Wisconsin Entomological Society
Newsletter

Volume 44, Number 3 October 2017

Stanley W. Szczytko (1949-2017)

[**Editor's note** — I am indebted to Dreux J. Watermolen, Wisconsin Department of Natural Resources, for sharing most of the following information with us.]

Dr. Stanley W. Szczytko, a stonefly expert from the University of Wisconsin – Stevens Point (UWSP), died as a result of a sailing accident on Lake Superior on August 30. He was 68 years old. Szczytko had retired from UWSP in 2013, after attaining the title of Professor of Water Resources. He taught in the College of Natural Resources (CNR) from 1979 to 2012. In 1984, he was named the intern program coordinator and in 1989 the UWSP Water Resources Coordinator. During his tenure, Szczytko trained many young entomologists and future water resources specialists. He also helped to establish the CNR's Aquatic Biomonitoring Laboratory in 1985.

Szczytko, a native of New Jersey, had earned a master's degree from the University of North Texas in 1975 with the thesis, "The Stoneflies (Plecoptera) of Texas," and a Ph.D. from the same institution in 1978 with the dissertation, "Holomorphology and Drumming Behavior of Western Nearctic *Isoperla* (Plecoptera)." Over the course of his professional career, he published 45 scientific papers and authored three books. UWSP bestowed its University Scholar Award on Szczytko in 1983. In June 2015, he was the recipient of the Lifetime Achievement Award of the International Society for Plecoptera and Ephemeroptera.

Szczytko was a longtime member of the Port Superior Marina in Bayfield, Wisconsin, from which he often sailed with friends and family. A memorial service for Szczytko was held on September 7 at the Sentry World Grand Hall. A memorial scholarship is being created in his name at UWSP.

The Harvestmen or Daddy Long-legs of Wisconsin

By Dreux J. Watermolen
Dreux.Watermolen@Wisconsin.gov

Introduction

The harvestmen or daddy long-legs (Arachnida: Opiliones) have been the subject of minimal study in Wisconsin. Levi and Levi (1952), tangential to their work on spiders (Araneae), published a preliminary checklist of fourteen species of harvestmen found in the state along with a key to their genera. They later added an additional species to the checklist (Levi et al. 1958). Edgar (1966) followed with a key to species then known to occur in the entire Great Lakes region. These early works provided a basis for the Wisconsin species list included in Cokendolpher and Lee's (1993) North American catalog. Since these preliminary works, only a small number of studies have addressed Wisconsin harvestmen; a single species and a small number of locality records have been added to the state checklist in the intervening years.

Levi and Levi (1952) deposited voucher specimens from their work in Harvard

University's Museum of Comparative Zoology (MCZ) collection but did not include the catalog numbers assigned to them in their paper. In an effort to update the state checklist, I recently searched the MCZ's database to confirm that the Levis' specimens remain available for verification and study. I supplemented this effort with searches of recent literature and additional museum databases. I also reviewed photographic records available on citizen science websites: BugGuide (BG; http://bugguide.net/) and iNaturalist (iNat; www.inaturalist.org). These efforts confirmed the availability of the Levis' specimens and yielded additional records.

An updated species checklist with county records follows. Families, genera, and species are listed alphabetically. Collection numbers are provided for specimens from the MCZ (the Levis' specimens as well as others), Denver Museum of Nature and Science (DMNS), and Illinois Natural History Survey (INHS). In many instances, specimen collection data were found to be incomplete, often lacking expert-determined species identifications or county information. I omitted such records from the current checklist, but acknowledge that they merit further investigation. Reports from the BG and iNat sites are referenced when I felt confident that the species identification provided is likely accurate.

Species Checklist

Family Acropsopilionidae

Acropsopilio boopis (Crosby)
Records: **Vernon** (MCZ 47322, Levi et al. 1958).

Family Caddidae

Caddo agilis Banks
Records: **Door** (Snyder et al. 2004, Shultz 2013); **Douglas** (MCZ 47321, Levi and Levi 1952).

Caddo pepperella Shear
Records: **Door** (Shultz 2013).

Family Ischyropsalididae

Sabacon cavicolens (Packard)
Records: **Grant** (MCZ 36960, Levi and Levi 1952, Shear 1975); **Kewaunee** (MCZ 36957, Levi and Levi 1952, Shear 1975); **Monroe** (MCZ 36270); **Shawano** (MCZ 36961, Levi and Levi 1952, Shear 1975).

Family Phalangiidae

Odiellus pictus (Wood)
O. pictus will likely be found in additional northern and western counties as it occurs throughout Michigan's Upper Peninsula (Edgar 1971) and has been reported from eastern Minnesota (Shoemaker et al. 2017). Records: **Dane** (BG 2016[?]); **Door** (Snyder et al. 2004, Snyder and Draney 2008, Shultz 2013); **Douglas** (MCZ 36589 and 36600, Levi and Levi 1952); **Fond du Lac** (MCZ 36595, Levi and Levi 1952); **Iron** (MCZ 36594); **Kewaunee** (MCZ 47319); **Langlade** (MCZ 36591, Levi and Levi 1952); **Lincoln** (MCZ 36598, Levi and Levi 1952); **Polk** (iNat 2013); **St. Croix** (BG 2013).

