AMERICAN ARACHNOLOGY

The Newsletter of the American Arachnological Society

Number 46 **NOVEMBER 1992**

1993 A A S MEETING

SEATTLE, WASHINGTON

The 1993 AAS meeting will be held from 20 - 28 June at the University of Washington in Seattle. Rod Crawford of the university's Burke Museum and John Edwards of its Zoology Department will serve as co-hosts for the meeting. Preliminary information is provided below. More details will appear in the spring newsletter.

Tentative Schedule:

Sunday, 20 June -- Registration and evening social

Monday, 21 June to Thursday, 25 June -- Paper sessions

Friday, 26 June -- Field trip

Saturday, 27 June -- Possible field trip

Sunday, 28 June -- AM checkout

Tentative Costs:

Lodging: $19/person/night -- single occupancy
$29/night -- single occupancy

Meals: $18/day

NOTICES AND REQUESTS

HIGHLANDS BIOLOGICAL STATION

The Highlands Biological Station in southwestern North Carolina is an ideal facility for research on the rich spider fauna of the southern Appalachians. Located on a high plateau of the southern Blue Ridge the station is conveniently situated for field studies in the Nantahala, Unicoi, Cowee, Balsam, and Great Smoky Mountains, as well as well as in the Blue Ridge itself and the adjacent Piedmont. The station's laboratories are well-equipped for research in systematics, ecology, and behavior. Comfortable housing is available on the site.

Recent work on spiders at Highlands includes studies of *Tetragnatha, Hypochilus, Wadotes*, and *Nesticus*. Other studies include

IN THIS ISSUE

AMERICAN ARACHNOLOGY is the official newsletter of the American Arachnological Society and is distributed twice a year to members of the society. Items for the newsletter should be sent to the editor, Brent D. Opell, Department of Biology, Virginia Tech, Blacksburg, Virginia 24061, U.S.A. (Bitnet address: Uloborid@VTVM1. Deadline for receipt of material for the fall issue is 10 September and for the spring issue 10 March. All correspondence concerning changes of address and information on membership in the American Arachnological Society should be addressed to the Society's membership secretary, Norman I. Platnick, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024, U.S.A. Members of the Society also receive the JOURNAL OF ARACHNOLOGY, which is published three times each year.

studies of biodiversity and the effects of timber harvesting on spider diversity. The Highlands Biological Station encourages bilogists with interests in spiders of the southern Appalachians to consider the Station as a base for field studies.

Grants-in-aid and research scholarships are available at both the pre- and post-doctoral level. For informatin, contact : Highlands Biological Station, P. O. Box 580, Highlands, North Carolina 28741; telephone 704-526-2602; FAX 704-526-2797.

NOMENCLATURAL NOTE

Opinion 1680: *Buthus vittatus* Say 1821 (currently *Centruroides vittatus*), *Centrurus hentzi* Banks, 1904 (currently *Centruroides hentzi*) and *Buthus vittatus* Guerin Meneville, [1838] (currenty *Bothriurus vittatus*) (Arachnida, Scorpionida): specific names conserved. Bulletin of Zoological Nomenclature, Vol. 49, part 2.

RECENT PUBLICATIONS

Invertebrates of Michigan, Volume 24, Number 1 of the Michigan Academician. This volume contains symposium papers on the Michigan invertebrates presented at the 1990 Annual Meeting of the Academy. One of the purposes of assembling this group of papers is to report on the current status of research on the taxonomic groupes covered. Literature citatins are typically included. The volume includes papers on spiders pseudoscorpions, opiliones, and water mites plus other invertebrate groups. It is available for $15.00 from: Michigan Academy of Science, Arts and Letters; Argus Building II, 400 South Fourth Street, Ann Arbor, Michigan 48109-4816, phone (313) 936-2938.

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ARTHROPODA SELECTA, a new Russian journal of research in Arthropoda is being launched. The scope of the journal is the morphology, taxonomy, development, life histories, geography, phylogeny, and evolution of Crustacea, Chelicerata, Myriapoda, and other arthropods, both recent and fossil. The journal is published mostly in English with extended Russian abstracts. The journal will be issued quarterly. Subscription rates for 1992 are $51.80 U.S., plus $2.00 postage and handling per issue ($59.80 per year total). Correspondence should be addressed to: Dr. K. G. Mikhailov and Dr. V. A. Spiridonov, Zoological Museum of Moscow Lomonosov State University, Hersen Street 6, 103009, Moscow, RUSSIA. Payment should be sent to: Account No. 653437-100087-787-KOB-1, Pierwszy Komercyjny BANC S.A., Lublin, POLAND, in care of Mikhail A. Kiriyshkin, the journal's publisher.

NEW MUSEUM CURATORS

Ann E. Mahler recently joined the staff of the Dallas Museum of Natural History and will create and curate a collection of mainly local arachnids for the museum. She is interested in receiving suggestions about the curation, storage, and cataloging, of arachnids and obtaining specimens from the Dallas area for the collection. Her address is: Invertebrates, Dallas Museum of Natural Hisroty, P.O. Box 150433, Dallas, TX 75315.

