Report from the 2007 AAS meeting........ 2
Field trip report ........................................ 2
Abstracts of 2007 Oral Presentations..... 3
Abstracts of Poster Presentations ...... 10
Student Paper Awards ......................... 16
AAS 2007 Elections; Student Travel Awards 17
European Congress of Arachnology ..... 17
2008 AAS Annual Meeting ................. 18
Announcements ............................... 19

2008 AAS Annual Meeting
University of California
Berkeley California
Wednesday, 25 June – Monday, 30 June
hosted by
Rosemary Gillespie &
Charles Griswold

Report from the
31st Annual A.A.S.
Meeting
Susquehanna Univ.,
Selinsgrove, PA
13-17 July 2007
hosted by
Dr. Matt Persons
The 2007 AAS meeting was meticulously planned and executed by our hard-working host at Susquehanna University in Selinsgrove, PA. All in attendance agreed that it was an informative, relaxed, and entertaining meeting that provided many opportunities for arachnologists to confer, learn, and socialize. Matt and his crew deserve a heartfelt "Thanks & Well Done!". Full report on Page 2...

Reminder !!!!
Registration and Abstract Submission Deadline is Monday 19 May
Register for the 2008 meeting at:
http://www.americanarachnology.org/AAS_Meetings/index.html
Report from the 31st Annual AAS Meeting
Susquehanna University Selinsgrove, PA
July 13-17 2007
hosted by Matt Persons

The 31st Annual American Arachnological Society Meeting was held in the fine little borough of Selinsgrove deep in the heart of central Pennsylvania and the Susquehanna Valley. The meeting kicked off with 110 registrants from throughout the USA as well as Canada and South Korea. A relaxing BBQ social set the tone Friday evening. Saturday jump started the first day of talks with an 8:00am welcome by Susquehanna University President, L. Jay Lemons. The morning included two oral presentation sessions covering Ecology and Behavior followed by a group photo of attendees on the steps of historic Seibert Hall. The afternoon featured a poster session in Lore Degenstein Art Gallery. Well-placed lighting, fine hors de'oeuvres, and plenty of mingling space made for a fine atmosphere for posters. The evening included a casual night with arachnids as well as several talks sponsored by the affable yet stalwart AAAFF (Arachnological Association for the Absorption of Federal Funds).

Sunday featured oral presentations on evolution and systematics as well as behavior. Needless to say lycosids were well-represented in the latter group of talks. Sunday afternoon was open allowing time for well-attended kayak trips down the Susquehanna River (over 30 showed up and the weather was good). The executive committee met Sunday night and a free “Taste of Pennsylvania” dining experience was offered in the evening. It was the opinion of the host that experimental Pennsylvania cuisine such as chicken and waffles, and shoe-fly pie should not incur financial obligations to the naïve palate.

Monday was a full day of talks with morning sessions in functional morphology and physiology, and behavior. A session of talks in the afternoon preceded the business meeting. A silent and live auction along with student awards concluded the day. Before the night was over, George Uetz and his side men was cajoled to sing a fine rendition of “Music sex and cookies” for Society financial gain. The field trip included travel to Tall Timbers National Natural Landmark for some good collecting in an old growth hemlock forest. Bruce Cutler and Charles Bier were on hand to lend their taxonomic expertise along with the usual assortment of functional morphologists, taxonomically-impaired behavioral ecologists, and others.

A hearty thanks to Maggie Gardner, Jamie Havrilak, Beth Lawrence, Kristen Shimmel, Alex Sweger, Becky Holler, and Lee Bobbie for their hard work organizing the meeting, manning the registration table and working feverishly behind the scenes. Additional thanks go to Ken Prestwich who streamlined the registration process and helped organize abstracts. Rick Vetter, Beth Jakob, Paula Cushing, and Nancy Kreiter all were good advisors, mentors, and therapists for the meeting.

2007 Meeting Field Trip Report

Many thanks to Bruce Cutler for providing us with this report about the Field trip:

On a delightful Tuesday, July 17th, ten dedicated arachnologists departed from the Susquehanna University campus for the Appalachian Mountains. Our destination was the Snyder-Middleswarth Natural Area in Bald Eagle State Forest. The site is a beautiful scenic tract characterized by pine and some hemlock, with some hardwoods as well, including virgin stands of white pine, pitch pine, and hemlock.

Trails bordering Swift Run, a classic mountain stream tumbling over a rocky bed, provided access to the closed forest environment. Because of the habitat and elevation the weather was very pleasant, with moderate temperatures although it was high summer. Matt Persons noted that the stream was low because of a continuing drought, and parts of the trails that were quite dry are normally very muddy. July is the “growing season” in the northeast, essentially all spiders collected were immature. Pardosa were common running over the rocks at the stream edge, and sweeping produced predominantly immature araneids, Leucauge, linyphiids, Tetragnatha, and theridiids. Small numbers of Philodromus, salticids and thomisids were also uncovered. On bridges spanning the stream and under logs nearby, agelenids and amauropiids occurred. By far the most interesting objects were hundreds of Theridiosoma gemmosum egg sacs on logs and rocks adjacent to the stream. On one cut surface of a large log about 1 m in diameter I counted over 40 egg sacs. Despite searching, no Theridiosoma were found, nor did they turn up in sweeping. Some of the egg sacs collected were later found to be viable. For someone interested in this species, definitely a site to consider.
Phylogenetic analyses of relationships among SMase D genes in representatives from all continents on which they are native. We have isolated and Aphantochilinae previously generally considered as a separate toxin, and has relevance for understanding risks and treatments family of Thomisidae do not group within thomisids. However, based cladistic work. The Thomisinae clade is recovered as a clade and the Thomisinae clade, pending detailed morphology, confirming multiple independent origins of sociality. Within the social A. eximius we see a pattern of colony propagation by single matrilineages and absence of colony mixing, suggesting faithful inbreeding within colonies. Across species we find evidence of the constancy. We manipulated the mesh widths of population genetic patterns. Social species show lowered sequence divergence both in mitochondrial and nuclear data as compared to the outbred subsocial species. This suggests that inbreeding and other consequences of sociality, such as high turnover and small effective population sizes, have resulted in reduced genetic variability. If genetic variation is the basis of evolutionary potential of species to respond to environmental change and disease, then lowered genetic diversity in the inbred social spiders may help explain their low diversification and relatively brief persistence in evolutionary time.

Family ties: molecular phylogeny of crab spiders (Araneae: Thomisidae)

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The first quantitative phylogenetic analysis of three sequenced SMase D cDNAs from representatives of all currently sequenced SMase D family lineage. Multiple origins of sociality but low diversification of lineages once social. Interestingly, each time sociality arises, it is accompanied by a switch to inbreeding and results in strikingly similar social structure. Here, we address several questions surrounding sociality and its evolution using molecular data. We find that the molecular data agrees well with the morphological phylogeny, confirming multiple independent origins of sociality. Within the social A. eximius we see a pattern of colony propagation by single matrilineages and absence of colony mixing, suggesting faithful inbreeding within colonies. Across species we find evidence of the constancy of the mesh widths of population genetic patterns. Social species show lowered sequence divergence both in mitochondrial and nuclear data as compared to the outbred subsocial species. This suggests that inbreeding and other consequences of sociality, such as high turnover and small effective population sizes, have resulted in reduced genetic variability. If genetic variation is the basis of evolutionary potential of species to respond to environmental change and disease, then lowered genetic diversity in the inbred social spiders may help explain their low diversification and relatively brief persistence in evolutionary time.

Evolution of the sphingomyelinase D gene family in sicariid spiders

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Spiders in the family Sicariidae are well known for bites that cause dermonecrotic lesions in mammalian tissues. The venom toxin sphingomyelinase D (SMase D) is a sufficient causative agent for lesion formation. This toxin is a member of a gene family about which little is known with respect to patterns of variation of venom-expressed paralogs within and among species. Understanding these patterns allows inference of mechanisms of evolution. By analyzing the diversification of this toxin, and has relevance for understanding risks and treatments of bites. To date, inferring evolutionary mechanisms influencing these toxins has been limited by sparse taxon sampling of venom-expressed SMase D genes. We have isolated and sequenced SMase D cDNAs from representatives of all currently described species groups of Loxosceles and Sicarius and representatives from all continents on which they are native.

Phylogenetic analyses of relationships among SMase D genes in comparison to patterns of relationships of species as inferred from 28S, CO1 and ND1 indicate that (a) the number of SMase D paralogs expressed in venoms may vary across species, ranging from 3 to at least 7; (b) duplications are frequent in the SMase D family lineage.

Functionally independent components of prey capture are architecturally constrained in spider orb webs

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Orb webs first intercept and then retain insects long enough to be attacked by spiders. Improving either function increases prey capture and they are largely determined by different aspects of orb architecture. We manipulated the mesh width of orbs to investigate its effect, along with web size, on prey capture by spiders and found that they functioned independently. Probability of prey capture increased with web size but was not affected by mesh width. Conversely, spiders on narrow meshed webs were almost three times more likely to capture energetically profitable large insects, which demand greater prey retention. Yet, the two functions are still constrained during web spinning because increasing mesh width maximizes web size and hence interception while retention is improved by reduced mesh size. The importance of silk adhesions to insects. The architectural coupling between prey interception and retention has likely played a key role in both the macroevolution of orb web shape and the expression of plasticity in the spinning behaviors of spiders.

Biogeography of spiders across the boreal-tundra transition

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Spiders (Arachnida: Araneae) are ecologically important arthropods that exhibit high global diversity and are well-represented in northern ecosystems. Areas such as northwestern North America, which possess some of the highest rates of endemism, remain largely understudied compared to temperate zones. Spiders were collected in pit-fall traps from early June to mid August 2005 along 500 km of the Dempster Highway in the Yukon to examine effects of this latitudinal gradient and habitat transition on terrestrial arachnid richness, composition and abundance. Over 100 species have been identified and species show varying responses to the gradient. The two habitats seem to be important in determining species composition, however, no significant differences were found in species richness or abundance along the sampled transect.

Leg autotomy affects both terrestrial and aquatic locomotion in the wolf spider Pardosa valens (Part 2)

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Many spiders voluntarily amputate (autotomize) a leg as an antipredator behavior. While beneficial in the short term (as it can allow the spider to survive encountering a predator), leg autotomy may have detrimental effects over the longer term. In several species of wolf spiders, leg autotomy causes a reduction in burst sprint speed, an important trait both for avoiding predators and capturing food. In our first experiment we examined burst sprint speed before and after leg autotomy in males and females of the riparian-zone wolf spider Pardosa valens during June 2005. Since this species moves readily both on land and through the water surface, we conducted experiments in linear race tracks mimicking both these surfaces. In terrestrial trials, males and females did not differ in speed, but both sexes ran significantly slower following loss of a leg. In aquatic trials, females ran significantly faster than males, and leg loss led to a significant decrease in speed for males but not females. We also found a potential tradeoff: males run in the evening (when they were presumably warmer) were generally faster than those run during the morning. Despite females weighing nearly twice as much as males, all of the above results held when adjusting for body mass. Finally, males were...
less likely to run on the aquatic track, and to go shorter distances when they did run, than females during July 2006, and found the above effects for females only. In this study, we found no significant effects of autotomy or temperature on female running performance. These results suggest that both aquatic and terrestrial locomotion can be impaired by leg loss in P. valens, but that these costs may differ between sexes and age or season.

Patch characteristics and population density in
Geolycosa xera archboldii, a burrowing wolf spider narrowly endemic to Florida Scrub
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Habitat fragmentation is considered a major threat to the persistence of many rare and endangered species. However, experimental studies of habitat fragmentation have shown both positive and negative effects on the density of populations in remnant habitat patches, reflecting autecological differences among species. We investigated the relationship between density of Geolycosa xera archboldii and population density of patchy rosemary balds that it strongly prefers in native Florida Scrub. We used Akaike’s Information Criterion (AIC) to evaluate the effect of six a priori habitat models in predicting density of G. x. archboldii in remnant balds. Only one model was strongly supported: there was a strong positive correlation between spider density and distance from a bald to the nearest sandy road or fire-lane. Other models (area of bald, shape complexity of bald, distance to nearest neighboring bald, time since last fire, and global) were not supported. Thus, contrary to our initial hypothesis, primitive roads and fire-lanes do not serve primarily as corridors of cursorial colonization; instead, they appear to be paths of emigration for spiders dispersing from balds. We wonder whether primitive roads and fire-lanes have a negative effect on G. x. archboldii density in Florida Scrub or, alternatively, if they may function effectively as highly linear “bonds,” thereby increasing the overall density of this narrowly endemic spider.

