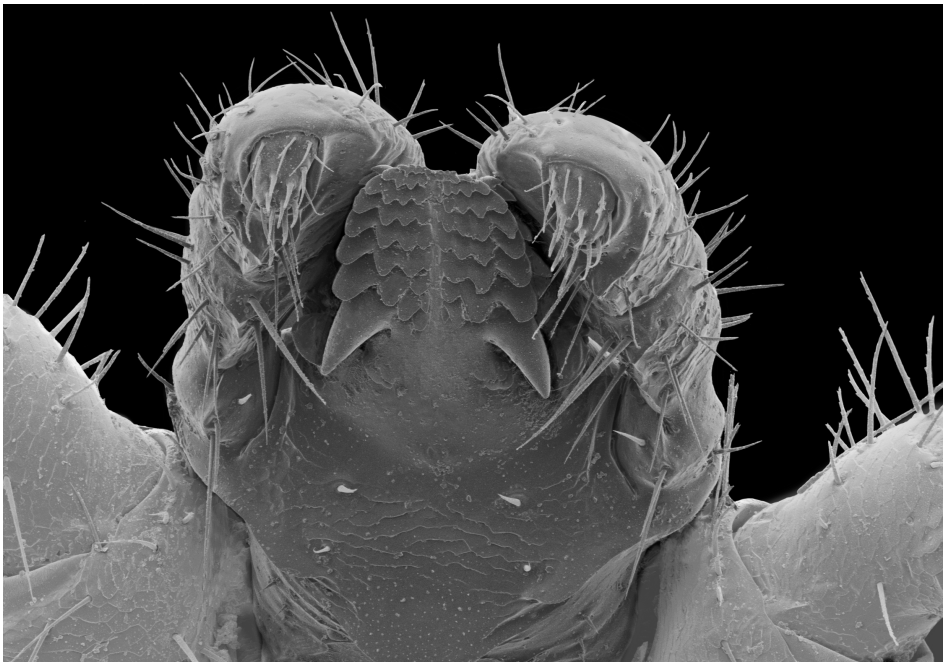
THE 71st ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS

Program and Information

Minnesota State University Mankato
Mankato, MN 56001
June 6-June 8, 2019



Papers and Posters by Students and Faculty

Symposium – Dr. Jillian Detwiler and Dr. Jeff Bell

Banquet Address – Dr. Bobbi Pritt

AMCOP 71
June 6–8, 2019
Minnesota State University Mankato
Mankato, MN 56001

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University of North Dakota

Program Officer…… Dr. Robert Sorensen
Minnesota State University Mankato

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ACKNOWLEDGEMENTS

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For support of Travel Award expenses.

THE MEMBERSHIP OF AMCOP
For support of the Honorable Mention awards and other expenses.

The 71st Annual Midwestern Conference of Parasitologists provides 4 Continuing Education Credits (4 CE). Your registration confirmation is proof of your attendance.

SCHEDULE

THURSDAY, JUNE 6, 2019

5:00-6:00 pm Room Check-in at Julia Sears Residence on 540 West Rd. The front desk will be open for registration from 4-11pm. Extra staff will be present to speed the process from 5-6pm

6:00-9:00pm Opening Mixer: Bradley's on Stadium, 1660 Warren Street #17 (in the east side of the business complex that is immediately east of campus across Warren Street)

FRIDAY, JUNE 7, 2019

Clinical Science Building (CSB)

8:00am Continental Breakfast (hallway adjacent to CSB 112) and Silent Auction Setup (CSB 312)

8:45am Opening Remarks and Welcome

- Dr. Robert Sorensen, Program Officer
- Dr. Aaron Budge – CSET Interim Dean
- Dr. Vasyl Tkach, Presiding Officer

CONTRIBUTED PAPERS
CSB 112

(STUDENT COMPETITION PAPERS INDICATED BY *)

9:00 1. *Liver-ing the dream: Analyzing spatial patterns of helminth infection using deer livers and fecal pellets. **J. TREVOR VANNATTA[1,2] (GS)**. [1]Purdue University, West Lafayette, IN, 47907; [2]University of Minnesota – Duluth, Duluth, Minnesota, USA

9:15 2. *Helminths of bats in the State of Pará, Brazil. **THAYANE FERREIRA FERNANDES (GS)[1];** VASYL V. TKACH (MP)[2]; FRANCISCO TIAGO DE VASCONCELOS MELO (MP)[1]; ADRIANO PENHA FURTADO (MP)[1]; JEANNIE NASCIMENTO DOS SANTOS (MP) [1]. [1]Laboratory of Cellular Biology and

Helminthology "Profa. Dra. Reinalda Marisa Lanfredi", Institute of Biological Sciences, Federal University of Pará, Av. Augusto Correa 01, Guamá, Belém, Para, 66075-110, Brazil. E-mail: jeanniensantos@gmail.com; [2]Department of Biology, University of North Dakota, 10, Cornell Street, Grand Forks, ND, 58202, USA.

9:30 3. *Occurrence of turtle *Neoechinorhynchus* species (phylum: Acanthocephala) in ostracod intermediate and snail paratenic hosts. **RYAN W. KOCH** (GS), RYAN P. SHANNON (GS), and MATTHEW G. BOLEK (MP), Department of Integrative Biology, Oklahoma State University, Stillwater, OK 74075.

9:45 4. *Seasonal occurrence of *Neoechinorhynchus emydis* (phylum: Acanthocephala) in the freshwater snail, *Helisoma trivolvis*. **RYAN W. KOCH** (GS), RYAN P. SHANNON (GS), SCOTT GOEPPNER (GS), and MATTHEW G. BOLEK (MP), Department of Integrative Biology, Oklahoma State University, Stillwater, OK 74075.

10:00 5. *Screening for pathogens of the nine-banded armadillo (*Dasypus novemcinctus*) at its northern range periphery. **CARLY HAYWOOD (GS)**, C.K. NIELSEN (MP), and F. AGUSTÍN JIMENÉZ (MP). Department of Zoology, Southern Illinois University Carbondale, Carbondale, IL 62901.

10:15 6. *Molecular phylogenetic analysis of the *Uvulifer* Yamaguti, 1934. **TYLER J. ACHATZ**[1] **(GS)**, STEPHEN S. CURRAN[2] (MP), KAYLYN F. PATITUCCI[1] (GS), ALAN FECCHIO[3] (MP) AND VASYL V. TKACH[1] (MP). [1]Department of Biology, University of North Dakota, Grand Forks, ND 58202; [2]Division of Coastal Sciences, The University of Southern Mississippi, Ocean Springs, MS 39564; [3]Universidade Federal de Mato Grosso, Cuiabá, MT, Brazil.

10:30 BREAK & SILENT AUCTION BIDDING

10:45 7. *Dicrocoeliids from a cloud forest in Ecuador. **DAWN W. CLEVELAND[1] (GS),** TYLER J. ACHATZ[1] (GS), LAWRENCE K. CRONIN[1] (UG), CARLOS CARRIÓN BONILLA[2] (GS), and VASYL V. TKACH[1] (MP). [1]Department of Biology, University of North Dakota, Grand Forks, ND 58202; [2]Department of Biology, University of New Mexico, Albuquerque, NM 87131.

11:00 8. *What's in our fish? **JAKSON R. MARTENS (UG)**, TYLER J. ACHATZ (GS), VASYL V. TKACH (MP), Department of Biology, University of North Dakota, Grand Forks, ND, 58201.

11:15 9. *Picky parasites? Parasites detect the infection status of potential hosts. **J. TREVOR VANNATTA (GS)[1]** , THOMAS KNOWLES (UG)[1] , DENNIS J. MINCHELLA (MP)[1] , and ALYSSA M. GLEICHSNER (MP)[2]. [1] Department of Biological Sciences, Purdue University, 915 West State Street, West Lafayette, Indiana, USA; [2] Department of Biological Sciences, SUNY Plattsburgh, 101 Broad Street, Plattsburgh, New York, USA

11:30 10. *Phylogeny and diversification of *Gastrotaenia*, the most secretive tapeworms on Earth. **MITCHELL FLOURA[1] (UG)**, DANIEL GONZÁLEZ-ACUÑA[2] (MP), TYLER ACHATZ[1] (GS) and VASYL V. TKACH[1] (MP). [1]Department of Biology, University of North Dakota, Grand Forks, ND 58202; [2]Department of Animal Science, Faculty of Veterinary Sciences, Universidad de Concepción, Chillán, Chile.

11:45 11. *On the impediment to identify species of *Oswaldocruzia* (Nematoda) in neotropical amphibians. **VICTORIA PHILLIPS (GS)** AND AGUSTIN JIMENEZ (MP),

Department of Zoology, Southern Illinois University Carbondale, Carbondale, IL 62901

12:00 12. *Documenting the materialistic evidence of tick diversity and their expansion. **VICTORIA PHILLIPS (GS)**, ELLIOT ZIEMAN (PD), AND AGUSTIN JIMENEZ (MP), Department of Zoology, Southern Illinois University Carbondale, Carbondale, IL 62901. Department of Biology, Wilmington College, Wilmington, OH 45177.

12:15 LUNCH

THE AMCOP SYMPOSIUM

CSB 112

Topic: Influences of Biogeography and Ecology on Parasite-Host Diversity

1:00 **Dr. Jillian Detweiler,** University of Manitoba.
The 'vicissitudes' and 'monstrosities' of snail taxonomy: Should parasite ecologists be afraid?

2:00 **Dr. Jeffrey Bell,** University of North Dakota.
Biogeography and host ecology shape the diversity and distribution of avian haemosporidians in South America

POSTER SESSION

Location CSB 312

(Poster set-up can occur anytime on Friday)

3:15 – 4:30

13. * Malaria eradication in Central America: potential role of drug-treated cattle. **STACI DREYER** (GS) and JEFFERSON VAUGHAN (MP)**.** Department of Biology, University of North Dakota, Grand Forks, ND 58202

14. * You're only as old as you feel: Wing damage as a correlate of parasitoid age. **JAMES RUDOLPH MIKSANEK (GS)** and

GEORGE E. HEIMPEL (MP), Department of Entomology, University of Minnesota, Saint Paul, MN 55108..

