AMERICAN ARACHNOLOGY

THE NEWSLETTER OF THE AMERICAN ARACHNOLOGICAL SOCIETY

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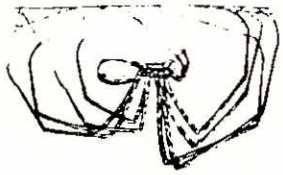

1987 MEETINGS

American Arachnological Society
to be held at Harvard University, Cambridge, Massachusetts

Dates: June 16, 17, 18 (Tues.-Thurs.) 1987. Field trip on June 19th.

Host: Dr. Herbert W. Levi, Invertebrate Department, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts 02138

Housing: Graduate student dormitories, across Oxford Street from the Museum. Cost will be approximately $27 per person per day. All rooms are singles. For many this is a steep fee; Those who have friends in the area may want to stay with them. On the other hand, commuting in and out of Cambridge can be a nuisance, whereas the dormitory is only a block from where the meetings will be held, and only a 5 minute walk from Harvard Square and the subway into Boston.

Parking: Daily parking permits for the Harvard University lots can be purchased for $3 at the time of registration.

Registration: Tentatively set at about $15 for students and $25 for faculty. We are making every attempt to pare this down to offset the relatively high price of housing and eating out in Cambridge. The registration fee will cover the handbook and registration packet, lecture hall and any set up fees, security officer or a projectionist if needed, and the opening night dinner and social.

Food: People will be expected to pay for their own breakfasts, lunches, the mid-morning and mid-afternoon breaks, and Wednesday night dinner. The cafeteria lounge across from the lecture hall is reserved for our use, and the management is willing to stock up on our needs and preferences (i.e., cheap, good, interesting). For those who want to explore the many and varied eateries in Cambridge, the registration packet will include a map and suggestions, as well as indicating nearby supermarkets. In addition, the dormitory is equipped with kitchen and lounge facilities on each floor. Anyone wanting to use these should bring their own cooking implements.

We anticipate that all will want to attend the Thursday night final banquet, a Boston Harbor cruise. Cost should not exceed $20 for the 3-hour sunset cruise and buffet dinner.

Field Trip: Friday, June 19th to Beaver Brook Reservation, Hollis, New Hampshire.

Check-in and Check-out Times: People may arrive as early as Monday, June 15th; check-out is by 9:00 a.m. Saturday morning, June 20th. We realize that the meetings are brief; for many they also represent a blast from the past. Many participants may not have the time to visit old haunts and get in all the sightseeing they had hoped. We therefore encourage you, if you can afford it, to come a day early.

A pre-registration form is enclosed in the center of your newsletter. Please complete and send this form to: Invertebrate Department, Museum of Comparative Zoology, 26 Oxford Street, Cambridge, MA 02138

SOCIETY BUSINESS

Board of Directors Election: William Eberhard was elected to the Board of Directors in this spring's election.

Society Archives: At the annual business meeting the society voted to transfer its newly formed archives to the Smithsonian Institution. The Smithsonian will maintain existing materials and receive new items donated to the archives. Vincent Roth was reelected as Society Archivist. Anyone who has material to donate to the archives should send them to Vincent (Box G, Portal Arizona 85632) who will then organize and send it to the Smithsonian.

IN THIS ISSUE --

AMERICAN ARACHNOLOGY is the newsletter of the American Arachnological Society and is sent only to society members. For information on membership, write: Dr. Norman I. 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.

Submission of items for AMERICAN ARACHNOLOGY or other correspondence concerning the newsletter should be directed to the editor, Dr. Brent D. Opell, Department of Biology, Virginia Tech, Blacksburg, Virginia, 24061, USA. Deadline for receipt of material for the fall issue of the newsletter is 24 September and for the spring issue, 24 March.

The society's executive committee recently voted in favor of the following items.

New Associate Editor of Journal of Arachnology: Jerome Rovner will replace William Peck as Associate Editor beginning 1 July 1987.

Anonymous Reviews Return: Effective immediately, reviewers for Journal of Arachnology are no longer required to sign their reviews. However, those who prefer to sign reviews may still do so.

Waiving Page Charges for Journal of Arachnology Articles: As announced earlier, the journal now has page charges for published articles. Decisions on reducing or waiving these charges for individuals unable to pay them will be made by the three Directors, using information supplied by the Associate Editor.

Exline-Frizzell Awards Committee: William Peck (Chairperson), Charles Dondale, and Matthew Greenstone will continue to serve on this committee for 1987. In 1988 the committee will consist of Gail Stratton (Chairperson), Charles Dondale, and Ann Rypstra.

1988 MEETING

The 1988 American Arachnological Society meeting will be held at New Mexico State University, Las Cruces, New Mexico. David Richman, Department of Entomology and Marsha Conley, Department of Biology will host the meeting, which will be held on 28, 29, and 30 June. Anyone interested in organizing a symposium should contact David Richman.

SPIDERS: WEBS, BEHAVIOR, AND EVOLUTION

Edited by WILLIAM A. SHEAR

This book, written by sixteen internationally recognized arachnologists, provides an up-to-date summary of what is known of the relationships of spiders to their webs, and the light cast by those relationships on the evolution of spiders--particularly as regards the constraints of behavior on evolution. The book confronts such fundamental questions as whether web-building spiders evolved from hunting spiders or vice verse.

There are contributions on web-site selection, webs as sensory transducers, and the effects of web geometry on prey-catching efficiency; and an entirely new field of research is opened by a chapter on how spiders take down their webs. Several chapters focus on orb-webs, those familiar and spectacular architectures of the garden, which provide insights into the evolutionary history of the spiders that weave them, and into what happens to spider behavior when spiders evolve "beyond the orb-web." Two chapters deal with the varied webs constructed by social spiders and how the web has facilitated and/or constrained the development of social behavior. Three others make detailed surveys of silk use in unusual groups of spiders (Mygalomorphae, Uloboridae, and Salticidae). The final chapter, a major new statement, summarizes the research on web evolution and stakes out new areas for future research.