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Charles E. Griswold has moved to the California Academy of Sciences in San Francisco, where he has been appointed to the Schlinger Chair of Systematic Arachnology in the Entomology Department. All inquireis regarding Arachnida, Myriapoda, and Onycophora should now be addressed to him. The arachnid collection of the California Academy of Sciences, which includes the major part of the Exline-Peck collection, is one of the most important collections housed in North America, with in excess of 100,000 specimens from all over the world. Special strengths are collections from Africa, California, the Schlinger Chilean collection, and material collected during Ed Ross' many travels around the world.

Dr. Charles E. Griswold, Department of Entomology, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118; phone: (415) 750-7231, FAX: (415) 750-7106.

GUIDELINES FOR STUDENT PAPER AWARDS

From: **Petra Sierwald**, Insects, Zool., Field Museum of Natural History Roosevelt Rd at Lake Shore Dr., Chicago, IL 60605; Phone: (312) 922-9410, ext. 407 (office), (708) 524-4798 (home).

To: Members of the A A S

Dear AAS-member,

At the business meeting (16th AAS meeting at St. Anselm's College) a committee was formed with the goal to improve the Society's procedures for the student paper competition at each AAS-Meeting. This committee consists of:

Myself; Alan B. Cady, 4200 East University Blvd, Middletown, Ohio 45042; Leslie Bishop, Dept. of Biology, Earlham College, Richmond, Indiana 47374; Gail Stratton, Albion College, Albion, Michigan 49224; Jack Kaspar, 132 West 25th Ave, Oshkosh, Wisconsin 54901.

Please review the suggested evaluation criteria and procedure changes listed below. I will compile all input I get from members. The committee will discuss them, we will report our findings and forward our recommendations to the President-Elect (J.E. Carico, Lynchburg College, Lynchburg, VA 24501).

Thank you very much for your cooperation. The American Arachnological Society needs your input to remain a Society that serves its members and Arachnology. I am looking forward to receive your comments and suggestions. I wish you a successful 1992-1993 academic year and hope to see you at the 17th AAS-meeting.

Sincerely, Petra Sierwald

STUDENT PAPER COMPETITION: Suggestions for NEW PROCEDURES

Each year at the meeting, the President-Elect selects three judges, consisting of three Meeting participants, to judge the student papers. To improve the effectiveness of the three judges and to make the procedure more transparent to the student participants, the following suggestions are supplied for your consideration and review.

1) Should the three judges be selected before begin of the meeting? Should the prospective judges receive the Student-Paper Abstracts before the meeting? Should they receive information, whether it is a co-authored paper, for masters or Ph.D etc.? Each participant at a meeting should indicate on the registration form, whether he/she is willing to be one of the judges. This would only require an extra line on the registration form. However, the President-Elect would need this information. How do we avoid undue burden for the host? Suggested Procedure: The student receives blank and address of President-Elect from host; student completes form and mails one copy including Abstract to host and another copy including Abstract to President-Elect. President-Elect compiles and photocopies all abstracts and Information-sheets and mails them to judges before the meeting.

2) Should we formalize the criteria (see suggestions below) on which the judges should base their decision into discrete categories? This could be done by implementing a point system, where each category may receive a maximum number of points. Students may feel more comfortable with this method. How will we handle co-authored papers?

3) Criteria-categories and their evaluation. These are only suggestions. Input of any kind is welcome. Change everything!

Suggested criteria are listed on page 5. This sheet may be removed from the newsletter and sent to Petra with your comments.

A LIVING DEEP-SEA ARACHNID

BY: Jeffrey W. Shultz
Department of Biological Sciences
University of Cincinnati
Cincinnati, OH 45221-0006

Evidence from paleontology, comparative morphology and phylogenetic systematics suggests that arachnids invaded the terrestrial environment several times during the Paleozoic Era. Among modern forms, none appears to have retained the primitive marine lifestyle, although several terrestrial lineages have reinvaded the intertidal zone. As a consequence, advances in our understanding of arachnid terrestrialization seem to depend largely upon serendipitous discoveries of new fossils and speculations derived from comparative morphology and physiology of modern terrestrial forms. Remarkably, it now appears that arachnologists could one day examine a living marine arachnid. High-quality color photographs of an arachnid-like arthropod have been obtained in the course of a photographic survey of the benthic deep-sea fauna in a South Pacific polymetallic nodule field (Thiel & Schriever, 1989). This animal is no Gibbocellum; I believe

that it could well be the most important and exciting arachnological discovery of the century.

The four color photographs that accompany Thiel & Schriever's paper (there are apparently 20 in all) were taken at 4150 m near a platform baited with dead fish. The photos clearly show a pale arthropod that bears a startling resemblance to a long-legged spider. The body is composed of two tagmata joined by a narrow 'waist' or pedicel. The subtrianglular anterior "prosoma" is approximately 13 mm long and 10 mm wide; the oval "opisthosoma" is about 50 mm long and 20 mm wide. Theil & Schriever counted five pairs of appendages, and all appear to attach at the "prosoma". The first pair of appendages are somewhat shorter than the rest (about 10 mm) and may have up to 4 segments. These appendages (pedipalps?) can be observed protruding forward in one of the published photos, but the authors could not ascertain their precise function. The second appendages (leg 1?) are long, antenniform structures that the animal tends to hold vertically in the water column. The authors report that the "antennae" are apparently jointed, and one of these joints is bent in at least one of their photographs. The three appendages function as walking legs and appear to have three principal joints, although the authors could not discount the existence of others. They estimated that if the second pair of walking legs were stretched out, it would span 200 mm from tip to tip. The authors did not report chelicerae, but the photos were taken at some distance and chelicerae may have been too small to be observed.