15. * Use it before you lose it: Incorporating fecundity compensation into population and infection dynamics. **J. TREVOR VANNATTA (GS)** and DENNIS J. MINCHELLA (MP), Purdue University, West Lafayette, IN, 47907.

16. Development and distribution of two neogregarines (*Mattesia* sp. and *Ophryocystis elektroscirrha*), infecting the hypodermis of fire ants, Solenopsidini, and milkweed butterflies, Danaini, RYAN P. SHANNON (GS), LAUREN NADEN (UG), KRISTEN A. BAUM (MP), and **MATTHEW G. BOLEK (MP)**. Department of Integrative Biology, Oklahoma State University, Stillwater, OK.

17. Effect of phytochemicals on *Trichomonas tenax* (Trichomonadida: Trichomonadidae) viability. DEBORAH A. HUDMAN (T), HANNAH C. MOTES (GS), NICOLE C. LIGHTHOUSE (GS), and **MELISSA K. STUART (MP).** Department of Microbiology/Immunology, Kirksville College of Osteopathic Medicine, A.T. Still University of Health Sciences, Kirksville, MO 63501

18. Optimizing infectivity of *Brugia microfilariae*. DUENING A (UG), HARTER B (T), and **MICHALSKI ML (MP).** Department of Biology, University of WI Oshkosh, Oshkosh, WI 54901.

BANQUET

University Ballroom

Social hour 5:00 – 6:30 pm

Dinner 6:00 pm

KEYNOTE SPEAKER

Dr Bobbi Pritt,

Director, Clinical Parasitology, Mayo Clinic, Rochester, MN

"Worms you won't find in your garden."

SATURDAY, JUNE 10, 2019.
Clinical Life Science Building (CSB)

8:00 Continental Breakfast (hallway adjacent to CSB 112) & Silent Auction Bidding (CSB)

9:00 19. Sampling the Land of Fire and Ice: The First Documentation of Hairworms (Phylum Nematomorpha) in Iceland **CHRISTINA ANAYA (GS)** AND MATTHEW G. BOLEK (MP). OKLAHOMA STATE UNIVERSITY.

9:15 20. Infection by parasites reduces predation risk by dragonfly nymphs in isopod prey. **OLWYN C. FRIESEN (PD)**, Department of Biological Sciences, University of Manitoba, Winnipeg, MB, Canada, SARAH GOELLNER (GS), Department of Infectious Diseases, University of Heidelberg, Heidelberg, Germany, ROBERT POULIN (MP), Department of Zoology, University of Otago, Dunedin, New Zealand and CLEMENT LAGRUE (MP), Department of Biological Sciences, University of Alberta, Edmonton AB, Canada

9:30 21. Molecules and morphology of some Haploporidae (Digenea) possessing a caecum. **ERIC E. PULIS (MP)[1]**, MICHAEL J. ANDRES (MP)[2], THOMAS H. CRIBB (MP)[3], ROBIN M. OVERSTREET (MP)[2], [1]Department of Science and Mathematics, Northern State University, Aberdeen, SD, 57401 [2] Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS, 39564; [3]School of Biological Sciences, The University of Queensland, QLD 4072, Australia.

9:45 22. Role of oxylipins in host-parasite interactions. **OLWYN C. FRIESEN (PD),** Department of Biological Sciences, University of Manitoba, Winnipeg, MB, Canada, R3T 2N2, HAROLD AUKEMA (MP), Department of Food and Human Nutritional Sciences, University of Manitoba,

Winnipeg, MB, Canada, R3T 2N2, and JILLIAN DETWILER (MP), Department of Biological Sciences, University of Manitoba, Winnipeg, MB, Canada, R3T 2N2

10:00 23. The making of a soldier: What can neogregarines in the genus *Ophryocystis* tell us about the evolutionary history of their danaid butterfly hosts? **MATTHEW G. BOLEK (MP)**, RYAN P. SHANNON (GS), DAVID D. BERMAN (GS), and KRISTEN A. BAUM (MP), Department of Integrative Biology, Oklahoma State University, Stillwater, OK

10:15 Last chance for silent auction bidding

10:30 Business Meeting and Award Presentations.
Dr. Vasyl Tkach, AMCOP Presiding Officer

Dorm check out following meeting.

ABSTRACTS

1. Liver-ing the dream: Analyzing spatial patterns of helminth infection using deer livers and fecal pellets. **J. TREVOR VANNATTA[1,2] (GS)**. [1]Purdue University, West Lafayette, IN, 47907; [2]University of Minnesota – Duluth, Duluth, Minnesota, USA.

   The giant liver fluke, thin-necked bladderworm, and brainworm are common helminth parasites of white-tailed deer in North America. The impacts of these parasites on white-tailed deer fitness appear largely negligible, however, infections in other species can have severe pathology. I used two data sets to explore helminth infection across the landscape: deer fecal pellet collections from across northern Minnesota and hunter-harvested deer from the city of Duluth, Minnesota. Deer pellet data showed a large degree of spatial infection heterogeneity. However, higher prevalence and intensity of infection were spatially clustered in the southern portion of the study area. Analysis of coinfection from deer pellets suggests brainworm and giant liver flukes may have spatially distinct transmission patterns. Approximately 250 deer livers were collected in the city of Duluth, Minnesota and examined for helminth infections. Prevalence of giant liver flukes was

near 50% while prevalence of thin-necked bladderworm was ~15%. The probability of infection was positively related to liver mass for both species. This was likely due to host age. Despite a significant association between infections, the spatial patterns of infection appear distinct. Giant liver flukes were associated with wet cover types, whereas bladderworms showed little association with any landscape features. The spatial patterns of these infections suggest that all these parasites have unique habitat requirements, which could be used to predict infection risk on the landscape.

2. Helminths of bats in the State of Pará, Brazil. **THAYANE FERREIRA FERNANDES (GS)[1];** VASYL V. TKACH (MP)[2]; FRANCISCO TIAGO DE VASCONCELOS MELO (MP)[1]; ADRIANO PENHA FURTADO (MP)[1]; JEANNIE NASCIMENTO DOS SANTOS (MP)[1]. [1]Laboratory of Cellular Biology and Helminthology "Profa. Dra. Reinalda Marisa Lanfredi", Institute of Biological Sciences, Federal University of Pará, Av. Augusto Correa 01, Guamá, Belém, Para, 66075-110, Brazil. E-mail: jeanniensantos@gmail.com; [2]Department of Biology, University of North Dakota, 10, Cornell Street, Grand Forks, ND, 58202, USA

Despite their astounding diversity, very few Amazonian bats have been examined for parasites so far. In order to close this gap in knowledge we studied the helminth fauna of bats in several localities and different habitats in the State of Pará, Brazil. Bats were collected by mist netting, euthanized according to the approved protocols and examined for helminth. Upon removal from the host, helminths were placed in saline solution and fixed in hot 70% alcohol. Nematodes were studied on temporary mounts cleared with lactophenol. Flatworms were stained with alum carmine and mounted permanently on slides. Eighty seven out of 311 bats (27.9%) collected and examined during 2017 had helminth parasites. Representatives of the digenean genera *Anenterotrema*, *Metadelphis*, *Paralecithodendrium*, *Ochoterenatrema*, *Limatulum*, *Urotrema*, the cestode genus *Vampirolepis,* the nematode genera *Histiostrongylus*, *Cheiropteronema* and an unidentified Capillariidae, were found. Three new digenean species and two new cestode species were discovered and are being described using combined morphological and molecular approaches. New geographical and host records are also reported. The low overall prevalence of helminth infections is explained by the high proportion of fruit bats in our samples. Our study demonstrates that South American bats and particularly those found in Amazonian ecosystems, likely harbor

significant undescribed diversity of parasitic worms still awaiting their discovery and formal description. The collecting was carried out under the permit nº56638-1 and 9178-1 from ICMBio and the study was done according to the protocol nº 6319260717 approved by the Committee on Ethics in Research with Animals/UFPA.

3. Occurrence of turtle *Neoechinorhynchus* species (phylum: Acanthocephala) in ostracod intermediate and snail paratenic hosts. **RYAN W. KOCH** (GS), RYAN P. SHANNON (GS), and MATTHEW G. BOLEK (MP), Department of Integrative Biology, Oklahoma State University, Stillwater, OK 74075

   Although little information exists on the role of intermediate and paratenic hosts in the life cycles of acanthocephalans, the North American turtle acanthocephalan, *Neoechinorhynchus emydis*, has been reported from freshwater ostracod intermediate and snail paratenic hosts. However, few studies have examined ostracods and snails for acanthocephalan infections. Here, 2 species of snails, *Helisoma trivolvis* and *Physa acuta*, were examined for acanthocephalan infections from 23 sites throughout Oklahoma. Additionally, ostracod hosts were examined for acanthocephalans at 2 locations. The complete ITS region of nuclear rDNA was then sequenced from juveniles from ostracods and snails and adults of 5 species of *Neoechinorhynchus* from turtle definitive hosts. Of the 23 locations sampled, 7 had snails infected with acanthocephalans (prevalence 5 – 70% and intensity 1 – 56). In contrast, prevalence in ostracod intermediate hosts ranged from 0.05 – 0.2% with a mean intensity of 1. The ITS sequences of acanthocephalans recovered from snail hosts were identical to sequences from adult *N. emydis* from turtle hosts. In contrast, the ITS sequences of 2 acanthocephalans from ostracods were identical to *N. emydis*, as well as *N. pseudemydis* from turtles. These results suggest that snails play an important role in the transmission of *N. emydis* to turtle definitive hosts, whereas *N. pseudemydis* appears not to utilize snail hosts. Additionally, this study provides baseline ITS sequence data to serve as a genetic barcode for acanthocephalans from ostracod, snail, and turtle hosts, which can help with the identification of potentially new intermediate and paratenic hosts in the life cycles of acanthocephalans.