Spectral properties of the light environment and visual communication in the wolf spider, Schizocosa ocreata (Hentz)
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Animal color patterns often evolve as a compromise between natural selection for crypsis and/or in conspicuousness to predators, and sexual selection for conspicuousness to potential mates. In leaf litter dwelling spider species such as S. ocreata, body coloration often closely matches the background coloration of a generally brown environment. As a rule, however, body parts used in communication often contrast against background coloration. We used spectral analysis to examine male and female coloration for matching but were unable to explain why any part of the body contrasts against leaf litter. Values were plotted in multivariate space, based on reflectivity in different frequency ranges. When viewed from above (top prosoma, top abdomen), both males and females overlap with values for leaf litter and soil, but not green plants, suggesting cryptic coloration. When viewed by potential predators, however, when viewed from a lateral perspective (side prosoma, side abdomen) both males and females show values that are polar opposites of the backgrounds, suggesting higher contrast when viewed by other spiders. Moreover, male secondary characters (leg brushes) used in visual signaling by S. ocreata show the highest level of background contrast. We tested the hypothesis that visual displays and leg tufts are more conspicuous against complex leaf-litter backgrounds with video playback of courting males superimposed on backgrounds of natural leaf litter in sun vs. shade. Results suggest that complexity and light level of the leaf litter background affect potential detection of male visual signals by females, and that male foreleg tufts increase chances of detection (and subsequent receptivity) against this background.

Undersampling bias: the null hypothesis for singleton species in tropical arthropod surveys
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Singletons—species represented by single individuals—average 32% of large tropical arthropod surveys. We use a large but incomplete census of spiders in one hectare of lowland forest to test four common explanations for singleton frequency (patchiness, body sizes, sex ratios, ontogeny) against a null hypothesis of undersampling bias. Singletons are larger than other species, are disproportionately female, share no particular life-style, and do not clump at 0.25-1 ha scales. Monte Carlo simulation of the best-flog normal community shows that the bera are 2nd. 1. a. 4. 3. 1. pad, c. of c. 1. 1. 10-1, 2-11 million individuals. Previous studies also failed to find a strong biological rationale for high singleton frequencies. We argue that undersampling bias should be the default null hypothesis for singleton frequencies. Undersampling bias can be a concept of species richness than species richness estimates using standard non-parametric methods; at 61.6, the average sampling intensity in large tropical arthropod surveys is severely inadequate. Methodological advances to increase estimator efficiency combined with increased expectations for sampling intensity in tropical arthropod inventory studies are called for if species richness estimates are to be credible; increased use of the lognormal may be part of the solution.

Cape Cod spiders and their habitats
Robert L. Edwards
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During WWII and for some years afterwards, large tracts of agricultural land were abandoned. Subsequently, depending on the land use history, large areas were left to develop on their own. Today there are a wide variety of sizable blocks of relatively uniform habitats. These have been sampled since 1990, largely by myself with some assistance in the field in upland areas. Particular attention is paid to comparing differences in species composition, and relative abundance in 11 different habitats when comparing numbers and weight of spiders. Whether looking at weight or number, the degree of relationship is evident. In this area two coniferous trees are particularly aggressive pioneers - Red Cedar (Juniperus virginiana L. and Pitch Pine (Pinus rigida Mill. The third large block of introduced Norther Spruce (Picea abies L. is also present. The effect of structure on the species composition is clearly evident. 'Hockey Stick' plots are useful for getting a first impression of which species constitute that set that dominates the population. They may be computed on the basis of average number/quadrat, total numbers or even weight. Various approaches provide different insights and suggests further means of analysis, when comparing seasons for example.

Origins of Synsphyronus (Pseudoscorpiones) diversity on the outcrops of southwestern Australia
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Pseudoscorpions are found in a variety of habitats worldwide yet this arachnid order with at least 3300 species remains unexplored. In a chapter in the book Geographic Catalogues of Pseudoscorpions 28 described species found in Australia and New Zealand. One region where this clade’s diversity has not been fully documented is southwestern Australia, an ancient landscape noted for its floristic richness and granite outcrops. The granite outcrops form terrestrial habitat islands, refugia for isolated populations of outcrop-endemic biota including Synsphyronus. S. elegans was the sole described outcrop-endemic in this region, known only from the type locality, but recently two new morphospecies were collected from an outcrop 50 km away.

This project aims 1) to characterize the diversity and evolutionary relationships of Synsphyronus endemic to the outcrops in
southwestern Australia and 2) to elucidate the evolutionary origins of the outcrop-endemic lineages of Synsphyronus by reconstructing a genealogical hypothesis. Specifically, we are testing the hypothesis that there are multiple origins of outcrop lineages. DNA sequence data provide a useful way to infer relationships as these pseudoscorpions are morphologically cryptic and exhibit high levels of homoplasy. The 70 populations we have sampled within a ~35,000 km² region sort into five morphospecies, which includes two described species. Data from cytochrome oxidase subunit I and internal transcribed spacer region indicate that these outcrop taxa are not monophyletic, but instead form four deeply differentiated lineages which largely correspond to four outcrop-endemic species. These data are consistent with the hypothesis that there have been multiple origins of outcrop lineages in southwestern Australia.

Examining the enzymatic action of select spider venoms on the phospholipids of sheep red blood cell ghosts

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It has proven difficult to identify those spiders which cause necrotic lesions. Aside from Loxosceles reclusa, conflicting reports from case studies and reviews have only managed to make identification even more confusing. In an attempt to clarify the medical significance of some of the spiders, we embarked on a survey of over 45 spider species venoms for their potential to cause hemolysis. Together with the known hemolytic activity of L. reclusa venom, we found that Loxosceles mildesi and C. mildei are highly hemolytic as well. As an extension of that research, our lab examined the ability of select spider venoms to cleave phospholipids present in the membranes of sheep erythrocytes. Hemoglobin-depleted red blood cell ghosts were challenged with venom gland homogenates from Chelifer cancroides, Heterometrus swammerdami, Lycosa geometricus, C. mildei or L. reclusa for three hours at 37°C. The results suggest that the venom of C. mildei contains a phospholipase A2. However, even more interesting was the presence of phospholipase activity in the venom of L. reclusa, which along with ephingomyselinase D, cleaved most of phospholipids in the red blood cell ghosts.

Biological organization of molting in the scorpion Heterometrus swammerdami

Mohammad Habibulla
Schaumburg Township Human Services

Although a lot is known about molting in insects, it is regrettable that we know very little concerning it, in the case of arachnids, especially in the scorpions. Our long-term study of the scorpion Heterometrus swammerdami has revealed interesting information in this archaic group. Structurally and functionally, in many respects, the biological organization of molting is different in this scorpion. This difference reflects in the fact that in the scorpion there are only a series of molts without metamorphosis resulting in physical growth and sexual maturity. Protocerebral neurosecretory cells, leucocytes, and the blind end organ the rostral organ, the hypocerebral ganglion and the frontal ganglia of the brain are all structurally and functionally connected and form a nervous system which largely corresponds to the motor nerves of insects. Neurosecretory effectors from the brain, effector's following systems, signaling messaging devices, and some feedback mechanisms shall be discussed in the presentation.

Shifting metabolic needs during development: The proximal path to giant females

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Nephila clavipes life history has two widely known attributes: extreme sexual size dimorphism, and highly variable but exceptionally large growth rates. Although growth rate and size at maturity vary considerably, the variation in body size is not due to diet availability, but instead is driven by gene expression. In our previous work, we developed a brood-fostering model that predicts that in cooler environments mothers in multiple-female colonies will have a selective advantage over solitary female nests. This is because the rate of juvenile maturation is slowed and the mother has a higher probability of dying before the brood reaches independence. In her absence, other females would foster her brood. We tested this hypothesis by manipulating colony size and by monitoring the reproductive success of naturally occurring solitary- and multi-female colonies in cold and warm temperature environments. Our results indicate that while multiple-female colonies have higher fitness than cool sites, the solitary female nests achieve higher fitness at warmer sites. The higher reproductive success of multi-female colonies at cold sites further reflects the total failure of solitary female nests at these sites. Surviving solitary female nests generally had higher reproductive success than multi-female colonies. In another colony, the highest female fitness was for multi-female colonies in the colder environments, and decreases in the larger colonies. We use these data to refine the brood-fostering model and discuss the results with regard to the observed polymorphism in social structure.

Patterns of reproductive success associated with social structure and microclimate in Anelosimus studiosus (Araneidae, Theridiidae)

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In east Tennessee, the Theridiid spider Anelosimus studiosus varies widely in its social structure from the solitary/territorial female with her offspring, to cooperative colonies of tens to hundreds of adult females. In previous work, we developed a brood-fostering model that predicts that in cooler environments mothers in multiple-female colonies will have a selective advantage over solitary female nests. This is because the rate of juvenile maturation is slowed and the mother has a higher probability of dying before the brood reaches independence. In her absence, other females would foster her brood. We tested this hypothesis by manipulating colony size and by monitoring the reproductive success of naturally occurring solitary- and multi-female colonies in cold and warm temperature environments. Our results indicate that while multiple-female colonies have higher fitness than cool sites, the solitary female nests achieve higher fitness at warmer sites. The higher reproductive success of multi-female colonies at cold sites further reflects the total failure of solitary female nests at these sites. Surviving solitary female nests generally had higher reproductive success than multi-female colonies. In another colony, the highest female fitness was for multi-female colonies in the colder environments, and decreases in the larger colonies. We use these data to refine the brood-fostering model and discuss the results with regard to the observed polymorphism in social structure.
The benefits and costs of group courtship in the sexually cannibalistic species Dolomedes triton

Nancy A. Kreiter & Virginia L. Weeks

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Predatory females place constraints on male courtship in sexually cannibalistic species. For example, courting in groups may increase competition for mating opportunities, but it also can reduce and mask individual male contributions. Small groups of male Dolomedes triton have been observed in the field simultaneously exhibiting courtship; participation in such group courtship may represent a tradeoff between safety and mating success. Laboratory tests of this hypothesis were conducted using newly molted adult females paired with either a single male (n=24) or two males (n=26). Field-caught juvenile spiders were allowed to mature in the laboratory. Males were tested in both conditions ( singly and with another male), with order of the trials randomly assigned. The presence of other males did not result in significant benefits or costs to males. Cannibalistic rates were not statistically different for single males (12.5%) and focal males in 2-male trials (7.7%), and the presence of a competitor did not cost males in lost inseminations. Single males mated in 37.5% of trials, while focal males in 2-male trials mated in 31% of trials. Females, however, derived many benefits from being paired. Single males are more likely to mate if two males (54%), rather than one male (37.5%), were present and were almost twice as likely as cannibalize if two males were present (23%) than one (12.5%). Group courtship in D. triton may not reflect male strategies for reducing cannibalism, but may instead represent a mechanism for female choice in this species.

Diversity of canopy spiders at multiple spatial scales in hardwood forests of southern Québec, Canada

Maxim Larivée** & Chris Budde

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Understanding how arthropod diversity is distributed in space within ecosystems is essential to infer on the processes that govern their diversity. I hypothesize that hierarchically nested spatial scales do not contribute equally to the regional spider diversity pattern. I set out to characterize and compare the structure and composition of canopy and understory patterns of canopy and understory spiders on sugar maple (Acer saccarrum Marsh) and American beech (Fagus grandifolia Ehrh) at multiple spatial scales during the summers of 2005 and 2006. Following a hierarchically nested design in space, spiders were sampled in the canopies of 45 sugar maple and 45 American beech trees. Sampling in the canopies was done with the DINO 260xt® a mobile aerial lift platform towed from site to site with a 4WD vehicle. The canopy of 3 individuals (1st scale) of each tree species was sampled by beating the foliage in maple-beech stands (500 m²) replicated 5 times in 3 sugar maple forests (3rd scale) found within the greater Montréal region (4th scale). Our results based on a NMDS ordination, a NPMANOVA, and a partitioning of species richness show that the diversity and species composition of canopy and understory spiders differ on sugar maple and American beech. Also, that species diversity patterns in space are non random in the understory and the canopy, and that the spatial scales considered do not contribute equally to the regional spider diversity pool.

