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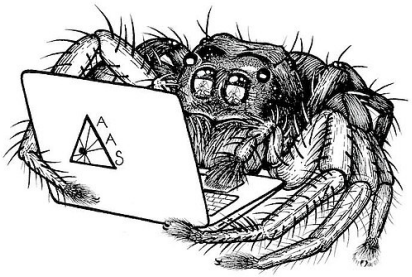
2021 American Arachnological Society Virtual Conference Report

Due to the continuing challenges of the COVID-19 pandemic, the AAS decided to host the 2nd ever virtual conference. The 2021 AAS virtual annual meeting was held June 24 – July 1, 2021. Registration for this meeting broke all past registration records for AAS meetings with 511 registrants from 21 different countries. This virtual meeting helped the society welcome participants from all continents except Antarctica. Registrants included not only professional arachnologists but also science communicators, biodiversity specialists, educators, paraprofessionals, and arachnid enthusiasts. The youngest registrant was 11 yrs old. This virtual meeting included 93 oral presentations; 45 poster presentations; a keynote address by Maydianne Andrade; and three plenary talks by Mercedes Burns, Ivan Magalhães, and Lauren Esposito.

The meeting also included some fabulous special events, workshops, and other activities including a Diversity, Equity, and Inclusion (DEI) panel discussion and workshop; a session where folks could ask about arachnids; a photography workshop; a virtual Bioblitz; a session about arachnid identification communities and resources; casual arachnid presentations; a photo and arachno-art contest; virtual happy hours; showing of the movie, "Sixteen Legs"; a viewing of the movie "Maratus"; and even an online auction. Attendees were also treated to an excellent lecture – "The Thief in the Web" – by Jillian Cowles, author of the book *Amazing Arachnids*.



This extraordinarily successful virtual conference was made possible thanks to the organizing committee headed by AAS past-president extraordinaire, Greta Binford, with help from Sarah Stellwagen, Brian Patrick, Rich Bradley, Catherine Scott, Sebastian Echeverri, Peter Midford, webmaster Daniel Gloor, and Zoom Master, Sydney Gelling.

Most of the presentations from the 2021 Virtual Conference can be viewed on the society YouTube channel at:

https://www.youtube.com/channel/UCJGFIn_r-2j6VRVREamUgKQ/featured

2021 Conference Presentation Winners

At every annual meeting, the President Elect of the society heads up a committee that judges oral and poster presentations by students. Given the unusually large number of participants in the 2021 virtual conference, the 2021 committee decided to split the paper competition into the two concurrent sessions resulting in three separate award categories: Posters, Track 1 talks, and Track 2 talks. In each category, a team of judges selected the top two presentations to receive awards. The first-place winners in each category received a $150 award and one year of free membership in the society. Second place winners received a $100 award and one year of free membership in the society.

In the Poster presentation category, judges considered 12 projects and after careful consideration, selected the following winners:

- First Place: Madeline Hannappel of the University of North Texas for "Mud Dauber Nests as Sources of Spiders in Mercury Monitoring Studies."
- Second Place: Tiffany Guth of Susquehanna University for "Landmark-guided T-maze learning in the wolf spider *Tigrosa helluo*."

In the Track 1 Paper category, judges considered 14 presentations, and selected the following:

- First place: Abel Corver of John Hopkins University for "Towards a computational ethology of web-making: quantifying movement sequences underlying stages of web-building in *Uloborus diversus*."
- Second place: Anna Holmquist of the University of California, Berkeley, for "The role of historical legacies in shaping spider communities across two mountain ranges in Sulawesi, Indonesia."

In the Track 2 Paper category, judges considered 12 projects and selected the following:

- First place: Tierney Bougie of San Diego State University for "Dynamics of hybridization in a complex unimodal hybrid zone between members of the *Habronattus americanus* subgroup (F. Salticidae)."
- Second place: Daniela Candia-Ramirez for "Diversity and evolution of a new genus of tiger rump tarantulas of southern Mexico and Central America (Araneae: Theraphosidae: Theraphosinae)."

The judges also recognized the excellent outreach presentation given by our youngest attendee, eleven year old very early career arachnologist and youngest conference attendee, Freddie Wolfe.



2021 AAS Virtual Conference first place presentation award winners Madeline Hannappel, Abel Cover, and Anna Holmquist (left to right).

Castianeira (Araneae, Corinnidae) in Kansas

By Hank Guarisco (hguarisco@fhsu.edu)

Introduction

The cosmopolitan hunting spider genus *Castianeira* Keyserling 1880 (Araneae: Corinnidae) is represented in Kansas by 10 species. Formerly a member of the family Clubionidae, this genus has been moved into the Corinnidae (Ubick and Richman 2005). The thin legs and swift movements of these denizens of forests, forest edge, and old field habitats give them the generalized appearance of ants. They are active hunters roaming through leaf litter and in trees and shrubs in search of prey. Several diurnal species within the genus that frequent more open, arid environments resemble mutillid wasps because of their bright orange coloration.

Scheffer (1904) recorded the first three species of *Castianeira* in Kansas: *Castianeira amoena* (C.L. Koch 1842) (listed as *Corinna ornata* Hentz), *Castianeira cingulata* (C.L. Koch 1841) (listed as *Castianeira bivittata* Keyserling), and *Castianeira longipalpa* (Hentz 1847) (listed as *Castianeira pinnata* Emerton). The following year, *Castianeira crocata* Hentz 1847 was reported from Riley and Wallace Counties, but the Wallace county record stills needs to be verified (Scheffer 1905). Natural history observations of five members of the genus in northeastern Kansas added three more species to the state fauna: *Castianeira descripta* (Hentz 1947), *Castianeira trilineata* (Hentz 1847), and *Castianeira variata* Gertsch 1942 (Fitch 1963). The latest generic revision of the North and Central American fauna includes Kansas records of some of the above-mentioned species (Reiskind 1969). More recently, *Castianeira alteranda* Gertsch 1942 was found near prairie dog towns in shortgrass prairie in Logan County (Guarisco et al. 2004).

Field work by the author has confirmed the presence of *C. crocata*, and revealed the existence of two additional members of the genus in Kansas: *Castianeira occidens* Reiskind 1969 and *Castianeira alata* Muma 1945. Important field characteristics are presented to aid in identifying these species within the state.