4. Seasonal occurrence of *Neoechinorhynchus emydis* (phylum: Acanthocephala) in the freshwater snail, *Helisoma trivolvis*. **RYAN W. KOCH** (GS), RYAN P. SHANNON (GS), SCOTT GOEPPNER (GS),

and MATTHEW G. BOLEK (MP), Department of Integrative Biology, Oklahoma State University, Stillwater, OK 74075

Neoechinorhynchus emydis infects freshwater turtle definitive and ostracod intermediate hosts, and is the only acanthocephalan species reported to infect snails as paratenic hosts. Currently, no information is available on the seasonality of *N. emydis* in snail hosts. To address this, the seasonal distribution of acanthocephalans in freshwater snails (*Helisoma trivolvis*) was examined from a single location in Oklahoma. Seasonally, prevalence of *N. emydis* in snails was highest (50%) during the summer and lowest (0%) during the winter. Shell diameter was smallest in the winter, suggesting that larger/older snails were dying during the winter. However, it was unclear whether the seasonal variation of acanthocephalan infections was a result of snail mortality due to snail age or co-infections. To control for this, additional experiments were implemented. First, laboratory *H. trivolvis* snails were exposed to naturally infected ostracods in field cages. Second, a laboratory experiment was conducted by testing the survival of snails naturally infected with acanthocephalans and/or trematodes. Data from snail cage infections were consistent with the field survey, with *N. emydis* infections being highest in the summer (20%) and lowest (0%) in the winter, suggesting that snails were not ingesting infected ostracods during the winter. Finally, the snail survival experiment indicated that snails co-infected with trematodes and acanthocephalans died at a faster rate than snails only infected with acanthocephalans. Taken together, these results suggest that the occurrence of acanthocephalans in snails throughout the year may be influenced by the abundance of infected ostracods, co-infections, and snail population fluctuations during the year.

5. Screening for pathogens of the nine-banded armadillo (*Dasypus novemcinctus*) at its northern range periphery. **CARLY HAYWOOD (GS)**, C.K. NIELSEN (MP), and F. AGUSTÍN JIMENÉZ (MP). Department of Zoology, Southern Illinois University Carbondale, Carbondale, IL 62901.

   Originally endemic to South America, the nine-banded armadillo has steadily dispersed into the United States. They have become a recent addition to the local fauna of Illinois as a putative response to global climate change. With this range expansion comes concern from both wildlife managers and the public for what pathogens armadillos have carried with them into the state. Our ongoing study focuses on the screening of roadkill armadillos for *Trypanosoma cruzi* and

Mycobacterium leprae, two of the most prominent pathogens found in armadillos that are known to infect humans. Necropsies have also been used to screen for various intestinal macroparasites. Roadkill have tested negative for *M. leprae* thus far. Despite *T. cruzi* and its vector being present in Illinois, roadkills have tested negative for *T. cruzi* as well. It is assumed that this is due to previous low densities of armadillo populations in Illinois, along with the idea that dispersing individuals at the forefront of their range are more robust than those individuals at the center of their range. Additional samples will be screened to further support this hypothesis.

6. Molecular phylogenetic analysis of the *Uvulifer* Yamaguti, 1934. **TYLER J. ACHATZ**[1] **(GS)**, STEPHEN S. CURRAN[2] (MP), KAYLYN F. PATITUCCI[1] (GS), ALAN FECCHIO[3] (MP) AND VASYL V. TKACH[1] (MP). [1]Department of Biology, University of North Dakota, Grand Forks, ND 58202; [2]Division of Coastal Sciences, The University of Southern Mississippi, Ocean Springs, MS 39564; [3]Universidade Federal de Mato Grosso, Cuiabá, MT, Brazil.

Uvulifer Yamaguti, 1934 is a small, but globally distributed genus of diplostomid digeneans parasitic as adults in the intestine of kingfishers (Aves: Alcedinidae). Members of the genus are among the most common causative agents of the infamous black spot disease in fish. *Uvulifer* includes arguably between 16 and 19 species worldwide with 6 species reported from the New World. Only one named species of *Uvulifer* has been included in previous molecular phylogenetic analyses, although sequences of multiple unidentified species from North and Central America have been previously published. In this study, we used partial sequences of the nuclear ribosomal *28S* gene and the mitochondrial *CO1* gene to examine phylogenetic interrelationships among several species of *Uvulifer* from North, Central and South America. The combination of morphological and molecular analyses revealed the presence of 2 new species of *Uvulifer* which are being formally described. The phylogenetic interrelationships among *Uvulifer* spp. used in our study did not follow clear patterns associated with either geographic origin of the samples or major morphological characters of adults suggesting close evolutionary interrelationships among members of Uvulifer across the Americas. This study was funded in part by the National Science Foundation project numbers DEB 1120734, the Joe K. Neel Research award from the University of North Dakota, and the Willis A. Reid, Jr. Student Research Grant from the American Society of Parasitologists.

7. Dicrocoeliids from a cloud forest in Ecuador. **DAWN W. CLEVELAND[1] (GS),** TYLER J. ACHATZ[1] (GS), LAWRENCE K. CRONIN[1] (UG), CARLOS CARRIÓN BONILLA[2] (GS), and VASYL V. TKACH[1] (MP). [1]Department of Biology, University of North Dakota, Grand Forks, ND 58202; [2]Department of Biology, University of New Mexico, Albuquerque, NM 87131.

   The Dicrocoeliidae is a highly diverse and globally distributed family of digeneans that includes parasites of amniotic tetrapods, predominantly birds. Most dicrocoeliids parasitize the gallbladder and bile ducts of their definitive hosts. The taxonomic history of the family is very complex and phylogenetic interrelationships among its constituent taxa are still poorly understood. This is particularly true for the dicrocoeliids from South America including those parasitic in mammals. Currently, only a few dicrocoeliid parasites of mammals have DNA sequence data available, none of them came from marsupial hosts. In this study, we have found and described a new species of *Canaania* from Tate's shrew opossum (*Caenolestes fuliginosus*) in Ecuador. This is the first report of any helminths from members of the family Caenolestidae, one of the basal lineages of marsupials. In addition, we found and described a new *Metadelphis* species from Geoffroy's tailless bat (*Anoura geoffroyi*) in Ecuador. We obtained partial sequences of the nuclear large ribosomal subunit DNA sequence data from both forms and incorporated them into a phylogenetic analysis that included all previously available sequences of the Dicrocoeliidae. This is the first study to provide sequence data for the genus *Canaania* and only the second work to report sequence data from *Metadelphis*.

8. What's in our fish? **JAKSON R. MARTENS (UG)**, TYLER J. ACHATZ (GS), VASYL V. TKACH (MP), Department of Biology, University of North Dakota, Grand Forks, ND, 58201.

   Black spot disease in fish is caused by the metacercaria of some digeneans which mostly mature in fish-eating birds; many of these metacercaria belong to the family Diplostomidae (e.g. *Uvulifer*). Black spot disease is characterized by raised, black nodules on the skin, fins, and eyes of fish. In high infections, black spot disease can cause problems such as difficulty swimming resulting in higher vulnerability to predation. While this disease does not pose a health risk to humans if the fish are properly cooked, black spot disease can affect fisheries and sports fishing due to the unsightly appearance of the infected fish. While many ecological studies have been carried out on black spot

disease, few have used molecular techniques. We surveyed the larval digenean parasites on the skin and fins of 5 species of fish throughout North Dakota and Minnesota. In addition, we examined the brain, eyes, and liver of some fishes. We used partial sequences of the nuclear *28S* ribosomal and mitochondrial *CO1* genes to differentiate between taxa. On the skin, we found representatives of 1 genus from the Apocreadiidae, 4 genera from the Diplostomidae, 2 genera from the Echinostomatidae, 2 genera from the Heterophyidae, 1 genus from the Nudacotylidae, and 1 genus from the Opisthorchiidae. We identified 6 genera of diplostomids infecting the brain, eyes and liver. In total, we found 30 species of digenean parasites. This study was funded in part by the Willis A. Reid, Jr. Student Research Grant from the American Society of Parasitologists.

9. Picky parasites? Parasites detect the infection status of potential hosts. **J. TREVOR VANNATTA (GS)[1]** , THOMAS KNOWLES (UG)[1] , DENNIS J. MINCHELLA (MP)[1] , and ALYSSA M. GLEICHSNER (MP)[2]. [1] Department of Biological Sciences, Purdue University, 915 West State Street, West Lafayette, Indiana, USA; [2] Department of Biological Sciences, SUNY Plattsburgh, 101 Broad Street, Plattsburgh, New York, USA.

   The manipulation of host organisms by their parasites has captured the attention of behaviorists, parasitologists, and the public. However, our knowledge of parasite behavior independent of a host is limited despite the far-reaching implications of parasite behavior. Parasite behaviors can help explain trematode community structure, the aggregation of parasites within host populations and can potentially be harnessed in biocontrol measures. In this study, we used a simple choice chamber design to examine whether trematode parasites can detect the infection status of a potential host and avoid hosts infected with a competitively dominant species. Our results show that *Schistosoma mansoni*, a competitively subordinate species, can detect and avoid hosts infected with a competitively dominant parasite, *Echinostoma caproni*. However, *Echinostoma caproni*, despite showing a significant preference for snails infected with *S. mansoni* over uninfected snails, showed little ability to detect the infection status of the host or even the hosts' presence. We propose subordinate species may be under stronger selection to avoid dominant competitors, whereas dominant competitors may be more strongly selected to find any suitable host regardless of infection status. Previous research has focused on parasites distinguishing between 'host' and 'non-host', which has variable evolutionary costs and benefits. However, the ability of

subordinate parasites to determine the infection status of a host results in a consistent evolutionary advantage.