Avian predation on the Brush-legged Wolf Spider, Schizocosa ocreata (Hentz), and anti-predator responses to avian cues

Anne Lohrey & George Uetz

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A pair of axial fibers produced by flagelliform glands supports the axial fiber elasticity is crucial for the operation of the SBM. It did so by comparing the stickiness of threads producing by five species of the family Araneidae (Araneus marmoreus, Argiope aurantia, Micrathena gracilis, Verrucosa arenata, and Cyclosa turbinata) at their native lengths and when elongated to two and three times this length. To maintain the number of droplets contributing to a thread’s stickiness, we measured threads with contact plates whose widths were proportional to thread elongation. Using the strain of each species’ thread at rupture, we computed the percentage increase in its Young’s modulus (PYM), the maximum elongation (Emax), and the width of a material) to the Young’s modulus (PYM). For all species but A. marmoreus, PYM was inversely related to thread stickiness and contributed to the Elongation of droplet volume to the stickiness per droplet of a species’ thread. Axial fiber elasticity appears to increase the stickiness of viscous threads by allowing an increase in the angle between a loaded capture thread and the surface it contacts, thereby enhancing the thread’s ability to recruit the adhesion generated by multiple droplets.

The arthropod community associated with webs of a subsocial spider Anelosimus studiosus (Theridiidae)

Sarah Mock & Alan Harvey

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Spiders are usually solitary predators that only come together to mate. For the subsocial spider, Anelosimus studiosus, tolerance conspecifics and other arthropods in its web. I found and identified the arthropod species living in these webs. I randomly collected 250 webs in their entirety, including the branches each web was wrapped upon and any leaves that were attached, from five webbed branches and five control, non-webbed branches from each tree. In addition, I collected 50 webs each from Agelenopsis sp. and Linyphia sp. to see if any other arthropods were present in webs similar to A. studiosus. One thousand and six arthropods and 105 species of arthropods were found in the 250 A. Studiosus webs; 91 species were found only in the webs and not in the controls. There were 56 species of arachnids, representing 14 families. There were also species of Diptera, Lepidoptera, Coleoptera, Hemiptera, and Hymenoptera living in A. Studiosus webs. The arthropod fauna in 50 Agelenopsis sp. webs supported a total 141 arthropods and 34 species; 14 of these species were also found in A. studiosus webs. The Linyphiidae webs sampled did not contain any other arthropods. The community of arthropods in A. studiosus webs consisted of herbivores, carnivores, omnivores, kleptoparasites, and parasitoids.

The contribution of axial fiber elasticity to the adhesion of viscous capture threads spun by orb-weaving spiders

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A pair of axial fibers produced by flagelliform glands supports the axial fiber elasticity is crucial for the operation of the SBM. It did so by comparing the stickiness of threads producing by five species of the family Araneidae (Araneus marmoreus, Argiope aurantia, Micrathena gracilis, Verrucosa arenata, and Cyclosa turbinata) at their native lengths and when elongated to two and three times this length. To maintain the number of droplets contributing to a thread’s stickiness, we measured threads with contact plates whose widths were proportional to thread elongation. Using the strain of each species’ thread at rupture, we computed the percentage increase in its Young’s modulus (PYM), the maximum elongation (E_max), and the width of a material) to the Young’s modulus (PYM). For all species but A. marmoreus, PYM was inversely related to thread stickiness and contributed to the elongation of droplet volume to the stickiness per droplet of a species’ thread. Axial fiber elasticity appears to increase the stickiness of viscous threads by allowing an increase in the angle between a loaded capture thread and the surface it contacts, thereby enhancing the thread’s ability to recruit the adhesion generated by multiple droplets.

Brown recluse weight dynamics: An informal discussion

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Brown recluse spiders (L. reclusa) have been known to survive for months with no food or water, yet basic predatory and information behaviors for this spider species have not been well documented. This study focuses on spider daily weight fluctuations, rate of prey ingestion, and predator weight gain vs. prey
weight loss comparisons, in addition to applying Waldbauer indices such as percentage weight gain, feeding mass transfer ratio, and percent food intake, causes them to be a taxonomic arachnid. Feeding behaviors, such as the tendency of this spider to attack prey significantly larger than themselves, are also discussed.

Plant litter and fertilization alter epigeal spider (Araneae) community structure in a temperate grassland

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Nutrient enrichment of terrestrial ecosystems increases plant biomass and litter production while decreasing nutrient species richness. However, the effects of these well-documented, nutrient-mediated changes to primary producers on the epigeal spider community remain largely unexplored. To address this, we manipulated nutrient availability and plant litter in grasslands in northeastern Ohio to investigate whether nutrient-mediated changes in plants and plant litter resulted in increased spider biomass/abundance and decreased species richness. While documenting changes in plant biomass and species richness during 2002-2005, we used pitfall traps to sample the epigeal arthropod community. Within 20m diameter circular plots in an old-field grassland, we manipulated nutrients (NPK fertilizer added vs. no fertilizer) and plant litter (following annual mowing in autumn; plant litter removed vs. left in place) to form a blocked 2x2 factorial design with six replicates (N = 24 experimental plots). Four pitfall traps per plot (N = 96 traps) were used to sample arthropods for alternating two-week-open/ two-week-closed intervals during late May through mid-August of each year. For all years, fertilization significantly affected epigeal spider community structure, with a few, common species becoming hyper abundant in fertilized plots. During 2002-2004, only fertilization significantly affected spiders, with increased biomass/abundance and slightly decreased species richness. However, following an unusually high amount of April snowfall during 2005, plant litter was the only significant influence on epigeal spiders, significantly decreasing species richness. These results indicate that epigeal spiders may respond differently to anthropogenic influences and that global climate change may affect local arthropod community stability.

Field observations of activity patterns and behavior in Schizocosa ocreata (Hentz)

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The expression of elaborate courtship characteristics, such as the suite of multimodal traits and behaviors used by male, Schizocosa ocreata, to signal females, is generally believed to represent a balance between sexual and natural selection. To date, field studies that address aspects of the natural history of this species are few and most of the evidence supporting either sexual selection benefits or physiological, predatory, or competitive costs associated with the use of complex display characteristics has been based on laboratory observation. To truly understand the importance of various display characteristics, it is absolutely critical to examine the overall activity and use of these traits and behaviors in a natural setting. In the spring of 2003, we began a long-term field study of male SCHIZOCOSA OCREATA to explore the suite of traits and activity patterns in the field, which concluded at the end of the 2005, spring breeding season. Over the five field seasons in the study, we used a combination of systematic collections, focal individual observations, and scan sampling to establish phenology patterns, activity patterns, inter-individual spacing, and interaction rates with conspecifics and heterospecifics. We present here initial results of this survey with particular emphasis on phenology patterns and male behavioral patterns within and between seasons.

Vouchering DNA barcoding specimens: Test of a non-destructive extraction protocol for arachnids

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The correct identification of species is essential to the performance of ecological research. Morphology-based keys support accurate identification of many taxa. However, for taxa that are not well studied, or for which distinguishing morphological characters have not been discerned, identification can be very difficult. Accurate identification is especially problematic for very small organisms, for members of sibling species, for eggs, and for immatures. For such cases, DNA barcodes may provide diagnostic characters. Ecologists deposit museum vouchers to document the species studied in their research. If barcodes are to be used for identification, then both the DNA and the specimen from which it was extracted should be vouchered. We describe a protocol for the non-destructive extraction of DNA from terrestrial arachnids, using as examples members of the orders Acarina and Araneae. We successfully extract sequenceable DNA from all species after 1 - 4 weeks of immersion in a 1:5:1 buffer of ammonium acetate, extracted carcasses, processed and imaged using protocols standard for the taxon, were distinguishable from closely related species, and adequate as morphological vouchers.

How to avoid being consumed by a relationship risk of sexual cannibalism affects how male wolf spiders search for females

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Chemical cues (silk, excreta, feces) reveal a wide array of specific information about a conspecific but do not provide accurate locational information. Thus a male searching for mates may focus on different features of the female’s chemical signature if there is a risk of sexual cannibalism. We tested this idea by comparing how the males of two species of wolf spiders (Araneae, Lycosidae) reacted to air and substrate borne chemical cues from females. Female Pardosa milvina rarely engage in sexual cannibalism (<1%) whereas female Hogna helluo consume males more than 35% of the time. Pardosa males are attracted by airborne cues from females but Hogna males are repelled by them. Although Pardosa males change activity and courtship intensity in the presence of substrate chemical cues from females that differ in mating status (mated vs virgin), their was no difference in their response to those same cues from food-limited and well-fed females. On the other hand, substrate chemical cues from mated or virgin females did not affect the activity or courtship intensity of Hogna males. However, Hogna males were more likely to follow the cues of well-fed females and courted more vigorously on substrate cues from well-fed females. We conclude that the potential for sexual cannibalism in Hogna males is a sensitive cue to female hunger whereas Pardosa males, with a low probability of cannibalism, use the same type of cues to focus on the mating status of females.

Spider colonization of apple orchards

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The colonization of agroecosystems by natural enemies is an important demographic process, as regular disturbances may reduce their populations. We studied colonization of apple orchard foliage in Southern Québec, Canada, by spiders, an abundant and diverse group of generalist predators in orchards. We planted twelve "micro" orchards (consisting of ten 1.7m apple trees) at two distances (10 m and 50 m) from deciduous forest, and spiders were collected from the tree foliage from June to September. We determined the rate and
phenology of spider colonization, and the effect of distance on the spider assemblage composition. We also compared the relative abundance of spider species in micro-orchards to those in older orchards. Spider colonization of micro-orchards reached a peak rate in late July, up to 40 spiders/week/m3 foliage. Spider assemblage composition significantly differed between micro-orchards depending upon their distance from the deciduous forest, as measured by a large spatial scale. The assemblage composition was more similar to that of the forest in the micro-orchards near to the forest. In orchards that had been established for a longer time (15+ years) the dominant spider species were the same as in the micro-orchards, but had different relative abundances, indicating that local factors modulated the assemblage composition after colonization.

Whip spiders produce an agonistic display that is detected by their opponent’s trichobothria

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Araignées trichobothрия respond to the movements of air particles. Some types of air particle movement give away the presence of a predator or prey item, and the trichobothria of many arachnid species are important in detecting these stimuli and mediating an appropriate escape or prey capture behavior. Here we present evidence suggesting that the touchlessness of whip spiders (Arachnida, Amblypygi) also play a role in the detection of a particular display that they produce during agonistic contests. This display consists of a vigorous vibration of one antenniform leg, and it is produced for a significantly greater fraction of contest duration by contestants than by contest losers. Here we show that, during an antenniform leg vibration display: (i) the vibrating antenniform leg of the displaying whip spider is positioned above its opponent’s walking legs, which bear trichobothria; (ii) the vibrating antenniform leg can excite the sensory cells of these trichobothria via air movements and without direct contact; (iii) the antenniform leg of the displaying whip spider vibrates at a frequency that causes strong excitation but little adaptation in the trichobothrium sensory cells; and (iv) the duration of an antenniform leg vibration display can be extracted from the response of a trichobothrium sensory cell. Whip spider trichobothria may, therefore, play an important role in agonistic contest behavior.

Spontaneous death and male mate choice in the fishing spider, Dolomedes tenebrosus Hentz

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Sexual cannibalism is defined as the killing and consumption of males by females during some stage of sexual reproduction (i.e. courtship, copulation, or following copulation). Sexual cannibalism is quite common in a number of spider families and can affect the population size, sex ratio, ecology, and behavior of many species. In some sexually cannibalistic spider species, males appear to sacrifice themselves, facilitating their death and consumption by a female. In most cases of sexual cannibalism, females will kill and consume males, but examples of spontaneous male death are rare. Here, we describe the prevalence of spontaneous male death in the fishing spider Dolomedes tenebrosus. Laboratory experiments and field observations reveal that males spontaneously die immediately upon the insertion of their first pedipalp. Since males of this species appear to be limited to a maximum of one copulation, using only one pedipalp, their mating investment appears to be extremely high and thus, one might expect males to exhibit strong mate choice. In support of this prediction, we have preliminary evidence suggesting that Dolomedes tenebrosus males do indeed saw mate choice, as some males appear to reject some females.

