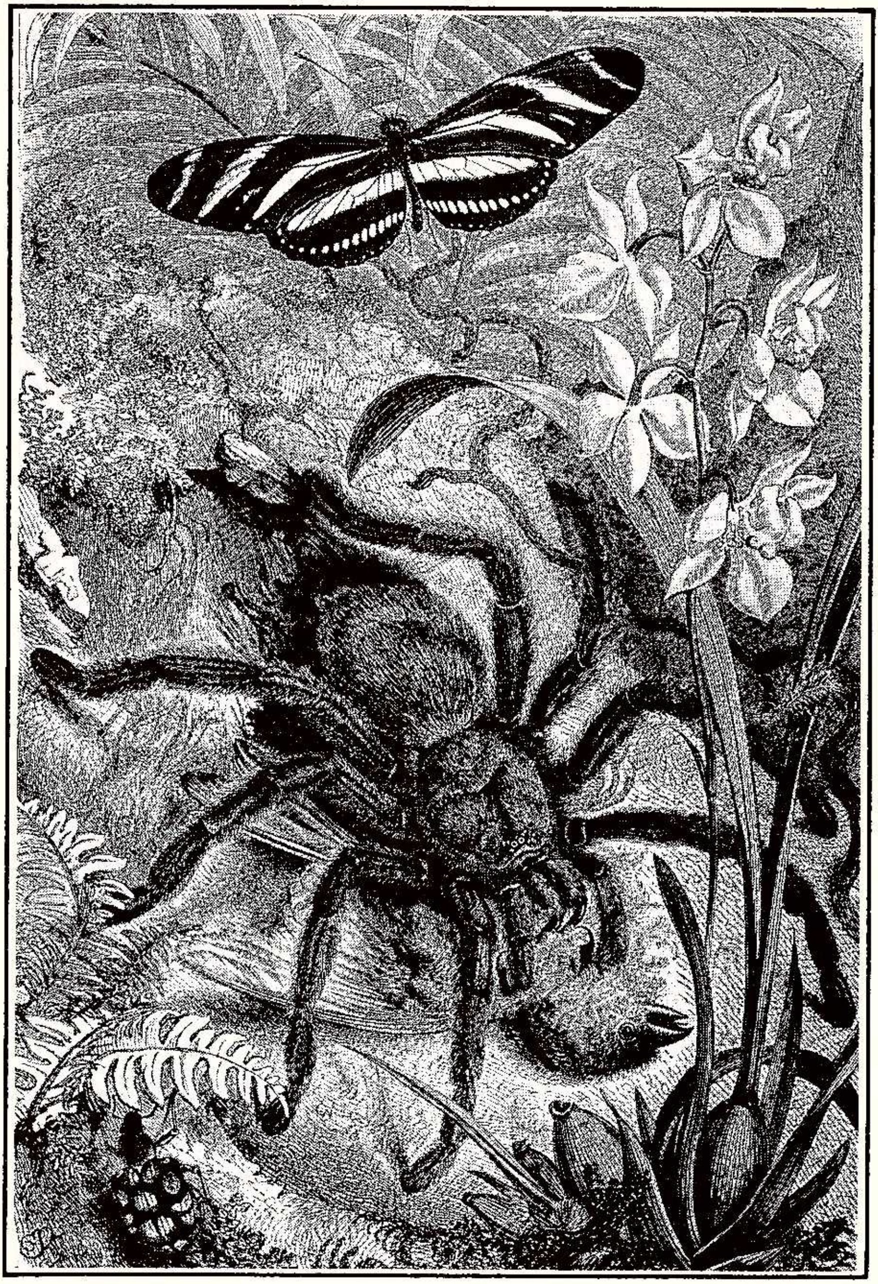
American Arachnology

The Newsletter of the American Arachnological Society



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AMERICAN ARACHNOLOGY #29

May, 1984

In this issue of AMERICAN ARACHNOLOGY:

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

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

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

1984 MEETING IN NEW ORLEANS

AMERICAN ARACHNOLOGICAL SOCIETY

International Convention--New Orleans, Louisiana--June 19-23, 1984

Preregistration: A registration fee of $26 for regular members, $16 for student members or $30 for nonmembers and a $20 housing deposit per person should be received by April 2. These are refundable in case of cancellation. A late fee of $5 will be charged after this date. Upon receiving the fee and deposit, the Host will send a receipt and confirmation of housing, in addition to a map of the area and last minute details.