There is an extensive taxonomic glossary to all families and genera of spiders mentioned in the text, with references to further information on their taxonomy and biology. The book is illustrated with 119 photographs (including many unusual web constructions) and 68 line drawings.

Shear, W. A. (editor). 1986. Spiders: Webs, Behavior, and Behavior. Stanford University Press, Stanford, California. 520 pages. ISBN 0-8047-1203-4. Price $55.00.

CONTENTS

NOTICES AND REQUESTS

SPECIMENS NEEDED -- OPILIONES FROM CUBA

Luis F. de Armas (Academia de Ciencias de Cuba) and I are presently studying the Gagrellidae from the Greater Antilles and desire further materials and records from Cuba, Jamaica, and Hispaniola. We would also appreciate hearing from anyone (museum or individual) that has opilionids (all families) from Cuba for future studies. Please write to: James C. Cokendolpher, Department of Entomology, Texas Tech University, Lubbock, Texas 79409.

SICK ARACHNIDS??

Insect pathologist Carlo Ignoffo and I are trying to broaden our basic knowledge of *Nomuraea atypicola* and other arachnophilous fungi. If you find dead or dying animals with fuzzy or powdery coverings, we would appreciate receiving them for culturing. Please send them dry, (not in preservative!) to: Matt Greenstone, USDA, BCIRL, P.O. Box 7629, Columbia, MO 65205.

RESEARCH REPORTS

Joseph Beatty
Department of Zoology
Southern Illinois University
Carbondale, Illinois 62901

Right at the beginning of my work with spiders I quite accidentally became much involved with spiders on islands, and this interest continues.

My 25-year study of spiders on the Lake Erie islands has been terminated, and a paper on part of it is in press. I presented a discussion of the results at a Symposium on Biogeography at Ohio State University in summer of 1985.

During Dec. 1984 and Jan. 1985 I spent three weeks on Penang Island, Malaysia. With the help of a former student, Zairi Jaal, I was able to get about 60 *Liphistius*. I expected difficulty in locating their habitat or burrows, but there was none. They seem common on Penang. I found them every time I looked for them (not, of course, at every site I examined). Two brief trips to the mainland were less successful, though a few were found at Kedah Peak. Two specimens, an adult female of each of the two Penang species, are still living.

Last spring semester I taught a graduate level arachnology course for 3 students. One of them, Dan Mott, is working on a revision of North American mimetids, and another, Stephen Keffer, is doing non-thesis research on spiders with me. All four of us attended the Society meeting last summer.

At the end of December I will be going on sabbatical, and plan to join Jim Berry for more collecting in the Pacific. I also hope to get to Paris, London and Hamburgh to examine museum material.

Norman Horner
Department of Biology
Midwestern State University
Wichita Falls, TX 76308-2099

It seems that the majority of my time is spent teaching and doing paper work; however, I do have a couple of "active" spider projects.

Cathy Tugmon, a masters' candidate, is doing her thesis research on spider karyotypes. She is primarily working with salticids and using 5 day old eggs. The technique followed is essentially that outlined by Matsumoto in 1977. (An observation of Somatic Chromosomes from Spider Embryo-Cells. Acta Arachnol. 27:167-172). To date, she has successfully karyotyped 8 species of salticids. If everything goes as planned, Cathy will be presenting the results next summer at the Harvard Meeting.

Dr. Fred Stangl, a colleague, and I observed a large population of *Salticus austinensis* Gertsch under a rock ledge overhanging the shoreline of a local reservoir a couple of years ago. At that time, we were surprised to see so many in such close association. This past spring Fred discovered another population on the brick siding of his home. We certainly do not consider ourselves behaviorists; however, some interesting observations have been made. For example: 1) They appear to forage almost exclusively on vertical and inverted surfaces. 2) Intra-specific interactions are characterized by mutual avoidance and cannabalism appears to be nonexistent. 3) They feed almost exclusively on soft-bodied dipterans. 4) Where populations of *S. austinensis* are found, *Metacryba undata* (DeGeer) appears to coexist with it. 5) Temperatures during our periods of observation ranged from 70°F to 102°F and seemed to have no major effect on spider activity. We anticipate that further observations will result in some useful and interesting notes on its biology.

We would be delighted to hear from anyone who could help us with these little guys.

Yael D. Lubin
Institute for Desert Research
Ben-Gurion University of the Negev
Sede Boqer Campus
84990, Israel

The move from Neotropical rainforest to Middle Eastern Desert involved many readjustments. On the 'plus' side, working in the canopy of a desert shrub habitat is certainly easier than in tropical rainforest canopy, and one needn't worry about stinging *Paraponera* ants, or ticks and mosquitoes. The 'minuses' are that field work is more strictly regulated by climate (only 'mad dogs and Englishmen go out in the midday sun'), and the lack of stinging and biting arthropods is compensated by the prevalence of highly poisonous snakes.

One cannot help but be amazed at the diversity of adaptations to this extreme desert environment. In general, the behavioral and life history adaptations of arthropods to deserts are poorly understood. The widow spiders, *Latrodectus*, seemed like a good place to start: There are many species in Israel, and some of these are strictly desert-adapted. (The systematics of the Israeli species is well known, thanks to a recent revision of the genus by G. Levy and P. Amitai). *Latrodectus revivensis* is one such species; it is apparently restricted to the Negev desert, but also overlaps with two other species, *L. pallidus* and *L. tridecimguttatus*, which have broader ecological and geographic distributions. My approach to studying the evolution of desert adaptations in this group is (1) to investigate the cause and effect relationships between environmental factors and behaviors, and (2) to compare behaviors among the three species.

L. revivensis and *L. pallidus* have similar web structures. These webs are specialized traps for ambulatory, terrestrial arthropods. However, the details of web structure, website selection and placement of webs differ in the two species, as do some aspects of their life histories. Since the web has many functions in the life of the spider, I contend that web design (structure, websites and placement) is critical and will be under strong environmental selection. Consequently, I have chosen to test ideas about the influence of environmental factors on behavior by examining web design (in the broad sense) in these two species, with the emphasis on mechanisms of adaptations in *L. revivensis*.