Opilio parietinus (De Geer)
Records: **Crawford** (MCZ 35986, Levi and Levi 1952); **Marathon** (MCZ 35974, Levi and Levi 1952).

Phalangium opilio Linnaeus

Levi and Levi (1952) listed this species simply as "very common in all parts of Wisconsin." It will likely be found in additional northern counties as it occurs throughout Michigan's Upper Peninsula (Edgar 1971). Records: **Columbia** (DMNS 21792, Werling et al. 2012); **Dane** (Snelling 1968[?]); **Door** (Snyder et al. 2004, Snyder and Draney 2008, Shultz 2013); **Iron** (MCZ 35784); **Outagamie** (BG 2013); **Trempealeau** (MCZ 35784).

Family Sclerosomatidae

Leiobunum aldrichi Weed

Levi and Levi (1952) reported this species as "common in southern and central Wisconsin," and noted that they found "no records of it from counties north of Lincoln County, though it probably does occur farther north." Shoemaker et al. (2017) recently reported *L. aldrichi* from several counties in eastern Minnesota. Records: **Door** (MCZ 36758, 36760, and 36766; Shultz 2013); **Fond du Lac** (MCZ 47310); **Jackson** (MCZ 36759); **Juneau** (MCZ 36762); **Kewaunee** (MCZ 36772 and 102156); **La Crosse** (MCZ 36754); **Lincoln** (MCZ 36752 and 36767); **Marathon** (MCZ 36751 and 36765); **Marinette** (MCZ 36753); **Monroe** (MCZ 36770); **Oconto** (MCZ 36773); **Pierce** (MCZ 36743 and 36769); **Richland** (MCZ 36757 and 36771); **Sauk** (BG 2006); **Trempealeau** (MCZ 36744); **Vernon** (MCZ 36763, 36764, and 36768).

Leiobunum calcar (Wood)

L. calcar will likely be found in additional northern and western counties as it occurs throughout Michigan's Upper Peninsula (Edgar 1971) and has been reported from eastern Minnesota (Shoemaker et al. 2017). Records: **Ashland** (MCZ 39778, Levi and Levi 1952, INHS Opiliones 1382); **Door** (MCZ 36787 and 36792, Levi and Levi 1952, Snyder et al. 2004); **Florence** (Levi and Levi 1952); **Grant** (MCZ 36777, Levi and Levi 1952).

Leiobunum flavum Banks

Records: **Barron** (MCZ 36836); **Brown** (Draney and Jaskula 2004); **Dane** (MCZ 36835); **Grant** (MCZ 36837 and 47304, Levi and Levi 1952); **Vernon** (MCZ 47303, Levi and Levi 1952).

Leiobunum nigropalpi (Wood)

Records: **Ashland** (MCZ 47308, Levi and Levi 1952); **Barron** (BG 2015), **Dane** (BG 2010); **Forest** (MCZ 36516, Levi and Levi 1952); **Jackson** (Levi and Levi 1952); **Marathon** (MCZ 36506); **Milwaukee** (BG 2010); **Oneida** (MCZ 36517, Levi and Levi 1952); **Price** (MCZ 36515, Levi and Levi 1952); **Walworth** (MCZ 36519 and 36521, Levi and Levi 1952).

Leiobunum politum Weed

L. politum will likely be found in additional northern and western counties as it occurs throughout Michigan's Upper Peninsula (Edgar 1971) and has been reported from eastern Minnesota (Shoemaker et al. 2017). Records: **Adams** (MCZ 36477, Levi and Levi 1952); **Ashland** (MCZ 36483, Levi and Levi 1952); **Buffalo** (MCZ 36476,

Levi and Levi 1952); **Chippewa** (MCZ 36484, Levi and Levi 1952); **Douglas** (MCZ 36479 and 36488, Levi and Levi 1952); **Fond du Lac** (Levi and Levi 1952); **Forest** (MCZ 36466, Levi and Levi 1952); **Kewaunee** (MCZ 36478); **Manitowoc** (MCZ 36493, Levi and Levi 1952); **Oconto** (MCZ 36485, Levi and Levi 1952); **Price** (MCZ 36467, Levi and Levi 1952); **Trempealeau** (MCZ 36468, Levi and Levi 1952); **Vernon** (MCZ 36473 and 47309), Levi and Levi 1952; **Walworth** (MCZ 36491, Levi and Levi 1952).

Leiobunum ventricosum (Wood)

Records: **Door** (Snyder et al. 2004); **Douglas** (MCZ 36663, Levi and Levi 1952); **Florence** (MCZ 36662 and 36674[?], Levi and Levi 1952), **Grant** (MCZ 47298, Levi and Levi 1952); **Green** (INHS Opiliones 1364); **Milwaukee** (BG 2010); **Oconto** (BG 2007); **Polk** (Davis 1934); **Vernon** (MCZ 36673[?]); **Vilas** (MCZ 36681); **Walworth** (MCZ 36664 and 47299, Levi and Levi 1952).