Call for Papers: Abstracts should be received by May 1. The Abstract should be typed single spaced in a rectangle no larger than 4 inches high X 6 inches wide (10 x 15 cm). It should include the author's name but not address. You will be informed in mid-May of your place on the program. For those desiring a formal letter of invitation and/or acceptance of the Abstract, please contact the Host.

Transportation: New Orleans is accessible from air and road. Taxi fare from the airport to the campus is $18 ($6 each for 3 people). The Loyola University campus is conveniently located on the St. Charles streetcar line.

Registration: At Buddig Hall on the Loyola University campus-- Tuesday, June 19 (6PM-10PM) and Wednesday, June 20 (8AM- 10AM). Late night arrivals may go to the main desk at Buddig which will be manned 24 hours per day.

Sessions: To be held in Nunemaker Hall, Loyola University-- Wednesday, June 20 through Friday, June 22. Papers will be fifteen minutes in length. A 35 mm slide projector, 8 and 16 mm projectors and coffee will be available. Poster papers are welcome; please inform the Host when submitting your Abstract if you wish to give a poster paper.

Housing: Daily rates for Buddig Hall are: student members- $18 per person double occupancy and $30 for a single; regular members- $20 per person double occupancy and $30 for a single. Hide-a-away bed and linen is available for children for a one time charge of $10. Please, this is meant for families only. Rooms will be available for two nights after the meetings (June 24,25) for those wishing to stay for the World's Fair. This will cost an additional $5 per person per night. At registration you may make arrangements to extend your visit even longer.

Meals: Several restaurants can be found on campus and nearby.

Field Trips: Saturday, June 23 we will have a collecting trip at the F. Edward Hebert Center of Tulane University. This is a hardwood, bottomland forest complete with an impressive diversity and biomass of spiders. Sunday, June 24 a canoe trip in Honey Island Swamp can be arranged for those wishing to see cypress and bayous. This will cost about $18 per person. A nature walk to the same area can also be arranged for that Sunday. Cost would be about $6 per person. Final arrangements for the latter two trips will depend upon numbers of individuals interested.

Banquet: Thursday, June 21 a Louisiana style dinner featuring creole and cajun food. Local biologists will present a slide show on the diverse plant and animal life of Louisiana. Tickets are $11.50.

Roth Student Award: A $100 award will be given for the best student presentation.

Other Events: Evening socials (Wednesday night at the Christenson house, Tuesday and Friday nights at Buddig Hall); slide swap (bring your extras for trading); group photo; T-shirts (with appropriate design); and films (please volunteer films or submit requests).

Local Host: Terry Christenson Department of Psychology Tulane University New Orleans, Louisiana 70118. (504) 865-5331

PREREGISTRATION FORM: AMERICAN ARACHNOLOGICAL SOCIETY MEETING

NEW ORLEANS, LOUISIANA--- JUNE 19-23, 1984

In order to insure your housing, this form or a copy in addition to the registration fee and housing deposit should be received no later than April 2. A $5 late charge will be added after this date.

Name ______________________________

Address ______________________________

____

Registration fee:

Regular member	$ 26	=	$ ______
Student member	$ 16	=	$ ______
Nonmember	$ 30	=	$ ______

Housing Registration:

First night: June _____ Last night: June _____

Double occupancy:	Student member	$ 18 x _____	nights	=	$ ______
	Regular member/nonmember	$ 20 x _____	nights	=	$ ______
Single occupancy:	Student member	$ 30 x _____	nights	=	$ ______
	Regular member/nonmember	$ 30 x _____	nights	=	$ ______
Hide-a-away bed and linen (families only)		$ 10 x _____	children	=	$ ______