Species Accounts

Castianeira alata Muma 1945

This distinctively marked spider has often been confused with *C. longipalpa* and *C. variata* (Fig.1). The type series consists of 1M collected in mid-June, and 3F found in June, July, and October in houses and under leaf litter in Maryland (Muma 1945). Because it was not reported elsewhere, this species was considered to be an endemic with a limited distribution in Maryland (Reiskind 1969). This designation has undoubtedly discouraged other arachnologists from recognizing the species in areas far from the type locality. It was eventually discovered in West Virginia (Martinat and Jennings 1993), Illinois (Beatty 2002; Sierwald et al. 2005), and Mississippi (personal observation).

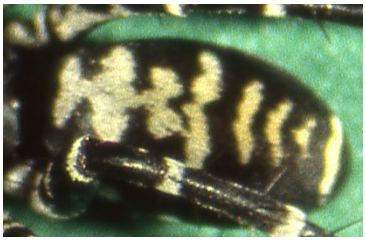


Fig. 1. Distinctive patterns of *C. alata* abdomen.

Castianeira alata is a common species found in the following counties in eastern Kansas: Douglas, Elk, Jefferson, Leavenworth, and Lyon. Winter is passed in the juvenile stage. They reach maturity in May and early June. On May 10, 2000, an adult male and a penultimate female were found near each other in leaf litter in open woods in Jefferson County. Adults of both sexes were observed during the summer. They occur in leaf litter in woods and at the edge of woods, and have been collected in flight intercept traps, pitfall traps, and in a bathroom sink.

Castianeira alteranda Gertsch 1942

Fig. 2. Brightly colored *C. alteranda*.

This brightly colored hunter has an orange body with four contrasting black bands, the first one not continuous (Fig. 2). The type specimens (MF) were collected in late May in Montana. According to Gertsch (1942), the general appearance and coloration is similar to *C. amoena*, and is best differentiated by its longer legs, 4th patella and tibia taken together exceeds the carapace length. It is a member of the shortgrass steppe ecosystem (Weeks 1997) and occurs in both grass and mixed grass habitats with shrubs (Weeks and Holtzer 2000).

In Kansas, it was first discovered in a pitfall trap inside a prairie dog town on the Nature Conservancy's Smoky Valley Ranch in Logan County on July 8, 2000 (Guarisco et al. 2004). An immature female was captured at Monument Rocks in Gove County during early September. These two Kansas records represent the southeastern edge of this species known range, which extends from southern Alberta and Saskatchewan, southward to Boulder County, Colorado (Dondale and Redner 1982; Reiskind 1969), and western Texas (Dean 2016).

Castianeira amoena (C.L. Koch 1842)

This species also has a brilliant, orange base coloration with approximately seven black bands, some incomplete (Fig. 3). In North Carolina, it is very active in woods and unfrequented places in July and August [reported as *Herpyllus ornatus*] (Hentz 1875). Adult females were found in July and September in Johnson and Pope Counties, Illinois (Beatty and Nelson 1979). This southeastern species ranges from eastern Nebraska to North Carolina southward to eastern Texas and Florida (Dean 2016; Reiskind 1969). *Castianeira amoena* is a diurnal species that may gain protection by resembling a mutillid wasp (Gaddy and Morse 1985).

Fig. 3. Markings of *C. amoena*.

In Kansas, there is an old record from limestone hills near Manhattan, Riley County (Scheffer 1904). On June 7, 1998, an immature female was discovered under a rock in open woods in Schermerhorn Park, Cherokee County. She shed twice in captivity before maturing later that summer.

Castianeira cingulata (C.L. Koch 1842)

This interesting, antlike species is dark chestnut and reddish brown with two thin white transverse bands, one about ¼ from the anterior end of the abdomen and the second almost across its middle. The legs have dark, thin stripes on the sides and top of the femora.

In Maine, it was collected from litter in red maple and white birch forests, and *Kalmia-Vaccinium* heath (Jennings and Graham 2007). In Massachusetts, it was found in recently logged hemlock stands, but not in untouched hemlock or hardwood forests (Sackett et al. 2011). On Beaver Island, Michigan, this species frequents leaf litter of mixed conifer-hardwood forests as well as beach debris along the shore (Drew 1967); while in Mississippi, it occurs in both *Juncus* and *Spartina* zones of tidal marshes (LaSalle 1984). It is the most common member of the genus in Connecticut. Males occur in July and August, females during the winter, spring and summer months. Four eggsacs collected in early April were flattened discs, 13.5 mm x 12 mm, and 2.4 mm high, and contained 22, 24, 24, and 30 orange eggs each. Juveniles resemble adults in color pattern (Kaston 1981). *Castianeira cingulata* resembles large carpenter ants (*Camponotus* sp.) in shape, pattern and behavior, and have been seen running with them (Montgomery 1909; Truman 1942). This species ranges from Ontario to Nova Scotia, southward to Kansas and Florida (Dondale and Redner 1982). It has been reported from: South Carolina (Gaddy and Morse 1985), the Georgia piedmont floodplain (Draney 1997), Arkansas (Dorris 1985), Missouri (Stirmaman et al. 1998), Mississippi (Dorris 1972); and Illinois, Indiana, Ohio, Wisconsin, and Michigan (Sierwald et al. 2005).

It occurs in leaf litter and beneath logs and rocks in oak-hickory forest in eastern Kansas (Fitch 1963), and was found in the following counties: Cherokee, Douglas, Jefferson, and Johnson. A penultimate female was taken on June 10, 1987 on the Fitch Natural History Reservation (FNHR) in Douglas County. An adult male was found in Shawnee Mission Park in Johnson County on June 29, 1985. On June 8, 1988, a female was discovered in leaf litter at the edge of woods on the FNHR. Five days later, a white eggsac with dimensions of 10 mm x 7 mm and containing 15 orange eggs, was constructed against the wall of the glass vial housing the spider. A female collected on June 20, produced an egg sac with 17 eggs the following day.

Castianeira crocata (Hentz 1847)

Excerpts of an early account of this species by the "father of American arachnology," Nicholas Marcellus Hentz, is very informative: "Piceous black, abdomen darker, with a saffron-colored band widening toward the apex, blackish beneath, …inhabits houses, hiding in cracks, under boards etc. It does not vary in marking, and is very well characterized." [reported as *Herpyllus crocatus*] (Hentz 1875).