Phylogeny of Hogna and Rabidosa; insights from a morphological study

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Understanding relationships of large wolf spiders in the southeastern USA has been challenging, made difficult by uncertain taxonomy and in some cases by the cryptic lifestyle of some species. I present here a work in progress that examines these large and interesting wolf spiders. A morphological phylogenetic study was completed using 53 taxa including species of Geolycosa, Hogna, Rabidosa, Schizocosa, and Trochosa. The study included Hogna radiata from France, the type species for the genus Hogna. 117 characters were scored for all taxa. Of these characters, 108 were found to be parsimony informative. 70 characters were somatic, 26 were male palpal characters and 20 were female epigynal characters. Heuristic searches were completed using PAUP* with 1000 random starting point heuristic searches using the Step wise addition option and the TBR branch swapping algorithm. With all characters weighted equally, 6 most parsimonious trees were found. These trees suggest that there are two large clades with members of Hogna found in each clade. The larger clade included all Rabidosa species, as well as Geolycosa species and some Hogna species including the Hogna radiata. The smaller clade included Schizocosa, Trochosa and two species of Hogna. A literature was basal to the two clades. This study suggests something that is already well known: wolf spider phylogeny and taxonomy is difficult and confused.

The effects of predation risk on female silk deposition and male response to predator-cued or uncued female silk in the wolf spider Pardosa milvina

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Females of the wolf spider, Pardosa milvina, advertise sexual receptivity toward males via pheromone-laden silk draglines and male Pardosa exhibit conspicuous species-specific courtship behavior (leg-waving and tapping) when encountering silk from females. Previous studies have shown that: 1) silk and excreta produced from the larger co-occurring predatory wolf spider, Hogna helluo, induces adaptive antipredator responses (immobility) in Pardosa; 2) the presence of Hogna silk causes significant reductions in male Pardosa courtship behavior when encountering conspecific female silk; and 3) Hogna is preferentially attracted to silk and excreta deposited by female Pardosa when previously fed Hogna silk. Taken together, these studies suggest that 1) female Pardosa may benefit by limiting silk advertisements and excreta deposition when encountering silk from the predator, Hogna, and 2) male Pardosa may exhibit reductions in courtship when encountering silk from females previously exposed to Hogna silk. In this experiment we compared the amount of silk and excreta deposited by unmarked female Pardosa exposed or not exposed to predatory silk from Hogna. We found no significant difference in the propensity of males to court or display latency in the presence of silk from predator-cued or uncued females.

More than just a pretty face? A potential quality-signaling role of facial coloration in Habronattus pyrrithrix (Salticidae)

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The role of bright, conspicuous coloration as an honest indicator of male mate quality has been well studied in many vertebrates (such as birds, reptiles, and fish) and some invertebrates (such as butterflies and mantisflies) but has rarely been examined in spiders. In Habronattus pyrrithrix jumping spiders (family Salticidae) females have dull and inconspicuous coloration, while males have a brilliant red patch of color on their face. Males display this facial coloration during courtship and elaborate courtship dance. Because facial color is often a costly visual signal, male color has the potential to function as an honest signal of mate quality. If this is the case, males with the brightest colors should also be in the best physical condition. To test this prediction, we estimated the body condition of wild-caught adult males and quantified their coloration using microspectrophotometry. We found that aspects of male color (hue and red chroma) were indeed positively correlated with body condition, suggesting that this color has the potential to function as a mate quality signal.
Because variation in color expression may be explained by underlying morphological variation in the facial scales in which this color is produced, we imaged a subset of the brightest and drabbest males using scanning electron microscopy (SEM) and compared several aspects of morphology between bright and drab males. Results of the SEM work should help us gain insights into the mechanisms of condition-dependence.

Sublethal insecticide exposure influences behaviors of web-building spiders

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Many arthropodicides kill target and non-target species by affecting their nervous systems. Since an animal’s behavior is governed by interactions among nerve cells, it is not surprising that even low doses of pesticides influence various arthropod behaviors. Web-building spiders have extended contact with broadcast pesticides since their snare serves as a collector of the toxin. Field and laboratory experiments using digital web analyses show that web-weaving spiders (Argiope trifasciata, Araneus diadematus, Araneus marmoreus) exposed to sublethal doses of malathion built webs with altered configuration, structure, and function. These changes, in conjunction with other behavioral changes after malathion exposure (feeding, egg sac production) impair prey capture and reproduction. For example, dosed A. diadematus built significantly smaller webs with greater irregularity than non-treated spiders in the lab. Exposed spiders displayed this response in a dose-dependant manner, and never recovered normal web construction. Argiope trifasciata dosed in the field also built smaller and more irregular webs. Furthermore, dosed A. trifasciata laid fewer and lighter egg sacs than controls. Web-building spiders (Araneus marmoreus) in the lab were unable to construct webs and simply deposited patches of silk on cage surfaces. This effect lasted over seven weeks. A consistent lab finding was that dosed spiders tended not to feed. Perhaps altered web vibration characteristics impaired prey signaling to spiders, the spiders were unable to correctly process sensory information, or they could not perform appropriate prey capture behaviors. Furthermore, since proper communication during courtship and mating is crucial, distorted web vibrations could impair reproductive processes.

The active space of multi-modal communication for male Schizocosa ocreata (Hentz) wolf spiders in a complex forest floor environment

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We examined the foraging activities of a common leaf litter microhabitat on transmission of multimodal (visual and seismic) signals of courting male Schizocosa ocreata (Hentz) wolf spiders (Araneae: Lycosidae) and measured the “active space” of signals in the field and lab. We measured maximum visual detection range of prey and courting males by females in laboratory studies, and used laser distance measures to determine effective line-of-sight visual detection distance in the field. We used Laser Doppler vibrometry to record the seismic component of male courtship in the laboratory on natural substrata typical for the habitat (leaves, bark/wood, soil, and rock) and to measure seismic vibration point distances in situ in the field. Laser vibrometry revealed that leaves are highly conductive substrata for seismic signals in contrast to other habitat surfaces (soil, wood, rock), but there were no significant differences between leaf species. Seismic signal amplitude and frequency spectra both attenuated with distance. Within mean potential detection distance of visual signals is similar to that of seismic signals, the range of visual signals exhibits greater variation owing to the patchy nature of the forest floor habitat. Moreover, the maximum visual range of spiders appears to be greater than the active space of seismic signals. The role of complex habitat structure and spatial extent in the evolution of multimodal communication will be discussed.

Reports of brown recluse spider bites greatly outnumber verifications of Loxosceles spiders in Pennsylvania and South Carolina.

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Wolf spider courtship behavior involves both visual and chemotactile components. In some spiders, males utilize sex pheromones associated with silk draglines and other excreta to locate females and assess the quality of potential mates. In the large wolf spider Hogna helluo, we tested the hypotheses that 1) males can detect the chemotactile cues of potential mates, 2) female pheromones were elicited from court and 3) males would use chemotactile cues to discriminate between virgin vs. mated females. Male H. helluo behavior was compared among three cue conditions (blank substrate, virgin female cues, and mated female cues). Males moved more slowly and spent more time in non-forward motion in the presence of female cues compared to controls. Males engaged in significantly more leg taps, a sensory behavior that also is a component of courtship, in the presence of female cues. However, the behaviors we quantified did not differ between the mated and virgin cue treatments. These results suggest that male H. helluo use chemotactile cues (i.e., pheromones) in mate location and they are sufficient to elicit the early stages of courtship. However, we have no evidence that males could differentiate between mated and virgin females from these chemotactile cues. If they could distinguish a difference, the information about reproductive status and receptivity can be determined. This would be highly advantageous for males, females, or a blank treatment. In the quadrants

Sex pheromones in the wolf spider, Hogna helluo (Araneae, Lycosidae)

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In preliminary observations of the harvestmen Leiobunum vittatum harvestmen (Opiliones, Sclerosomatidae) towards conspecific contact chemicals

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In preliminary observations of the harvestmen Leiobunum vittatum, we found that individuals rub their bodies against the substrate, suggesting chemical marking. To determine if this behavior could function in intra-specific communication, we examined the behavior of L. vittatum on filter paper upon which conspecifics had resided. Testing consisted of monitoring a male or female for 15 minutes in a circular arena divided in four quadrants - two of which had filter paper previously impregnated either by males, females, or a blank treatment. In the quadrants...
impregnated with male and female cues, males spent more time, scraped the sensory legs I more often, and engaged in pedipalp tapping more often, suggesting that males are able to detect cues left on the substrate by conspecifics. Males also displayed two behaviors (regardless of the impregnating sex) never seen among females—(i) “fast approach” and (ii) “jerking”. Females did not spend more time sniffing or tapping their pedipalps, but males did spend more time tapping their pedipalps on male- vs female-impregnated filter paper, suggesting that females can detect differences between male and female chemicals. In a second experiment, we examined whether females could distinguish between the chemical cues of males based upon their reproductive potential or fighting ability. Females were offered a choice between filter papers previously impregnated by two conspecific males. We found no evidence that females discriminated among males based on their previous contest outcome. In summary, results presented here suggest that intraspecific communication in _L. vittatum_ may be mediated in part by chemical signals.

**POSTER ABSTRACTS**

*Indicates student competition; presenters in **bold**

**Microhabitat selection and movements of harvestmen (Opiliones: Phalangiida) in gardens**

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Harvestmen are ubiquitous and abundant generalist predatory arthropods, yet little is known about their ecology and behavior. They are known to consume a variety of pests, and due to their prominence in agroecosystems, great dispersal ability, and gregarious tendencies, they may have potential as agents of biological control in gardens. This study used mark and recapture methods to investigate the feasibility of sustaining a harvestman population (Opiliones: Phalangiida) in a garden. Unrestricted harvestmen movements were systematically followed and small, wooden shelters shaped like lean-tos were placed as diurnal refugia for these humidity-sensate predators in an attempt to prevent their emigration. Furthermore, it was predicted that more harvestmen would be observed in dense vegetation where microclimatic conditions (temperature & humidity) should be more favorable during the day. Significantly lower daytime temperatures and reduced temperature variability were recorded in denser vegetation. More harvestmen inhabited dense vegetation than areas of sparse or no vegetation. Significantly more harvestmen were observed in the proximity of shelters, thus, adding shelters reduced their tendency to leave the garden. The range and movements of harvestmen tended to be less in areas of dense vegetation and near shelters than in more exposed areas.

**Resources for research on arachnids and other non-insect arthropods at Carnegie Museum of Natural History, Pittsburgh**

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The Section of Invertebrate Zoology at Carnegie Museum of Natural History (CMNH) is recognized worldwide for insect collections exceeding 11 million specimens. Non-insect resources at CMNH are less well known and infrequently used, especially non-acarine Arachnida and crayfish (Crustacea: Astacoidea). On-staff expertise is limited until recently; now a visiting curator works on crayfish (JWF) and a research associate on spiders (CWB). Historic arachnid holdings include Brazilian spiders of H.H. Smith (1880’s), and Pennsylvanian spiders from B. Vogel (1960’s). Since 1985 extensive trap-based collecting worldwide has provided sample residues containing diverse arachnids. The A. Ortmann Crayfish Collection (1900’s), with recent material from Nearctic and Australian regions, comprise crustacean holdings exceeding 2,000 lots. Collection facilities have been renovated since 1981 by four NSF grants. Storage in standardized glassware is far-advanced, and emphasis placed on curating new material from fieldwork and historical samples. Collections are associated with library materials including most pre-1950 literature; post-1950 coverage is less comprehensive, but actively supplemented as collections require. Information initiatives for arthropod specimens are expanding (links from homepage http://iz Carnegie:inhome.org). On-line databases will cover crustacean and arachnid holdings as curation permits. We also use the Pennsylvania database, based on Pennsylvania spiders using the “Catalog of Pennsylvania Biodiversity”, a web-accessible checklist of specimens documenting Pennsylvania occurrence. CMNH hosts “Global Crayfish Resources” developed by JWF, including a taxonomy browser, checklists, discussion forum, and international Asilomar forum. CMNH endeavors to make non-insect arthropod resources accessible to active investigators interested in systematics, faunistics, and issues related to conservation and resource management.