I wish to share a room with ______________________________

Indicate events in which you plan to participate:

Wednesday night social at Christenson house _____
Thursday evening banquet- $11.50 x _______ tickets = $ ______
Saturday morning collecting trip _____
Sunday morning canoe trip _____
Sunday morning nature walk _____

I would like information concerning:

Babysitters ______
Sightseeing ______
Other ______________________________

Amount Remitted:

Registration fee (refundable at cancellation)	=	$ ______
Housing deposit ($ 20 per person; also refundable)	=	$ ______
Housing (can be paid at registration)	=	$ ______
Banquet (can be paid at registration)	=	$ ______
Total	=	$ ______

Make check payable to: American Arachnological Society and send to Terry Christenson Department of Psychology Tulane University New Orleans, Louisiana 70118

REPORTS ON ONGOING RESEARCH

Recently, we asked a number of active arachnological researchers to write a few pages for the newsletter on current activities in their laboratories. The contributions of those who responded are reprinted below. We hope that these brief accounts will help members of the society keep abreast of forthcoming developments in the field. It's a way of making the newsletter more "newsy!"

Before going on to my research, I should say that at long last, the manuscript of our multi-author book, "Spiders: Webs, Behavior, and Evolution," has gone to the publisher (Stanford University Press) and should appear at your bookstore in 10 months.

My research seems to be in a state of permanent flux. Arachnids continue to occupy my attention, specifically opilionids. I have in rough manuscript a cladistic analysis of the Family Ischyropsalididae, which I now believe to be the most primitive "Palpatores." The paper will include a description of a new monotypic genus from Idaho and Washington which appears to have the tergite over legs III not incorporated into the cephalothorax. Also in preparation is a description of a unique family of cyphophthalmids from a cave in East Africa. Somewhat farther in the future lies work on the oncopodids, an advanced "Laniatores" family from the tropics of Asia.

Millipeds have crept in again. In press at "Myriapodology," our companion journal, is a description of a new Macromastus (Conotylidae) from a lava tube. As I finish yet another paper on the Mexican cave fauna, the urge arises to revise the family Rhachodesmidae, the Blue Millipeds. This highly unusual family is endemic to Mexico and Central America, and may eventually include 150-200 species. Some of them really are blue. Why blue? This would be a major question about the group; there is no record I know of that cites blue as an aposematic color--and the rhachodesmids, in any case, seem unable or unwilling to discharge a secretion as most polydesmoids do.

And, of course, the Gilboa fossils. Now supported by grants from NSF and the Jeffress Trust, I am studying the fossils with a Nomarski Interference Contrast microscope. New material just digested from the rock a few months ago includes evidence of a second trigonotarbid genus, real spiders, different centipeds, and at least one more species of exquisitely preserved mite. Our preliminary report will appear very soon in the pages of "Science." This work is being done in collaboration with paleobotanists Doug GRIERSON and Pat BONAMO of SUNY/Binghamton. Roy NORTON is our "mite man."

This term I have enjoyed teaching a seminar based on Lynn MARGULIS' wonderful book, "Symbiosis in Cell Evolution." Having tracked this line of research over the years, it is exciting to see it winning almost universal acceptance. Last spring I attended a Chautauqua run by Lynn and her students at Mt. Holyoke College, and I am hoping to be accepted for a laboratory short course in the subject at the Woods Hole Marine Biological Laboratory this summer--which is why you may not see me at New Orleans (can't afford both). Will I switch my research now to termite gut ecosystems, or microbial mats? Hmmmmm....

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Having just finished a revision of the African funnel-web mygalomorph spider genus Allothele (Dipluridae), I am resuming my nearly completed revisionary study of the related genus Euagrus. Erroneously assigned to Euagrus by some authors, Allothele species have, like Euagrus, male leg II mating claspers, but the females have a pair of long, distinctively hair-lined spermathecal trunks (with each trunk usually terminating in two spermathecal bulbs in such a way that the whole affairs often looks amusingly like a pair of hairy human legs). Euagrus, which will consist of about 15 species at the conclusion of my study, ranges from Arizona and Texas south to Costa Rica and is the most abundant mygalomorph spider genus in Mexico. Fortunately, I am finding that spermathecal form, if carefully examined, is a more useful species-diagnostic character in Euagrus than it is in the antrodiaetid genera that I have revised. Male mating clasper form and palpal form allow easy diagnosis of all Euagrus species. For this and other reasons, as I pointed out in a paper I presented at the arachnological congress last summer, this genus appears well suited for testing hypotheses (including Bill EBERHARD's sexual selection by female choice hypothesis) regarding the functions of species-specific male mating structures.