Leiobunum verrucosum (Wood)

Records: **Door** (Snyder and Draney 2008); **La Crosse** (BG 2007); **Richland** (MCZ 36798); **Walworth** (MCZ 36799); **Waupaca** (MCZ 36796); **Waushara** (MCZ 72875, Levi and Levi 1952).

Leiobunum vittatum (Say)

The taxonomic status of this widespread and morphologically variable species merits further study as it may actually represent a species complex (Burns et al. 2012). Levi and Levi (1952) listed *L. vittatum* simply as "very common in all parts of Wisconsin." Records are available from 21 counties. The species will likely be found in additional areas as it occurs throughout Michigan's Upper Peninsula (Edgar 1971) and has been reported from Illinois (Weed 1889) and eastern Minnesota (Shoemaker et al. 2017). Records: **Barron** (BG 1999); **Burnett** (MCZ 36400); **Crawford** (MCZ 36443, 36445, 36455, and 47296); **Dane** (MCZ 36407, BG 2013, iNat 2016); **Door** (MCZ 36462, Snyder et al. 2004); **Iowa** (MCZ 36402); **Jackson** (MCZ 36438); **Lincoln** (MCZ 36405); **Manitowoc** (MCZ 36463); **Marathon** (MCZ 36460); **Marinette** (BG 2010); **Milwaukee** (Davis 1934[?], BG 2007, BG 2009, BG 2010, BG 2013, Fowler-Finn et al. 2014, Kilmer and Rodríguez 2017); **Polk** (BG 2015); **Richland** (MCZ 36396); **Sheboygan** (BG 2012); **Trempealeau** (MCZ 36430); **Vernon** (MCZ 36391, 36393, and 36451); **Vilas** (MCZ 36415); **Walworth** (MCZ 36399, 36409, 36410, and 36431); **Washington** (MCZ 36461); **Waupaca** (MCZ 36392 and 36457).

Family Taracidae

Crosbycus dasycmenus (Crosby)

Records: **Columbia** (MCZ 47324, Levi et al. 1958); **Eau Claire** (MCZ 36274); **Iron** (Levi et al. 1958); **La Crosse** (Levi et al. 1958); **Sauk** (MCZ 36269, Levi et al. 1958); **Taylor** (MCZ 36285, Levi and Levi 1952); **Vernon** (MCZ 36271, Levi et al. 1958).

Notes on Identification

Shear (1975) provides an updated diagnosis of *Sabacon cavicolens*. McGhee (1977) offers a redescription of *Leiobunum politum* and Ingianni et al. (2011) provide a helpful key for distinguishing *L. calcar* from *L. nigropalpi* and related congeners. *Caddo pepperella* has only recently been reported from Wisconsin (Shultz 2013) and is not included in Edgar's (1966) regional key. The following couplet, modified from Shear (1974), is provided to help distinguish this species from its more common congener.

1a. Width of eye tubercle of adults 1.3-1.5 mm; body strongly marked purplish brown and silver.

1b. Width of eye tubercle of adults 0.6-0.8 mm; body more or less evenly colored medium brown.

Edgar's keys to Michigan (1991) and North American (1990) species remain useful for our fauna.

Conclusions

The available information on harvestmen in Wisconsin remains limited; sixteen species have been documented in the state. Other species likely occur here. For example, *Hadrobunus maculosus* (Wood), considered a "northern" species by Edgar (1966), has been found just over the border in Lake County, Illinois (iNat 2014) and may eventually be found in southern Wisconsin. Additional fieldwork and further evaluation of museum collections will allow a better understanding of what is needed for conservation of these intriguing arachnids. Property managers, undergraduate students, and citizen scientists can make meaningful contributions in these areas. A potential starting point would be counties from which harvestmen have yet to be collected or reported: Bayfield, Calumet, Clark, Dunn, Green Lake, Jefferson, Kenosha, Lafayette, Marquette, Menominee, Ozaukee, Pepin, Portage, Racine, Rock, Rusk, Sawyer, Washburn, Waukesha, Winnebago, and Wood.

Literature Cited

Burns, M., M. Hedin, and J.W. Shultz. 2012. Molecular phylogeny of the leiobunine harvestmen of eastern North America (Opiliones: Sclerosomatidae: Leiobuninae). *Molecular Phylogenetics and Evolution* 63:291-298.

Cokendolpher, J.C. & V.F. Lee. 1993. *Catalogue of the Cyphopalpatores and bibliography to the harvestmen (Arachnida, Opiliones) of Greenland, Canada, USA and Mexico*. Vintage Press, Lubbock, TX.

Davis, N.W. 1934. A revision of the genus *Leiobunum* (Opiliones) of the United States. *American Midland Naturalist* 15(6):662-705.

Draney, M.L., and J.M. Jaskula. 2004. Araneae and Opiliones from *Typha* spp. and *Phragmites australis* stands of Green Bay, Lake Michigan, and an exotic spider species newly reported from the U.S. Great Lakes region. *Great Lakes Entomologist* 37(3-4):159-164.