Theil & Schriever's description strongly indicates that the enigmatic deep-sea arthropod is a hitherto unknown chelicerate; it is clearly not a pycnogonid and it bears no resemblance to any other known marine chelicerate, living or fossil. But it is remarkably similar to certain terrestrial chelicerates. Thiel & Schriever go so far as to place the animal within the Pedipalpi along with Amblypygi and Uropygi, a classification that they acknowledge as speculative. The tentative classification is based on the organization of the appendages. The first leg in pedipalpians is antenniform and leg pairs 2-4 are used for walking, but this arrangement is also present in Solifugae and, to some extent, Palpigradi. Furthermore, phylogenetic systematics and comparative morphology strongly suggest that pedipalpians are primitively terrestrial; their closest relatives (Araneae and Trigonotarbida) are also terrestrial and are characterized by the same type of aerial respiratory organs (two pairs of book lungs on the second and third opisthosomal somites). This reasoning does not preclude the possibility that these arachnids achieved terrestriality more than once, but such a scenario would require repeated convergence in a rather complex respiratory system and thus speaks against the idea that the enigmatic arthropod is a member of Pedipalpi. This is exactly the kind of question that an intensive morphological study of the animal might resolve.

If the enigmatic arthropod proves to be an arachnid, the implications are profound. Its general body plan is like that of many members of the supraordinal taxon Megoperculata, which includes spiders, whipscorpions and palpigrades. This suggests that the 'megoperculate grade' of organization was attained prior to the marine-to-terrestrial transition, just as the scorpionoid grade was apparently attained in the marine environment and inherited by terrestrial descendants. Even more than the fossil marine scorpions, the enigmatic arthropod has the potential to demonstrate the extent to which "terrestrial adaptations" (e.g., trichobothria, fluid feeding, Malpighian tubules, internalized respiratory lamellae) were achieved in the marine environment or, at the very least, it may establish how these features could have evolved from their primitive "marine-adapted" antecedants. Most importantly, the discovery of this animal provides an undreamed of opportunity to understand the biology of an organism whose kind was thought to have vanished hundred of millions of years ago.

Thiel H. and G. Schriever. 1989. The DISCOL enigmatic species: a deep-sea pedipalp? Senckenbergiana marit. 20:171-175.

Information-and-Judging-Sheet

Name of Student: _____

Co-Authors: _____

Title of Paper: _____

The research for the presentation was completed as /undergraduate-/ /masters-/ /Ph.D.-student/. The research was completed _____ years/months ago. (Circle one and fill in)

EVALUATION CRITERIA (number of points)

1) Title and Abstract (maximum of ...? (10?)

_____ Organization (maximum of ...? (5?)

_____ Clarity (maximum of ...? (5?) points)

2) Scientific Merit (maximum of ...? (50?) points)

_____ difficulty and scope of research problem (maximum of ...? (10?) points)

_____ approach and design of study (= collection of data?) (max. of ... ? points)

_____ details of analysis (maximum of ...? (10?) points)

_____ technical achievements (maximum of ...? (5?) points)

_____ soundness of conclusion (maximum of ...? (10) points)

_____ significance of results (maximum of ...? (5?) points)

3. Presentation (maximum of ...? (40?) points)

_____ organization of talk (maximum of ...? (12?) points)

_____ oral presentation skill; poise (maximum of ...? (6?) points)

_____ timing of talk (maximum of ...? (8?) points) etc.

_____ quality of visual aids (maximum of ...? (6?) points)

_____ response to questions (maximum of ...? (8)(points)

Additional comments:

Total number of points: 100

Points awarded _____

Total number of points by all three judges: _____

1992 A A S MEETING

From the 22nd to the 26th of June, members of the American Arachnological Society gathered on the peaceful campus of Saint Anselm College, located near Manchester, New Hampshire. The society's sixteenth annual meeting was hosted by Craig Hieber, who treated participants to three-and-one-half days of paper presentations interspersed with two evening socials and an outdoor clam bake. During the meeting 29 papers and five posters were presented on topics ranging from how spiders behave during a total solar eclipse, to the phylogenetic relationships of chelicerate orders based on molecular data, to methods for constructing scientific equipment from disposable 2-liter beverage containers. An informal evening session gave members a chance to show slides and videos of arachnids and their habitats and to learn about George Uetz and Craig Hieber's trend-setting research on the systematics of rubber and plastic spiders. Thanks to Craig for organizing a meeting that gave participants ample opportunities to renew and make new acquaintances and to learn about current research in arachnology.

STUDENT PAPER AWARDS

The award for best student paper was given to Peter Sherman, University of Michigan, for his paper entitled: The orb-web: An energetic and behavioral indicator of the foraging and reproductive behavior of the orb weaving spider *Nuctenea cornuta* (Araneidae). The second place award went to Cheryl Hayashi, for a paper coauthored with Ward Wheeler and Norman Platnick and entitled: Molecular phylogenetics of chelicerates with a special emphasis on basal araneomorphs.

