metatarsi.

Female larger than male by perhaps one-fourth (see Fig. 70).

Genus *Aysha* Keyserling

The pale-colored, long-legged ghostlike spiders of this genus are usually found in woodland. The posterior row of eyes is straight or slightly procurved. The eyes of the anterior rows are subequal. The metatarsus of the first leg has a pair of ventral spines. The spirocular furrow is much nearer to the epigastric furrow than the latter is to the spinnerets. One species inhabits the Galapagos Islands, and others occur in North America, South America, and the West Indies.

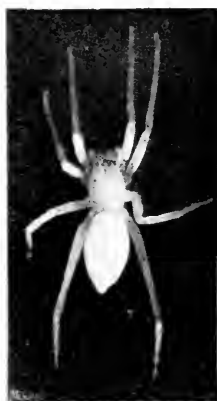


FIG. 70. *Anyphaena fraterna*, female,
 $\times 2\frac{2}{3}$.



FIG. 71. *Aysha gracilis*, female,
 $\times 2\frac{2}{3}$.

Aysha gracilis (Hentz)

Gray-dotted Spider

Chybiona gracilis Hentz, 1847, Jour. Boston Soc. Nat. Hist., vol. 5, p. 452, pl. 23, fig. 19.

Anyphaena rubra; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 4.

Aysha gracilis; Jones, 1936 Field Lab. 4(2):70.

Identifications.—AB, WJC.

Range.—Known chiefly from the eastern United States, but has been recorded also from Utah and California.

Description.—Female, length 5.6, carapace 2.5, abdomen 2.9, extended legs 22. Carapace dull amber with pair of faint grayish poorly defined longitudinal bands; eyes narrowly rimmed with black; chelicerae brown, becoming darker distally; abdomen oval or elliptical, slightly less bulky than cephalo-

thorax, dull white, faintly speckled with pale brown, longitudinally elongated dots, and with pale pubescence; legs dull white, translucent, with black spines; first pair of legs markedly longer than others; male slightly smaller with longer legs resembling her in most respects (see Fig. 71).

Habitat and Habits.—The species has been found on foliage of trees and is partly arboreal in habits. Most individuals seen on the Reservation were on or in an automobile that usually was left parked beneath a large elm tree in the headquarters area. Kaston (1948:405) stated that in Connecticut this spider overwinters in the penultimate instar, under bark or dead leaves, and that most individuals attain maturity in early spring. He recorded clutches of 134 and 196 eggs in June.

Genus *Wulfil* Cambridge

The woodland spiders of this genus are small, pale-colored, and long-legged. The anterior legs, especially, are elongated and are at least twice the length of the body. The posterior row of eyes is slightly recurved. The anterior median eyes are smaller than the posterior medians. The spiracular furrow is midway between the epigastric furrow and the spinnerets. Members of this genus are widely distributed in the United States, but the species are most concentrated in Central America and the West Indies.

Wulfil saltabunda (Hentz)

Foliage Spider

Clubiona ? *saltabunda* Hentz, 1847, Jour. Boston. Soc. Nat. Hist., vol. 5, p. 454, pl. 23, fig. 24.

Anyphaenella saltabunda; Bryant, 1931, Psyche, vol. 38, p. 116, pl. 20, fig. 21.

Identification.—AB.

Range.—Deciduous Forest Formation of the eastern United States.

Description.—Female, length 4.5, carapace 1.9, abdomen 2.2, extended legs 22.2. Entirely white except for series of paired, obscure dusky spots dorsally on abdomen; carapace and legs somewhat translucent; abdomen opaque creamy white; legs have numerous black spines (see Fig. 72).

Habitat and Habits.—In June and July these spiders have often been swept from foliage of shrubbery such as dogwood or coralberry, or from elm saplings, and they seem to be persistently scansorial in habits.



FIG. 72. *Wulfil saltabunda*, male, $\times 5$.

Family THOMISIDAE Sundevall

Crab Spiders

These are medium-sized to small cribellate dionychous spiders, which have the body flattened in a horizontal plane and are more or less crablike in appearance and behavior. The first two pairs of legs are much enlarged, and powerful as compared with those of the third and fourth pairs, and rotated so that what primitively was the ventral surface is directed forward. These powerful and usually spinose legs are used for seizing the prey, as crab spiders construct no webs, but hunt by stealth and ambush. The eight eyes are dark, and homogeneous, and are arranged in two rows, which are recurved—especially the posterior row. The lateral eyes are elevated on tubercles, which may be conjoined. The labium is free. The chelicera has a boss, but the scopula is poorly developed or lacking.

KEY TO THE SPECIES OF THE FAMILY THOMISIDAE OF THE RESERVATION

1. Legs not greatly disparate in size 18
- 1'. Legs of first and second pair much larger and more powerful than those of third and fourth pairs 2
2. Abdomen somewhat elongate, with a prominent dorsal tubercle near the rear end *Tmarus angulatus*, p. 156
- 2'. Abdomen relatively short and broad lacking a dorsal tubercle 3
3. Tubercles of lateral eyes confluent 4
- 3'. Tubercles of lateral eyes distinct 8
4. Clypeus with a distinct white carina ... *Misumenoides formosipes*, p. 148
- 4'. No clypeal carina 5
5. Eyes of anterior row subequal; carapace and abdomen not spinose; legs with few spines *Misumena vatia*, p. 148
- 5'. Lateral eyes of anterior row larger than medians; carapace and abdomen and legs spinose (*Misumenops*), 6
6. Dorsal spines on abdomen of female; male embolus not forming a spiral *Misumenops oblongus*, p. 150
- 6'. No dorsal spines on abdomen of female; male embolus spiralled ... 7
7. *Truncus* of embolus free from *pars pendula* for most of its length.
..... *Misumenops delphinus*, p. 150
- 7'. *Truncus* of embolus in contact with *pars pendula* for most of its length *Misumenops asperatus*, p. 149
8. Median ocular area longer than broad; two pairs of ventral spines on tibia of first leg *Oxyptila monroensis*, p. 151
- 8'. Median ocular area broader than long; three or more pairs of ventral spines 9
9. Claws on first tarsus have six or more teeth *Synema varians*, p. 154
- 9'. Claws on first tarsus have fewer than six teeth 10
10. Anterior row of eyes straight or almost so ... *Coriarachne lenta*, p. 147
- 10'. Anterior row of eyes recurved (*Xysticus*) 11
11. Length more than 7.5 mm. in female and more than 5.5 in male; legs with more abundant spines (15 on prolateral aspect of femur, 12 on ventral aspect of tibia, 14 on ventral aspect of metatarsus).
..... *Xysticus elegans*, p. 159

- 11'. Length 7.5 mm. or less; legs with fewer spines than indicated above 12
12. Femora and patellae of first and second legs dark brown, the distal segments paler 17
- 12'. Femora and patellae of first and second legs not darker than other leg segments 13
13. Tibia of first leg lacking spines of prolateral and retrolateral surfaces; metatarsus having only one spine on prolateral and retrolateral surfaces *Xysticus bicuspis*, p. 158
- 13'. Tibia of first leg having several spines on prolateral and retrolateral surfaces; metatarsus having several spines on prolateral and on retrolateral surfaces 14
14. Tibia having 5 pairs of ventral spines *Xysticus transversatus*, p. 161
- 14'. Tibia having 4 pairs of ventral spines 15
15. Prolateral surface of femur of first leg having ten spines; prolateral and ventral surface of metatarsus having only two spines. *Xysticus triguttatus*, p. 161
- 15'. Prolateral surface of femur of first leg having fewer than 10 spines; prolateral and ventral surfaces of metatarsus having more than 2 16
16. Femur of first leg having 6 dorsal spines and 6 prolateral spines. *Xysticus lemniscatus*, p. 159
- 16'. Femur of first leg having 4 dorsal spines and 4 prolateral spines. *Xysticus tumefactus*, p. 162
17. Carapace dark reddish brown, lacking a distinct median band. *Xysticus pallax*, p. 160
- 17'. Carapace dark on sides, with a broad, pale middorsal band. *Xysticus texanus*, p. 160
18. Carapace as wide as long or nearly so 19
- 18'. Carapace conspicuously longer than wide; abdomen at least three times as long as wide *Tibellus oblongus*, p. 156
19. A dark lanceolate mark on dorsum *Thanatus formicinus*, p. 155
- 19'. No conspicuous dark lanceolate mark on dorsum 20
20. Length less than 4.5 mm.; color coppery, metallic in male, milky white and dark gray in female *Philodromus marxi*, p. 151
- 20'. Length more than 4.5 mm.; no metallic colors or white in pattern. 21
21. Abdomen less than twice as long as wide *Philodromus pernix*, p. 152
- 21'. Abdomen more than twice as long as wide *Philodromus pratariae*, p. 153

Genus *Coriarachne* Thorell

The members of this genus are typical crab spiders, with laterigrade legs and with horizontal flattening of the body pronounced. The coloration is dull, with varying shades of brown or gray which would render the spider concealingly colored against a background such as rough bark of a tree. The cervical groove is well developed. The median ocular area is a little broader than long. The anterior lateral eyes are relatively large, and the anterior medians are nearer to them than to each other. The posterior row of eyes is recurved with eyes almost equally spaced. The genus occurs in Canada, the United States, Europe and Asia (including India).

Coriarachne lenta (Walekenaer)

Crevise Spider

Thomisus lentus Walckenaer, 1837, *Histoire Naturelle des Insectes Apteres*, vol. 1, p. 509.

Nysticus versicolor: Scheffer, 1904 *Industrialist* (Kansas State Agr. Coll.), vol. 30, p. 3.

Coriarachne lenta: Chamberlin and Ivie, 1944, *Bull. Univ. Utah, Biol. Ser.*, vol. 8(5), p. 156.

Identifications.—RLG, AB.

Range.—New England states west to the Rocky Mountains; eastern part of Mexico.

Description.—Female, length 5.8, carapace 2.6, abdomen 3.2, extended legs 16.5. Carapace mottled with several shades of brown, dark brown, at and near lateral edges of thoracic region, and lighter elsewhere; eye tubercles pale brown; carapace with broad middorsal pale tan band, flanked by darker brown; abdomen truncate, broader than long, broadest near posterior end, having series of W-shaped cream markings on tan background set off by dark brown; legs light brown mottled with dark irregular spots; middorsal cream stripes on femora (see Fig. 73).

Male resembles female in most respects but smaller by about one-fifth.

Habitat and Habits.—Like *Philodromus pernix* and *Metacryba undata*, this spider was most often found on the trunks of shag-bark hickories, beneath the loose flakes of bark. Although this seemed to be the preferred habitat, others were found on walls of buildings, and one was on bare soil of a gravelled road. This one was guarding an egg sac, which was attached to a pebble. Spiders of this species are slow and sluggish, obviously relying on their effective cryptic coloration for concealment from their prey and predators. Kaston (1948:419) recorded egg sacs in late July, with 61, 67, and 74 eggs.

Genus *Misumena* Latreille

Members of this genus are flower spiders, which ambush insects that come to blossoms to feed, and are typical representatives of the Thomisidae. The first two pairs of legs are enlarged and laterigrade. The body is depressed. The color is predominantly whitish or yellowish. Both rows of eyes are

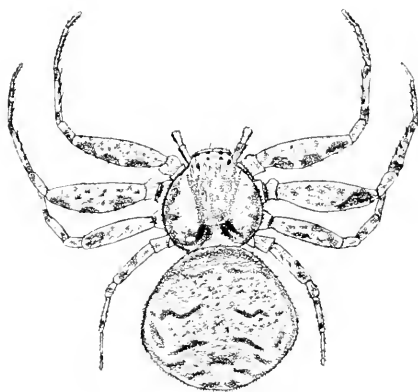


FIG. 73. *Coriarachne lenta*, female, $\times 6$.

recurved (the second more strongly) with eyes subequal and equidistantly spaced. The lateral eyes are on large confluent tubercles and the median ocular area is broader than long, slightly narrower in front than behind. The tibia and metatarsus of the first leg have strong spines on their undersurfaces, but there are no spines on the dorsal or prolateral surfaces of any of the legs. These spiders have an annual life cycle and mature in early summer. The genus is cosmopolitan.

Misumena vatia (Clerck)

Smooth Flower Spider

Araneus vatius Clerck, 1757, Svenska Spindlar, p. 28; pl. 6, fig. 5.

Misumena vatia; Thorell, 1870. Remarks on synonyms of European spiders, p. 183.

Identifications.—RLG, AB.

Range.—Holarctic; occurs throughout the entire United States, and in (southward to ?) Peru.

Description.—Penultimate female, length, 5.9, carapace 2.6, abdomen 3.3, extended legs 22. Carapace uniform pale tan, except for chalky white ocular tubercles; no spines on carapace; three weak spines on femur of each leg of first pair; dorsum glossy white; venter pale, marbled with white; legs pale tan.

Male approximately half length of female, with carapace dark reddish brown, abdomen creamy white with pair of lateral red bands, first and second legs reddish brown with yellow annulations; third and fourth legs immaculate yellow.

Habitat and Habits.—This is a typical flower spider, usually found on yellow or white blossoms. There is some capacity to change from white to yellow, or *vice versa*, depending on the type of flower providing the background. The prey is ambushed, and consists of a wide variety of insects including moths, butterflies, flies, bees, and hemipteran bugs that visit such flowers. Some of the prey taken exceeds the spider itself in size.

Genus Misumenoides Cambridge

The flower spiders of this genus are closely related to those of the genus *Misumena* and agree with them in nearly all characters except that *Misumenoides* has a transverse, white, clypeal carina. The genus occurs in North America and South America.

Misumenoides formosipes (Walckenaer)

Ridge-faced Flower Spider

Thomisus formosipes Walckenaer, 1837, Histoire Naturelle des Insects Apteres, vol. 1, p. 504, (pl. 418).

Misumena aleatoria; Scheffer, 1904 Industrialist (Kansas State Agr. Coll.), vol. 30, p. 2.

Identifications.—MHM, RLG, AB.

Range.—Entire United States, southeastern Canada, Kurile Islands.

Description.—Female, length 8.9, carapace 3.2, abdomen 5.9, extended

legs 28. Carapace pale green laterally with broad median white stripe; eye region marked with bright red; abdomen creamy white, with three pairs of large dark purplish brown spots dorsally, barely or almost touching each other, converging anteriorly and forming V-shaped mark; similarly colored irregular dark band on each side on anterior half of abdomen; legs creamy white (see Fig. 74).



FIG. 74. *Misumenoides formosipes*, female, $\times 3$.

Habitat and Habits.—This is the commonest of the flower spiders. It matures in late summer, and flowering heads of composites such as goldenrods, asters, sunflowers, fleabanes, compass plants or ironweed are its favorite haunts. Pastureland and prairie provide the best habitat. In late summer and early autumn the flower heads swarm with insects and the spiders hiding among the

blossoms are able to make captures easily.

Mating is known to occur in August and the lenticular white egg sacs are made in September. There is a record of a sac with only 14 eggs, but typically there are at least 100 eggs.

Genus *Misumenops* Cambridge

Like *Misumena* and *Misumenoides* the members of this genus are also flower spiders, and they resemble the representatives of those genera in most respects. In *Misumenops* the carapace, abdomen and legs are spinose. There are spines on the prolateral surface of the femur of the first leg, which are lacking in the other two genera. This large genus is mainly neotropical, but several species occur in the United States, one occurs across Europe and Asia, and there are others in the Melanesian and Polynesian regions.

Misumenops asperatus (Hentz)

Bristly Flower Spider

Thomisus asperatus Hentz, 1847. Jour. Boston Soc. Nat. Hist., vol. 5, p. 447: pl. 23, fig. 7.

Misumenops asperatus; Simon, 1903. Histoire Naturelle des Araignées, vol. 2 (4), p. 1012.

Misumena asperata; Scheffer, 1904 Industrialist (Kansas State Agr. Coll.), vol. 30, p. 2.

Identifications.—TBK, MHM, AB.

Range.—Southern Canada and most of the United States, southward into Costa Rica and the West Indies.

Description.—Female, length 8.7, carapace 3.6, abdomen 5.0, extended legs 25. Pale yellow, with pair of broad irregular brownish longitudinal bands on carapace, nearer sides than middle; abdomen mottled with brown in some

individuals, and having broad red streak on each side anteriorly; ocular region white, an alate white middorsal mark on carapace; legs pale yellow with black claws; tibia of first leg having several stout brown spines.

Misumenops delphinus (Walckenaer)

Thomisus delphinus Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1, p. 519.

Misumenops delphinus; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 159.



FIG. 75. *Misumenops delphinus*, female,
× 3.

Identifications.—RLC, AB.

Range.—Most of United States (rare in northeastern part); British Columbia; south through Mexico to Central America and in the West Indies.

Description. — Female, length 7.0, carapace 2.8, abdomen 4.0, extended legs 28. Carapace pale brownish yellow; legs slightly paler; abdomen rounded, but little longer than broad, dirty white, with four faint gray longitudinal marks; bristles on anterior part of carapace and on abdomen; ventral spines on tibia and metatarsus (see Fig. 75).

Male only half to two-thirds length of female, resembling her in appearance.

Misumenops oblongus (Keyserling)

Misumena oblonga Keyserling, 1880, Die Spinnen Amerikas, Laterigradae, p. 79, pl. 2, fig. 41.

Misumenops oblongus; Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., vol. 29, p. 413.

Identification.—AB.

Range.—Eastern United States, and Cuba.

Description.—Male, length 3.0, carapace 1.3, abdomen 1.6, extended legs 17. Ivory-yellow, with annulations of brown on the proximal and distal parts of tibia, distal half of metatarsus and distal third of tarsus on first and second legs; carapace almost equal in length and width and has series of anteriorly directed bristles, forming serrations along its edges; spines on abdomen and on proximal segments of legs; abdomen oval, its length approximately twice its width.

Female somewhat more than twice length of male, otherwise resembles him.

