AMERICAN ARACHNOLOGY

The Newsletter of the American Arachnological Society

NUMBER 50 November 1994

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FUTURE MEETING SITES

1995 - University of Missouri Columbia, Missouri 20 - 25 June (See pg. 14)

1996 - Tucson, Arizona

Journal of Arachnology Note

Back issues of the Journal of Arachnology may be obtained from:
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AMERICAN ARACHNOLOGY
is the official newsletter of the American Arachnological Society and is distributed biennially to members of the Society. Items for the Newsletter should be sent to the editor, Alan B. Cady, Dept. Zoology, Miami Univ.-Middletown, 4200 E. Univ. Blvd., Middletown, Ohio, 45042, USA. (E-mail: ACADY@MIAVX3 [BitNet]; ACADY@MIAVX3.MID.MUOHIO.EDU [Inter-Net]). Deadline for receipt of material for the spring issue is 1 April, 1995. All correspondence concerning changes of address and information on membership in the American Arachnological Society should be addressed to the membership secretary, Norman I. Platnick, American Museum of Natural History, Central Park West at 79th St., New York, N.Y., USA. Members of the Society also receive the JOURNAL OF ARACHNOLOGY, published triennially.

REPORT ON THE 1994 A.A.S. MEETING

As part of their last activity, those who organized and implemented the very successful 1994 meeting of the American Arachnological Society in Gainesville, Florida, were asked to write reports about the activities which took place. Their reports follow. The Editor wishes to thank them for these written accounts, and is sure the meeting attendees join him in expressing their gratitude to them for giving the Society a very fine meeting. The organizing committee consisted of John Anderson, James and Betsy Berry, Paula Cushing, G. B. Edwards, Jon Reiskind, and Mark Stowe.

The 1994 AAS annual meetings took place at the University of Florida. This is the first repeat of a meeting site - the AAS having met in Gainesville in 1978. (This venue was not in the original plan, but volunteered to be host when the initial site became unavailable. -Ed.) Papers and posters were presented from Saturday 30 July - Monday 1 August (please see abstracts). Tuesday 2 August was devoted to a field trip to Ocala National Forest. The meeting was attended by over 100 participants from all over the U.S. and abroad (including Canada, Denmark, France, the Russian Federation, New Zealand, and Mexico).

The program included a symposium on Spiders in Ecological Communities (organized by David Wise) and one on Higher Order Systematics of Spiders (organized by Norman Platnick). Informal presentations Saturday evening included a preview of next year's meetings in Columbia, Missouri by Jim Carrel, a presentation on the new Smithsonian traveling spider exhibit by Petra Sierwald, slides of spiders from the Gray Ranch in New Mexico by Dave Richman, a graphic film on acrocerid emergence from their spider hosts by Peggy Gerba, and stunning photos of Costa Rican spiders by Joe Warfel. Two other informal presentations were given on Sunday: film of the gruesome sacrifice of the male Australian Redback spider (*Latrodectus*) during courtship (Lynn Forster) and a slide show of European arachnologists (Yuri Marusik).

During a computer workshop presented by Mark Stowe, entomological resources on the Internet were reviewed and it was proposed that an e-mail arachnological discussion group should be initiated which would lead to the eventual creation of a site on the Internet where arachnological information could be archived. See future issues of the newsletter for details.

Starting with a lively mixer on Friday evening, the social activities were highlighted by a Sunday evening banquet at the Law School. The table centerpieces consisted of carafes half-filled with water and populated by goldfish and a very large *Dolomedes okefenokensis* (Pisauridae). Sticks in the containers allowed the spiders to go in and out of the water, and while they failed to eat the fish (commonly occurring in the field) they were very impressive in their shiny coats of captured air when they submerged themselves.

After the feast, in an informal celebration commemorating the centenary of the publication of the 1894 *Histoire Naturelle des Araignees*, Vince Roth paid tribute to Eugene Simon with a slide show of Simon's Paris laboratory. This tribute was followed by the second annual Arachno-Auction (presided-over by ace auctioneer and bon-vivant, George Uetz) where over $600 was raised. The highlight was placing a copy of Eugene Simon's early 1864 work on the natural history of spiders on the auction block (a generous gift from John Anderson of U.F.). The lively bidding for that prize came from all quarters, but Don Cameron emerged as the newest custodian of the volume. In addition, President-elect Matt Greenstone took the podium and honored Wil Whitcomb for his long and distinguished contributions to arachnology.

The T-shirt of the meeting featured a courting pair of Rosemary Wolf Spiders (designed by Liza Karpook). This species, *Lycosa ericeticola* Wallace, a spider with a very restricted range in this area of Florida, was described by the late Floridian arachnologist, H. K. Wallace, who died earlier in the year. This species has been the subject of a 10 year study by one the meeting hosts, Jon Reiskind.

Field trips

Participants were treated to two spontaneous and two scheduled field trips. Mark Stowe led the first trip Friday evening to a stretch of cypress swamp shoreline along Newnan's Lake just east of Gainesville. Sand washes into the lake along this particular stretch of shoreline producing unusually good footing for a swamp and making it the ideal site for wading amongst cypress trees and seeing the spider fauna which is especially dense and diverse due to the constant clouds of chironomid midges blowing in from the lake. About 25 brave souls waded into the dark swamp using head lamps to illuminate their way and the resident arachnids. Most folks wore a pair of shoes from a box of old shoes Mark Stowe had been providentially saving for years (for reasons poorly known even to himself). The most impressive residents of the swamp are the enormous *Dolomedes okefenokensis* and *D. albineus*, but following the eye shines which were everywhere also brings one face to face with numerous large *Lycosa* (especially the *helluo* group) and *Schizocosa*. Orbweavers include hordes of *Tetragnatha* species and *Metazygia wittfeldae*, as well as the ubiquitous *Nephila clavipes*, *Leucauge venusta*, *Gasteracantha cancriformis*, and the enormous *Araneus bicentennarius*. Only a few alligator eye shines were visible in the distance.

Mark Stowe also led a spontaneous field trip Sunday night to mesic forest areas on the U.F. campus (featured on the official U.F. campus spider map), as well as the official nocturnal field trip Monday night to the Devil's Millhopper State Park - an area of especially lush and diverse mesic woods surrounding a scenic deep sinkhole (which is Florida's largest). Perhaps most memorable amongst all the diverse spiders seen on both trips were *Sphodros abotti* purse web spiders, and the net-casting spider *Dinopis bispinosa*. *D. bispinosa* is one of the best camouflaged spiders during the day but is widespread and often found in large numbers at night. Many participants saw one of the two male *D. bispinosa* charging their palps from their sperm webs. The false-wolf spider *Ctenus captiosus* from the tropical family Ctenidae was seen occasionally in areas with deep leaf litter. Charles Griswold introduced everyone to the fine art of hunting tiny spherical orbweaving mysmenids. Other unusual orbweavers were *Dolichognatha pentagona* and *Azilia affinis*. Notable theridiids were the reduced web-spinning *Spintharus flavidus*, the non-web spinning, ant-hunting *Euryopis funebris*, and the abundant *Argyrodes* as kleptoparasites in *Nephila* webs. *Scoloderus cordatus* ladder-web spiders and bolas spiders (*Mastophora* species) are also found in these woods but it was not the best time of year and disappointingly, none were seen.

On Tuesday 2 August, G.B. Edwards led a motley crew of 40 or so hardy individuals on a trek into the wilds of Ocala National Forest. We were met there and accompanied by three forest rangers who were curious as to what all the excitement with spiders was about, so we showed them. This area contains the largest sandhill habitat in the state, a result of the islands formed by Pleistocene water level fluctuations. This habitat is home to numerous species which are endemic to the state or restricted to this habitat. The dominant tree is *Pinus clausa*, the sand pine, with an extensive understory of scrub oaks, holly relatives, blueberry relatives, and palmettos, including the blue palmetto, *Sabal etonia*. The fence lizard *Sceloporus woodi* is found only here and in a few other scattered locales where this habitat occurs in Florida. The tailed whip-scorpion, *Mastigoproctus giganteus*, also is found here. Three localities were sampled. The first was in the vicinity of Mill Run near a lake, where we sampled in the forest proper. Here along the forest edge, in a palmetto where they are typically found, was a pair of red widows, *Latrodectus bishopi*, endemic to this habitat. In a more open area, an orb weaver with an X-shaped stabilimentum proved to be the endemic *Argiope florida*. Other web-building spiders found included *Neoscona*, *Nephila*, *Leucauge*, *Achaearanea*, *Tidarren*, and *Agelenopsis*. Heather Proctor and Matt Greenstone took the opportunity at the lake to sample water mites. The second stop near the Central Tower was an area kept cleared for a power line, and therefore an excellent area to sample the primary successional stage of the sand pine ecosystem. Here we found more *Latrodectus* and *Argiope*, but in addition, several species of hunting spiders, including *Aysha velox*, *Phidippus regius*, *P. workmani*, *P. n.sp.*, and *Thiodina sylvana*. A bushy plant known as rosemary, *Ceratiola ericoides*, was home to species of *Dictyna*, *Tmarus*, and

Misumenops bellulus. The last stop was Juniper Springs, a campground and recreational area. Lunch was consumed here in a more comfortable setting than the semi-desert like habitats investigated during the morning. Some participants took the opportunity to cool off by swimming in the spring-fed pool. Others wandered the paths of the hydric habitat, including some rather large hardwoods flanking the stream generated by the springs. A few more spiders were collected, but mostly it was a time to enjoy the camaraderie of friends seen only once a year. Finally, a typically Floridian afternoon tropical shower dampened the festivities, and the group headed back to Gainesville.

The student awards this year were conducted under the newly established procedures and guidelines. Once again, selecting the top two papers was a very difficult task due to their high quality. First place this year went to I-Min Tso for his paper on how the stablimenta of *Argiope trifasciata* may attract prey. He received a year membership to the Society, and $100. Second place went to John R. Dobyns for his report on how sampling intensity and spider phenologies influence estimations of species richness. John acquired a $50 reward for his efforts. Hearty congratulations to I-Min and John !

PAPER ABSTRACTS

BIOGEOGRAPHY OF SALTICIDS OF THE PACIFIC ISLANDS:

Jim Berry*. Dept. of Biological Sciences, Butler University, Indianapolis, Indiana 46208; and **Joe Beatty**, Dept. of Zoology, Southern Illinois University, Carbondale, Illinois 62901

The salticid fauna of the Pacific islands is derived from both east and west. The east Pacific islands (Revillagigedo, Galapagos, Juan Fernandez have species of American origin. The species of the central and west Pacific originate in Australia, New Guinea or SE Asia. The number of species per island decreases from the western Pacific islands to the more remote islands in the eastern Pacific. For example, only 7 species were found by us in the eastern Marquesas Islands, and all of them were common "tramp" species. Our collection presently includes 27 genera and between 760-65 identifiable species/populations, many of which are undescribed. Typically, the representatives of a particular genus are found on several islands, with minor but observable differences in the specimens from island to island. Spiders have apparently not undergone evolutionary radiations on the Pacific islands to the extent that some other organisms have, e.g., no spider family is endemic to any of the islands or to the entire region. The most extensive radiations known are in the Hawaiian thomisids and Tetragnatha. Several species of the genus Modunda (previously referred to Sandalodes) are recorded as endemic to Hawaii and others to the Marquesas. These have not been revised so the actual number of species is in doubt. Many species now known only from a single island each will probably prove to have wider ranges when more extensive collecting is done.

ARE SOME BRACONID WASPS CHEMICALLY DEFENDED FROM SPIDERS?

Buckingham, Gary. USDA\ARS, Biocontrol Laboratory, P.O. Box 147100, Gainesville, FL 32614-7100

Adults in various braconid subfamilies have paired gland cell clusters on their terga and in males in some subfamilies, for example, Agathidinae, Alysiinae, Cosmophorinae, and Opiinae, the glands have large storage reservoirs. When a male *Psyttalia concolor*, an opiine parasitoid of fruit flies, is grabbed with forceps or by a predator, it bends the tip of its abdomen and attempts to touch the tormentor with the exposed gland openings. A sweet odor is noticeable at this time and odors have been reported to be noticeable during the rearing of various species of opiines. Tests with several species of spiders and ants indicated that the glands might have a defensive function. Spiders grabbed and ate flies and males with their abdomens removed but were much less successful when attacking normal males. Similar results were obtained with ants. Spiders often retreated from the males after an unsuccessful attack and would not attack again for days afterwards. Ants often rubbed their mouthparts on the substrate after an attack. Similar predator reactions were observed with males of other opiines and with an alysiine.