10. Phylogeny and diversification of *Gastrotaenia*, the most secretive tapeworms on Earth. **MITCHELL FLOURA**[1] **(UG)**, DANIEL GONZÁLEZ-ACUÑA[2] (MP), TYLER ACHATZ[1] (GS) and VASYL V. TKACH[1] (MP). [1]Department of Biology, University of North Dakota, Grand Forks, ND 58202; [2]Department of Animal Science, Faculty of Veterinary Sciences, Universidad de Concepción, Chillán, Chile.

    Adult stages of all Eucestoda inhabit gastrointestinal tract of their vertebrate hosts. All eucestodes with the exception of a single genus, live in some part of the intestine or cloaca. The only exception is *Gastrotaenia* (Hymenolepididae, Cyclophyllidea) found in waterfowl. These cestodes not only uniquely moved from the intestine to stomach, but in order to avoid the acidic pH they live under the lining of the gizzard of ducks, geese and swans. In addition, *Gastrotaenia* lost visible external segmentation, a condition known among cyclophyllideans only in the family Nematotaeniidae and another hymenolepidid genus, *Nematoparataenia*. Moreover, *Gastrotaenia* spp. apparently lack genital pores. Due to their unusual morphology, *Gastrotaenia* and *Nematoparataenia* have been placed in the past in their own separate order Aporidea which was not accepted by most researchers. Merely 2 valid species of *Gastrotaenia* have been recognized until now with only the type-species *Gastrotaenia cygni* is known from the Western hemisphere. No molecular data exists for *Gastrotaenia* spp. and their phylogenetic relationships have never been examined. In this study we used partial sequences of the nuclear ribosomal 28S gene and mitochondrial nad1 gene of *Gastrotaenia* samples collected in North and South America, and Europe, to explore the diversity and phylogenetic interrelationships within the genus as well as its position among the Hymenolepididae. Our results significantly expanded the known diversity and geographic distribution of *Gastrotaenia*, and demonstrated its phylogenetic position among basal taxa of the Hymenolepididae. This study was funded in part by the NSF project DEB 1120734..

11. On the impediment to identify species of *Oswaldocruzia* (Nematoda) in neotropical amphibians. **VICTORIA PHILLIPS (GS)** AND AGUSTIN JIMENEZ (MP), Department of Zoology, Southern Illinois University Carbondale, Carbondale, IL 62901.

The cane toad (*Rhinella marina*), is a neotropical amphibian with a range extending more than 6,200km from Brazil to northern Mexico. It has recently been introduced to parts of Florida and Australia where it behaves as an invasive species. The helminth community of this amphibian needs to be thoroughly characterized across its range to identify generalist species of parasites that represent potential risk of introduction of invasive parasites that can be spread with the cane toad. A survey of parasites of local fauna was conducted in southern Mexico and one of the nematodes present belongs to Oswaldocruzia *spp.* Species of *Oswaldocruzia* resemble *O. subauricularis*, which was originally described in Brazil. The species has been reported consistently in the cane toad throughout Mexico and parts of South America, yet there is no publicly available barcode for the species to confirm its identity. Since no barcode is publicly available we sequenced the ITS and cox1 gene regions of the nematodes using published primers. We have inferred the identity of the species and have linked sequence data and morphological characteristics by correlating entries in GenBank and the H.W. Manter collection of parasitology.

12. Documenting the materialistic evidence of tick diversity and their expansion. **VICTORIA PHILLIPS (GS)**, ELLIOT ZIEMAN (PD), AND AGUSTIN JIMENEZ (MP), Department of Zoology, Southern Illinois University Carbondale, Carbondale, IL 62901. Department of Biology, Wilmington College, Wilmington, OH 45177.

    Changes in the distribution of vectors and vector borne diseases respond to shifts in environmental conditions that favor disease transmission. These changes are documented through literature and the deposition of specimens in scientific collections. In southern Illinois, there are sporadic records of the abundance and distribution of ticks in the region. The inconsistent information makes it difficult for health officials to develop strategies of prevention against tick borne illnesses. I propose to survey the tick species in southern Illinois, screen them for pathogens, and deposit specimens in publicly available collections with browsable search engines. Collections will be conducted at 30 different sites across southern Illinois that have been placed in urban areas, roadsides, or frequented natural areas with edge habitat as they present the greatest risk of transmission to humans. Sites will be surveyed every 2 weeks from May-September utilizing the tick dragging technique. I will excise genomic DNA from the anterior quarter of the tick, as pathogens are in the salivary glands, and use primers specific to each bacterium to amplify target gene regions through PCR. The data gathered will be used

to analyze potential tick-borne disease risk in southern Illinois. The rest of the tick will be deposited in the Harold W. Manter Laboratory, University of Nebraska, Lincoln and the National Tick Collection to provide evidence of species present. Documenting the presence of vectors and vector borne diseases may help health officials to identify areas of greater risk and enable them to educate the public about their presence.

13. Malaria eradication in Central America: potential role of drug-treated cattle. **STACI DREYER** (GS) and JEFFERSON VAUGHAN (MP)**.** Department of Biology, University of North Dakota, Grand Forks, ND 58202.

    Malaria is a tropical disease transmitted to humans by *Anopheles* mosquitoes. In Central America, there are hopes that malaria eradication can be achieved in our lifetime. Eradication will require strategies to control *Anopheles* species that feed both on humans and livestock. One strategy is to treat livestock with drugs and render cattle "poisonous" to mosquitoes that feed on them. My research tested the effectiveness of two drugs used routinely in cattle to control ticks (i.e., ivermectin and fipronil) against *Anopheles albimanus*, a Central American malaria vector. A small pilot trial involving six heifers was conducted in Belize, using wild-caught local mosquitoes. The fipronil-treated heifers killed mosquitoes up to two weeks. An ivermectin-treated heifer killed mosquitoes up to one week. Fipronil also inhibited ovarian development in the treated mosquitoes. This project demonstrates that treating livestock with commercially-available drugs could assist malaria eradication efforts in Central America.

14. You're only as old as you feel: Wing damage as a correlate of parasitoid age. **JAMES RUDOLPH MIKSANEK (GS)** and GEORGE E. HEIMPEL (MP), Department of Entomology, University of Minnesota, Saint Paul, MN 55108.

    Free-living adult parasitoids require nutrients for reproduction and survival. For aphid parasitoids, protein is obtained from the host hemolymph and sugar from honeydew. For these parasitoids, lifespan will not only be negatively affected by low host densities, but will be lower in the field (than in the lab) because of uncontrolled environmental factors. We tested this hypothesis using *Aphelinus certus* (Hymenoptera: Aphelinidae), which is an introduced parasitoid of soybean aphid (*Aphis glycines*; Homoptera: Aphididae*)* in North America. We exposed *A. certus* females to different host densities until

death and used a logistic model to calculate the number of hosts required for parasitoids to reach their maximum lifespan, finding that parasitoid survival was severely challenged at low host densities. At death, we graded the damage along the edge of the forewings and correlated this value with age to construct a wing wear index. This index was used to estimate the age of field-collected parasitoids, suggesting that parasitoids have a marginally shorter lifespan in the field. These results detail a relatively unstudied phenomenon of density dependence that may strongly influence host–parasitoid population dynamics and ecology.

15. Use it before you lose it: Incorporating fecundity compensation into population and infection dynamics. **J. TREVOR VANNATTA (GS)** and DENNIS J. MINCHELLA (MP), Purdue University, West Lafayette, IN, 47907.

    Fecundity compensation, a temporary increase in reproductive output from hosts prior to parasitic castration, was first described nearly 40 years ago. In the intervening period, fecundity compensation has been demonstrated in selected laboratory systems across various species. However, the ecological significance of fecundity compensation has remained largely unexplored. This is partly due to the highly dynamic and temporally brief window in which fecundity compensation occurs. Traditional models of disease transmission largely ignore fecundity compensation or distill the phenomenon done to a constant rate. We developed an individual-based model to explore fecundity compensation in a simplified human-schistosome system. Individual-based modelling allowed us to know the age of infection of each individual in our model and assign them to either a fecundity compensation, castrated, or uninfected state. This simulation was developed to answer two primary questions: 1) Does fecundity compensation sustain susceptibility in snail populations? and 2) Does fecundity compensation alter snail population dynamics? Our simulation models successfully produced spatial heterogeneity in infection and snail populations. Interestingly, fecundity compensation had no impact on the overall population size or variance of snails. However, fecundity compensation may impact selection on resistance. Additionally, our models suggest that the magnitude of fecundity compensation itself presents a tradeoff that may be selected for or against. These results suggest that research focused on snail control or resistance traits in snail populations cannot ignore fecundity compensation.

16. Development and distribution of two neogregarines (*Mattesia* sp. and *Ophryocystis elektroscirrha*), infecting the hypodermis of fire ants, Solenopsidini, and milkweed butterflies, Danaini, RYAN P. SHANNON (GS), LAUREN NADEN (UG), KRISTEN A. BAUM (MP), and **MATTHEW G. BOLEK (MP)**. Department of Integrative Biology, Oklahoma State University, Stillwater, OK..