Fig. 4. Close-up of abdomen of *C. crocata.*

This species has often been confused with *C. descripta*, which has a superficially similar abdominal pattern (Reiskind 1969). After examining Kansas specimens of both species, species-specific differences became apparent. In *C. crocata* females, the medial, abdominal, saffron-colored stripe usually begins just behind the brown dorsal sclerite and extends the length of the abdomen. The stripe is narrow anteriorly and becomes wider until it reaches its greatest width two-thirds to three-quarters toward the rear of the abdomen. After this point, it becomes narrow, or more rarely, remains the same width to the posterior end. In some specimens, the stripe begins two-thirds from the anterior end of the abdomen, and again either narrows or remains the same width posteriorly (Fig. 4). As suspected by Reiskind (1969) and confirmed by Breene et al. 1993), the conformation of the male palp is identical to the palp of *C. floridana* (Banks 1904).

This species ranges from southern New Jersey to Missouri, south to Texas (Reiskind 1969), Illinois and Indiana (Beatty 2002). In Kansas, *C. crocata* occurs in the following counties: Clark, Douglas, Jefferson, Johnson, Lincoln, Lyon, Meade, and Riley. There is an historic record from Wallace County that needs verification (Scheffer 1905). Several adult males from Kansas was taken in a pitfall traps in May and June.

A penultimate female was captured on May 12, 1988. Adult females were observed from the latter half of May through early August. On May 31, 1989, a female was collected from under corregated tin in a shrubby field on the FNHR in Douglas County. On June 4th, she produced an eggs sac, 13 mm in diameter that contained 47 eggs. Habitat includes open, deciduous forest and forest edge, shrubby fields, limestone outcrops and lawns.

Castianeira descripta (Hentz 1847)

This brightly-colored spider may be recognized by its medial, orange-red abdominal stripe, which is either the same width throughout or widens posteriorly, producing an orange-red wedge that extends onto the sides of the abdomen. The anterior half of this stripe encloses a wide, faint, dark central stripe (Fig. 5). Males also possess an orange stripe that widens toward the rear (Fig. 6).

It ranges throughout most of the eastern United States, westward into Wisconsin, Iowa, Kansas, Oklahoma and Texas (Reiskind 1969). *C. descripta* inhabits both grass and mixed grass with shrubs in shortgrass steppe ecosystems (Weeks and Holtzer 2000), and near playas in grassland of the Southern High Plains of Texas (Cokendolpher et al. 2008). It also occurs in post oak savanna with pasture, and in the following crops in Texas: cotton, peanuts, and sugarcane (Dean 2016).

Fig. 5 (left). Close-up of abdominal pattern of *C. descripta.* Fig. 6 (right). Male *C. descripta.*

In Kansas, this species was collected in the following counties: Chase, Meade, Montgomery, Saline, and Sherman. On July 15, 1993, an adult male was found on a gravel road above the dam at Elk City Lake in Montgomery County. A penultimate female was taken on the Air National Guard Bombing Range in Saline County on July 1, 2000. She matured one week later. Adult females were observed during July and August. Two adult females were found in August in Meade County (Fitch and Fitch 1966).

Castianeira longipalpa (Hentz 1847)

This species superficially resembles both *C. alata* and *C. variata* because it has a series of white abdominal bands. Kansas specimens may be recognized by having four, thin, white bands.

It is widely distributed across southern Canada, the eastern half of the United States, and the northwestern states of Washington, Oregon, Idaho, and Utah (Reiskind 1969). It has been collected in deciduous forests, forest edge, bogs, and hayfields under rocks in prairies, sagebrush, and a saltmarsh in Maine (Jennings and Graham 2007). In Texas, *C. longipalpa* was found in cabbage, cotton, and peanut crops, in pasture, post oak woods, sandy areas, and near playas (Dean 2016). Mating and reproduction has been investigated by Montgomery (1909), who found five eggs sacs, each containing 8, 8, 9, 9, and 9 eggs, respectively.

In Kansas, its occurrence was documented in Douglas, Ellsworth, Jefferson, and Riley Counties. Habitat includes oak-hickory forest and woodland edge (Fitch 1963). Males were found from June through early September. A female collected on June 15, 1989 on the FNHR in Douglas County produced an egg sac containing 17 eggs two days later. On December 3, 1989, a female was discovered guarding an egg sac containing 20 eggs in an old stone wall on the University of Kansas campus.

Castianeira occidens Reiskind 1969

This spider may be immediately recognized by the combination of a black carapace with a broad, white, central stripe that extends onto the anterior part of the abdomen, and a red-orange abdomen bordered by black (Fig. 7).

This striking species occurs from California to Utah, southward to Arizona, New Mexico, and northwestern Mexico (Reiskind 1969). Habitat includes coastal sage scrub in southern California (Prentice et al. 1998), the Chihauhuan Desert in the Trans-Pecos area of west Texas (Broussard and Horner 2006), and has been

Fig. 7. Habitus of *C. occidens*.

collected in grassland and mesquite, as well as in wooded mountains up to 8000 feet in elevation. One white egg sac reportedly contained 16 young (Reiskind 1969).

In Kansas, an adult male with a penultimate female were discovered under trash in a roadside gully five miles west of Attica in the Red Hills of Harper County on August 16, 1998.

Castianeira trilineata (Hentz 1847)

This species is characterized by a shiny, orange-amber carapace that is darker toward the edge, and a reddish-brown abdomen with two thin, pale bands followed by a shorter pale band. The amber-colored legs are not marked and become lighter distally.

This spider occurs throughout the eastern half of the US in leaf litter of open woods and forest edge habitats (Dondale and Redner 1982; Fitch 1963; Kaston 1981; Reiskind 1969; Sierwald et al. 2005). It has been found in the following counties in northeastern Kansas: Douglas, Franklin, Jefferson, and Leavenworth. Fitch (1963) noted: "in size, coloration, and behavior it resembles the carpenter ant, *Camponotus castaneus*." In Kansas, adults were seen during May, June, and July (Fitch 1963).

Castianeira variata Gertsch 1942

This species is distinguished by the striking preponderance of white setae on the carapace and abdomen of both sexes. Eight, thick, white bands cover most of the dark-colored abdomen. Additionally, it may be recognized by its unique behavior. Fitch (1963) named this species the "swaying ant spider" because of its "peculiar habit of pumping the abdomen up and down with a rhythmic, swaying motion."

It ranges from southern Ontario and Massachusetts to Louisiana and Kansas, and was taken in pitfall traps in tall grass and relict prairies (Dondale and Redner 1982).

In Kansas, it has been recorded in Douglas County, and frequents dry woods, sidewalks, buildings, wood piles and gravel roads (Fitch 1963). On June 14, 1988, a penultimate male was discovered on a Lawrence residence. Maturity is reach in late June, and adults may be encountered during the summer months.