Small non-taxonomic projects on the biology of two primitive spiders are also in progress. Last fall I observed and photographed several Mictohexura montivaga matings with a stereomicroscope and will soon prepare drawings and a description of that process (the male tibia I claspers always grip the base of the female's pedipalps). Additionally I am analyzing the results of a year-long study of a dense population of Hypochilus thorelli in the Great Smoky Mountains National Park. The data confirm Ian FERGUSON's hypothesis that this species takes two years to develop from egg to maturity. The data also show that adults do not survive for more than one breeding season. In addition, I have found that, although adult male body size (cephalothorax length and tibia I length) in this population is highly variable, palpal dimensions are significantly less variable. I'll probably present these results at the New Orleans meetings this summer.

My next taxonomic project will be revisions of both the American genus Ischnothele and the Old World genus Thelechoris, two diplurid genera in the same subfamily as Euagrus which spin voluminous entrapment webs with their impressively long spinnerets. I collected many Ischnothele specimens during my recent Mexican and Costa Rican trips and have examined enough material in these genera from South America and Africa to see that they each contain about as many species as Euagrus. I would appreciate receiving loans of these genera from anyone who may have them in their personal collections.

Jackie PALMER is busy in both my lab and Rick HARRISON's lab finishing her M.S. thesis study of the histochemistry and anatomy of the silk production system of Euagrus. Additionally, she and Rick are looking at Microhexura silk glands. (Jackie will continue her comparative study of silk production systems this fall at Harvard with Herb LEVI.) Robb BENNETT is finishing his manuscript on the taxonomy and natural history of Cicurina bryantae and is cranking out a series of excellent drawings of palpal characters and epigyna for his M.S. thesis revision of the agelenid genus Wadotes. He hopes to present a phylogeny of Wadotes species (based on a study of male characters) at the New Orleans meetings.

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The order Schizomida includes 74 New World and 50 Old World extant described species, four of which belong to the New World family Protoschizomidae, and the remainder to the Schizomidae. The systematics of the order is presently being studied by James R. REDDELL, Texas Memorian Museum, University of Texas, Austin, Texas, in collaboration with James C. COKENDOLPHER, Texas Tech University, Lubbock, Texas.

Since the revision of the New World Schizomida by ROWLAND and REDDELL (1979-1981) a few previously unavailable types and extensive new collections from this region have become available for study. Approximately 25 new species are now known from the West Indies, Mexico, Costa Rica, Panama, Colombia, Surinam, and Ecuador. In addition, extensive berlese samples and other material from these same regions have yielded valuable information on variation and on the distribution of both described and undescribed species. Once the description of the new material is published it should be possible to discuss in some detail the zoogeography and phylogeny of the New World fauna. Papers now in press or nearing completion include the description of a new troglobitic (cave-adapted) Schizomus from Ecuador; a description of the male of Schizomus sbordonii (Brignoli) from Mexico; a revision of the family Protoschizomidae (including descriptions of new species and the first description of the female spermathecae for the family); new species and records of Schizomus from Mexico; redescriptions of three species described by Remy (the types of which were not earlier available), and description of new species from Surinam; and new species of Schizomus from Panama and Costa Rica.