A PITFALL TRAP DESIGN FOR REPEATED USE WHICH REPELS RAIN AND ANIMAL INTRUSION.

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Studies on arthropod populations have long used pitfall traps (deadfall or livefall) to acquire information on the animals' densities, movements, locations, and activities. The design and configuration of the traps vary widely according to the study habitat, target arthropods, and investigator. Each design has assets and liabilities, but all are plagued by rainfall, flooding and disturbance or destruction by larger foraging animals (mostly mammals such as raccoons, skunks, and opossums). Any one of these hazards could render the sample useless and possibly damage the trap itself. Furthermore, many types of traps are unable to withstand repeated use over an extended period of time. A pitfall trap design is shown that attempts to minimize the effects of rainfall, flooding, and animal entry or mayhem. It also may be used for long term studies without disintegrating. The trap requires a number of different components and time for fabrication, but it protects samples from downpours (and sunlight), and keeps marauding raccoons and skunks from demolishing the trap and valuable sample. The trap configuration centers around two 20 cm squares of 8 mm thick exterior plywood. A centered hole in one square is cut to snugly hold the top rim of a small plastic funnel (which then extends through the square). The other square serves as the "roof" by being nailed to the first square, leaving a 2 cm space between. This spacing is maintained by plastic tubing, through which run the four 8 cm galvanized nails. These nails then project from beneath the bottom plywood square and help anchor the trap on the earth. A receptacle (holding the preservative of your choice) is lowered into a trap-hole (which remains patent due to a sleeve), and the trap assembly is placed so the funnel empties into the receptacle. After smoothing the soil around the trap's edges, a 40 cm square of chicken wire or hardware cloth is staked over the entire trap. This trap and all the accessories will be shown and discussed.

THE IMPACT OF *ARGYRODES TRIGONUM* ON THE DISTRIBUTION AND ABUNDANCE OF *NERIENE RADIATA*.

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Argyrodes trigonum interacts with *Neriene radiata* in a variety of ways: as predator, as commensal, as web stealer and occasionally as prey stealer. A variety of factors related to seasonal changes likely determine the nature of the interaction that may occur between these two species. The versatility of *A. trigonum* foraging tactics should translate into a broad and therefore significant negative impact on *N. radiata* populations. A field experiment was designed in order to determine the effects of the presence of *A. trigonum* on *N. radiata* abundance and web relocation over a period of approximately 4.5 months (from late May to October); as well as to determine how the availability of host, host webs, and web sites influence the foraging mode exhibited by *A. trigonum*. Three 10 x 2 m experimental areas were designated along the forest floor within the habitat of these species. Populations of *A. trigonum* and *N. radiata* were censused through a visual search of the plots up to a height of 2 m. All *A. trigonum* were removed from one of the areas on a daily basis and

a constant number of *A. trigonum* were added to another area; the third area was left as a control. The addition area consistently contained the fewest number of total *N. radiata* individuals while the removal area showed the greatest number throughout most of the experiment. Also, there was a greater percentage of young *N. radiata* (2nd-3rd instar) relative to older *N. radiata* (4th-5th instar), and a greater number of web movements in the addition area. These results indicate that *A. trigonum* has a wide variety of detrimental influences on *N. radiata*.

USE OF THE SPINNERET SPIGOT MORPHOLOGY TO SEPARATE THE CYRTOPHORINAE FROM OTHER ARANEIDAE GENERA.

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The araneid subfamily Cyrtophorinae includes two genera: *Cyrtophora* and *Mecynogea*. *Cyrtophora* is mainly tropical and occurs in both the New and Old World, but its greatest diversity occurs in the South Pacific Islands. *Cyrtophora* contains 19 species. *Mecynogea* is found mainly in the New World, with one species from Yemen, *Mecynogea subacacylpha* (Simon). Female spinneret spigot morphology for 18 of 19 species of *Cyrtophora* was examined, along with the females of *M. lemniscata* (Walck.) and *M. subacacylpha*. Female spinneret spigot morphology was also examined for *Mangora maculata* (Keys.), *Argiope aurantia* (Lucas), and *Cyclosa conica* (Pallas). Male spinneret spigot morphology was examined for *Cyrtophora moluccensis* (Doleschall) and *Mecynogea lemniscata*. Spinneret spigot morphology unite *Cyrtophora* and *Mecynogea* based on the types and arrangement of spigots on the spinnerets. Anterior lateral spinnerets have the piriform spigots in a J-shape in *Cyrtophora* and a T-shape in *Mecynogea*. Both *Cyrtophora* and *Mecynogea* contain cylindrical and aciniform spigots on the posterior lateral spinnerets, but *Mecynogea* also contains aggregate spigots. *Mangora maculata* and *Cyclosa conica* have aggregate and flagelliform spigots on the posterior lateral spinnerets.

DETAILS OF THE NATURAL HISTORY AND ECOLOGY OF A SPIDER ANT-GUEST.

Cushing, P.E. Department of Zoology, University of Florida, Gainesville, FL 32611

Within the colony chambers of the Florida harvester ant, *Pogonomyrmex badius* Latreille, lives a small, undescribed species of spider of the genus *Masoncus* (Linyphiidae: Erigoninae). *Masoncus* sp. has never been collected outside an ant colony and appears to spend most, if not all, of its life inside the nest. These spiders are found in deep chambers as well as in brood and seed storage chambers and feed on collembolans (springtails) and other tiny symbionts. I have excavated nearly 30 *P. badius* nests in order to "uncover" details of the natural history, population structure, and adaptations associated with the unique lifestyle of this spider ant-guest.

LIFE HISTORY RESPONSES OF DENSE AND SPARSE POPULATIONS OF THE BASILICA SPIDER (ARANEIDAE: *MECYNOGEA LEMNISCATA* (WALCKENAER)).

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The basilica spider is an ideal subject for studying life history strategies because females inhabit conspicuous semi-permanent webs. Also, the entire reproductive output of this univoltine species is easily quantifiable, as egg sacs are sequentially secured to an egg string. This study examined the life history responses of female basilica spiders from two disparate habitats on the Savannah River Site, South Carolina. A winter-filling Carolina bay (temporary pond) supported a dense population of basilica spiders, whereas a more xeric sandhills site (pine-oak forest) contained a much less dense population. A feeding experiment designed to determine if the sandhills individuals were more food-limited produced inconclusive results; however, field monitoring of individuals and quantification of their reproductive outputs revealed distinct differences in the responses of the two populations. As expected, number of eggs per clutch decreased with successive clutches in both populations. Spiders at the Carolina bay tended to produce more clutches and more eggs per clutch than those at the sandhills habitat, but the mean dry weight of individual eggs did not differ between successive clutches or between habitats. Although total egg production was significantly higher at the Carolina bay habitat, the egg sacs at this site had a much higher probability of being consumed by parasitoid wasps (Eulophidae: *Tetrastichus* sp.). Rate of parasitism was correlated with density of females in the plots, within and between sites. Thus the disparity of reproductive success of females at the two sites was not as great as expected. Egg sacs produced earlier may be more likely to be parasitized because they are exposed to attack for a longer period during the warm season.

THE EFFECTS OF SAMPLING INTENSITY AND PHENOLOGY ON THE ESTIMATION OF SPIDER SPECIES RICHNESS IN A SOUTHERN APPALACHIAN COVE HARDWOOD FOREST.

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Three collectors using three time-based (ground hand collecting, aerial hand collecting, and aerial beating) and one area-based methods (1 m^2 litter samples) sampled spiders from 10 x 50 m plots in the Ellicott Rock Wilderness Area of northern Georgia between 18 May and 4 June, 1993. Eighty samples (repetitive) from four 10 x 50 m plots (0.2 ha) contained 77 species while 77 samples (non-repetitive) from 24 such plots (1.2 ha) contained 78 species. A total of 2842 adult spiders were collected from the 1.4 ha sampled, representing 92 species, 64 genera, and 20 families. Repetitive sampling is a more efficient strategy for accessing cryptic and/or covert species as opposed to the non-repetitive sampling, which tends to continually collect obvious species. The samples were analyzed with five equations designed to estimate the species richness of the study site: the jackknife, the lognormal, the Michaelis- Menten species accumulation curve, and two estimators created by A. Chao. The estimates ranged from a low of 85 to a high of 144 for the repetitive samples, from 88 to 95 for the non-repetitive samples, and from 102 to 112 for the combined samples. The confidence intervals for the estimates generated from the total (157) spring samples overlapped with those generated from a fall collection in the same cove, and suggest that the number of spider species present as adults in this cove remains fairly constant between the fall and spring. The cove now has a total known adult spider fauna of 139 species, with only 42 of these species being found in both the fall and spring. The spider species richness estimates for the site generated from the combined fall and spring samples indicate that 150 to 198 spider species may be present in the site.

MAJOR TYPES OF BIOCONTROL ORGANISMS, INCLUDING SPIDERS, AND THE PEST CATEGORIES THEY BEST CONTROL, WITH SPECIAL REFERENCE TO COTTON.

Edwards, G. B. Florida State Collection of Arthropods, Division of Plant Industry, P.O. Box 147100, Gainesville, FL 32614-710

Pest life stages are classified as sessile external (SE), sessile internal (SI), or mobile, visually-acute (MV). Parasitoids and predators such as lady beetles and lacewing larvae best control SE prey, ants best control SI prey, and spiders best control MV prey. In cotton, red imported fire ants, where their numbers are sufficient, control the boll weevil and bollworm, the most important SI pests. The presence of minor SE pests like aphids may increase ant foraging for more serious pests by providing an energy source (honeydew). Spiders control the cotton fleahopper, the most serious MV pest. Spider polyphagy and cannibalism may be necessary components of maintaining a spider presence in crops, particularly in early season when prey density is low.

PHYLOGENY OF THE ORB WEB BUILDING SPIDERS (ARANEOMORPHAE, ORBICULARIAE)

Griswold, C., Coddington, J., Hormiga, G., and Scharff, N. Department of Entomology, California Academy of Sciences, Golden Gate Park, San Francisco, CA. 94118, USA.

The phylogeny of the orb-web building spiders is examined through analysis of a data set comprising 36 morphological and behavioral characters scored for 31 exemplar taxa representing the 14 families: Anapidae, Araneidae, Cyatholipidae, Deinopidae, Linyphiidae, Mysmenidae, Nesticidae, Pimoidae, Symphytognathidae, Synotaxidae, Tetragnathidae, Theridiidae, Theridiosomatidae, and Uloboridae. The single most parsimonious cladogram obtained, which was also preferred under successive weighting and parsimony analysis under implied weights, suggests ((Uloboridae, Deinopidae) (Araneidae (Tetragnathidae ((Theridiosomatidae (Mysmenidae (Symphytognathidae, Anapidae))) ((Linyphiidae, Pimoidae) ((Theridiidae, Nesticidae) (Cyatholipidae, Synotaxidae))))))).

MOLECULAR EVIDENCE FOR HIGHER LEVEL ARANEOMORPHAE RELATIONSHIPS.

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To examine the higher level relationships of araneomorph spiders, DNA sequences were determined for regions of one mitochondrial and two nuclear ribosomal genes, Exemplars from Mygalomorphae and Mesothelae were also sampled as outgroups. The DNA sequences were aligned using a parsimony based computer program, Malign, and analyzed cladistically. By varying gap change cost parameters, alignment ambiguous regions were identified and the effects of different character weighting schemes were explored. The results of these analyses were compared to phylogenetic hypotheses based on morphological evidence.

HABITAT AND COURTSHIP BEHAVIOR OF THE WOLF SPIDER *SCHIZOCOSA RETRORSA* (ARANEAE; LYCOSIDAE).