    Neogregarines infect the fat-body, hypodermis, intestines or Malpighian tubules of insects. All *Mattesia* species undergo intracellular schizogony in the fat-body or Malpighian tubules of beetles, moths, and fleas, with the exception of two species, which develop in the hypodermis of ants. Additionally, all *Ophryocystis* species undergo extracellular schizogony in the Malpighian tubules of beetles, except for *O. elektroscirrha*, which undergoes intracellular schizogony in the hypodermis of Danaid butterflies. Using histological and SEM techniques, we examined the development, distribution and pathology of a *Mattesia* sp. in red imported fire ants, *Solenopsis invicta* and *O. elektroscirrha* in monarchs, *Danaus plexippus* and queens, *D. gilippus*. Our results indicate that oocysts of *Mattesia* sp. were always located within the hemocoel of their ant hosts. Oocysts were distributed throughout the head, thorax and abdomen, and thousands of oocysts were observed surrounding the brain of infected ants. In contrast, oocysts of *O. elektroscirrha* in butterflies were distributed on the cuticle surface and on inverted cuticular organs of hypodermal origin. Importantly, oocysts were commonly embedded in the cuticle of female monarch butterflies, while no oocysts were ever embedded in the cuticle of queen butterflies. These observations may be important as previous studies indicate that female monarchs lose weight at a faster rate than uninfected monarchs; suggesting *O. elektroscirrha* infections may increase the rate of water loss through the cuticle. It is currently unclear what effects the occurrence of *Mattesia* sp. oocysts surrounding the brain of infected fire ants may have on ant fitness or behavior.

17. Effect of phytochemicals on *Trichomonas tenax* (Trichomonadida: Trichomonadidae) viability. DEBORAH A. HUDMAN (T), HANNAH C. MOTES (GS), NICOLE C. LIGHTHOUSE (GS), and **MELISSA K. STUART (MP).** Department of Microbiology/Immunology, Kirksville College of Osteopathic Medicine, A.T. Still University of Health Sciences, Kirksville, MO 63501

The incidence of oral colonization by the protozoan *Trichomonas tenax* correlates with gingival inflammation and periodontitis in humans. Nevertheless, dentists are reluctant to prescribe antimicrobials to patients with oral trichomoniasis. Here we determined whether phytochemicals extracted from foods and nutritional supplements inhibit *T. tenax* viability and thus might help reduce the parasite burden in the oral cavity. For viability screening assays, trophozoites (10^5/well) were cultured in 96-well plates in LYI medium containing 0.02% w/v solutions of grape seed, jujube fruit, green tea, pomegranate seed or black tea, or with 100 μM tomatine or tomatidine hydrochloride. After 24 h of culture at 35ºC, trophozoite viability was determined by MTT assay. Data were averaged for 3 to 7 trials per compound and were expressed as percent inhibition of viability ± SE. Pomegranate seed extract (38%±7) and green tea polyphenols (22%±10) were the most inhibitory of the phytochemicals tested. Jujube extract and tomatidine hydrochloride stimulated *T. tenax* proliferation, yielding negative inhibition values of −8%±5 and −5%±10, respectively. The positive control for inhibition, 100 μM metronidazole, caused a 75%±7 reduction in trophozoite viability compared to regular medium. For compounds that were inhibitory in the screening assay, IC_{50} values were determined after 8 h of culturing *T. tenax* with serial dilutions of the compounds. IC_{50} values were found to be: pomegranate seed extract, 0.0096%; green tea polyphenols, 0.077%; and metronidazole 43.6 μM. From these results, we conclude that pomegranate seed extract and green tea polyphenols show promise for suppressing *T. tenax* oral infections.

18. Optimizing infectivity of *Brugia microfilariae*. DUENING A (UG), HARTER B (T), and **MICHALSKI ML (MP).** Department of Biology, University of WI Oshkosh, Oshkosh, WI 54901.

Brugia pahangi, a species of filarial worm, is maintained at the University of Wisconsin Oshkosh for research through the Filariasis Research Reagent Resource Center. The primary methods of obtaining *Brugia pahangi* from their gerbil host include removing them from the peritoneal cavity,. While worms obtained subcutaneously tend to be more infective to the mosquito host, worms taken from the intraperitoneal cavity are more numerous. However, there have been observations made that suggest intraperitoneally-obtained worms that are allowed to incubate in blood become just as infective as those obtained subcutaneously obtained. To test this hypothesis we obtained microfilaria stage worms from the peritoneal cavity of experimentally infected Mongolian gerbils, incubated them in commercially obtained

rabbit blood, then fed them to adult female *Aedes aegypti*, a species of mosquito and vector of these worms. The infectivity of these worms after 0 hours, 3 hours, 6 hours, and 24 hours of blood incubation was measured by determining the number of third stage larvae recovered from mosquitoes two weeks after infection. It was determined that incubation times of 0,3, and 6 hours were correlated with higher L3 recoveries, and that the difference between 3 hour incubation and 24 hour incubation was statistically significant ($p \leq 0.05$) as measured by one way analysis of variance and Tukey's honest significant difference test. These findings will help to increase the efficiency in which *Brugia pahangi* is maintained in a laboratory setting.

19. Sampling the Land of Fire and Ice: The First Documentation of Hairworms (Phylum Nematomorpha) in Iceland **CHRISTINA ANAYA (GS)** AND MATTHEW G. BOLEK (MP). OKLAHOMA STATE UNIVERSITY.

    The Phylum Nematomorpha are parasites of terrestrial arthropods with a complex life cycle that includes a free-living and parasitic phase with multiple hosts. Hairworms have been described as one of the most understudied groups of parasites because it has been suggested that only 18% of an estimated 2000 hairworm species have been described. New techniques such as using snails as hairworm biodiversity indicators are now being used but a lack of sampling contributes to the low species diversity of hairworms compared to other parasite taxa. The purpose of this study was to conduct a survey of Gordiids using freshwater snails throughout Iceland, where despite evidence for hairworms, no species have been described from this sub-Arctic region. Of 68 sites, two were positive for hairworm adults, two additional sites were positive for cysts in snails only, and one site was positive for both adults and cysts. We also examined museum specimens and documented five additional sites where adult hairworms were collected in the past. During surveys, ground beetles were collected, and one was found to be infected with an immature hairworm, providing evidence for at least one definitive host. Using microscopy, we found adults to have characters consistent with the genus *Gordionus*, a genus commonly found throughout Europe. To our knowledge, these findings represent the first description of a Nematomorph from Iceland and the first documentation of cysts for this genus of hairworms. Notes on collection, cysts prevalence in aquatic snails, and future directions for this research will be discussed.

20. Infection by parasites reduces predation risk by dragonfly nymphs in isopod prey. **OLWYN C. FRIESEN (PD)**, Department of Biological Sciences, University of Manitoba, Winnipeg, MB, Canada, SARAH GOELLNER (GS), Department of Infectious Diseases, University of Heidelberg, Heidelberg, Germany, ROBERT POULIN (MP), Department of Zoology, University of Otago, Dunedin, New Zealand and CLEMENT LAGRUE (MP), Department of Biological Sciences, University of Alberta, Edmonton AB, Canada.

    Parasites can modify the phenotype of their hosts, leading to changes in host vulnerability to predation. Trophically transmitted parasites often rely on these changes to increase their probability of transmission to the next host or alternatively, reduce their chances of being consumed by the wrong predator/host species. However, many phenotypic changes may actually increase the host's vulnerability to other predator species that are 'dead-ends' for the parasite, reducing parasite fitness while potentially impacting host populations. The isopod *Austridotea annectens* serves as intermediate host to the trematode *Maritrema poulini*. Infected isopods display changes in behaviour that may increase transmission of the parasite to bird definitive hosts. We tested the role of *M. poulini* infection on predation risk of isopod hosts by a dragonfly nymph (*Hemicordulia australiae*), a 'dead-end' host for the parasite. Pairs of size-matched isopods were exposed to dragonfly nymphs and observed until the predator captured one individual, after which parasite abundance in each isopod was determined via dissection. Isopods with lower parasite abundance were significantly more likely to be caught by dragonfly predators. Several mechanisms may explain this differential predation risk. Behavioural modification by the parasites may be altering isopod behaviour to avoid predation by dead-end hosts, such as decreasing movement and burrowing. Alternatively, increased activity levels may allow heavily infected isopods to avoid predation by sit and wait predators like dragonfly nymphs. Assessing the effects of parasites on their host's ability to avoid predation is crucial to understand how parasites may affect population dynamics and ecosystem structure.

21. Molecules and morphology of some Haploporidae (Digenea) possessing a caecum. **ERIC E. PULIS (MP)[1]**, MICHAEL J. ANDRES (MP)[2], THOMAS H. CRIBB (MP)[3], ROBIN M. OVERSTREET (MP)[2], [1]Department of Science and Mathematics, Northern State University, Aberdeen, SD, 57401 [2] Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 East Beach Drive, Ocean

Springs, MS, 39564; [3]School of Biological Sciences, The University of Queensland, QLD 4072, Australia.

The definitive hosts of Haploporidae are primarily fishes of the family Mugilidae in the tropics and subtropics. Historically the family has been divided according to the nature of the reproductive system and the development of miracidium in-utero. Several species of Haploporidae possessing an undivided caecum are reported and characterized. By using a combination of morphological and molecular data the reported species were found to be closely related, in contrast to what was expected based on the nature of the reproductive systems and requires several changes to the organization of the Haploporidae. Phylogenetic hypotheses based on analysis of partial 28S sequences with other available haploporid sequences indicate that 1) members of *Malabarotrema, Unisaccoides*, and *Unisaccus* are more closely related to each other than to other species of haploporids; 2) Waretrematinae is not a monophyletic group when species of *Unisaccus* are excluded; and 3) the clade formed by species of *Malabarotrema*, *Unisaccoides*, and *Unisaccus* are well supported within the Waretrematinae. Reduced vitellarium and the presence of eye-spotted miracidium in-utero are not considered characters that exclude species from Waretrematinae.

