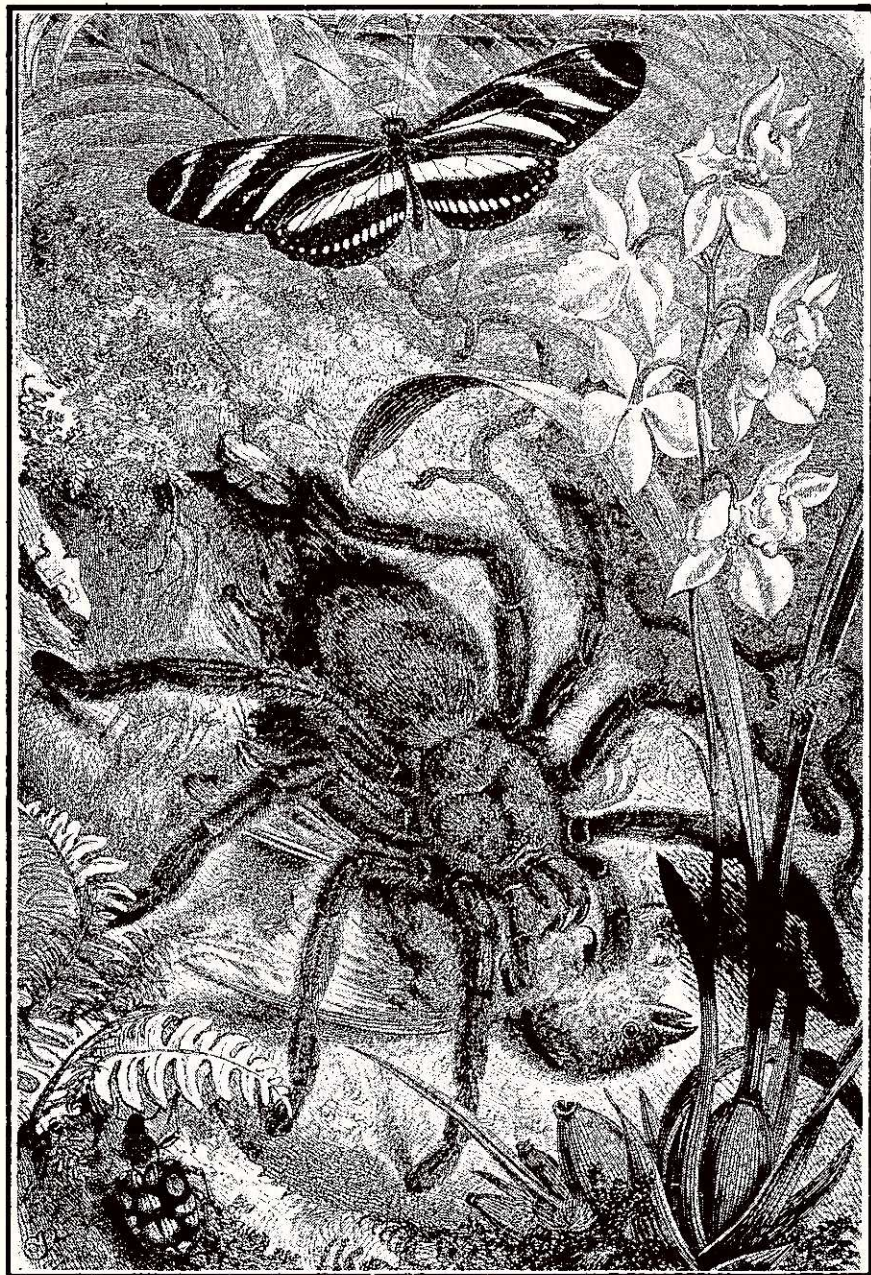


# American Arachnology

*The Newsletter of the American Arachnological Society*



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## AMERICAN ARACHNOLOGY #24

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AMERICAN ARACHNOLOGY is the newsletter of the American Arachnological Society and is sent only to society members. For information on membership, write Dr. Norman Platnick, Membership Secretary, American Arachnological Society, Department of Entomology, The American Museum of Natural History, New York, NY 10024, USA. Members of the Society also receive the JOURNAL OF ARACHNOLOGY three times a year.

Correspondence, submissions and requests for back issues of AMERICAN ARACHNOLOGY should be directed to the editor, William A. Shear, Biology Department, Hampden-Sydney College, Hampden-Sydney, VA 23943, USA.

Notice of a change of address should be sent only to the Membership Secretary (see above). To do otherwise merely delays the change; all mailing for the Society is done from a list maintained by the Membership Secretary.

# Society News

JIM CARICO, Chairman of the Nominations and Elections Committee reports the following election results: For President-elect: SUSAN REICHERT. For Director: MICHAEL ROBINSON. For Treasurer, NORMAN HORNER. The change in the by-laws, article 1, section 3, was agreed to.

Article VIII of the AAS Constitution states that the principal office of the Society is in Los Angeles County, California. As this is no longer true, this article will be deleted from the constitution and Article IX will be renumbered as VIII.

## 1982 Meetings: Places And And Times

The Western Meeting of the AMERICAN ARACHNOLOGICAL SOCIETY will be held on the campus of Doane College, Crete, Nebraska, July 28th to 30th. BILL RAPP will be the host and has planned two days of papers and a day of field trips to nearby grassland areas. Bill will be sending out a flier early next year with details.

The Eastern Meeting will take place at Hampden-Sydney College, Hampden-Sydney, Virginia, June 18-21, and will be organized by BILL SHEAR. Present plans call for a week-long course in Arachnology, emphasizing spiders, to precede the meetings. No college-level biology background will be needed to benefit from the course. Again, details will be made available early in 1982.

The next International Meeting will be held in 1984 in Panama, the first to be held outside the United States. Hosts will be MIKE and BARBARA ROBINSON and DIOMEDES QUINTERO.

## Research Requests

ANDY PENNIMAN (Department of Zoology, Ohio State University, Columbus, OH 43210) is still interested in obtaining specimens of Scotinella (a.k.a. Phrurolithus and Phruronellus, Clubionidae) for a taxonomic study.

JÜRGEN PÖHLMANN (Albrechtstrasse 113, 1000 Berlin 42) wants living specimens of the following theraphosid species for a projected behavioral study: Avicularia avicularia, Grammostola mollicoma, G. iheringi, G. pulcripes, G. aceton, Lasiadora Klugi, Xenesthis spp., Eurypelma spp., Aphonopelma spp., Brachypelma smithi, Dugesiella hentzi, Psalmopoeus spp., Theraphosa blondi, Pamphobeteus roseus, Megaphobema robusta, Eupalaestrus tenuitarsus and E. tarsi-crassus. North American correspondents are warned that the Post Offices of the United States and Canada may consider "tarantulas" to be venomous animals and so prohibit them from the mails. Also, please see the item in this newsletter on the AMERICAN TARANTULA SOCIETY.

# Books New And Old

A new printing of the Spiders of Connecticut by B. J. Kaston, with about 146 additional pages of revisionary material, will be ready for distribution about mid-October. Total number of pages 1020, with 161 plates. Copies are obtainable from Publication Sales, Department of Environmental Protection, State Office Building Room 555, Hartford, Conn. 06115. Payment of \$25 must accompany the order. Make check or money order payable to the Department of Environmental Protection. Connecticut residents must add the sales tax of 7½%.

PECKHAMIA, the journal/newsletter of the PECKHAM SOCIETY, an informal organization dedicated to research in the biology of jumping spiders (Salticidae), has recently resumed publication, with Volume 2, Number 1, issued in December of 1980. G. B. EDWARDS is editor of the newsletter, which costs \$1.50 per number. Submissions of articles from authors in the USA should be sent to DAVID RICHMAN, Department of Entomology and Nematology, 3103 McCarty Hall, University of Florida, Gainesville, FL 32611, while those from authors in other countries should be sent to BRUCE GUTLER, 1747 Eustis Street, St. Paul, MN 55113. Manuscripts must be in English; authors may be required to pay the costs of half-tone or color illustrations. Material submitted should be in the PECKHAMIA format and offset-ready.

The current issue contains an obituary of ELIZABETH GIFFORD PECKHAM (d. 1940) and seven articles on jumping spider biology.

In its current sale catalog (effective until December 31, 1981) Harvard University Press is offering PETER WEYGOLDT's classic book, "The Biology of Pseudoscorpions" for only \$2.50. Orders must be on the special form included in the catalog, so begin by requesting the catalog from Harvard University Press, 79 Garden Street, Cambridge, MA 02138.

## American Tarantula Society: Report and Opinion

At the Knoxville meeting, Society members were made aware of the existence of the AMERICAN TARANTULA SOCIETY, an organization of persons interested in "tarantulas" as pets. Pet shops, particularly those in major urban areas or near university campuses, now offer theraphosid spiders for sale at prices ranging from \$35.00 to \$200.00, usually depending on the attractive coloration of the species offered. Most of the animals are imported from Mexico, Central America, South America or the West Indies, while some come from the southwestern United States. There is reason for concern over this traffic. First, the taxonomy of the Theraphosidae is very poorly known; many of the species imported are undescribed ones or are not identifiable from the available literature. Despite the long paper by Chamberlin (1940, Bull. Univ. Utah, Biol. Ser. 5(8): 39 pp) which lists 25 species from the southwestern United States and parts of Mexico, the status of many names remains unclear. Secondly, as a consequence of this lack of knowledge, and in the usual absence of any detailed information on the place of origin of spiders offered for sale, it is not possible to ascertain if a given individual is a member of a potentially endangered species or not. In addition, some few Theraphosidae from the West Indies and northern South Africa are suspected of being venomous, and may represent a health hazard. At the meeting, some members expressed concern over the deaths of many theraphosids due to improper handling, and feared that indiscriminate collecting for a commercial market could lead to the extinction of species even before the most rudimentary scientific studies could be carried out in the field.

Commercial collecting is not the same as collecting done for scientific work, or by an individual for his own education or amusement. Commercial collectors focus intensely and indiscriminately on all desirable material, plant or animal, within a given region, and an unscrupulous minority has already done incalculable damage serving American fanciers of orchids, bromeliads, cacti, tropical birds, reptiles, and fish, to say nothing of unusual small mammals (ocelots, jaguarundis, etc.) generally quite unsuitable as pets.