FIELD TRIP REPORT

By: Dan Mott
Division of Natural Sciences
Dickinson State University
Dickinson, ND 58601

The 1992 AAS field trip began Saturday, June 27 from the beautiful campus of St. Anselm College. Under threatening skies, our intrepid bus driver/tour guide was located at the dorm, relocated to the cafeteria and, with only one small detour, delivered us to Rollins State Park, approximately one hour northwest of Manchester. On the way our driver/guide was quick to point out the many flea markets, rummage sales, and meadow muffin contests in addition to a recently famous women's state prison and even managed an occasional glimpse out the windshield.

Nearly 30 brave souls (and a few airline captives) then began the climb up beautiful Mt. Kearsarge. Not knowing the length of the climb, most did little collecting on the way up, but saved energy, lest the altitude prove too challenging. It was not actually too difficult as our ages ranged from 5 years (Master Hieber) to quite a bit older and all made the top (and bottom) without mishap. Many ate lunch at the top, accompanied by a breathtaking view and, as always, stimulating conversation. Shortly after noon the skies again turned threatening and a somewhat hasty decent began.

The Canadian contingent (Dondale, Redner, Charles, and Strazynski) did manage to collect some lycosids (*Pardosa* and *Trochosa* spp.) with the aid of their elegant aspirators. The Kaspars also got some more aerial specimens. Our three photographers (Levi, Rovner, and Warfel) were able to shoot a few arachnids and some outstanding angiosperms.

Although this trip did not produce untold numbers of specimens, it did show some interesting habitats and magnificent scenery and was well worth the effort.

ABSTRACTS

THE EFFECTS OF HURRICANE DISTURBANCE ON POPULATIONS OF *LEUCAUGE REGNYI* IN THE RAIN FOREST OF PUERTO RICO

Leslie Bishop, Department of Biology, Earlham College, Richmond, IN. 47374

In the rain forest of the Luquillo Mountains of Puerto Rico, the ecological community has recently been drastically altered by the disturbance of Hurricane Hugo (September, 1989). This major disturbance offers a prime opportunity for ecologists to study the dynamic quality of community structure - how species composition changes through time and how species recover. I have initiated a long-term study of the spider species *Leucauge regnyi* which was common and abundant before the hurricane and is

patchily so now. In this preliminary analysis, the following objectives will be addressed which will serve as a basis for repeated measurements as the forest recovers from hurricane disturbance: 1) to determine the prey type of *Leucauge regnyi* and 2) to compare the density of *Leucauge regnyi* and insect prey in habitats of varied disturbance levels.

RELATIONSHIPS BETWEEN MATURE DATE AND REPRODUCTIVE SUCCESS FOR A FIELD POPULATION OF *ACHEARANEA TEPIDARIORUM*

Alan B. Cady, Department of Zoology, Miami University-Middletown, Middletown, Ohio 45042

Timing of reproduction and maturation are vital considerations for survival of temperate arthropod populations. Not just proper synchronization of life events with the seasons is important to existence, but the specific time within a season maturity is attained may also impact fitness by influencing access to prey, mates, or protective and defensible microhabitats. An *Achaeranea tepidariorum* (Theridiidae) population was studied for three field seasons (April-October). Adult spiders and their egg sacs were weighed and spider lengths measured. Detailed website parameters and spider movements were also recorded. The spiders were surveyed at least twice daily, 3-5 days per week. The *A. tepidoriorum* maturing earlier in the season had significantly greater weights, egg sac weights, and body lengths than those maturing later. Spiders maturing earlier moved less than those which became adults later. Stepwise regression indicated the size of the web's main tangle best predicted the variables listed above. Where *A. tepidariorum* were added to an isolated cliff six times during a month, 5-10 at a time (total of 65 invading spiders), the original residents defended and maintained their websites while withstanding cold temperatures better than did the added spiders. The *A. tepidariorum* maturing earlier in the season (i.e. May, June) accrued advantages over those which attained adulthood later. Spiders maturing early could establish websites first, permitting construction of larger webs. Since spiders having larger main web tangles were heavier, longer, produced heavier egg sacs, and shifted websites fewer times, possession of a large web seemed to increase the capacity for gathering energy, thus boosting their reproductive output. Those spiders would also be first to reproduce. *A. Tepidoriorum* hatching early in the season would have all summer to grow, would be larger when overwintering, and also mature earliest the next spring. A cycle may exist where those spiders securing a website early have increased fitness. Is there a genetic component where cold-hardiness (which may be a function of size) or ability to reproduce early confers an advantage, or is it simply that "early spiders" happen to occupy the best and largest websites first, thus perpetuating the cycle?

CONVERSION OF 2-LITER BEVERAGE CONTAINERS TO PITFALL TRAPS

Alan B. Cady, Department of Zoology, Miami University-Middletown, Middletown, Ohio 45042

Tight budgets and shrinking buying power have impacted the ecological researcher. As a result, workers must use their imaginations and call upon less conventional resources to equip their labs and investigations. With some innovative thought, many readily available household items may be converted into scientific apparatus. The ubiquitous 2-liter polyethylene beverage bottle presents an opportunity for the creative investigator to collect data and also save money. With a few well-placed cuts and punches, these containers may be turned into a weather-resistant, fully functional pitfall trap. The trap has provisions for turning "off" or "on", and may easily be modified to collect certain sized specimens. The trap easily fits holes made by the standard posthole digging implement, and many common types of specimen cups fit inside the trap. A demonstration of trap fabrication will be given.