Edgar, A.L. 1966. Phalangida of the Great Lakes region. *American Midland Naturalist* 75(2):347-366.

Edgar, A.L. 1971. Studies on the biology and ecology of Michigan Phalangida (Opiliones). Miscellaneous Publications Museum of Zoology, University of Michigan 144:1-64.

Edgar, A.L. 1990. Opiliones (Phalangida). Pp. 529-582 In D.L. Dindal (ed). *Soil Biology Guide*. John Wiley & Sons, New York, NY.

Edgar, A.L. 1991. Harvestmen (Arachnida: Opiliones) in Michigan. *Michigan Academician* 24(1):265-275.

Fowler-Finn, K.D., E. Triana, and O.G. Miller. 2014. Mating in the harvestman *Leiobunum vittatum* (Arachnida: Opiliones): from premating

struggles to solicitous tactile engagement. *Behaviour* 151(12-13):1663-1686.

Ingianni, E.A., C.R. McGhee, and J.W. Shultz. 2011. Taxonomy of the *Leiobunum calcar* species-group (Opiliones: Sclerosomatidae: Leiobuninae). *Journal of Arachnology* 39(3):454-481.

Kilmer, J.T., and R.L. Rodríguez. 2017. Do structures with sexual contact functions evolve negative static allometries? A case study with the harvestman *Leiobunum vittatum* (Opiliones Sclerosomatidae). *Ethology, Ecology & Evolution* 29(1):64-73.

Levi, H.W., L.R. Levi and J.L. Kaspar. 1958. Harvestmen and spiders of Wisconsin; additional species and notes. *Transactions of the Wisconsin Academy of Sciences, Arts, and Letters* 47:43-51.

Levi, L.R., and H.W. Levi. 1952. Preliminary list of harvestmen of Wisconsin with a key to genera. *Transactions of the Wisconsin Academy of Sciences, Arts, and Letters* 41:163-167.

McGhee, C.R. 1977. The *politum* group (bulbate species) of *Leiobunum* (Arachnida: Phalangida: Phalangidae) of North America. *Journal of Arachnology* 3(2):151-163.

Shear, W.A. 1974. The opilionid family Caddidae in North America, with notes on species from other regions (Opiliones, Palpatores, Caddoidea). *Journal of Arachnology* 2(2):65-88.

Shear, W.A. 1975. The opilionid genera *Sabacon* and *Tomicomerus* in America (Opiliones, Trogulidae, Ischyropsalidae). *Journal of Arachnology* 3(1):5-29.

Shoemaker, A.K., M. Burns, and S.L. Boyer. 2017. New records of harvestmen (Arachnida, Opiliones) from Minnesota, USA. *Zootaxa* 4273(2):279-286.

Shultz, J.W. 2013. Significant range extensions for two caddid harvestmen in eastern North America, *Caddo pepperella* and *Acropsopilio boopis* (Opiliones: Eupnoi: Caddidae). *Zootaxa* 3637(1):94-96.

Snelling, J.C. 1968. Overlap in feeding habits of Redwinged Blackbirds and Common Grackles nesting in a cattail marsh. *Auk* 85:560-585.

Snyder, B.A., and M.L. Draney. 2008. Additional records of spiders, harvestmen, millipedes, and isopods of Toft Point Natural Area, Door County, Wisconsin. *Great Lakes Entomologist* 41(1-2):80-85.

Snyder, B.A., M.L. Draney, J.L. Kaspar, and J. Whitehouse. 2004. Preliminary survey of the terrestrial isopods (Isopoda), millipedes (Diplopoda), harvestmen (Opiliones), and spiders (Araneae) of Toft Point Natural Area, Door County, Wisconsin. *Great Lakes Entomologist* 37(3-4):105-115.

Weed, C.M. 1889. A descriptive catalogue of the Phalangiinae of Illinois. *Bulletin of the Illinois State Laboratory of Natural History* 3(5):79-97.

Werling, B.P., J. Harmon, C. Straub, and C. Gratton. 2012. Influence of native North American prairie grasses on predation of an insect herbivore of potato. *Biological Control* 61:15-25.

The *Wisconsin Entomological Society Newsletter* is published three times per year. The newsletter is provided to encourage and facilitate the exchange of information by the membership, and to keep members informed of the activities of the organization. Members are encouraged to contribute items for inclusion in the newsletter. Please send all news items, notes, new or interesting insect records, seasonal summaries, and research reports or requests to the editor.

Dues notices for 2017 were mailed in early January. Prompt payment will be most appreciated. Members already paid for 2017 or ahead will not receive notices. Dues status appears after your name on address labels of all mailings. Please contact Les Ferge at lesferge@gmail.com with any questions.

Membership Dues:
Individual or family: $10 per year
Sustaining: $15 per year
Patron: $25 per year

Please make checks payable to WES and send to:
Les Ferge, Treasurer, 7119 Hubbard Avenue, Middleton, WI 53562-3231. lesferge@gmail.com
Please report any address changes to the Treasurer.