Pet fanciers are in part responsible for the activities of commercial collectors, because they create the market these persons serve. I hope that members of the AMERICAN TARANTULA SOCIETY will take this responsibility seriously and investigate the conditions under which their pets are captured, imported, and offered for sale. By so doing they would perform a service to science and to the animals themselves. Likewise, members of AAS in the southwestern United States, Mexico, Central and South America, and the West Indies, should contact state and national authorities to familiarize themselves with whatever regulations may exist that could be employed to control the traffic in tarantulas and make sure the spiders are not indiscriminately collected and are given humane treatment.

BOB SNETSINGER (Dept. of Entomology, Pennsylvania State University, University Park, PA 16802) is in contact with the officers of ATS, and I suggest that your concern be expressed through him. By cooperating with ATS members and making our expertise available to them, we can work together to make sure irreparable damage is not done.

# Report On The Knoxville Meeting

The International Meeting of the AMERICAN ARACHNOLOGICAL SOCIETY was held at the University of Tennessee, Knoxville, from August 5th to 8th. More than 120 persons attended.

The efficient conference staff of the University of Tennessee handled the registration in a friendly and speedy manner, and the accommodations at Humes Hall were clean and comfortable. The meeting got under way Wednesday morning with a paper session in the Shiloh Room of the Student Center. Papers on behavior, systematics and ecology were read, with breaks for lunch and coffee, until 5:30 P.M., when the group moved out to the home of host SUSAN REICHERT and her husband, MAC POST, for barbecue and conversation on the lawn, followed by a session of arachnological films in an outdoor "walk-in" theater. The audience was raucous but appreciative.

Thursday was occupied by a symposium organized by BILL SHEAR on "Spider webs and spider behavior," with participation by MITCH MASTERS, TONY JANETOS, SUSAN REICHERT, FRED COYLE, JON CODDINGTON, YAEL LUBIN, MARK STOWE, JIM CARICO, BILL EBERHARD and GEORGE UETZ. A paper by BILL TIETJEN was read by AL CADY. This was followed by a paper session lasting until after 6:00 P.M., moderated by F. G. BARTH.

The Business Meeting was capably conducted by outgoing President HERB LEVI, despite the late and sometimes unruly arrivals of officers and members. Thursday evening's social featured a Bluegrass band, square dancing, and the vocalizations of GEORGE UETZ and AL CADY. These guys are definitely headed for the big time.

Friday morning's symposium was organized by MATT GREENSTONE. The subject was "Spider predation: optimal foraging and prey population suppression," and participating were TONY JANETOS, Z. B. GALECKA, A. KAJAK, J. UCHMANSKI, DOUGLASS MORSE, CADER OLIVE, SUSAN REICHERT, GEORGE UETZ, J. LUCZAK, E. DABROWSKA-PROT., FADEL MANSOUR, WILL WHITCOMB and MATT GREENSTONE. There is a strong possibility that both symposia from this meeting will be published as separate volumes. The quality of the papers was extremely high. PETER GABBUTT then moderated a paper session that filled out Friday afternoon. In addition to the many papers read, the coffee room featured poster presentations of other research.

After a splendid dinner at the Faculty Club, menaced but not dampened by a nearby thunderstorm, B. J. KASTON presented a keynote address on "The History of Arachnology," filled with amusing anecdotes about the great arachnologists of the past. Following KASTON's speech, WILLIS GERTSCH was surprised by the presentation of the proof sheets of a volume of papers in honor of his 75th birthday, to appear as a Bulletin of the American Museum of Natural History. The festschrift was organized by NORMAN PLATNICK, who managed to keep it a secret from Willis until the presentation. Prizes were given for the best student papers to JON CODDINGTON for his symposium presentation on "Web architecture in ray spiders and some related families" and to GAIL STRATTON for her paper, "Behavioral genetics of a reproductive isolating mechanism." In this connection, I want to say that the most encouraging thing about the meeting was the uniform high quality of the papers given by graduate and undergraduate students--the judges awarding the prizes had a difficult task before them! This augurs well for the future of arachnology.

Field trips were organized to the Smoky Mountain National Park and the Cumberland Plateau for Saturday and Sunday.

Again, many thanks to SUSAN REICHERT for a memorable meeting, and to her small army of UT "redshirts" who took care of every detail.

# Abstracts Of Papers From From Knoxville

SYMPOSIUM: WEBS AND BEHAVIOR

William Shear, Organizer

CARICO, James E.  
WEB REMOVAL PATTERNS IN ORB-WEAVING SPIDERS  
Department of Biology  
Lynchburg College

Web removal, a long-ignored but important part of the behavioral repertoire of orb-weaving spiders, is discussed. Two principal patterns are described. First is the "slow pattern" in which usually 3-5 sectors are removed each time the spider moves from the hub to the periphery. This activity, which resembles a pass of a "snow-plough", and is repeated several times, leaves the frame lines intact and simultaneously puts the first new radii in place. The second, or "quick pattern", resembles the raising of a "window shade" when the spider cuts the lower frame threads and collapses the entire web upwards against the bridge. The bridge, with the collapsed web, is then removed leaving, at most, a "Y-shaped" pattern of drag-lines that may be used as the basis for the next web. Other patterns that occur in unusual webs are also discussed.

The cyclic nature of web building in orb-weavers is described and emphasized with web removal as an essential component. It is therefore important that descriptions of web construction should also include a description of the removal phase to complete our knowledge of this important and interesting behavior in orb-weaving spiders.

CODDINGTON, Jonathan  
WEB ARCHITECTURE IN RAY SPIDERS AND RELATED ARANEOID TAXA  
Department of Zoology  
Harvard University

Changes in the architecture of theridiosomatid orb-webs suggest a formal definition of an orb-web to be used in other araneoid families. Behavioral evidence for interfamilial relationships is evaluated.

COYLE, Frederick A.  
THE ROLE OF SILK IN PREY CAPTURE BY NON-ARANEOMORPH SPIDERS  
Western Carolina University

A literature review and some new observations on the prey capture behavior and silk constructs of non-araneomorph spiders (Liphistiidae and Mygalomorphae) reveal that nearly all their prey are captured at or close to the entrance of a tubular silk retreat and that portions or extensions of this retreat often help to detect and locate prey by extending the range of substrate vibration receptors located on the pedipalps and legs.

Trap doors, which serve primarily for protection, are plesiomorphic within the Liphistiidae, Ctenizidae, Migidae, and Barychelidae. The loss of trap doors, by several taxa within some of these groups, the evolution of double-door strategies in the Migidae, Actinopodidae, and Barychelidae, and the attachment of prey detection devices to the entrance rim are more easily understood in light of experimental evidence that trap doors reduce prey capture effectiveness. The presentation of substrate vibration stimuli to capture-ready antrodiaetid spiders revealed a significantly greater ( $P < .05$ ) prey capture effectiveness (as measured by the percent of stimuli resulting in accurate strikes) for the collar door spider, Antrodiaetus unicolor, than for Aliatypus trap door spiders. The propensity to strike and the strike accuracy are significantly lower ( $P < .01$ ) for Aliatypus than for A. unicolor at the dorsal sector of the entrance where the trap door is hinged, but not at the ventral sector. Apparently Aliatypus is genetically programmed to be very reluctant to strike at substrate vibrations near the hinge because the hinge decreases the chance that a strike will be successful.

Extensions of the spider's prey-sensing area by extending the entrance rim or by attaching pieces of litter or radiating silk lines to the rim have evolved many times independently in several non-araneomorph families. Probably the diplurid, hexathelid, and mecicobothriid funnel and sheet webs, some of which are trapping webs, have evolved from such a system of silk signal lines radiating out from the entrance of a tubular silk retreat. It is suggested that the failure of non-araneomorphs to evolve more sophisticated aerial webs may be due in part to the limitations imposed upon prey capture and water conservation by paraxial chelicerae and book lungs, respectively.

EBERHARD, William G.  
WEBS AND BEHAVIOR AS TAXONOMIC CHARACTERS IN ORB-WEAVING SPIDERS  
Dependencia de Biología  
Universidad de Costa Rica

Some details of orb web construction and attack behavior are evolutionarily conservative and appear to be useful in defining subfamilies and families and determining their relationships. The patterns of distribution of these characters among at least 148 species in at least 55 genera agree in general with classical taxonomic schemes based on adult morphology. The data suggest that convergent evolution of orb webs may have occurred in two lines (Uloboridae and araneoids). They also indicate that several previous proposals regarding the evolution of orb weavers and their webs may be incorrect. Certain behaviors appear to constitute autapomorphies for Uloboridae, Nephilinae, and Araneinae, while others may be synapomorphies for Theridiomatidae - Anapidae. Some characters in orb webs themselves may be useful in characterizing and distinguishing different genera.

JANETOS, Anthony C.  
WEB-SITE SELECTION  
Department of Biology  
Princeton University

I have been studying the foraging behavior of some web-building spiders in order to answer the question: what are the behavioral mechanisms used to



exploit variable prey supplies and dependable prey supplies?

Orb-weavers (Araneidae) and sheetweb weavers (Linyphiidae) require different vegetation structures for web supports, but both catch flying insects randomly, and both eat similarly sized insects. However, the prey supply at typical araneid web-sites is extremely variable, while the prey supply at typical linyphiid web-sites is more consistent.

A significant consequence is the movement pattern of spiders among web-sites. In old fields, orb-weavers have a short average residence time at a web-site, and the distribution of residence times is significantly non-random. Orb-weavers either move quickly or stay at a web-site for a long time. Field data and laboratory experiments suggest that spiders stay if they catch enough prey in their first day; otherwise they move.

The residence times of the Linyphiidae are virtually identical to those expected from random movement, although the average is longer than that of araneids. If one thinks of spiders as searching for a profitable place to hunt, then araneids are active searchers, while linyphiids are sit-and-wait predators.