FEMALE RECEPTIVITY AND MATE CHOICE IN WOLF SPIDERS

Veronica M. Casebolt and George W. Uetz, Department of Biological Sciences, U. of Cincinnati, Cincinnati, Ohio 45221

Male spiders of *Schizocosa ocreata* are recognized by conspicuous tufts of bristles on their first pair of legs, which may influence mate choice. Males mature before females, thus early maturing females may have more potential mates and be more selective. Females of different ages were paired with intact or experimentally altered (tufts removed) males. Female receptivity varied with age: females mature <48 hrs showed less receptivity than those mature >3 wks, and females >3 wks demonstrated a preference for intact males. To ensure female response is due to the presence of tufts rather than differences in male courtship, experiments controlling male behavior are in progress. With recent evidence suggesting that some spiders (Salticidae, Lycosidae) respond to video images as if real, females were presented with videotaped males and live males. Females responded identically to video and live males, exhibiting the same behaviors and levels of receptivity. Future mate choice studies can therefore use video males in place of live males to control for male courtship behavior.

PRECOPULATORY GUARDING OF PENULTIMATE FEMALES AND POSSIBLE

NECTAR FEEDING BY MALE CRAB SPIDERS, *MISUMENOIDES FORMOSIPES*.

Gary N. Dodson (1) and Michael W. Beck (2), (1) Department of Biology, Ball State University, Muncie, Indiana 47306 (2) Department of Biological Science, Florida State University, Tallahassee, Florida 32306

Guarding of penultimate females by males of the crab spider *Misumenoides* formosipes is expected on the basis of ecological factors and female reproductive anatomy. Experimental tests supported the prediction that males would cohabit with penultimate females longer than with either adult-virgin or once-mated females. Males took up residence under inflorescences occupied by penultimate females. Fights with intruders resulted in leg autotomization and could be lethal. Staged fights between equally- and differently-sized opponents were performed and logistic regression analyses revealed that proportional differences of 10% or greater in cephalothorax width influenced fight outcome, whereas body length and weight had no effect.

BIODIVERSITY OF GROUND-LAYER SPIDER ASSEMBLAGES FROM FOUR GEORGIA FLOODPLAIN HABITATS.

Michael L. Draney and D. A. Crossley, Jr., Department of Entomology, University of Georgia, Athens, GA 30602.

A one-year pitfall study was conducted to compare spider assemblages of four adjacent floodplain habitats which differ in the management regimes imposed on them. About 92 species of spiders form 16 families were trapped at the site. Spider abundance and species-richness was greater in habitats maintained by intermediate levels of disturbance (grassy field borders and no-tillage fields) than habitats maintained under high disturbance (conventional tillage fields) or low disturbance (forest) regimes. Linyphiidae dominated all assemblages in terms of numbers of individuals and species richness. Species-level diversity patterns showed no distinct between-habitat trends. The floodplain forest showed greater family-level spider diversity than any other habitat or all habitats combined. This is largely due to higher family richness and less domination by Linyphiidae in the forest than in other habitats. Since many adaptive syndromes in spiders emerge at the family level, it is informative to examine spider biodiversity at this level.

HOW MANY SPECIES OF SPIDERS ON CAPE COD?

Robert L. Edwards, Box 505, Woods Hole, MA 02543

Using a non-parametric estimator, with data based on sampling 14 well defined microhabitats, the species richness of an upland area on Cape Cod is estimated to be 383 species. This compares favorably with actual collection data that suggests that approximately 400 species occur in the area.

ISLANDS IN A DESERT SEA: BIOGEOGRAPHY OF SPIDERS AND SCORPIONS IN TURKMENISTAN

Victor Fet, Department of Biological Sciences, Loyola University, New Orleans, LA 70118

A combination of lowland continental deserts and Mediterranean-type arid mountains in the Republic of Turkmenistan (Central Asia) provides an exciting biogeographical test site. Fauna of spiders (ca. 300 spp) and scorpions (6 spp.) was studied by the author in 1976-1987. Island scenarios for Kopetdagh Mountain range, which is sandwiched between Karakum (South Turan) and Iranian deserts, suggest that it served as a corridor/filter for spider dispersal west- and eastwards, during the Pleistocene transgressions of the early Caspian Sea. The list of common Palearctic spiders (e.g. spp. of *Teutana, Latrodectus, Agalenatea, Thomisus, Haplodrassus, Thanatus, Xysticus*) is complemented by European-Mediterranean species, Turanian desert elements (e.g. spp. of *Phyxioschaema, Stegodyphus, Minosia, Minosiella, Pterotricha, Artema, Mogrus*), and local (North Iranian) "island" endemics (e.g. spp. of *Cedicus, Dysdera, Hersiliola and Reveniola*). Scorpions (Buthidae) in Turkmenistan lack specific mountain forms but undergo desert (ancient?) speciation with psammophilous (*Pectinibuthus, Liobuthus, Anomalobuthus*) and peculiar salt lake shore (*Kraepelinia*) monotypic genera.

COOKING WITH SPIDERS: *CHEIRACANTHIUM*, GASS GRILLS, AND THE MAGLIOZZI EFFECT

Matthew H. Greenstone, (1) Biological Control of Insects Research Laboratory U.S.D.A., Agricultural Research Service, P.O. Box 7629, Columbia, Missouri 65205

Members of several families of wandering spiders build silken retreats for resting, molting, courtship, mating and oviposition. Retreats are often built within man-made structures, where they may be considered innocuous or a nuisance depending upon one's point of view. Rarely, however, they may pose a threat to life, limb and property. A case in point is the tendency of *Cheiracanthium*, and possibly other species, to spin in the venturis of backyard gas grills. The dense silk may allow enough of the fuel-air mixture to make it to the burner to sustain a flame, forcing the excess to back up and exit the opposite

end of the venturi. From there it migrates to the burner, where it ignites in a flash which travels back to the control panel and fuel tank. Eventually the fuel hose may burn and rupture, spraying burning gas over people, decks, and patios.