Distinguishing Species within the Genus

Although making a definitive species determination requires the examination of the genitalia, many specimens may be recognized by their distinctive coloration and pattern. For example, *C. occidens* can be immediately distinguished by its broad, white stripe on the carapace and the predominantly red-orange abdomen.

Although both *C. descripta* and *C. crocata* have a black carapace and a black abdomen with a central orange-red stripe, they can be distinguished from each other by details mentioned in the species accounts.

Both *C. amoena* and *C. alteranda* have an orange carapace and abdomen. However, the abdomen of the former possesses nine, thin black bands, while that of the latter has four thicker black bands.

Both *C. cingulata* and *C. trilineata* have two thin pale bands on the anterior half of the abdomen, but the former has a dark chestnut blown-black carapace and dark brown stripes on the dorsal, prolateral and retrolateral surfaces of the first and second femora. However, *C. trilineata* has a shiny, orange-amber carapace, lacks femoral stripes, and has a short, pale, posterior abdominal band.

Three species, *C. alata*, *C. longipalpa*, and *C. variata*, have a series of white bands on a dark brown to black abdomen, and may be difficult to identify, especially if the specimen has been "rubbed" so that some of the white setae comprising the bands are missing. However, *C. alata* can be recognized by the distinctive shape and arrangement of approximately 8 bands - the first three or more being connected along the midline. Bands 4 to 7 are often in the shape of shallow, curved triangles, decreasing in width from the fourth to the

seventh. The last band is a thin straight line of white setae. The entire pattern is somewhat reminiscent of a Japanese pagoda.

In contrast, the abdomen of *C. variata* is densely covered with approximately 8 thick, straight, white bands; and the carapace is almost completely covered in white setae. Specimens of *C. longipalpa* are dark maroon to black with several, often indistinct, thin white bands on the abdomen. Others have reported four to eight thin, white, abdominal bands (Dondale and Redner 1982; Reiskind 1969).

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Assessing the Patterns and Drivers of Shape Complexity in the Amblypygid Pedipalp

By Callum McLean (callumjmclean@aol.com)

Amblypygid pedipalps are one of the most novel and interesting structures in the arachnid orders, taking a completely different form to other arachnid pedipalps. Compared to other orders, amblypygid pedipalps are relatively elongate and spinose, with perhaps the closest analogues being the raptorial forelimbs of praying mantis and some assassin bugs. They also are used in a wide array of tasks, most prominently in prey capture, but also in courtship display, territorial contest, drinking, and grooming. This naturally means that the pedipalps are under a number of selective pressures, including sexual selection via mate choice and functional selection for prey capture. The varying strengths of these selective pressure likely explains the vast array of pedipalp forms we see across amblypygid species, with pedipalps varying markedly in length, aspect ratio, spine arrangement and spine length across the order. Thus, being able to quantify pedipalp morphology across a range of amblypgyid species may help us to understand the selective pressures behind the development of this unique structure.

Accurately quantifying morphology can be tricky though, with descriptions and linear measures often missing key information on shape. One effective method of measuring shape is geometric morphometrics (GMM), which we used to quantify sexual shape dimorphism and size dependent shape change in *Damon variegatus* in a *Journal of Zoology* paper published in 2020. However, this method requires the placement of landmarks on homologous points, and with the homology of pedipalp spines across species not well understood we could not use this method to compare across species. Our answer was to use elliptical Fourier analysis (EFA), a method that uses an entire perimeter to quantify shape. This gives EFA some key advantages over GMM. Firstly, there is no need to define homologous landmarks, meaning it can be used in situations, such as ours, where homology is unclear or on shapes landmarks are hard to accurately define. Secondly, EFA gives you a more 'complete' view of a given shape, where GMM is limited to analyzing the differences in the position of pre-defined landmarks corresponding to key structures.

From this analysis, we highlighted a number of previously undocumented shape relationships in pedipalps across amblypygids. Chiefly, we found that pedipalp shape complexity decreases with increasing pedipalp length across species. Functionally, this means that species with longer pedipalps tend to have a thinner central shaft, and also have shorter and fewer spines. We interpret this as indication of a potential trade-off between investment in pedipalp total length, for use in sexual selection and territorial contest, and pedipalp spine length primarily for use in prey capture. Furthermore, females exhibit more complex pedipalp shapes than males across the group, potentially highlighting the pervasive pressures of display-based contest and courtship, and trophic niche partitioning. We also find intraspecific shape variation can exceed shape differences between species, thus, we advise caution when defining species on the basis of pedipalp characters. I encourage anyone interested further to read the full paper recently published in *Ecology and Evolution*, which is freely available for anyone to read, or to get in touch.

I would also like to thank the AAS for their role in this project and my other PhD work. This project was supported by an AAS student grant, which allowed me to access key specimens at the American Museum of Natural History and greatly improved the study. I also received funding to present some of my other PhD research at the 2019 AAS Annual Meeting. I hope that I can inform you of exciting new research in a future meeting or newsletter.

McLean, C., Garwood, R. and Brassey, C., 2021. Assessing the patterns and drivers of shape complexity in the amblypygid pedipalp. Ecology and evolution, 11(15), pp.10709-10719.

Bianarized images of pedipalps that were created for the study from pedipalp photographs. This figure shows the range of pedipalp shapes (normalized to equal length).

Euphrynichus bacillifer – one of several amblypygids used in the study.

Spider Maternal Care in the Fossil Record

By Paul Selden (paulselden@mac.com)

Maternal care is ubiquitous among spiders, and ranges from simple wrapping of eggs in a protective silken sac, through defense of spiderlings by the mother (e.g., lycosids carrying them on her back, pisaurids building a nursery web), to shared guarding in social spiders. Maternal care is also found in the closest living relatives of spiders, the Amblypygi, which suggests it is an ancient feature in Araneae.

A recent paper by Xiangbo Guo and his PhD advisers Paul Selden (Kansas) and Dong Ren (Beijing) describes a number of pieces of Burmese amber from the mid-Cretaceous (~99 Ma) of Myanmar which contain evidence of maternal care in the Lagonomegopidae. This family of spiders is known only from the Cretaceous, and its species are characterized by a pair of enlarged eyes situated at the anterolateral corners of the carapace. Together with body patterns formed by colored scales, lagonomegopids show a distinct resemblance to salticids, but are unrelated (they are sister to palpimanoids: Guo et al. 2021). Moreover, evidence of a tapetum in these large eyes (Park et al. 2019) show that they are not anterior median eyes, as in salticids, but likely posterior medians, and adapted for vision in dark conditions.