22. Role of oxylipins in host-parasite interactions. **OLWYN C. FRIESEN (PD),** Department of Biological Sciences, University of Manitoba, Winnipeg, MB, Canada, R3T 2N2, HAROLD AUKEMA (MP), Department of Food and Human Nutritional Sciences, University of Manitoba, Winnipeg, MB, Canada, R3T 2N2, and JILLIAN DETWILER (MP), Department of Biological Sciences, University of Manitoba, Winnipeg, MB, Canada, R3T 2N2

    Many parasites alter the behaviour of their hosts to increase the likelihood of transmission, but the mechanisms underlying this interaction are poorly understood. Some hosts and parasites release chemical signalling molecules that may affect transmission, but the limited taxonomic and contextual scope of these studies limits our ability to understand the role of signalling molecules, like oxylipids, in parasite-modified behaviour. Thus, we characterized oxylipins in two species of freshwater snails that are commonly infected with trematode parasites. We tested for differences in the diversity and amounts of oxylipins based on host species, host diet, infection status, and parasite activity. Oxylipins were extracted from snail-conditioned water samples and quantified using high performance liquid chromatography-tandem mass spectrometry. Preliminary results indicate that the

diversity and amounts of specific oxylipins differ between host species and according to infection status. In contrast, parasite activity did not affect most oxylipins. Snails are required hosts in the life cycles of many trematode parasites. By determining the factors that affect oxylipins, we will better understand their function in this essential host-parasite relationship. As parasite behavioural modification can play an important part in ecosystem structure and function, further understanding of the mechanisms behind these interactions is crucial.

23. The making of a soldier: What can neogregarines in the genus *Ophryocystis* tell us about the evolutionary history of their danaid butterfly hosts? **MATTHEW G. BOLEK (MP)**, RYAN P. SHANNON (GS), DAVID D. BERMAN (GS), and KRISTEN A. BAUM (MP), Department of Integrative Biology, Oklahoma State University, Stillwater, OK.

Ophryocystis elektroscirrha infects the hypodermal tissues of monarch (*Danaus plexippus*) and queen butterflies (*D. gilippus*); and can be transmitted horizontally, maternally and/or sexually. However, the diversity of these parasites in other butterfly species is unknown. To evaluate this, we examined 45 species of milkweed butterflies from 9 genera collected on 5 continents; including all 11 *Danaus* species (monarchs, tigers, and queens) for *Ophryocystis* infections. Based on oocyst morphology and ITS rDNA sequences, only 4 species of milkweed butterflies in the genus *Danaus*, from 2 subgenera, were infected with 3 linages of *Ophryocystis*. More interestingly, for maternally and sexually transmitted parasites, the distribution of *Ophryocystis* linages on the *Danaus* phylogeny was peculiar. *Ophryocystis* occurred in 3 of 4 species of queens (subgenus *Anosia*), 0 of 4 species of tigers (subgenus *Salatura*; the sister clade to queens) and 1 of 3 species of monarchs (subgenus *Danaus*). Because recent genomics studies suggest post-speciation gene flow between queens (*D. gilippus*) and monarchs (*D. plexippus*), and queens and their sister species the soldier (*D. eresimus*), we conducted crosses between monarchs and queens, and evaluated a mitochondrial gene (partial COI) for various subspecies of monarchs, queens and soldiers. Our results suggest that mitochondrial introgression between monarchs, queens and their hybrids resulted in multiple linages of soldiers, some of which are more closely related to monarchs while others are more closely related to queens. The implications of our findings are discussed in terms of host switching events for sexually transmitted parasites and conservation efforts for monarch butterflies..

SUMMARY OF THE 70TH ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS.

The 70th Annual Midwestern Conference of Parasitologists was held on May 31–June 2, 2018, at eastern Illinois University in Charleston, IL. Dr. Sarah Orlofske, served as Presiding Officer during the meeting. Dr. Jeffrey Laursen of Eastern Illinois University made local arrangements and served as Program Officer. Thirty members registered and participated in the meeting.

The meeting was filled with interesting and informative presentations that consisted of eleven talks, and six posters, a symposium on the utility of molecular and life-history data, a keynote address on complexity of disease risks in amphibian populations, and a demonstration of microfilarial resources available through NIH/NIAID Filariasis Research Reagent Resource Center. Three awards were given to student members of AMCOP this year. The C. A. Herrick Award and $300 for the outstanding student poster, which is sponsored by ELANCO Animal Health, was awarded to Ryan Koch from Oklahoma State University for his poster "Infection dynamics and host-parasite interactions of the snail host, *Helisoma trivolvis,* to the acanthocephalan, *Neoechinorhynchus emydis*." The G. R. LaRue Award and $300 for outstanding student talk was awarded to Tyler Achatz of the University of North Dakota for his presentation "Molecular phylogenetic analysis of the Cyathocotylidae." Chi Peng from Berea College was awarded the R. M. Cable undergraduate award and $200 for her presentation "Biology of the cercaria of *Leuceruthrus micropteri* (Trematoda: Azygiidae) recovered from the snail, *Pleurocera semicarinata.*" The presentation by Tyler Achatz was chosen as the best overall presentation and, as such, he received a $250 travel award and is the AMCOP nominee for the American Society of Parasitologists' (ASP) student travel grant award for 2018. In addition, to encourage our presenters to take their presentations to other meetings, all annual winners are invited to claim an additional $200 to support travel to a scientific meeting prior the next AMCOP meeting.

The AMCOP symposium on molecular and life history data

questions was presented by Dr. Vasyl Tkach, from the University of North Dakota, and Dr. Matt Bolek, from Oklahoma State University. Dr. Tkach's talk was titled **"**Molecular systematics and taxonomy of helminths: exciting developments and some pitfalls" Dr. Bolek's presentation was titled **"**What can parasite life cycles teach us about the taxonomy, systematics, and hidden biodiversity of parasites and their hosts?" The keynote speaker at our banquet Friday evening was Dr. Jason Hoverman, from Purdue University. He engaged us with his presentation about aspects disease ecology related to amphibians, which was titled "Exploring the complexities of disease risk in amphibian populations."

At the Business Meeting, reports were received from the various committees. The first of these was the Auditing Committee, composed of Doug Woodmansee and Thomas Platt. After review of financial statements, receipts, account registers, and tax documents, the committee found AMCOP's financial records to be in order. Secretary/Treasurer Sorensen followed this report by presenting the Treasurer's report for 2017 and the interim financial report for 2018. These reports were both approved by the membership.

The Meeting Sites Committee confirmed that AMCOP 71 would be held in 2019 at Minnesota State University Mankato, Mankato, MN. Respective Program Officers for AMCOP 72–74 confirmed the availability of those meeting sites. In addition, the University of Wisconsin-Oshkosh was approved as the site for AMCOP 75. The future meeting sites are:

AMCOP 72—2020: St. Norbert College, DePere, WI
AMCOP 73—2021: Southern Illinois University, Carbondale, IL
AMCOP 74—2022: University of Wisconsin-Stevens Point, Stevens Point, Wisconsin
AMCOP 75—2022: University of Wisconsin-Oshkosh, Oshkosh, Wisconsin

The Nominating Committee put forward the following nominations for AMCOP 71 leadership positions: Vasyl Tkach, University of North Dakota (Presiding Officer), Robert Sorensen, Minnesota State University Mankato (Program Officer); Robert Sorensen, Minnesota

State University Mankato (Secretary/Treasurer, 2-year term). The nominated candidates were elected to their positions by a majority of the membership. Doug Woodmansee and Robert Jadin volunteered to serve on the Student Research Grant committee for a two-year term, replacing Rosen and Laursen. Shelly Michalski, who volunteered to be on this committee just prior to AMCOP 70, agreed to continue her role on that committee for another year.

The Symposium Suggestion Committee (Robert Jadin, Jacob Shurba) suggested the following topics: Hyperparasitism; Metadata Bioinformatics; and Parasite Epidemiology.

The Resolutions Committee (Agustín Jiménez, Matt Bolek) entertained the membership with their eloquently composed consideration for all involved in making AMCOP 70 a great success. Their report also included sincere thanks to the organizations that provide financial support to AMCOP. These organizations include Elanco Animal Health, a division of Eli Lilly Company, for its continued support ($300) of the C.A. Herrick Award; PLoS Pathogens, for their support ($500) of the G. R. LaRue, and the R. M. Cable Awards; the American Society of Parasitologists ($250) for their continued support of the Best Overall Presentation award; and W. Nuhsbaum, Inc., a regional Leica dealer, for their support ($250) of invited speaker travel expenses.

The AMCOP Student Research Grant Committee—Kim Bates (Chair), Ron Rosen, Shelly Michalski, Jeff Laursen, and Dennis Minchella—reported its decision for recipients of the AMCOP Student Research Grant. This year's graduate student grants was awarded to Haitham Alnaqeb, from Oklahoma State University ($500)" and to Sarah Porter, from Western Illinois University ($500).

The annual silent auction included the sale of 23 donated items raised $227 to support future AMCOP activities. A highlight of the silent auction was Dr. Michalski's closeout sale of Lab Goddess merchandise. Following her sale, Shelly generously donated $190 to the silent auction fund.

Items brought forward for discussion during the Business Meeting included a decision to have the Secretary/Treasurer complete paperwork and pay necessary fees to obtain 501(c)(3) tax-exempt status for AMCOP. A draft version of a revised AMCOP Organizing Document and Bylaws was updated and accepted by majority vote to replace the existing document. Dissolution of the Sponsorship Committee was another action taken during the Business Meeting. In its place all AMCOP members are encouraged to use their connections with businesses, organizations, and individuals to seek funding sources to continue AMCOP's objectives. Questions about membership and attendance patterns were discussed during the Business Meeting. A suggestion was put forward that the Secretary/Treasurer should request access to the American Society of Parasitologists email list to ensure that AMCOP announcements are reaching all ASP members in the Midwest. There was also discussion about developing a new mechanism for getting broader AMCOP membership input on future Symposium topics to include suggestions for the names of speakers that could best present on the suggested topics. Secretary/Treasurer Sorensen agreed to look into using an online polling system, like SurveyMonkey to facilitate that process.