It has become apparent that a true understanding of the phylogeny and zooegography of the order cannot be had until the Old World fauna is better known. The female genitalia of only one Old World species has been described and the types of most species, including the type-species of the genera, remain to be restudied. A redescription of Trithyreus grassii (Thorell) based on a study of the holotype, and a description of the spermathecae of Megaschizomus mossambicus (Lawrence) is now in press and verifies the distinctness of the genus Trithyreus from Schizomus. A redescription of Schizomus crassicaudatus (O. P.-Cambridge), the type-species of Schizomus, is nearing completion. Other studies now in progress on the Old World fauna include a redescription of the types of Trithyreus claviger Hansen, description of several new species from Malaysia and Thailand, description of new species from Micronesia, and description of a new species from the Hawaiian Islands which appears to be closely related to the Micronesian fauna.

Also nearing completion is a checklist and bibliography of the order Schizomida which includes all published records, the museum location of all specimens (so far as it can be determined from the literature or through correspondence with curators), and a summary of information on habitat, behavior, etc.

The study of the Old World fauna, though only beginning, has already indicated that the order is more diverse than was previously believed and that probably it will be possible to recognize several genera among the species presently placed in Schizomus. The difficulty, as in most poorly-studied and little-collected groups, remains that of recognition of many of the older species described on the basis of females or immatures, and the types of which are lost or are in poor condition. Nevertheless, it is believed that the recent emphasis on soil fauna and the increased use of berlese and other collecting techniques will allow the accumulation of enought material to make possible an understanding of the phylogeny and zoogeography of the world schizomid fauna.

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James REDDELL
(Address above)

I plan to revise noncribellate orb-weavers of the neotropics, and am just finishing work on the first group of genera: Micrathena and Chaetacis. Next I will study Chrysometa (a metid), followed by "Araneus", Parawixia, Neosconella and related genera. My aim is to make it possible to determine species and to find out which genera are related.

The problems to be addressed in this revision are well illustrated by Micrathena species. Micrathena are common tropical, often colorful, diurnal orb-weavers found in woods. Of the 180 species of Micrathena listed in catalogs, only six were known from both females and males; 134 were known from females alone, 26 from males, and three from immatures. CHICKERING, in the 1960's, was able to match another four species. The problems for me to solve were the following: Whether or not it is possible to match males (lacking spines on the abdomen) with the very different looking females. Do juveniles have the same arrangement of spines as adults? Can one tell adults by the arrangement of spines, or must one examine genitalia, which had not been illustrated for most species cited in the literature? Are all the descriptions of new species distinct, or in part redescriptions of previously existing ones? Other questions concern the function of the spectacular spines on the abdomen: Are they a defense against predatory wasps, lizards or birds? And, finally, how does the genus fit into the evolutionary scheme of the Araneoidea? Are Micrathena really primitive Araneidae, as might be suggested by their inability to attack-wrap prey like other orb-weaving spiders?

After two and a half years of examining, illustrating, dissecting, measuring, mapping and labeling Micrathena, I think that I have answers to most of these questions. All will be on paper later this year (and published in 1985 or 1986). Once published, if the paper is any good, the answers to all the questions will appear obvious; only errors will stand out.

Thus, in early summer I can start on the next genus or group of genera, posing a different set of questions: Are there specialized (synapomorphic) characters that separate the metid genera from araneid and tetragnathid orb-weavers? Do the morphological differences in nephilid, metid, tetragnathid, and araneid orb-weavers match the behavioral differences found by W. EBERHARD, M. and B. ROBINSON and others?

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My research focuses on systematics of the spider family Uloboridae, but includes studies of the family's natural history, development, and behavior. I am currently completing a world-wide revision of the genus Miagrammopes and beginning studies of morphological changes that accompany reduction of the family's typical horizontal orb-web.

Miagrammopes is a pantropical genus, represented by approximately 50 species. Its members spin reduced webs consisting of either a single, horizontal capture thread or a nonsticky, horizontal resting thread from which one or several vertical or diagonal capture threads extend. While monitoring its web, a Miagrammopes tenses one or two of the capture threads with its first legs. When a prey item contacts a capture thread, the spider vigorously jerks the capture thread before anchoring and running down it to begin prey wrapping.