Among the pieces of Burmese amber is one which shows an adult female lagonomegopid clutching an egg sac. The eggs contain prelarvae. Three other pieces of amber contain many tiny, recently hatched, lagonomegopid spiderlings, identifiable by their large eyes. Adjacent to some groups of spiderlings are some adult lagonomegopid legs. The fact that the spiderlings have not dispersed is taken as evidence of maternal care for the young after hatching from the egg sac.

Even though spiders are thought to have shown maternal care throughout their history, physical evidence of its existence in the fossil record around 100 million years ago is delightful to see.

Literature Cited

Guo, X-B., Selden, P. A. & Ren, D. 2021. Maternal care in Mid-Cretaceous lagonomegopid spiders. *Proceedings of the Royal Society B: Biological Sciences* **288**: 20211279.

Guo, X-B., Selden, P. A. & Ren, D. 2021. New specimens from Mid-Cretaceous Myanmar amber illuminate the phylogenetic placement of Lagonomegopidae (Arachnida: Araneae). *Zoological Journal of the Linnean Society*.

Park, T-Y. S., Nam, K-S. & Selden, P. A. 2019. A diverse new spider (Araneae) fauna from the Jinju Formation, Cretaceous (Albian) of Korea. *Journal of Systematic Palaeontology* **17**: 1051–1077.

See the following for popular press coverage and images from this study:

https://www.sciencenews.org/article/oldest-fossil-evidence-amber-spider-mom-care-young?utm_source=email&utm_medium=email&utm_campaign=latest-newsletter-v2&utm_source=Latest_Headlines&utm_medium=email&utm_campaign=Latest_Headlines

AAS Election Results

This year, membership voted for President Elect, Treasurer, and Director. We had the best participation we have ever had with 43% of members participating in this election (195 ballots submitted). First, thanks very much to all the members who agreed to run for these open positions. The AAS is a very active society so agreeing to join the Executive Committee means agreeing to serve a very active role in maintaining the society and participating in society business.

Two AAS members agreed to run for President Elect: Michael Draney and Linda Rayor. The votes were neck-and-neck for these candidates but by a hairs' breadth, Linda Rayor will be our President Elect. She will serve in that capacity for two years, then as President of the society for two years, and then will become one of our three directors for two years.

Cara Shillington agreed to continue serving as our society Treasurer and 100% of those who voted approved and agreed that she should continue to serve in this capacity.

We had five AAS members who agreed to run for the open Director position: Kenny Chapin, Marc Milne, Daniel Proud, Sarah Rose, and Hannah Wood. This was also a close election. Hannah Wood won and will serve the society as one of our three Directors.

Norm Platnick Awardee

The Norman Platnick Award for Taxonomic Research honors the late Dr. Norman Platnick whose prowess and tenacity greatly advanced systematic research into spiders and other arachnids. The American Arachnological Society acknowledges the support of Dr Platnick's family in making this bequest. More information about this Award can be found at https://www.americanarachnology.org/society/awards/.

Nominees represent early career researchers who are members of the American Arachnological Society and who are no more than six years post-PhD. The award criteria are based on taxonomic or systematic publications dealing with non-mite arachnids that have been published or have been accepted for publication.

2021 represented the inaugural year for the presentation of the first Norman Platnick Award for Taxonomic Research. The review panel received three nominations for this award: Shahan Derkarabetian, Ivan Magalhães, and Jeremy Wilson. The committee recognized the significant contributions of all three early career scientists. The 2021 recipient of the Norman Platnick Award was Ivan Magalhães, Dr. Magalhães received his PhD in 2017 and has published 26 papers, including 19 as first author. He has described 53 new species. These publications include a 151-page monograph on the spider genus *Kukulkania* and a 130-page monograph on the phylogeny of the spider family Sicariidae, along with smaller publications on the morphology, phylogenomics, and phylogenetics of various spider taxa. The Panel was very impressed by the detailed observations of numerous

morphological features, along with papers devoted to the practice of taxonomy through the development of taxonomic tools. Congratulations to Dr. Magalhães!

Student Research Grant Winners

The AAS provides funding to support student research. The Arachnological Research Fund provides support for undergraduate or graduate student AAS members whose work relates to any aspect of the behavior, ecology, physiology, or evolution of any of the arachnid groups. The Vincent Roth Fund for Systematics Research supports students whose work focuses on the taxonomy or systematics of any arachnid group. More information about these grants can be found at:

https://www.americanarachnology.org/society/grants/research-grants/

The 2021 recipients of the Arachnological Research Fund grants are:

- Tahnee Ames, UG student, SUNY Syracuse. (Title: Palau Schizomida: island progression, taxon cycle, or neither?)
- Olivia Bauer-Nilsen, MS student, University of Cincinnati (Title: Eco-Immunology in spiders: how infected affects female assessment of male courtship in the brush-legged wolf spider, *Schizocosa ocreata* (Hentz))
- David Blumsack, UG student, University of Massachusetts Lowell (Title: Finding function in the non-spidroin proteins that comprise spider silk)
- Bruna Cassettari, PhD candidate, Universidade de São Paulo (Title: Male dimorphism in an Amazonian harvestman: Are there differences in genital morphology between morphs?)
- Irina Das Sarkar, PhD student, Wildlife Institute of India (Title: Spiders of the cold deserts of Trans-Himalayas: A case study from Spiti Valley of India)
- Laura Gatch, PhD student, University of Oklahoma (Title: Effects of *Latrodectus* juvenile social period on hunting and venom metering)
- Jake Godfrey, PhD candidate, Miami University Ohio (Title: Does sexual selection override the Pace of Life Syndrome?)
- Luis Carlos Hernández, PhD student, Center for Scientific Research and Higher Education at Ensenada (Title: Biogeography and macroevolution of the genus *Phidippus* (Araneae, Salticidae))
- Brigitte Jara Torres, UG student, Universidad de los Llanos (Title: Colour change in *Cyrtophora citricola* (Araneae: Araneidae))
- Sean Kelly, PhD student, San Diego State University (Title: Has introgression shaped the evolution of courtship phenotypes in the *Habronattus clypeatus* species group?)
- Pallabi Kundu, PhD student, University of Nebraska-Lincoln (Title: Characterizing the function of elongate sensory hairs in the arachnid order Solifugae (camel spiders))
- Mauro Martínez Villar, MS student, Universidad de la República (Title: Gain or loss of the nuptial gift? Behavioral and phylogenetic approaches in the spider genus *Trechaleoides* (Trechaleidae))
- Alexandra Miller, MS student, Eastern Michigan University (Title: Influence of subsociality on physiology and behavior in tarantulas (Theraphosidae: *Hysterocrates* spp.))
- Michael Monzon, MS student, Rutgers University (Title: Predation strategies of two spider species under total dark conditions)
- Gunnar Nystrom, PhD candidate, Florida State University (Title: Experimental evolution of antimicrobial peptides in giant desert hairy scorpion venoms)
- Kendra Perkins, MS student, Eastern Michigan University (Title: Influence of nutrient consumption on metabolic rate and growth trajectory in a sexually dimorphic tarantula (Theraphosidae: *Tliltocatl albopilosus* (Curly Hair Tarantula)))
- Dante Poy, PhD student, Museo Argentino de Ciencias Naturales (Title: Evolution of copulatory mechanics in spiders)