Genus *Oxyptila* Simon

In most respects spiders of this genus resemble those of the genus *Xysticus*, but they are smaller, with relatively short legs. The legs have a few spines. There are spatulate spines on the body. The carapace is usually slightly longer than broad. The genus is cosmopolitan.

Oxyptila monroensis Keyserling

Monroe Crab Spider

Oxyptila monroensis Keyserling, 1883, Verh. Zool.-bot. Ges. Wien, vol. 3., p. 671.

Identification.—WJG.

Range.—Ontario and adjacent United States, south to Georgia and Alabama, west to Missouri and Kansas.

Description.—Female, length 2.8, carapace 1.8, abdomen 1.5, extended legs 8.7. Carapace reddish brown, with paler broad middorsal band; abdomen dark grayish brown, clouded with black with faint paler transverse markings, having thick club-shaped hairs; legs yellowish brown.

Male not seen, reported to be similar to female, but markedly smaller (Kaston, 1948:420).

Genus Philodromus Walekenae

The members of this genus are small to medium-large crab spiders, laterigrade, with all the legs much elongated (the second pair the longest) and with body horizontally flattened. Some are specially adapted for living on and beneath the bark of trees, others live on grass or bushes. The width of the carapace equals or exceeds its length, and it is considerably narrowed in front. The height of the clypeus is less than that of the median ocular area, which is wider behind, and is as broad as long, or longer. The sternum is broad and heart-shaped. The labium is longer than broad. Both rows of eyes are slightly recurved; in the posterior row the median eyes are usually nearer to the laterals than to each other. The genus is cosmopolitan.

Philodromus marxi Keyserling

Metallic Crab Spider

Philodromus marxi Keyserling, 1884, Verh. Zool.-bot. Ges. Wien, vol. 33, p. 677, pl. 21, fig. 25.

Identification.—WJG.

Range.—Eastern United States and southeastern Canada, chiefly or entirely within the Deciduous Forest Formation.

Description.—Male, length 2.9, carapace 1.4, abdomen 1.5, extended legs 15.7. Carapace reddish brown, heavily stippled with dark brown except in middorsal area; abdomen coppery brown dorsally, clouded with darker pigment, marked with dark brown on sides, and pale ventrally; both abdomen and carapace somewhat iridescent dorsally; legs pale brownish yellow on proximal portions, darkening to chestnut distally, with many long spines and dark hairs; anterior median eyes widely separated, each near anterior lateral eye, which is anterior and lateral to it.

Female, length 3.3, carapace 1.3, abdomen 1.9, extended legs 11.7; milky white but with dark brown areas on sides of carapace and abdomen, and with sparse dark brown stippling on legs.

Habitat and Habits.—This small crab spider is not common but has been seen occasionally in open areas near the Reservation head-

quarters. The males dart about erratically with remarkable speed and persistence, running up and down stems and quartering back and forth over the ground surface. They have been seen chiefly in June and July.

***Philodromus pernix* Blackwall**

Hickory Bark Crab Spider

Philodromus pernix Blackwall. 1846. Ann. Mag. Nat. Hist., vol. 17, p. 38. vol. 30, p. 3.

Philodromus vulgaris; Scheffer. 1904. Industrialist (Kansas State Agric. College), vol. 30, p. 3.

Identification.—AB.

Range.—Kurile Islands; United States, chiefly in eastern half, but recorded also from Utah and California; southern Canada.

Description.—Female, length 8.0, carapace 3.5, abdomen 4.9, extended legs 38. Carapace shiny brown, paler in area between cephalic groove and posterior row of eyes, and has sparse pubescence; abdomen dark grayish brown with dense covering of short, light brown hairs; legs pale tan, stippled with dark brown; individual dots elongated in direction of long axis of leg; besides numerous dots legs have larger dark spots and areas which are not sharply defined; suffusion of dark pigment in vicinity of each joint.

Carapace slightly wider than long; abdomen narrower than carapace, high in front and rear but bowed at center, where pair of large pit-like depressions is situated; abdomen widest at point slightly more than three-fourths of distance back from anterior end; it tapers to a blunt point posteriorly (see Fig. 76).



FIG. 76. *Philodromus pernix*, female, $\times 2\%$.

Habitat and Habits.—This is a scansorial crab spider. On the Reservation, most of those seen were on the trunks of hickories (*Carya ovata*). In its dull gray color matching that of the bark, flattened form permitting it to squeeze into crevices beneath slabs of bark, and skill in climbing and clinging to the vertical trunks,

the spider is admirably adapted for life in this situation. It is difficult to collect; when exposed by the removal of a slab of bark, the spider will dart into a new hiding place beneath another slab or drop to the ground and conceal itself in leaf litter. Most of the spiders collected were penultimates, obtained in winter when they were relatively slow in their movements and could be caught more easily than at other times. These wintering spiders were in rather exposed situations, and were not enclosed in cocoons. Kaston (1948:431) stated that in Connecticut maturity is attained in early April and the adults survive through October. On July 8, 1960, a female was found beside her egg sac under a strip of bark. In contrast to the usual behavior, she did not try to escape. Kaston (*loc. cit.*) stated that females produce two to five egg sacs in the course of a season, the early sacs containing 40 to 50 eggs and the late sacs as few as seven.

***Philodromus pratariae* (Scheffer)**

Prairie Crab Spider

Philodromoides pratariae. Scheffer, 1905, Trans. Kansas Acad. Sci., vol. 20, p. 122.

Identification.—HSF.

Range.—Recorded from the eastern parts of Nebraska, Kansas and Oklahoma, and perhaps occurs also in neighboring states that have extensive tall-grass prairie habitat.

Description.—Male, length 4.6, carapace 2.0, abdomen 2.6, extended legs 23.5. Carapace pale brownish yellow, with two pairs of chocolate colored longitudinal bands; outer bands narrow and broken; inner bands broad, slightly wider than pale mid-dorsal area between them and about twice as wide as pale areas separating them from outer bands; eyes rimmed with black; abdomen colored similarly to carapace with two pairs of chocolate colored bands continuing onto it; broader bands gradually converge and join behind center; each broad band has small black spot on anterior part of abdomen; paler area lateral to each broad band faintly reticulated, and posteriorly speckled with black; legs dull yellow, chocolate colored beneath, and with pair of narrow crimson longitudinal streaks dorsally; palps and chelicerae speckled with black; sternum mostly dark brown with pale central area; ventrum reticulate; first row of eyes strongly procurved, second row even more strongly recurved.

Female resembles male but slightly larger and more robust (see Fig. 77).



FIG. 77. *Philodromus pratariae*, female, $\times 3$.

Habitat and Habits.—These spiders seem to be typical of a tall-grass prairie habitat. They have been mentioned only a few times in the literature. Scheffer (1905:122) reported these spiders to be fairly common in the vicinity of Manhattan in prairie habitat in mid-summer. He collected adults of both sexes on August 17. Banks, Newport and Bird (1932:28) found the speices in prairie habitat in Oklahoma.

On the Reservation the species was overlooked until August 23, 1960, when it was found to be the most abundant kind of adult spider in an upland area of re-established prairie on the north edge of the Reservation. On September 10, 1960, a series of a dozen adult females were collected by sweeping tall prairie grass on original prairie of the Rockefeller Tract, and adjacent re-established prairie. These spiders were sluggish, and when swept up in a net they would "play possum" remaining motionless for a long time in bits of debris. Often they were overlooked until they moved. The movements were fairly rapid but much less so than those of *Philodromus pernix*. One spider pounced upon a leaf-hopper and then rolled over on its back and lay motionless apparently feeding on its victim. One that crawled onto a twig extended its legs anteriorly and posteriorly, pressed along the twig, so that it was well concealed.

Genus *Synema* Simon

The members of this genus are typical crab spiders. The body is flattened, the legs are laterigrade, there is no cervical groove. The posterior row of eyes is strongly recurved, the anterior row much less so. In each row the eyes are almost equally spaced. The lateral eyes are on subequal distinct tubercles. The median ocular area is broader than long, and narrower in front than behind. The width of the carapace equals or exceeds its length. The genus is cosmopolitan.

Synema varians (Walckenaer)

Thomisus varians Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1, p. 504.

Synema varians, Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8, p. 163.

Identification.—AB.

Range.—Eastern United States; Mexico.

Description.—Female (immature), length 2.8, carapace 1.2, abdomen 1.5, extended legs 11. (Adult length 4.5 to 5.0 according to Kaston, 1948:417.) Carapace yellowish brown, abdomen yellowish gray with broad black band across its posterior fourth; concave on its anterior edge; legs dull yellow with faint darker annulations.

Genus *Thanatus* Koch

The members of this genus are medium-small ground-living crab spiders in which the legs are not strongly laterigrade and the appearance is rather lycosid-like. The legs are all nearly equal in length, the second and fourth both exceeding the first. Both carapace and abdomen are somewhat longer than wide. The eyes are subequal. The first leg has three pairs of ventral spines on the tibia and two on the metatarsus. The genus is cosmopolitan.

Thanatus formicinus (Clerck)

Araneus formicinus Clerck, 1757, Svenska Spindlar, p. 134; pl. 6, table 2.

Thanatus formicinus; Koch, 1837, Uebersicht des Arachnidensystems, p. 28.

Identifications.—RLC, AB.

Range.—Holarctic; found throughout the United States.

Description.—Female, length 6.0, carapace 2.8, abdomen 4.0, extended legs 24. Predominantly grayish brown; broad middorsal band on carapace, pale tan because of its dense covering of hairs of that color, with darker area on either side; eyes subequal; abdomen has slender black lanceolate mark, extending little more than halfway back from anterior end, having irregular edges, and margined with yellowish gray; on posterior part of abdomen pair of well separated dark longitudinal streaks having their lateral edges notched.

Male, length 4.5, carapace 2.0, abdomen 2.5, extended legs 18. Coloration and general proportions essentially similar in both sexes (see Fig. 78).

Habitat and Habits.—These spiders were found only in grassland, either in tall-grass prairie or in brome pastures. They were usually seen on the ground or in dead vegetation of the ground litter, but occasionally were climbing on living plants. Their movements were brisk and active; they seemed to lack the furtive behavior and secretive habits of most other crab spiders. On July 29 and 30, 1954, females were collected with their egg sacs, both on leaves of ironweed (*Vernonia interior*) about two feet above the ground. Kaston (1948:438) stated that in Connecticut adults were collected in fall, spring and early summer, and he believed that hibernation occurred in the adult and penultimate instars. On the Reservation on May 20, 1954, an adult female was found carrying and feeding upon a smaller spider, an immature *Castianeira descripta*.

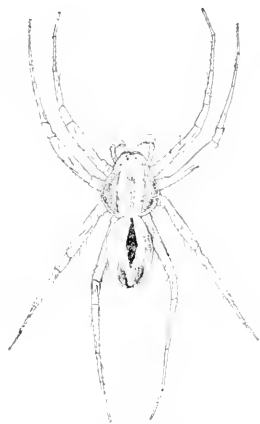


FIG. 78. *Thanatus formicinus*, male, $\times 3$.

Genus *Tibellus* Simon

Members of this genus are elongate crab spiders adapted to a habitat of tall grass. The body is not much flattened but the abdomen is remarkably

elongate and cylindrical and the legs are moderately long. The color is pale, yellowish or grayish, with longitudinal dark marks. Both rows of eyes are recurved, the eyes are small and subequal, the median ocular area is narrowed anteriorly and its width equals or exceeds its length. In order of length the legs are 2, 4, 1, 3. The chelicera has two teeth on the promargin and none on the retromargin. The genus is cosmopolitan.



FIG. 79.
Tibellus
oblongus,
female,
× 2.

Tibellus oblongus (Walckenaer)

Aranea oblonga Walckenaer 1802 Faune Parisienne, Ins. II:228.
Tibellus oblongus; Simon, 1875, Les Arachnides de France.
Tome 2, pp. 311-360.

Identification.—AB.

Range.—Europe, Asia, Alaska, Canada and United States.

Description.—Female length 10.0, carapace 4.2, abdomen 6.5, extended legs 31. Ivory yellow with faint brownish suffusion; brown band extending for length of carapace and abdomen, indistinct at its anterior end; thoracic portion of this band consists of fine stippling, not evident on abdomen; carapace and abdomen have sparse covering of short white hairs; legs stippled with dark brown; pair of small black spots on abdomen at about one-fourth of its length from rear end; male slightly smaller, with longer legs. (See Fig. 79.)

Habitat and Habits.—This crab spider has been found on the Reservation and Rockefeller Tract in both original and re-established tall-grass prairie and not elsewhere. It is moderately common. Other workers likewise have found it exclusively in grassland habitats, but of a variety of types, ranging from sandhill to marsh.

Genus *Tmarus* Simon

The members of this genus are atypical crab spiders highly specialized for a scansorial existence. The abdomen is enlarged and rather elongate, and has near its posterior end an upward projecting tubercle. When at rest the spider wraps its legs around the twig, and is scarcely noticeable except for its protuberant abdomen, which is well camouflaged by its dull gray or brown color as a bud or leaf scar. The lateral eyes on each side are raised on conspicuous tubercles of which the posterior are the larger. The carapace is strongly convex above. The clypeus is sloping and almost as high as the median ocular area. The genus is cosmopolitan.

Tmarus angulatus (Walckenaer)

Twig Spider

Thomisus angulatus Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1, p. 537.

Tmarus angulatus; Simon, 1895, Histoire Naturelle des Araignées, vol. 1, p. 993.

Tmarus angulatus; Scheffer, 1904 Industrialist (Kansas State Agr. Coll.), vol. 30, p. 3.

Identifications.—RLG, AB.

Range.—Eastern United States; Arizona, Utah, California and Mexico.

Description.—Penultimate male, length 6.0, carapace 2.0, abdomen 4.0, extended legs 20. Carapace dark brown with scattered black dots and mottling of pale brown; hour-glass-shaped tan mark extending for most of length of carapace with constriction at cervical groove; carapace slopes off obliquely at its anterior end; in each row of eyes laterals markedly larger than medians, and on prominent tubercles; posterior lateral eyes directed postero-laterally; abdomen truncate at its anterior end and overlaps posterior fifth of carapace; narrow and flattened anteriorly, but expanded and increased in both depth and breadth posteriorly; series of three large middorsal reddish gray blotches connecting with each other, heavily stippled with dark brown, and bordered with chestnut; pair of pale reddish brown areas on posterior half of dorsolateral aspect of abdomen; posterior end of abdomen raised into peculiar tubercle; venter pale, with broad dark brown lanceolate area in the mid-line; sternum whitish, dotted with dark brown; first and second pairs of legs much longer than third and fourth (first slightly longer than second); legs pale brown, almost white, heavily stippled with black (see Fig. 80).

Female resembles male but larger by perhaps one-third.

Habitat and Habits. — Because of their arboreal habits and lack of a web these spiders are not often seen but probably are fairly common. From time to time individuals were found on an automobile parked beneath a large American elm at the Reservation headquarters. Others were found in mesic woodland, suspended in mid-air by a strand of web, or, less frequently, crawling over branches or foliage. They were sluggish and rather slow.

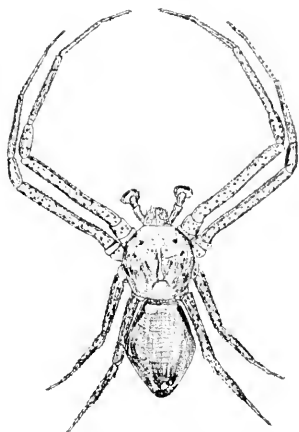


FIG. 80. *Tmarus angulatus*, male, $\times 4$.

Genus *Xysticus* Koch

The members of this genus are medium-sized to large typical crab spiders, having laterigrade legs and dull cryptic coloration. The length of the carapace equals or exceeds its width. The cervical groove is inconspicuous. The first two legs are subequal, large and powerful, strongly spinose. Both rows of eyes are recurved. The anterior median eyes are nearer to the much larger anterior laterals than to each other, whereas in the posterior row the spacing is more nearly uniform. The median ocular area is slightly narrower anteriorly, and its width equals or exceeds its length. Spines scattered over the body are filiform, rarely spatulate. The genus is cosmopolitan.

Xysticus bicuspis Keyserling

Xysticus bicuspis Keyserling, 1887, Verh. Zool.-bot. Ges. Wien, vol. 37, p. 478, pl. 6, fig. 38.

Xysticus graminis; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 122.

Identification.—WJG.

Range.—Eastern United States.

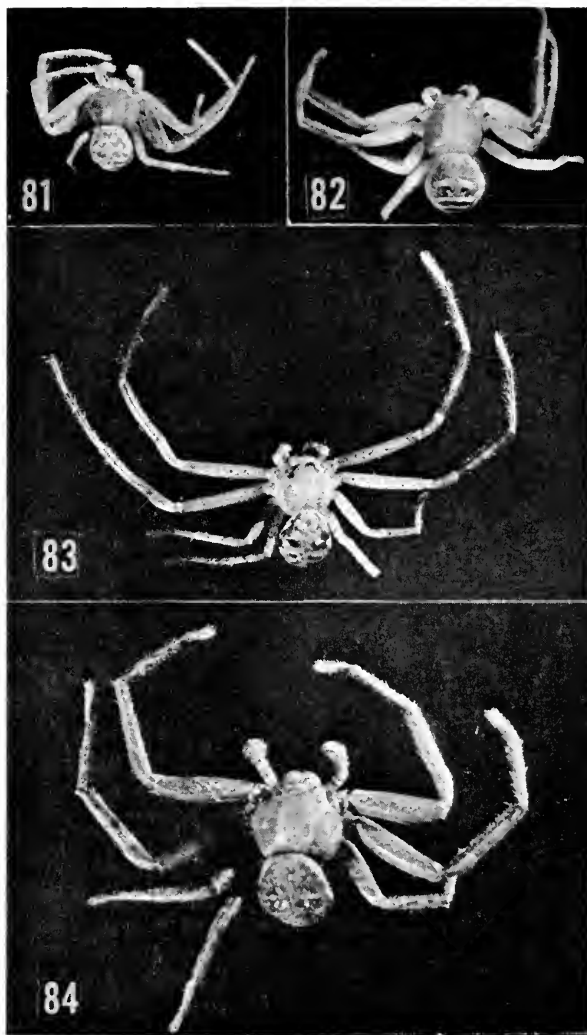


FIG. 81. *Xysticus triguttatus*, male, $\times 3$.