I am looking at adaptations relating to four main functions of the web: prey capture, microclimate control, reproduction, and protection from predators or parasites. (1) *L. revivensis* webs are located on isolated shrubs that may serve as foci for arthropod activity. I am investigating web and website characteristics, web orientation, and movement of spiders between websites with respect to food supply. (2) Webs of both species have cone or funnel-shaped retreats, placed high in shrubs, in which the spiders sit during the day. *L. revivensis* decorates the outer walls of the cone with prey remains, while *L. pallidus* uses stones, sand and twigs. Do these function in regulating the microclimate within the retreat? Preliminary measurements indicate that they do. (3) Males often inhabit webs of adult and subadult females, sometimes adding their small webs to those of the females. Movements of females between websites may be related to the presence or absence of males. In addition, "eggsac webs" of mature females are structurally different from webs of previous instars. The significance of these differences is not clear. (4) Protection from predators is perhaps the most difficult function to observe. Egg predators do exist. As with most of these functions, manipulations of webs and websites should yield answers to many of the questions.

David Wise
Department of Biological Sciences
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Baltimore County Campus
Catonsville, MD 21228

Currently, I am working on a book entitled "Spiders in Ecological Webs", to be published by Cambridge University Press as a contribution to the series Cambridge Studies in Ecology. In this book I will examine what we know about the position of spiders in ecological communities, simultaneously discussing and analyzing several broad issues in population and community ecology. One major focus, for example, will be the role of manipulative field experiments—their virtues and limitations—in ecological research. The book will be addressed to the general ecological community, the goal being to reach a diverse audience. In the process of treating topics of general ecological interest, I hope also to inform fellow ecologists about the importance and place of spiders in natural communities, perhaps winning converts to our ranks in the process. In order to make the book as current as possible when it is published, I would like to incorporate the most recent research on spider ecology. Thus I would appreciate receiving copies of any manuscripts you have in press and hearing about current research—your own, your students or that of colleagues.

Last month I returned from almost 15 months in Europe, having spent my sabbatical with Matthias Schaefer in Goettingen, West Germany. The year was highly productive and rewarding. I addition to collaboration and numerous discussions with Prof. Schaefer, I had the opportunity to visit and meet with many European arachnologists and ecologists. I initiated two projects (in addition to my book) while in Goettingen: 1) a field experiment to follow the decomposition rates of different types of leaf litter in a beech forest, and 2) development of a mathematical model of energy flow through the decomposer community that Prof. Schaefer, his students and colleagues have been studying for several years. I am re-orienting my research to the study of interactions in complex assemblages of species, and used my sabbatical to explore the feasibility of working with terrestrial decomposers and their natural enemies. I have not abandoned spiders, as they are major predators in such communities. My future research will deal with spiders as one compartment, albeit a major one, of the systems to which they belong.

Before going on sabbatical I initiated research on the intriguing color polymorphism exhibited by the theridiid *Enoplognatha ovata*. My Ph.D. student, Paul Reillo, is continuing this research with the support of a NSF Predoctoral Fellowship.

I hope to hear from many of you about ongoing ecological research that should be included in the book I am writing. I want to make it as complete and up to date as possible, and will appreciate any help you can give me in incorporating the latest findings.

1986 C.I.D.A. MEETING REPORT

by B. Opell

The tenth International Arachnological Congress, was held from 2-7 September 1986 in Jaca, Spain; a town of approximately 12,000, located in the Pyrenes of north central Spain. The meeting was hosted by Maria Rambla, Enrique Balcells, Jose Barrientos, Eugenio Ortiz, Cesar Pedrocchi, Carles Ribera, Carmen Urones, and Miguel Ferrandez.

The congress opened with a poster session, a reception hosted by Jaca's mayor, and a tour of the city. Each of the remaining four meeting days

began with a major address, included paper presentations, and concluded with a discussion. On the first day Rainer Foelix opened the meetings with a presentation on recent developments in spider neurobiology, on the second day Rainer Blanke discussed homologies in spider mating behavior and their usefulness in systematics, on the third day Patrick Blandin discussed the spatial and temperal structure of spider communities, and on the final day Jochen Martens summarized recent research in opilionid systematics, emphasizing the importance of genitalic characters. Concluding discussions focused on analogies and homologies in sensory and glandular structures of arachnids (lead by R. Legendre), ethospecies and ethological patterns as interspecific barriers (lead by L. Vlijm), spatial and temperal distribution patterns in arachnid fauna and methods for apraising them (lead by E. Duffy) and, methods of establishing serial relationships (lead by N. Platnick).

Jaca's many cafes and bars afforded opportunities for less formal discussions of these topics as well the 70 papers and 18 posters that were presented. Following the first two days of paper presentations, the congress excursion provided a chance to see surrounding regions. This excursion began with a visit to Santa Cruz de la Seros and a tour of its romanesque church. A winding road next took us to tenth century monastery at San Juan de la Pena and then to the high plane where a "new" monastery was build in the late seventeenth century to replace it.

The congress ended with an elaborate banquet, complete with an exhibition of traditional dancing. Many participants departed the following day, although about 30 stayed for a three-day, post-congress excursion that featured visits to villages and collecting stops in a variety of habitats. The next congress will be held in Turku, Finland and will be hosted by Pekka Lehtinen.

1986 A.A.S. MEETING

Meeting Report

by B. Opell

From 19 to 21 June, approximately 62 arachnologists gathered at Lindenwood College, St. Charles, Missouri for the society's 1986 meeting. Bill Tietjen, Alan Cady and L. Rao Ayyagari, all of Lindenwood, hosted the meeting and introduced its participants to the local night life. St. Charles is an old riverfront town on the Missouri River, not far from St. Louis. Lindenwood College entered the picture in 1827 and remains a pleasant, quiet campus -- even when invaded by arachnologists.