Hebets, E.A., Stratton, G.A., and Miller, G. Albion College, Albion, MI 49224

The habitat, phenology, and courtship behavior of the wolf spider *Schizocosa retrorsa* (Banks) were studied and are described here for the first time. The range of *S. retrorsa* (previously reported by Dondale and Redner, 1978) was extended northward to include Michigan. The species was found to be locally abundant in northern Mississippi, particularly in highly disturbed and exposed habitats. Specimens were collected on sand, in lichens, or on pine needles in open pine woods or "borrow pits". Twenty-three pairs of *S. retrorsa* were observed and videotaped. Of the 23 pairs, 17 showed courtship displays; of these, 7 pairs copulated. Nineteen of the 23 pairings were separated into one of four categories [pairs that copulated (N=6), non copulating courting pairs (N=5), non-courting non-copulating pairs (N=5), and pairs with aggressive females (N=3)] and were scored for one min. each (4 of the pairings were unable to be scored due to poor camera angles). The frequency of seven behavioral displays was determined: palpal drumming, push up, extended leg tap, double leg arch, approach, and orientations. The extended leg tap was seen most frequently in pairs that copulated with a mean frequency of 7.83/min. followed by the non-copulating courting pair frequency of 0.50/min. The push up display was also most frequent in pairs that copulated (6.33/min.) followed by non-copulating courting pairs (2.33/min.). Both the extended leg tap and the push up display were absent in the remaining two pairing categories. The approach was only observed in pairs that copulated (0.33/min.). The and orientations were observed in pairs that copulated (X = 0.50/min.; X = 0.17/min.) and in non-copulating courting pairs (X = 0.17; X = 0.17). The importance of the substrate on the effectiveness of these courtship displays will also be discussed.

COURTSHIP BEHAVIOR IN WOLF SPIDERS: COMPARISON OF SPECIES FROM *ARCTOSA, GLADICOSA, SCHIZOCOSA, LYCOSA, RABIDOSA* AND *GEOLYCOSA*.

Hebets, E.A., Stratton, G.E., Miller, G.L., Hardy, J.,and Miller, P.R. Albion College, Albion, MI 49224

As part of a long term study of wolf spiders, we have videotaped courtship behavior in 23 species. This includes 12 species of *Schizocosa*, plus *Gladicosa bellamyi, Arctosa sanctaerosae, A. littoralis, Lycosa acompa, Lycosa* sp."*lenta*" group (2 species), *Lycosa georgicola, Lycosa annexa, Rabidosa hentzi, R. rabida* and *Geolycosa turricola*. The *Geolycosa* and *Arctosa sanctaerosae* are obligate burrowers. *Geolycosa turricola* copulated in their burrow, and courtship occurred near the top of the burrow. In *A. sanctaerosae*, courtship and copulation occurred at the top of the burrow. In the facultative burrowers, *A. littoralis* and *L. georgicola*, courtship and copulation occurred away from burrows. Sounds were recorded in all courtships except the *Arctosa* and *Geolycosa* (we have not yet devised a means to determine if they produce sounds). In general, species lacking ornamentation on the front legs (such as *S. rovneri, S. mccooki, S. floridana, S. duplex, S. saltatrix*, a new species nr. *S. saltatrix*, and *R. hentzi*) courted in one location and did not wave or tap their legs. Species with brushes on the front legs (*S. ocreata, S. crassipes* and populations nr. *S. ocreata*) actively moved about and had extensive leg movements. Courtship in species that had distinct coloration on the forelegs (*A. sanctaerosae, L. annexa, S. stridulans, S. retrorsa*) involved movements that accentuated the legs, and generally involved tapping or waving of the legs (or the tips of the legs) often very quickly. Copulation in the two *Arctosa* species lasted a few seconds, while copulation in the *Lycosa* sp. "*lenta*" group lasted 30 min, and copulations in *Schizocosa* lasted from 2-8 hours.

PARALLEL EVOLUTION IN APPALACHIAN CAVE SPIDERS (*NESTICUS*).

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Several classic examples of how natural selection drives adaptive evolution arise from patterns of parallel and convergent evolution in organismal features. My talk will outline an example of parallelism which includes evidence of similar ecomorphologies evolving in equivalent selective regimes, across phylogenetically independent lineages of Appalachian cave spiders (genus *Nesticus*). *Nesticus* is both taxonomically and ecologically diverse in the southern Appalachians, where approximately thirty species occupy "surface", "deep-cave" and "intermediate" habitats. First, I ask whether species which share similar selective regimes occupy a similar morphospace. Results of principal component analyses on morphological variables show that "troglobitic" taxa occupy a morphospace distinct from that of "epigean" or "troglophilic" taxa. Second, I ask whether these morphologies have evolved independently. Phylogenies based on both nuclear and mitochondrial DNA sequence data strongly support the conclusion that the evolution of "troglobitic" taxa has occurred independently several times in Appalachian *Nesticus*. Finally, comparative analyses are used to understand the historical context of this parallel evolution, in terms of both directionality and rate of morphological change. For example, I ask whether or not there is a repeated, unidirectional sequence of character evolution from "epigean" to "troglophilic" to "troglobitic" across independent lineages. Also, I use parsimony algorithms to infer nodal species values, reconstruct the "morphology" of these hypothetical taxa, and ask whether there is a "vector" of change which can be visualized in two- or three-dimensional morphospace.

PREDATOR GUILD INTERACTIONS AND THE STRUCTURE OF OLD-FIELD ARTHROPOD ASSEMBLAGES: SPIDERS V. MANTIDS.

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Old-fields are common successional communities in which species diversity and trophic complexity are spatially and temporally variable. Arthropod generalist predator guilds usually are dominated by spiders, though praying mantids sometimes contribute as much or more to abundance and biomass. Studies of mantids and their interactions with spiders in old fields have indicated that population dynamics, guild interaction and community impact are highly dependent on relative interspecific phenologies and taxonomic composition of specific assemblages. The short-term response of spider populations to elevated mantid density in one field experiment was rapid emigration of mantid prey- sized spiders from experimental plots, indicating a strong behavioral component to intraguild interactions. Mantid (and perhaps spider) populations in old-field communities achieve ontogenetically adjustable carrying capacities (OAK) from a trade-off between diminishing population density and increasing body mass over seasonal time. Mantids were able to sustain higher than background (control) predator load over the growing season in field experiments. Generalists may therefore have intrinsically higher carrying capacities than more specialized predators. The effect of mantids on prey is highly density-dependent in both magnitude and direction: in one experiment low densities of mantids reduced aphid abundance; high density enhanced it. In another experiment, aphid abundance was enhanced when mantids switched to small spiders as prey, relieving aphids from predation. The interaction strengths of positive (indirect) and negative (direct) effects on putative prey taxa can be of the same magnitude (i.e., compensatory), which may constitute a higher order, emergent property of these highly diverse arthropod assemblages

STABILIMENTUM OF THE GARDEN SPIDER *ARGIOPE TRIFASCIATA*: A POSSIBLE PREY ATTRACTING DEVICE.

I-Min Tso. Mollusk Division, Museum of Zoology, The University of Michigan, Ann Arbor, MI 48109-1079.

Stabilimenta are silky structures on the webs of some orb weavers whose function is still not well understood. In this study I tested the prey attraction hypothesis for the function of stabilimenta with the garden spider *Argiope trifasciata* in southeastern Michigan. I observed twenty mature females for 40 days and daily recorded their stabilimentum pattern, prey trapping rates and web characteristics. Results from regression analyses showed that those spiders building stabilimenta more frequently also trapped more flying insects. Webs having stabilimenta trapped 51% more flying insects than webs without stabilimenta. The difference in trapping rate did not seem to result from different web characteristics or web sites. The number of arms or the length of a stabilimentum had little effect on increasing prey trapping ability. Higher stabilimentum building frequency did not correlate with higher grasshopper trapping rate. In contrast to the results from flying insects, no significant differences were found in grasshopper trapping rates between webs with and without stabilimenta. Since presence of stabilimenta could only increase flying insect trapping rate but not grasshopper trapping rate, stabilimenta only increased spiders' overall daily prey biomass intake by 17%. A stabilimentum's moderate benefit in increasing prey biomass intake and potential cost in attracting predators might explain the high degree of inconsistency in stabilimentum building characteristic of *Argiope* species.

SOCIAL PREADAPTATION IN SOLITARY SPIDERS.

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One of the most striking feature of spider societies is the cooperation displayed by individuals in web building, prey capture, sometimes their transport, and parental care. We suggest that these cooperative displays are the result of group life. Several characteristics of solitary species, comparable to social preadaptations, may have contributed to the emergence of these behaviors. In the early stages of life, all spiders are gregarious. Groups of spiderlings often spin a common web before dispersing. During this phase, spiders show group cohesiveness and mutual tolerance, forms of behavior which disappear during dispersal. Some interactions between the young are very similar to those observed in non social structures, and under the influence of environmental conditions, behavioral plasticity manifests itself in a surprising way at the level of social potentialities. It has been possible, by preventing dispersal of the young in a maternal social species, to obtain "artificial societies" of adults exploiting the same web. In addition, web construction certainly facilitates groups cohesiveness and plays an essential role as a vector of information, already exploited in solitary species for locating prey, detecting intruders or exchanging signals with a sexual partner. Thus, the ability to construct and exploit webs enables social species to coordinate complex activities in an economical way. It is thus unlikely that important changes in the species behavioral program would have been required for sociality to emerge in spiders. As a matter of fact societies are polyphyletic, which suggests that the transition from solitary to social life occurred several times. As a consequence we suggest that the single fundamental behavioral modification necessary for the transition from solitary to social life to occur would be the persistence and development of mutual tolerance.

INTRASEXUAL SELECTION AND RESOURCE VALUE IN THE COLONIAL SPIDER *METEPEIRA INCRASSATA* (ARANEAE, ARANEIDAE).

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This research studied male combat over females in the colonial web-building spider *Metepeira incrassata*. In *M. incrassata*, larger females aggressively maintain positions in the center of the colony where they are safer from predators, live longer, and have higher reproductive success. As males guard penultimate females for several days until their molt to maturity, at which time they mate, we predicted that males should preferentially compete for higher value females in the colony center. Data were collected from field studies in Fortin De Las Flores, Veracruz, Mexico from 1990-1992 to test this hypothesis. In 1990, naturally occurring colonies were censused and the number, location, and size of all individuals guarding females were recorded. Results showed more guarded females in the center of colonies with larger male residents than those on the periphery. Also, there were more satellite males (assumed to be competing) in the core. In all three years, paired observations compared rates of aggression between the core and periphery of colonies, with size and residency of winners noted for each aggressive act. Results showed higher rates of aggression in the core of colonies for all three years, and a significant size and residency bias in winners of interactions. In 1992, a detailed study of marked individuals was undertaken with all occurrence sampling of aggression and mating from dawn to dusk for seven days. All interactions were recorded on microcassette tape for later analysis. The results confirmed the size and residency biases on the level of the bout, but when repeated bouts between two individuals are considered (as a contest), residency became less important. Male fighting success increased with size. In addition, the cumulative duration of fighting per female increased as females neared their final molt. Implications of these factors for male mating success will also be discussed.

THE FUNCTION OF COURTSHIP IN *ARGYRODES TRIGONUM*.

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Courtship in spiders has long been assumed to function primarily as a means for males to avoid becoming a meal for their potential mates. However, for spiders with reduced predation tendencies, the inhibition of female aggression may not be as important. Because members of the species *Argyrodes trigonum* may have diminished predatory abilities, discerning the role of courtship in *A. trigonum* may provide insight into the function and evolution of courtship in spiders. The purpose of this study was to determine the extent to which *A. trigonum* uses ritualized courtship behavior in order to inhibit female aggression. Pairs of *A. trigonum* were provided with an abandoned web of a host spider. The courtship behavior was then video recorded and the duration of three distinct phases and the frequencies and types of behaviors within each phase were compared. The function of these phases were assessed to determine the relative importance of each in it's role as an inhibitor of female aggression or as a mechanism for mate selection within the species. The initial phase does appear to function in the inhibition of female aggression since males that deviate from a certain pattern in this phase elicit aggressive behavior from the female. Aggression by the female, however, does not necessarily prevent the male from achieving a successful mating.

COSTS OF GROUP LIVING FOR THE COLONIAL *METEPEIRA INCRASSATA*: KLEPTOPARASITISM AND PREDATION BY *ARGYRODES*.