The cost of moving to a new web-site fits into these general patterns. The smaller sheetweb weavers invest proportionally much more silk in their webs and do not recycle silk. Araneids use much less silk in their sticky snares, and recycle the silk by eating the web at the end of the day. Thus the linyphiids pay a very high cost for moving to a new web-site; araneids pay a low cost.

Linyphiids in a lowland woods follow the same sit-and-wait strategy as their relatives in old fields. The lower insect abundance in the woods makes web-site bonanzas rare, and woods araneids converge on a sit-and-wait strategy.

There may be a general association of a sit-and-wait strategy with dependable prey supplies and an active foraging strategy with variable prey supplies.

LUBIN, Y. D.

#### VARIATION IN ULOBORID WEB STRUCTURE AND SPECULATIONS ON THE

#### ADVANTAGES OF COMPLEX VERSUS REDUCED WEBS

Smithsonian Tropical Research Institute

Balboa, Rep. Panama and Charles Darwin Research

Station, Galapagos, Ecuador

Most uloborids construct orb webs superficially like those of araneids, the most obvious differences being the presence of a cribellar silk spiral instead of the araneid sticky spiral. The modifications of the basic uloborid web structure and the diversity of web types within the Uloboridae are less well known than in the Araneidae. In this paper I bring to attention some of the variation that exists in uloborid webs and raise questions concerning economies in the use of silk in uloborids. Two examples are given: (1) an orb-plus-cone web whose complex construction involves building two orb webs and takes about 3 hours to complete, and (2) a reduced web with one or few sticky (cribellar) threads. Sticky-trap experiments simulating single- and multiple-thread webs indicate that reduced visibility may be an important factor in the evolution of reduced webs. Considerations of the use of silk in web construction and prey capture behaviour leads one to speculate on the importance of anti-predator adaptations in the evolution of uloborid webs.

MASTERS, W. Mitch and Hubert Markl

#### TRANSMISSION OF VIBRATION SIGNALS THROUGH SPIDER ORBWEB

Fakultat für Biologie

Universität Konstanz

D-7750 Konstanz

Germany

Vibration transmitted through an orbweb (perhaps from prey trapped in the catching region of the web or from a courting male) can be divided into three main components: (a) transverse vibration perpendicular to a radial strand and perpendicular to the plane of the web, (b) lateral vibration perpendicular to the radius and in the plane of the web, and (c) longitudinal vibration parallel to the radius. Two measuring techniques (laser Doppler vibrometry

and a new optical position-sensing system) were used to measure transmission of these three components in loaded and unloaded orbwebs of Nuctenea sclopetaria. In the unloaded web (that is, one containing neither spider nor prey) longitudinal vibration is transmitted to the hub with less attenuation than transverse or lateral vibration -- usually only 1 to 3 dB over the frequency range measured (1-10,000 Hz), sometimes with amplification in the kilohertz range. In contrast, the other two vibration types are attenuated by at least 10 dB, and usually more as the frequency increases. Longitudinal vibration also provides more information on the direction of the source of vibration from the hub than do the other two types. Preliminary measurements of the vibration signals transmitted to the (empty) hub by prey trapped in the catching zone of the web show that the vibration amplitude is greatest in the range below a few hundred Hz, but that there is signal energy at frequencies higher than 1kHz, and for longitudinal vibration we occasionally measure energy up to about 10 kHz.

RIECHERT, Susan E.  
SPIDER CONFLICT OVER WEB-SITES: HABITAT QUALITY ASSESSMENTS  
Department of Zoology  
University of Tennessee

Agelenopsis aperta (Gertsch) shows within and between population variation in the levels of persistence and escalation it exhibits in conflicts over webs and associated territories. These differences are correlated with variation in habitat quality. They do not appear to be correlated with the quality of the web itself (e.g., web size and state of repair). The cues Agelenopsis uses in selecting web-sites are delineated: 1) shade and temperature in locating a suitable thermal environment; 2) chemical cues in locating areas of prey activity. The territory owner is also shown to monitor prey availability during the course of its residency at a site and to utilize this information in its persistence and escalation "decisions".

TIETJEN, William James  
SOCIAL SPIDER WEBS WITH SPECIAL REFERENCE TO THE NESTS  
OF MALLOS GREGALIS  
Department of Biology  
Georgia College

Various authors have suggested that the cooperative activities of nestmates in the building of communal web complexes is an important factor in explaining the evolution of social behavior among the Araneae. Not only do these constructions allow for more efficient prey capture, but also they provide a potential for organizing the behavior of colony members. Mallos gregalis is used as the primary example to show how several cues associated with the web might aid in coordinating colony activities. Such cues include, but are not limited to chemical communication, vibrational signals and position-dependent effects which may alter individual behavior patterns. The use of the web in subduing prey and in possible prey attraction is discussed as well as problems that are associated with large web structures. Such problems include attraction of predators and sanitation-related consequences in nests that are utilized over long periods of time. Data concerning the structure of natural webs, structure and growth of laboratory webs and environmental buffering effects of the web are also presented.

UETZ, George W.  
WEB-BUILDING AND PREY CAPTURE IN THE COLONIAL ORB WEAVER,  
METEPEIRA SPINIPES (ARANEAE: ARANEIDAE)  
University of Cincinnati

An orb web building spider found in Mexico, Metepeira spinipes, occurs solitarily, but more frequently occurs in aggregations of 5-150 or more individuals. Although colonial, each individual maintains a web and retreat within the colony, and captures its own prey. Aspects of the behavior and ecology of this species were studied during several trips to Mexico in 1978 and 1979.

Web-building in *Metepeira spinipes* occurs during the night and in the early morning hours. The daily rhythm of activity is the same for solitary and colonial individuals. Nightly destruction and ingestion of the catching spiral are followed by construction of a new spiral. This process has several discernable phases and takes several hours to complete. It is during the web construction phase that most agonistic interactions between colonial individuals occur. As a result, web spacing, orientation and location vary within and between colonies and over time. Spacing patterns suggest that these spiders tolerate conspecifics at closer distances than if individual web units were merely attached to each other. Analysis of spatial distribution of spiders shows much variance in within-colony dispersion, including random, aggregated and overdispersed patterns.

*M. spinipes* colonial webs may allow this species to occupy sites at the top of *Agave* plants or between branches of *Opuntia*; sites to which other (solitary) spiders may not have access. It is possible that web complexes are architecturally more stable than solitary webs, and better able to withstand wind and rain encountered in open microhabitats. Spiders occupying these sites may also have access to kinds of flying prey not present in other microhabitats.

The increased prey knockdown effect of grouped webs may allow colonial individuals a higher prey capture rate than solitary spiders. An explanation for this may lie in the fact that a sizeable proportion of the prey captured in *M. spinipes* web colonies consists of insects deflected from other spider's webs. In observing the fate of insects flying into web colonies, it was noted that those captured after striking and escaping from several webs (5-10%) were significantly larger in size. The knockdown effect of grouped webs may thus contribute prey of greater biomass than that typically available to solitary spiders.

SYMPOSIUM: SPIDER PREDATION:  
OPTIMAL FORAGING AND PREY POPULATION SUPPRESSION

Matthew Greenstone, Organizer

GREENSTONE, Matthew H.  
OPTIMAL FORAGING AND INSECT POPULATION  
SUPPRESSION - A SYNTHESIS OF MODELS AND DATA

If optimal foraging models are valid they should enable us to predict the individual and population-level responses of spiders to change in prey population densities. Models of feeding behavior with respect to food availability, food quality, and habitat patchiness are reviewed and their predictions compared with empirical data on functional and numerical responses and the impact of spiders on prey populations.

All web and wandering spider species tested in the field or laboratory show classical type I or type II (respectively) functional responses to the availability of single prey species. However, field data from a complex system show that single-species functional responses may bear no relationship to responses to the same species in the field for these polyphagous predators.

Most spider populations have behavioral mechanisms which confer strong population homeostasis and thereby prevent significant numerical responses to fluctuations in prey populations. However, some spider populations do show numerical responses to prey populations. Whether or not they do may depend upon the predictability of prey availability, habitat patchiness, and the extent to which the spider is dependent upon features of the habitat.

The pitfalls of component analyses of predation, and their failure to predict reported cases of significant impact of spiders on prey populations, are discussed.

JANETOS, Anthony C.  
FORAGING TACTICS OF WEB-SPINNING SPIDER GUILDS  
Department of Biology  
University of Utah

A simple theoretical analysis provides insight into the movement tactics of web-spinning spiders. Spiders that leave web-sites frequently will have higher food intake depending on three parameters: the difference between good and poor web-sites, the cost of moving between web-sites and the efficiency of the decision rule.

This insight has been used to analyze the foraging tactics of orbweavers (Araneidae and Tetragnathidae) and sheetweb weavers (Linyphiidae) in old fields in New Jersey. Field data uphold its qualitative predictions. However, several accounts in the literature refer to web-spinning spiders that leave web-sites and re-establish themselves elsewhere. I review these studies to determine whether the simple theory has general applications or if significant modifications are needed.

Variation in foraging tactics within guilds can be partitioned in two ways: within or between species. I examine field data for evidence of correlation between the type of partitioning and foraging tactics. Implications for co-existence and competition are discussed.

Finally, I discuss shortly the connections between life-history characteristics and foraging tactics. The selective forces acting on each are seen to be extremely complicated, and no totally satisfactory arguments can be made at this time.

Galecka, Z. B., A. KAJAK, and J. Uchmanski  
SIMULATED PREDATION ON APHIDS  
Institute of Ecology  
Poland

It has been found in laboratory raised *Myzus persicae* Sulz. populations that the decrease in number of instar 4 determines the number of females and the abundance of the next generation. This has been confirmed by removal experiments. The removal of mostly this instar, had a greater effect on the abundance of the next generation than the removal of earlier instars. It is concluded that spiders, which mostly prey upon adults, can have an important effect on the abundance of the next generation.