The 32 papers presented at the meetings gave participants a chance to learn about the latest findings of familiar research programs. For example, Allen Brady spoke about new problems and solutions in Lycosid systematics, Jonathan Coddington and Claudia Sobrevila told us that dinopids can use both forward and backward web strikes to capture prey, George Uetz informed us that there are really three species of colonial Metepeira, and Graeme Wilson showed that jumping spiders can see red. Many of the papers introduced new topics. Bret Beal showed that members of the fossil order Kustarachnida are really opilionids, Petra Sierwald demonstrated the usefulness of ontogenetic evidence in studies of spider genitalia, and Linda Rayor described the impact of damselfly predators on web site tenacity and reproductive success of pholcids.

Mat Greenstone raised our concern about spider hygiene by demonstrating their susceptibility to fungus and Jerry Rovner restored some peace of mind by showing that the setae and behaviors of many ground-dwelling spiders help prevent them from drowning during floods. As always, the creativity and quality of student papers provided good models for us all. For example, Jeff Schultz presented an elegant analysis of Dolomedes aquatic an terrestrial locomotion, showing that leg coordination in spiders is achieved by ipsilateral rather than diagonal intersegmental nervous coupling. Giselle Mora described an intriguing opilionid species whose males construct nests and guard eggs.

The meeting concluded with a banquet and an evening session during which Lenny Vincent presented an illustrated tribute to B.J. Kaston. This session also included presentations of the latest para-arachnological research. Employing their well-known "deadness index", Bill Tietjen and Alan Cady discussing the ability of spiders to withstand submergence in various liquids and Jerry Rovner provided evidence for the monophyly of primates and arachnids.

Field Trip Report

by B. Vogel

Lincoln Hills, in the Cuiver River State Park, was the site of the field trip for the national AAS meeting. Lincoln Hills is a limestone highlands that drops eastwardly to the mighty Mississippi and has probably served as a refugium from the ice sheets. Biologically this area is very similar to the famous Ozarks located to the south and contains a great diversity of habitats: hardwood forests, eastern-type prairies, dry brushy ridges and deep cool ravines flowing with cool clear streams.

Our first stop was at Sac Prairie, one of the open grasslands managed by controlled burning. It was a gently undulating area of a few acres with an interesting diversity of vegetation. The spider fauna, alas, was not so diverse -- *Hyctia, Metaphidippus* and *Dictyna*. It is my opinion that burning, which may be benign for small vertebrates, can be disasterous for arthropods.

The next brief stop was at one of the cool ravines with a clear flowing stream (Little Sugar Creek?). Collecting here was also on the meager side, as the creek had recently been scoured by a flood which rose to 6-10' above streem's current level. Those who went upstream said they found *Pardosa*, but I went downstream and found nothing on the gravel bars, or under rocks. I found *Xysticus* and *Micrathena* high up on the greenery, until I was blocked by the dread P.I.

The final stop at a picnic shelter gave access to a hardwood forest, forest creek, open sunny forests and dry brushy ridge trail. We all scattered in different directions, collecting merrily until lunch time. The catch included *Neoantistia, Dolomedes, Lecauge*, gnaphosids, *Microthena, Teutalena elegans, Oxyopes sclaris, Phidippus johnsoni, Tetragnatha, Mimetus, Philodromus, Argyrodes, Steatoda, Pirata, Tegenaria* and opilionids. Not a bad sample for a half day outing. I would have preferred a few more hours in Cuivre River Stat Park, but the bus had to return to the barn.

STUDENT PAPER AWARDS

This year's first place student paper award was given to Jeffry W. Schultz, Department of Anatomy, University of Chicago for his paper entitled "Walking and surface film locomotion in terrestrial and semi-aquatic spiders." Giselle Mora, Department of Zoology, University of Florida, received the second place student paper award for her paper entitled "Nest Construction and nest acquisition strategies of daddy long legs with male egg guarding behavior."

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ABSTRACTS

Bret S. Beal (University of Michigan) 1
REINTERPRETATION OF THE KUSTARACHNIDA.

Petrunkevitch erected the order Kustarachnida to accommodate three poorly preserved Carboniferous arachnid fossils. Re-examination of these specimens indicates that several features cited as diagnostic of kustarachnids (pedicel; chelate pedipalps; pedipalpal coxae fused medially; double trochanters) are misinterpretations of the fossil material. Other characters (e.g., triangular coxae; legs long and slender; two eyes on median tubercle) suggest that these fossils are actually opilionids. One feature, a three-segmented "pygidium" on one specimen, is not observed in extant opilionids, but it may be plesiomorphic for the order. The name Kustarachnida should be regarded as a *nomen nudum*. This reinterpretation is pertinent to clarifying arachnid ordinal relationships.

Allen R. Brady (Hope College) 2
SYSTEMATIC PROBLEMS IN THE LYCOSINAE

Over 50 species of medium to large size wolf spiders from the Nearctic Region have been placed in the genus *Lycosa*. Recent studies indicate that several distinct genera are included in *Lycosa*. Roewer (1958, 1959) established 51 new genera of Lycosinae based primarily upon differences in

the number of posterior cheliceral teeth and the arrangement of the eyes in the anterior row. My investigations of North American Lycosinae indicate that color patterns on the dorsal surface of the carapace, length of legs relative to body size, and the structure of the male and female genitalia are most reliable in determining generic relationships. The new lycosid genus *Gladicosa* has been established based upon these characteristics. Measurements of eye arrangement, leg lengths, and bodily dimensions are not necessary for differentiating species, but they are very useful in establishing species groups and genera.

John A. Bruce (Washington State Univ.) & James C. Carico (Lynchburg College) 3
SEXUAL BONDAGE IN SPIDERS: THE MATING BEHAVIOR OF *PISAURINA MIRA* (WALICK.) (PISAURIDAE)

The mating behavior of the nursery web spider *Pisaurina mira*, is described for the first time. These spiders mate while suspended from draglines as in *Oxyopes heteropthalmus* (Latr.) and *Peucetia viridens* (Hentz). The unique feature of the mating in *P. mira*, however, is the male's use of a veil of silk to wrap the female's legs I and II into a folded position. Mating is accomplished in a version of position II with bodies in a right angle as the female is cradled by the male's legs. The use of silk to "tie" the female is known elsewhere only in *Xysticus*.