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Several *Argyrodes* species are found in colonial webs of *Metepeira incrassata* (from Mexico), where they steal prey and/or prey upon host spiders. Census data taken over a range of *Metepeira* colony sizes determined that *Argyrodes* are present in approximately 50% of colonies, and that they become increasingly prevalent as colony size increases. However, *Argyrodes* load per host spider decreases with increasing colony size, owing to both an "encounter effect" and a "dilution effect". Additionally, the risk of *Argyrodes* attack is not shared equally by all *Metepeira* colony members - all observed events of predation on host spiders occurred on the outer periphery of colonies. *Metepeira* living in the central core of large colonies may therefore be protected due to a "selfish herd" effect. The presence of *Argyrodes* in *Metepeira* colonies was found to be largely dependent upon the presence of several normally solitary web-weaving spiders that also invade colonies. These "invading spiders" may reduce their own *Argyrodes* load while increasing the *Argyrodes* load for *Metepeira*. The composition of *Argyrodes* species in *Metepeira* colonies may also be dependent upon the species of invading spiders present. This observation may be critical because, as demonstrated with a field enclosure experiment, predatory species of *Argyrodes* may inflict high mortality upon *Metepeira*, whereas kleptoparasitic species may only reduce prey consumption of their hosts.

TAXONOMY AND ZOOGEOGRAPHY OF LYCOSID SPIDERS FROM NORTHEAST ASIA (ARANEAE, LYCOSIDAE).

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The northeast Asian wolf spider fauna comprise not less than 36 species belonging at least to 6 genera (Marusik et al. 1992): *Acantholycosa* (3 species); *Alopecosa* (about 10), *Pardosa* (18), *Pirata* (2), *Tricca* (2), *Xerolycosa* (1). The 36th species - *Pirata denticulata*, which was known to be distributed in China and Yakutia, was recently found on the coastal part of the Sea of Okhots. The adjacent territories lying on the same latitudes, Yakutia and Alaska, are inhabited by nearly exactly the same number of lycosid species: 37 (Marusik et al. 1993) and 36 (40?) (Dondale, Redner 1990) respectively. Among all taxa only *Alopecosa solivaga* species group needs special revision. Other taxonomical difficulties are connected with correct generic placement of *Tricca alpigena* and *T. insignita* as well as correct placement of Asian specimens in *Pardosa groenlandica* (Bartosh, Gorbunova 1994). Majority of the northeast Asian species has wide Holarctic (5), Palaearctic (8) or Siberio-American (10) ranges, and other 13 has Siberian ranges including northwest Siberian endemics (2). Similarity between two Asian faunas, northeast Siberia and Yakutia, are significantly higher than between former fauna and that of Alaska both in respect to species and to generic composition.

GEOGRAPHIC VARIATION IN MALE COURTSHIP BEHAVIOR IN BRUSH-LEGGED *SCHIZOCOSA* (*S. OCREATA* SPECIES GROUP).

Miller, G.L., Stratton, G.S., and Hebets, E.A. Department of Biology, University of Mississippi, University, Mississippi 38677

Populations of brush-legged *Schizocosa* (*S.* nr. *ocreata* or nr. *crassipes*) are common throughout the lower Mississippi River Valley and other areas in the Southeastern United States. Preliminary studies by our group suggested that there is substantial variation in morphology, phenology and habitat preference among these populations. Male courtship behavior is known to be the principle reproductive isolating mechanism in the *S. ocreata* species group. In this study, we asked whether male courtship behavior showed substantial interpopulation variation. We collected *S. ocreata* and *S. crassipes* from a population in Florida and subadult male and female brush- legged spiders from 13 populations in Louisiana, Mississippi, and Tennessee. We reared them to maturity at which time we video recorded courting males from each population. One min segments of male courtship behavior (e.g., bounce, leg extension, leg arch, leg tapping, leg waving) were scored to determine the frequency of occurrence of specific behaviors and to determine the pace of the courtship. Considerable variation in the frequency of occurrence of behaviors was observed among populations. An analysis of the behavioral transition matrix revealed interpopulation differences in facilitating and inhibiting behaviors. The study suggests the possibility of reproductive isolation among populations of brush-legged spiders.

REPRODUCTIVE ISOLATION AMONG POPULATIONS OF BRUSH-LEGGED *SCHIZOCOSA* (*S. OCREATA* SPECIES GROUP).

Miller, G.L., Stratton, G.S., and Hebets, E.A. Department of Biology, University of Mississippi, University, Mississippi 38677

We determined in another study that considerable interpopulation variation in male courtship behavior exists in the southeastern brush-legged spiders (*S.* nr. *ocreata*). As part of a large hybridization study, we determined (1) how females respond to the courtship of males from other populations and (2) whether evidence exists for mechanical incompatibility during copulation in *Schizocosa*. In the first part, the receptivity behavior (e.g., slow pivots, approach, stagger walk, tandem leg waves, single leg waves, settle, touch/tap, abdominal raise) and likelihood of copulation were scored for samples of females interacting either with a male from her own population or a male from another population. We examined spiders from four populations in Mississippi and one in Florida. Females displayed more receptivity behavior to males from their own population and never copulated with a male from another population. However, females from a pure *S. rovneri* population showed considerable receptivity to courting males from a nearby pure population *S.* nr. *ocreata* although such pairs never copulated. In the second part, we forced copulation between pairs of female *S. rovneri* and male *S.* nr. *ocreata*, males and females of two different *S.* nr. *ocreata* populations known to have different male courtship behavior, and pairs of *S.* nr. *ocreata* from the same population. We then obtained close up videos of palpal insertions. Males copulating with females of another species or with females of another population of the presumed same species inserted inefficiently and infrequently. The video gives clues about the function of the parts of the male palp during insertion.

THE REMARKABLE MONTANE DISTRIBUTION OF GROUND SPIDERS OF THE GENUS *PARASYRISCA* (GNAPHOSIDAE) IN THE HOLARCTIC.

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The spider genus *Parasyrisca* was described by Schenkel in 1965. Its type species was described from a single male, *P. potanini* Schenkel, then known from China. Revision of this genus (with N. Platnick and Y. Marusik) will show that the genus includes 37 species (31 new) and is Holarctic in distribution. Representatives of the genus occur as a rule only in the mountain systems all across the Palearctic: Pyrenees, Alps, the Caucasus, Pamir, Tian Shan, Altay, Tuva, North China, Mongolia, Chita and Khabarovsk regions, Kolymskoye Plateau in Magadan and also in the Nearctic: southern British Columbia in Canada and western Washington in the USA. Spiders of the genus *Parasyrisca* occur on higher elevations, mostly alpine mountain zones or montane tundras, thus species of *Parasyrisca* have extremely restricted distributions. Taxonomical study of the genus demonstrates that *Parasyrisca* is a complex genus consisting of four species groups.

THE INFLUENCE OF SENSORY INFORMATION ON FORAGING DECISIONS IN TWO SIBLING SPECIES OF WOLF SPIDER (ARANEAE: LYCOSIDAE).

Persons, M. H., and Uetz, G.W. Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006

Current foraging models emphasize reward and/or prey capture rates as primary determinants of patch residence time. For spiders, sensory information may have an equally important influence on patch tenure. Two sibling species of wolf spiders, *Schizocosa ocreata* (Hentz) and *S. rovneri* Uetz & Dondale were studied to determine: 1) the influence of sensory cues in patch tenure (without food rewards); 2) sex, age, and species based differences in sensory foraging biases. Individuals of *S. ocreata* and *S. rovneri* were tested once as immatures and again as adults. Spiders were videotaped in a four chambered artificial habitat. Each of the four chambers (patches) varied in the type of sensory information provided by prey. Live crickets were used as stimuli. Patches consisted of the following sensory stimuli: visual stimuli alone; vibratory stimuli alone; visual and vibratory; and control (no stimuli). Spiders were allowed to move freely from chamber to chamber while the duration (residence time) and frequency of patch visits were recorded. Analysis revealed that sensory cues (e.g. visual and vibratory stimuli), even without food rewards, are sufficient criteria to influence residence time. Results further indicate significant differences between immatures and adults in their patch tenure and sensory modes. Runs tests on individual spiders revealed random movement patterns between patches, suggesting that spiders have limited short term spatial memory. Differences in sensory biases between *S. ocreata* and *S. rovneri* will be discussed.

THE EFFECTS OF MARINE INPUT AND PREDATORS ON THE DYNAMICS OF COASTAL SPIDER COMMUNITIES OF BAJA CALIFORNIA AND NAMIBIA.

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Small islands and coastal areas in the Gulf of California and Namibia support spiders, scorpions and/or lizards at densities 2->100x greater than on large islands and inland on the mainland. Two variables are important: the input of matter from the ocean and predation intensity. The important predators on spiders are scorpions and, in wet (El Niño) years, pompilid wasps. Marine detritus from shore wrack and nesting marine birds are the main conduits of marine productivity; dietary and stable isotope analyses show that land plants contribute little to the energy budget of populations on small islands and coastal areas. We investigated how energy flow from the ocean influenced the food web in terrestrial communities on small islands and the coast. In Namibia, a type of trophic cascade occurs: high densities of spiders lower herbivore abundance; plant damage is thus less relative to areas not receiving allochthonous inputs.

A TRAPPING METHOD FOR SAMPLING BALLOONING SPIDERS IN PECAN GROVES.

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Trapping methods for ballooning spiders usually involve the use of some form of insect trap coating (such as Tanglefoot®), which is difficult and sometimes hazardous to process because of the need to use volatile solvents. We have designed a method, herein described, which uses grease or oil treatment on 14 unit screens arrayed on a 6 m high frame. The screens (.6 cm mesh) can be easily cleaned using a detergent solution and the specimens saved for later examination. We also present some preliminary data collected from four such traps, which were arranged in N-S and E-W facing configurations inside and outside of a pecan grove in Mesilla Valley, Dona Ana Co., New Mexico, during spring to fall of 1993.

WHAT DETERMINES COURTSHIP DURATION AND PROBABILITY OF REMATING IN THE WATER MITE *ARRENURUS MANUBRIATOR*?

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The role of male courtship is a contentious issue. Courtship may serve to identify the male's species, bring the female into a state of readiness, encourage her to take up sperm, or discourage her from mating with other males. The water mite *Arrenurus manubriator* has a lengthy courtship in which the male strokes and shakes the female for up to 3.5 hr. Male nutritional state or size of males or females may affect courtship duration, which in turn may affect the probability of a female choosing to mate with a second male. I examined this issue by videotaping mating in 19 pairs of mites in which the males were either fed or unfed, and then pairing females with new males to determine whether, how quickly, and how long they remated. There was no correlation between male size and duration of courtship or number of spermatophores produced; however, unfed males produced significantly fewer spermatophores than did well fed ones. Females were less likely to mate with unfed males, but of those that did there was no significant difference between fed and unfed males with regard to duration of courtship. Remating was affected by the duration of the first mating; females that spent a long time coupled to the first male both took longer to mount a second male and spent less time mating with him. Although oviposition rate was correlated with female size neither duration of male courtship nor number of spermatophores produced was affected by female size. Thus lengthy courtship in *Arrenurus manubriator* may benefit males by reducing a female's inclination to remate, but courtship duration is not based on a female's potential fecundity.

LIFE HISTORY, DISPERSAL AND SUBSTRATE ASSOCIATIONS OF AN OKLAHOMA BURROWING WOLF SPIDER.

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An Oklahoma population of burrowing wolf spiders (*Geolycosa missouriensis* Banks) was studied to determine life history, dispersal patterns and adult substrate choice. I found a two year life cycle that contrasted with both the one year cycle found in populations studied at more southern latitudes as well as the three year cycle found at northern latitudes. As in studies of congeners from other locations, the Oklahoma *Geolycosa* dispersed from their mother's burrow after a period of cohabitation, constructed a burrow that was proportional to their size and enlarged the burrow as they grew. Following the final moult no mature males were found in burrows. A portion of the mature females produced single egg sacs in their second spring and died soon after their spiderlings dispersed. Fourteen populations of burrowing wolf spiders were found on five of twenty-two available soils. A series of alternative hypotheses derived from previous work on spider habitat selection was tested to distinguish possible factors leading to spider/soil association. Adult spiders given two soil choices showed no preferences across a range of grain sizes. Spiders also did not initiate burrowing more quickly in certain soil options. Spider/soil associations could not be explained on the basis of active choice of soil by adult spiders. Survival analysis comparing spiders that burrowed in sand versus clay showed no difference under laboratory conditions. If spider/soil associations are due to differential survival in soils, the effect was masked in the laboratory.