Skyline Orientation in Honeybee Homing

William F. Towne and his colleagues at Kutztown University of Pennsylvania have performed a novel experiment which documents the role of the skyline in guiding view-based navigation by honeybees (*Apis mellifera* L.). The experiment enabled researchers gradually to 'train' the bees to acquire food at a sugar-water feeder in relative proximity to the colony's hive.

Before the experiment began, a complete 360-degree panoramic photograph of the horizon surrounding the feeder was assembled. Next, an artificial horizon was created in black and white that exactly matched the unobstructed visual horizon. To maximize the contrast in features between the artificial sky and horizon, the sky was given a UV-reflective coating, while the horizon was treated with a UV-absorbing coating. This artificial horizon was suspended on a series of poles surrounding the feeder, at exactly the height of the natural horizon. To further acquaint the bees with having to lift off over the edge of the artificial horizon when departing, a transparent plastic band of the same dimensions was first installed at the same height.

Orientations of the bees' departures from the feeder were recorded by a video camera suspended above the experimental arena. Rules employed in a scoring system were developed to maximize the number of observations while excluding bees that did not immediately depart from the feeder, or whose departure may have been influenced by that of a previous bee. Inter-observer reliability in scoring the observations was also satisfactorily attained. All experimental observations, including controls, were conducted on overcast days, so as to minimize any possible celestial cues.

To evaluate the hypothesis that honeybees use the skyline in homing flight orientations, the artificial horizon was first rotated 5 degrees relative to the natural horizon, and then by three additional amounts of 90, 180, and 270 degrees. In all of the latter cases, statistically significant occurrences of the bees' rotation of their departure directions, at the 95% confidence interval, were observed. A small rightward-bias of the bees' departure directions, noted in both the control and experimental observations, was attributed to 'beacon-aiming', caused by the proximity of a corner fence post to the testing arena.

This study is the first to demonstrate the importance of the skyline in the orientation system of honeybee navigation. For the full research paper, see W. F. Towne, et al., "Honeybees use the skyline in orientation," *Journal of Experimental Biology* 220 (2017): 2476-2485.

Wisconsin Entomological Society Officers:

President: Kyle Johnson
UW-Madison
1630 Linden Drive
Madison, WI 53706
kejohnson4@wisc.edu

Vice-President: Patrick (PJ) Liesch
UW-Madison
1630 Linden Drive, Room 246
Madison, WI 53706
pliesch@wisc.edu

Secretary-Treasurer: Les Ferge
7119 Hubbard Avenue
Middleton, WI 53562-3231
lesferge@gmail.com

Newsletter Editor: Jordan D. Marché II
5415 Lost Woods Court
Oregon, WI 53575
jdmarcheii@gmail.com

Inland Range Extension of *Harpalus rubripes* (Coleoptera: Carabidae)

[**Editor's note** — The following letter, from WES member Peter W. Messer to Jennifer Zaspel, Milwaukee Public Museum, conveys news of the capture of a specimen of the introduced ground beetle, *Harpalus rubripes*, during the 2017 BioBlitz at Fox River Park. Superficially, this beetle resembles its congener, *H. pennsylvanicus*, but instead possesses a bright metallic green body. Any further observations or captures of the species in Wisconsin should be relayed to Peter.]

16 July 2017

Dear Dr. Jennifer Zaspel,

As promised by end of this week, here are the talking points you requested for the forthcoming news media interview regarding scientifically important discoveries at the 2017 BioBlitz held during the 24-hour period June 9 – 10 in Fox River Park of Waukesha County.

A single 'ground beetle' specimen of *Harpalus rubripes* captured in Fox River Park extends the known westward spread of this Eurasian species. The specimen is now held in the Peter W. Messer synoptic collection of North American Caraboidea. *Harpalus rubripes* was first captured in the Western Hemisphere (New Hampshire) in 1981 and first reported in a 1987 article by my colleagues Ross Bell and Robert Davidson. Prior to its discovery in Fox River Park, the published western limit had been the southwestern shores of Lake Michigan with first capture there in 2009 and subsequent records reported in my 2014 article published in *The Great Lakes Entomologist*, Vol. 47: 66 - 72. Relevant sections of the article are inserted below.

I speculate that the beetle has run out of easy corridor access to the west along lake shores and so it is now making its way inland. Fox River Park is 20 miles due west of Lake Michigan. Furthermore, this spring for the first time, I found several beetles running during the daytime across my home pavement, local roads, and grassy fields in Mequon, Wisconsin. This silent invasion is in full swing and hardly anyone knows about it! I suspect *Harpalus rubripes* will have little agro-economic impact in the states. However, it will likely displace native species in many places. I have no immediate plans to formally publish a short note on the range extension. You already have my inventory of 27 species of ground beetles (carabids) taken at the 2017 BioBlitz. Among them are two other European species now well-established throughout USA. They are *Harpalus affinis* and *Pterostichus melanarius* which posed no environmental problems except for competition with native species.

Phototographs of *Harpalus rubripes* are posted on BugGuide at http://bugguide.net/node/view/48722. Ignore the incomplete geographic range reported at that website.