FIG. 82. *Xysticus texanus*, male, $\times 3$.

FIG. 83. *Xysticus tumefactus*, male, $\times 3$.

FIG. 84. *Xysticus elegans*, male, $\times 3$.

Description.—Female, length 5.5, carapace 2.0, abdomen 3.5, extended legs 18. Dorsal coloration dusky tan; three faint longitudinal black stripes on carapace, faint black and light marks on abdomen; legs reddish brown near their bases, but duller colored distally.

Habitat and Habits.—The only specimen obtained was an adult female, collected on June 3, 1949. Kaston (1948:427) stated that in Connecticut this uncommon species had been found in low bushes and under leaves.

Xysticus elegans Keyserling

Elegant Crab Spider

Xysticus elegans Keyserling, 1880, Die Spinnen Amerikas, Laterigradae, pp. 31-32, pl. 1, fig. 14.

Identifications.—AB, WJG.

Range.—Alaska; United States and Canada mainly or entirely east of the Rocky Mountains; Kurile Islands of northeastern Asia.

Description.—Female, length 9.5, carapace 4.5, abdomen 5.0, extended legs 32. Carapace brown, with darker brown spots creating a spotted pattern, with chalky white horseshoe-shaped mark extending from ocular region for about three-fourths length of carapace; chalky white band between anterior lateral eyes, with sharp point between posterior median eyes; carapace darker brown laterally; abdomen light brown, with paler streaking laterally, and with three pairs of dark brown transverse spots on posterior half; each spot surrounded by paler area; venter yellowish white, with minute brown furrows; streaking posteriorly; legs translucent, grayish, heavily spotted with dark brown and yellowish white; dorsal surface of each leg having median chalky white stripe; male smaller by one-fourth, with more sharply defined pattern.

Habitat and Habits.—This large crab spider has been found chiefly in woodland, but also in edge and grassland situations. It is often found in flowering heads of plants, and occasionally on logs and tree-trunks, but most often it is found on the ground, sometimes beneath rocks or other sheltering objects.

Xysticus lemniscatus Walckenaer

Thomisus lemniscatus Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1, p. 525.

Xysticus auctifuscus; Keyserling, 1880, Die Spinnen Amerikas, Laterigradae, p. 25, pl. 1, fig. 10.

Identification.—WJG.

Range.—Southern and midwestern United States, and Mexico.

Description.—Male, length 3.0, carapace 2.0, abdomen 1.5, extended legs 16. Carapace dark amber-brown with three elongate black spots near posterior edge, whitish in ocular area; traces of broad, pale, middorsal band; abdomen cream with four pairs of black marks (first pair largest) and anterior median round black spot; legs pale amber, with heavy spines.

Xysticus pallax Cambridge

Dark Crab Spider

Xysticus pallax Cambridge, 1894, Biol. Centr.-Amer., vol. 1, p. 138, t. 17, fig. 14.

Identification.—WJG.

Range.—Nova Scotia, Ontario, and the eastern United States, west to Idaho, Utah, and Baja California, south to Vera Cruz.



FIG. 85. *Xysticus pallax*, male,
× 3.

Description.—Male, length 4.0, carapace 2.0, abdomen 2.0, extended legs 21. Carapace dark brown, almost black, abdomen dark brown with tan areas on anterolateral margins; coxae, femora and patellae of first two pairs of legs of same color, but distally these legs gradually pale to light tan on tarsi; third and fourth legs dark brown mottled with tan; which forms almost continuous line on patella and tibia, and is predominant color on metatarsus and tarsus (see Fig. 85).

Female resembles male but is markedly larger.

Xysticus texanus Banks

Texas Crab Spider

Xysticus texanus Banks, 1904, Jour. New York Ent. Soc., vol. 12, p. 112.

Identification.—WJG.

Range.—Southeastern United States, west to Colorado, Texas and Nuevo Leon.

Description.—Male, length 4.3, carapace 2.5, abdomen 2.2, extended legs 18. Carapace pale yellowish brown in middorsal area for about one-third of its width in cephalic region, but widening posteriorly to width of abdomen; median pale band divided for half its length anteriorly by middorsal dark streak; lateral areas of carapace slaty, these dark areas coalescing anteriorly to include clypeus and ocular area; abdomen dark brown dorsally, with three pale yellowish brown transverse bands; five additional bands on posterior aspect of abdomen, narrower and paler than dorsal bands and extending anteriorly along sides of abdomen, which are obliquely marked with many of these narrow alternating black and white bands; legs pale yellowish brown except for patellae and tibiae of first and second, which are dark brown, almost black (see Fig. 82).

Habitat and Habits.—The only specimen seen was an adult male, obtained by sweeping in bluestem prairie in June 1961.

Xysticus transversatus (Walckenaer)

Tan Crab Spider

Thomisus transversatus Walckenaer, 1837, *Histoire Naturelle des Insectes Aptères*, vol. 1, p. 525.

Xysticus stomachosus; Scheffer, 1904 *Industrialist* (Kansas State Agr. Coll.), vol. 30, p. 3.

Xysticus transversatus; Chamberlin and Ivie, 1944, *Bull. Univ. Utah Biol. Ser.*, vol. 8(5), p. 170, fig. 28.

Identifications.—RLG, AB, WJG.

Range.—Recorded chiefly from the eastern United States, but also from Colorado, Utah, Montana, California, and Alberta.

Description.—Female, length 7.5, carapace 4.0, abdomen 4.7, extended legs 28. Dark brown and pale tan brown; paler color predominating on vertical face of the carapace's anterior end, in broad median band on carapace, on legs and on anterior part of abdomen, but these light areas blotched and speckled with darker color; abdomen flattened, broader than long, overlaps carapace and is wider posteriorly; on its dorsal aspect it has three pairs of large, dimple-like depressions; first pair of legs largest, those of second pair nearly as large; tibiae and metatarsi of first two pairs of legs set with spines.

Male, length 4.2, carapace 2.2, abdomen 2.0, extended legs 24; darker than female; carapace and legs of first pair chestnut brown; carapace paler mid-dorsally; abdomen dark chocolate brown with four irregular but conspicuous transverse markings; legs have rather indistinct dark annulations, some of which have incomplete borders of white distally; third and fourth legs yellowish brown; lateral folds present on abdomen of female scarcely discernible in male.

Habitat and Habits.—This large fat-bodied crab spider is the most common member of its genus on the Reservation. It has been found chiefly in woodland and edge situations, but is not narrowly restricted in choice of habitat. It has often been found under flat rocks, about logs, on tree trunks, on weedy vegetation, and especially on flowering heads. Attention may be attracted to the spider by the carcass of its prey. Like most other crab spiders, this kind hunts by ambush, and often catches insects that are much bulkier than it is, especially moths and butterflies. The observer first notices the insect prey, tilted in an unnatural position; only upon closer inspection does he notice the cryptically colored spider holding the prey. After its capture the victim is carried about and fed upon for many hours.

Xysticus triguttatus Keyserling

White-banded Crab Spider

Xysticus triguttatus Keyserling, 1880, *Die Spinnen Amerikas, Laterigradae*, p. 12, pl. 1, figs. 3, 6.

Xysticus triguttatus; Scheffer, 1904 *Industrialist* (Kansas State Agr. Coll.), vol. 30, p. 3.

Identifications.—AB, WJG.

Range.—Kurile Islands; eastern United States; Colorado.

Description.—Male, length 3.5, carapace 1.9, abdomen 1.6, extended legs 16; carapace dark amber, paler in middorsal area, but with irregularly arranged dark pigmentation laterally; legs of same color proximally, but paling to light amber distally; abdomen white with three irregular black bands across posterior half and with irregular black marks on anterior half (see Fig. 81).

Xysticus tumefactus Walckenaer

Thomisus tumefactus Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1, p. 502.

Xysticus funestus; Keyserling, 1880, Die Spinnen Amerikas, Laterigradae, p. 10.

Xysticus nervosus; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 3.

Xysticus tumefactus; Chamberlin and Ivic, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 198.

Identifications.—MHM, WJG.

Range.—Known from southeastern Canada and from the United States in New England, west to Oklahoma and to the Rocky Mountains, south into Mexico.

Description.—Male, length 4.5, carapace 2.5, abdomen 2.5, extended legs 26. Carapace dark rusty brown; abdomen dull golden brown with irregular white area around its anterior border, and with irregular transverse white streaks across its posterior half; pair of large, black dimple-like depressions near middle of abdomen on its dorsal aspect; legs dark amber on coxae, femora and patellae, paling to light brown on their distal segments, and having many heavy dark spines (see Fig. 83).

Habitat and Habits.—This is one of the commoner species of the genus; in autumn many adult males have been noticed in edge habitat, notably in the headquarters area, where several were found on a screened porch.

Family SALTICIDAE Blackwall

Jumping Spiders

Size ranges from small to large in these ecribellate dionychous spiders. The body is usually compact and heavy, the legs short and powerful. The anterior median eyes are greatly enlarged, and situated on the vertical face directed forward. To these enlarged eyes the salticids owe their acuity of vision, far exceeding that in other spiders, and making possible the catlike stalking of prey which is characteristic of the group. The anterior lateral eyes are in line with the anterior median pair, forming a row; the posterior median eyes, which are by far the smallest, are located behind the anterior laterals, and the small posterior lateral eyes form a third row still farther back. These spiders may be either hairy or smooth. The legs are spiny. Some salticids are brightly colored and others have striking patterns. The margins of the fang furrow are usually toothed. A scopula is present. There is no boss. The labium

is free. Salticids do not construct webs for capture of the prey. They do spin cocoons for their egg sacs, or to enclose themselves during molt or hibernation.

KEY TO THE SPECIES OF THE FAMILY SALTICIDAE OF THE RESERVATION

1. Abdomen elongate; more than twice as long as wide. *Marpissa pikei*, p. 172
- 1'. Abdomen not more than twice as long as wide 2
2. Abdomen conspicuously constricted behind anterior third; carapace constricted behind rear eyes *Peckhamia americana*, p. 180
- 2'. Abdomen and carapace not conspicuously constricted 3
3. Carapace nearly twice as long as wide, with a well-marked cervical groove *Myrmarachne hentzi*, p. 177
- 3'. Carapace much less than twice as long as wide, lacking a well-marked cervical groove 4
4. Combined length of tibia and patella of third leg less than combined length of tibia and patella of fourth leg 11
- 4'. Combined length of tibia and patella of third leg not less than combined length of tibia and patella of fourth leg 5
5. Two pairs of bulbous setae on ventral aspect of tibia of first leg 6
- 5'. No bulbous setae on legs 7
6. Abdomen predominantly dark *Thiodina puerpera*, p. 189
- 6'. Abdomen predominantly pale, cream-colored *Thiodina iniquies*, p. 188
7. Ocular quadrangle not wider behind *Habrocestum pulex*, p. 166
- 7'. Ocular quadrangle wider behind 8
8. First leg longer than third leg *Evarcha hoyi*, p. 165
- 8'. Third leg longer than first leg (Habronattus) 9
9. Third leg unmodified, similar to fourth leg. *Habronattus sabulosus*, p. 168
- 9'. Third leg having a spur on patella 10
10. Clypeus reddish *Habronattus coronatus*, p. 167
- 10'. Clypeus whitish *Habronattus viridipes*, p. 168
11. Body brilliantly iridescent 12
- 11'. Body not brilliantly iridescent 13
12. Legs whitish with dark lines above; abdomen not rimmed with white *Tutelina elegans*, p. 189
- 12'. Legs unmarked; abdomen rimmed with white. *Sassacus papenhoei*, p. 187
13. Second, third and fourth legs white and translucent (Hentzia) 14
- 13'. Second, third and fourth legs not white and translucent 15
14. Body brown, with lateral white stripes, first leg of male brown; median lobe of epigynum wider than long *Hentzia ambigua*, p. 169
- 14'. Body cream-colored or tan with white stripes; first leg of male white; median lobe of epigynum longer than wide *Hentzia mitrata*, p. 169
15. Tibia of first leg having four pairs of ventral spines. *Maccia inclemens*, p. 171
- 15'. Tibia of first leg having two or three pairs of ventral spines 16
16. Ocular quadrangle occupying only about $\frac{2}{3}$ of length of carapace. 17
- 16'. Ocular quadrangle occupying more than $\frac{2}{3}$ of length of carapace. 21
17. Length of abdomen about twice its width *Marpissa bina*, p. 172
- 17'. Length of abdomen somewhat less than twice its width 18
18. Length more than 7 mm. in adults 19
- 18'. Length less than 7 mm. 20

19. Dorsal color predominantly gray with leaflike marking on dorsal aspect of abdomen *Metacyrba undata*, p. 174
- 19'. Dorsal color predominantly dark with no leaflike marking on dorsal aspect of abdomen *Metaphidippus castaneus*, p. 175
- [20. Abdomen having dorsal series of five sharply defined black spots. *Metaphidippus insignis*, presence not substantiated.]
- 20'. Abdomen lacking dorsal spots or having poorly defined spots 21
21. Legs conspicuously annulate; femur of first leg in male lacks whitish scales; abdomen of female with whitish spots and faint dark chevrons *Metaphidippus galathea*, p. 175
- 21'. Legs only faintly annulate, or lacking annulations; femur of first leg in males bears whitish scales on prolateral surface; abdomen of female dull yellow with poorly defined dark spots.
Metaphidippus protervus, p. 176
22. Ocular quadrangle occupying more than half length of carapace 23
- 22'. Ocular quadrangle occupying not more than half length of carapace 24
23. Abdomen having two faint but regular transverse light bands.
Gertschia scorpionia, p. 166
- 23'. Abdomen having two pairs of white spots, which may be obliquely extended to form chevron shaped marks *Zygoballus bettini*, p. 190
24. Ocular area occupying approximately half length of carapace; body and legs glabrous *Icius hartii*, p. 170
- 24'. Ocular area occupying conspicuously less than half length of carapace; body and legs hairy 25
25. Cephalothorax with sides weakly rounded, its greatest width markedly less than length (by at least one-fifth); smaller and less hairy 26
- 25'. Cephalothorax with sides strongly rounded, its greatest width approximating length; larger and hairier 28
26. Much iridescence on dorsal surface; length of female greater than 8 mm., length of male greater than 7 mm. *Paraphidippus aurantius*, p. 177
- 26'. Little or no iridescence on dorsal surface; length of female less than 8 mm. and of male less than 7 mm. 27
27. Abdomen of female having several pairs of oblique white spots; abdomen of male having encircling white band.
Paraphidippus marginatus, p. 178
- 27'. Abdomen lacking oblique white spots in female, and encircling band in male *Paraphidippus pineus*, p. 179
28. Black, with white markings including large central spot on dorsum of abdomen, but spot occasionally reddish *Phidippus variegatus*, p. 184
- 28'. Not black and white, as described above 29
29. Black with dorsal aspects of abdomen and carapace mostly bright red *Phidippus apacheanus*, p. 181
- 29'. Pattern not a combination of black and bright red as described above 30
30. Carapace and abdomen mostly reddish orange in male, somewhat duller in female, with pair of black bands on posterior part of abdomen, sometimes enclosing two pairs of white spots. *Phidippus pius*, p. 182
- 30'. Carapace and abdomen not predominantly reddish orange with pattern described above 31

31. Gray, with large central white spot on abdomen. *Phidippus putnami*, p. 183
- 31'. Not gray with large central white spot on abdomen 32
32. Carapace and abdomen red in male, except for black patch in ocular area; female purplish gray *Phidippus whitmani*, p. 187
- 32'. No red on carapace of male; female not purplish gray 33
33. Male black with white markings and with lateral red areas on abdomen; female dull orange-gray *Phidippus rimator*, p. 183
- 33'. Pattern not as described above 34
34. Carapace black with wide lateral white stripes in male; abdomen in both sexes having broad, median black band enclosing orange mark and orange dorsolateral areas *Phidippus fraudulentus*, p. 181
- 34'. Carapace black in ocular area, brown posteriorly, with no light stripes; abdomen orange *Phidippus princeps*, p. 182

Genus *Evarcha* Simon

Except for certain characters of the genitalia, the members of this genus resemble those of *Habronattus* in most respects, but the first leg is longer than the third. The genus is widely distributed in tropical regions both in the Old World and in the New World.

Evarcha hoyi (Peckham)

Long-legged Jumping Spider

Attus hoyi Peckham, 1883, Descriptions of new or little known Attidae, p. 7, pl. 1, fig. 5.

Evarcha hoyi; Simon, 1903, Histoire Naturelle des Araignées, vol. 2, pp. 703-787.

Identification.—AB.

Range.—Occurs over much of the United States, from New England and Pennsylvania west to the Pacific Coast, in southeastern Canada, and southward to Brazil.

Description.—Male, length 5.0, carapace 2.0, abdomen 2.8, extended legs 15. Carapace with black anteriorly in ocular region, extending posteriorly to surround posterior lateral eyes; pair of conspicuous light hair tufts on each side of midline between posterior median eyes and posterior laterals; dorsal area behind posterior lateral eyes tan; sides of carapace dark brown marbled with black; abdomen slender, narrower than carapace, dark brown with faint, light brown, chevronlike markings and spots posteriorly; legs uniform, pale cream; female closely resembling male in size and appearance.

Habitat and Habits.—This small jumping spider is not common locally. It has been seen chiefly in early summer. Several have been seen on screens, or walls of buildings, and others have been swept from brome grass or from shrubs in woodland edge situations.

Genus *Gertschia* Kaston

In this small antlike jumping spider the cephalothorax is low and flat. The ocular quadrangle occupies two-thirds or more of the length of the carapace,

is approximately the same width fore and aft, and at its rear end is approximately four-fifths of the width of the carapace. The sternum is oval; the labium is wider than long; there is a retromarginal cheliceral tooth, which is distinctly bicuspid. The abdomen has a faint constriction at its anterior third. Members of this genus are known chiefly from the United States and adjacent areas.