**Variation in the material properties of the silk in the common house spider**

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Spider webs are capture devices that depend upon both web structure and mechanical performance of the silk fibers to capture prey. Alterations in the material properties of these silk fibers could therefore change web function, but there is little direct evidence for this. We investigated the mechanical performance of the silk of _Achaearanea tepidiorum_ (Araneae: Theridiidae) fed two different types of prey (large, fast crickets versus small, slow isopods) for one week. _A. tepidiorum_ spins a cobweb composed of several main structures, including supporting threads, and gumfooted line capture threads. By comparing silk within each component, we found that silk in the support region of cobwebs was tougher, and more elastic when spiders were fed crickets. In contrast, the material properties of the gumfooted capture threads of cobwebs did not differ between the two groups of spiders. Thus, spiders fed larger prey seem to use silk fibers for supporting the web rather than for capturing them.

Energetic costs of courtship signaling in two wolf spider species with divergent courtship behaviors

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Active, complex display behaviors of males may provide information about male quality to females, and are considered to be “honest” indicators of male quality. As a consequence, females may prefer males capable of sustaining higher levels of energetically costly behavior. We measured energetic costs of courtship behavior for two sympatric wolf spiders (Schizocosa ocreata (Hentz) and _S. rovneri_ (Uetz & Dondale)) which are reproductively isolated on the basis of differences in courtship behavior. These sibling species exhibit distinct courtship behaviors with different activity levels: _S. ocreata_ uses multimodal communication (visual and vibratory signals) and an actively moving courtship display, while _S. rovneri_ uses only visual signaling produced while stationary. Energetic expense (peak CO2 output) was recorded using a Sable Systems TR-2 flow-through respirometry system for spiders engaged in three behavioral activities: stationary, locomotion, and courtship behavior, and was found to vary significantly with species, individuals, and behavioral activity. No significant differences existed between species in peak CO2 output during stationary or locomotory behaviors, although these behaviors were significantly different within species. Courtship behavior of both species had significantly greater peak CO2 output than the other behaviors, and differences between species were significant. The active “jerky-tapping” courtship of _S. ocreata_ produced higher peak CO2 levels than the stationary vibratory “abdomen bounce” display of _S. rovneri_. Differences in the energetic costs of courtship for these closely-related species may reflect the influence of sexual selection for different male signaling strategies.
The costs and benefits of freezing in the presence of a predator in a Leiobuninae harvestman (Opiliones, Sclerosomatidae)

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In this study, we aimed to determine the costs and benefits associated with a specific defensive behavior displayed by immature Leiobuninae harvestman from North America (Opiliones, Sclerosomatidae). Preliminary observations showed that immature individuals often become immobile (i.e. ‘freeze’2) in the presence of the syntopic wolf spider Schizocosa ocreata (Araneae, Lycosidae). Harvestmen paired with spiders spent more time motionless than harvestmen alone or harvestmen paired with another harvestman. In order to determine if this immobility could decrease the likelihood of an attack by a spider, we examined the spider’s willingness to attack and eat motionless versus moving prey. Schizocosa ocreata individuals were paired with either living, and thus moving, crickets versus crickets that had been frozen to death and were thus motionless. Preliminary analyses suggest that the spiders took significantly longer to prey upon the motionless cricket than the live one. Some spiders never preyed upon the dead cricket, but readily ate a live cricket offered immediately after the trial. A third experiment allowed us to assess one potential cost of this defensive behavior. Harvestmen were paired with either a spider, another harvestman, or nothing in arenas containing pieces of wet bread for 2 hours. Focal individuals were weighed immediately before and after the experiment. Individuals paired with spiders gained significantly less weight than individuals paired with other harvestmen or left alone. Our results suggest that the immobile behavior witnessed here may protect harvestmen from wolf spider attacks, but at the cost of reduced food/water intake.

Spiders in Paint Creek, a local wetland: initial findings in family composition and distribution

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The presence of spiders in terrestrial ecosystems has been studied extensively. Little is known, however, about the role of spiders in aquatic ecosystems, especially wetlands. The purpose of this study was to obtain a preliminary understanding of the spider community found in a wetland, Paint Creek. Aerial and ground samples were collected along a 50-meter transect in a dense stand of native Typha latifolia. Samples were taken monthly from May to September, and were analyzed for both family composition and plant biomass. Initial findings indicate that spider communities in wetlands were very diverse. Aerial and ground samples yielded the largest number of individuals, high plant biomass yielded a diverse composition of spiders, and all variables changed with season. Overall, the family Lycosidae exhibited the highest abundance, followed by Clubionidae. Unexpectedly, the family Tetragnathidae exhibited the least number of individuals collected over the 5 month period. Continued sampling is needed to further understand the complex dynamics of spider communities in wetland habitats.

Global survey and inventory of Solifugae

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Solifugae, the sixth most diverse order of arachnids, are dominant predators in arid ecosystems on all major terrestrial landmasses except Antarctica, Australia, Madagascar and New Zealand. Despite their diversity, worldwide distribution, ecological importance, and remarkable morphology, behavior and life history, research on these fascinating arachnids has advanced little in 50 years. Many aspects of their biology remain unknown.

fewer than ten researchers worldwide are presently studying any aspect of their biology, and publications on the group currently average only five per year. Given the paucity of active specialists, the situation will not improve until more are trained. Research is further hindered by a limited application of modern concepts and methods. The Global Survey and Inventory of Solifugae (http://www.solifugaeinfo.net), funded by the Biodiversity Surveys and Inventories program of the U.S. National Science Foundation, aims to reverse these negative trends and stimulate research on Solifugae as follows. (1) Fieldwork will be conducted in 13 countries in four regions of greatest known diversity to discover new species, document distributions, and gather fresh material for morphological, anatomical, behavioral and genetic studies. (2) The higher classification will be revised based on phylogenetic analysis. (3) Monographs on large monophyletic groups (three family-scale revisions) will be published. (4) Rigorous standards and modern techniques will be employed in research. (5) Collaborations will be forged among specialists currently working largely in isolation, and resources provided to expand their research. (6) New experts will be trained in traditional techniques as well as modern concepts and methods. (7) Funds will be solicited to expand the project to resuscitate solifugid research, coordinated in North America but involving the world’s solifugid specialists and arachnologists interested in diverse aspects of solifugid research in 17 countries, will invigorate solifuge research worldwide.

Galvanizing your specimens: unintended consequences of using green neoprene stoppers in alcohol based collections

Bruce Cutler

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During an ongoing investigation of heavy metal occurrence in spider cuticle a few ethanol stored specimens showed anomalous zinc distribution. This was eventually traced to specimens stored in vials with green neoprene stoppers. Ethanol from vials with just a few years exposure to green stoppers contained zinc. Ethanol from vials stopped with other common closures, including black, red and white rubber stoppers lacked zinc, even over an extended period of seven years. Zinc is present in most rubber products since they are used as curing and filling agents, however only green stoppers appear to leach zinc into the ethanol. The overall effect of this zinc deposition on the specimens is uncertain. Zinc does have some antimicrobial properties so perhaps it could inhibit specimen decay. On the other hand, it can interfere with chemical analysis as in this instance, and possibly could interfere with other types of analysis.

Behavioral responses to the threat of predation in a mixed population of brush-legged and non-ornamented wolf spiders

Kasey D Fowler-Finn** & Eileen A Hebets

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In a recently discovered population of Schizocosa wolf spiders, we find individuals comprised of two adult male forms, each with unique morphology and courtship displays - a non-ornamented male form with unique seismic and elaborate visual signals. Preliminary microsatellite data reveal no genetic distinction between these two male forms and thus the question remains as to what is maintaining the presence of both forms. Though brush-legged males are relatively more numerous, previous field studies showed no differences in over-all rates of predation on the two male forms. However, a measure of over-all predation rate can mask potential form-specific differences in predation risk, anti-predator behavior and/or predator-prey interactions. Here we conducted controlled laboratory experiments to investigate the details of anti-predator reaction-precy interactions. We captured the responses of each male form to predator silk and excreta cues. Overall movement time and likelihood of courtship was significantly greater in the absence of predator silk cues for both male forms but we found no form-specific differences. In a second experiment, brush-legged live preyed on a larval stage predatory wolf spider to examine the latency to and number of survived attacks. Again, we found no differences between the brush-legged and non-ornamented males for the latency to the first attack, the number of survived attacks, the latency to capture or failure rate. These experiments, in conjunction with the previous study field suggest that there are no differential costs associated with predation from larger predatory wolf spiders.
between brush-legged and non-ornamented males from this mixed population.

A comparison of the courtship behaviors of the funnel-web spiders Barronopsis texana, Agelenopsis emertoni, and Agele... A. aperta, has been previously described in detail. Here we describe the courtship of another species in the genus, A. emertoni, as well as the courtship of a member of its sister genus, B. texana. Similar behaviors are observed in all three species, but the temporal patterning and frequencies of these behaviors differ. These differences in male time activity level are described and discussed in light of phylogeny.

Do male Schizocosa ocreata (Hentz) wolf spiders respond to other courting males?

Emily Galbraith, Jenni Milliser, George W. Uetz, Corrina Kizer, David L. Clark, & J. Andrew Roberts

Selection on males to locate females before other males may favor exploiting mate-searching efforts of others by “eavesdropping” on courting males. Male Schizocosa ocreata (Hentz) wolf spiders spend a large portion of their time searching for potential mates within complex forest leaf-litter. We used video playback techniques to modify male traits, and presented courting in response to female silk draglines. Previous studies using both live males and video playback suggest that males do not exhibit social facilitation of courtship (i.e., respond to the courtship of others with increased courtship after exposure). However, these studies used isolated males. Given that males occur in high densities in nature, it seems likely they encounter courting conspecifics often during the mating season. In this study, we test the hypothesis that prior experience and exposure in the field impacts the tendency of male S. ocreata wolf spiders to respond to eavesdropping on conspecific males. Video playback studies with field-collected males demonstrated behavior consistent with eavesdropping, i.e. increased following and courtship behavior during and after exposure to a courting male stimulus. Studies also showed that when presented with two male video stimuli simultaneously, males interact more with images of courting conspecific males than with males walking on leaf litter, frequently courting in response to female silk draglines. Previous studies using live spiders were more equivocal, and do not fully corroborate video results. While some of these results suggest experiments may fail to evaluate a behavior where it is actually displayed, it is present in males and to what extent eavesdropping occurs.

Investigation of decision-making and transitivity of preferences in female choice of Schizocosa ocreata (Hentz) (Araneae: Lycosidae)

Emily L. Galbraith, George W. Uetz, Stephanie Norton, & J. Andrew Roberts

Preferences of novel and known prey types of the tarantula Phormictopus cancrines

Ryan Harper, Brandon Neel, Sharif Shahin & Cara Shillington

As sit-and-wait predators, tarantulas are opportunistic carnivores that rapidly attack and subdue a wide variety of prey moving within their burrows or on surfaces. However, in a laboratory environment, captive-bred and raised tarantulas are more likely to have limited exposure to different prey. We examined prey capture and feeding behaviors of Phormictopus cancrines (Araneae: Theraphosidae) raised on a combination of both crickets and waxworms (Group 1) or crickets alone (Group 2). During feeding experiments individuals from these groups were offered waxworms, crickets, and cockroaches in separate trials. Thus, both groups were exposed to both novel and known prey items. We recorded feeding behaviors associated with each prey type including: 1) first movement towards prey; 2) first contact with prey; and 3) capture time. Within both groups, crickets were captured the quickest, often with no prior contact. Group 1, took the longest time to capture waxworms even though they had been fed waxworms prior to the start of trials. Differences in prey behavior and movement influences tarantula activity. Similar prey-handling behaviors associated with capture of novel and known prey are described in detail in the abstract by Shahin et al.