- Fabian Salgado Roa, PhD student, University of Melbourne (Title: The role of spider colour in prey attraction: experimental test in a tropical)
- Laura Segura-Hernández, PhD student, University of Nebraska-Lincoln (Title: Do abiotic and biotic cues affect the phoretic behavior of the small tropical ectotherm *Parachernes nevermanni* (Pseudoscorpiones: Chernetidae)?)

The 2021 recipients of the Vincent Roth Fund grants are:

- Benjamin Brenner-Gibson, MS student, San Diego State University (Title: Investigating cryptic diversity in *Bothriocyrtum californicum*)
- Erik Ciaccio, PhD student, University of Idaho (Title: Understanding the forces that generate diversity in poorly dispersing relictual lineages)
- Fabián García Oviedo, MS student, Museu Paraense Emílio Goeldi (Title: Taxonomic revision and distribution modeling of the spider genus *Falconina* Brignoli, 1985 (Araneae: Corinnidae))
- Mayara Magalhães, PhD student, Universidade Federal de Minas Gerais (Title: Systematics of *Paravulsor* (Xenoctenidae): testing biogeographic hypothesis with a Brazilian Atlantic Forest spider)
- Colby Sain, UG student, University of Tennessee (Title: Exploring the arachnid diversity of Mount Cameroon, an African biodiversity hotspot)
- Iara Silva, MS student, Universidade Federal do Piauí (Title: Systematics and taxonomy of Schizomida (Arachnida: Pedipalpi): evaluating the role of the male genitalia)
- Karina Silvestre Bringas, PhD student, University of Idaho (Title: Understanding the evolutionary history of the *Aphonopelma marxi* species group across the Madrean Archipelago "Sky Islands" biodiversity hotspot)

Herb Levi Memorial Fund for Arachnological Research (HLMFAR) grant winners

The Herb Levi Memorial Fund for Arachnological Research (HLMFAR) was established by the AAS in 2015 to honor Herb Levi and to support non-student AAS members (including post-docs) who receive little to no institutional support for their research programs. More information about this fund can be found at:

https://www.americanarachnology.org/society/grants/research-grants/

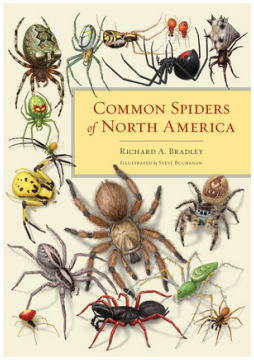
In 2021, the HLMFAR committee received 10 applications representing researchers from Argentina, Brazil, Mexico, Pakistan, Democratic Republic of the Congo, India, and Australia and was able to provide support to four of these applicants:

- David Chame Vazquez, postdoctoral scholar at the Instituto Politecnico Nacional, Mexico. Project Title: The genus *Plectreurys* Simon, 1893 (Araneae: Plectreuridae) in Northwest of Mexico.
- J. Cruz-Lopez, Permanent Researcher Level C, Forest Entomology, at the Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), Centro de Investigación Pacífico Sur, Campo Experimental Valles Centrales, Oaxaca, Mexico. Project Title: Systematics and biogeography of the selected genera *Prosontes* and *Guerrobunus* (Opiliones: Cosmetidae and Phalangodidae).
- Solimary Garcia Herandez, Associate researcher at the Instituto de Biociências, Universidade de São Paulo, Brasil. Project Title: Effect of food availability on the lifetime reproductive success of females in a wild population of a neotropical harvestman.
- Ana Munevar, postdoctoral scholar at Instituto de Biología subtropica, Argentina. Project Title: Discovering the hidden diversity of spiders in the southern Atlantic forest and the phylogenetic consequences of human land uses.

The AAS and the HLMFAR requests donations to support this grant program in order that the committee can provide additional support for projects from researchers in areas of the world where biodiversity surveys

are desperately needed and where researchers are poorly supported by their home institutions. See later in this newsletter for information on how to donate to the society.

Common Spiders of North America Report



In 2012, Richard Bradley and illustrator Steve Buchanan published the stunning field guide to North American spiders: *Common Spiders of North America*. This field guide is now available in hardcover, paperback, and E-book. The AAS, with the help of an incredibly generous anonymous donor, paid for the contributions of illustrator, Steve Buchanan, and, as a thank-you to the society for its support of this amazing resource, members of AAS receive a 30% discount on publication costs when they purchase copies through the University of California Press. The discount code is included in the letter members receive each year from our Membership Secretary, Brian Patrick. Information about this book can be found at:

https://www.americanarachnology.org/about-arachnids/publications/

Rich recently sent an update about sales of this field guide. To date, over 5,300 copies of the hardback version, over 3,200 copies of the paperback version, and over 550 (at least) versions of the E-version have been sold with total sales numbering over 10,000 copies! Congratulations to Rich and Steve for the success of *Common Spiders of North America*!

New Graduate Student Representative

The AAS Executive Committee includes a graduate student representative. The duties of the grad student representative include attending the Executive Committee (EC) meetings, providing input and feedback on issues impacting students, establishing communications with student society members, planning and coordinating social events for students at annual meetings, and assisting the EC and other AAS committees on an ad hoc basis.

Alexander Berry was our previous grad student representative and did a great job connecting students and early career scientists at past annual meetings and providing support for student needs. Alex had to step off the Executive Committee because he got a job! Alex is now an Assistant Professor of Biology at Buena Vista University in Iowa – congratulations, Dr. Berry and thank you for your work as our past Grad Student Rep!