Gertschia scorpionia (Hentz)

Gertsch's Ant Spider

Synemosyna scorpionia Hentz, 1846, Jour. Boston Soc. Nat. Hist., vol. 5, p. 369.

Gertschia scorpionia; Kaston, 1945, Amer. Mus. Novit., no. 1290, p. 16.

Identification.—WJG.

Range.—Recorded chiefly in the eastern United States, but also in Arizona.

Description.—Male, length 2.6, carapace 1.3, abdomen 1.3, extended legs 6.0. Carapace elongate, reddish brown, with dark area around each posterior lateral eye and, another, horseshoe-shaped dark area encompassing the remaining eyes; abdomen narrow anteriorly, with conspicuous constriction behind its anterior one-third, marked by transverse white band; anterior part of abdomen colored like carapace; posterior two-thirds slaty gray; legs reddish brown, paling to amber distally; first pair of legs much larger and more powerful than others.

Female resembles male but markedly larger.

Habitat and Habits.—An adult male, found in early May, 1955, was running over a limestone slab, with a jerky, antlike gait. It was within two inches of a group of the common small brown ant, *Crematogaster* sp., which it strongly resembled in both size and appearance.

Genus Habrocestum Simon

In the small, chunky jumping spiders of this genus the cephalothorax is high and convex; the ocular quadrangle occupies about two-fifths of the length of the carapace and is narrower posteriorly than anteriorly. The third and fourth pairs of legs are longer than the first and second pairs. The retromarginal tooth of the chelicera is simple. The genus occurs throughout the tropics and into the Temperate Zones.

Habrocestum pulex (Hentz)

Flea Spider

Attus pulex Hentz, 1846, Jour. Boston Soc. Nat. Hist., vol. 5, p. 361; pl. 22, fig. 3.

Habrocestum pulex; Simon, 1901, Histoire Naturelle des Araignées, vol. 2(3), p. 661.

Saitis pulex; Secheffer, 1904 Industrialist (Kansas State Agr. Coll.), vol. 30, p. 6.

Identifications.—MHM, RLG.

Range.—Southeastern Canada and eastern United States in the Deciduous Forest Formation.

Description.—Female, length 4.7, carapace 2.4, abdomen 2.7, extended legs 10.5. Tan dorsally, mottled with black; abdomen has pair of large black spots little more than half way back from anterior end, and tan area behind them; both carapace and abdomen mostly dark on sides; dorsal surface of carapace densely covered with short white hairs and less abundant carmine red hairs; both carapace and abdomen have longer, black hairs; legs tan, with black annulations; carapace high and arched; abdomen ovate.

Male smaller on average, carapace orange-brown, black in cephalic region; small and faint scutum on dorsum; legs dark, except for tarsi, with indistinct fine lines.

Habitat and Habits.—This small spider is abundant along the hilltop outcrops of Oread Limestone but is scarce elsewhere on the area. Occasionally it has been found in leaf litter but characteristically it is found on bare rock surfaces. It is quick and active in its movements, progressing jerkily as it walks or runs, and often making long hops. Small ants, especially the abundant *Crematogaster*, are often preyed upon.

On June 18, 1957, a pair was courting on a flat rock. The male, with forelegs extended, would approach the female cautiously but she was aggressive and would dart at him with several successive lunges, following persistently, and he was able to escape only by darting backward agilely, with several sudden turns.

Genus *Habronattus* Cambridge

In the small chunky jumping spiders of this genus the cephalothorax is high, convex, and only a little longer than wide. The ocular quadrangle is wider than long and usually wider behind than in front; the small eyes are midway between those of the first and third rows. In order of length the legs are: 3, 1, 4, 2. In the males the legs of the first and third pairs have fringes of hairs and contrasting markings, which serve in courtship displays. The genus is confined to North America and Central America.

Habronattus coronatus (Hentz)

Attus coronatus Hentz, 1846, Jour. Boston Soc. Nat. Hist., vol. 5, p. 361; pl. 45, fig. 3.

Habronattus coronatus; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 198.

Identifications.—MHM, AB.

Range.—Recorded chiefly from the eastern United States, but also in Colorado, and southward in Mexico and the West Indies.

Description.—Female, length 5.5, carapace 2.2, abdomen 3.3, extended legs 11. Carapace reddish brown, darkening to almost black in cephalic region with thick coat of grayish hairs; abdomen oval, slightly less bulky than the

cephalothorax, heavily coated with yellowish gray hairs; large rounded mid-dorsal white spot on abdomen little more than two-thirds of distance from front to rear end; legs stout and short, light reddish brown, with numerous dark brown spines, and with grayish hairs.

Male markedly smaller and more brightly colored, having orange hairs on cephalic plate, heavy fringes of hairs on first leg.

Habronattus cf. sabulosus Peckham

Pellenes sabulosus Peckham, 1901, Bull. Wisconsin Nat. Hist. Soc., new series, vol. 1(4), p. 219.

Habronattus sabulosus; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 199.

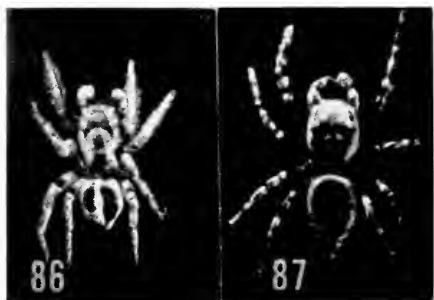


FIG. 86. *Habronattus cf. sabulosus*, male, $\times 2$.

FIG. 87. *Zygoballus bettini*, female, $\times 4$.

Identification.—WJG.

Range.—Southeastern United States.

Description. — Female, length 7.7, carapace 3.5, abdomen 4.2, extended legs 12. Appearance that of typical salticid; carapace rounded, posterior lateral eyes directed laterally; pair of dorso-lateral broad tan stripes on carapace and broken middorsal tan stripe on abdomen, legs banded with tan; otherwise black; male slightly smaller than female and having more distinct markings.

Habitat and Habits.—Several individuals of both sexes found in different years, all in grass near woodland edge in April and May.

Habronattus viridipes (Hentz)

Green-legged Jumping Spider

Attus viridipes Hentz, 1946, Jour. Boston Soc. Nat. Hist., vol. 5, p. 362; pl. 22, fig. 5.

Habronattus viridipes; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 201.

Identifications.—MHM, AB.

Range.—Throughout most of the United States.

Description.—Female, length 8.0, carapace 3.5, abdomen 4.5, extended legs 12.5. Carapace thickly coated in interocular quadrangle with silvery gray scalelike hairs, and with long, black anteriorly directed bristles; sides, and rear of middorsal area of carapace chestnut, with paler yellowish brown area in intervening space, which has shape of much thickened W; abdomen has pale yellowish-tan middorsal stripe with irregular borders, and with broader dark brown area on either side of it; sides of abdomen brown mottled with tan; legs reddish brown with numerous black bristles and with coating of pale scalelike hairs; anterior legs slightly iridescent.

Male markedly smaller, with brighter more sharply defined pattern.

Genus *Hentzia* Marx

In the small, flattened jumping spiders of this genus the ocular quadrangle occupies two-fifths of the length of the carapace, and is narrower in front than behind. The small eyes are midway between the eyes of the anterior and posterior rows. The abdomen is elongate. The first pair of legs is the longest; the remaining three pairs of legs are white and translucent. The genus is confined to southeastern Canada and the eastern half of the United States.

Hentzia ambigua (Walckenaer)

Long-jawed Jumping Spider

Attus ambiguus Walckenaer, 1837, Histoire Naturelle des Insectes Aptères, vol. 1, p. 467.

Wala palmarum; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 125.

Hentzia ambigua; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 201.

Identification.—AB.

Range.—Southeastern Canada and eastern United States in the Deciduous Forest Formation.

Description.—Male, length 6.0, carapace 2.5, abdomen 3.5, extended legs 12.5. Legs of first pair enlarged, powerful, dark brown; remaining legs pale amber; chelicerae greatly enlarged, protruding forward from body; anterior face of each chelicera flattened almost all in same plane, its surface slightly rugose; carapace and abdomen golden brown, with lateral zone of dense, white, scalelike hairs; fringe of orange hairs extended along ocular area in spaces between eyes; body shiny and iridescent (see Fig. 88).

Female slightly larger, with chelicerae scarcely protruding, colors duller, all legs pale and translucent, and with faint dusky chevrons on dorsum.

Habitat and Habits.—Several of these spiders were collected from sweepings of brome grass and coralberry, and others were seen climbing on the walls and ceiling of the porch. In Nebraska, Worley and Pickwell (1931:123) found them in forest shrubbery and about houses. Adults are found through most of the summer.

Hentzia mitrata (Hentz)

Mitre Jumping Spider

Attus mitratus Hentz, 1845, Jour. Boston Soc. Nat. Hist., vol. 5, p. 363; pl. 22, fig. 9.

Hentzia mitrata; Kaston, 1938, Bull. Connecticut Geol. and Nat. Hist. Surv., vol. 60, p. 195.

Identifications.—RLG, AB.

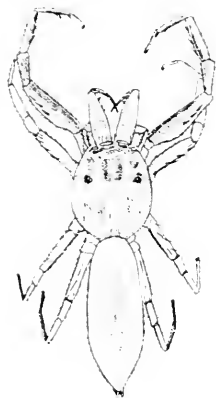


FIG. 88. *Hentzia ambigua*, male, $\times 6$.

Range.—Southeastern Canada and eastern United States in the Deciduous Forest Formation.

Description.—Female, length 6.0, carapace 2.4, abdomen 3.6, extended legs 10. Carapace reddish brown, with black areas around eyes; and having sparse coating of anteriorly directed, short black bristles; abdomen oval, much more bulky than cephalothorax; cream-colored, with four pairs of faint, pale brown chevrons; legs cream colored, with many heavy dark brown bristles.

Male slightly smaller than female, with white lateral bands on carapace.

Genus *Icius* Simon

In the small jumping spiders of this genus the body is flattened, with the sides of the carapace nearly parallel. The ocular quadrangle occupies less than half the length of the carapace, and is not quite so wide in front as behind. The small eyes are midway, or a little less, from the anterior row of eyes to the posterior row. The abdomen is elongate. In order of length the legs are first, fourth, second, third in males, and fourth, first, second, third in females. There are small iridescent scales on the body. The genus is cosmopolitan.

Icius hartii Emerton

Hart's Jumping Spider

Icius hartii Emerton, 1891, Trans. Connecticut Acad. Sci., vol. 8, p. 235, pl. 18, figs. 5-5d.

Identification.—AB.

Range.—United States chiefly in northern part, from New England west to Washington.

Description.—Male, length 4.0, carapace 1.9, abdomen 2.2, extended legs 10. Carapace and abdomen dark grayish brown with yellowish-gray pubescence, and metallic iridescent sheen; first leg remarkably large, heavy and powerful; fringe of bristles on median side of tibia of first leg, and extending onto distal part of patella; ocular quadrangle occupies half length of carapace.

Female averages slightly larger than male but otherwise resembles him.

Habitat and Habits.—Only one specimen has been found on the Reservation, and nothing was recorded concerning the circumstances of its capture, in the summer of 1952. Worley and Pickwell (1931:110) recorded this spider from the high plains in Nebraska, but Kaston (1948:490) stated that in Connecticut it was most commonly found running over the bark of trees, from ground level up to the highest branches.

Genus *Maevia* Koch

The cephalothorax is high, and its width is about two-thirds its length. The ocular quadrangle occupies from two-fifths to one-half the length of the carapace, and is slightly wider in front than behind. The small eyes are midway between the anterior and posterior eye rows. The first leg is slightly heavier than the others, and its tibia has four pairs of ventral spines. The genus occurs throughout the tropical regions of the World, and north into the Temperate Zone.

Maevia inclemens* (Walckenaer)*Black-bodied Jumping Spider**

Attus inclemens Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1, p. 465.

Maevia vittata; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 125.

Maevia inclemens; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 201.

Identifications.—MIIM, RLG, AB.

Range.—Recorded chiefly from the eastern United States; also from Colorado.

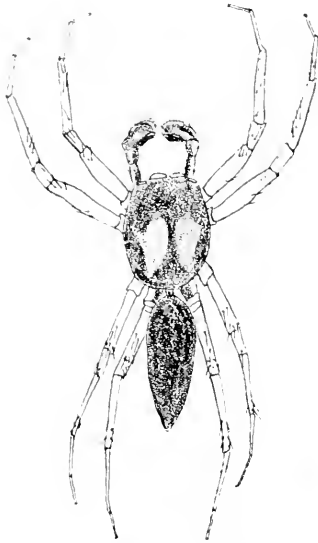


FIG. 89. *Maevia inclemens*, male, $\times 5$.



FIG. 90. *Maevia inclemens*, female, $\times 3$.

Description.—Female, length 8.5, carapace 3.0, abdomen 4.8, extended legs 14.5. Carapace cream-colored, with black in ocular area; numerous black hairs scattered over carapace, most numerous anteriorly; legs cream colored, having black spots on dorsal surfaces, and having many spines; dorsum having sublateral pair of brown stripes extending for its entire length, and series of irregular, dusky spots against cream-colored background; posterior portion of abdomen having series of chevronlike brown marks; venter immaculate cream-colored (see Fig. 90).

Male darker, averaging approximately three-fourths of female's length (see Fig. 89), more slender, with relatively longer legs.

Genus *Marpissa* Koch

The members of this genus are small- to medium-sized salticids having the carapace flattened, its width is approximately two-thirds of its length. In

the anterior row of eyes the medians are twice the diameter of the laterals, or slightly less; the ocular area is 40 per cent to 50 per cent of the length of the carapace; the first leg is two to three times as large as the remaining legs. In order of decreasing length the legs are: 1, 4, 3, 2 or 1, 4, 2, 3. On the first leg the tibia has four pairs of ventral spines, and the metatarsus two pairs. The genus occurs in North America, Central America, Europe, Asia, and North Africa.

Marpissa bina (Hentz)

Attus binus Hentz, 1846, Jour. Boston Soc. Nat. Hist., vol. 5, p. 352, pl. 21, fig. 2.

Marpissa binus; Banks, 1910, Bull. U. S. Nat. Mus., vol. 72, p. 73.

Identification.—WJG.

Range.—Eastern United States in the Deciduous Forest Formation.

Description.—Male, length 6.2, carapace 2.8, abdomen 3.4, extended legs 13.4. Carapace dark brown, nearly black, with purplish iridescence; first leg relatively large and powerful, dark brown; other legs dark brown basally paling to tan on distal segment; abdomen elliptical, approximately twice as long (not including spinnerets) as broad, dark brown, with purplish iridescence on dorsum, and with two pairs of elongate white spots on posterior half of dorsum; venter cream colored with mid-ventral dark area and dark streaks laterally.

Female resembles male, but larger, perhaps by one-third.

Habitat and Habits.—The only specimen obtained on the Reservation, an adult male, was swept from brome grass in August 1960. Worley and Pickwell (1931:108) in Nebraska recorded the species in high and low prairie and on gooseberry bushes.

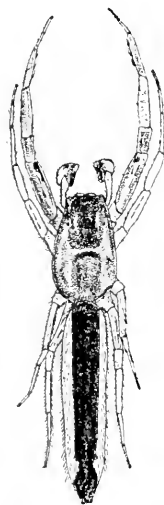


FIG. 91. *Marpissa pikei*, male, $\times 5$.

Marpissa pikei (Peckham and Peckham)

Long-bodied Jumping Spider

Illytia pikei Peckham and Peckham, 1888, Trans. Wisconsin Acad. Sci., vol. 7, p. 79, pl. 1, fig. 59; pl. 5, fig. 59; pl. 6, fig. 59a.

Illytia pikei; 1904, Scheffer, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 6.

Marpissa pikei; Barnes, 1958, Amer. Mus. Novit., no. 1867, p. 15.

Identification.—HSF.

Range.—Recorded chiefly in the eastern United States, but also in Texas, New Mexico, Arizona, and in Cuba.

Description.—Male, length, 8.0, carapace 2.7, abdomen 6.4, extended legs 9.4. Broad median stripe begins in anterior eye region, extending for length of carapace, and becoming more distinct on abdomen; eye region enclosed in black; remainder of carapace dull orange; first pair of legs also orange, other legs pale cream; abdomen has

broad black median stripe flanked by pale cream areas. (See Fig. 91.)

Female resembles male in size and otherwise except for duller pattern; carapace cream with orange shading and duskier gray markings forming thin median line along thoracic groove, with lines radiating from this axis; eyes enclosed in black area; gray stripes extending from posterior lateral eyes to posterior edge of carapace; abdomen pale cream-colored speckled with black; legs pale cream.

Habitat and Habits.—These peculiarly elongate little jumping spiders were found only in grassland and were obtained only by sweeping with a net. They are so well concealed that they escape attention ordinarily. Even when contents of a net were emptied into an enamel pan, these spiders were usually overlooked until they moved. The movements are exceedingly quick and jerky. The spiders were first obtained in 1953 in the patch of original blue-stem prairie in the northwest corner of the Reservation but in later years they were found in reestablished prairie and in brome grass meadows. When at rest the first and second pairs of legs are extended forward and the third and fourth pairs are extended posteriorly, so that the spider is not easily seen when clinging to a stem or blade of grass. The enlarged legs of the first pair are not used in walking, but are extended anteriorly and held clear of the ground.

Adults have been collected each month from May to October inclusive. In most samples there was also a smaller number of immature spiders. When sweepings from a net were emptied into a pan, the spiders were sometimes active in preying upon the other small arthropods concentrated there. They would approach with catlike stalking movements, and pounce upon a leaf hopper or a small crab spider. In August 1961, when many of these spiders were collected by sweeping tall grass, a male and female were placed together in a vial. Almost immediately courtship began, the male approaching the female with his front legs extended and waving, and within a few minutes mating was consummated.