I hope your forthcoming interview with the news media people is a successful one. Please let me know if you need additional information.

Sincerely,

Peter W. Messer,
Research Associate in the Invertebrate Zoology Department at the Milwaukee Public Museum

My carabid research projects and published articles may be accessed at http://bugguide.net/user/view/12327.

Brave New Mosquito

Researchers at Michigan State University (MSU) have been awarded a highly competitive grant to develop novel techniques in the fight against the Zika virus. Last fall, the U.S. Agency for International Development awarded a $1 million grant to Zhiyong Xi, associate professor of microbiology and molecular genetics at MSU, to construct a mosquito 'factory' in Yucatan, Mexico. The new laboratory will be modeled after a similar facility led by Xi at Guangzhou, China, in partnership with Sun Yat-sen University.

The new laboratory will breed millions of male mosquitoes that are infected with a strain of *Wolbachia* bacteria, one that is present in natural populations of mosquitoes but causes no harm to humans. When the infected mosquitoes are released, they will mate with females and render them sterile. Field testing in China has already reduced selected mosquito populations by over 90 percent; comparable results are expected from operation of the newer laboratory in Mexico.

In 2010, Xi and his colleagues discovered that *Wolbachia* bacteria are able to stop the dengue virus from replicating. This work focused on two mosquito species, *Aedes albopictus* and *A. aegypti*. Then, in 2013, Xi's team performed a similar investigation using *Wolbachia* against the spread of malaria. Their work was the first to show that *Wolbachia* could be successfully established within a key malaria vector — the mosquito *Anopheles stephensi*.

Now, efforts are being focused on the bacterium's ability to reduce or eliminate the Zika virus in *Aedes aegypti*, considered to be a primary vector of the Zika virus. Their technique is "environmentally friendly, non-GMO and provides the ability to establish and maintain mosquito vector-free zones," Xi noted. He added, "We hope our approach will fill the gap in our ability in mosquito vector control and facilitate developing integrated vector management strategies for effective disease control."

For a fuller account of this research, see Anon., "Taking the bite out of vector-borne diseases," *Connections* (MSU College of Natural Science), Fall 2016, 8-10.

Texas Weather Found to Impact Midwestern Monarch Populations

Two researchers from Michigan State University (MSU) have perfected a model that better serves to predict summertime Monarch butterfly populations in Ohio and Illinois. Elise Zipkin, assistant professor of integrative biology, along with Sarah Saunders, postdoctoral research associate, originally developed the model to forecast ecological responses stemming from climate changes. One of the things that was learned was that springtime weather conditions in Texas, along the returning Monarchs' migratory pathways, can significantly influence later abundances of the butterflies in Ohio and Illinois.

While these two states are separated by some 140 miles, Monarch populations there generally experience a high degree of spatio-temporal synchrony, as a result of their common migration routes through Texas. Thus, along with such factors as deforestation in Mexico, and fewer milkweed plants in the Midwest on which to lay their eggs, Monarchs can be susceptible to violent storms and flooding in Texas. As Zipkin explained, "This is the first-ever model that has accurately predicted annual Monarch abundance using environmental

variables." Yet, extreme weather events, she notes, makes it very difficult to develop conservation strategies for Monarchs.

This research was likewise reported in Anon., "The Texas butterfly effect," *Connections* (MSU College of Natural Science), Fall 2016, 5.

Books and Websites

By Andrew Khitsun
akhitsun@tds.net

Spiders of North America, 2nd edition, by D. Ubick, et al., updates this handy manual to make it even more useful. While it is not a photo guide, more than 1,400 illustrations make it indispensable in identifying spiders around you. **Giant Silkmoths** by P. Howse and K. Wolfe is a wonderful collection of images accompanied by text, celebrating these spectacular moths. Speaking of the latter author, he recently released a CD on Saturniids at his website (mentioned previously at this column); please revisit http://www.silkmoths.bizland.com/kirbywolfe.htm to buy a copy!

Also check out **Seeing Butterflies: New Perspective on Color, Patterns & Mimicry** by P. Howse. The author believes there is more to butterfly wing patterns than just blending in with flowers and such, and that predators actually see images of other animals or plants that may attract or repulse them. **Mariposas Nocturnas: Moths of Central and South America, A Study in Beauty and Diversity** is by E. Gowin — a photographer known more for his photos documenting the impact of human activity on the planet, and who now has decided to present portraits of more than 1,000 species of South American moths.

Inspired by Insects by A. Rooney is a book of contemporary art involving insects and other bugs. **Insects: Their Natural History and Diversity: With a Photographic Guide to Insects of Eastern North America** by S. Marshall is into its second edition, and judging by responses from customers is even better than the first edition was. **The Secret Life of Flies** by E. McAlister is packed with amazing facts and stories about this group of insects that most people find at the very least annoying, and sometimes repulsive.