MOLECULAR PHYLOGENETICS OF CHELICERATES WITH A SPECIAL EMPHASIS ON BASAL ARANEOMORPHS

Cheryl Hayashi (1), Ward Wheeler (1), and Norman Platnick (2), (1) Department of Invertebrates, (2) Department of Entomology, American Museum of Natural History, Central Park West at 79th St., New York, NY 10024-5192

Results of a molecular study on the relationships of major chelicerate orders are presented. Exemplars of pycnogonids, xiphosurans, scorpions, uropygids, amblypygids, pseudoscorpions, solpugids, opilionids, acarines, and spiders were included in this study. Sequence from a 1000 base pair fragment of 18S ribosomal DNA from each taxon were subjected to cladistic analyses and compared to prior phylogenetic hypotheses. Non-araneae taxa were used as outgroups for a preliminary study on the relationships of basal araneomorphs. An analysis was performed with both molecular and morphological characters. This is part of a long term project on the phylogenetic relationships of spider families using DNA characters.

NEPHILA IN THE DESERT.

Linden Higgins, Department of Zoology, University of Texas at Austin, Austin Texas 78712

A population of the large, orb-weaving spider *Nephila clavipes* (Araneae: Tetragnathidae) was found in the desert of Tehuacan, Puebla, Mexico. This site is 1500 m above sea level, receives an average 30 cm rainfall annually, and is seasonally cool. Data from other sources indicate that this was once a more humid tropical environment. To describe the apparent physiological and behavioral adjustments that allowed survival in this environment, I present observations of foraging investment, foraging success, and prey types and sizes, with comparative data from populations in more typical, wet tropical locations. Additionally, data were collected concerning thermoregulatory behavior. Only large females in Tehuacan exhibited thermoregulatory behavior, having nonrandom orientation of the orb and apparently thermoregulatory postures on the orb. A simulation revealed that thermoregulating individuals intercepts less solar radiation than would non-thermoregulating individuals. The behavioral plasticity documented is probably vital for the survival of this relict population.

CONSPECIFICS AS CUES: A MECHANISM FOR WEB-SITE SELECTION IN THE LAMP-SHADE SPIDER *(HYPOCHILUS THORELLI)*.

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

Sericophily is the behavior of following silk threads laid down by other spiders, and may be an important mechanism by which aggregations of web-building spiders form. The purpose of this study was to determine if conspecific attraction and sericophily are mechanisms responsible for the aggregated distribution of the lamp-shade spider, *Hypochilus thorelli* (Araneae: Hypochilidae). On two cliffs, half of the resident *H. thorelli* and their webs were removed. These spiders ("immigrants") were released onto the opposite cliff. All of these immigrants (n=37) settled next to, and attached their webs to spiders which had not been removed from the cliff. Various microhabitat variables (height, angle, substrate character, temperature and humidity) of randomly chosen sites and actual web-sites were compared. There were no detectable differences between web-sites and random sites. This supports the hypothesis that web-site choice by immigrating *Hypochilus* was based on the presence of conspecifics rather than physical features of the site. Web attachment indicates that the mechanism of site choice was sericophily.

SIGNALING IN MALE-MALE INTERACTIONS IN A COLONIAL SPIDER

David Kroeger and George W. Uetz, Department of Biological Sciences, University of Cincinnati, Cincinnati, Ohio 45221-006

Interactions between male *Metepeira incrassata* (Araneae, araneidae) over females were examined for the role of signaling in determining contest outcome. These interactions were stereotypical with seventy percent of interactions settled by threat behaviors. Signals were hypothesized to convey information about Resource Holding Power (RHP), or the ability to win contests. If this is true, we expect organisms with an advantage in RHP to signal more often. In the core, resident (i.e. resource holding) spiders were significantly larger than intruders and, therefore, have an advantage in RHP. On the periphery, intruders were often larger than residents. Residents were more likely to signal first in the core, but intruders were more likely to signal first on the periphery. Also, winning spiders signaled more times per interaction than losing spiders. In addition, when interactions were settled by signalling alone, losers were more likely to retreat following a threat signal by the winner. These observations support the hypothesis given.

EXAMINATION OF STRIDULATORY STRUCTURES OF SEVENTEEN SPECIES OF *MICRATHENA* AND ONE SPECIES OF *CHAETACIS* WITH NOTES ON ACOUSATIC RECORDINGS OF *M. GRACILIS* STRIDULATION

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Stridulatory structures on booklung covers and IV trochanters of seventeen species of *Micrathena* and one species of *Chaetacis* were examined by SEM. Four of seven species examined species of Kirbyi group of *Micrathena* did not have stridulatory structures: ridged booklung covers and satae with enlarged basal areas. Triangularispinosa, Spinosa, and Militaris group species did not have stridulatory structures. Militaris group males, not females, had folded and wrinkled booklung covers. All other species, males and females of a species had similar booklung covers and IV trochanters. Immatures had fewer ridges but with similar ridge spacing as adults. Gracilis group had booklung covers with variable ridge spacing. Whole specimen examination showed enlarged setal bases on the IV trochanter proximal medial surface function as plectra. Acoustical recordings of live *M. gracilis* stridulation were of 8-20kHz.