LUCZAK, J. and E. Dabrowska-Prot.  
THE EFFECT OF DIFFERENT ECOLOGICAL CONDITIONS ON  
INDIVIDUAL FOOD RATIOS OF SPIDERS  
Institute of Ecology  
Poland

Under the conditions of field experiments, investigations were carried out on the changing amount of individual food rations (mosquitos) of two ecologically different spider species. The following evaluations of the effect on the food ration size were made: of prey density and subsequent changes of prey dynamics in the environment. Differences in the predatory activity/efficiency on such types of prey of two spider species were evaluated.

MANSOUR, Fadei  
SPIDERS AS BIOLOGICAL CONTROL AGENTS OF INJURIOUS INSECTS  
IN ISRAEL.  
Agricultural Research Organization  
Israel

Egg masses of the Egyptian cotton leafworm *Spodoptera littoralis* (Boisd) were attached to foliage of unsprayed apple trees in the experimental orchard of the Research Station at Neve Ya'ar. Daily observations indicated that exposed young larvae of *S. littoralis* did not cause any significant damage, whereas spiders were seen preying upon them. These observations led to the supposition that spiders are predators of some practical value.

A survey of spider populations was carried out all the year round in both unsprayed and pesticide-treated apple orchards. The spiders collected from apple trees were reared individually to maturity and identified.

The spider population in the unsprayed orchard was found to be much larger than the one in the sprayed orchard. Each of the species obtained in the survey was tested for its ability to prey on young larvae of S. littoralis under laboratory conditions. Chiracanthium mildei Koch (Arachnida: Clubionidae) was found to be the dominant species in the unsprayed orchard and has shown the greatest ability to prey on the larvae of S. littoralis.

A field experiment was carried out in order to evaluate the effectiveness of spiders in the biological control of Spodoptera larvae in the apple orchard ecosystem. Apple trees in the unsprayed orchard were infested with laboratory-reared egg masses of S. littoralis. Spiders were carefully eliminated from half of the infested trees, whereas on the other half they were left undisturbed. The fate of the egg masses of the two groups of trees was compared, and it was found that larval populations of Spodoptera did not develop to damaging proportions on the trees on which spiders were permitted to act freely.

Several aspects related to the evaluation of Ch. mildei as a biological control agent were examined:

1. The disturbing effect of Ch. mildei on the aggregations of first-instar had a pronounced disturbing effect, averaging 31.2% (in addition to their actual preying upon the same colonies of larvae, which averaged 62.9%).
2. The functional response of Ch. mildei to prey density. Laboratory experiments demonstrated that the spider shows an obvious functional response to rising prey density, and a sigmoid curve was found to represent the preying rate.
3. The influence of commonly used pesticides (a) on Ch. mildei and (b) on the general population of spiders in the apple orchard.

a) Laboratory experiments employing various procedures were carried out to evaluate the influence of commercial pesticides which are used to control apple pests in Israel on Ch. mildei. It was found that Thiodan (a chlorinated hydrocarbon) was more harmful to the spiders than Guthion (an organophosphorus compound). The acaricide Plictran was more harmful to the spider than Guthion but less so than Thiodan when the spiders were exposed to residues of the pesticides, but did not cause any mortality by topical application.

b) In a field experiment apple trees were sprayed with Guthion and Supracide (another organophosphorus compound), and caused a significant suppression of the spider population.

The results of this research indicate that spiders do play an important role as natural enemies of Spodoptera littoralis larvae in apple orchards. The dominant species, Ch. mildei, was also found to prey upon most other apple pests. The research also demonstrated that the deleterious effect of various pesticides on spiders is not uniform and that there is a possibility of selectivity. Further study of this aspect seems to be essential for the development of integrated pest control programs.

MORSE, Douglass H.  
HOW CRAB SPIDERS HUNT AT FLOWERS  
Department of Biology and Medicine  
Brown University

Crab spiders Misumena vatia commonly occupy flowers of pasture rose, milkweed and goldenrod. They sit motionless on these flowers and frequently attack insect

visitors, which sometimes are larger than they are. Their commonest prey are bumble bees, honey bees, moths, and syrphid flies. Prey caught differ as a function of their abundance. On flowers where food intake is highest, spiders exhibit some choice of food, but where intake is lowest, on pasture rose, they attack all prey with equal frequency. Misumena's ability to occupy the sites visited by the most insects differs with the scale of the movement required: they usually occupy the prime flowers of a stalk, but their ability to move from one stalk to a superior stalk is near random. Nevertheless, they show a strong tendency to initiate movements when the quality of their stalk is low. These results are compared with predictions of optimal foraging theory. Non-conformities are then discussed and alternatives briefly explored.

OLIVE, Cader  
FORAGING RESPONSE OF ORB-WEAVING SPIDERS TO SPATIAL VARIATION  
IN NET RATE OF ENERGY RETURN  
Department of Zoology  
University of California, Davis

Replicated experiments in field enclosures with Argiope trifasciata and Araneus trifolium indicate that orb-weaving spiders stay for shorter periods and move farther when leaving web sites with low rates of net energy return. However, vegetation type had differential effects on constraining the responses of the 2 species across habitat types. The data give an indication of the rate and scale of orb-weaver functional response to spatial variation in return rate.

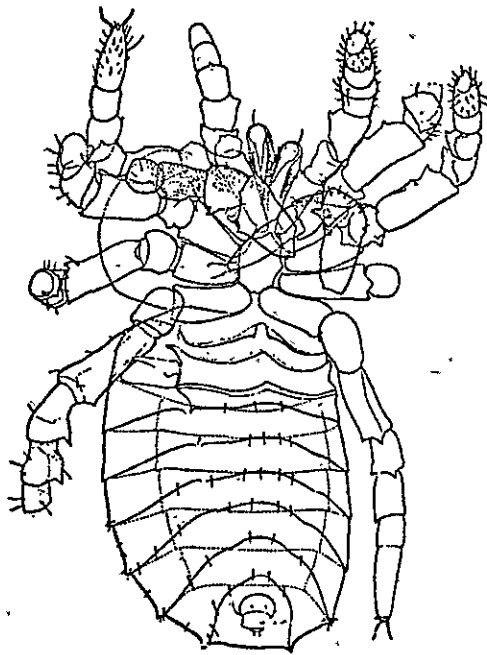
RIECHERT, Susan E.  
MICROECONOMIC THEORY AND OPTIMAL FORAGING IN SPIDERS  
Department of Zoology  
University of Tennessee

The predatory behavior of the spider Agelenopsis aperta (Gertsch) is used to test three constructs of microeconomic theory related to optimal foraging: 1) that as prey availability increases, the diet becomes more specialized or narrow; 2) that as prey availability increases, time and energy expenditures per prey item decrease; and 3) that spiders should exhibit the phenomenon called "prudent predation" (i.e., they will accept prey that are satisfactory, if better prey are unlikely to be encountered in the time span required to subdue the first prey encountered). Agelenopsis is shown to closely follow the predictions of constructs 1 and 2, but to deviate from that of 3. The fact that this spider does not always act as a prudent predator is shown to be related to its role as a sit and wait forager and the fact that it frequently occupies web-sites affording limited prey.

UETZ, George W.  
RISK-SENSITIVE FORAGING IN COLONIAL SPIDERS  
Department of Biological Sciences  
University of Cincinnati

An orb web building spider found in Mexico, Metepeira spinipes, frequently occurs in aggregations of 5-150 or more individuals. Although colonial, each individual maintains a web and retreat within the colony, and captures its own prey. The combination of solitary and colonial behaviors exhibited by this species suggests that it may represent an intermediate stage in the evolution of social behavior in orb-weaving spiders.

The flexible spacing and social grouping observed in this spider fit predictions of models of risk-sensitive foraging in patchy environments. Group foraging in predatory animals tends to increase the efficiency of food finding (i.e., prey capture) and reduces the variance in food available to the individual. Thus, spiders building grouped webs may increase their prey capture efficiency and minimize the risk of starvation in a variable environment. Group foraging would be most advantageous in environments where the mean food



AMERICAN ARACHNOLOGICAL SOCIETY

1982 Eastern Section Meeting

First Announcement

THE MEETING WILL BE HELD JUNE 18-21, 1982, AT

HAMPDEN-SYDNEY COLLEGE, HAMPDEN-SYDNEY, VA 23943

INFORMATION ON PAPER SESSIONS, LECTURES, ACCOMMODATIONS,

AND TRANSPORTATION WILL BE SENT OUT IN FEBRUARY

.....

A one-week arachnology course emphasizing spider biology and classification, has been proposed for the week preceding the meetings. The course would use the facilities of the Hampden-Sydney College Biology Department and accommodations would be available at the college. The total cost (room and board included) would be \$200 or less, books and materials extra. If you are interested in this course, or know someone (a student?) who would be, please return this form to the address on the back of this issue of AA.

.....

YES! I am interested in a one-week arachnology course,  
Please keep me informed.

Undergraduate Student	_____	Name	_____
Graduate Student	_____	Address	_____
Amateur	_____		_____
			_____

availability is equal to or greater than the energy needs of the individual, but with high variance over time and/or space. Solitary foraging would be most advantageous in variable environments where the mean food availability is less than the energy needs of the individual. Group foraging in this case may increase prey take, but at the risk of starvation. Solitary individuals also risk starvation, but have a higher probability of exploiting those occasionally encountered patches where prey are abundant.

Laboratory studies of caged Metepeira support predictions based on theory. Group size does influence prey capture rate, with larger groups capturing more prey/spider than smaller groups and solitary individuals. Group size also influences the variance in prey capture rates, with larger groups having lower variance in number of prey captured/spider. Group foraging is shown to be advantageous on this basis for prey treatment levels providing the basic maintenance level of prey.

Group size in M. spinipes varies geographically over a range of habitats studied in Mexico. In severe habitats where prey availability is low and environmental conditions are extreme, (high altitude; desert grassland), individuals are predominantly solitary or in small groups. In intermediate sites (agricultural areas with seasonal rainfall) spiders occur more frequently in aggregations. In the tropical site, where climate is benign and favorable year-round, and insect abundance is great, colony size is very large. Nearest neighbor distances show a significant negative correlation with prey availability. Field experiments in which colonies were moved and reestablished in areas of lower prey activity confirm this: nearest neighbor distance increased after transport except where prey was supplemented by addition of attractants (cow dung).