Genus *Metacyrba* Cambridge

The members of this genus are medium-sized to small salticids in which the carapace is relatively flat, its width fifty per cent to eighty per cent of its length; the eyes of the anterior row are subcontiguous, with the median eyes about twice the diameter of the laterals or slightly less; the ocular area is wider than long and occupies 40 to 55 per cent of the carapace's length; the first pair of legs are at least twice as large as the remaining legs. The genus is cosmopolitan.

Metacryba undata (DeGeer)

Tree Trunk Spider

Aranca undata DeGeer, 1778, Mem. Hist. Insectes, vol. 7, p. 320, pl. 39, fig. 8.

Marptussa familiaris; Scheffer, 1904 Industrialist (Kansas State Agr. Coll.), vol. 30, p. 5.

Metacryba undata; Barnes, 1958, Amer. Mus. Novit., no. 1867, p. 36.

Identifications.—MHM, RLG, AB.

Range.—Eastern United States, and southward to Guatemala.

Description.—Female, length 7.5, carapace 3.2, abdomen 4.3, extended legs

17. Carapace reddish-brown with black connecting anterior and posterior eyes, and black stripe on lateral edge; carapace hairy with black tufts behind minute posterior median eyes and below posterior median eyes; abdomen gray-brown, with a broad middorsal whitish band having irregular scalloped edges; venter tan with median darker lanceolate mark; legs hairy, brown with traces of yellow, and with dusky markings; male somewhat smaller, otherwise resembling female (see Fig. 92).

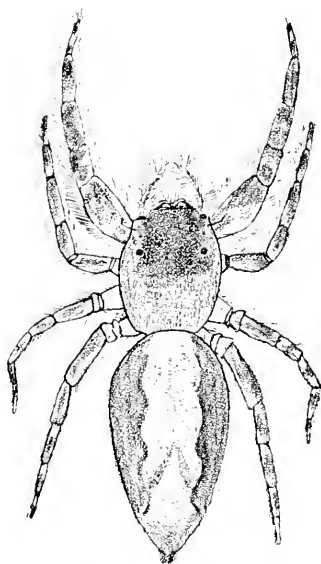


FIG. 92. *Metacryba undata*, female, $\times 4$.

Habitat and Habits.—These dull gray flat-bodied jumping spiders seem especially well adapted for living on the trunks of shag-bark hickory (*Carya ovata*) and have been seen most often in this situation, though they have also often been noted on the trunks of other kinds of trees, on fence posts, rocks, and the walls of buildings. I have often found these spiders or their cocoons,

by flaking off the loose bark of hickories. They form aggregations with many cocoons close together in a spot favorable for hibernating. For example on September 30, 1952, I found a group of 12 adults in separate cocoons within a space $2\frac{1}{2}$ inches square beneath loose bark of a dead elm. At the disturbance each spider broke free from its cocoon and scuttled away. Several times within the next few minutes as two spiders moving about happened to approach each other, the first one to sense the other's presence, would back away rapidly to avoid contact. One that was more aggressive, spread its front legs widely in what may have been courtship behavior, and advanced slowly as another retreated. In January,

1954, a penultimate was found hibernating in a cell of a mud-dauber's nest beneath a bridge. Individuals newly emerged from hibernation have been seen in the second week of April, and females distended with eggs have been recorded in late April. Often these spiders have been seen carrying their prey, including various dipterous insects, aphids, and spiders. Prey is captured by stealthy stalking in which the spider takes full advantage of its cryptic coloration. Besides various insects including moths, flies, leafhoppers, other spiders are sometimes eaten. On one occasion a *Metacryba* seen on the outside wall of the house was carrying the carcass of a somewhat smaller *Achacaranea*. On various other occasions *Metacryba* have been seen dead in the webs of *Achacaranea*.

Genus *Metaphidippus* Cambridge

In the small jumping spiders of this genus the cephalothorax is high and convex, with sides nearly parallel but bulging slightly in the cephalic region. The greatest width is about three-fourths the length. The ocular quadrangle occupies about two-fifths of the length of the carapace and is slightly wider behind than in front, with the small eyes midway between those of the anterior and posterior rows. The genus occurs in the Neotropical Region and north into the United States.

Metaphidippus castaneus (Hentz)

Chestnut Spider

Attus castaneus Hentz, 1845, Jour. Boston Soc. Nat. Hist., vol. 5, p. 353.

Metaphidippus castaneus; Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., vol. 29, p. 626.

Identification.—WJG.

Range.—Virginia and North Carolina west to Kansas.

Description.—Female, length 8.5, carapace 3.0, abdomen 5.5, extended legs 15. Carapace dark chestnut, nearly black; abdomen purplish gray dorsally with whitish crescent at anterior end and pale flecks arranged in oblique rows; legs of first pair much larger and more powerful than others, reddish chestnut, with broad black annulation on distal half of tibia, another on metatarsus, and incomplete one on patella; second, third and fourth legs dull yellow, marked with black, especially on femora; venter with alternate gray (3), and whitish (4) stripes medially, and mottled laterally with gray and white.

Metaphidippus galathea (Walckenaer)

Attus galathea Walckenaer, 1805, Tableau des Aranéides, p. 23.

Metaphidippus galathea; Chamberlin and Ivie, 1944, Univ. Utah Bull., Biol. Ser., vol. 8(5), p. 208.

Identifications.—MHM, AB.

Range.—Southeastern Canada throughout most of the United States and south into Mexico and the Antilles.

Description.—Male, length 3.6, carapace 1.9, abdomen 2.5, extended legs 10.3. Carapace dark chestnut, with black in ocular area; abdomen reddish brown above with white margin, and with five pairs of indistinct white spots; legs short and stout, brown, with darker and lighter annulations.

Female averages slightly larger, with duller pattern.

Metaphidippus protervus (Walckenaer)

Attus protervus Walckenaer, 1837, *Histoire Naturelle des Insectes Aptères*, vol. 1, p. 443.

Dendryphantus capitatus; Scheffer, 1904 *Industrialist* (Kansas State Agr. Coll.), vol. 30, p. 8.

Metaphidippus protervus; Chamberlin and Ivie, 1944, *Bull. Univ. Utah Biol. Ser.*, vol. 8(5), p. 204.

Identifications.—MHM, AB.

Range.—Throughout the United States but more common in the north than south (Kaston, 1953:125).

Description.—Female, length 4.1, carapace 1.6, abdomen 2.4, extended legs 6.8. Carapace reddish-brown, dusky along sides and black in eye region; abdomen light cream with brown markings—central longitudinal stripe with transverse extensions forming four pairs of large spots; venter cream, with broad median brown stripe extending from behind epigastric furrow posteriorly almost to spinnerets; legs pale cream, with darker reddish brown annulations and irregular spots; male averages somewhat smaller, with dorsum mostly dark, not showing distinct spots (see Fig. 93).



FIG. 93. *Metaphidippus protervus*, female, $\times 9$.

Habitat and Habits.—These minute jumping spiders are abundant throughout the summer in prairie and pasture habitat. They usually stay on the leaves of tall, broad leafed herbs, such as milkweed (*Asclepias kansana*), ironweed, compass plant, or in flower heads. Often they have been seen

carrying prey—leafhoppers and small dipterous insects.

Genus *Myrmarachne* MacLeay

In the small antlike jumping spiders of this genus the cephalothorax is long and narrow (only a little more than half as wide as long); the cervical groove is well defined and the cephalic area is much higher than the steeply sloping thoracic part of the carapace. The abdomen has a transverse depression in the male, and has a dorsal scutum in both sexes. In the female the tibia and tarsus of the palp are swollen. These spiders mimic ants in their behavior, and are often found associated with ants. The genus occurs throughout the tropics, and northward through the eastern half of the United States.

Myrmarachne hentzi Banks**Hentz's Ant Spider**

Myrmarachne hentzi Banks, 1913, Proc. Acad. Nat. Sci. Philadelphia, vol. 65, p. 188.

Identifications.—RLG, AB.

Range.—Eastern United States in the Deciduous Forest Formation, south to Brazil.

Description.—Female, length 6.0, carapace 2.5, abdomen 3.5, extended legs 12. Pale yellowish brown with, on the abdomen, a grayish suffusion and with no well-defined marking except that area immediately surrounding each eye is black; hair short, sparse, hardly noticeable; spider slender, having antlike appearance (see Fig. 94).

Male markedly smaller, 4.5 mm. long, of which one mm. consists of chelicerae protruding in front of carapace; pattern like that of female but darker.

Habitat and Habits.—An adult female captured on June 19, 1952, is the only individual of this species seen on the Reservation. She was in a nest made of a broad leaf of grass (*Panicum clandestinum*) rolled into a tube, approximately two feet above ground, amid dense herbaceous vegetation beneath a large walnut tree at the edge of the woods. The spider had been discovered in the same nest two days earlier, but on this occasion it dropped to the ground and escaped among grass stems.

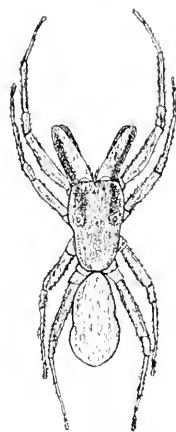


FIG. 94. *Myrmarachne hentzi*, female, $\times 4$.

Genus Paraphidippus Cambridge

The jumping spiders of this genus are of medium size, resemble those of the genus *Phidippus*, but are smaller, of more slender build, and less hairy. The length of the carapace is about $1\frac{1}{4}$ times the width. The small eyes are between one-third and one-half the distance from those of the anterior row to those of the posterior row. The third row of eyes is little wider than the first row. In males the chelicerae are large and powerful, projecting forward prominently from the anterior end of the body. Most of the species occur in Central America, but a few range northward into the United States, and occur throughout most of the country.

Paraphidippus aurantius (Lucas)**Changeable Spider**

Salticus aurantius Lucas, 1833, Ann. Soc. Ent. France, vol. 2, p. 480.

Paraphidippus aurantius; Chamberlin and Ivie, 1944, Bull. Univ. Utah, vol. 34, p. 205.

Identification.—WJG.

Range.—"Delaware and Illinois south to Florida and west to Arizona"

(Kaston, 1953:114); extends into Neotropical Region to Costa Rica and the West Indies.

Description.—Female, length 10, carapace 4.0, abdomen 6.0, extended legs 20. Carapace reddish brown, black with some iridescence in ocular area, and with broad dorsolateral yellowish brown band on each side formed by close-set scalelike hairs; carapace elsewhere sparsely clothed with short brown hairs, and with few longer black hairs anteriorly; abdomen brown, with patches of iridescent scales on dorsum and with three pairs of white spots; anterior one-third of abdomen rimmed with pale red area; two broad vertical bars of same color on each side of posterior half; legs yellowish brown, faintly annulated with darker brown, clothed with whitish hairs, and sparser black hairs and armed with black spines; entire ventral surface pale brown, with sparse whitish hairs (see Fig. 95).



FIG. 95. *Paraphidippus aurantius*, female, $\times 3$.

Habitat and Habits.—This species, less common than *P. marginatus*, has been found on shrubs and tall herbaceous vegetation in woodland and woodland edge situations.



FIG. 96. *Paraphidippus marginatus*, male, $\times 3$.

Paraphidippus marginatus (Walckenaer)

Attus marginatus Walckenaer, 1837, Histoire Naturelle des Insectes Aptères, vol. 1, p. 466.

Philacus militaris; Scheffer, 1905 Trans. Kansas Acad. Sci., vol. 19, p. 119.

Paraphidippus marginatus; Crosby and Bishop, 1928, Cornell Univ. Agric. Exp. Sta., Mem., vol. 101, p. 1072.

Identifications.—MHM, RLG, AB.

Range.—Southern Canada throughout most of the United States and southward into Mexico.

Description.—Male, length 7.0, carapace 2.8, abdomen 3.8, extended legs 20. Carapace dark chestnut, almost black in interocular region, with iridescent scutum and with longitudinal band of white hairs on each side; abdomen bronze, iridescent dorsally, with two pairs of faint white spots, with a white rim anteriorly, and with two large white spots laterally on posterior part; legs dark chestnut paling to light brown on terminal segments; chelicerae elongated and project anteriorly from carapace as seen from above (see Fig. 96).

Female, length 8.6, carapace 4.2, abdomen 4.4, extended legs 21.5. Carapace shiny light brown, darker in interocular region, with flattened iridescent hairs appearing pink and green; abdomen bronze with iridescent hairs dorsally, and with two pairs of white spots, with white anterior margin, and with two large transverse spots on sides posteriorly; legs shiny, light brown, paler on terminal segments, and with faint dark annulations.

Habitat and Habits.—These showy and medium-large spiders are fairly common on the Reservation, and have been found occasionally in grassland but more often in woodland or woodland edge. In late summer they have been obtained in numbers by sweeping tall weeds and other understory vegetation in dense mesic woodland on a north slope. This species occurs regularly, though in relatively small numbers compared with orbweavers and flower spiders in the mud nests of the wasp *Sceliphron*.

Paraphidippus pineus Kaston

Pine Jumping Spider

Paraphidippus pineus Kaston, 1945, Amer. Mus. Novit., no. 1290, p. 11, figs. 54-58.

Identification.—AB.

Range.—Poorly known; reaches Massachusetts, Connecticut and Kansas.

Description.—Male, length 6.3, carapace 3.0, abdomen 3.3, extended legs 18. Carapace black with pair of white stripes extending posteriorly for two-thirds of its length, just lateral to ocular area; few rusty hairs in anterior ocular area, and few iridescent scales in middorsal region of carapace; abdomen almost twice as long as broad, pointed posteriorly, with conspicuous scutum of iridescent scales; hairy, rimmed with white anteriorly, and having pair of white transverse marks near posterior end; and two pairs of white dots in its mid-portion; legs dark brown, almost black on proximal segments, paling to light brown terminally, having patches of scalelike white hairs; chelicerae relatively long, projecting anteriorly, with long sinuate fangs; female larger (length 9 mm.), more robust, with shorter legs and swollen abdomen, her color predominantly pale brown rather than black.

Genus Peckhamia Simon

In the small antlike jumping spiders of this genus the length of the cephalothorax is about twice the width and $2\frac{1}{2}$ times the height. The sides of the carapace are almost parallel; the ocular quadrangle is from half to three-fifths the length of the carapace, and is slightly narrower posteriorly than at its anterior end. The small eyes are much nearer to the anterior lateral eyes than to the rear eyes. The labium is as long as wide. There is a well defined cervical furrow behind the posterior pair of eyes, and there is a well developed constriction on the abdomen. The tibia of the first leg has three pairs of ventral spines. The genus occurs in the United States and the Neotropical Region.

Peckhamia americana (Peckham)

Peckham's Ant Spider

Synagles americana Peckham, 1892 Occas. Papers Nat. Hist. Soc. Wisconsin, vol. 2(1), p. 65.

Peckhamia americana; Simon, 1903 Hist. Naturelle des Araignées. Tome 2, fasc. 4, p. 868.

Identification.—WJG.

Range.—United States, chiefly in southern half; southward to Vera Cruz.

Description.—Male, length, 4.1, carapace 1.7, abdomen 2.3, extended legs 8.0. Anterior half of carapace dorsally covered with fine, iridescent scales; first pair of legs large and powerful; overall aspect remarkably antlike; abdomen constricted behind anterior one-fourth, and even enlarged posterior part narrower than anterior fourth; white hairs on thorax, especially in area of anterior eyes, between posterior lateral eyes, at margin of carapace above bases of second pair of legs, and ventrolaterally on abdominal constriction; portion of abdomen behind constriction shiny and slate colored.

Female resembles male in most respects but averages larger.

Habitat and Habits.—An adult male taken in July, 1960, was the only specimen found. It was in open oak woods on a north slope. In New York and Wisconsin the species has been found in forests. It is remarkable for its low reproductive potential; several observers have reported that there are only three or four eggs per sae produced by members of this genus but several sacs may be produced in the course of a season.

Genus Phidippus Koch

The members of this genus are medium to large stocky and hairy salticids. The posterior row of eyes is one and one-fourth times as wide as the anterior



FIG. 97. *Phidippus fraudulentus*, female, $\times 3$.

FIG. 98. *Phidippus whitmantii*, female, $\times 3$.

row. The small eyes are approximately one-third the distance from the anterior row to the posterior row of eyes. The cephalothorax is wide and bulging laterally, its width only a little less than its length. The males have prominent tufts of hair in the ocular region, and in many the chelicerae are more or less iridescent. The pattern is variable, but most species have a light band on the base of the abdomen, and paired light spots on the abdomen dorsally. The genus has many species, mostly in the United States and Mexico, but the range extends from southern Canada south to Brazil and Peru, with one species recorded from Japan and another from the Nicobar Islands.

Phidippus apacheanus Chamberlin and Gertsch

Apache Jumping Spider

Phidippus apacheanus Chamberlin and Gertsch, 1929, Jour. Ent. and Zool., vol. 23, p. 108.

Identification.—WJG.

Range.—Southwestern United States, northeast to Wisconsin.

Description.—Female, length 11.8, carapace 5.0, abdomen 6.8, extended legs 24. Large jet-black jumping spider having anterior three-fifths of dorsal side of carapace, and dorsal surface of abdomen (except for a broad middorsal band on posterior half) brilliant scarlet from coatings of close-set scalelike hairs; legs hairy with some long white hairs and scalelike hairs especially on palp, fewer on first legs, and relatively few on second leg, chelicerae greenish blue on anterior surface, deepening to indigo distally.

Habitat and Habits.—Few individuals were found in the area of my study, and all were in hot and dry situations—bare ground of an eroded field, on a gravel road, on a fence post, and on the outside wall of the old barn on the Rockefeller Tract. Another specimen was found in open woods, on a limestone slab of the hilltop ledge within a few yards of the northwest corner of the Reservation, on an adjoining farm. A rocky habitat, with loose boulders or slabs, in short-grass prairie or pasture seems to be the preferred habitat. Many of the spiders were found under such conditions on a farm four miles north of the Reservation in September, 1961, and in the same month, the species was found to be even more numerous at various localities in the Flint Hills, approximately 80 miles southwest.