A COMPUTER-AIDED KEY TO THE SPIDERS IN EGYPTIAN COTTON FIELDS.

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A key to the spiders commonly found in Egyptian cotton fields was developed and illustrated through the use of computer generated color photographs. This method can be used for most, if not all, arthropod taxa and could simplify the production of keys for the use of extension agents, field researchers, agriculturalists and farmers. Eventually such keys could be stored with others on CD ROM and selectively printed for cropping systems, environmental units or any other category.

A SPIDER SURVEY OF THE GRAY RANCH, HIDALGO CO., NEW MEXICO.

Richman, David B. Department of Entomology, Plant Pathology and Weed Science. New Mexico State University, Las Cruces, NM 88003

The Gray Ranch is a large (nearly 130,000 ha) nature reserve in southwestern New Mexico purchased by the Nature Conservancy in 1990. It since has been acquired by the Animas Foundation in cooperation with the Conservancy. A survey of the spiders of the ranch was initiated in 1991. Since then there have been semiregular trips to this unique extension of the Mexican Sierra Madre. The survey is ongoing, but some preliminary results are presented to demonstrate the diversity of the fauna and the beauty and diversity of the habitats on this huge nature reserve. Areas involved include Pleistocene lake relic dune, live oak canyon, sycamore canyon, cienega (marsh), mesquite, shortgrass prairie, juniper and riparian (stream) communities.

MALE-FEMALE INTERACTIONS IN SIGHTED VS. BLIND WOLF SPIDERS. *RABIDOSA RABIDA* (ARANEAE, LYCOSIDAE).

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To determine the importance of vision for interactions between male and female *Rabidosa rabida* (Walckenaer), the behavior of sighted and blind individuals paired in various combinations was videotaped and analyzed. Blind males responded to vibrations from moving females at up to about 4 male body lengths (46 mm, face-to-face) distance. Neither sighted nor blind males detected slowly moving or motionless females at any distance. This indicated the effectiveness of visually and vibrationally cryptic locomotion, the lack of form vision, and the lack of a close- range olfactory pheromone. The tightened display posture in blind courting males when a soliciting female approached indicated that his response did not require visual input. After pouncing, unreceptive sighted females usually failed to re-orient toward escaping males, whose locomotion may exceed an upper limit for visual movement detection. Blind females turned up to 140° toward males courting at distances of up to about 3 female body lengths (58 mm). They also detected a male's leg I wave at 3 mm between leg surfaces, probably via the trichobothria. In both sexes, visual detection provided for accurate orientation responses at greater distances than did mechanoreception.

TOP-DOWN CONTROL OF INSECT ACTIVITY BY SPIDERS IN A SOYBEAN AGROECOSYSTEM.

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The effects of top predators can propagate through a food web affecting lower trophic levels both directly and indirectly. In the case of spiders the potential effects are complex in that the spiders consume both beneficial and damaging insects and rely heavily on the structure and microclimate created by the presence of the plants. In initial field experiments, small localized manipulations of spider density influenced the amount of leaf damage in two of three years. Laboratory experiments demonstrated that, even with a degree of cannibalism among the spiders, they could affect the herbivorous activity of Japanese Beetles and Mexican Bean Beetles. Previous experiments demonstrated that cannibalism levels among spiders are reduced when there is ample alternative prey. Further field experiments were conducted in which both hungry and well-fed spiders were introduced into soybean fields. Well-fed spiders remained in the fields in higher densities than those who were hungry at the time of release. At those higher densities, the spiders consumed more pest insects and the plants near these aggregations experienced less herbivore damage than other plants in the fields. Taken together these data suggest that the trophic cascade effects are measurable in soybean agroecosystems and that spiders exhibit a degree of top-down control on primary productivity in this habitat.

A METHOD TO STUDY THE GENITAL MECHANICS OF SPIDERS.

Southard, D., Coddington, J., and Scharff, N. Smithsonian Institution National Museum of Natural History, NHB-105, Washington D.C. 20560

We studied the genital mechanics of two species of spiders to elucidate the functional role of palpal sclerites. We developed an easily repeatable method to study in detail the genital complex of spiders in copula. Copulating pairs of *Neriene radiata* (Linyphiidae) and *Agelenopsis naevia* (Agelenidae) were freeze fixed in liquid nitrogen, and subsequently freeze dried. Once dried, the pairs were studied using light and scanning electron microscopy to determine the function and orientation of the different palpal sclerites and their relationship to the female genitalia. The functionally expanded palps were compared to artificially expanded palps and the use of artificial palp expansion to infer function is discussed.

SURVEY OF THE MORPHOLOGY AND BEHAVIOR OF SOUND PRODUCTION IN WOLF SPIDERS.

Stratton, G.A., Miller, G.L., Forrest, T.G., Baker, G.T., Miller, P.R., and Hebets, E.A. Albion College, Albion, MI 49224.

We used scanning electron microscopy to describe the sound production structures in 13 species of wolf spiders and in several populations of brush-legged *Schizocosa*. Video analysis was used to describe the movements involved in producing sounds. For those species that produced sounds loud enough for acoustic analysis we produced time-wave forms of the sounds to compare the patterns. The species include *S. ocreata, S. crassipes* and *S. floridana* from Florida; *S. ocreata* and *S. crassipes* from Tennessee; *S. rovneri, S. stridulans*, a new species in the *S. ocreata* species group, and several populations of *S.* nr. *ocreata* and *S.* nr. *crassipes* from Mississippi and Louisiana; *S. saltatrix* and a new species similar to *S. saltatrix*, as well as *S. duplex, S. avida, S. retrorsa* and *Gladicosa bellamyi* all from Mississippi and *Lycosa acompa* from Louisiana. All species examined have a scraper and file located on the palp of the male described by Rovner in 1975 and in all individuals the overall shape of the scraper and file were similar. The ridges on the proximal end of the file are markedly larger than distal ridges in *G. bellamyi, S. avida, S. retrorsa* and *S. rovneri*. This is most pronounced in *S. retrorsa* and may correspond with the "push up" behavior observed in this species. Known methods of producing sounds include stridulation, tapping of the first legs, palpal drumming and body bouncing. We have observed species of *S.* nr. *ocreata* to make sounds by banging their chelicerae on the substrate. At least two species (*S. floridana* and *S.* nr. *saltatrix*) are producing sounds in additional ways we cannot yet explain.

GEOGRAPHIC DISTRIBUTION, PHENOLOGY AND HABITAT OF *SCHIZOCOSA* FROM THE SOUTHEASTERN UNITED STATES.

Stratton, G.E., Miller, P.R., and Miller, G.L. Albion College, Albion, MI 49224

The center of diversity of the nearctic wolf spider genus *Schizocosa* appears to be in the southeastern United States where there are 13

described species and two known undescribed species. All known species of the *S. ocreata* species group (*S. ocreata, S. crassipes, S. rovneri, S. stridulans, S. floridana* and a new species) are present. An intensive field study was conducted throughout the lower Mississippi River basin and other areas in the Southeast to further document the range, phenology and habitat of members of this genus. The range of *S. rovneri* has been extended to northwestern Arkansas and to southern Louisiana. Its habitat in the south is moist deciduous woods, including cypress swamps and upland woods. *Schizocosa rovneri* is frequently found with a brush-legged *Schizocosa* (nr. *S. ocreata*). At Grand Gulf State Park in south Mississippi, *S. rovneri* was the dominant species in the deciduous litter on the bluffs, while *S.* nr. *ocreata* was found on the floodplain. *Schizocosa stridulans* is found in upland deciduous woods and usually occurs with an undescribed species of *Schizocosa.* The range of *S. stridulans* has also been extended west to NW Arkansas. An undescribed species is the dominant *Schizocosa* in deciduous woods in June and July and is found in Arkansas, Louisiana, Tennessee and throughout much of north Mississippi and Alabama. There are numerous populations of brush-legged *Schizocosa* throughout the lower Mississippi River valley, with some populations morphologically similar to *S. crassipes* and some similar to *S. ocreata.* Patterns in the timing of maturation of the species in the *ocreata* species group will be discussed and potential for interbreeding will be assessed.

SPIDER NECTARIVORY.

Taylor, R.M. and Foster, W.A. Ohio State University-Sea Grant, 1314 Kinnear Rd., Columbus, OH 43212.

Even the most recent reviews of spider feeding and nutrition give the impression that all spiders are exclusively or almost exclusively predacious. Protein, lipid, glycogen, vitamins, minerals, and even water are implied to come only from prey. The vast majority of spiders feed on arthropods, a few take small vertebrates, and there are references to some eating arthropod eggs and dead arthropods. Reported exceptions to this carnivory are rare and usually anecdotal. Some orbweaving spiderlings, however, have been shown to coincidentally ingest significant amounts of pollen while consuming their webs, and a recent study of crab spiders indicates that males use nectar as a source of energy during mating activities on flowers. We suggest that both sexes of some wandering spiders feed on plant nectar frequently and may make it an important source of energy for survival, prey foraging, and reproduction. In Costa Rica, Panama, and Florida, we have observed immatures and adult male and female *Hibana* (Anyphaenidae), *Trachelas* (Corinnidae), and *Chiracanthium* (Clubionidae) systematically foraging and apparently nectar feeding among floral and extrafloral nectaries in a manner indicating that it is a distinctive activity. An experiment with spiderlings demonstrated that with the availability of sucrose their longevity was doubled.

FOOD CONDITIONS FOR SPIDERS IN DANISH CEREAL FIELDS.

Toft, Søren. Department of Zoology, University of Aarhus, Building 135, DK-8000 Aarhus C, DENMARK

Ongoing studies attempt to describe the quality of cereal fields as living habitat for spiders. Two aspects are considered here: Food limitation and prey quality. A simple experimental procedure allows us to quantify the degree of food limitation of single individuals. Besides prey abundance, food availability (or limitation) depends on prey quality. Arthropod predators of cereal fields have aroused interest mainly in the context of their potential as aphid antagonists. Many of them, in particular the spiders, are not very well adapted as aphid predators: they show a very low preference for aphids in feeding trials; on pure diets females stop egg laying and young are unable to develop. However, several other natural prey types, including more kinds of Collembola and Diptera, are likewise little preferred and presumably of low quality as food. Polyphagy in these predators may be adaptive for two reasons: nutritional advantage of a varied diet, and inability to satisfy the food demand on one kind of prey.

LEG LOSS AND SUBSEQUENT REGENERATIVE ASYMMETRY INFLUENCES FEMALE CHOICE IN WOLF SPIDERS.

Uetz, G. W., Miller, D., and McClintock, W. J. Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221- 0006

Males of the brush-legged wolf spider *Schizocosa ocreata*, have conspicuous tufts of dark bristles on the tibia of the first pair of legs, which are used in courtship and agonistic displays. Previous studies have suggested that male-male interactions in this species maintain a dominance hierarchy among males that may influence male mating success (Aspey 1977). When one of the decorated forelegs is autotomized prior to and regenerated during the molt to adulthood, the new foreleg usually lacks the characteristic tuft. Mating success (ability to elicit female receptivity) of asymmetric males is significantly lower (16.75%) than for symmetric males with bristles on both legs (75.7%) suggesting that female choice may be based in part on tuft asymmetry. Symmetric males paired with females before and after experimental removal of one of the tufts elicited significantly less receptivity after shaving made them asymmetric. We hypothesize that females discriminate against asymmetric males because regenerative asymmetry may reflect leg loss as a consequence of losing an agonistic encounter. Surveys of penultimate spiders collected in the field in Spring show that males have a significantly higher frequency of missing and/or regenerating legs (21.9%) than females (7.6%). Among these males, there was a significant tendency to be missing or regenerating one of the forelegs (52.4%). Staged encounters between penultimate males all included agonistic interactions involving either display (91.6%), contact (83.3%), or grappling (50%). These data provide indirect support for the hypothesis that female choice based on regenerative asymmetry may be adaptive as females can assess the past performance and potential fighting ability of males prior to mating.

EFFECTS OF HABITAT COMPLEXITY AND PREY ABUNDANCE ON RATES OF CANNIBALISM IN *SCHIZOCOSA OCREATA* SPIDERLINGS: A LABORATORY STUDY.