Data suggest that the foraging strategy of Metepeira spinipes, with flexibility in social grouping and spacing, is an adaptation to reduce the risk of starvation in a variable environment.

WHITCOMB, W. H.  
PREDATOR PREY SYSTEM  
Department of Entomology and Nematology  
University of Florida

Numerical responses of spiders in soybeans and cotton are seldom reflected in numbers of prey consumed. Although numerical responses due to reproductive and aggregative effects as well as to reduction in intraspecific competition are sometimes indicated, functional response often alters actual prey consumption.

#### PAPER AND POSTER SESSIONS

BARTH, F. G., R. Hergenröder, K. Klärner  
VIBRATORY SIGNALS FOR HUNGRY SPIDERS  
FachBereich Biologie - Zoologie  
J. W. Goethe - Universität,  
West Germany

Vibratory signals are of particular relevance in spider behavior. Prey catching can easily be elicited by vibratory stimulation. The present paper reports the results of recent experiments which were designed to give answers to three sets of questions: 1. What is the respective role of trichobothria and slit sense organs in eliciting prey capture? 2. Are the vibration sensitive slit sense organs and the behavioral reaction tuned to particular frequency ranges? 3. How do vagabond spiders compare to web spiders? Our results show that both types of sensilla alone can elicit prey catching when properly stimulated. However, they also point to a complex interaction of both types of sensilla when substrate borne stimuli are used. With sinusoidal stimuli and taking displacement as the parameter the tuning of the whole animal's behavior is very similar to that of the vibration sensitive slit sensilla (electrophysiological experiments) with sensitivity staying constant up to about 40Hz and rapidly increasing beyond. Only in Nephila (behavioral response) the tuning curve showed a minimum within the frequency range tested (1Hz to 1 KHz). Noise bands are more effective than sinusoidal stimuli. Although the structure and mechanics of the most distal leg joint which picks up substrate vibrations differ considerably in web and vagabond spiders, respectively, our data impress us much more with the similarities between the two types of spiders than with differences.



BLUMBERG, Andrew, Y. and D. A. Crossley, Jr.  
DISTRIBUTIONS OF SPIDERS IN NO-TILLAGE AND CONVENTIONAL  
TILLAGE AGROECOSYSTEMS  
Department of Entomology  
University of Georgia

Spider communities in conventional tillage (CT) and no-tillage (NT) sorghum and adjacent old field (OF) were compared using pitfall trap captures. Spiders comprised only eight percent of the total number of arthropod species captured and 11 percent of the individuals in CT, while they were 15 and 17 percent of the species and 30 and 22 percent of the individuals in NT and OF, respectively. The number of individuals captured in NT was approximately four times that in CT and almost twice that in OF. The dwarf spiders were overall the most numerous group and comprised 63 percent of the CT catch, 46 percent of the NT and 33 percent of the OF.

BOWER, Lynn F. and Robert Snetsinger  
SPIDERS OVERWINTERING UNDER TREEBARK IN AN  
OLD-MAPLE FOREST  
Department of Entomology  
Penn State University

Thirty-one species of spiders were collected from beneath the bark of 17 species of trees during the winter season. The 720 specimens collected belong to 14 families. Phidippus audax, Ballus youngii, Eris marginatus, Callobius bennetti, Drapetisca alteranda, and Steatoda borealis were the most common species, representing 67% of the total number collected. Differences in overwintering survival preference of tree species as wintering sites, maturity of spiders at this season, and movements of spiders as winter approached were recorded.

BRADY, Allen R.  
SYSTEMATIC PROBLEMS IN THE GENUS LYCOSA (ARANEAE: LYCOSIDAE)  
Hope College

Preparatory studies of North American species of Lycosidae described in the genus Lycosa indicate a number of species groups that may well represent several genera. Morphological features of the male and female genitalia in lycosids have proven to be valuable in distinguishing different species. Recent revisions by Wallace and Exline (1978), Dondale (1978, 1979) and Brady (1979) support this notion. Genitalic characters also allow recognition of some higher taxonomic groups within the Lycosidae. Both Schizocosa (Dondale 1978) and Sosippus (Brady 1962, 1972) have genitalic features that clearly separate them from other genera of lycosids. Within the genus Lycosa, however, there are some striking similarities in genitalic structure between taxa that are quite distinct in other ways, e.g. Lycosa helluo and L. rabida. On the other hand some lycosid species that are similar in color pattern, body dimensions, and habitat preferences, have distinct genitalia (Trochosa terricola and T. avara). Additional characters must be examined in order to understand the evolutionary relationship of lycosid species.

Preliminary investigations of morphological characters in the genus Lycosa indicate that color pattern, carapace dimensions, eye arrangement, and the relative length of legs to body may be useful in determining relationships above the species level. In addition, information concerning the ecology (habitat, niche) and behavior (prey capturing mechanisms, escape behavior) are also important. The morphological features mentioned are not unrelated to ecological elements and behavioral repertoire of the species. Together they make up functional morphological complexes that should be most valuable in reconstructing evolutionary pathways.

BULTMAN, Thomas L.  
COMMUNITY STRUCTURE OF FOREST FLOOR  
SPIDERS FOLLOWING LITTER MANIPULATION  
Department of Biological Sciences  
University of Cincinnati

Data from the literature concerning forest floor spiders suggests that both the structural complexity of leaf litter and litter depth play roles in structuring these biotic communities. Regarding litter depth, it is not clear whether a change in litter depth or the accompanying change in litter energy content is most important in organizing communities of litter spiders. To better understand the importance of these variables, a field experiment involving the manipulation of litter nutrient content and structural complexity was conducted. Non-nutritive artificial (vinyl plastic) as well as natural leaves of varied physical structures (flat, intermediate and curly) were placed in wire baskets on a Beech forest floor. Litter depth was constant in all baskets and equal to that of the natural litter depth at the study site. Positions of baskets followed a random block design. Spiders were removed from the baskets monthly. The community structure and relative abundance of various groups were used to analyze the effects of these litter manipulations. Results are discussed in light of previous work.

<sup>1</sup>  
CURTIS, David J. and Eric M. Bignal<sup>2</sup>  
TOWARDS THE PREDICTION OF PEATLAND SPIDER COMMUNITIES  
Department of Biology<sup>1</sup>  
Paisley College of Technology, Paisley, Scotland  
Nature Conservancy Council, Southwest Scotland Region<sup>2</sup>

Ever-increasing pressures for the development and exploitation of land pose a threat for many relict habitats. An example of this is provided by the scattered remnants of peat-bogs in the Strathclyde Region of south-west Scotland. In considering the conservation value of such sites, the most commonly-used data are botanical as they are obtained relatively easily in comparison to faunistic data. An arachnologist would have more interest in the species involved in the arachnid communities at the sites, but such data are more difficult to obtain because of sampling problems and the seasonal nature of these communities. It would be of great use to be able to predict, not just in general terms but with some precision, the composition and structure of the spider community at a site from botanical data.

126 identifiable peat-bogs in our study area have been surveyed for plant species composition and vegetation physiognomy. The phytosociological data have been used to produce classifications of site-types and plant associations, while the vegetation physiognomic data have yielded structural types interpretable in terms of features such as density, shrubbiness and orientation. Arachnological data from a selection of these sites are being used to develop predictive models for single species and for spider assemblages.

DENNE, Kathryn Wing  
SPIDER RESPONSE TO VEGETATION  
ARCHITECTURE AND INSECT ABUNDANCE  
Department of Biology  
Utah State University

A comparison of spider guild arrays was used to evaluate the response of a sagebrush (*Artemisia tridentata*) spider community to the following experimental manipulations: 1) change in the sagebrush architecture, and 2) an increase in insect numbers and size classes available in the sagebrush. All spider guild (based on hunting techniques) numbers increased with the increase in insect numbers. However, the guild arrays changed differentially with the architectural manipulation.

EISNER, Thomas  
ARTHROPOD DEFENSES AGAINST SPIDERS  
Section of Neurobiology and Behavior  
Cornell University

Arthropods are the principal prey of spiders, but many are protected against

predation. Chemical, mechanical, and behavioral strategies will be discussed that reduce the vulnerability of insects and millipedes to spider attack. Counteradaptations of spiders will also be discussed that enable spiders to deal more effectively with defended prey.

FRANCKE, Oscar  
ON THE CLASSIFICATION OF NULLIBROTEAS WILLIAMS (SCORPIONES)  
Department of Biological Sciences  
Texas Tech University

Nullibroteas allenii (Wood) is a small, relatively rare scorpion endemic to Baja California, Mexico. Described in 1863 in Scorpius, by 1888 it was transferred to Broteas (family Chactidae), a genus otherwise known only from northern South America. It remained enigmatic and undisturbed in Broteas until 1974 when Williams created Nullibroteas for allenii and placed the new genus in the family Vaejovidae. The problems existing with the separation of Chactidae and Vaejovidae are exposed; the taxonomic position of Nullibroteas is revised, and the zoogeographic puzzle it presents to dispersalists is analyzed.

GABBUTT, Peter D.  
THE THERMAL AND PHOTOECOLOGY OF PSEUDOSCORPIONS  
Department of Zoology  
The University, Manchester, England

Field and laboratory experiments with Chthonius ischnocheles (Hermann) suggest that the seasonal migration down into the soil, followed by the construction of silken chambers for the purpose of hibernation, is primed by decreasing photoperiod in the summer, triggered at the critical photoperiod during the autumn and mediated by low temperature during the winter.

GREENSTONE, Matthew H.  
WEB SPIDER RESOURCE-PARTITIONING ALONG  
TEMPERATE AND TROPICAL ELEVATIONAL GRADIENTS  
Department of Entomology & Nematology  
University of Florida

Resource-partitioning and species packing patterns in web spider guilds were studied along elevational gradients in California and Costa Rica. In each region two habitats, a meadow and a scrub, were studied at each of the three elevations, 0 m, 1200 m, and 2500 m, in order to see whether habitat structure constrains guild organization. Preliminary data on (food and space) niche breadth and overlap, insect availability (sticky trapped) and vegetation structure are presented.