Are you paying attention? Female wolf spiders increase silk deposition when males don’t court

Jamie Havrilak, Kristen Shimmel

Female spiders use silk to advertise their receptivity to mate but little is known about variation in investment in silk to attract males or the context in which it is deposited. We measured variation in silk deposition by measuring females from both novel and known male courtship of the wolf spider, Pardosa milvina, in the presence or absence of microbial fauna associated with the medically implicated hobo spider, Tegenaria agrestis, in the U.S. Pacific Northwest and their likelihood of causing infectious lesions

Melissa M. Gaver

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In the Pacific Northwest (PNW), the hobo spider, Tegenaria agrestis, has been implicated as a spider of medical concern because the bite is thought to cause necrotic lesions. The hobo spider has rapidly expanded its range since its introduction into the PNW in the 1930’s and has moved into neighboring states beyond the PNW. Although there are no verified published accounts, the hobo spider continues to be named as the causative agent for necrotic or infected lesions of unknown origin. Venom analysis does not show any known components that would induce tissue necrosis and the spider is not a medical concern in Europe, the originating country. Recent publications link ne...
females and among males that varied in their courtship intensity. We measured total female silk deposition, cord silk deposition, and attachment disk deposition in response to one of four treatments: 1) an intensively courting male with access to female silk, 2) a weakly courting or non-courting male without access to female silk, 3) a weakly courting male with access to female silk, and 4) no stimulus (control). Unmated females were placed with previously courted and force-mated males and females. Courtship behavior was recorded and measured for 4 hours on individual grid-bearing 80 mm diameter paper disks. We then quantified cord silk and fine-gauge dragline silk coverages, number of attachment disks, and excreta deposition on gridded sheets of paper. Adult females with eggsacs produced more draglines than species living in simpler environments. Although these studies suggest adaptations of the spinning-apparatus to habitat complexity, ontogenetic changes in dragline production as a consequence of habitat shifts within a species are lacking. We examined changes in silk deposition in the wolf spider, Hogna helluo, as a consequence of shifting habitats. Hogna helluo spiderlings were introduced to containers with either simple or complex environments. After one month, half of the spiders in each treatment were removed from their containers and transplanted to containers with the alternate environment type (simple or complex) while the remaining spiders were maintained in their existing containers. We quantified the amount of fine gauge silk, attachment disks, and excreta as a function of habitat type and treatment, and found significant differences in any of the four silk types measured were found as a function of habitat type, although a significant time by treatment interaction was noted for cord silk. These data suggest that silk deposition in Hogna helluo changes little in response to changing habitat types.

I'm just not into you: Using forced mating experiments to untangle male and female mate choice in the wolf spider Pardosa milvina

Jamie Havrilak, Abraham Taylor & Matthew H. Persons

Our results suggest that females invest more heavily in dragline production as a consequence of habitat shifts within a species. We sought to quantify egg sac production of females that former accepted or rejected males produced. Our results suggest that females choose males based on copulatory behavior toward previously rejected males but produced significantly less cord silk among non-courting or weakly courting males. We then measured egg sac production of females that formed courtships with formerly accepted or rejected males compared to control matings with unanesthetized females. Males that formerly failed to elicit receptive responses in females were significantly less likely to mount anesthetized females, suggesting that male mate choice may be involved in mating failures. Among formerly rejected males that did mate with anesthetized females, the insertion rate and number of missed insertions were different than that of previously accepted males suggesting that once mounted, females do not modify their copulatory behavior toward previously rejected males and females do not modify their copulatory behavior toward previously rejected females. Egg sac production was the same among formerly rejected and accepted force-mated females.

Ontogenetic and sex-specific differences in dragline and excreta deposition in the wolf spider Pardosa milvina

Rebecca Holler*, Christopher Latanich & Matthew H. Persons

Drangline deposition is common among most spiders but variation in silk production based on the age, sex, and reproductive status of spiders remains unclear for cursorial spiders. We measured the quantity and type of silk and excreta deposition in the wolf spider, Pardosa milvina, in comparison to Pardosa amentata and Pardosa amentata. We then measured cord silk and fine-gauge dragline silk coverages, number of attachment disks, and excreta produced on each sheet. Cord silk deposition did not vary across any group. We found significant differences in attachment disk deposition with adult females with eggsac producing none, adult and subadult males producing very low levels, and adult males producing more than virgin females. Total silk deposition was significantly lower among egg sac-carrying females and highest among females immediately collected from the field. Surprisingly, we found no significant difference in silk deposition between mated and virgin females nor between adult males and unmated females. Egg sacs carrying affects attachment and fine-gauge silk deposition but has little impact on cord silk. Excreta deposition is highest among females producing more than virgin females and adult males producing the most and adult females with eggsacs the least. This suggests reduced feeding among egg sac-carrying females and high feeding rates among unmated females and adult males.

Effects of structural complexity and habitat switching upon the development of silk deposition behaviors in the wolf spider Hogna helluo

Christopher A. Latanich, Michelle M. Smith, Rebecca L. Holler, Ann L. Rypstra & Matthew H. Persons

All spiders produce silk draglines as they move through the environment. Wolf spiders have been shown to exhibit greater development of the major ampullate silk glands and produce more draglines than species living in simpler environments. Although these studies suggest adaptations of the spinning-apparatus to habitat complexity, ontogenetic changes in dragline production as a consequence of habitat shifts within a species are lacking. We examined changes in silk deposition in the wolf spider, Hogna helluo, as a consequence of shifting habitats. Hogna helluo spiderlings were introduced to containers with either simple or complex environments. After one month, half of the spiders in each treatment were removed from their containers and transplanted to containers with the alternate environment type (simple or complex) while the remaining spiders were maintained in their existing containers. We quantified the amount of fine gauge silk, attachment disks, and excreta as a function of habitat type and treatment, and found significant differences in any of the four silk types measured were found as a function of habitat type, although a significant time by treatment interaction was noted for cord silk. These data suggest that silk deposition in Hogna helluo changes little in response to changing habitat types.

Inventory of the biodiversity and distribution of spiders on Nantucket Island, Massachusetts

Andrew Mckenna-Foster**, & Cheryl Comeau Beaton

On Nantucket Island, Massachusetts, we conducted spider species inventories in five permanent Nantucket Biodiversity Initiative plots representing four major island habitats: barrier beach and dune, the globally rare sandplain grassland and coastal heathland, scrub oak and pitch pine (represented by two plots), and hardwood forest. We collected 2,508 spiders (856 adults and 1,650 juveniles or immatures) representing 26 families and potentially 217 species. Within the plots we followed standard timed one hour collecting methods including aerial and ground collecting, beat sheeting and sweep-netting. We also accepted spiders collected casually from anywhere on the island. Species richness curves suggest that our inventories are not complete for any of the sampled habitats and that more collection is needed. The species composition is only 31% similar to a historical island collection assembled by James H. Emmert and colleagues. Our results support consideration in future management strategies especially those concerning the rare and intensively managed sandplain grassland and coastal heathland habitat. This study lays the groundwork for future studies investigating the effects of prescribed burning and plant community succession on Nantucket spider populations.

Intraguild predation by the black striped bark scorpion, Centruroides vittatus (Scorpiones: Buthidae) in the Tamaulipan Biotic Province at Laredo, Texas

C. Neal McReynolds

The function of intraguild predation (IGP) by the black striped bark scorpion, Centruroides vittatus (Scorpiones: Buthidae) is either as a form of predation or interference competition. Intraguild predation by C. vittatus included spiders (Araneae) and
well as new genera and new species. Of biodiversity the spiders on the island are extremely diverse; our short expedition, only 12 days, demonstrated that in terms of spiders, DR offers an outstanding habitat. As we just lack information about the spiders currently inhabiting the island, it is possible that lived on the island 30 million years ago are extinct on the island. There could be a few possible answers. For example, spiders may have been wiped out because of a major asteroid impact. Though sexually cannibalistic species like spiders may be subject to intense early pressure against the evolution of sociality in vertebrates, for example, a number of non-social systems. For example, spiders were studied using scanning electron microscope to reveal differentiation of its silk spinning tubes. In spite of the fact that the spiders do not spin webs to trap a prey, they also have silk apparatus even though the functions are not fully defined. The spinning apparatus of the postembryo is the mechanical properties of dragline silk fibers using light and electron microscopes. The major ampullate gland is composed of three functional parts, excretory duct, storage ampulla, and convoluted tail regions. The external spinning nozzle is connected to the storage ampulla via the excretory duct. The duct is basically divided into three substructures at the cuticle layer such as exocuticle, endocuticle and subcuticle. Among these, the electron lucent subcuticle which has the function of water absorption during silk polymerization is well developed at the anterior region near the nozzle of the spinneret, whereas the endocuticle which contains the protein that maintains the cross-section are developed at the rest of duct region. The critical procedure for conversion of the liquid feedstocks into an insoluble silk seems to be accomplished at nozzle of spigot including the liquid feedstocks.

Effect of hunger on female mate choice in Schizocosa ocreata (Hentz)

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Hunger can directly affect foraging, risk taking, and other behaviors. Recent studies with vertebrate models suggest that hunger level may also play a role in female mate choice, although sexually cannibalistic species like spiders may be subject to different costs and constraints. For example, spiders have been shown to exhibit mate choice based on male traits, but are often food limited in the wild and may also resort to sexual cannibalism. We studied the influence of hunger on female mate choice in Schizocosa ocreata (Hentz), using video playback to present a controlled male stimulus to females who were either food restricted or well-fed. As females assess males of this species on the basis of their secondary sexual characteristics (foreleg tufts), we also manipulated males (enlarge vs. reduced tufts) to determine the receptivity of starved vs. well-fed females. Males with enlarged (well-fed) vs. reduced (starved) tufts were significantly more selected by females with larger tufts. While there were no differences in latency to orient at male stimuli across treatment groups, length of time between orientation behavior and a female’s first receptive display varied significantly with tuft size in the well-fed treatment group, but not the starved group. However, females who were starved for longer periods did not discriminate between the different quality males. Aggressive behaviors were more frequent in hungry females, who were more likely to lunge at males, regardless of tuft size. Results suggest complex trade-offs between natural selection and sexual selection in evolution of female choice behavior.

Biodiversity of spiders of Dominican Republic

Vladimir Ovtcharenko & Kenneth Polanco

The spiders of Dominican Republic (DR) are virtually undiscovered. At the same time, DR is a unique place to study the spiders and the history of spiders on the island and in the entire Caribbean region. This is because spiders are very common in the bean region. This is because spiders are very common in the bean region. This is because spiders are very common in the bean region. The spiders of DR are virtual unknown. The DR amber is composed of 30-40% spiders and more often to males with larger tufts. While there were no differences in latency to orient at male stimuli across treatment groups, length of time between orientation behavior and a female’s first receptive display varied significantly with tuft size in the well-fed treatment group, but not the starved group. However, females who were starved for longer periods did not discriminate between the different quality males. Aggressive behaviors were more frequent in hungry females, who were more likely to lunge at males, regardless of tuft size. Results suggest complex trade-offs between natural selection and sexual selection in evolution of female choice behavior.

Fine structural analysis of the spinning nozzle and duct for the dragline silk in the spider Nephila clavata

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The dragline silk of major ampullate silk gland possesses an exceptional combination of tensile strength and elasticity in the orb-web spider Nephila clavata. The spinning nozzles and the ducts of major ampullate gland were investigated to reveal the relationship between the fine structural characteristics and the mechanical properties of dragline silk fibers using light and electron microscopes. The major ampullate gland is composed of three functional parts, excretory duct, storage ampulla, and convoluted tail regions. The external spinning nozzle is connected to the storage ampulla via the excretory duct. The duct is basically composed of three superposed types of the layers which are internal cuticles, monolayered epithelial cells and peripheral connective cells. By fine structural analysis, we could observe three substructures at the cuticle layer such as exocuticle, endocuticle and subcuticle. Among these, the electron lucent subcuticle which has the function of water absorption during silk polymerization is well developed at the anterior region near the nozzle of the spinneret. Whereas the endocuticle which contains the protein that maintains the cross-section is developed at the rest of duct region. The critical procedure for conversion of the liquid feedstocks into an insoluble silk seems to be accomplished at nozzle of spigot including the liquid feedstocks.

Competitive consequences of sociality in a behaviorally polymorphic population of the social spider, Anelosimus studiosus

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The question as to why some organisms cooperate and why others do not has been a focal topic of evolutionary biology since the time of Darwin, yet little is known about the early stages of its evolution, when both a solitary and social phenotype persist in the species. This stage is paramount in the evolution of sociality as before the social phenotype can spread it first must out compete the selfish phenotype underlying the solitary lifestyle. If social individuals lack a phenotype recognition mechanism, they likely compete at a disadvantage. We investigate the competitive consequences of sociality in a behaviorally polymorphic population of the social spider Anelosimus studiosus (family: Theridiidae) by performing a series of staged encounters for a contested food item. Spiders were deprived of food for one week prior to encounters and pairs were released simultaneously onto a neutral web, foreign to both competitors and given 15 seconds to acclimate before a food item was dropped in the central portion of the web. Individuals scored as possessing a social phenotype took longer to approach the prey item, failed to capture prey items, failed to monopolize access to the prey whether they captured the prey item or not, and when contact was made with an aggressive individual either fled, or were injured and/or consumed. These findings suggest that early competition with non-cooperative conspecifics may be an intense early pressure against the evolution of sociality in some systems.
Here we focus specifically on behaviors and prey-handling novel and known prey items (see abstract by Harper et al.).