Welcome to Ryan Jones, the new Graduate Student Representative on the AAS Executive Committee. Ryan is a PhD student in Paula Cushing's lab and is based out of the University of Colorado, Denver campus. He is working on solifuges and is excited to participate in the governance of the AAS. Ryan can be contacted at richjones327@gmail.com. Ryan welcomes input from students at all stages of their careers. Please reach out to Ryan about your needs, concerns, or suggestions!

Tribute to Don Cameron

On July 17, 2021, the AAS lost long time member and friend to all, Dr. H. Don Cameron. The following tribute to Don is compiled from the University of Michigan site by his colleague and friend, Dr. Ben Fortson, as well as from remembrances of many of Don's friends in the AAS. Don was born on August 8, 1934 in Michigan and spent most of his academic career at the

University of Michigan. Don's background included mathematics and classics. Dr. Fortson wrote in his wonderful tribute to Don:

> "Of central importance to Don were the twin joys of amassing an eclectic body of knowledge that was as broad as it was deep, and sharing both the knowledge and the joy as an inseparable whole, like the two halves of Aristophanes' mythical proto-humans before they were rent asunder. The number of subjects that Don knew in great depth seemed endless, and attached to each one of them was a raft of often humorous anecdotes about people and events. He carried his learning lightly, yet also with a certain aplomb; he fooled no one when he called himself "a bear with very little brain," and there was no missing his profound erudition. There are those who say that knowledge is power; but for Don, knowledge was something much more important: fun. And the pursuit of knowledge was even funner (a solecism he would have chuckled at), and fun was meant to be enjoyed liberally with any and all. Of all the colleagues with whom I have shared my ideas or discoveries, Don was the only one who greeted one of them with a roar of laughter—of delight at the discovery and at the thought-process as I finished outlining it for him and came to the punchline. Of course, there are many among us academics who find it fun to know things and teach them to others, but few of us also have the background in performance (he was a seasoned singer and actor on stage) combined with preternatural gifts of wit leavened with avuncular charm to turn the act of sharing knowledge into something mesmerizing that sticks in the mind for years rather than remaining an ephemeral flash of light that presently fades. The dozens of his former students, some going back decades, who returned to campus to surprise him on his final day teaching Great Books in 2010—a program he had famously taught in since the 1960s and became the head of in 1983—attest to the lasting impact of his ability to share knowledge and wisdom in life-enriching ways."

Not only was Dr. Cameron known for his erudition and expertise in the traditional arenas of classical literature, such as Aeschulus and Thucydides, the arachnological community knew Don as the author of the chapter in the back of *Spiders of North America: an identification manual*, "An Etymological Dictionary of North American Spider Genus Names" (2005). Dr. Fortson writes of this work:

> "A great many of the things Don truly cared about and much of what made him tick can be found in one way or another in this work's 60-odd pages. Hidden behind the perhaps unpromising title and (probably to many) dry-sounding and abstruse subject is a glittering tapestry of astonishing intellectual-history sleuthing, linguistics, Classics, history, literature, and fondness for understanding personalities past and present—all piggy-backing (or spider-backing) on the central subject of arachnids, which might not be everyone's cup of tea but which Don deeply loved, and all displaying his tenacity in chasing puzzles to their roots. His research on this occupied him for many years and I saw first-hand how much satisfaction he derived from it. But compiling the *Dictionary* was not all just about figuring things out. It was a gesture of love and affection to the fields of zoology and taxonomy—fields in which he had international renown—, an appreciation of the importance of names and their histories, and a way of communing with scholars of the past whose lives and minds he had to know intimately to suss out why they assigned the names they did. For many of the names do not have obvious motivations or meanings derived from characteristics of the animals themselves, but are the result of caprice; their origins had to be ferreted out by intensive engagement on Don's part with surviving records of these scholars' lives, reading habits, personal interests, travels, and much more. (The affection Don felt for his fellow zoologists went both ways: a species of spider, the sheet weaver *Tapinocyba cameroni*, was named after him by two prominent arachnologists in 2007.)."

Don Cameron was also known at his University for his intimate knowledge of *Robert's Rules of Order*. Don served as both Parliamentarian for the College of Literature, Science, and Arts at the University of Michigan and for the American Arachnological Society for several years.

Unsurprisingly, for anyone who had ever met Don, another of his passions was for teaching. He was awarded teaching prizes at both the institutional and national levels including a Class of 1923 Teaching

Award in 1965, the American Philological Association's Award for Excellence in Teaching at the Collegiate Level in 1987, and an Arthur F. Thurnau professorship in 1992.

The following remembrances of Don were sent by members of the arachnological community when word was sent about his death:

From Joe Warfel: Don was such a big intellect ready to share and an even bigger hearted person to know…"

From TJ Jones: "Such sad news. He was among the greatest minds and wits ever to be. One of my fondest professional memories is of him reading the proclamation of gratitude to 'TJ and his crew' at the meeting we hosted."

From Petra Sierwald: "I am very sad about Don Cameron's passing. A group of us at the 2018 AAS meeting in Ypsilanti Michigan (Carta Shillington was our gracious host) visited Don (thanks to Al Cady for arranging the meeting). We hugged Don so enthusiastically that one of the monitors went off. A dedicated nurse came in to check on Don and us. My colleague (and husband) Rudiger enjoyed his regular communications with Don about correct, appropriate (and inappropriate, by Linneus and others) taxonomic mollusk names." Petra also sent this remembrance: "In the mid-1990s I visited Ann Arbor and met up with Don. We searched for northern widows in the region and discovered our enthusiasm for Pleistocene geomorphic landforms (growing up in North Germany those were the only land forms I knew). The Eskers of Michigan are famous. Don drove to some of them, I had only heard about eskers, but never seen one. Don was all around knowledgeable. I miss him."

Excerpted from Chris Starr's remembrances: "Don was an ardent amateur arachnologist. Professionally, he was a linguist and professor of Classics at the University of Michigan. As far as I know, he did not publish any original biological observations about arachnids, but many arachnologists were happy to make use of his expertise in Greek and Latin. He was for a time an AAS director. Don was no shrinking introvert, but neither would one call him an extrovert. I would say he was more Willis Gertsch than B.J. Kaston. Accordingly, he attended more than one annual AAS meeting before it became generally known to the faithful who he was and what he knew better than any of the rest of us. I believe it was during at the 1977 meeting in Cullowhee, North Carolina, that he very suddenly was discovered by the faithful. When that happened he was often surrounded by arachnologists asking him to explicate various taxon names, which he did with ease. I found it really quite amusing to see that my old friend Don had all at once become a star.