Phidippus fraudulentus (Walckenaer)

Dotted Jumping Spider

Attus fraudulentus Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1, p. 442.

Phidippus fraudulentus; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 208.

Identifications.—RLG, AB.

Range.—Eastern United States.

Description.—Male, length 8.0, carapace 4.0, abdomen 4.0, extended legs 19. Dorsal coloration deep purplish brown, almost black on carapace, slightly paler on legs; abdomen having arc of white hairs on dorsal surface near anterior end; farther posteriorly dorsum densely clothed with red hairs except for median area; entire ventral surface, legs, and sides of carapace clothed with white hairs; hornlike tuft of black hairs anterior to posterior lateral eye on each side.

Female averaging slightly larger, lacking white bands on carapace, which is brown rather than black, and having duller pattern (see Fig. 97).

Phidippus pius Scheffer

Kansas Jumping Spider

Phidippus pius Scheffer, 1905, Trans. Kansas Acad. Sci., vol. 20, p. 123.

Identification.—WJG.

Range.—Kansas and adjoining states.

Description.—Male, length 8.0, carapace 3.5, abdomen 4.5, extended legs 22. Dorsal coloration on carapace and abdomen bright red, because of dense, short, flat, red hairs; median ocular area dark; pair of dark longitudinal bands on abdomen, each with two red spots in its posterior half; sparse black hairs over carapace and abdomen; legs light brown with abundant yellowish-brown hairs; sparse tuft of black hair between posterior median eyes and posterior laterals; ventral surface light brown; abdomen elliptical.

Female larger by perhaps one-fourth, with pattern resembling that of male, but with duller colors.

Habitat and Habits.—This relatively rare but brightly colored and conspicuous species was always found in xeric situations, chiefly on barren soil of eroded upland fields on the Reservation and Rockefeller Tract. Several were found on the outside wall of the barn, on the south side, at the Rockefeller Tract, and on nearby fence posts. The species was first recorded by Scheffer (1905:123) from the northern Flint Hills, in rocky grassland habitat.

Phidippus princeps (Peckham)

Attus princeps Peckham, 1883, Descriptions of new or little known spiders of the family Attidae from various parts of the United States. p. 18.

Phidippus princeps; Peckham, 1901, Trans. Wisconsin Acad. Sci. Arts and Letters, vol. 13(1), p. 288.

Identifications.—TBK, MHM, RLG.

Range.—Eastern United States.

Description.—Male, length 8.5, carapace 4.0, abdomen 4.5, extended legs 20. Cephalothorax and legs dark purplish brown, with fine grayish pubescence; abdomen rimmed with white anteriorly, orange red over remainder of dorsal surface because of dense covering of fine scalelike hairs; white hairs on dorsal surface of palp and on medial surface of first leg.

Female larger by perhaps one-fourth, having lighter color, with gray pubescence.

Habitat and Habits.—This is the least common species of the genus on the Reservation. It has been found chiefly in dry, fairly open woodland, in late April, May and June.

Phidippus putnami (Peckham)

Putnam's Jumping Spider

Attus putnamii Peckham, 1883, Descriptions of new or little known spiders of the family Attidae from various parts of North America, p. 1.

Phidippus putnamii, Peckham, 1888, Trans. Wisconsin Acad. Sci. Arts and Letters, vol. 7, p. 417.

Identification.—WJG.

Range.—Midwestern states including Ohio, Kentucky, Iowa and Kansas.

Description.—Male, length 7.0, carapace 3.5, abdomen 3.5, extended legs 17.5. Carapace dark chestnut, almost black, with large, middorsal, arrowhead-shaped white mark just behind level of posterior eyes, and with many pale, grayish brown hairs projecting anteriorly; white streak on each side behind and below small eye; prominent black hair tuft in front of posterior eye on each side; abdomen dark chestnut, almost black, with large central white spot and with four irregularly arranged pairs of smaller white spots, and with white border anteriorly; legs and pedipalps yellowish brown, abundantly clothed with white hairs, which, on tibiae of first legs, especially, form prominent tufts.

Habitat and Habits.—The only specimen seen was an adult male obtained on the gravel driveway of the Rockefeller Tract, in re-established prairie in August 1961.

Phidippus rimator Walckenaer

Red and Black Jumping Spider

Attus rimator Walckenaer, 1837, Histoire Naturelle des Insectes Apteres, vol. 1, pp. 446, 488.

Phidippus multiformis; Scheffer, 1906, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 124.

Identifications.—MHM, RLG, AB.

Range.—Throughout most of United States.

Description.—Male, length 9.0, carapace 4.0, abdomen 5.0, extended legs 25. Carapace deep purplish brown, almost black, and this color extends onto anterior end of abdomen; arc of white hairs dorsally on abdomen, short of its anterior end; farther posteriorly abdomen covered with bright red hairs except for bare middorsal area, colored like carapace; legs also dark purplish brown, but with faint annulations of lighter brown, clothed with black hairs; pedipalps densely covered with white hairs on dorsal surfaces; abdomen pear-shaped, bluntly pointed posteriorly, but little smaller than cephalothorax; anterior legs especially long and powerful; sternum and coxae slightly paler than carapace; venter having two faint dark stripes converging posteriorly (see Fig. 99).

Female approximately same size as male, but legs are stubbier, abdomen broader, more nearly flat, and less pointed behind; yellowish brown dorsally, with ocular area suffused with black and with irregular dark marks on ocular area, and with sparse covering on both body and legs of pale yellow hairs; faint dark annulations on legs.



FIG. 99. *Phidippus rimator*, male, $\times 3$.

Habitat and Habits.—This large and colorful jumping spider is characteristic of grassland habitats, and is abundant both in tall-grass prairie and in brome grass pastures. It is sometimes even more numerous in old fields having broad-leafed herbs such as sunflower and ironweed. The spiders are active and alert, and at the approach of a person, one will dart to the opposite side of a stem or leaf, concealing itself, and usually escaping attention. However, they can be obtained in numbers by sweep-

ing the vegetation with a net. In April and May most of those seen were penultimates. On many occasions in the latter half of July and in early August pairs have been found. In almost every instance the female was enclosed in a filmy cocoon and the male was beside it.

The prey includes a wide variety of insects, some nearly as large as the spiders themselves, including lepidopterous larvae, moths, butterflies, hemipterans, dipterans, and occasionally other spiders.

Phidippus variegatus (Lucas)

White-spotted Jumping Spider

Salticus variegatus Lucas, 1833, Ann. Soc. Ent. France, vol. 2, p. 478.

Attus audax; Hentz, 1844, Jour. Boston Soc. Nat. Hist., vol. 5, p. 199, pl. 17, figs. 6-7.

Phidippus morsitans; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 6.

Identifications.—TBK, MHM, RLG, AB.

Range.—Southeastern Canada and eastern United States west to Colorado, south into Cuba and Mexico.

Description.—Female, length 15.0, carapace 7.0, abdomen 8.0, extended legs 31. Body robust; dark reddish brown, almost black; body and legs hairy; chelicerae iridescent green; large white spot in center of dorsum; pair of well

separated smaller white spots between large spot and posterior end of abdomen (see Fig. 100 and outside of front cover).

Male similar in most respects but slightly less bulky, with legs relatively longer, and with fringe of white hairs on first leg.

Habitat and Habits.—This common large blackish jumping spider has been found in a wide range of habitat conditions. It requires exposed surfaces of wood, rock, or soil to prowl over, and niches or crevices for escape. It is most abundant in dry open woods, and, in grassland, in rocky situations, as where there are outcrops, rock piles, or stone walls. Usually it is numerous on the outside walls of buildings, and occasionally makes its way inside by way of cracks along the edges of windows or doors.

Some of these spiders may overwinter as adults, but most do so in the penultimate stage. Kaston (1948:483) has described hibernating aggregations of as many as 30 individuals. Each keeps to its own sac, a cottony web mass open at both ends. Eggs are laid in June and July. For nests, broad-leaved herbs such as ironweed (*Vernonia interior*) or milkweed (*Asclepias kansana*) often are used; the growing leaves are used as a protective covering, either by rolling one into a cylindrical shape, or by binding two or more leaves together. Inside the shelter thus formed, a thick cocoon encloses the eggs. On July 2, 1952, a female with her newly hatched brood of young was found inside the nest box attached to a mouse trap. On October 2, 1952, a cocoon was found beneath loose bark of an old red haw stump, and it contained an adult female and the sloughs of numerous spiderlings that were no longer present.

On May 30, 1953, courtship was observed; a male on a rock ledge with his front legs extended and twitching repeatedly sidled up to a larger female. The female was sluggish and unresponsive, but would back away or move off sideways, facing the male. From time to time when he came close, she would advance threateningly, driving him back. On May 30, 1961, a male placed in a container



FIG. 100. *Phidippus variegatus*, female, $\times 3$.

with a larger female courted her and mated, but later in the day she had killed and eaten him. On several other occasions when two adults of either sex were put together, the larger (usually a female) killed and ate the other. The demeanor was always menacing when one was aware of another's proximity. Finally, with a sudden lunge, one would catch the other unaware, sink its fangs into his body and soon kill and devour him.

The insect prey is often larger than the spider itself. A high proportion consists of flying insects, dipterans, lepidopterans and others, which are caught by speed and stealth. In stalking prey the spider's movements are swift, jerky and catlike. On numerous occasions it has been seen to miss. Once an adult female perched on a flat rock was seen to jump several inches high in an unsuccessful attempt to catch a dragonfly many times as large as the spider itself. On other occasions these spiders have been seen carrying dragonflies, moths, or butterflies of considerably greater size. Caterpillars and grasshoppers are important food sources. Other spiders also are frequently preyed upon. An adult female entered the laboratory building and there caught and killed a purse web spider (*Atypus*) only a little smaller, which was confined in a jar. Another time, one was seen dragging the body of a wolf spider (*Lycosa rabida*) nearly as large as itself. A large female jumping spider was noticed on the wall of the porch, beside the web of a house spider (*Achacaranca tepidariorum*). The jumping spider was poked with a stick and lunged forward momentarily entangling herself in the web, but broke free before the approaching house spider could further entangle her, then dropped to the floor and escaped in a crack. Several hours later, a jumping spider, presumably the same, was again beside the web, and was feeding on the body of the smaller *Achacaranca*.

On numerous other occasions remains of the jumping spiders have been found in the webs of the house spiders, which, despite their smaller size, seem to have the advantage when their webs are intact. This jumping spider is a favorite prey of certain lizards. Among 738 prey items of the five-lined skink from the Reservation, 334 were spiders, and of these *P. variegatus* was the most frequently represented, although many were not definitely identifiable. Of 456 prey items identified from fecal pellets of the collared lizard (*Crotaphytus collaris*), 38 were *P. variegatus* and 17 others identified merely as *Phidippus* probably represented this jumping spider mainly or entirely.

Phidippus whitmanii Peckham

Whitman's Jumping Spider

Phidippus whitmanii Peckham, 1909, Trans. Wisconsin Acad. Sci. Arts and Letters, vol. 16(1), pp. 383, 386, 394.

Identifications.—MHM, RLG, AB, WJG.

Range.—Southeastern Canada and New England states, west to Wisconsin and Kansas.

Description.—Female, length 13.0, carapace 5.0, abdomen 8.0, extended legs 23. Carapace black in ocular region; dark reddish-brown immediately behind posterior lateral eyes; darker laterally and posteriorly; dorsum light brown with horseshoe-shaped cream colored band beginning near base and running laterally and ventrally about half length of abdomen; indistinct lighter cream colored folium in center of dorsum; epigastric plate yellow with gray striations; venter finely spotted reddish brown with lighter yellowish color forming background; dark brown band underlining epigastric furrow and extending along sides to spinnerets forming elongate triangle with median stripe of same color extending from apex and not quite reaching base; legs reddish brown with femora darkest and almost black on anterior pair of legs (see Fig. 98).

Male averages somewhat smaller, mostly bright red dorsally, black in cephalic region, and with basal yellowish stripe on abdomen; heavy fringe of white hairs on first leg.

Habitat and Habits.—These large jumping spiders have been found chiefly in dry, open places, especially on broad-leaved herbs (ironweed, milkweed) in old pastures, but also on the side of a barn, and on fence posts. The species is not common and only a few individuals have been seen.

Genus Sassacus

The members of this genus are small, short-legged jumping spiders having the body covered with iridescent scales which give it a shiny metallic bluish, greenish or coppery appearance. The tibia of the first leg is armed with two or three pairs of spines. The width of the carapace is about five-sixths of the length, and the height about half the length. The ocular quadrangle is wider behind than in front, and occupies half the length of the cephalothorax. The small eyes are slightly closer to the anterior row than to the posterior. The genus occurs from the northern United States southward to Paraguay; the majority of species are in the Neotropical Region.

Sassacus papenhoei Peckham

Papenhoe's Jumping Spider

Sassacus papenhoei Peckham, 1895, Occas. Papers Nat. Hist. Soc. Wisconsin, vol. 2(3), p. 177.

Identification.—AB.

Range.—Tennessee and Ohio, west to the Pacific Coast, north to Wisconsin and Washington.

Description.—Female, length 5.0, carapace 2.2, abdomen 3.2, extended legs 7.0. Carapace dark, its anterior two-thirds covered dorsally with granular iridescent scutum; short white, flattened hairs on sides of carapace; abdomen slaty, rimmed with white (from band of dense flattened white hairs), with many iridescent hairs on the dorsal surface; legs dark reddish brown, with white hairs; palp coated with white hairs on its anterior surface.

Male smaller by at least one-fourth, lacking light bands on sides of abdomen.

Habitat and Habits.—These small, active jumping spiders were not common on the Reservation, but were found from time to time on broad-leaved weedy vegetation, such as milkweed and ironweed, in open situations in July and August.

Genus *Thiodina* Simon

The small compactly built jumping spiders of this genus resemble members of the genus *Habronattus* in most respects, but differ in having on each tibia of the first pair of legs, two pairs of bulbous setae, which are believed to have a sensory function. Members of the genus are found in North America and South America, chiefly in the tropics.

Thiodina iniquies (Walckenaer)

Pale Jumping Spider

Attus iniquies Walckenaer, 1837, *Histoire Naturelle des Insectes Aptères*, vol. 1, p. 438.

Thiodina sylvana; Scheffer, 1906, *Industrialist Trans. Kansas Acad. Sci.*, vol. 20, p. 125.

Thiodina iniquies; Chamberlin and Ivie, 1944, *Bull. Univ. Utah Biol. Ser.*, vol. 8(5), p. 216.

Identifications.—RLG, AB.

Range.—Southern New England, Iowa, Utah and California southward to Panama and the Antilles.

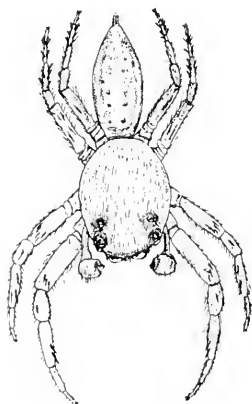


FIG. 101. *Thiodina iniquies*, male, $\times 4$.

Description.—Male, length 7.0, carapace 2.3, abdomen 4.5, extended legs 14. Carapace shiny dark brown with broad, rectangular tan mark behind anterior median eyes, narrowing to half this width between posterior lateral eyes, continuing posteriorly to edge of thoracic slope; pair of broad lateral bands of same tan color from behind anterior lateral eyes to below posterior lateral eyes; abdomen yellow with broad median black stripe, traces of yellow extending to spinnerets, which are also black; lateral areas of dorsum predominantly black lined with yellow; venter black with lateral yellow stripes; chelicerae black except for distal portions and fangs, which are brown; first and second pairs of legs black; third and fourth pairs

having bases of femora yellow (see Fig. 101).

Thiodina puerpera Hentz

Hentz's Jumping Spider

Attus puerperus Hentz, 1846, Jour. Boston Soc. Nat. Hist., vol. 5, p. 360.

Thiodina puerpera; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30(24), p. 8.

Thiodina puerpera; Peckham, 1909, Trans. Wisconsin Acad. Sci. Arts and Letters, vol. 16, p. 449.

Identification.—WJG.

Range.—Southern and central United States, north to Kansas and Pennsylvania.

Description.—Male, length 7.0, carapace 3.0, abdomen 4.0, extended legs 13.5. Carapace dark brown, almost black, with median patch of white scales between posterior eyes, larger patch lateral to each of small eyes; fringe of brown bristles above anterior eyes; abdomen heavily coated with brown hairs, dark olive with broad middorsal band mottled with black, bordered on each side by white band; legs dark brown, nearly black, except for pale tan trochanter and proximal half of femur anteriorly; female relatively large (length 10) and pale—light yellowish tan, with ocular area opaque, whitish, having each eye rimmed with black; carapace narrowly rimmed with black.

Genus Tutelina Simon

The small iridescent jumping spiders of this genus are much like members of the genus *Icius* in most respects, but have the sternum truncated in front and narrower at its anterior end than is the adjacent base of the labium. The chelicerae are relatively small, and the fangs are short, especially in females. The genus occurs in North America and South America, and in the Old World Tropics.

Tutelina elegans (Hentz)

Iridescent Jumping Spider

Attus elegans Hentz, 1846, Jour. Boston Soc. Nat. Hist., vol. 5, p. 353, pl. 21, fig. 6.

Tutelina elegans; Simon, 1901, Histoire Naturelle des Araignées, vol. 2, pp. 544, 549, 554.

Identification.—AB.

Range.—Southeastern Canada; United States, chiefly in the eastern part, in the Deciduous Forest Formation, but also in the state of Washington; Kurile Islands in northeastern Asia.

Description.—Immature female, length 4.6, carapace 1.8, abdomen 2.8, extended legs 7.0. Carapace dark chestnut, abdomen plumbeous; many scale-like iridescent green or purple hairs over entire dorsal surface; femora of first pair of legs black; legs otherwise pale brownish yellow with dark dorsal line on each for most of its length; similar lines on prolateral and retrolateral aspects of tibiae and metatarsi of fourth pair of legs; palps pale yellow.