It is well established that male *Schizocosa ocreata* wolf spiders (Lycosidae) spend a significant portion of their daily time budget seeking potential mates. Little information exists however, concerning estimates of average travel distance for males during the spring breeding season. Males who travel greater distances are argued to be more likely to encounter potential mates, but are also more likely to expose themselves to increased predation risk. As part of a long-term survey (2001 – 2005) of male behavior and activity patterns in the field, we measured linear distance traveled by individual males during ten-minute observation periods. Here we present data on the average distance traveled by male spiders as a function of temperature, weeks elapsed from the start of the breeding season, and the time specific relative proportion of males to females in the population. Preliminary analyses show no evidence for a difference between the average distance traveled and collecting site, but do show evidence for a difference between the average distance traveled and weeks elapsed within season and between years of the study.

**Energetic costs of web spinning in cobweb spiders**

**Raphael Royaute**, Peter H. Niewiarowski & Todd A. Blackledge

Component spiders are used as a model system to investigate questions about foraging ecology and life history tradeoffs. The shapes of webs are relatively easy to characterize and compare between individuals or among species. However, almost nothing is known about the energetic costs involved in spinning webs. We report on preliminary investigation into the energetic costs of web production in the western black widow (*Latrodectus hesperus*) and the common house spider (*Achaearanea tepidariorum*). We use microbomb calorimetry to measure the material costs silk in different webs and respirometry to measure the costs associated with the spinning behaviors themselves.

**Differences in prey-handling behaviors associated with novel and known prey in the tarantula**

**Sharif Shahin**, Brandon Neel, Ryan Harper & Cara Shillington

Predators use a diverse array of strategies to capture prey and, based on optimal foraging theory, should maximize their prey capture efficiency. Thus, predators should be able to discriminate between different types of prey and adjust behaviors accordingly. We examined prey capture and feeding behaviors in the tarantula *Phormictopus cancerides* using both novel and known prey items (see abstract by Harper et al.). Here we focus specifically on prey-handling associated with different prey; both novel and known. Prior to the feeding experiments, tarantulas were separated into two groups. Group 1 was raised on both waxworms and crickets while Group 2 was raised on crickets alone. Novel prey items were thus controls for the effects of the type of prey brought into the arena. Waxworms and cockroaches for Group 2. We observed differences in prey tracking and handling for each prey item and behaviors also varied depending on whether the prey was novel or not. Crickets were typically captured the quickest with minimal prior contact. Silk production, cord silk deposition, and attachment disk deposition of males over 30 minutes on gridded sheets of paper in response to four stimulus treatments (n=40/treatment): 1) silk from a virgin female coupled with a live virgin female that was outside a transparent petri dish in which the male was contained, 2) a live virgin female outside the dish, but no female silk available, 3) no female present, but virgin silk present, and 4) no stimulus present (control). Males produced significantly more total silk when a female was present along with her silk cues compared to any other treatments. The silk treatment significantly increased when female silk was present, irrespective of whether a live female was also present. Attachment disks also increased significantly when female silk and a live female were present compared to when females were present without silk or the control group. Our results suggest that male silk deposition like a function in s to quantity, duration and in a more quantitative fashion. Results of this analysis will be discussed. In addition, males were bled immediately following male choice trials, and each sample was subjected to various immune assays in order to determine whether or not immune function is related to these secondary sexual characters. The results of these experiments will be discussed.

**Do male wolf spiders advertise to females with dragline silk?: Variation in male silk deposition among conspecific males and females**

**Kristen Shimmel**, Jamie Havrilak, Ann L. Rypstra & Matthew H. Persons

It is well known that sexually receptive adult female spiders produce pheromone-laden draglines to attract prospective mates, but male spiders of many species also produce draglines and the role of this silk in sexual communication remains understudied. We measured silk deposition, cord silk deposition, and attachment disk deposition of males over 30 minutes on gridded sheets of paper in response to four stimulus treatments (n=40/treatment): 1) silk from a virgin female coupled with a live virgin female that was outside a transparent petri dish in which the male was contained, 2) a live virgin female outside the dish, but no female silk available, 3) no female present, but virgin silk present, and 4) no stimulus present (control). Males produced significantly more total silk when a female was present along with her silk cues compared to any other treatments. The silk treatment significantly increased when female silk was present, irrespective of whether a live female was also present. Attachment disks also increased significantly when female silk and a live female were present compared to when females were present without silk or the control group. Our results suggest that male silk deposition like a function in s to quantity, duration and in a more quantitative fashion. Results of this analysis will be discussed. In addition, males were bled immediately following male choice trials, and each sample was subjected to various immune assays in order to determine whether or not immune function is related to these secondary sexual characters. The results of these experiments will be discussed.

**Foraging and growth costs of habitat switching in the wolf spider Hogna helluo**

**Michelle M. Smith, Christopher A. Latanich & Matthew H. Persons**

The wolf spider *Hogna helluo* is a model species to study the effects of rearing environment and habitat switching on foraging performance and mortality. *Hogna* lives in agricultural fields which are subject to or can experience modifications within the lifespan of the spider. We randomly assigned 120 juvenile *Hogna* to two experimental habitat types (simple and complex). Habitat treatments varied only in their physical structure and consisted of plastic shoebox containers with either a topsoil substrate (simple) or a topsoil substrate with numerous artificial plants (complex). For each habitat treatment, we collected data on spider foraging success including prey capture latency, growth rates, body condition, and mortality during a one-month period. We then divided each treatment into two sub-groups and randomly assigned half the spiders to the reciprocal treatment (simple or complex) while retaining half the spiders within their existing treatment. For one additional month we then measured the same variables again after habitat reassignment. *Hogna*
Behavior of the wolf spider Schizocosa bilineata

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In the spring of 2006, we began a survey of wolf spider species on the Newark Campus of The Ohio State University. A unique research opportunity arose when we discovered a number of Schizocosa bilineata (Araneidae) being carried by several mature males. We noted that several regions of the spiders’ bodies, including the spiracles, book lungs, epigyna and palps, can have long curved hairs associated with them. These hairs typically are hydrophobic and appear to contribute to the maintenance of an air space over these structures; they may be important in protecting the underlying openings from dust and pathogens borne in free, standing water and in rain droplets or the splashes generated by rain. We have shown that water repellency not only varies widely among spider species but also within an individual across its ventral topography. We surmise that the support of respiratory and other functions by the hair-bearing cuticle is likely to have played an important role in the evolutionary history of spiders.

Role of juvenile male ornamentation in Habronattus borealis (Banks 1895) jumping spiders (Araneae, Salticidae) during agonistic interactions

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Agonistic encounters are prevalent throughout the animal kingdom and typically occur due to competition for resources such as food, space, or mates. During these agonistic encounters, stereotyped displays often function in opponent assessment, putatively decreasing the likelihood of contest escalation and thus decreasing the probability of injury. Many agonistic displays involve conspicuous ornamentation that may aid in the assessment of opponent characteristics (i.e., sex, age, size, condition). Males of the jumping spider Habronattus borealis exhibit red coloration on the clypeus solely during the later immature stages (antepenultimate and penultimate), losing the red coloration upon maturation. In order to determine any role this stage-specific ornament plays in conspecific interactions, such as agonistic encounters, we staged male-male, female-female, and male-female interactions combining two individuals of either the same or different life stages (immature/mature). We described and quantified all displays (agonistic, courtship) occurring throughout each trial. Habronattus borealis was found to exhibit a stereotyped agonistic display which involves both forelegs being extended above the prosoma and out laterally from the body. During interactions, males exhibited this display more frequently than females. We also found that agonistic interactions between mature males escalated to a greater degree and injuries to one male were more frequent than during any male-male interactions involving an immature individual, potentially suggesting that the red ornamentation may play a role in decreasing opponent aggression.

Water repellent properties of spiders: topographical variations and functional correlates

Robert B. Suter & Gail E. Stratton

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We examined the water repellency of the surfaces of individuals from four families of spiders representing divergent lifestyles. For each species, 15-20 individuals were collected and reared in the laboratory, and then misted with an ultrasonic humidifier, and finally completely submerged in distilled water. A series of images was taken using a Nikon D100 camera connected to an Olympus SZX12 dissecting microscope with lighting provided by an electronic flash. As expected, Dolomedes (Dolomedesidae) and Larinioides (Tetragnathidae) have surfaces that are very hydrophobic. In contrast, only portions of the cuticle of Larinioides (Araneidae) are hydrophobic and the surfaces of the hirsute Platycryptus (Salticidae) are not conspicuously hydrophobic. We noted that several regions of the spiders’ bodies, including the spiracles, book lungs, epigyna and palps, can have long curved hairs associated with them. These hairs typically are hydrophobic and appear to contribute to the maintenance of an air space over these structures; they may be important in protecting the underlying openings from dust and pathogens borne in free, standing water and in rain droplets or the splashes generated by rain. We have shown that water repellency not only varies widely among spider species but also within an individual across its ventral topography. We surmise that the support of respiratory and other functions by the hair-bearing cuticle is likely to have played an important role in the evolutionary history of spiders.

Student Paper Awardees

The Student Paper Competition at the Selinsgrove AAS Meeting produced many fine student presentations. The awardees were:

Podium Presentation—

First place was Julianna L. Johns, University of Cincinnati (with George Uetz & J. Andrew Roberts) for “Once bitten, twice shy? Aggressive male mating behaviors and fang use in the brush-legged wolf spider Schizocosa ocreata”. Second Place was Maxim Larriveé, McGill University (with Chris Budde) for “Diversity of canopy spiders at multiple scales in hardwood forests of southern Québec”.

Poster Presentation—

First place for the poster was Emily Galbraith, University of Cincinnati (with George Uetz, Stephanie Norton, J. Andrew Roberts) for “Investigation of decision-making and transitivity of preferences in female choice of Schizocosa ocreata” (Hentz) (Araneae: Lycosidae). Second Place was Kasey D. Fowler-Finn, University of Nebraska-Lincoln (with Eileen Hebets) for “Behavioral responses to the threat of predation in a mixed population of brush-legged and non-ornamental wolf spiders”.

Congratulations to the award recipients, and we look forward to the student presentations in Berkeley!
2007 AAS Election

This year we elected a new President-Elect and Director.

Our President-Elect is Rosemary Gillespie and the newest Director is Greta Binford, who replaces Chris Buddle. (We thank Chris for his two years of service!) Karen Cangialosi remains as Secretary.

This year (2008) we elect a new Director. Look for your ballot this spring.

Zoology Internship


Awards are for 1 – 7 months and range between $500 - $1,000. A final report summarizing the results of the project will be due upon completion of the funded activities.

Application Deadline is May 15, 2008. Please see attachment or contact Paula.Cushing@dmns.org for information.

Student Travel Award

The American Arachnological Society announces a student travel award to aid students attending this year’s AAS Annual Meeting in Berkeley, California. This award is intended to provide partial support of up to $350 to undergraduate or graduate students who are presenting authors on a poster or presentation at the AAS meeting. Applicants must be members of AAS and have a demonstrated financial need that cannot be met by other sources (e.g. advisor, department or university).

To apply, please send an electronic version of the completed application form to Dr. Greta Binford: binfo@lclark.edu. The application form is attached and will also be posted on the AAS website at WWW.AMERICANARACHNOLOGY.ORG

You are cordially invited to attend the

24th EUROPEAN CONGRESS OF ARACHNOLOGY

25-29 AUGUST 2008
BERN, SWITZERLAND

The conference will be held in the university’s historical main building, next door to the railway station. It is jointly organised by the University of Bern, and the Natural History Museum Bern, and supported by KCS Convention Service.

Bern is Switzerland’s cozy capital, and a UNESCO Cultural World Heritage Site. It is located inside a loop of the Aare river that comes directly from the nearby Alps. This provides for both cultural and natural highlights, some of which can be explored during the conference. Although Switzerland is relatively expensive, the congress fee is comparable to former European Congresses. We are making all efforts to limit costs, e.g. by arranging private accommodation for students.