In addition to having the family's most reduced web form, Miagrammopes has the most highly modified cephalothorax. Its members are characterized by: 1. the absence of the four anterior eyes, 2. prominent posterior lateral eye tubercles, 3. unique lateral apodemes, 4. weakly sclerotized anterior lateral carapace margins, 5. anteriorly rather than ventrally directed chelicerae, and 6. a sternum that is divided between the second and third coxae by a weakly sclerotized transverse suture. A cladistic analysis of the genus shows that subsequent changes in such features as sternum width, eye curvature, length of thoracic region, posterior median eye separation, and lateral apodeme position play an important role in depicting intrageneric relationship. Within each of the eight species groups differences in male and female genitalia provide the most useful evidence for species identity.

Since coming to Virginia Tech, I have studied the life history, web production, and feeding of Hyptiotes. This temperate genus is the sister genus of Miagrammopes and shows similar, though much less extreme, carapace modifications. In the eastern United States and Canada it is represented only by Hyptiotes cavatus, whose vertical triangle-webs are commonly found in the lower branches of conifers. These webs consist of four radii between which about 14 cribellar strands extend. Like Miagrammopes, Hyptiotes tenses its web while waiting for prey and jerks the web when an insect contacts the web.

Within the last two years, insights from these systematic and natural history studies have combined to suggest that many characteristics of uloborids that spin reduced, vertical webs are modifications for effective use of these webs. I have begun to test corollaries of this hypothesis and have found that they support its premise and provide a fuller explanation of the family's diversity. This line of investigation began with a statistical analysis of 51 indices that describe the carapace shape and eye arrangement of 34 species representing each of the family's 18 genera. Indices that describe the anterior lateral carapace region were most important in explaining differences in carapace shape and most highly correlated with web type, thus supporting the hypothesis that carapace modification accompanies web reduction.

Two broad, nonexclusive hypotheses may explain this relationship. The first predicts that because reduced-web uloborids operate their snares by tugging on a single line rather than hanging beneath a hub as orb-weavers do, cephalothoracic changes should permit the legs to move more nearly parallel to the monitoring line. Additionally, leg article lengths and muscle insertions or mass should change to increase the force Hyptiotes can exert and the movement and speed of which Miagrammopes legs are capable. Because reduced-web uloborids are not protected by the hub of a web, but hang at or near the signal line's attachment to a twig, where they may be more vulnerable to predation, the second hypothesis predicts that their ventral visual capabilities should be well developed. As web reduction is accomplished by reduction or loss of the four anterior eyes (which my studies show provide most ventral vision in orb-weaver) these changes must be expressed in positional and optical changes in the four posterior eyes.

Although I have only begun to test these hypotheses, my studies show that both mechanical and visual changes accompany web reduction. Differences in cephalothorax musculature and in endosternite structure permit the first leg bases of reduced-web uloborids to move more nearly parallel to the midsaggital body plane. Comparison of the forces exerted by Hyptiotes cavatus and the orb-weaver Uloborus glomosus, both of which have similar web monitoring postures, shows that throughout development Hyptiotes cavatus, despite its smaller size, exerts significantly more force. With an undergraduate student I have compared the visual fields of a Miagrammopes and an orb-weaving uloborid and found that, despite loss of the anterior eyes, Miagrammopes has more extensive ventral vision. This is made possible by shifts in the visual axes of the eyes and by lens and retinal changes that expand the visual angles. I plan to continue these taxonomic, phylogenetic, and morphological studies of the Uloboridae in the hope that together they wll provide a clearer picture of the family's diversity.

Brent OPELL
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Currently, I am involved in three interrelated studies associated with respiratory energetics and physiology in spiders. The studies are at various levels of completion and deal with predictions or questions raised in the previous report (ANDERSON and PRESTWICH, 1982) describing respiratory gas exchange in spiders.

The project nearest completion involved investigation (in collaboration with K. N. PRESTWICH) of respiratory gas exchange and energetics of sustained running in the spider Brachypelma smithi (Theraphosidae). These large (up to 35 grams) and inoffensive spiders can run for long enough times (up to 10 minutes at speeds of 5 cm/second) to obtain steady-state measurements of oxygen consumption. Our results indicate these animals achieve maximal rates of O_2 consumption about eight times resting values. This measured factorial scope for aerobic respiration agrees with that predicted based on morphological analysis of their book-lungs. Other data extracted from these experiments will allow us to partition aerobic and anaerobic contributions in meeting the energetic demands of maximum physical activity and also to determine whether tarantulas are facultative endotherms during activity.