Male smaller by perhaps one-fourth, having cephalic tufts of hair, and lacking white basal band on abdomen; fringe and black spots on first tibia.

Habitat and Habits.—Peckham and Peckham (1909:500) stated that in Wisconsin this species matures about July 10, and from ten days to two weeks thereafter it is abundant and conspicuous. They collected many from hazel bushes. Worley and Pickwell (1931:109) in Nebraska found this spider on coralberry bushes, and under dung on the high plains.

Genus *Zygoballus* Peckham

In the small jumping spiders of this genus the cephalothorax is high with a steep declivity a little behind the posterior eyes. The ocular quadrangle occupies three-fifths of the length of the carapace, and is wider behind—approximately $1\frac{1}{2}$ times as wide as long. The small eyes are much nearer to the anterior row than to the posterior. The first leg is the heaviest and has three pairs of spines on the ventral surface of its tibia. The chelicerae are long and slender and in the male a peculiar stout process is developed on the lower surface near the retrolateral edge. The genus is mainly neotropical in its distribution.

Zygoballus bettini Peckham

Hammer-jawed Spider

Zygoballus bettini Peckham, 1888, Trans. Wisconsin Acad. Sci., Arts and Letters, vol. 7, p. 89, pl. 1, figs. 68-69a; pl. 6, figs. 68-68b.

Identifications.—RLG, AB.

Range.—Eastern United States in the Deciduous Forest Formation.

Description.—Male, length 5.0, carapace 2.5, abdomen 2.5, extended legs 14. Carapace dark brown; abdomen slightly paler, with band of whitish hairs around its anterior end, and with faint pale chevronlike markings on its dorsal surface; cephalothorax high and arched; abdomen flattened, and somewhat pointed posteriorly, with spinnerets protruding; both carapace and abdomen highly iridescent, with fine, sparse, amber-colored hairs on their dorsal surfaces; chelicerae, palps, and coxae and femora of first pair of legs chestnut; tarsi of first pair of legs mostly black; legs of second, third and fourth pairs pale amber, with faint suggestions of dark annulations; chelicerae much enlarged; projecting anteriorly from cephalic region; pair of remarkably large teeth on each chelicera, one on each margin of fang furrow (see Fig. 87).

Female larger by perhaps one-third, lacking iridescence, and abdomen has white transverse band.

Habitat and Habits.—This spider is moderately common on the area. It has been found throughout most of the summer, chiefly in mesic forest habitat and at woodland edge. Most of those seen have been swept from foliage of shrubby vegetation such as dogwood, elderberry or coralberry; others have been found climbing on the screen or ceiling of the Reservation residence, and still others were climbing on the outside wall of the house after the adjacent lawn had been sprinkled. In September, 1961, when a

patch of dayflower was cleared, at the southwest corner of my residence in the shade of a large elm, a sizable colony of these spiders was found, and many were collected as they moved over the walls of the building. In Nebraska, Worley and Pickwell (1931:124) likewise found the species on foliage and shrubbery in deep deciduous forest. Kaston (1948:497) found it under stones and bark, and in sweeping from tall grass and bushes. He noted that it overwinters in the adult state.

Family DICTYNIDAE Cambridge

Mesh Web Spinners

These small cribellate spiders have eight eyes in two rows, or there may be only six with the anterior median eyes lacking. The chelicera has boss and scopula, and the margins of the fang furrows have teeth. The labium is free. There are few trichobothria on the tibiae and metatarsi and none on the tarsi, which have three claws. The sternum extends posteriorly between the hind coxae. The cribellum is undivided.

KEY TO THE SPECIES OF THE FAMILY DICTYNIDAE OF THE RESERVATION

1. Abdomen having pale, broad middorsal band, with irregular edges, but lacking paired black spots on its posterior half 2
- 1'. Abdomen lacking pale middorsal band with irregular edges, but having four pairs of black spots on its posterior half 3
2. Length usually more than 2 mm. in males and 2.7 mm. in females.
Dictyna sublata, p. 192
- 2'. Length usually less than 2 mm. in males and 2.7 mm. in females.
Dictyna foliacea, p. 191
3. Length more than 2.5 mm. *Dictyna volucripes*, p. 192
- 3'. Length less than 2.0 mm. *Dictyna formidolosa*, p. 192

Genus *Dictyna* Sundevall

A well marked cervical groove divides the cephalic region from the thoracic region. The abdomen is oval, and almost white, with a pattern of brown and yellow areas. The entire body is clothed in long hairs, which are longest on the carapace. The calanistrum occupies the middle half to two-thirds of the length of metatarsus on the fourth leg. In males the chelicerae are long, concave in front and bowed outward near the middle. The genus is cosmopolitan.

Dictyna foliacea (Hentz)

Theridion foliaceum Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 277, pl. 9, fig. 14.

Dictyna foliacea; Kaston, 1948, Banks, 1895, Jour. New York Ent. Soc., vol. 3, p. 83.

Identification.—WJG.

Range.—Most of United States, southeastern Canada, and Mexico.

Description.—Female, length 1.7, carapace .7, abdomen 1.0, extended legs

4.4. Carapace pale brown, yellowish in cephalic region; abdomen brownish gray with broad middorsal yellowish band extending from posterior end almost to anterior, deeply notched on each side near anterior end; legs pale yellow.

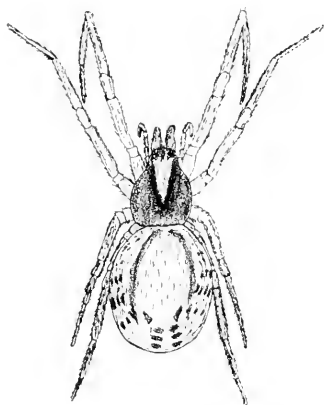


FIG. 102. *Dictyna formidolosa*, female, $\times 17$.

Dictyna formidolosa Gertsch and Ivie

Dictyna armata Banks, 1911, Proc. Acad. Nat. Sci., Philadelphia, vol. 63, p. 444.

Dictyna formidolosa; Gertsch and Ivie, 1936, Amer. Mus. Novit., no. 858, p. 10.

Identification.—AB.

Range.—United States.

Description.—Female, length 1.8, carapace .7, abdomen 1.2, extended legs 4.2. Carapace brown, palest in cephalic region, darker laterally, having narrow dark brown stripe; abdomen cream colored, with median dark stripe extending from base about one-third of distance to posterior end, and series of dark spots near posterior end; abdomen having many stout bristles; venter uniformly cream colored; legs pale translucent yellow; male averaging slightly smaller (see Fig. 102).

Dictyna sublata (Hentz)

Theridion sublatum Hentz, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 276.

Dictyna sublata; Marx, 1883, Araneina in Howard (L.O.). A list of the invertebrate fauna of South Carolina. Charleston, p. 23.

Identification.—WJG.

Range.—Southern Canada, entire United States, and south into Mexico.

Description.—Male, length 2.7, carapace 1.4, abdomen 1.2, extended legs 7.5. Carapace reddish brown; abdomen oval, smaller than cephalothorax, slaty; legs pale amber; eyes small and almost uniformly spaced, with both rows recurved, anterior more strongly; cymbium brown, broader than cephalic portion of carapace.

Dictyna volucris Keyserling

Dictyna volucris Keyserling, 1881, Verh. Zool.-bot. Ges. Wien, vol. 31, p. 286; pl. 11, fig. 11.

Dictyna volucris; Scheffer, 1904, Industrialist (Kansas State Agr. Coll.), vol. 30, p. 2.

Identifications.—RLG, AB.

Range.—Probably almost the entire United States; southeastern Canada.

Description.—Female, length 3.0, carapace 1.7, abdomen 1.7, extended legs 7.5. Carapace dark reddish brown, dull or with faint lustrous sheen; short dense forward-directed yellowish hairs in transverse arc following cervical groove; tuft of similar hairs on clypeus, with few extending into ocular region; abdomen oval, only little larger than carapace, well clothed with covering of dense, short, flattened hairs, which give it characteristic pattern;

hairs are yellowish on sides of abdomen, which has wide irregular middorsal band beginning short distance back from anterior end and extends for remaining length, expanding onto sides posteriorly; within this band, little anterior to its mid-point are pair of small, oblique, oval hairless areas appearing as spots; legs brown, with paler hairs.

Male averages smaller by approximately one-third.

Habitat and Habits.—This is one of the most abundant species of spiders on the Reservation, but is so small that but for its web it would usually be overlooked. The web is in a vertical plane on the head of an old dry stalk of grass or a weed. False red-top (*Triodia flarens*), sweet clover (*Melilotus alba*) and ragweed (*Ambrosia artemisiifolia*) provide favorite sites for the webs. The spider has a more closely woven retreat in a sheltered situation near the center of the web. Prey consists of minute Diptera and other small insects that become entangled in the web. Comstock (1948:285) stated that in mid-summer, the pairing season, the male lives with the female in her web, and that in autumn the female shares her web with her brood of hatchlings.

Family ULOBORIDAE Cambridge

Feather-legged Spiders

In the spiders of this small family a cribellum is present and is undivided. There are eight homogeneous dark eyes arranged in two well-separated rows. A boss may be present or lacking on the chelicera, and the fang margins usually have several teeth but may have only one tooth. The labium is free. Trichobothria are present in a row on the femur, one or two on the tibia, and on the metatarsus, and none on the tarsus. There are three tarsal claws. The metatarsus of the fourth leg is compressed, concave above, and bears several spines on the ventral side of its distal third. The feather-legged spiders are peculiar in lacking venom glands. The prey is captured in a web of the orb type, peculiar in that it often is incomplete consisting merely of sectors of orbs.

Genus *Uloborus* Latreille

The two rows of eyes are approximately the same length, with eyes subequal, and are strongly recurved. The first pair of legs are much larger and more robust than the other legs, and they bear, on the distal halves of their tibiae the characteristic featherlike tuft of hairs. The genus is cosmopolitan.

Uloborus glomosus (Walckenaer)

Feather-footed Spider

Epeira glomosa Walckenaer, 1841, Histoire Naturelle des Insectes Apteres, vol. 2, p. 143.

Uloborus plumipes; Scheffer, 1906, Trans. Kansas Acad. Sci., vol. 20, p. 121.

Uloborus glomosus; Chamberlin and Ivie, 1944, Bull. Univ. Utah Biol. Ser., vol. 8(5), p. 34.

Identifications.—RLG. AB.

Range.—Southeastern Canada and eastern United States, southward to South America.

Description.—Female, length 5.5, carapace 1.6, abdomen 3.7, extended legs 15. Carapace brown, with coating of anteriorly directed gray hairs; abdomen several times bulk of cephalothorax, high anteriorly and has pair of prominent dorsal tubercles one-third distance back from anterior end; abdomen cream colored with irregular brown markings in middorsal area and on sides; legs brown, faintly banded with darker and lighter areas; first leg relatively large and robust, bears prominent brush of hairs on distal two-thirds (see Fig. 103).



FIG. 103. *Uloborus glomosus*, female, $\times 3$.

Male slightly more than half female's length, lacking elevations on abdomen and featherlike cluster of hairs on tibia of first leg.

Habitat and Habits.—This spider is uncommon on the area and has been found only in mesic woodland on heavily shaded north slopes. Several young have been found in their webs in cavities in limestone outcrops, and beneath the edges of logs. Such well protected sites are preferred, but on August 29, 1961, a female was found in a more open situation, in a web four feet above the ground. Kaston (1948:513) recorded egg sacs with 60, 30 and 30 eggs respectively.

Family AMAUROBIIDAE Thorrell

Hackled Band Weavers

These cribellate spiders have eight homogeneous eyes in two rows. Chelicerae are powerful provided with boss and scopula and have both fang margins toothed. The labium is free. The legs are spiny and lack scopulae. The tarsi have only one row of trichobothriae, and there are three tarsal claws. The cribellum is divided into two parts.

Genus *Titanoeca* Thorell

The anterior median eyes are a little smaller than the posterior medians. The tarsal trichobothria are short, little longer than the ordinary hairs, and not increasing in length toward distal part of tarsus. The calamistrum occupies almost the entire length of the fourth metatarsus. The genus is mainly holarctic but with a few species extending into the tropics.

Titanoeca americana Emerton

Titanoeca americana Emerton. 1888, Trans. Connecticut Acad. Sci., vol. 7, p. 453, pl. 10, figs. 4, 4d.

Amaurobius americanus: Scheffer, 1904, Industrialist (Kansas State Agr. Coll.) vol. 30, p. 2.

Identifications.—RLG, AB.

Range.—Southern Canada throughout much of the United States except the southern part.

Description.—Female, length 6.0, carapace 2.7, abdomen 3.5, extended legs 12. Carapace shiny, chestnut brown, its posterior half widened; legs shiny dark brown becoming paler distally; abdomen dull gray much more bulky than cephalothorax; palp and facial region hairy; carapace and abdomen almost bare and legs only sparsely haired; chelicerae chestnut, darker than carapace; calamistrum composed of single row of bristles extending for almost entire length of metatarsus of fourth leg (see Fig. 104).

Male resembles female except that tibia and metatarsus of first leg are much elongated and have numerous short spines ventrally.



FIG. 104. *Titanoecca americana*, female,
× 5.

Habitat and Habits.—Only three specimens have been collected, of which two were immature. An adult female was obtained on June 1, 1960. Kaston (1948:518) cited an instance of large numbers of these spiders living together in rotting logs in the Chicago area. Kaston also reported finding the spiders under stones and leaves in Con-

necticut. He found egg sacs in July, and counted 78, 58 and 44 eggs in three.

DISCUSSION AND CONCLUSIONS

Through intermittent collecting over a thirteen-year period, a total of 192 species of spiders of 21 families and 114 genera were obtained on the 750 acres of the combined University of Kansas Natural History Reservation and Rockefeller Experimental Tract. The area of the study is approximately half deciduous forest and half grassland (or with a cover of herbaceous vegetation), and is situated in the region of the ecotone between the original forest of the eastern United States and the grasslands of the Great Plains. Of the 192 species of spiders present, 119 are judged to be most characteristic of a deciduous forest habitat whereas 56 are kinds associated with grassland; for the remaining 18 species nothing is known of habitat preferences. The relative numbers of kinds associated with woodland and with grassland are in line with the ratios determined for other groups of animals on the same area (Fitch and McGregor, 1956:101). The forest, with its abundant shelter and stratified vegetation, has a larger number of ecological

niches than the grassland. In this region the prairie is a fire subclimax, and, in general, is inhabited only by those animals having specialized adaptations to escape or resist incineration when the dry grass is burned off in late fall or spring.

Of the various habitat types, leaf litter in woodland is the most productive of spiders, both in numbers of species and numbers of individuals. The 55 species found in leaf litter include all of the 13 erigonids; also 11 theridiids, 11 clubionids, ten species each of salticids and lycosids, seven thomisids, six gnaphosids, five argiopids, four agelenids, four linyphiids, and one each of pisaurid and amaurobiid.

Twenty-nine species are considered arboreal or partly so. These kinds spin their webs high in trees, or else forage over foliage or tree trunks. They include ten salticids, eight argiopids, seven thomisids, two clubionids, one gnaphosid and one anyphaenid. Many other spiders, including various grass living species, are scansorial to some extent, but climb chiefly on low vegetation within a few feet of the ground. Fifteen species are considered burrowers. Some of these are to be found beneath massive sunken rocks. The burrowers include seven lycosids, four gnaphosids, two atypids, and one each of ctenizid and agelenid.

Among the 116 genera known from the area, each of 78 has only one representative there, each of 18 has two species, each of 14 has three, each of two has four, one (*Castianeira*) has five, another (*Lycosa*) has seven, and each of two others (*Phidippus* and *Xysticus*) has eight. The many instances of congeneric species existing together afford abundant material for the study of overlapping ecological niches and the effects of resultant competition on the species involved. No such instances have been thoroughly studied on the area as yet, but seemingly all degrees of overlapping and competition exist. Divergence in size, microhabitat, and seasonal schedule all reduce competition and permit closely related species to thrive in sympatric situations. In the genus *Lycosa*, for instance, the seven abundant species form a graded series from the largest, *L. carolinensis*, which is as much as 35 millimeters long, to the smallest, *L. avara*, as little as six millimeters in length. Furthermore, three species are characteristic of woodland, three are usually found in open situations, and one is found in either type although perhaps it is more partial to woodland. In the orbweaver genus *Micrathena*, the three abundant species occur together in the same habitat, but *M. sagittata* usually makes its webs within a few inches of the ground whereas *M. gracilis* and *M. mitrata*

usually have their webs several feet above the ground. Although these last two species coexist in the same stratum, *gracilis* is markedly larger, and competition is doubtless further reduced by the fact that *gracilis* matures weeks earlier than *mitrata*. In each of the genera *Ceraticelus*, *Metaphidippus*, *Misumenops*, *Paraphidippus*, *Phidippus*, *Phrurotimpus*, *Pirata*, *Schizocosa*, and *Xysticus* there are abundant species much alike in size and habitat preferences, which probably compete with each other more or less intensively with resultant unilateral or bilateral effects on population densities and local distributions.