James E. Carrel (University of Missouri-Columbia) 4
THE SPIDER HEART AS A PHYSIOLOGICAL INDICATOR

Evidence that a spider's heart is a major indicator of its physiological condition will be reviewed. The influence of exercise, temperature, dietary toxins, and other stimuli on spider cardiac frequencies will be presented. Finally, the controversy over the relationship between resting heart rates and resting metabolic rates in spiders will be discussed.

Jonathan Coddington and Claudia Sobrevila (Smithsonian Institution) 5
TWO STEROTYPED ATTACK BEHAVIORS IN *DINOPIS SPINOSUS* MARX.

A series of experimental manipulations documents that *Dinopis spinosus* Marx has at least two sterotyped attack behaviors. In "backward" strikes the spider expands the net backward over its cephalothorax and away from the substrate; these strikes capture aerial prey. Vibratory stimuli are necessary and sufficient to elicit backward strikes. In "forward" strikes the spider expands the web downward and forward against the substrate; these strikes capture walking prey, and visual rather than vibratory stimuli are more effective. The mechanisms enabling each type of strike and the extraordinary extensibility of the web are described. This work resolved a long-standing controversy in the literature over the manner in which dinopids catch prey.

Matthew H. Greenstone, Carlo M. Ignoffo (U.S.D.A., Biological Control of Insects Research Laboratory, Columbia, Missouri) and Robert A. Samson (Centraal Bureau Voor Schimmelculture, Baarn, The Netherlands). 6
SUSCEPTIBILITY OF SPIDER SPECIES TO THE FUNGUS, *NOMURAEA ATYPICOLA*.

The fungus *Nomuraea atypicola* has been associated with spiders but reported only sporadically from a few species in anecdotal field accounts. We tested twenty species in ten families of spiders and one species of harvestman for susceptibility to the fungus. Our results show that spiders, and possibly arachnids generally, are widely susceptible to the fungus.

Craig S. Hieber (University of Florida) 7
MORE CONTAINER SCIENCE: WATER, FUNGUS, AND DROWNING

The ability of the cocoons of *Mecynogea lemniscata* and *Argiope aurantia* (Araneidae) to control fungal attack and drowning were examined. The results of laboratory and field experiments indicate that the component parts of these cocoons do not conduct water toward or into the cocoon. How this relates to fungal attack is unclear. The cover and suspension system of *M. lemniscata* cocoons play no role in controlling fungal attack in the egg stage, although the cover is important in the spiderling stage. The suspension system of this cocoon is also important in protecting eggs and spiderlings from drowning. In contrast, the cover and suspension system of *A. aurantia* cocoons play no role in protecting either the eggs or spiderlings from fungal attack or drowning. The observed differences between the two cocoons may be related to cocoon size and the thickness of the flocculent silk layer within the cocoons.

Maggie Hodge (University of Cincinnati) 8
THE RELATIONSHIP BETWEEN AGNOSTIC BEHAVIOR AND SPATIAL ORGANIZATION IN DESERT AND TROPICAL *METEPEIRA* SPP. FROM MEXICO.

Populations of *Metepeira* spp. from desert and tropical regions of Mexico show varying degrees of social behavior. Recent work suggests that differences in spacing behavior are genetically controlled and that spacing seems to be maintained by aggressive interactions between individual spiders. This research examined the relationship between agonistic behavior and spacing in populations of these spiders raised under identical conditions of space and food availability in the laboratory. These studies found that individuals from the desert population show a greater tendency to behave agonistically towards conspecifics, whereas the tropical spiders show a high level of tolerance for one another. Interaction strategies used in disputes over web sites were found to differ in tendencies to escalate to conflict and to abandon a fight. Continued studies in the field should give us some ideas about how different behavioral strategies can evolve in different environments.

J. K. Johnson (University of Kansas) 9
SHEDDING OF PHOTORECEPTOR MEMBRANE IS DEPENDENT UPON LIGHT IN THE OPILIONID RETINA.

Shedding of photoreceptor membrane occurs over a 24-hour period in *Mesosoma roeweri* (Opilionida: Palpatores) and *Vonones ornata* (Opilionida: Laniatores). Animals from both species were dark-adapted (DA) for periods of 2, 26, 50, 74, and 98 hours beyond normal light onset. Additional animals were DA 98 hours then given 30 minutes of light; 30 minutes of light followed by 60 minutes of dark, or 90 minutes of light and fixed. Results indicate two spatially distinct shedding pathways exist in *V. ornata* (intracellular and intercellular), whereas only one pathway exists in *M. roeweri* (intracellular). The intracellular pathway is atenuated by the prolonged absence of light in both species. However, intercellular shedding in *V. ornata* is unaffected by the prolonged absence of light, but is reset to zero and the rhabdom is structurally rejuvenated by a 30 minute pulse of light.

David A. Landes, James Hunt (University of Missouri-St. Louis), and Alan B. Cady (Lindenwood College) 10
SEASONAL AND LATITUDINAL VARIATION IN SPIDER PREY OF THE BLUE MUD DAUBER *CHALYBION CALIFORNICUM*

Spider prey of the Blue Mud-Dauber, *Chalybion californicum* (Saussure) in eastern Missouri included 15 species representing 4 families. Araneidae was the most diverse family, with 9 species, but Theridiidae was more numerous, with *Steatoda americana* (Emerton) outnumbering all other species combined. Theridiidae constitute a majority of the total individuals in both this survey and a similar survey from Maryland; corresponding studies in southern Oklahoma and Florida yielded high proportions of Araneidae. The present study resembled the two southerly sites in having more species of Araneidae than any other family, while the most northerly survey found more species of Theridiidae. Latitudinal patterning of these differences suggests that analysis of the spider prey of mud-dauber wasps may provide insights into the biogeography of spider diversity.

Gary L. Miller and Patricia Ramey Miller (Weber State College) 11
REPRODUCTIVE BIOLOGY AND COURTSHIP BEHAVIOR OF *GEOLYCOSA TURRICOLA* (TREAT).