KLEPTOPARASITES - A TWO-FOLD COST FOR COLONIAL WEB-BUILDING SPIDERS

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Several *Argyrodes* species are found in colonial spider webs of *Metepeira incrassata* (from Mexico), where they steal prey and/or prey upon juvenile or molting host spiders. Census data taken over a range of *Metepeira* colony sizes determined that *Argyrodes* become increasingly prevalent as colony size increases, but are rare in small colonies (<10 host spiders). However, *Argyrodes* load per host spider decreases with increasing colony size, suggesting a "dilution effect". Additionally, in large colonies, *Argyrodes* are found mostly on the periphery, and individual *M. incressata* have a reduced risk of attack if located in the central core of the colony. While previous studies have suggested that kleptoparasite burden is a cost of group living for communal spiders, in *Metepeira incrassata* colonies the fitness cost incurred by cohabitating *Argyrodes* may be due to both predatory and kleptoparasitic behavior.

THE EFFECT OF WEB ARCHITECTURE AND PHYLOGENETIC POSITION ON THE STICKINESS OF CRIBELLAR PREY CAPTURE THREADS IN THE SPIDER FAMILY ULOBORIDAE

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The stickiness of cribellar threads spun by adult female uloborids was measured. This included two species of the triangle-web genus *Hyptiotes*, two species of the simple-web genus *Miagrammopes*, and one species each of five orb-web genera. Relative to spider live weight, the cribellar thread stickiness of orb-weavers is less than that of triangle-weavers, which is less than that of simple-web-weavers. A transformational analysis of orb-web species shows a phylogenetic trend toward the reduction of thread stickiness. When the weight-specific number of cribellar spinning spigots of these species are compared, orb-weavers have the fewest spigots and simple-web-weavers the most. A transformational analysis of orb-weavers shows a trend toward reduction in the weight-specific number of spinning spigots. Although the relationship between cribellum features and cribellar thread properties is complex, reduction in spinning spigot number results in reduced cribellar thread stickiness.

THE INFLUENCE OF WEB-MONITORING TACTICS ON THE DENSITY OF MITOCHONDRIA IN LEG MUSCLES OF THE SPIDER FAMILY ULOBORIDAE

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From electron micrographs we determined the ratio of mitochondrial to myofibril cross sectional area in cells of the first leg anterior depressor muscles of adult females of four spider species, each from a different genus. Species with more active web-monitoring tactics and greater trachael supplies to their first legs have muscle cells that are better supplied with mitochondria than those with less active tactics and less well developed trachael systems. These results demonstrate that, even in homologous tissues of closely related species, mitochondrial supply can change to accommodate changes in metabolic activity.

SENSORY ECOLOGY OF FORAGING AND COURTSHIP BEHAVIOR IN LYCOSIDS.

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Prey detection and courtship displays in wolf spiders use the same sensory channels. By analyzing the importance of different sensory cues in foraging, it is possible to distinguish how perceptual biases shape foraging decisions and patterns. A prey searching mechanism may predispose a species toward a particular mate-recognition system. Foraging patterns as measured by foraging patch visitation rates and durations differ with age and sex as a result of differential energy requirements between groups. Foraging pattern differences and perceptual biases are compared between the lycosids *S. ocreata* and *S. roverni*. Duration and frequency of patch visitation as well as visual and vibratory biases are measured in an artificial foraging patch for 1 h trials using crickets as stimuli. The apparatus is four chambered consisting of one of the following: 1) control, no crickets, 2) visual and vibratory, 3) visual only 4) vibratory only. Preliminary observations suggest that *S. ocreata* has a visual foraging bias.

POSTERIOR MEDIAN AND POSTERIOR LATERAL EYES CAN MEDIATE COURTSHIP ONSET IN THE WOLF SPIDER *RABIDOSA RABIDA*

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After occlusion of one or more pairs of eyes, male *Rabidosa rabida* (Walckenaer) were exposed to the video image of a walking female. (Males were 50% less responsive to video playback than similarly treated females tested previously.) When responding, males oriented toward and/or approached the image; and some performed courtship display. In tests on four groups of males which had one pair of eyes occluded, several members of each group displayed courtship (unlike salticids, in which occluding one pair, the AME, prevents courtship). In tests involving four groups of males in which all eyes except one pair occluded, courtship could be triggered via either the PME or the PLE. Apparently, courtship can be initiated in male *R. rabida* when an object of appropriate size, speed, and perhaps movement pattern enters the visual field of any one of the posterior eyes. However, this may not be true for all lycosids.

THE ORB-WEB: AN ENERGETIC AND BEHAVIORAL INDICATOR OF THE FORAGING AND REPRODUCTIVE BEHAVIOR OF THE ORB WEAVING SPIDER *NUCTENEA CORNUTA* (ARANEIDAE)

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Dimensions of consecutively built webs for individual orb-weavers vary in predictable patterns based upon prey availability, previous foraging experience, and reproductive output. Each night, orb-weaving spiders ingest and then replace their previously built orb web.