"The time that he really amazed me was at an informal side event to the 1990 meeting in Ottawa. Together with Norm Platnick, Don had published a paper in, I believe, *Systematic Zoology*, explaining how the basic method was the same in a) phylogenetic analysis of taxa, b) phylogenetic analysis of languages, and c) the relative dating of manuscripts. At that time I was a visitor at the Canadian National Collection of Insects and Arachnids (Charlie Dondale's outfit), where we had a discussion group around systematic questions. At my invitation, Don came over to address us one noon. After setting forth the topic of that paper, he opened for questions. My question was 'Does that mean that from comparative knowledge of modern Indo-European languages one could infer, for example, what the Sanskrit word for *hand* was?' Don did not hesitate. 'Yes, we can tell in this way that the Sanskrit word for *hand* is *hanti*. Or at least it was originally. In fact, *hanti* has been taken over to refer to the elephant's trunk, which manipulates like a hand, so that they adopted a new word for *hand*.' I don't know about the others in the group, but I was just flabbergasted by this casual show of erudition.

"More recently I had occasion to take advantage of Don's expertise in a more concrete way. Recall that in hymenoptera and some mites, among others, females derive from fertilized eggs and males from unfertilized eggs. This form of haplodiploidy is known as *arrhenotoky*. In a paper published this year (*Journal of Genetics* 100, 17. https://doi.org/10.1007/s12041-021-01263-9) I noted that the opposite form (females haploid from unfertilized eggs) is possible but necessarily very unstable, a sufficient reason why

it is unknown in nature. I needed a name for this alternative form of haplodiploidy, and Don supplied it for me: *enantiotoky*, from ενάντιος, meaning opposite or reverse."

Don Cameron and Bea Vogel (first President pro-tem of the AAS) in the 1970s.

Brent Opell supplied information on additional arachnological contributions from Don: "Don was also a curator (adjunct, I believe) in the University of Michigan's Museum of Zoology, where he pursued his interest in scorpions. He also co-authored a paper on cladistics with Norm Platnick as this approach was being contested and becoming established: Platnick, N. I. and H. D. Cameron. 1977. Cladistic methods in textual, linguistic, and phylogenetic analysis. Systematic Zoology 26(4): 380–385. [He] was one of the early editors of the first World Spider Catalog: Platnick, N. I. 2000. The World Spider Catalog, Version 1.0. [ed. P. Merrett and H. D. Cameron] American Museum of Natural History. He continued in this capacity through the 2014 edition, maybe longer: Platnick, N. I. 2014b. The World Spider Catalog, Version 15. [ed. P. Merrett and H. D. Cameron] American Museum of Natural History."

From Bruce Cutler: "My fondest memory of him, I can still see the scene, was standing at the entrance of a dorm at one of the AAS meetings, can't remember which one, with him and Bob Edwards puffing away (Bob was a chain smoker) and enjoying the banter. End of an era."

From Rick Vetter: "I would like to share some moments that I had with Don Cameron. Don took me under his avuncular wing at the 1993 meeting in Seattle. He cherished watching me develop in the society from newbie to presenter to author to host to director and especially my work with the brown recluse culminating in a book. After my second time giving a talk at AAS, he approached me and conveyed that Jim Berry had said that I was very intelligent. I protested this evaluation because I didn't think anyone could make that assessment based solely on my two talks which had as many jokes as it did useful spider information. Don repeated Jim's opinion. I continued to protest and finally Don put his hand gently on my forearm and said, 'He didn't say you were wise.'

Rick Vetter and Don Cameron.

"I drove us through Teddy Roosevelt Natl. Park during the Dickinson AAS meeting in North Dakota as we hoped to see bison. As we drove, Don (now in his 60s) kept identifying the plants along the roadside. He rattled off one after another and said 'that's silver sage.' I turned to him and slowly said 'Are referring to…….yourself?' Don straightened his spine at the compliment, turned slowly toward me and in self-mocking erudition said, 'Yes!'

"On the same car trip, he discussed so many topics knowledgeably. After several discourses I said, 'What DON'T you know about?' Don again in self-mocking tone said 'Sports and music. The rest of the world is my domain.'

"Don had a colleague at Univ Mich. (Ted Cohn) who was whackier than me if you can believe that, who was doing taxonomic work on camel crickets. I was pitfalling for *Neoanagraphis* spiders in the Mojave Desert and was getting camel crickets which I sent to Ted. Ted wanted to pay me for my efforts but I refused as it was already funded by an agency. After several refusals, knowing Ted was a character, here is what I suggested for payment for my collecting services if it was within his behavioral capability. The next time he ran into Don, Ted was to grab Don's cheeks with the enthusiasm of an Italian grandmother grabbing the cheeks of a single-digit aged grandchild, shake them back and forth and say 'wooja wooja wooja.' About 6 months after making the request, my debt was paid. What was amazing is that this occurred without any

reference to me in Michigan and Don said after his initial shock, the next thought that went through his mind was 'Vetter!!!'

"We had a very wonderful friendship. One of the world's brightest lights just went out."

AAS Grant Deadlines, Donation Information, and Reminder

Members of the AAS are reminded that February 15th is the deadline for applications to all research grants (student and non-student grants). Information about these different programs can be found at:

https://www.americanarachnology.org/society/grants/

As 2021 comes to a close, it is worth reminding readers of the *American Arachnology* to consider the AAS in your end-of-year donations. Over 83 registrants to the 2021 Virtual Conference were able to participate due to generous donations covering registration fees. Donations to the society support student research, travel to annual meetings for those who cannot afford costs, research by early career arachnologists, student presentation awards, arachnology-related outreach activities, as well as monetary awards to recognize stellar research accomplishments. Donations can be made online at:

https://www.americanarachnology.org/society/donations/

Finally, just a reminder that the *American Arachnology* newsletter is published twice a year – deadlines for articles, announcements, and news are April 15th and October 15th. Past issues of the newsletter are available at: https://www.americanarachnology.org/news-projects/aas-newsletter/. Given the number of items to be published in each issue, the editor requests that contributions henceforth, including short articles, be no more than 900 words in length if possible.

Please send any articles, news, or announcements directly to AAS Secretary, Paula.Cushing@dmns.org. Any feedback about the newsletter would also be greatly appreciated!