The results of field and laboratory studies of the reproductive cycle and courtship behavior of the obligate burrowing spider *Geolycosa turricola* are reported, and comparisons are made to the reproductive patterns of other lycosids. Some components of the typical lycosid male courtship, such as palpal displays and palpal drumming, are absent or reduced. Modifications in other displays are described. A cohabitation phase (immature female with mature male) is described and its significance discussed. *Geolycosa* reproductive biology is discussed in terms of limitations related to burrowing.

Giselle Mora (University of Florida) 12
NEST CONSTRUCTION AND NEST ACQUISTION STRATEGIES OF DADDY LONG LEGS WITH MALE EGG GUARDING BEHAVIOR.

Zygopachylus albomarginis (Opiliones:Gonyleptidae) is the only arachnid known to have paternal care. Males build nests out of mud and tree bark or take over previously-constructed nests. Females court males and lay eggs inside the nests. I will present observations on the natural history and reproductive biology of this species and will discuss nest acquisition strategies of males under different ecological conditions.

Brent D. Opell (Virginia Tech) 13
CHANGES IN FORCE ASSOCIATED WITH WEB REDUCTION IN THE SPIDER FAMILY ULOBORIDAE.

Resting and maximum force measurements were taken of a developmental series of *Hyptiotes cavatus, Uloborus glomosus, Miagrammopes animotus, Miagrammopes pinopus,* and a undescribed Costa Rican *Miagrammopes* as they hung from a thread spun between the glass needle and fixed support of a strain gauge. Both carapace length and spider weight were used as an index of size. When regression analyses of resting and maximum forces were compared, *H. cavatus* exerted the greatest relative force and *Miagrammopes* species the least. Within the genus *Miagrammopes*, the species with the most highly modified carapace expressed the greatest force.

William J. Pfeiffer (Center for Energy and Environmental Research, University of Puerto Rico) 14
COMMUNITY STRUCTURE AND POPULATION DYNAMICS FOR SPIDERS OCCUPYING THE LITTER LAYER OF A PUERTO RICAN RAINFOREST

Litter arthropods from a subtropical wet forest in the Caribbean National Forest were censused with a D-Vac suction sampler at roughly 40-day intervals for one year. The 40 samples collected at each interval were subjected to Tullgren extraction and manual sorting. The spider community was characterized by: a) a low species richness (20 species from 12 families), b) high community densities (mean annual density - 354 m^{-2}), c) numerical domination by two species, a pholcid and an ochyroceratid, which account for 62% of over 4300 specimens, d) the lowest annual variability of community density in available literature, and e) reduced body size for the community as a whole, suggesting high turnover rates and production/biomass ratios. Spider densities were significantly related to litter standing crop and potential prey densities. The high proportional representation of spiders in this arthropod community has also been noted for other Puerto Rican habitats (secondary growth vegetation) in previous studies. Standing stock estimates based on morphometric regressions and preliminary production values from the size-frequency method will be presented.

Norman I. Platnick (American Museum of Natural History) 15
THE TIBIAL AND PATELLAR GLAND OF THE LETTONETIDAE

Linda S. Rayor (Department of Systematics & Ecology, University of Kansas, Lawrence, Kansas) 16
EFFECTS OF DAMSELFLY PREDATION ON PHOLCID SPIDER FITNESS AND WEB SITE TENACITY.

The large neotropical damselfly, *Mecistogaster modestus*, preys exclusively on small web-building spiders in the rainforest. One pholcid spider species, *Modisimus* sp. C, receives 55.3% of the damselfly predation attempts, but escapes from 51% of those attacks. Pholcids in sunflecks and gaps are subject to much greater predation risk than pholcids living in shadier areas with a denser canopy, because the damselflies only forage in direct sunlight. However, the insect prey available to the spiders appears to be greater in the sunnier areas. I am examining the effects of the conflicting pressures of predation risk and food acquistion on the pholcids' web-site tenacity and reproductive fitness. I will discuss aspects of this predator-prey system, and results from my first field season.

Jon Reiskind (University of Florida) 17
LYCOSA ERICETICOLA, A NATIVE FLORIDAN WOLF SPIDER

The entire range of the Rosemary Wolf Spider, *Lycosa ericeticola* Wallace, is a compact area of about 2500 hectares in north central Florida. Its distribution is almost entirely found within that of the evergreen shrub Rosemary, *Ceratiola ericoides.* The distinctiveness of the male genitalia of *Lycosa ericeticola* makes it easy to distinguish from its congener and close relative, *L. ammophila.* The overall appearance of these two species is very similar (if not identical) and both are found in the Rosemary habitat but they have never been found sympatric. The cause of this exclusionary pattern of distribution is not known but may be historical or due to some sort of competitive interaction. A third member of the species group, *L. timuqua,* is found in association with both of these species although with a slight difference in preferred substrate (on leaves rather than open sand).

Jerome S. Rovner (Ohio University) 18
DENSE SETAL DISTRIBUTION AND REDUCED LOCOMOTION ENHANCE FLOODING SURVIVAL IN INLAND TERRESTRIAL SPIDERS

Three of six species of spiders collected from webs under stones showed no apparent effects of a 1-hr submergence. These spiders had dense coats of hydrofuge hairs on the opisthosoma that trapped an extensive air store. This bubble prevented entry of water into the respiratory openings and provided a small oxygen supply and short-term physical gill. The hydrofuge hairs also enabled the spiders to float high and dry on the surface after being buoyed up by the bubble. The slower and reduced locomotion of these spiders during submergence probably further reduced their already low oxygen needs. Four aerial web weavers fared poorly when submerged, especially two araneid species, which had sparse setae yielding little or no air store. These and previous data suggest that setal density in terrestrial spiders relates partly to drowning resistance.