HASKINS, Mary F., J. H. Shaddy, and R. F. Meiser  
SPIDER (ARANEAE) ACTIVITY IN MANIPULATED OLD-FIELD HABITATS  
Northeast Missouri State University

The effects of burning, mowing, and plowing on spider activity were measured and compared to that of a control field. The three management techniques have been employed in three of the sample fields annually for four years. A four-year succession field for each of the three techniques was also sampled. Pit traps were used as the sampling device and samples were taken from April-October 1980.

HIEBER, Craig S.  
THE "INSULATION" LAYER IN THE COCOONS OF  
ARGIOPE AURANTIA (ARANEAE: ARANEIDAE)  
Department of Zoology  
University of Florida

The effect of the insulation layer in controlling internal temperatures in the cocoons of Argiope aurantia (Araneidae) was examined. Data from the field and from the laboratory indicate that the layer does not function to control either the rate of heat gain or loss, or the maximum or minimum internal temperature the cocoons achieve. Other possible functions for this layer of materials are discussed.

HOFFMASTER, Debra K.  
FACTORS CONTRIBUTING TO ESCALATION OF AGGRESSIVE  
ENCOUNTERS INVOLVING ORB-WEAVING SPIDERS  
Texas Tech University

I induced aggressive encounters between orb-weaving spiders by introducing a spider onto an occupied web. I recorded the total length, cephalothoracic width, sex and species of each combatant. I also recorded 11 habitat parameters, related to website structure and location. An index of escalation was constructed for each combatant using the behavioral factor loadings computed by Riechert (1978).

Both occupant and intruder escalations were significantly affected by the opponent's behavior and size, however, the slope of the relationship differed between occupants and intruders. A significant interaction between size and behavior existed for occupant escalations only. Website structure and spider species did not influence escalation.

HORTON, Charles C. and David H. Wise  
EFFECTS OF ENVIRONMENT VERSUS COMPETITION IN TWO  
ORB-WEB SPIDERS (ARANEAE, ARANEIDAE)  
Department of Biological Sciences  
University of Maryland Baltimore County

We report on the results of a two-year experimental study of intra and inter-specific competition among Argiope aurantia Lucas and Argiope trifasciata (Forskål), two orb-weaving characteristic of old field habitats. We adjusted densities of immature spiders within unenclosed, 12 x 12 m plots at the beginning of each growing season in 1979 and 1980. For each species there were two high-density (2X) and two low-density (1X) plots. One plot within each density regime contained both species, and in the second plot the other species was removed throughout the season. Each treatment was replicated twice each year. Inferences on the extent of competition within and between the species are based upon the effects of the treatments upon height of the webs in the vegetation, taxa and size of prey captured, growth rate and change in population size throughout the season. The experiment uncovered significant effects due to intraspecific competition, but no evidence of inter-specific competition. Density-dependent effects were expressed in web-site selection in both species, and in growth and rate of population decline in A. trifasciata. However, similar responses were not observed both years. The experiment also uncovered the importance of non-competitive environmental factors. Variations in vegetation structure between plots influenced web height. Prey taxa taken by each species differed between replicates and between years. The degree of overlap between A. aurantia and A. trifasciata in prey taken also differed between years. Both species were of a smaller size in August 1980 than in 1979. Smaller size was correlated with drought conditions during 1980. The drought could have had a direct effect through added physical stress, or an indirect effect through reduced prey availability. Differences in vegetation and physical factors appear to have exerted a greater influence on web-location, prey captured and growth than did competitive interactions.

KILLEBREW, D. W. and N. B. Ford.  
REPRODUCTIVE EFFORT IN THE GREEN LYNX SPIDER, PEUCETIA VIRIDANS.  
The University of Texas at Tyler

The Green Lynx spider, Peucetia viridans, is among those animals that expend a tremendous amount of energy in a single reproductive event. These semelparous animals must regulate two factors (1) total energy for any one reproductive event and (2) the energy invested in any one progeny. The optimal tactic will produce the largest number of offspring with the highest possible individual fitness. In this study the average fitness of a clutch (mean weight of individuals in a clutch) was examined in relation to female size, clutch size, and reproductive effort (total weight of clutch divided by female weight). These relationships suggest that approximately the same amount of energy is invested per young over all clutches examined. Even though the larger females have only slightly greater reproductive effort than smaller females, there is a strong relationship between a female's reproductive effort and the number of young in a clutch. These data tend to indicate that the number of offspring per clutch alone is a good estimator for parental fitness. It was also determined that larger females invest less energy in egg sac construction per young than smaller females.

LÖCKLEY, T. C., J. W. Smith, W. P. Scott  
and C. R. Parencia  
RELATIONSHIP OF POPULATIONS OF THE STRIPED LYNX SPIDER  
OXYOPEs SALTIcUS HENTZ AND THE TOBACCO BUDWORM  
HELIOTHIS VIRESCENS IN SELECTED COTTON FIELDS IN  
PANOLA AND PONTOTOC COUNTIES, MISSISSIPPI, 1977, 1978,  
1979, & 1980  
Bioenvironmental Insect Control Laboratory  
U. S. Dept. of Agriculture, Stoneville, Mississippi

Populations of the striped lynx spider, Oxyopes salticus Hentz, and the tobacco budworm, Heliothis virescens (F.), were studied in 30 selected cotton fields in Panola and Pontotoc counties, Mississippi in 1977, 1978, 1979, and 1980. Larval populations of H. virescens increased or decreased as populations of O. salticus decreased or increased.

LUBIN, Yael D.  
DISPERSAL AND SWARMING IN A SOCIAL THERIDIID  
Smithsonian Tropical Research Institute and  
Charles Darwin Research Station  
Ecuador

A cooperative, group-living theridiid, Achaearanea wau Levi, in Papua New Guinea disperses and founds new colonies by swarming, a type of synchronized emigration previously known to occur only in certain social insects, notably bees, wasps and some ants. Spiders within a colony share a communal web, cooperate in prey capture, feed communally and have synchronized development. Young do not disperse, but mature, court and mate within the parent colony. Swarming generally occurs after most females are fertilized. Swarming behaviour involves (1) construction of a silk highway from the parent web to other trees, (2) synchronized emigration of females after the highway is constructed and (3) establishment of new colonies at or near the end of the highway. Although adult males may move from one colony to another, no other method of long-range dispersal of females was found in this species. The importance of swarming behaviour in terms of colony social structure, population dynamics and the evolution of sociality are discussed.

MADDISON, Wayne  
A Y CHROMOSOME IN THE JUMPING SPIDER  
GENUS PELLENES  
Museum of Comparative Zoology  
Harvard University

Observations of male meiosis and female chromosome number indicated that eight species of Pellenes have the  $X_1X_2O$  male,  $X_1X_1X_2X_2$  female sex chromosome system typical of salticids, four species have an  $X_1^1X_2^2X_3^3Y$  male,  $X_1^1X_1^2X_2^2X_3^3X_3^3$  female system, and one species has both  $X_1X_2O$  and  $X_1^1X_2^2X_3^3Y$  males. This is the first report of a Y chromosome in spiders. It is hypothesized that the  $X_1^1X_2^2X_3^3Y$  system was derived from an  $X_1X_2O$  system by a tandem X-autosome fusion which yielded the  $X_2^2$  and a centric autosome fusion which yielded the Y. Data on heteropycnosis, chiasmata, segregation, chromosome number and arm length support this hypothesis. The distribution of the  $X_1^1X_2^2X_3^3Y$  system within the genus is phylogenetically confusing and suggests that the two sex chromosome systems have been maintained together as a polymorphism in some lineage for long periods of time or that there have been repeated derivations of the  $X_1^1X_2^2X_3^3Y$  or  $X_1X_2O$  systems.

MARTYNIUK, John  
ELECTROPHORETICAL EVIDENCE FOR MULTIPLE MATING IN FIELD POPULATIONS  
OF LINYPHIA MARGINATA (ARANEAE: LINYPHIIDAE).  
Department of Biological Science  
State University of New York at Binghamton

Six mating pairs of Linyphia marginata were captured in the field. In the

REDBORG, K. E.  
INTERFERENCE WITH DEVELOPMENT IN A SPIDER, LYCOSA RABIDA, BY  
THE MANTISPID, MANTISPA UHLERI.  
Department of Entomology  
University of Illinois

The larvae of Mantispa uhleri Banks (Neuroptera: Mantispidae) board spiders to await the production of an egg sac containing their obligate larval food. While aboard the spider, larvae feed on spider blood. This parasitic behavior was investigated by allowing larvae to board sixth instar Lycosa rabida Walckenaer (Araneae: Lycosidae). Larvae have a direct and indirect effect on the developmental physiology of the spider. The direct effect, equal in both sexes, is an increase in developmental time and a decrease in adult size. An indirect effect on developmental time and adult size is brought about by the loss of an instar in female spiders only. Parasitized females were mature at nine or ten instars; control females at ten and eleven. Male instar number was not affected; both control and parasitized males were mature at nine or ten instars. The net result is that parasitized female spiders are even smaller than would be predicted from the direct effect alone, but actually mature faster than control females. In males, there is only a direct effect.

REISKIND, Jon  
NOTES ON THE ARANEOGEOGRAPHY OF PENINSULA FLORIDA (OR, THE CONSEQUENCES TO  
FLORIDA OF DAMN YANKEES, CUBAN REFUGEES AND FLORIDA CRACKERS).  
Department of Zoology  
University of Florida

Every species of spider in peninsula Florida is a newcomer since the entire peninsula was submerged a mere one million years ago. The present spider diversity is the result of both migration and speciation events. To determine the origin of the fauna one can use distributional and phenological data. In certain groups autochthonal species have arisen during the Quaternary apparently as the results of periodic isolation of populations on islands formed during the high sea levels during the interglacial periods. But most species have invaded Florida either from the mainland to the northwest or from the West Indies, especially Cuba, to the south.