If you want to deviate from the insect world a bit and go into a more scientific realm, pick up **Invertebrates,** third edition, by R. Brusca, et al., or **Biology of Invertebrates,** 7th edition, by J. Pechenik. Worthy of attention also is the textbook **Insect Ecology: Behavior, Populations and Communities** by P. Price, et al., or **Insect Ecology: An Ecosystem Approach** by T. Schowalter. While at it, grab **Ecology of Insects: Concepts and Applications** by M. Speight, et al., or **Insect Behavior** by R. Matthews, et al. All of the scientific volumes mentioned here were published in the last 10 years, and so contain fresh views of the topics discussed.

As mentioned before, National Geographic got into the business of publishing insect guides, with their second one having just been released: **National Geographic Backyard Guide to Insects & Spiders of North America** by A. Evans. Also not mentioned here before is the series, **A Folding Pocket Guide to Familiar Species (A Pocket Naturalist Guide)**, which presents an extensive list of small guides covering all wildlife subjects in North America, including many on insects topics.

Insects of Eastern Hardwood Trees (Forestry Technical Report) by O. Lindquist is a great reference to insects that cause damage to trees east of the Rocky Mountains.

The website **Wormspit** at http://www.wormspit.com/index.htm is about silk and silk moths. The colored **Guide to pests and diseases of Aspen** can be downloaded here: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3833855.pdf.

And on the local front, **Zooplankton of the Great Lakes: A Guide to the Identification and Ecology of the Common Crustacean Species** by M. Balcer has great taxonomic keys and detailed line drawings.

[**Editor's note** — I'd also like to mention the 2017 release of **Monarchs and Milkweed: A Migrating Butterfly, a Poisonous Plant, and Their Remarkable Story of Coevolution** by Anurag Agrawal (Princeton University Press). It is worth noting that the author takes issue with the widespread claim that Monarch populations are declining as a result of decreasing milkweed abundance along their migratory corridors.]

Junior Entomologist's Corner: To BEE or not to BEE?

By Sabrina Stewart
stacystewart@mac.com

Yellow Jacket Flower Fly (*Milesia virginiensis*).

This year, I noticed a lot more bees on golden rod (*Solidago* sp.). When I looked closer, they were not all honey bees, bumblebees or Hymenoptera. They were flies (Diptera) mimicking bees and wasps. There is one, in particular, that I remember most fondly. I nicknamed it the Charley Harper fly, because it was so symmetrical. That is not its real name, of course. It is a Yellow Jacket Flower Fly (*Milesia virginiensis*).

I was running around with a container, trying not to get stung. After three tries, I FINALLY caught him and took a second look at him. "It's not a bee," I said, "It's a fly!" I put it into the freezer. Once I got it out to pin it, I was still astonished that it looked so much like a bee. This "bee" has created a new curiosity in me and now, I look closer at every "Hymenoptera" to see if it is a bee, a fly or even a moth.

The eyes, antennae, and the number of wings are the clues you have to look for.

Mimicry is my latest fascination. There seem to be examples of it everywhere, now that I am looking for it!

Will you sting me or are you *just* pretending?

Update from the Insect Diagnostic Lab

By P. J. Liesch, UW-Entomology
pliesch@wisc.edu

In my fourth summer at the UW Insect Diagnostic Lab, it was another busy season, and the lab saw over 1,200 samples between Memorial Day and Labor Day. As in the past, every summer has a different story to tell.

With all of the rain we had this spring and summer, it wasn't a surprise that **mosquito** pressure was high around the state throughout the summer months. One big surprise though, was the first detection of the Asian Tiger Mosquito (*Aedes albopictus*) in the Madison area in July. Within a short time, a second site with *Aedes albopictus* larvae was discovered in SE Wisconsin. Technically, this species can act as a vector of diseases such as the Zika Virus, but luckily this is unlikely to be an issue this far north.

While **Japanese beetle** numbers had been surprisingly low after the brutally cold winter of 2013-14, they were destined to rebound at some point. There was solid pressure from Japanese beetles last summer (2016), but these beetles seemed to be out in full force during the summer of 2017. Feeding damage was so bad in some spots that I got to be pretty good at identifying damaged linden trees (one of their favorite food plants) from a half mile or further away. *Why were they so bad in many parts of the state this year?* It's hard to tell for sure, but I'm suspicious that the two consecutive mild winters may be to blame.

While not an insect, invasive **jumping worms** (*Amynthas* sp.) made a surprising number of appearances at the diagnostic lab this year. These worms have only been in the state a few years, but they've been popping up more and more in unexpected locations. Unfortunately, there aren't any effective management tactics at this point to eliminate them from the soil, and these worms have significant impacts on plants when they alter the soil structure and destroy its water holding capacity. It'll be a wild ride to see what these worms do in the state in the long run.