Ann L. Rypstra (Miami University, Hamilton Ohio) 19
A COMPARISON OF THE FORAGING SUCCESS IN SOLITARY AND AGGREGATED SPIDER WEBS

Recent foraging theories have taken into account both the mean and variance associated with food intake. These theories predict that hungry individuals should select the foraging mode with the greatest variance (risk prone) so that they have some probability of meeting their metabolic needs. Observation of foraging success in spiders indicate that mean capture success is similar between individuals and aggregates. However, variability in daily food intake is much greater for solitary spiders than for those in groups. Similar results were obtained in prey introduction experiments. Insects entering groups were frequently captured by the second or third spider they encountered, whereas spiders in lone webs either captured their prey or lost it. Since spiders in the temperate zone only seem to aggregate in areas of high prey, these results are consistent with risk sensitive foraging theories.

William A. Shear (Hampden-Sydney College) 20
EVOLUTION OF THE OPILIONID SUPERFAMILY ISCHYROPSALIDOIDEA

A cladistic analysis of the opilionid superfamily Ischyropsalidoidea revealed three groups of genera, each probably monophyletic, and recognized here as families. The family Ischyropsalididae Simon is redefined to include only the genus *Ischyropsalis*, the family Sabaconidae Dresco is expanded to include *Sabacon* (= *Tomicornerus*, new synonymy) and *Taracus*, and the family Ceratolasmatidae is described as new for the genera *Ceratolasma, Hesperonemstoma, Crosbycus*, and *Acuclavella*, new genus.

Jeffrey W. Shultz (University of Chicago) 21
WALKING AND SURFACE FILM LOCOMOTION IN TERRESTRIAL AND SEMI-AQUATIC SPIDERS

When moving on solid substrates, most spiders use a gait characterized by alternation in the stepping of intrasegmental and adjacent ipsilateral legs and synchronous stepping of diagonally adjacent contralateral legs (the alternating tetrapod gait). Surface film locomotion in the semiaquatic spider *Dolomedes triton*, however, is accomplished through synchronous movements of intrasegmental legs and nearly synchronous movements of adjacent ipsilateral legs. Comparison of this "natural experiment" in coordination with terrestrial and surface film locomotion in a terrestrial lycosid indicates that interleg coordination in spiders is governed by two distinct coupling mechanisms: intra- and intersegmental mechanisms. The intersegmental mechanism appears to be arranged ipsilaterally, not diagonally as the logic of the alternating tetrapod model implies. Similarities of surface film locomotion in *D. triton* and the terrestrial spider suggest that rowing in the semiaquatic spider is a mosaic of primitive and specialized features.

Petra Sierwald (Smithsonian Institution) 22
ONTOGENY OF THE FEMALE COPULATORY ORGANS IN PISAAURIDS

The development of female copulatory organs has been studied by collecting the molted skins of specimens of $Dolomedes tenebrosus, *D. scriptus* and *Pisaurina mira*. For these species complete sets containing 3 to 6 primordial stages have been found. The number of stages may vary within a species as observed in *P. mira*. In addition, late primordial stages in other *Dolomedes* species, *Tinus peregrinus* and several species of *Thalassius* were included. The female copultory organs invaginate as two lateral, longitudinal folds. The inner edges of the folds, which will form the vulva, are differentiated in distinct areas. The position of the future receptaculum seminis can be identified even in the first stage. In order to judge the plesiomorphic versus apomorphic value of the observed features, equivalent studies in other families (Lycosidae, Oxyopidae, Ctenidae, etc.) are needed.

Scott A. Stockwell (Texas Tech University) 23
THE IDENTITY OF *ENTRUROIDES VITTATUS* (SAY)

The scorpion, *Buthus vittatus* Say, 1821, has not been correctly identified in the literature since its description. This name, in its various combinations, has been erroneously applied to a species from Texas, color variants of which were later described as *Centruroides chisosaurius* Gertsch, 1939, and *Centruroides pantheriensis* Stahnke, 1956. The taxon from Florida and Georgia, originally described by Say, was subsequently described by Banks (1904) as *Centrurus hentzi*. It is the purpose of this contribution to elucidate the taxonomic history of these two species and to restore their respective valid names.

Gail E. Stratton (Albion College) 24
& Wayne P. Maddison (Harvard University),
SOUND PRODUCTION IN SALTICIDAE: ABLATION EXPERIMENTS IN *HABRONATTUS*, WITH COMPARISONS TO OTHER GROUPS.

Stridulating male jumping spiders in the *Habronattus agilis* species-group have a file on the back of the cephlothorax and stout, curved setae on the front of the abdomen. Compared to the non-stridultors, stridulators have modified sclerites around the pedicel, and much more massive muscles running from the lorum to the carapace apodeme and from the side of the pedicel to the epigastric plate. Sound mostly below 3500 Hz is produced during courtship when the abdomen is vibrated up and down against the carapace. When most of the scraper setae are ablated, the sound is diminished but not entirely extinguished. Stridulation may have evolved from the common salticid behavior of abdomen bobbing. Sound production in Salticidae is more common than formerly believed, with at least 11 species producing sounds.

Robert B. Suter, Cari M. Shane, and 25
Andrea J. Hirscheimer (Vassar College)
SPIDER VS. SPIDER: FRONTINELLA DETECTS ARGYRODES KAIROMONES

Bowl and doily spiders (*Frontinella pyramitela*: Linyphiidae) construct webs that they occasionally must share with a kleptoparasitic theridiid, *Argyrodes trigonum*. The relationship between these two species goes beyond the theft of prey by the theridiid, however, for the hosts themselves frequently are captured and consumed by *Argyrodes*. Because intersexual interactions in bowl and doily spiders are mediated in part by pheromones, we suspected that semiochemicals might also have a role in this interspecific relationship. Our investigation of this possibility revealed that a hexane-soluble chemical borne on the cuticle of *Argyrodes* elicits predator-avoidance behaviors from bowl and doily spiders. This result is particularly interesting because those same avoidance behaviors are not elicited by contact with the cuticle of a thomisid which probably never preys upon *Frontinella*. This result suggests that the evolutionary relationship between *Frontinella* and *Argyrodes* has been intense and, perhaps, of long duration.

W. J. Tietjen and L. Rao Ayyagari (Lindenwood College) 26
CHANGES IN THE COMPOSITION OF MICROFLORA SYMBIONTS OF THE SOCIAL SPIDER *MALLOS GREGALIS*.