Wagner, J.D. and Wise, D.H. Department of Entomology, University of Kentucky, Lexington, KY 40546-0091

Results from previous field experiments suggest cannibalism acts as a major density-dependent mortality factor for young stages of the wolf spider *Schizocosa ocreata*. We designed two laboratory studies that: (1) documented that cannibalism occurs between *S. ocreata* spiderlings of the same age and size class; (2) determined the magnitude of size-dependent mortality created by cannibalism; (3) examined the effect of habitat complexity and prey availability on the rates of cannibalism; and 4) evaluated if cannibalism is a density-dependent mortality factor strong enough to explain the density decline observed in previous field studies. We found that cannibalism readily occurred between spiderlings of similar age and size. In the absence of prey, cannibalism induced size-dependent mortality, causing the distribution of spider sizes to become positively skewed. The shift was towards many small individuals, a few large individuals, and a decrease in the number of intermediate sized individuals. There was a significant interaction between habitat complexity and prey abundance. In the absence of prey, increasing habitat complexity had no effect on rates of cannibalism. When prey were present, rates of cannibalism were higher in the complex habitat than in the simple habitat. We found that in laboratory conditions that most closely mimicked the field, i.e., complex leaf-litter habitat with prey and natural densities, the rate of mortality was not significantly different from that observed in the field. We conclude that cannibalism is a strongly density-dependent mortality factor regulating densities of newly dispersed *Schizocosa ocreata* spiderlings.

SPIDERS DETRIMENTAL TO MAN AND AGRICULTURE.

Whitcomb, W., and Coler, R. Professor Emeritus, University of Florida, 4013 NW 39th Way Gainesville, FL 32606

In the 1950s it took large quantities of hard data to demonstrate to the agricultural community that spiders formed a very important part of the arthropod predator complex protecting their crops. Interestingly, we now find ourselves showing that some spiders can at times be detrimental to agriculture. Some spiders stalk and feed upon other species of spiders as their primary food source. Many of the species attacked are themselves important predators of pest insects. Similarly, a number of generalist spiders, represented by a wide array of families, kill other spiders when they are available. Spiders that feed upon other beneficial arachnids negatively impact the potential of the natural enemy complex. It has only been recently that spiders have been acknowledged as important competitors to insect predators. This must be considered when developing and studying biological control in field crops. Most important of all are spiders as natural enemies of both insect predators and parasitoids. All important insect predators have specific spider enemies. Certain parasitoids have been shown to successfully resist attacks by salticid spiders. Another potential detriment is the silk produced by spiders. Although the webbing is often a nuisance and unsightly in the homes and offices, some dairy farmers in Florida are experiencing a more serious problem. They claim that machinery has been damaged due to overheating caused by spider silk from pholcid webs which clog cooling radiators and impede airflow. There is a small group of spiders from the genera *Latrodectus*, *Loxosceles*, and *Atrax* that produce toxins detrimental to people and consequently are medically important. This group may also be expanded to include the genus *Dysdera*.

CONTRIBUTIONS OF WOLF SPIDERS TO CONTROL PROCESSES IN THE FOREST-FLOOR FOOD WEB.

Wise, David H., and Wagner, James D. Department of Entomology, College of Agriculture, University of Kentucky, Lexington, KY 40546-0091

Wolf spiders of the genus *Schizocosa* are abundant, intermediate-level predators in the food web of forest-floor leaf litter. A long-term research program is described in which *Schizocosa* serves as a focal organism for investigating the relative strengths of top-down control processes (cascading effects of predation) and bottom-up processes ("upward cascades" of control caused by changes in the resource supply at the bottom of the food web). The relative contribution of top-down and bottom-up forces in terrestrial communities is poorly understood. Theoretical arguments and empirical evidence lead to the conclusion that both types of control processes could be important in the forest-floor community, but the evidence for and against each type of control is often weak or equivocal. Field and laboratory experiments completed to date with a Maryland population of *Schizocosa ocreata* have revealed that: (1) young instars of *S. ocreata* exhibit effects of exploitative competition at natural densities, due to depression of densities of Collembola and possibly other prey groups; (2) limiting access of invertebrate predators to young *S. ocreata* has no detectable impact on the spider's numbers; and (3) cannibalism is the major interaction regulating densities of recently dispersed *S. ocreata*. Cannibalism, if a significant interaction for all stages of this abundant intermediate-level predator, would affect the intensity of both bottom-up and top-down control processes in the forest-floor food web. These results are evaluated both in the context of other research on wolf spiders, and in relation to ongoing and future experiments with *Schizocosa* spp. in Kentucky.

POSTER ABSTRACTS

THE EFFECTS OF TEMPERATURE ON THE WEB-BUILDING BEHAVIOR OF THE COMMON HOUSE SPIDER, *ACHAEARANEA TEPIDARIORUM* (C.L. KOCH) AND THE WESTERN BLACK WIDOW SPIDER, *LATRODECTUS HESPERUS* (CHAMBERLIN & IVIE).

Barghusen, L.E.*, and Claussen, D.L. Department of Zoology, Miami University, Oxford, Ohio 45056

The web of a spider is vital to its survival and differences in web quality due to the temperature at which the web is constructed can be an important measure of the thermal tolerance of a species. The possibility of some optimal temperature for web production and prey capture efficiency was investigated using *Achaearanea tepidariorum*, the common house spider, and *Latrodectus hesperus*, the Western black widow spider. The spiders were also tested in a thermal gradient to evaluate whether the temperature ranges selected by the spiders are close to those which result in the heaviest and most efficient webs. The web weight of *A. tepidariorum* peaked at 20 °C and webs spun at 20 and 25 °C were significantly heavier than those produced at 5 °C. The webs of *L. hesperus* were heaviest at 30 °C and webs spun at 30, 25 and 20 °C were significantly heavier than those spun at 15, 10 and 5 °C. Higher temperatures are currently being tested in an attempt to identify a peak web weight for *L. hesperus*. *Achaearanea tepidariorum* seemed to prefer temperatures between 14.0 and 20.1 °C, with 14/18 spiders found in that temperature range. The spiders were found in the temperature range of 10-20 °C significantly more often than in the range of 20-30 °C. Preliminary data did not demonstrate any significant thermal preference for *L. hesperus*. Tests of efficiency at prey capture of webs spun by *A. tepidariorum* under different temperatures revealed a highest frequency of capture occurring at 20 °C; however, this was not statistically significant. These collective data suggest that, for the species tested, there is an optimum temperature range for silk production and that this may be related to the prey capture efficiency of the web.

DEVELOPMENTAL INFLUENCES ON FORAGING STRATEGY IN *ARGYRODES TRIGONUM*.

Bierweller, L.M., and Cangialosi, K.R. Department of Biology, Keene State College, Keene, NH 03431

Argyrodes trigonum exhibits a wide range of strategies in order to acquire prey. Its major foraging strategies include stealing prey from an occupied host web, stealing the host web (and web-site) and using it to capture it's own prey, and preying on the host spider itself. Although many different factors may interact to determine which foraging strategy an individual *A. trigonum* may exhibit, developmental stage would be expected to significantly influence its behavior. The purpose of this study was to examine the foraging strategies of different developmental stages of *A. trigonum* for two of its host species, *Neriene radiata* and *Achaearanea tepidariorum*. An individual host spider was placed in a 10 gallon aquarium and given 24 hours to construct a web. Then, a single *A. trigonum* was added to the opposite end of the tank. Approximately 20 spiders of each host species were used. Observations of position of *A. trigonum*, position of host, and any interactions that occurred were recorded for 7-8 days. Smaller juvenile *A. trigonum* tend to steal *Neriene radiata* webs for foraging on their own, while they are more likely to share a web with *A. tepidariorum* and kleptoparasitize their prey. Penultimate and adult female *A. trigonum* are primarily predators of *Neriene radiata* of all ages and juvenile *A. tepidariorum*, but will co-habit and steal prey from adult *A. tepidariorum* webs. This suggests that *A. trigonum* changes its strategy as its size increases relative to a host and that foraging mode is influenced by host species and web type.

DIET CHANGES BETWEEN JUVENILES AND ADULTS OF FOREST-DWELLING *ACHAEARANEA TEPIDARIORUM*.

Cady, Alan B. Department of Zoology, Miami University-Middletown, 4200 E. Univ. Blvd., Middletown, OH, 45042

The numbers and types of prey consumed by *Achaearanea tepidariorum* in a mesic Eastern Tennessee forest is reported. These data are from observations of 744 juvenile and 1526 adult spider feeding events over a 3 year period. The results indicate that *A. tepidariorum* shifts its diet upon maturing. The change involves adults including stronger, larger arthropods able to escape from the smaller juvenile spiders. Changes in website position between the young and adults also contribute to the dietary shift. Thus, adult spiders have a wider variety of food available to them than do juveniles, mainly through different web placement and their ability to overpower the larger arthropods encountered in those websites. These shifts also have implications concerning *A. tepidariorum* within agroecosystems. For example, other spiders become a more important item of food upon *A. tepidariorum* attaining adulthood.

FIRE ECOLOGY OF *GEOLYCOSA* SPIDERS IN SCRUBBY FLATWOODS IN FLORIDA.

Carrel, J.E. Division of Biological Sciences, 210 Tucker Hall, Missouri University, Columbia, MO 65211

Two burrowing wolf spiders, *Geolycosa micanopy* and *G. xera* (Araneae, Lycosidae), occur sympatrically in fire-maintained, upland scrub habitats at the Archbold Biological Station, Highlands Co., Florida. To determine the response of spiders to burning, each year since 1987 my colleagues and I have censused burrows of both species during winter in replicate plots (15 x 100 m^2) in one xeric vegetative type, scrubby flatwoods with inopina oak. By chance all plots were burned in May, 1989 by a wildfire, ca.3 years into our study. We estimated the percent of the ground covered by leaf litter in a 10x10 cm quadrat centered on each burrow. Leaf litter coverage was also estimated annually at two permanent sites randomly located in each plot. The densities of both *Geolycosa* species were low during the first three years of the study but they increased threefold, from about 0.1 to 0.3 spider per m^2, within 9 months after the plots were burned in 1989. Subsequently the density of *G. xera* declined sharply so that by 1993, 4 years postburn, this species was back to preburn values. In contrast, the density of *G. micanopy* was stable for 3 years after the burn event before it began to decline to preburn levels. Densities of both *Geolycosa* species declined significantly as leaf litter increased on the plots, but the strength of the regression relationship was particularly strong for *G. xera*. Hence, both *Geolycosa* species seem to be highly fire adapted, but in rather different ways. *G. xera* appears to benefit from very frequent (every 3-7 years) burns of the scrub that keep the vegetation low-growing and much of the sandy soil barren and beachlike. On the other hand, *G. micanopy* appears to tolerate longer burn intervals (7-10 years), perhaps because it incorporates leaf litter in the turret around its burrow. One wonders whether these species can persist in scrubby flatwoods and other scrub habitats that go unburned for more than 2 decades, as often has happened in 20th century Florida.

USING MOLECULAR TECHNIQUES TO STUDY THE POPULATION STRUCTURE OF A SPIDER ANT-GUEST.

Cushing, P.E. University of Florida, Gainesville, FL 32611.

Many arthropods have evolved close symbiotic relationships with ants. My research focuses on a species of spider in the genus *Masoncus* (Linyphiidae) found within the nest chambers of the southern harvester ant, *Pogonomyrmex badius* (Formicidae). Certain ecological and life history parameters led me to hypothesize that the dispersal rate of spiders between ant nests would be low and that inbreeding of spiders within a nest would be high. To test my hypothesis, I collected 40 spiders from three different ant nests. Two of the nests were nearest neighbors and the third was 35 km away. I used the Random Amplified Polymorphic DNA (RAPD) technique to analyze the degree of polymorphisms both among spiders within each nest as well as among spiders from different nests. I found a higher degree of polymorphism than expected within each of the nests as well as a high degree of band sharing among the spiders from neighboring nests suggesting relatively high dispersal rates per generation. The data failed to support my hypothesis of low dispersal rates and high inbreeding.

INFLUENCE OF AGE AND SEX ON SPACE UTILIZATION IN TWO SPECIES OF WOLF SPIDERS IN LABORATORY ENVIRONMENTS.