Perhaps one of the biggest surprises this year were the **black widows**. During the past few years at the diagnostic lab, I'd be lucky to learn of a single sighting per year. But during the summer months of 2017, it seemed like I was hearing of a few reports each month. I wasn't alone in this regard, as Mike Draney at UW-Green Bay and I were frequently in touch with our latest widow reports. We even added a few new county records, including Brown and Sheboygan counties. One plump female black widow from Sheboygan has been living in a container on my desk for a few months now and seems to be satisfied with an occasional hissing cockroach nymph. Much to my surprise, the widow sightings weren't limited to Wisconsin. When my wife and I spent a week camping in Colorado in September, we even ended up with one in the tent. *I was just trying to relax on vacation and instead work decided to follow me on our trip!*

As is customary, there were a few "new" things that showed up in the state recently. An unexpected find was the cellar spider *Crossopriza lyoni*, which had recently been introduced to the U.S. from Asia and Mike Draney had also recently collected this species (pers. comm.). Based on sightings on BugGuide, it's been documented in a handful of other states, mostly in the southern half of the U.S. Another "new" find for the state was the "nut leaf weevil" (*Strophosoma melanogrammum*) found on hazelnuts in Bayfield County. This is a European species and there were actually some specimens in the Wisconsin Insect Research Collection, *but the collection location was in France!*

WES Fall Meeting:

Saturday, November 4: 10 a.m. – 4 p.m. Room 151 in Russell Labs on the UW-Madison campus.

By Kyle Johnson, WES President
kejohnson4@wisc.edu

Join us for a day of insect fun and comradery! Show up early (or stay late) to mingle with fellow insect enthusiasts. Lunch will be provided around noon (Glass Nickel Pizza Co.), followed by our annual photo salon—you can enter up to five photos. After this will be "Tales from the Field" by WES members, which showcases interesting and unusual discoveries from the current field season. If you have something you'd like to share—even just a few brief words, pictures, or specimens—please do so! (email Kyle or PJ)

Directions/Parking: Russell Labs is located at 1630 Linden Drive, Madison, WI 53706. Free parking is located in the Steenbock Ramp behind Russell Labs (directly northwest).

Heading west-bound on University Avenue: Take the Babcock Drive exit (0.25 miles after the Charter Street intersection) and go straight through the stop sign (Linden Drive) and continue to next stop sign (Observatory Drive). Go left (west) 0.1 miles and turn left again (south) to enter the Steenbock Parking Ramp. Walk to the tall building directly to the southeast (Russell Labs) and look for signs.

Heading east-bound on University Avenue: Take the Old University Avenue exit (immediately after the University Bay Drive intersection). Continue 0.4 miles to Walnut Street; go left (north) for 0.3 miles to the round-about. Take the first right (east) off the round-about and continue just over 0.5 miles and turn right (south) to the Steenbock Parking Ramp. Walk to the tall building directly to the southeast (Russell Labs) and look for signs.

Plan Ahead: ESA-NCB

The North Central Branch (NCB) of the Entomological Society of America (ESA) will hold its annual meeting at Madison, WI from Sunday, March 18 to Wednesday, March 21, 2018. The meeting will be held at the Madison Mariott West Hotel. Registration for the meeting opens in early November. Membership is required.

Few details have been posted yet about the meeting, but it is being hosted by the UW–Madison Department of Entomology. Additional information will become available as the meeting date draws nearer.

Check the following link for updates: http://www.entsoc.org/event-calendar/esa-north-central-branch-2018-meeting.

Can you name this insect?

This hemipteran, 7.5 mm, was collected at the Oregon Town Park, Dane Co., WI on 24 Sept. 2017. It belongs to the stinkbug family (Pentatomidae). Send guess(es) to the editor.

ENTOMOLOGY WORD SEARCH

M K N O T E L E K S O X E M M U K P H Y
A R A C H N I D H T K L R C P P X O T S
G A D I U R N A L E O O P H T V C I Y I
U L F X V B U S G L W P D U I M S A B M
N T T I I L R A E H A O S C O R C E E B
P T A N K H L I T T P R S E E V E D A E
S R S O E F I R S O I P V V Y T N E P E
B P G I U L A E R T I M I A I E T A U T
G B E O G E L H A D L D M S V A I G P L
G F M C L O T O E R O E A M M B P U F E
S A I N I R L R P I W R S U C D E S H S
C F B T A E F O B C A I B N T O D U F D
L O C U S T S H M P H X G X D M E F B G
P U A D U L T I M O C R E S M E W B H G
M A Y C N A M R O D T S Y E N N L F B E
H A R V E S T M E N D N I S A S N C X L
W U X A R O H T C B C E E L A L X S Y H
D E E A I D D I P T E R A B K L E X F C
A E E M I M I C B S R E B L G P I H N F
C U L L H L C W L A S R O D R X M S C W

Find the words hidden vertically, horizontally & diagonally throughout the puzzle.

WORDS

ABDOMEN
ADULT
AEDEAGUS
ARACHNID
ARTHROPOD
BEE
BEETLES
BIODIVERSITY
BRISTLES
CAMOUFLAGE
CENTIPEDE
CHELAE
CHRYSALIS
CYCLE
DIPTERA
DIURNAL
DORMANCY
DORSAL
EARTHWORM
EARWIGS
EGG
ENTOMOLOGIST
EXOSKELETON
EYESPOT
HARVESTMEN
LARVA
LOCUST
MIMIC
MITES
PARASITE
POLLEN
PUPAE
SILK
SPECIES
SPIDER
THORAX