One curious result of this study concerned the variable patterns of active ventilation of the book-lungs of our experimental animals. Although earlier reports suggested that spiders do not ventilate their lungs, several experimental studies over the last ten years indicate the opposite. While we observed that running spiders did ventilate, only about half of resting did so. We suggested, as have others, that lack of ventilation in resting spiders is adaptive in reducing water loss from the respiratory system. This water loss may be significant, as we found decreases in body temperature of 1°C in running, (and ventilating) spiders, due in part to evaporation of water. As such, I am planning a series of experiments to establish the relationship between rates of metabolism, rates of ventilation, and evaporative water loss from respiratory surfaces.

The third project is in the "data analysis" stage and is concerned with the relationship between nest size and body weight in the atypid spider, Sphodros abboti. COYLE and SHEAR (1981) showed that differences in web size are a function of the size of the individual spider, at least in part. Since these unusual webs are involved in prey detection, knowledge of the allometric relationship between certain web dimensions and body size might provide insight on how demands for energy are met in these animals. I plan to compare these relationships with that describing rates of metabolism versus body size previously published for this species.

Literature Cited

Coyle, F. A. and W. A. Shear. 1981. Observations on the natural history of Sphodros abboti and Sphodros rufipes (Araneae, Atypidae), with evidence for a contact sex pheromone. J. Arachnol. 9:317-326.

Anderson, J. F. and K. N. Prestwich. 1982. Respiratory gas exchange in spiders. Physiol. Zool. 55:72-90.

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Perhaps I should first mention that I recently exited graduate school, and so have not yet accumulated a very long list of unfinished projects. (I'm working on it, though.) I'll also list my new address:

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Current Research.

1. Orb Weaver monophyly. A paper is in press evaluating the evidence for a sister-group relationship between Dinopoidea and Araneoidea. The answer seems to be that such a relationship does exist, based on both behavioral and morphological data. One implication is that the sheet and cob-webs of linyphiids and theridiids are derived with respect to araneids, not vice versa. Another implication is that the web form ancestral to the orb must be sought in the cribellate outgroups to the orb weavers, such as the dictynoid or amaurobioid families. Consequently, I would like to examine the spinning behavior and spinnerets of exemplar taxa to try to find the sister taxon to all orb weavers.

2. Homology of palpal sclerites in orb weavers. A further test of the above hypothesis involves independent character systems, such as genitalic morphology. The task is to establish the character states of the primitive orb weaver and araneoid palp, and to compare phylogenetic implications with those of behavior.

3. Orb weaving in Dinopis. If (1) is true, dinopids are orb weavers. A preliminary study of the building behavior of an unidentified dinopis species in Costa Rica disclosed the same behavioral synomorphies that defined orb weavers. An ongoing project is checking the behavior of other Dinopis species, as well as spinneret morphology.

4. Web building in Wendilgarda. This theridiosomatid genus spins an unusual web. Morphological characters suggest that the web evolved from something similar to that spun by Theridiosoma. I'm collecting observations trying to show how and where in the web building process changes occurred that allowed Wendilgarda to attach its web to moving water.

5. Generic revision of Theridiosomatidae. This work was essentially my Ph.D. thesis, I hope to get it into press soon. Future spinoffs from it will include quite a bit of taxonomy, specifically species-level revisions of each of the nine theridiosomatid genera known thus far. Four genera are new. One surprise is that by palp structure, the enigmatic araneoid genus Tecmessa is a theridiosomatid (the name Tecmessa is preoccupied and will have to be changed.) Another is that Maymena bruneti is also a theridiosomatid (various authors have pointed out this fact). M. bruneti will be included in a new genus of theridiosomatids, now known from caves in Brazil, Ecuador, Venezuela, Colombia, and Trinidad.