De Lay, A.D., C. Hardesty and G.W. Uetz.
Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006, USA

The goal of this study was to compare space utilization and estimate the home range size of *Schizocosa ocreata* and *S. rovneri* in a laboratory setting. Housing protocol for these species requires the use of small individual containers, and it is not clear if this type of housing influences their behavior. This study was done in an effort to determine if the containers were sufficient in size to allow the spiders "natural" movement. The apparatus used to collect data was a large rectangular enclosure (1750 cm^2) that was filled with tissue paper leaves that approximated litter depths in their natural surroundings. Data were collected over a four day period for eight hours a day. Each half hour the spider location within the grid was marked and its position on the leaf litter was noted as either hidden or exposed. We examined differences in behavior between species and sex/age classes. When daily and total home range sizes were compared, there was no difference between species. Males of both species are more active than females and immatures, changing location twice as often and having a significantly larger home range size. Males of both species spent more time in exposed positions than females and immatures, which spent more time hidden under the leaves. While current laboratory housing provides less space than spiders use in open field environments, it has yet to be determined what, if any, effect it may have on their behavior. These findings support conclusions of earlier research that lycosids are "sit and wait" predators that change sites frequently (Ford 1978). *Schizocosa ocreata* and *S. rovneri* often occupy different types of litter habitat in the field, but there was no difference in daily locomotor pattern or space use by these sibling species in their laboratory environments.

AN INVESTIGATION OF POTENTIAL NUTRITIVE EGGS IN SPIDERS.

Ensminger, C. I. Biology Department, Winona State University, Winona, MN 55987.

For over a century, the idea of nutritive eggs as a food source for spiderlings in egg sacs has been proposed. This research is an attempt to determine whether nutritive eggs exist. Random samples were taken from egg sacs of three genera of spiders. The samples were fixed, sectioned, and mounted for microscopic examination. The sections were then stained using Harris Hematoxolin and Eosin. In egg populations explored to date, distinctive morphological differences exist. These differences are centered on lipid content. This research lends credence to the possibility of existence of nutritive eggs.

EXTANT SCORPIONS MAY HAVE MODERATE LEVELS OF GENETIC DIVERGENCE: EVIDENCE FROM A MITOCHONDRIAL PROTEIN-CODING GENE.

Fet, V.*, Sudman, P.D., Vezzetti, R. M., and Rao, A.
*Department of Biological Sciences, Loyola University, New Orleans, LA 70118

We present the first known DNA sequences for a mitochondrial protein-coding gene, cytochrome oxidase I, for two taxa of scorpions: *Centruroides exilicauda* (Buthidae) and *Hadrurus concolorous* (Iuridae). Sequences were obtained by DNA amplification via polymerase chain reaction (PCR). Although these taxa belong to phylogenetically distant families, observed genetic divergence levels appear to be rather moderate (compared with similar data on insects). Pairwise nucleotide distance between *Centruroides exilicauda* and *Hadrurus concolorous* was 16.7 % (for 327 base pairs); with third (degenerate) codon site excluded from analysis, it was 9.1 % (20 substitutions of 218 bp; of these, 7 were transversions, while 13 were transitions). Amino acid changes were inferred from nucleotide sequence; of 105 amino acid residues, 18 (17.1 %) were different, but only in six (5.7 %) cases did differing amino acids belong to different chemical classes. At the same time, evolutionary rates in scorpion mtDNA at the species/genus level do not seem to be specifically low (our unpublished data for genus *Centruroides*); thus, divergence between the taxa under consideration may reflect a rather recent phylogenetic split. Our data support existing opinions that the age of modern scorpion families probably is not older than Cretaceous.

THE ROLE OF INTRAGUILD PREDATION IN STRUCTURING A COMMUNITY OF CLIFF-DWELLING, WEB-BUILDING SPIDERS.

Hodge, M.A. Department of Biology, The College of Wooster, Wooster, OH 44691

This study investigated predatory interactions between three species of web-building spiders which inhabit sandstone outcrops along the Cumberland Plateau of east Tennessee: *Hypochilus thorelli* (Hypochilidae), *Achaearanea tepidariorum* (Theridiidae), and *Coras montanus* (Agelenidae). Previous studies have shown that 7-24% of the diet of each species consists of the other two species. This type of interaction, in which one species preys on a member of a species which uses resources in a similar way is called intraguild predation. Using removal experiments, I attempted to discover the significance of intraguild predation for each of the three species. Two replicates of three removal (experimental) and control plots were established on a 165 m stretch of rock outcrop. The experimental plots were areas from which two of the species were removed (weekly, July-October 1993), and the third remained. All three species remained on each control plot. I predicted that if the experimental treatments (removals) resulted in removal of an important source of food then: 1) the number of individuals of the remaining species should decline over time as a result of web relocation, and 2) body condition should be lower in the removal plots than in the controls. If the experimental treatments had the effect of removing predation, then the number of individuals remaining in these plots should remain the same or increase relative to the controls (where intraguild predation could occur). Results indicate that the experimental treatment did not result in a significant removal of food for any of the species. However, it does appear that removal of the other two species may have removed a source of mortality for *A. tepidariorum*. Though females in the removal plots had slightly fewer eggsacs than females in control plots, more spiderlings established webs in removal plots than in controls. This suggests that dispersing spiderlings in the control plots may have been intercepted by the two remaining species and consumed.

THE ARACHNID FOSSILS OF FLORISSANT: A SUMMARY OF THE ASSEMBLAGE AND ITS PALEOECOLOGY.

Licht, E.*, Schaefer, J., and Darrow, K. University of Colorado Museum, Campus Box 218, Boulder, CO 80309

In diversity and state of preservation, the Florissant spider fauna is second only to the faunas of the Baltic (40 Ma) and the Dominican (20-40 Ma) ambers. The Florissant fossils, carbonized films ranging in size from 3 mm to 12-13 mm (body length), show outstretched legs and fine structural details such as eye arrangement, palps, epigyna, hairs, and spines, which enable identification sometimes down to species level. Thus far, at least 12 families/subfamilies and 20 genera have been described and named from this site. For comparison, Colorado now has approximately 25 families with close to 75 genera. Aside from the unpublished notebooks of F. Martin Brown, the spider fauna of Florissant has not been thoroughly reviewed in almost 40 years. Of the 118 known specimens, 67 have not yet been identified with any degree of certainty and are currently under examination. Specimens that were identified decades ago should be reexamined using the latest techniques of microscopy. The entire fauna should be interpreted ecologically. In the hope of attracting attention to this interesting component of the Florissant ecosystem, we publish a list of the known specimens based on Brown's compilation, and incorporate comments from his unpublished writings. We then compare the Florissant spider fauna with that of contemporary Colorado and with the fossil spiders of the Baltic and Dominican ambers, which are held to be the products of, respectively, subtropical and tropical climates. These comparisons suggest that the climate at Florissant was temperate.

A COMPARATIVE ANALYSIS OF THE SPIDER FAUNAS OF NORTHEAST SIBERIA AND NORTHWEST NORTH AMERICA (ALASKA AND YUKON TERRITORY).

Marusik, Yuri M. Institute for Biological Problems of the North, K.Marx pr. 24, Magadan 685010, Russia.

The known spider fauna of northeast Siberia (Asia north of 52° N and east of 138°E) contains more than 550 species, while NW America contains according to published data only about 350 species (or about 500 counting new findings). There are 19 families in northeast Siberia and 20 in Alaska. All are the same in both faunas except for Oxyopidae, Corinnidae, Telemidae, and Cybaeidae. The three former families are represented by one species, as is the Pisauridae. The two former families are present in northeast Siberia, the two latter in Alaska. In spite of the poor knowledge of the spiders of northwest North America, the number of species known in some families from Alaska is greater than that from northeast Siberia. For example: Amaurobiidae 5 spp.-1 sp., Dictynidae 20-16, Hahniidae 10-4 and Tetragnathidae 8-7. The opposite situation occurs for the following families: Gnaphosidae 25-31; Linyphiidae 265-330 Liocranidae 1-2; Philodromidae 9-17; Salticidae 8-27; Theridiidae 12-24; Thomisidae 11-17. Equal numbers of species are found in Clubionidae (11). The greatest in the world species diversity of some taxa are observed in the northeast Siberian spider fauna: Linyphiidae as a whole, Hybauchenidium (3 species from 5 known in the world), Hilaira (24 of 32), Poeciloneta (7 of 12), Wubanoides (4 of 7). Distribution patterns and endemism of spider species in both areas are described.

HABITAT SELECTION IN THE SILVER GARDEN SPIDER, *ARGIOPE TRIFASCIATA* (FORSKAL).

McNett, B.J.* and Rypstra, A.L. Miami University, Department of Zoology, Oxford, OH 45056

This study examined habitat preference in *Argiope trifasciata* in the absence of interspecific competition. *Argiope trifasciata* were censused weekly for six weeks in three different habitats: grass, thistle, and goldenrod. Spiders were found in only two: grass and thistle. Of these two habitats, spiders preferred the thistle habitat. There was no difference in prey capture between the two habitats. In addition, a condition index, which was the ratio of abdomen width to total body length (TBL), suggests that spiders were equally successful at foraging in the two habitats. However, the thistle was more complex vegetationally, which suggests there may be more appropriate web attachment sights. Within the thistle habitat, large spiders (TBL 13.8-20.1 mm) captured more prey, had larger webs, had larger nearest neighbor distances, and had webs located higher in the vegetation than medium (TBL 11.8-13.7 mm) or small (TBL 6.4-11.7 mm) spiders. As the season progressed, there was a substantial decline in the *A. trifasciata* population, and those spiders that remained tended to be in the largest category. In addition, nearest neighbor distance increased, web diameter decreased and webs were built closer to the ground as the season passed.

TREASURER'S REPORT

The American Arachnological Society
Gail E. Stratton, Treasurer

FIRST QUARTER, 1994
APRIL 17, 1994

Activity of First Quarter	
Balance from 1993 4th Quarterly Statement, checking acct. Chemical Bank of Albion, MI Acct. #759647	**$70,762.81**
DEPOSITS	
Membership	$26,690.40
Page charges	2,150.00
Interest (checking acct- Jan., Feb., Mar.)	414.68
Sales, back issues of JOA	373.80
Subtotal:	**$29,628.88**
EXPENSES	
Supplies, Associate Editor	69.92
American Arachnology Newsletter Production, Miami University	600.00
Allen Press, JOA #21 (3)	6345.30
Ebsco Industries, refund for subscription entered in error	80.00
Bank charges for uncollected checks (checks have been replaced)	169.75
Subtotal:	**$7,264.97**
Total in Checking account, end of 1st quarter	**$93,126.72**

Respectfully Submitted,

Gail E. Stratton, Treasurer
Prepared April 17, 1994

(Continued on Page 14)

SECOND QUARTER, 1994
JULY 11, 1994

Activity of Second Quarter
Balance from 1994 1st Quarterly Statement, checking acct.
Chemical Bank of Albion, MI Acct. #759647

	$93,126.72
DEPOSITS	
Membership	$2,701.90
Interest (checking acct- Apr., May, June)	409.44
Sales, Spider Genera	1116.00
Subtotal:	$4,227.34
EXPENSES	
Whitehall Printing (2nd payment) Spider Genera of North America	1,398.14
Mailing expenses, Spider Genera	123.85
American Arachnology Newsletter Production, Miami University	850.00
Honoraium for Assoicate Editor (Honoraium for Editor returned to AAS)	1,000.00
Bank charges for uncollected checks	8.00
Subtotal:	$3,379.99
Total in Checking account, end of 2nd quarter	**$93,974.07**

Respectfully Submitted,

Gail E. Stratton, Treasurer
Prepared July 11, 1994

THIRD QUARTER, 1994
SEPT. 29, 1994

Activity of Third Quarter
Balance from 1994 2nd Quarterly Statement, checking acct.