Prepared June 6, 2018
Robert Sorensen
AMCOP Secretary/Treasurer

REPORT OF THE 70TH AMCOP RESOLUTIONS COMMITTEE

Matthew Bolek and Agustín Jiménez

As parasitologists from every corner of the Midwest converged under the commanding, medieval looking tower of Old Main to find their way to the Life Science Building in the campus of Eastern Illinois University on May 31- June 2, 2018.

As said parasitologists met at the most aptly named watering whole, "Dirty's" just to remind them of the long days of field work, laboratory setups and the necropsy of the occasional roadkill.

Therefore, we acknowledge with the utmost thanks the following:

Dr. Jeff Laursen, Program Officer, for his attention to detail and for being and amazing, relaxed host.

Cheryl Laursen, for the preparation of a substantial casserole that fueled the energy of young and seasoned scientists.

Dr. Douglas Klarup, Dean of the College of Sciences for his welcoming and introductory remarks.

Dr. Sarah Orlofske, for fulfilling the duties of Presiding Officer with firmness and poise, keeping every presenter on track of time, expect, for that one time.

Drs. Vasyl Tkach and Matthew Bolek, who must have felt like baseball starter pitchers, by being part of the first AMCOP symposium to be delayed by rain. They presented the details of their research on taxonomy and biodiversity of parasites on butterflies and Burmese pythons, herons and shrews, bats and blue tongued skinks.

Dr. Jason Hoverman, for unpacking the complexities of disease risk in amphibian populations, affected by commercial chemicals, hungry insect larvae and a changing world! His presentation was an elegant dissection of the complex experimental designs crafted to document the evolution of resistance.

The American Society of Parasitologists, for support of Travel Awards.

W. Nuhsbaum Leica's representative for supporting the travel expenses of the Invited Speaker.

Elanco Animal Health, for supporting the Herrick Award.

PLoS Pathogens, for support of the Cable and La Rue awards

Whereas the ubiquitous pinfish finds the greatest parasite diversity among beds of sea grass, and the quiet secrets of frog trypanosomes kept a maritime theme featuring forms that look like sails.

Whereas partial and complete nematodes, and other parasites like acanthocephalans are present in the squished barn swallow, yet several mysteries of the nematodes can be unravel by the careful observation of their caudal bursas and study of their DNA molecules.

Whereas, the dissertation about how the cystophorous cercaria forms its capsule by a synchronized wiggling, knock everybody's socks off.

Whereas we learned the ways, *Neochinorhynchus* cystacanths find a way to mingle with snails, and how cats and bobcats, while encountering ticks cannot scape their infection fate.

Whereas, the members of *Cyathocotyle* where shown to fluke their way around the world, switching from snakes to dolphins, mallards to crocodiles and the methods of botfly infection, include the methodical organization to the point to demand color coded gloves for the one who is ambidextrous.

Whereas the passionate exposition of the Konza Prairie nematodes instilled such concentration to away time from the last presentation, in which Presiding Officer Orlofske still had the time to provide a detailed guide and methods of how to incorporate the parasitological teaching curricula to every field of biology.

Whereas, the dynamic presentation by the filarial Goddess brought joy and excitement to the members of AMCOP, who felt like that very first time when they observed a wiggling nematode while observing live microfilaria and L3. The joy of discovery reigned on a glorious Midwestern Saturday morning.

With thanks to all students who presented their research in oral and poster platform, we considered the 70th AMCOP to be a rotund success!

THE ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS (AMCOP)

OBJECTIVES AND ORGANIZATION

A restatement to incorporate changes approved in 2018. Earlier statements have been approved in 1948, 1953, 1971, 1972, 1973, 1974, 1986, 1989, 2003 and 2004.

NAME

The organization shall be known as the ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS (AMCOP), hereinafter referred to as the Conference, or as AMCOP.

AFFILIATION

AMCOP is an affiliate of the American Society of Parasitologists.

OBJECTIVES

The Conference is a gathering of parasitologists and students of parasitology for the purpose of informal discussion of research and teaching in parasitology, and the furthering of the best interests of the discipline of parasitology. AMCOP is organized exclusively for charitable scientific purposes under Section 501(c)(3) of the Internal Revenue Code, or corresponding section of any future federal tax code. Upon dissolution or termination of the existence of the Conference, all of its property and assets shall, after payment of the lawful debts of the Conference and the expenses of its dissolution or termination, be delivered, conveyed, and paid over to such organization or organizations at the time exempt under the provisions of Section 501(c)(3) of the Internal Revenue Code, as now or hereafter amended, as the Policy Committee shall determine; example organizations include the American Society of Parasitologists (ASP), or a similar organization with a mission to improve public health and prevention of infectious diseases.

MEMBERS

The Conference is open to all interested persons regardless of place of work, residence, or affiliation in other recognized societies. There are three categories of membership: Emeritus, Regular, and Student. When a member retires from industry, university or other professional occupation, that person shall be eligible for emeritus membership.

DUES

Annual dues are required for emeritus, regular and student membership. The amount of the annual dues are established by the Policy Committee and collected by the Secretary/Treasurer each year.

MEETINGS

The Conference is held in the general midwestern area during early to mid-June, unless otherwise specified by a majority vote of the previous Conference or a majority vote of those listed members replying by mail. A registration fee will be charged to fund annual meetings. A committee composed of the Presiding Officer, the Secretary/Treasurer, and the Program Officer, who is to serve as its chair, will decide the amount of this fee for each Conference in a manner that covers the reasonable cost of space rental, refreshments for the meeting, and annual operating costs for AMCOP. This committee will also approve reasonable costs negotiated by the Program Officer for lodging and an affordable banquet at the conference site. Registration, lodging, and banquet charges will be collected from AMCOP members before the annual conference.

BYLAWS

1) Simple majority vote of members in attendance at regularly scheduled meetings of the Conference shall determine the policies of the Conference.

2) The AMCOP officers are a Presiding Officer, whose term of office is one year or until a successor is elected (normally the term expires with adjournment of the annual Conference over which the person presides); a Secretary/Treasurer, whose term of office is two years or until a successor is elected; a Program Officer whose term of office is one year; and a Policy Committee composed of the last five available retired Presiding Officers plus, *ex officio* and without vote, the current Presiding Officer and Secretary/Treasurer. All terms of office of each full member of the Policy Committee is five years, or so long as the person is one of the five most recent, available Presiding Officers. The most recent past Presiding Officer available chairs the Policy Committee and is the Vice-President of the current Conference.

3) The Presiding Officer, the Secretary/Treasurer, and the Program Officer are elected by a majority vote of those members attending a regularly scheduled business meeting of the Conference or by a majority vote of those replying to a mail ballot of the membership.

4) The Presiding Officer shall preside at all meetings of the Conference and shall arrange for a banquet speaker. On the first day of a Conference the Presiding Officer shall appoint the following committees, which shall serve until they have reported on the last day of the annual Conference:

(a) Nominating Committee,
(b) Committee to Recommend Future Meeting Places,
(c) Committee to Suggest Program Possibilities for Future Meetings,
(d) Resolutions Committee,
(e) Awards Committee,
(f) Audit Committee,
(g) such other *ad hoc* committees as may be required.

5) The Presiding Officer shall appoint the Conference Representative to the Council of the American Society of Parasitologists for the year, who must be a member of that society. The current Presiding Officer serves as a member without vote of the Policy Committee.

6) The responsibilities of the Secretary/Treasurer shall include:

a) issue annual dues notices to members who submitted dues during the two preceding years
b) about four months prior to each Conference, inform the new Presiding and Program Officers concerning their duties and the members of the Policy Committee of their tenure
c) about two months prior to each Conference, issue a call for participants in the program for each Conference
d) within three weeks after the annual election, notify the Secretary of the American Society of Parasitology
e) serve as Secretary of the Policy Committee and as an non-voting *ex officio* member
f) annually submit all necessary tax or business forms
g) and supervise all funds of the Conference.

7) The Program Officer shall be responsible for the general format of the Conference and for arranging suitable facilities and funding. It shall also be this person's responsibility to chair the special committee to determine and collect the registration fee for the Conference. The format of the Conference may vary, but should include both a demonstration session and a session of contributed papers, both open to

all members. A symposium may also be included or may replace a session of contributed papers.

8) The Policy Committee shall determine by majority vote all matters of procedure and policy pertaining to the Conference upon which decision must be reached between consecutive Conferences, as well as all matters referred specifically to it by the membership. Such a vote may be requested by any member of the Conference but must be directed through the Secretary/Treasurer. The Chairperson of the Policy Committee shall request approval by the membership for all decisions of the Committee at the earliest subsequent business meeting of the Conference.

9) The Conference confers three major awards during its annual meeting to student participants. These are the Chester A. Herrick Award, sponsored by the ELANCO Animal Health., for the best poster/demonstration of parasitological research, the George A. LaRue Award for the best oral presentation of parasitological research, and the Raymond M. Cable Award for best presentation given by an undergraduate student. Honorable mention awards will be given to the second-place poster/demonstration and second place oral presentation at the discretion of the awards committee. All awards are supported by donations from AMCOP membership, unless other organizations, companies, or any other non-member entities provide sponsorship or donations.

    a) A 3-person Awards Committee, appointed at each annual meeting by the Presiding Officer, will select the winner of each award. The committee will establish the criteria for judgment each year.
    b) The size of the Herrick and LaRue awards shall traditionally be $300. The Cable undergraduate award shall traditionally be $200 and honorable mention awards shall traditionally be $100. Awards may vary according to funds available from contributors.
    c) No person may win the same award more than one time while in student status. Likewise, no student may win both awards at the same meeting. However, one person may win each award while a student in different years.

10) Symposium and Keynote speakers for the annual meeting may request travel reimbursement by contacting the Secretary/Treasurer and submitting any necessary forms in a timely manner.