Conference contributions consist of talks, posters, photos, films, and books. The best posters and photos will be awarded. We especially encourage national and regional arachnological societies to present their organisation on a poster. Detailed information can be found at: http://www.esa2008.unibe.ch/

CALL FOR SYMPOSIA

We would like to invite you to organise symposia on topics such as behaviour, ecology, faunistics, methodology, physiology, systematics, taxonomy and toxicology of the different groups of arachnids. More specialised topics are welcome, provided that they attract a sufficient number of contributions. Please contact Wolfgang Nentwig with your suggestions by e-mail: wofgang.nentwig@zos.unibe.ch

We look forward to a stimulating conference and sincerely hope that you will be able to participate! Please forward this message to anyone who may be interested.

Christian Kropf
Martin Schmidt
Wolfgang Nentwig

AMERICAN ARACHNOLOGY

is the official newsletter of the American Arachnological Society, and is distributed biannually to members of the Society. Items for the Newsletter should be sent to the Editor, Alan Cady, Dept. Zoology, Miami Univ.-Middletown, 4200 E. Univ. Blvd., Middletown, Ohio, 45042, USA, Voice:(513)727-3258, Fax:(513)727-3450; E-mail: CADYAB@MUOHIO.EDU.

All correspondence concerning changes of address and information on membership in the American Arachnological Society should be addressed to the Membership Secretary, Jeffery Shultz, American Arachnological Society, Dept. of Entomology, Univ. of Maryland, College Park, MD 20742; Voice:(301)405-7519, Fax:(301)314-9290, E-mail: jshultz@umd.edu.

Membership information may be found at the AAS website: http://WWW.AMERICANARACHNOLOGY.ORG. Members of the Society also receive the JOURNAL OF ARACHNOLOGY (published triannually) and have access to electronic resources (JOA OnLine).
2008 AAS Annual Meeting  
University of California  
Berkeley, California  
Wednesday, 25 June – Monday, 30 June  
hosted by  

Rosemary Gillespie & Charles Griswold

This year’s AAS meeting will be held beside the campus of the University of California at Berkeley, founded in 1868. The UC Berkeley campus is home to a series of Natural History Museums, dating back to the early history of the institution: The Essig Museum of Entomology, the Museum of Vertebrate Zoology, the UC and Jepson Herbaria, the UC Museum of Paleontology, the Hearst Museum of Anthropology, and the UC Botanic Gardens. The city of Berkeley lies at the base of the Berkeley Hills, which rise steeply behind the campus (up to 535 m), and is traversed by the Hayward Fault, a major branch of the San Andreas Fault to the west. The city is well known for its vibrancy and liberalism, being the home of the 1960’s Free Speech Movement. The city of San Francisco is well connected to Berkeley, and provides a rich array of cultural offerings. The California Academy of Sciences, currently closed as it moves to its new facilities, is scheduled to open later this year in Golden Gate Park. The new building, designed by renown architect Renzo Piano, includes a huge, undulating, and functional, living roof, which will slope over interior exhibitions and read as hills against the natural landscape. It will house an aquarium, planetarium, and exhibition spaces.

On campus housing: The Foothill Residence Halls offers suite style housing featuring single and double occupancy suites, as well as laundry facilities and lounges. The residence hall has the look and feel of a ski resort and provides a peaceful setting for meetings. All rooms are carpeted and furnished. Ethernet network connections are provided in every room allowing access to the internet and campus resources and free basic Cable TV. In-room telephone lines are also provided. The dining center for breakfast and lunch is in the same complex. Foothill has its own executive chef; menus include traditional favorites, ethnic specialties, vegetarian and vegan selections.

Nearby accommodations are available if you would prefer not to stay in dorm rooms. However, these tend to be expensive, with a limited number of small rooms.

Field Trips: Tilden Park Collecting Trip: Tilden Park is a local favorite that offers access to hiking trails in a mixture of habitat types including oak- woodland and redwood forest. The park is situated high in the Berkeley Hills, provides excellent views of the Bay Area, and features a botanical garden devoted to California endemics. Participants will be loaned basic collecting equipment and allowed to collect arachnids in specific areas of the park. Transportation will be provided. Those with the dorm/meal package will be able to pick up a meal free of charge before leaving for the field trip. All others need to make some other arrangement for lunch.

Napa Valley Winery Tour: The Napa Valley is one of the most famous wine regions in the world, and offers visitors access to more than 300 tasting rooms. We will be visiting 4 wineries on this trip, including St. Supéry, V. Sattui, Beaulieu Vineyards, and Rombauer all of which have won awards in recent years and are Napa favorites. Transportation will be provided, but please bring $5 per winery as they typically charge a small tasting fee. Those with the dorm/meal package will be able to pick up a meal free of charge before leaving for the field trip. All others need to make some other arrangement for lunch.

There also is a ‘self-guided’ option to visit the sights of San Francisco.

Air Travel: There are two large airports that serve Berkeley, San Francisco International airport (SFO) which is 25 miles from the UC Berkeley campus, and Oakland International airport (OAK) which is 15 miles away. From the airport there are two easy options for reaching the Berkeley campus: (1) the BART (Bay Area Rapid Transit) train that takes you to downtown Berkeley; and (2) the Bayporter Shuttle, a door-to-door van service. Please see the AAS website (address below) for more travel information.

Preliminary Schedule:

Wednesday, June 25th: Registration and informal mixer.
Thursday, June 26th: Talks; Poster Session.
Friday, June 27th: Talks; Informal Casual Arachnid Evening
Saturday, June 28th: Talks; Business Meeting; Banquet-Student Awards, Auction (Life Science Building)
Sunday, June 29th: Field Trips

Local Host Contact Information:

Rosemary G. Gillespie, University of California Berkeley, Division of Insect Biology, 137 Mulford Hall, Berkeley, CA 94720-3114; VOICE: (510) 642-3445; FAX: (510) 642-7428; E-mail: gillespie@berkeley.edu

Charles E. Griswold, Department of Entomology, California Academy of Sciences, 875 Howard Street, San Francisco, CA 94103; VOICE: (415) 379-5312; E-mail: cgriswold@calacademy.org

Please register and submit abstracts by the deadline: 19 May 2008
You will find all meeting information and registration at: http://www.americanarachnology.org/AAS_Meetings/index.html

It is preferred that registration and abstract submissions be done through the website. However, registration and abstract submission forms will be available in the next Newsletter (coming very
ANNOUNCEMENTS

Information about THE JOURNAL OF ARACHNOLOGY

Some exciting changes are happening to the Journal of Arachnology that will be implemented in 2008. First, a new format. The journal will be larger format (8.5 x 11 inches) and will have a color cover. The two-column layout for text will be retained. The larger page size will permit better publication of large figures and tables.

Second, we have also decided to publish solicited review articles in the first issue of every year instead of the third issue. Unsolicited review articles are also welcome as submissions.

Just in case you have not noticed, we have completely caught up with the dreadful backlog of manuscripts that caused a delay in publication. Now, manuscripts accepted for publication in one year are typically being published that same year (unless, of course, they are accepted late in the year). Keep in mind that volume 36, issue 2 will be devoted to the ISA congress proceedings. Thus, expect issues 1 and 3 to be somewhat larger than normal to accommodate the non-Congress submissions.

In addition to being posted on the AAS website, JoA is also now being published via JSTOR and BioOne.

Finally, for those authors for whom figure numbering has always been a frustration, we now accept the following alternative figure numbering schemes:


The following alternate Figure numbering is now acceptable:

Figures 1a - e. A-us x-us, male from Timbuktu. a. Left leg; b. Right chelicerae; c. Dorsal aspect of genitalia; d. Ventral aspect of abdomen. Scale = 1.0 mm.

You may use either figure numbering scheme in your manuscript—just please be consistent throughout the manuscript (use one or the other numbering scheme but not both).

The newly revised Instructions to Authors are now posted on the AAS website and will be printed in volume 36.

Jim Carrel, Editor in Chief
Paula Cushing, Managing Editor

The ANIMAL BEHAVIOR SOCIETY's 45th annual meeting will be held 16-20 August 2008 at Snowbird Ski and Summer Resort in the mountains of eastern Utah, 45 minutes outside of Salt Lake City. This is a gorgeous Rocky Mountain location, located in a dry mountain canyon with both alpine tree line and the desert floor with easy driving distance. It is centrally located in the Rocky Mountain West, perfectly situated for a family vacation. Our venue will be classic conference center/resort meeting rooms, i.e. ballroom or flat seating.

We have an exciting schedule planned, including a Plenary Address by Mary Jane West-Eberhard (University of Costa Rica) on the theme of Alternative developmental pathways and why they are so important in behavior and evolution. This plenary highlights issues in a companion symposium entitled PATHWAYS TO NOVELTY AND DIVERSITY: THE CAUSES AND CONSEQUENCES OF POLYPHENISM organized by David W. Pfennig, University of North Carolina and Armin P. Moczek, Indiana University. The meeting also features lectures by Jerrem Brown (SUNY – Albany) on Untold Tales About Mexican Jays and R Haven Wiley (University of North Carolina, Chapel Hill) on A Signal-Detection Equilibrium in the Evolution of Communication. The keynote speaker will be John Mitani (University of Michigan), The Behavior of Wild Chimpanzees.

For further information see: http://www.animalbehavior.org/Snowbird08/ or contact the designated host, Jeff Podos (jpodos@bio.umass.edu).

Rich Bradley will be offering a course this summer in basic spider biology at the Stone Laboratory on Gibraltar Island in Lake Erie. The intent of this course is to provide an overview of Ohio's spider fauna, an understanding of spider behavior, and an appreciation of the important role that spiders play in our environment. Students will be introduced to the diversity of spiders, their structure, behavior, and ecology. We will observe living spiders building their webs and capturing prey. A variety of field and laboratory equipment will be used to collect and identify spiders. We will learn the basic techniques of spider study (sweep nets, hand capture, pitfall traps, Berlese funnel extraction, etc). The shores of Lake Erie are famous for both the abundance and variety of spiders. We will observe living spiders as well as study photographs and specimens of spiders to learn about their anatomy. Students in this course will learn how to identify spiders and become familiar with the fourteen most common spider families in Ohio.

The course runs from 3-9 August 2008, and is intended for upper-division undergraduates or graduate students. Information on the Stone Lab may be found at: http://ohioseagrant.osu.edu/stonelab/

and a detailed description of the course is at http://ohioseagrant.osu.edu/stonelab/courses/?course=52

Students not enrolled in a college program may still take the course under special arrangements (made through Stone Lab).

Rich Bradley – (bradley.10@osu.edu); (740) 725-6266; fax

http://ohioseagrant.osu.edu/stonelab/courses/?course=52

http://ohioseagrant.osu.edu/stonelab/

The Behavior of Wild Chimpanzees

John Mitani

University of Michigan

http://www.animalbehavior.org/Snowbird08/

contact the designated host, Jeff Podos

jpodos@bio.umass.edu

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University of Michigan

http://www.animalbehavior.org/Snowbird08/

contact the designated host, Jeff Podos

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American Arachnology
The Newsletter of the American Arachnological Society
Number 76 April 2008

American Arachnological Society Website
HTTP://WWW.AMERICANARACHNOLOGY.ORG

Ken Prestwich has developed our website where one may find membership information, Annual Meeting Info & registration, announcements & Bulletin Board, officers, meeting minutes, instructions to JOA authors, an electronic JOA index, graduate study opportunities, a photo gallery, links to other arachnological sites, and JOA OnLine (electronic versions of the Journal of Arachnology; available to A.A.S. Members). Many, many thanks and kudos to Ken for applying his time and skill to the Website!! Thanks too to Holy Cross for sponsoring the site.

Arachnology in Cyberspace
Here are some website addresses for arachnological information:
International Society of Arachnology—HTTP://WWW.ARACHNOLOGY.ORG
Arachnology Links—HTTP://WWW.ARACHNOLOGY.BE/ARACHNOLOGY.HTML
The Canadian Arachnologist—HTTP://CANADIANARACHNOLOGY.DYNDNS.ORG/

Spiders of North America — An Identification Guide

Order at: HTTP://WWW.AMERICANARACHNOLOGY.ORG/SPIDER_GUIDE.HTML

American Arachnology
Department of Zoology
Miami Univ.- Middletown
4200 E. Univ. Blvd.
Middletown, Ohio, 45042

Reminder About the 2008 AAS Annual Meeting !!!!
Registration and Abstract Submission Deadline is Monday 19 May
Register for the 2008 Meeting at:
http://www.americanarachnology.org/AAS_Meetings/index.html

See page 18 for more details