In our earlier studies we showed that the sweat yeast-like odor of *Mallos* nests is associated with the remains of prey, and that the microflora associated with fed-upon flies attracted prey. The present study examines the effect of various conditions on microflora including 1) prey density, 2) colony size, 3) length of spider feeding, and 4) the relative contribution of digestive juices and venom in affecting growth of the microflora. In addition, we observed odor changes in the colonies. Our results indicate the turnover of microflora with time proceeds from a initial high rate of yeast metabolism (sweet odor) through a high bacterial metabolism (rancid odor) to a final fungal growth (putrid odor). At this final stage, spider mortality rate is high.

George W. Uetz (University of Cincinnati) 27
SPECIES DIFFERENCES IN COLONIAL *METEPEIRA*.

Colonial spiders in the genus *Metepeira* show variation in social and spatial organization at the population level, depending on habitat. Once thought to be a single species, these populations have now been shown to be 3 distinct species, separated geographically and behaviorally. Differences in morphological characteristics, web building, colony structure, and egg sac construction support this conclusion. A number of environmental factors, relating to some of these differences (seasonality and overlap of generations, prey availability, web site architecture, and egg sac parasites) may contribute to differences in social organization. Studies of isozyme variation using electrophoresis suggest these species are closely related and recently diverged.

Leonard S. Vincent (Georgia Southern College) 28
BENJAMIN JULIAN KASTON, AMERICAN ARANEOLOGIST, 1906 - 1985.

B. J. Kaston died August 24, 1985, after more than half a century of teaching and publishing. In 1934 Kaston received his Ph.D. from Yale University where his major professor, Alexander Petrunkevitch, suggested he work with spiders. From 1934 to 1938 Kaston studied elm beetles at the Connecticut Agricultural Experiment Station. Then, as later, he worked on spiders in his spare time. Kaston taught a variety of biology courses at Brenau College, GA, 1938-45; Syracuse University, NY, 1945-46; Central Connecticut State College, 1946-63; and San Diego State University, CA, 1964-73. Though he held teaching appointments, he published 86 papers, mostly on spiders. His spider papers covered a variety of topics: systematics, anatomy, physiology, behavior, evolution, terminology, and book reviews. His book *How to Know the Spiders* (now in its third edition) has sold over 30,000 copies. His 1948 Spiders of Connecticut was revised in 1981 due to professional demand. Kaston was regarded as a dedicated and demanding teacher by his students and a perfectionist by his colleagues. He was also an accomplished nature photographer. Kaston was on the editorial board of the Journal of Arachnology for the last 12 years and the associate editor of the same from 1980 until his death.

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Jan C. Weaver (University of Missouri-Columbia) <u>29</u>
SPIDER COMMUNITY ADAPTATION TO PRAIRIE FIRES

If prairie spiders, like plants, are adapted to recurrent fire, then the community should show a predictable sequence of change after fire. Community parameters from the same point in different sequences should have similar values, regardless of when the sequences were initiated. At Tucker Research Prairie (UMC), I set up 12 30x30 m plots on prairie burned in 1983. Four plots were kept unburned, 4 were burned in 1984 and 4 were burned in 1985. In August '84 and '85 I collected 5 samples from each plot (samples were all spiders inside a .5 m^2 ring), and determined morphospecies (S), numbers (N), and Simpson's index (S_i) for each sample. N and S; for plots at the same time post burn, but for different years, were more similar than plots sampled in the same year but at different times post burn. S for plots five mos post burn was significantly different, but plots 17 mos post burn, sampled in different years, were more similar than plots sampled in the same years. Predictable change over 2 years suggests that spiders may be adapted to fire.

Graeme Wilson and Alan Peaslee <u>30</u>
(University of Alabama at Birmingham)
SPECTRAL SENSITIVITY OF *MAEVIA INCLEMENS* (ARANEAE: SALTICIDAE)

Measurements of spectral sensitivity reported previously were made with the spider bathed in red light. This we considered acceptable because it was believed that salticids were red blind. Although *Maevia* did not see red light as well as orange, yellow, green or blue, responses were obtained up to 700 nm. Hence they cannot be considered red blind. The experiment was repeated with the spider illuminated with longer wavelength red light (750nm - 850nm). In these wavelengths the spider was in the dark, and so were we. In order to see the spider's eye movements an image converter was used which was sensitive to long wavelength red light. The spider was positioned so that it could observe a monochromatic stimulus whose wavelength was adjustable. If the intensity of the light was above threshold, the spider responded with a fast eye movement when the stimulus was removed. By adjusting both the wavelength and the intensity, it was possible to plot the sensitivity throughout the spider's visual spectrum.

Robert J. Wolff (Trinity Christian College) <u>31</u>
THE STATUS OF THE JUMPING SPIDER GENERA *THIODINA* AND *PARATHIODINA* (SALTICIDAE).

The Salticid genus *Thiodina* currently consists of 17 described species that are morphologically quite similar. Color pattern, cheliceral teeth number, and palpal apophyses are among the most useful diagnostic characters. Three undescribed species are known from Central America, Mexico, and the Southwestern United States, and the first fossil member is known from Dominican amber. The monotypic genus *Parathiodina* from Haiti is considered valid based on the width of the third eye row, leg lengths, shape, and spination, and on genitalic characters of the both males and females.

Leslie Bishop (University of Tennessee) <u>32</u>
SPIDER LIMITATION OF INSECT PESTS IN A GARDEN TEST SYSTEM

There is considerable theoretical and empirical evidence to suggest that generalist arthropod predators may limit prey numbers. This hypothesis was tested using spiders as representative generalist predators in a vegetable garden system. Two habitat manipulations (addition of mulch and flowers) were performed in separate and combined treatments. Significantly higher spider densities were observed in the mulch and full treatment plots than in other plots, suggesting that spiders migrating into the study area remain in areas affording shelter. Pest insect numbers and damage to the plants were significantly lower in these same plots than in other plots (flowers and controls). That spiders were the probable cause of the effect was demonstrated in treatments containing mulch and flowers with spiders removed. Data collected from these plots coincided with the flower and control data.