While basic design-patterns of webs built are constant and species specific, finer dimensions change predictably between webs for an individual. This study analyzes changes in web dimensions from a natural population *Nuctenea cornuta* (Araneidae) in New York. Three web dimensions (area of catching spiral, total thread length, and mean mesh size) were measured for web consecutively constructed before and after heavy prey consumption and egg production. It is suggested that foraging effort can be altered energetically by changing thread length or behaviorally by changing mesh size and/or web area.

CLADISTIC ANALYSIS OF SEVEN GENERA OF THE *PISAURA* GENUS-GROUP

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The phylogenetic relationship of the African genera *Charminus, Cispius, Afropisaura, Tetraqonophthalma, Perenethis,* and *Maypacius* is presented. The previously poorly known monotypic south east Asian genus *Polyboea* Thorell, is considered a close relative of *Maypacius* and thus has to be included in the monophyletic *Pisaura* genus-group. The genus *Perenethis* has several members in Asia. The genera *Perenethis, Maypacius* and *Polyboea* form a monophyletic subunit within the seven genera analyzed here. The analysis is based predominantly on characters of male and female copulatory organs, with the female organs showing a high amounto fo homoplasy.

MOLT-RELATED CHANGES IN THE AMPULLATE SILK GLANDS OF ARANEUS CAVATICUS (ARANEIDAE)

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Araneus cavaticus have three sets of ampullate silk glands of unequal size, each set consisting of one pair of major ampullate glands and one pair of minor ampullate glands. For most of a juvenile stadium (from immediately after ecdysis to about apolysis) only one set, the largest, is in use. We refer to the glands in this set as primary (1) ampullate glands; the other two sets are composed of secondary (2) ampullate glands. During proecdysis, 1 ampullate glands become nonfunctional and the task of producing ampullate silk fibers falls to one of the 2 sets of ampullate glands. In even-numbered juvenile stadia one set of 2 ampullate glands is funcitonal during proecdysis, while the other set is functional in

odd-numbered juvenile stadia. Some of the structures known as nubbins are formed as a result of this mechanism for producing ampullate fibers during proecdysis. Since no further molts occur once adulthood is attained, only the 1 ampullate glands are functional in adults.

BALLOONING: SPIDER LEGS AS CONTROL SURFACES

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Ballooning, the aerial displacement of a spider caused by friction between air and the spider with its silk, remains poorly understood as a mechanical process. The studies reported here provide insight into the mechanics of ballooning by way of experiments involving (1) stroboscopic measurement of the rates of fall of spiders slowed by known lengths of silk and (2) direct measurement of the drag generated by moving air at the surface of spiders as those spiders change their postures. The terminal velocities of spiders trailing silk, derived from their rates of fall at known distances from release, were remarkably variable. The variability could not be attributed entirely to silk length which in some cases was not even significantly correlated with terminal velocity. Drag measurements made on living spiders revealed that the variability in terminal velocities could be explained by variability in posture.

THE EFFECTS OF PROTEASE INHIBITORS ON THE ENZYMES OF *ARGIOPE AURANTIA*

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We have examined a series of commercially available protease inhibitors for their effects upon *Agriope aurantia* digestive fluid proteases as well as the proteases in homogenates of the whole abdomen of this species. The inhibitors included Antipain, APMSF, Aprotinin, Bestatin, Chymostatin, EDTA, Leupeptin, Pepstatin, Phosphoramidon, and Soybean Trypsin Inhibitor. These were assayed by radial diffusion analysis. None of the above inhibitors were observed to reduce the proteolytic activity of spider digestive fluid. Several of the inhibitors reduced, but did not completely inhibit, the proteolytic activity of abdominal homogenates. In addition, the hemolymph of *Limulus polyphemus* was observed to reduce the proteolytic activity of spider abdominal homogenates.

Our results suggest that spider abdominal homogenates contain proteases other than just those occurring in the digestive fluid but, as of this writing, perhaps the best way to reduce undesirable proteolytic activity is that of using a dissection medium with a reduced pH.

EARLY WARNING OF PREDATOR APPROACH IN COLONIAL SPIDER WEBS

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We test the hypothesis that colonial web-building spiders benefit from advance warning of predator approach through vibrations in the colony web. Previous studies have shown that although wasps attack more than one spider in a colony, capture success declines with colony size, and spiders in central positions have reduced risk. Field experiments using a predator-stimulating vibration source demonstrate that mean reaction distance increases with colony size, and that spiders in core positions react at greater distances than those on the periphery. The number of spiders responding to the stimulus also increased with colony size. Spider defensive and evasive behaviors varied with the position of a spider in the sequence of attack; evasive responses were more frequent later in the sequence. Response latency decreased over the attack sequence, and in some cases, spiders responded prior to contact.

These results support the "Early Warning" hypothesis.

BEHAVIOR OF ORB-WEAVING SPIDERS DURING A SOLAR ECLIPSE

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We studied the behavior of colonial *Metepeira incrassata* in tropical Veracruz, Mexico, during a total solar eclipse. Spiders were observed during the 3 hour period from beginning to end of occlusion. Spiders behaved in a manner typical of daily activity until totality, when many began taking down webs. Totality lasted 6 min., and most web takedown was not complete. After solar reappearance, most spiders that had begun taking down webs rebuilt them by filling in the portion removed - in a manner more typical of early morning web building than of web repair: constructing the missing radii, temporary