RICHMAN, David B.  
THE COURTSHIP BEHAVIOR OF LYSSOMANES VIRIDIS (WALCKENAER) (ARANEAE:  
SALTICIDAE): RETINAL MOVEMENT AND ITS RELATIONSHIP TO DISPLAY  
Department of Entomology and Nematology  
University of Florida

The courtship of the salticid spider Lyssomanes viridis (Walckenaer) is characterized by rapid retinal movements by the male. A published description of the courtship of L. bradyspilus Crane indicated that such eye movements were part of the courtship, but observations of other salticids indicate that its main function is a scanning of the female similar to the scanning of prey or the environment.

ROLAND, Chantal  
CHEMICAL SIGNALS BOUND TO THE SILK IN SPIDER COMMUNICATION  
Laboratoire de Biologie du Comportement  
Université de Nancy I  
France

The silk produced by the spider contributes not only to the security of the individual (dragline, retreat, eggsac) and to capture prey (share) but also plays a role in the exchange of information between individuals.

The structured silk constitutes a network favourable to the transmission of vibratory phenomena but a single silk thread can also inform a spider the presence of a conspecific and of its sexual identity through tachochemical cues. A number of authors have shown, namely in Lycosidae, that the substratum of the female's silk with which a pheromone is associated, triggers off the courtship of the male. Moreover, an individual coming across a dragline can orientate its locomotion according to the identity of the spider who emitted the thread.

laboratory, pairs were allowed to finish copulation as indicated by the production of a sperm platform by the male. The male, female and resulting offspring were examined by an electrophoretic analysis of the variable phosphoglucosyltransferase (PGM) locus. Results indicate that in four of the six cases, eggs were fertilized by sperm other than the male captured, with a minimum detectable frequency of .36. In one of the two remaining cases, a chi square analysis suggests that it is unlikely that the male captured, fathered any of the offspring ( $p < .01$ ). The overall minimum detectable frequency of sperm use from earlier males for the six pairs is .22. These results suggest that multiple mating and sperm competition are common phenomena in natural populations of L. marginata.

MCGIMSEY, William, Frederick A. Coyle, and Frederick W. Harrison  
FUNCTIONAL MORPHOLOGY OF THE SPERMATHECAE OF ANTRODIAETUS UNICOLOR (ARANEAE: ANTRODIAETIDAE) AND HYPOCHILUS THORELLI (ARANEAE: HYPOCHILIDAE).  
Department of Biology  
Western Carolina University

The spermathecae and spermathecal glands of the mygalomorph spider, Antrodiaetus unicolor, and the hypochiloid spider, Hypochilus thorelli, are described and illustrated with a variety of fluorescent and absorption histochemical techniques. The presence of large numbers of sperm within the spermathecae of these spiders is conclusively demonstrated, thus laying to rest the idea that haplogyne spermathecae do not store sperm. Histochemical and anatomical evidence indicate that the spermathecal gland secretes glycogen into the lumen of the spermatheca through canals in the spermathecal wall. It is probable that this secretion serves as an energy source for the sperm.

PALMER, Jacqueline, Frederick Coyle, and Frederick Harrison  
OBSERVATIONS ON THE CYTOCHEMISTRY AND STRUCTURE OF SILK GLANDS IN THREE PRIMITIVE SPIDERS: ANTRODIAETUS UNICOLOR, SPHODROS SP., AND HYPOCHILUS THORELLI.  
Department of Biology  
Western Carolina University

Silk glands of the mygalomorph spiders Antrodiaetus unicolor (Antrodiaetidae) and Sphodros sp. (Atypidae) and of the primitive araneomorph spider Hypochilus thorelli (Hypochilidae) were studied using a variety of absorption and fluorescent cytochemical methods. A. unicolor spinnerets are served by four clusters of small oval glands which are all alike histochemically and in size and shape. Consequently, A. unicolor is one of the few spiders known to possess only one kind of silk gland. Each A. unicolor gland secretes two types of protein into its lumen, basic protein being produced by cells of the distal hemisphere and acidic protein characterized by numerous C-terminal carboxyl groups being secreted by the proximal hemisphere. Although Sphodros sp. silk glands possess the acidic and basic protein secreting regions observed in A. unicolor, they vary considerably in size and shape. Secretory activity is described in detail for one type of H. thorelli silk gland.

RAPP, William F.  
SOME PRELIMINARY THOUGHTS ON THE ZOOGEOGRAPHY OF THE GENUS TIBELLUS (PHILODROMIDAE)  
Division of Housing and Environmental Health  
Nebraska State Health Department

There are at least 30 species in the genus Tibellus and these are found in many parts of the world. Most species are found in the boreal region, but at least one species is known from the Australian region. At least two species, T. maritimus (Menge) and T. oblongus (Walckenaer) are Holarctic in distribution. Other species are wide spread in distribution and others appear to have a very limited distribution.

All species of Tibellus appear to occupy the same type of ecological niche... meadows and marshes, regardless of the biotic area.

A study of the epigynum indicates that there may be several lines of development.

Results obtained with Tegenaria domestica and T. pagana, thanks to a T-maze, show that specific female sexual factors associated with the silk enable the male to orient its movements. The nature of these factors has not yet been determined. It is, probably, a pheromone.

In our experimental conditions the specification of these factors appears to be only partial. A male coming across another species' dragline will follow it. But being given a choice between a conspecific dragline and a different species' dragline, it will move towards the former.

Finally, a male sexual factor able to orientate the female's direction has been demonstrated in Tegenaria domestica.

The silk-provided tachochemical information allows the spiders to orient themselves towards conspecifics and to adjust their behaviour (courtship behaviour) according to the conspecifics they may meet.

Similar results have been obtained with another species of Agelenidae (Coelotes terrestris) and with two species of Araneidae (Araneus sclopetarius and A. cornutus).

ROTH, Vince D.  
UTOSPASY IN ARACHNIDS  
American Museum of Natural History  
Southwestern Research Station

Autotomy evidently does not occur among arachnids but a phenomenon called Autospasy occurs among the Amblypygids and Opilionids and among some of the Araneids. Initial studies indicate that it occurs on or between leg or palpal segments other than those already recorded in literature. The opilionid, Sclerobunus sp. has a femoral constriction near the base of the segment at which point the leg separates. Many families of Araneids show no indication of autospasy at all, especially among the more primitive families. In most spiders where autospasy occurs the legs separate between the coxal-trochanteral joint. A few separate between the patella and the tibia. A third type of araneid autospasy occurs with a division of the patella in the genus Calymmaria and a related undescribed genus where a small wedge of the patella is left attached to the femur and the open wound is closed by a folding of the wedge down into the membranous area of the femoral-patellar joint.

ROVNER, Jerome S.  
VIBRATORY COMMUNICATION IN SPIDERS  
Department of Zoology  
Ohio University

The use of vibrations of silk threads for communication and prey-detection by web-dwelling spiders has received the attention of investigators using increasingly refined techniques for signal recording. Others have been interested in airborne sounds produced by spiders during displays. Attention now also should be directed to the transmission of signals through non-silk substrates, such as plants and soil, on which most wandering spiders are found. Rovner and Barth (in ms.) investigated vibratory signaling in Cupiennius salei (Ctenidae), a Neotropical wandering spider that lives on banana plants (Musa). The low-frequency vibratory components of the output produced by the male ( $\bar{Y} = 76$  Hz) and female ( $\bar{Y} = 49$  Hz) are transmitted through the plant more effectively than the higher-frequency percussive sounds, whose airborne components had been noted by Melchers (1963). Transmission through the plant is adequate for communication, as demonstrated by the persistence of reciprocal signaling in the presence of random noise much louder than the airborne component of the male's signal. The female's signal guides the male across the plant to her location, up to at least 1 m away, as measured through the plant. Thus, while we notice the airborne by-products of mechanical signal generation in wandering spiders, the components conducted via the substrate may play a greater role in communication. This was suggested for stridulating lycosid spiders, based on playback experiments (Rovner, 1967). As to other wandering spiders, we must await efforts by future workers equipped to enter the spider's Umwelt.



RYPSTRA, Ann L.  
FACTORS INFLUENCING THE FORAGING TIMES OF WEB SPIDER COMMUNITIES  
IN TEMPERATE AND TROPICAL FORESTS.  
Department of Biology  
Pennsylvania State University

The relative foraging activity of spiders (all species building tangle, sheet or orb webs on vegetation) in the forest undergrowth was determined by visual search of randomly selected plots, 15 m<sup>2</sup> in size at various times in the day. Insect activity was monitored at the time of the search by placing sticky traps in the adjacent vegetation. A relative measure of web site availability was determined by measuring the amount of vegetation on the plot using the pole intercept method. Temperate data were collected in a chestnut-oak climax deciduous forest located in Huntingdon County, Pennsylvania. Tropical data were collected from a tropical wet forest near Makokou, Gabon, West Africa and a sub-tropical moist forest in the Department of Madre de Dios, Peru, South America.

Temperate spider activity peaked in the evening (1600-2000). Midday (1000-1400) and midnight (2200-0200) activity levels were identical, while morning (0400-0800) was significantly lower than any other period. Temperature curves and prey activity follows this same pattern. The actual number of spiders foraging on a plot can be predicted from a regression line determined by both the number of prey on the sticky traps and the number of vegetational points recorded for the plot ( $r^2 = 95\%$ ).

Tropical spider activity was significantly higher at night than during the day, however, prey were more active during the day than at night. Daytime activity levels can be predicted from the same equation generated from the temperate data. A separate regression of night spiders on vegetation and prey yields a different but significant line ( $r^2 = 97\%$ ). Both prey size and web sizes were larger at night than during the day. Several speculations can be made as to the factors that influence this activity pattern.

SHEAR, William A.  
WHAT IS THE EMEIINE REDUVIID BUG EMESAYA BREVIPENNIS DOING  
IN ABANDONED SPIDER WEBS?  
Department of Biology  
Hamden-Sydney College

Emesaya brevipennis (Heteroptera, Reduviidae, Emeiinae) and other members of its subfamily have been frequently reported as inhabiting spider webs, but observations on what they do there are scanty. Field studies have shown that E. brevipennis does not survive more than 36 hours in tenanted spider webs, but prefers to locate in abandoned webs. In one Virginia site, the abandoned webs of Achearanea tepidariorum, Agelenopsis sp. and Latrodectus mactans are utilized. The bugs have not been observed feeding on spiders (though this has been reported for captive Emesaya) but appear to prey on small Diptera, including some which use spider silk as perching sites.