The ecological effect of any species depends to a large extent on its population density. Relatively few of the species of spiders found were seen in large numbers and for many species only one record or a few were obtained. However, most of these seemingly rare species probably are present in substantial numbers, still not revealed because of my failure to make intensive search at the proper time and place. In general spiders are most in evidence in late summer and autumn, when the majority of species are present as adults. Earlier in the growing season most of the species are much more numerous, but, because of their relatively small size, they usually escape attention. There are several species of large spiders that are so abundant as to become obtrusive in late summer when they have matured. These species include: *Agelenopsis naevia*, *Argiope aurantia*, *A. trifasciata*, *Lycosa aspersionis*, *L. rabida* and *Neoscona benjamina*. All of these regularly attain concentrations of many hundreds per acre under favorable circumstances. In general, the largest kinds of insects are their prey. Several medium-sized spiders including *Coriarachne versicolor*, *Eustala anastera*, *Lycosa gulosa*, *Micrathena gracilis*, *M. sagittata*, *Misumenoides formosipes*, *Phidippus rimator*, *P. variegatus*, *Schizocosa crassipes*, *S. saltatrix*, *Thanatus formicinus*, *Tetragnatha laboriosa*, and *Verrucosa arenata*, are in general even more abundant than those of the first named group, but attract less attention because they are not so conspicuous. In a still smaller size range, spiders usually less than five millimeters long, which are extremely abundant, are *Frontinella pyramitela*, *Mangora ornata*, *Metaphidippus protervus*, *Micrathena mitrata*, *Pardosa milvina*, *Phrurotimpus alarius* and *Singa pratensis*. Because of their small size these spiders are so inconspicuous that they usually escape the attention of the casual observer. But a few strokes of a net in tall grass or in woodland herbage may catch dozens of the small orb-weavers; the bowl and doily spider is so abundant that one small

bush may bear the webs of many individuals, and careful examination of damp soil at the edge of a pond may disclose many small wolf spiders on a square foot. Most abundant of all are the truly minute spiders, especially the erigonids. A handful of leaf litter or sod usually will be found to contain some minute spiders if careful examination is made. Naturally, many of these small spiders are juveniles. The larger argiopids, lycosids, pisaurids, thomisids and salticids are tremendously prolific, laying hundreds or even thousands of eggs at one time, whereas some of the smaller spiders are comparatively conservative in their reproduction, producing relatively larger young in smaller numbers.

The lists of families, genera, and species of spiders compiled from my study in northeastern Kansas provide a basis for comparison of the fauna with those of other regions. In the United States the fauna of southern New England has had by far the most intensive study, and the accumulated information gained by several generations of araneologists has been set forth in Kaston's (1945) excellent monograph of the Spiders of Connecticut. Through the recent work of Levi and Field (1954) and Levi, Levi and Kaspar (1958), Wisconsin is one of the best known states araneologically, but doubtless the list for the state is still much less complete than that for Connecticut. Chamberlin's and Ivie's (1944) Spiders of the Georgia Region of North America has made fairly well known the abundant spider fauna of the southeastern United States. No study comparable to any of these three has been made in the western half of the country. Worley's (1932) publication on the spiders of Washington is much less complete, and perhaps includes less than one third of the species actually occurring in the state. Although the lists compiled in these studies, and in my own, are all incomplete in varying degrees, they permit comparisons of sorts. The following table shows extent of correspondence on the area of my study with the known faunas of the other four areas mentioned. Connecticut, Georgia, and Wisconsin all show a considerable degree of correspondence with the Kansas fauna, as all are in the Deciduous Forest Formation. Resemblance is strongest in the case of Connecticut, which, though more remote than either Wisconsin or Georgia, is nearest the latitude of northeastern Kansas. There is much less correspondence between the faunas of Kansas and Washington.

TABLE 1. EXTENT OF CORRESPONDENCE OF THE SPIDER FAUNA OF THE RESERVATION IN NORTHEASTERN KANSAS WITH FAUNAS OF OTHER AREAS IN THE UNITED STATES WHERE INTENSIVE STUDIES HAVE BEEN MADE.

	Families	Genera	Species
<i>Washington:</i>			
Total number recorded	17	83	173
Per cent occurring on Reservation	82	65	46
Per cent of Reservation spiders occurring in state	67	47	14
<i>Wisconsin:</i>			
Total number recorded	25	195	438
Per cent occurring on Reservation	68	46	28
Per cent of Reservation spiders occurring in state	81	76	64
<i>Connecticut:</i>			
Total number recorded	26	220	585
Per cent occurring on Reservation	73	47	25
Per cent of Reservation spiders occurring in state	94	90	77
<i>Georgia:</i>			
Total number recorded	33	172	497
Per cent occurring on Reservation	55	57	26
Per cent of Reservation spiders occurring in state	86	84	68

LITERATURE CITED

- BANKS, N.
1910. Catalogue of Nearctic spiders. Bull. U. S. Nat. Mus., 72:i-iii, 1-80.
- BANKS, N., NEWPORT, N. M., AND BIRD, R. D.
1932. Oklahoma spiders. Publ. Univ. Oklahoma Biol. Surv., 4 (1):7-49.
- BARNES, R. D.
1958. North American jumping spiders of the subfamily Marpissinae (Araneae, Salticidae). Amer. Mus. Novit., no. 1867:1-50.
- BARROWS, W. M.
1919. The taxonomic position of *Mysmena bulbifera* (*Glenognatha bulbifera*) (Banks), with some observations on its habits. Ohio Jour. Sci., 19:210-212.
- BISHOP, S. C.
1924. A revision of the Pisauridae of the United States. New York State Mus. Bull., 252:1-140.
- BONNET, P.
1945. Bibliographia Araneorum. Analyse methodique de toute la literature araneologique jusqu'en 1939. Toulouse (L'Imprimerie Douladoure). Tome 1, xvii + 832 pp., pls. 1-28.
1955. *Ibid.* Tome 2 (pt. 1), 918 pp.
- BRAUN, E. L.
1950. Deciduous forests of eastern North America. The Blakiston Co., Philadelphia, xiv + 596 pp.
- CHAMBERLIN, R. V. AND IVIE, W.
1944. Spiders of the Georgia region of North America. Bull. Univ. Utah Biol. Ser., 8 (5):1-267.
- CHICKERING, A. M.
1939. Anyphaenidae and Clubionidae of Michigan. Papers Michigan Acad. Sci. for 1938, 28:49-84.
- COMSTOCK, J. H.
1940. The spider book. Revised and edited by W. J. Gertsch. New York, 729 pp.
- CROSBY, C. R., AND BISHOP, C. R.
1936. Acreonatic spiders with a description of a new species. Jour. New York Ent. Soc., 44:43-49.
- FITCH, H. S.
1952. The University of Kansas Natural History Reservation. Univ. Kansas Mus. Nat. Hist., Misc. Publ., 4:1-38, 4 pls., 3 figs.
1958. Home ranges, territories and seasonal movements in vertebrates of the Natural History Reservation. Univ. Kansas Publ. Mus. Nat. Hist., 11 (3):63-326.
1960. Antecology of the copperhead. Univ. Kansas Publ. Mus. Nat. Hist., 13 (4):85-288, pls. 13-20, 26 figs.
- FITCH, H. S., AND MCGREGOR, R. L.
1956. The forest habitat of the University of Kansas Natural History Reservation. Univ. Kansas Publ. Mus. Nat. Hist., 10 (3):77-127.
- GERTSCH, W. J.
1934. Notes on American Lycosidae. Amer. Mus. Novit., 693:1-25, 49 figs.
1939. A revision of the typical crab spiders (Misumeninae) north of Mexico. Bull. Amer. Mus. Nat. Hist., 76:277-442.
1949. American spiders. D. Van Nostrand Co., Inc., Princeton, N. J., xiv + 285 pp., 32 pls.
1953. The spider genera *Xysticus*, *Coriarachne*, and *Oxyptila* (Thomisidae, Misumeninae) in North America. Bull. Amer. Mus. Nat. Hist., 102 (4):417-482.

1958. The spider genus *Loxosceles* in North America, Central America, and the West Indies. Amer. Mus. Novit., 1907, 46 pp.
- KASTON, B. J.
1948. Spiders of Connecticut. Connecticut State Geol. and Nat. Hist. Surv., Bull. 70, 874 pp., 144 pls.
1953. How to know the spiders. Wm. C. Brown Co., Dubuque, Iowa. vi + 220 pp., 552 figs.
- LEONARD, A. B., AND GOBLE, C. R.
1952. Mollusca of the University of Kansas Natural History Reservation. Univ. Kansas Sci. Bull. 34:1013-1053, 3 pls.
- LEVI, H. W.
1955. The spider genera *Coressa* and *Achacarama* in America north of Mexico (Araneae, Theridiidae). Amer. Mus. Novit., 1718, 33 pp.
- 1957a. The spider genera *Enoplognatha*, *Theridion*, and *Paidisca* in America north of Mexico (Araneae, Theridiidae). Bull. Amer. Mus. Nat. Hist., 112 (1):1-123, 141 figs., 41 maps.
- 1957b. The spider genera *Crustulina* and *Steatoda* in North America, Central America and the West Indies (Araneae, Theridiidae). Bull. Mus. Comp. Zool., 117 (3):367-435, 156 figs., 19 maps.
1959. Problems in the spider genus *Steatoda* (Theridiidae). System. Zool., 8:107-116, 20 figs.
- LEVI, H. W., AND FIELD, H. M.
1954. The spiders of Wisconsin. Amer. Midl. Nat., 51:440-467.
- LEVI, H. W., LEVI, L. R., AND KASPAR, J. L.
1958. Harvestmen and spiders of Wisconsin: additional species and notes. Wisconsin Acad. Sci. Arts and Letters, 47:43-52.
- LOWRIE, D. C.
1942. The ecology of the spiders of the xeric dunelands in the Chicago area. Bull. Chicago Acad. Sci., 6:161-189.
- MACADYEN, A.
1957. Animal ecology, aims and methods. Sir Isaac Pitman and Sons, London, xv + 264 pp.
- PACKARD, R. L.
1956. The tree squirrels of Kansas: ecology and economic importance. Univ. Kansas Mus. Nat. Hist. Misc. Publ., 11:1-67, 2 pls., 11 figs.
- PECKHAM, C. W., AND PECKHAM, E. G.
1909. Revision of the Attidae of North America. Trans. Wisconsin Acad. Sci., 16:693-748.
- PETRUSKEVITCH, A.
1911. A synonymic index-catalogue of spiders of North, Central and South America with all adjacent islands, Greenland, Bermuda, West Indies, Tierra Del Fuego, Galapagos, etc. Bull. Amer. Mus. Nat. Hist., 24:1-809.
1933. An inquiry into the natural classification of spiders based on a study of their internal anatomy. Trans. Connecticut Acad. Sci., 31:299-389.
1946. Fossil spiders in the collection of the American Museum of Natural History. Amer. Mus. Novit., 1328:1-36, 80 figs.
1952. Principles of classification as illustrated by studies of Arachnida. System. Zool., 1 (1):1-19.
- SCHEFFER, T. H.
1904. A preliminary list of Kansas spiders. Industrialist (Kansas State Agr. Coll.), 30:371-386.
1905. Additions to the list of Kansas spiders. Industrialist (Kansas State Agr. Coll.), 31:435-444.

1905. List of spiders in the entomological collection of the Kansas State University. Kansas Univ. Sci. Bull., 3 (3):117-120.
1906. Additions to the list of Kansas Arachnida. Trans. Kansas Acad. Sci., 20:121-130.
- SHELFORD, V. E.
1945. The relative merits of the life zone and biome concepts. Wilson Bull., 57:248-252, 1 map.
- WALCKENAER, C. A.
- 1837-1841. Histoire Naturelle des Insectes Apteres. Paris. Tome I (1837), 680 pp.; Tome II (1841), 548 pp.
- WORLEY, L. G.
1932. The spiders of Washington. Univ. Washington Publ. Biol., 1 (1): 1-63.
- WORLEY, L. G., AND PICKWELL, G. B.
1931. The spiders of Nebraska. Univ. Nebraska Studies. 27:I-127.

Transmitted, June 24, 1963.



University of Kansas Museum of Natural History, Miscellaneous Publications

Institutional libraries interested in publications exchange may obtain this series by addressing the Exchange Librarian, University of Kansas, Lawrence, Kansas.

Requests of individuals are handled instead by the Museum of Natural History, University of Kansas, Lawrence, Kansas. There is no provision for sale of this series either by the Library or the Museum. However, when individuals request copies from the Museum, the amount indicated below should be included for the purpose of defraying some of the costs of producing, wrapping and mailing.

Nos. 6, 12, 17 and 27 obtainable only from the Arctic Institute.

- *1. The Museum of Natural History, the University of Kansas. By E. R. Hall and Ann Murray. Pp. 1-16, illustrated. January 5, 1946.
2. Handbook of amphibians and reptiles of Kansas. By Hobart M. Smith. Pp. 1-336, 233 figures in text. September 12, 1950.
- *3. In memoriam, Charles Dean Burkner, 1870-1948. By E. Raymond Hall. Pp. 1-11, 1 figure in text. December 15, 1951.
- *4. The University of Kansas, Natural History Reservation. By Henry S. Fitch. Pp. 1-58, 4 plates, 3 figures in text. February 20, 1952.
5. Prairie chickens of Kansas. By Maurice F. Baker. Pp. 1-68, 1 plates, 15 figures in text. March 10, 1953.
6. The barren ground caribou of Keewatin. By Francis Harper. Pp. 1-163, 28 figures, October 21, 1955. Copies, paperbound, \$1.50 postpaid from the Arctic Institute of North America, 1530 P Street, NW, Washington 5, D. C.
7. Handbook of mammals of Kansas. By E. Raymond Hall. Pp. 1-303, illustrated. December 13, 1955. Paperbound, \$1.50 postpaid.
8. Mammals of northern Alaska, on the arctic slope. By James W. Bee and E. Raymond Hall. Pp. 1-309, frontispiece colored, 1 plates, 127 figures in text. March 10, 1956. Paperbound, \$1.00 postpaid.
9. Handbook of amphibians and reptiles of Kansas. 2nd [revised] edition. By Hobart M. Smith. Pp. 1-356, 253 figures in text. April 20, 1956. Paperbound, \$1.50 postpaid (cloth \$1.00).
- *10. The raccoon in Kansas. By Howard J. Stains. Pp. 1-76, 4 plates, 11 figures in text. July 6, 1956.
- *11. The tree squirrels of Kansas. By Robert L. Packard. Pp. 1-67, 2 plates, 10 figures in text. August 20, 1956.
12. The mammals of Keewatin. By Francis Harper. Pp. 1-91, 6 plates, 8 figures in text, 1 map. October 26, 1956. Copies, paperbound, 75 cents postpaid from the Arctic Institute of North America, 1530 P Street, NW, Washington 5, D. C.
- *13. Museum of Natural History . . . University of Kansas. By Roy R. Moore and E. R. Hall. [An unpagcd, illustrated "flier," 11½ in. x 8½ in., printed on both sides, and folded twice.] June 1, 1957.
- *14. Vernacular names for North American mammals north of Mexico. By E. Raymond Hall, Sydney Anderson, J. Knox Jones, Jr., and Robert L. Packard. Pp. 1-16. June 19, 1957.
15. The ecology of bobwhites in south-central Kansas. By Thane S. Robinson. Pp. 1-81, 2 plates, 11 figures in text. September 6, 1957.
- *16. Natural history of the prairie dog in Kansas. By Ronald E. Smith. Pp. 1-36, 4 plates, 9 figures in text. June 17, 1958.
17. Birds of the Ungava Peninsula. By Francis Harper. Pp. 1-171, 6 plates, 26 figures in text. October 15, 1958. Copies, paperbound, \$2.00 postpaid from the Arctic Institute of North America, 1530 P Street, NW, Washington 5, D. C.
18. Furbearers in Kansas: A guide to trapping. By Howard J. Stains and Rollin H. Baker. Pp. 1-100, 2 plates, 13 figures in text. November 19, 1958. Paperbound, 50 cents postpaid.
- *19. Natural History Museum. By Roy R. Moore and E. R. Hall. [An unpagcd, illustrated "flier," 14½ in. x 8½ in., printed on both sides, and folded twice.] May 29, 1959.

(Continued on outside of back cover)

20. Handbook of gastropods in Kansas. By A. Byron Leonard. Pp. 1-224, plates 1-11, 87 figures in text. November 2, 1959. Paperbound, \$1.00 (cloth \$2.00) postpaid.
21. Management of channel catfish in Kansas. By Jackson Davis. Pp. 1-56, 8 figures in text. November 2, 1959.
22. Hand-list of the birds of Kansas. By Richard F. Johnston. Pp. 1-6 [folded twice]. May 7, 1960.
23. Directory to the bird-life of Kansas. By Richard F. Johnston. Pp. 1-69, 1 figure in text. August 31, 1960.
24. Natural History Museum. By Roy R. Moore and E. R. Hall. [An unpagged, illustrated "flier," 14½ in. x 8½ in., printed on both sides, and folded twice.] October 19, 1960.
25. Guide to the Panorama of North American Mammals. By E. Raymond Hall, *et al.* Pp. 1-31, silhouettes in black and white of Panorama, life-zones, and taped commentary for each zone. December 15, 1960.
26. Beaver in Kansas. By F. Robert Henderson. Pp. 1-85, illustrated. December 16, 1960.
27. Land and fresh-water mammals of the Ungava Peninsula. By Francis Harper. Pp. 1-178, plates 1-8, 3 figures in text. August 11, 1961. Paperbound, \$2.00 postpaid from the Arctic Institute of North America, 1530 P. Street, NW, Washington 5, D. C.
28. Handbook of unionid mussels in Kansas. By Harold D. Murray and A. Byron Leonard. Pp. 1-184, 45 plates, 42 figures. May 10, 1962. Paperbound, \$1.00 postpaid.
29. Farm ponds in Douglas County, Kansas. By Claude E. Hastings and Frank B. Cross. Pp. 1-21. May 17, 1962.
30. Collecting and preparing study specimens of vertebrates. By E. Raymond Hall. Pp. 1-46, 34 figures. May 21, 1962. Paperbound, 50 cents postpaid.
31. Natural History Museum. By Roy R. Moore and E. R. Hall. [An unpagged, illustrated "flier," 14½ in. x 8½ in., printed on both sides, and folded twice.] June 1, 1962.
32. The Bobwhite in Kansas. By Gary Packard. Pp. 1-12, illustrated. November 16, 1962.
33. Spiders of the University of Kansas Natural History Reservation and Rockefeller Experimental Tract. By Henry S. Fitch. Pp. 1-202, 104 figs. December 20, 1963. Paperbound, \$1.00 postpaid.

* Out of print.