Chemical Bank of Albion, MI Acct. #759647	$93,974.07
DEPOSITS	
Funds from 1992 meeting in New Hampshire	500.00
Membership	936.00
Interest (checking acct- July, Aug. Sept.)	426.63
Sales, *Spider Genera*	780.00
Subtotal:	$2,642.63
EXPENSES	
American Arachnology Newsletter Production, Miami University	800.00
Co-collected Dues	
British Arachnological Society	3,008.00
C.I.D.A.	3,412.00
Arach. Soc. of Japan	1,060.00
Revue Arachnologique	160.00
Allen Press, Journal of Arachnology Vol 22 (1).	5,672.35
Treasurer's expenses (duplicating material for meeting, mailing exp. & purchase of accounting program)	49.31
Subtotal:	$14,161.66
Total in Checking account, end of 3rd quarter	**$82,455.04**

Gail E. Stratton, Treasurer
Prepared Sept. 29, 1994

To: The Executive Committee of the American Arachnological Society
From: Gail Stratton, Treasurer
date: October 1, 1994

Under the charge of the executive committee to invest a portion of our funds in a federally insured interest bearing account, I have purchased three different c.d.s. as follows:

$51,000	3 yr C.D.	at 6.3%
$12,000	2 yr C.D.	at 6.05%
$10,000	1 yr C.D.	at 5.5%

These are all with Smith Barney Shearson, acct. # 11904
in their office a 1 Jackson Square, P.O. Box 1387, Jackson, MI 49204.

The interest from the first (the 3 yr c.d.) is designated for the "Student Research Award," the guidelines of which are being developed by a committee chaired by Craig Hieber. He and I both presume that the guidelines for this award must be approved by the executive committee and right now we expect the research awards to be similar to the old Exline Frizzel awards. Craig will contact the California Academy to verify the status of that award.

VOTING RESULTS

The Society needed to fill a vacant Director's position this year. The nominating committee, chaired by Maggie Hodge, did a good job of lining up three qualified candidates. It was a hard-fought contest, and all candidates are thanked for agreeing to run for the open Director position. A count of the ballots found that Pat Miller is the newest Director of the Society and member of the Executive Committee. Congratulations to Pat!

On Another Society Note...

The proposed amendment to the By-Laws of the Society which would add the Associate Editor of the Journal of Arachnology to the Executive Committee PASSED by a wide margin. Thus, Gary Miller, the current Associate Editor of the J.O.A. becomes a voting member of the Executive Committee.

1995 A.A.S. MEETING COLUMBIA, MISSOURI

The American Arachnological Society returns to the Show-Me state for the third time this June for their 19th annual meeting. Hosted by Jim Carrel of the University of Missouri in Columbia, (along with Jan Weaver and Matt Greenstone) the festivities will run between 20 and 25 June, 1995.

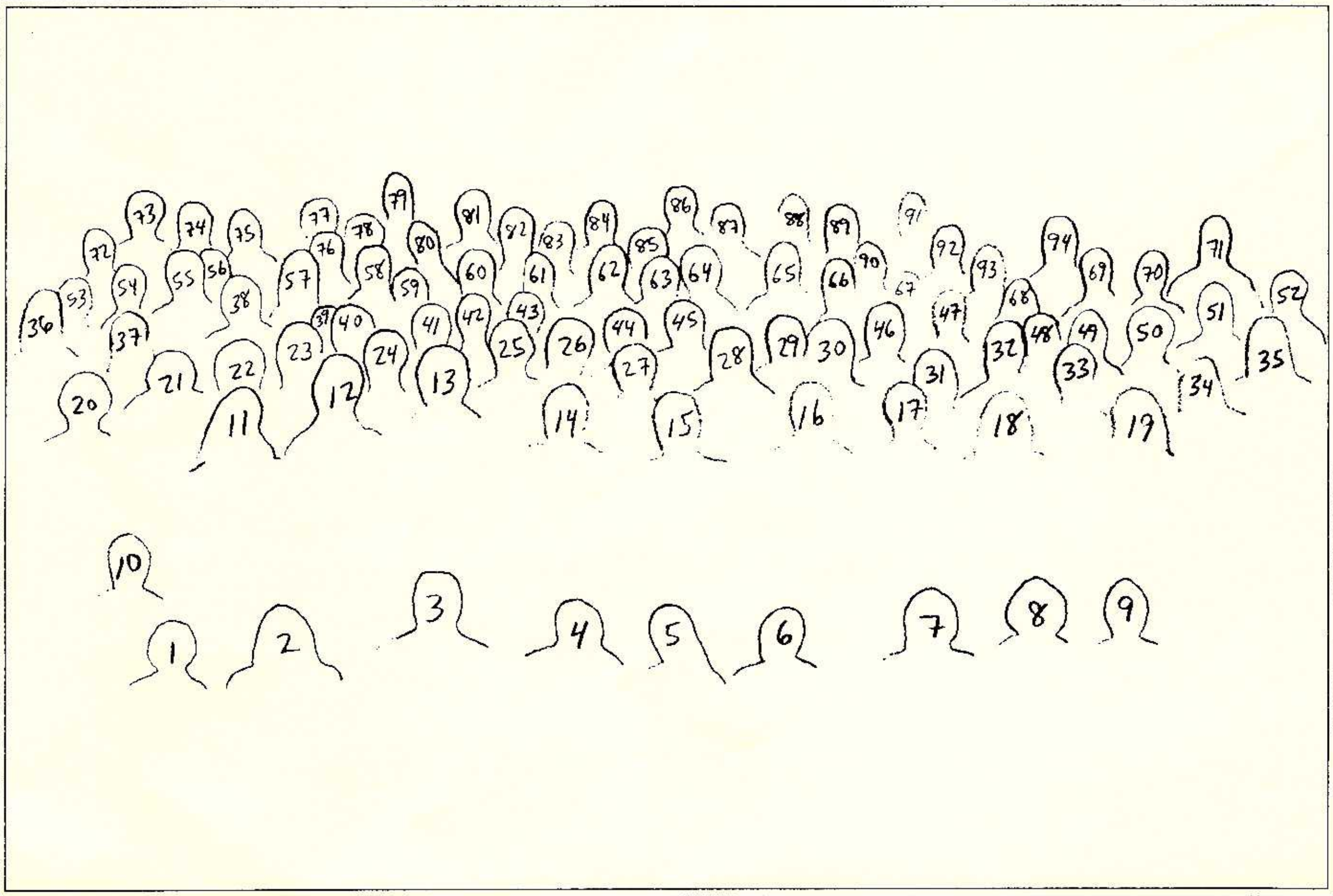
Tentative schedule:

Tuesday 20 June	Check-in at Dorms
Wednesday-Friday 21-23 June	Scientific Paper and Poster Sessions
Saturday 24 June	Field Trip
Sunday 25 June	Check Out

Estimated Costs (per person):

Conference Fees	$50 Regular, $25 Student
Dorm Rooms (per Night; includes Breakfast)	$15 Double, $25 Single
Banquet	$20 Regular, $12 Student, $6 Child (<12yr)
Field Trip	$12 for Transportation & Lunch

More information will be forthcoming in the Spring Newsletter. You may also contact Dr. James Carrel, Division of Biological Sciences, 110 Tucker Hall, Missouri University, Columbia, MO 65211, U.S.A. Tel.: (314) 882-3037; FAX: (314) 882-0123; E-mail: CARREL@BIOSCI.MBP.MISSOURI.EDU



Key to Group Photo Silhouette

1. M. Hodge 2. M. Gray 3. H.D. Cameron 4. V. Roth 5. P. Cushing 6. H. Proctor 7. L. Barghusen 8. B. McNett 9. P. Tuntibunpakul 10. E. Leighton 11. O. Bartosh 12. J. Fraser 13. L. Vincent 14. B. Vogel 15. P. Sierwald 16. L. Kerzicnik 17. D. Southard 18. J. Hedin 19. T. Plew 20. D. Whitcomb 21. W. Whitcomb 22. V. Ovtsharenko 23. V. Fet 24. J. Warfel 25. G. Mullen 26. W. Foster 27. R. Taylor 28. N. Platnick 29. A. Tovar 30. P. Gerba 31. L. Forster 32. I. Tso 33. P. Rovner 34. ? 35. A. Butler 36. R. Roeloffs 37. D. Smith 38. B. Krafft 39. B. Berry 40. Y. Marusik 41. J. Reiskind 42. ? 43. K. Cangialosi 44. L. Bierweiler 45. E. Licht 46. R. Bradley 47. W. Miller 48. P. Miller 49. G. Stratton 50. R. Richardson 51. M. Hedin 52. T. Yamashita 53. V. Medland 54. M. Draney 55. M. Greenstone 56. M. Peck 57. D. Kroeger 58. J. Wagner 59. E. Hebets 60. J. Anderson 61. M. Persons 62. D. Richman 63. J. Arnold 64. C. Griswold 65. G. Uetz 66. A. Brady 67. A. Rypstra 68. R. Holberton 69. G. Miller 70. J. Rovner 71. G.B. Edwards 72. J. Berry 73. D. Morse 74. M. Stowe 75. J. Beatty 76. B. Peck 77. S. Barlow 78. R. Samudio 79. A. Cady 80. T. Jones 81. B. Edwards 82. A. DeLay 83. S. Toft 84. D. Wise 85. B. Chen 86. L. Plew 87. L. Hurd 88. J. Carrel 89. J. Dobyns 90. D. Mott 91. ? 92. J. Shultz 93. D. Corey 94. ?

Please excuse any mistakes and omissions. Corrections may be directed to the Secretary.

Those wishing copies of the official participant photograph of the 1994 meeting of the American Arachnological Society (or photos from other meetings), please contact the Secretary, Alan B. Cady, Dept. Zoology, Miami University-Middletown, 4200 E. University Blvd., Middletown Ohio, 45042, U.S.A.

ARACHNOLOGICAL NOTES

WANTED: PSEUDOSCORPIONS FROM BATU CAVES

Whilst revising some Asian species of the pseudoscorpion family Ideoroncidae, I have had considerable trouble locating specimens of *Dhanus sumatranus* (Redikorzev), the type species of *Dhanus*. All of the specimens mentioned in the literature are apparently lost or currently unavailable, including the original type material. Although named *sumatranus* by Redikorzev, it seems clear that the species is restricted to the Batu Caves, near Kuala Lumpur, Malaysia. This locality may be familiar to araneologists as one of only two known localities of *Liphistius batuensis* Abraham (see Platnick and Sedgwick 1984. A revision of the spider genus *Liphistius* (Araneae, Mesothelae). *Am. Mus. Novit.* 2781: 1-31), one of the most famous of all spiders.

Does anybody have pseudoscorpions from the Batu Caves, or from other Asian caves, identified or not, that they are willing to lend for my revision? Any assistance will be gratefully received, and of course, duly acknowledged.

Please address correspondence to:
Western Australian Museum, Francis St. Perth, W.A. 6000, Australia, or harveym@muswa.dialix.oz.au. **Mark S. Harvey**

In The Next Issue ......

- More on the 1995 A.A.S. Meeting
- An attempt to produce a comprehensive A.A.S. phone/FAX/E-mail Directory
- Spiders of Hernandez's *Natural History of New Spain*
- Minutes from the 1994 A.A.S. Meeting
- More announcements
- And Much, Much More ! ....

AMERICAN ARACHNOLOGY

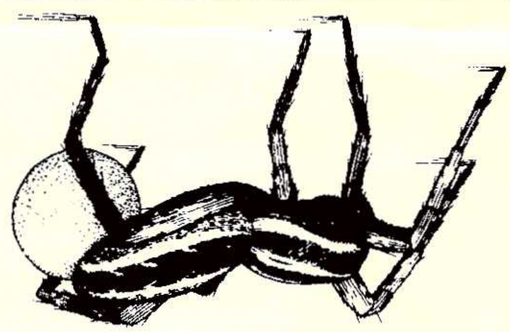
The Newsletter of the American Arachnological Society

Number 50 **November 1994**

E-Mail Happenings

The latest version of the A.A.S. E-Mail Directory (Version 2.6) was transmitted via e-mail in August 1994. It included those new addresses and corrections gathered at the Meeting in Gainesville. An updated version will be out in December, correcting mistakes in ver. 2.6 and include some other new addresses acquired since August. Version 2.7 will arrive electronically to those in the Directory, and those wishing a hard copy of the Directory should contact the Secretary (Alan B. Cady, Dept. Zoology, Miami Univ.-Middletown, 4200 E. Univ. Blvd., Middletown, OH 45042, U.S.A.).

If you wish to have your E-mail address included in the A.A.S. E-Mail Directory, or if your address has changed, or if it's an incorrect entry, please contact Alan Cady (ACADY@MIAVX3.MID.MUOHIO.EDU).



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