SIVARAMAN, S.  
CHANGES IN THE FUNCTIONAL RESPONSE AND PREY-PREDATOR  
INTERACTION OF PSEUDOSCORPIONS  
Department of Zoology  
Loyola College  
India

The components of prey-predator interactions are the rate of successful attack (a) and handling time ( $T_h$ ), involving the density factor and death-rate of the prey. Such functional response trials on six species of pseudoscorpions - Calocheiridius elegans, Geogarypus heterodentatus (Diplosphyronids); Tullgrenius indicus, Oratemmus indicus (Monosphyronids) and Comsadhia indica, Lechythia madrasica (Heterosphyronids), when exposed to five different prey - Drosophila larva, thrips, larva, Psocids, Drosophila adult and thrips adult varied in the two parameters (a &  $T_h$ ). The values of a and  $T_h$  were plotted for each predator species against different prey to advance the account for the observed relationships exist between diplosphyronids and monosphyronids than heterosphyronids.

The approximation of using modified random predator equation of Rogers (1972) to estimate  $a$  &  $T$  for pseudoscorpions is verified by subjecting the data to Chi - square goodness of fit test and is significant at 0.05 level. The co-existence of food preference and optimum predator-prey size relationships, and their influence on the prey - predator interaction of pseudoscorpions were discussed; the evolutionary significance of the predator behaviour and habitat selection were correlated with their prey - predator interaction.

STEVENSON, B. G.  
MICROHABITAT SELECTION OF *ENOPLOYNATHA OVATA* (CLERCK) (THERIDIIDAE)  
College of Environmental Science and Forestry  
State University of New York

No Abstract Provided

STRADLING, D. J.  
THE ECOLOGY OF THE TROPICAL ARBOREAL TARANTULA  
*AVICULARIA AVICULARIA*  
Department of Biological Sciences  
University of Exeter  
England

Various aspects of the basic biology and ecology of the theraphosid spider *A. avicularia* L. were studied in Trinidad, West Indies. This is an arboreal species which is commonly found in abandoned plantations, particularly of Tonka Bean (*Dipteryx odorata*) in the river valleys of Trinidad's Northern Range. A population of this species in one plantation was observed for a period of 18 months and showed a density of 40/Ha during this time. The well camouflaged retreats are built on the tree trunks between 2 and 3 metres above the ground and may be inhabited by the same individual for as long as three years. The seasonal pattern of occupation of retreats, weight changes and reproduction was investigated, with marked individuals. The maturation of males weight changes in adult females and production of eggs is strongly seasonal being geared to the production of young during the wet season.

Studies on the food and feeding patterns of this species show that it is a nocturnal 'sit and wait' predator. Eyesight apparently plays no part in prey detection which is achieved by vibration receptors in the metatarsi. The prey which consists largely of Katydid and small geckonid lizards is seized in a sudden rapid dash of great precision and no snare is used.

Courtship is not elaborate and no incidence of males falling prey to their mates was observed. Gestation and brooding last for up to two months.

The growth pattern of this species was studied by making comparative measurements of fang lengths in successive instars and relating these to instar duration. Maturity is reached by both sexes in the third year and at the XIVth or XVth instar.

A sexual dimorphism in the urticating hair type of adults is described and a possible reason suggested.

STRATTON, Gail E.  
BEHAVIORAL GENETICS OF A REPRODUCTIVE ISOLATING MECHANISM  
Department of Biology  
University of Cincinnati

Courtship behavior in *Schizocosa rovi<sup>er</sup>eri* (Araneae; Lycosidae) is distinct from its co-occurring sibling species *S. ocreata*. Sexual communication by sub-stratum coupled stridulation has been shown to be the critical factor in the reproductive isolation of these species. A forced mating technique using anesthetization of female species resulted in the production of normal offspring. Courtship in the hybrid males show elements of the courtship of both parental species. Laboratory pairings have shown that male hybrids will court other hybrids as well as parental species. Males of the parental species will court hybrids, conspecifics and heterospecifics with nearly equal frequency. Female hybrids show a low overall response to courtship from all groups, but tend to respond receptively more often to other hybrids than to the parental species. Crosses and backcrosses of the hybrids were attempted using the forced mating technique. The results of these crosses are presented.

TIETJEN, William James  
SANITARY BEHAVIOR IN THE SOCIAL SPIDER MALLOS GREGALIS  
Department of Biological and Environmental Sciences  
Georgia College

The organization of colony behavior depends not only on the behavioral repertoire observed in individuals, but also on physiological limitations evolution has imposed on the species. Such physiological restraints extend to the elimination of wastes by individuals which can affect the distribution of nutrients and parasites in the immediate environment. These by-products, in addition to prey remains, can have important consequences in social units of low vagility.

Mallos gregalis is one such group-living species of spiders in which thousands of individuals of both sexes and various age groups occupy a semi-permanent web. Data indicate that M. gregalis deposit excreta outside their area of cannibalism of injured or dead individuals, oophagy of infertile egg sacs and possibly an antifungal agent in the venom. Such behaviors are shown to reduce web-fouling in this species. In addition to the above data, an electronic recording method is described for monitoring animal distribution and activity.

TRAIL, Deborah Smith  
REPRODUCTIVE OUTPUT OF SOLITARY AND COMMUNAL SPIDERS  
Department of Entomology  
Cornell University

Philoponeilla oweni (Uloboridae) is a facultatively communal spider -- within the same habitat both solitary individuals and communal groups can be found. Communal females produced significantly more eggs per egg-case than solitary females. However, since communal females suffered from higher rates of egg-case parasitism from chalcidoid wasps, there was no significant difference in the average number of live offspring produced by solitary and communal females.

Among Uloboridae and Araneidae clutch size increases with increasing development of social behavior within a genus. In contrast, among the Eresidae, Agelenidae and Theridiidae clutch size decreases with increasing development of social behavior.

WISE, David H.  
AN EXPERIMENTAL STUDY OF PREDATION BY ARGYRODES TRIGONUM (THERIDIIDAE)  
UPON THE LABYRINTH SPIDER, METEPEIRA LABYRINTHEA (ARANEIDAE).  
Department of Biological Sciences  
University of Maryland Baltimore County

Argyrodes species inhabit the webs of other spiders, interacting with their hosts as commensals or kleptoparasites. Several investigators have also reported that some Argyrodes species may eat their host. In central Maryland the common Argyrodes trigonum has been found eating host species, including the labyrinth spider, Metepeira labyrinthea. Since the degree to which A. trigonum preys upon other spiders is unknown, I performed a field experiment to assess the possible impact of A. trigonum upon labyrinth spider populations. Replicated groups of M. labyrinthea were established on four unenclosed experimental units in the species' natural habitat. Each unit was a wood frame supporting wire fencing on which the introduced labyrinth spiders built their webs. Mature A. trigonum females were added to two of the units, and all four populations of the labyrinth spider were monitored for 18 days. Numbers of M. labyrinthea declined more rapidly on the units to which A. trigonum had been introduced. More dead labyrinth spiders were found in these populations, and on two occasions A. trigonum was observed eating its host. Twice A. trigonum was found in a web with a dead labyrinth spider. Indirect evidence suggests that losses from emigration may also have been higher in the presence of A. trigonum. The results of this experiment indicate that A. trigonum may be a significant mortality factor for M. labyrinthea. Labeling A. trigonum as a commensal is probably misleading.

TRAMBARULO, Anne  
PUBLIC ATTITUDES TOWARDS COCKROACHES AND THEIR POTENTIAL BIOLOGICAL CONTROL BY HETEROPODA VENATORIA L. (SPARASSIDAE).  
University of Florida.

Five neighborhoods of different socio-economic levels were surveyed in Gainesville, Florida in May 1981. The survey included questions about the extent and type of household cockroach problems, the esthetic injury level; household cockroach control practice, attitudes towards insecticides, cockroaches, and spiders in general, and willingness to introduce H. venatoria in houses for cockroach control.

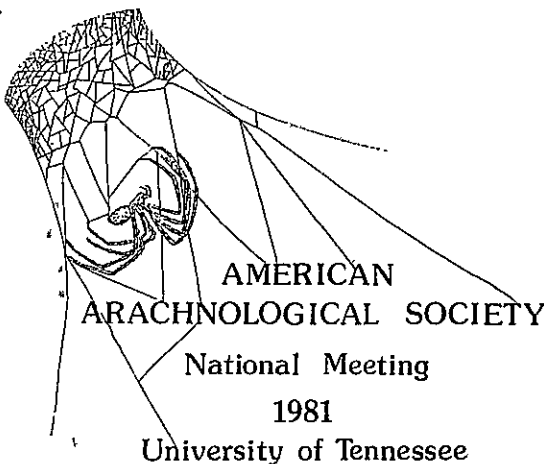
Cockroaches evoked a strong negative response (96% or 48/50), while 54% (27/50) felt neutral to very happy on seeing a spider in their home. This increased to 78% (39/50) when people knew the spider was eating cockroaches. 64% (32/50) said they would introduce H. venatoria into their home to control cockroaches after being shown the spider.

UETZ, George  
ARACHNID ECOLOGY -- INTO THE FIFTH GENERATION  
University of Cincinnati.

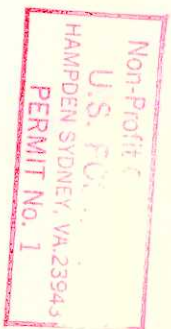
COCKERILL, James.  
MICROHABITAT SELECTION IN THREE SYMPATRIC HARVESTMEN SPECIES OF THE GENUS LEIOBUNUM AND ITS POSSIBLE RELATION TO FORAGING ACTIVITY, PREDATOR AVOIDANCE AND THERMOREGULATORY BEHAVIOR.  
University of Tennessee.

ZURCHER, Eric  
COMPARATIVE DESICCATION-RESISTANCE OF THREE SYMPATRIC SPECIES OF CRAB SPIDERS  
Department of Biology  
Utah State University

No Abstract Provided



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