11) While such funds are available, a mini-grant program of $1000 is being made available to promote research activities by student members of AMCOP. The general outline for the program is that:

a) At least two grants, one for undergraduate students and the other for graduate students, will be awarded each year, given there are sufficient high-quality grants. The maximum amount of any grant is $500 and it is up to the discretion of the Grant Committee, as to the amount and number of smaller awards. The intention is to provide equal funding to undergraduate and graduate students.
b) Awardees are to be members of AMCOP and are expected to present the results of their work at a future AMCOP.
c) A student may not receive more than two grants.
d) The program will be funded out of the surplus funds in AMCOP's general account beginning in 2012. The ability of AMCOP to fund this program in the upcoming year should be evaluated annually by its members during the business meeting at the annual conference.
e) A Student Research Committee, composed of 5 faculty AMCOP members with offset rotating 2-year terms, will evaluate submitted proposals. Committee members should be chosen to ensure coverage of a variety of areas of expertise in parasitology. Depending upon the year, 2 or 3 new committee members will be selected at each annual meeting.
f) When the annual "Call for Proposals" goes out in spring, it will be transmitted to the American Society of Parasitologists' Secretary-Treasurer, so that it can be advertised to the parent organization.

SUMMARY OF AMCOP MEETINGS 1949-PRESENT

Year	Meeting Site (Conference No.) Banquet Speaker & Title, PO=Program Officer, ST=Secy/Treas, H=Herrick Award, L=LaRue Award, HM=Honorable Mention, C=Cable Undergraduate Award; S=Symposium Title and Speakers	Presiding Officer
1949	Univ. Wisconsin, Madison, WI (AMCOP I)..... J.C. Baer, ST=J. R. Lincicome	Harley J. VanCleave
1950	Univ. Michigan, Ann Arbor, MI (II) ..... W.W. Cort, Trends in Helminthological Research. PO/ST=R. J. Porter	R.V. Bangham
1951	Purdue University, Lafayete, IN (III) ..... J.E. Ackert, Some Observations on Hookworm Disease.	L.O. Nolf

ST=W. Balamuth

1952 Univ. Illinois, Urbana, IL (IV) ..... R.J. Porter
A.C. Walton,
ST=W. Balamuth

1953 Iowa State College, Ames IA (V) ..... C.A. Herrick
R.M. Cable, Parasitological Experiences in Puerto Rico.
ST=W.D. Lindquist

1954 Michigan State Univ., East Lansing, MI (VI) ..... A.C. Walton
G.F Otto, Mosquitos, Worms, Somoans and the Parasitologist in Somoa.
ST=W.D. Lindquist

1955 Notre Dame Univ., IN (VII) ..... R.M. Cable
G.R. LaRue, Relationships in the Development of Digenetic Trematodes.
ST=W.D. Lindquist

1956 Iowa State University, Ames, IA (VIII) ..... W.D. Lindquist
W.H. Headlee,
ST=F.J. Krudenier

1957 Univ. of Michigan, Ann Arbor, MI (IX) ..... J.E. Ackert
A.C. Chandler,
ST=F.J. Krudenier

1958 Kansas St. Univ., Manhattan, KS (X) ..... G.R. LaRue
H.W. Manter, Trematodes of Many Waters.
ST=F.J. Krudenier

1959 Northwestern Univ., Evanston, IL (XI) ..... G.F. Otto
H. Van der Schalie, Contrasting Problems in Conrol of Schistosomiasis in Egypt and the Sudan.
ST=D.T. Clark

1960 Purdue Univ., Lafayette, IN (XII) ..... F.J. Krudenier
P.P. Weinstein, Aspects of Growth and Differentiation of Parasitic Helminths *in vitro* and *in vivo*.
ST=D.T. Clark

1961 Ohio State Univ., Columbus, OH (XIII) ..... N.D. Levine
B. Schwartz, Parasitology Old and New.
ST=D.T. Clark

1962 Univ. of Nebraska, Lincoln, NE (XIV) G.W. Kelley, Jr
O.W. Olsen, The Life History of the Hookworm of Fur Seals.
ST=D.T. Clark

1963 Univ. of Minnesota, St. Paul, MN (XV) M.F. Hansen
F.G. Wallace, Observations on the Louisiana State University Inter-American Program in Tropical Medicine
ST=D.T. Clark

1964 Univ. of Chicago, Chicago, IL (XVI) D.T. Clark
R.E. Kuntz, Paragonimiasis in Formosa.
ST=E. J. Hugghins

1965 Kellogg Biological Station, Gull Lake, MI (XVII) P.E. Thompson
L. Jacobs, Toxoplasmosis.
ST=E.J. Hugghins

1966 Univ. of Illinois, Urbana, IL (XVIII) M.J. Ulmer

D.L. De Guisti, The Acanthocephala.
ST=E.J. Hugghins

1967 Iowa State Univ., Ames, IA (XVIV) P.J. Silverman
N.D. Levine, Parasitology, Problems and Promise.
ST=E.J. Hugghins
H=P.M. Nollen [FIRST HERRICK AWARD]

1968 Univ. of Wisconsin, Madison, WI (XX) F.G. Wallace
D.R. Lincicome, The Goodness of Parasitism. (with APS & AIBS)
ST=J.H. Greve,
H=W.G. Barnes

1969 Univ. of Cincinnati, Cincinnati, OH (XXI) H.W. Manter
H.W. Stunkard, Life Histories and Systematics of Parasitic Flatworms.
ST=J.H. Greve,
H=B. Caverny, H=T.P. Bonner

1970 Loyola Univ., Chicago, IL (XXII) J.L. Crites
M.J. Ulmer, Helminths from Midwest to Mediterranean.
ST=J.H. Greve,
H=H. Blankespoor

1971 Univ. of Louisville, Louisville, KY (XXIII) F. Etges
H. Van der Schalie, Dam Large Rivers-Then What?
ST=J.H. Greve,
H=R. Campbell

1972 Southern Illinois Univ., Carbondale, IL (XXIV) B.J. Jaskowski
R.M. Cable, The Lighter Side of Parasitology.
PO=T.T. Dunagan, ST=J.H. Greve
H=E.M. Cornford

1973 Notre Dame Univ., Notre Dame, IN (XXV) R. Shumard
R.F. Rick, Babesiosis and the Development of *Babesia* in Ticks.
PO=R. Thorson, ST=J.H. Greve,
H=D. Danley

1974 Univ. of Michigan, Ann Arbor, MI (XXVI) D. Ameel
M.J. Ulmer, Snails, Swamps and Swimmer's Itch.
ST=J.H. Greve,
H=P.T. LaVerde and D. Prechel

1975 Iowa State Univ., Ames, IA (XXVII) W. Bemrick
P.M. Nollen, Studies on the Reproductive Systems of Parasitic Flatworms or All You Wanted to Know About Sex in Worms and Were Afraid to Ask.
ST=J.H. Greve,
H=D. Wittrock, L=V.M. Nelson [FIRST LARUE AWARD]

1976 Univ. of Nebraska, Lincoln, NE (XXVIII) J. Greve
A.C. Todd, A Redefinition of Subclinical Parasitism and its Impact on World Politics.
ST=W.H. Coil, PO=M.H. Pritchard,
H=W.L. Current,L=C.A. Klu

1977 Kansas State Univ., Manhattan, KA (XXIX) T.T. Dunagan
A.J. MacInnis, Snails, Dollars, DNA and Worms.
PO=W.D. Lindquist, ST=W.H. Coil,

H=M. Fletcher, L=L. Smurro, L=J. Ketchum

1978 Indiana Central Univ., Indianapolis, IN (XXX) E.J. Hugghins

J.P. Dubey, Recent Advances in Feline and Canine Coccidia and Related Organisms.

PO=M. Brandt, ST=W.H. Coil,
H=D. McNair, L=G.L. Hendrickson

1979 Loyola Univ., Chicago, IL (XXXI) D.E. Gilbertson

E. Foor, Basic Studies in Reproduction (in Nematodes).

PO=B.J. Jaskowski, ST=W.H. Coil,
H=G. Plorin, H=D. Minchella, L=M. Fletcher

1980 Eastern Michigan Univ., Ypsilanti, MI (XXXII) A.D. Johnson

J.R. Williams, Tropical Parasitiology at the Junction of the White and Blue Nile Rivers.

PO=E. Waffle, ST=G. Garoian,
H=C.L. Williams, L=M. Goldman, L=R. Gamble,
S=Functional Morphology of Acanthocephala

1981 Eastern Illinois Univ., Charleston, IL (XXXIII) D.M. Miller

G.D. Cain, Antigenic Variation: New Techniques Applied to Old Problems.

PO=B.T. Ridgeway, ST=G. Garoian,
H=J.M. Holy, L=B.N. Tuggle,
S=Immunity to Protozoan Parasites

1982 Western Illinois Univ., Macomb, IL (XXXIV) D.G. Myer

J.D. Briggs, Biological Control of Invertebrates in International Programs.

PO=P.M. Nollen, ST=G. Garoian,
H=D.E. Snyder, L=C.L. Williams,
S=Biological Control of Organisms

1983 Univ. of Illinois, Urbana, IL (XXXV) C.M. Vaughn

H.M. Moon, Speculations on the Pathogenesis of Cryptosporidiosis with Comparisons to Other Enteric Infections.

PO=K.S. Todd, Jr, ST=G. Garoian,
H=K.J. Hamann, L=K.W. Bafundo,
S=Intestinal Protozoa

1984 Univ. of Iowa, Iowa City, IA (XXXVI) W.H. Coil

J. Donelson, Genetic Rearrangement and the Basis of Antigenic Variation in African Trypanosomes.

PO=G.D. Cain, ST=G. Garoian,
H=K.F. Forton, L=D. Woodmansee,
S=Helminth Immunology

1985 Ohio State Univ., Columbus, OH (XXXVII) B.T. Ridgeway

K.D. Murrell, Epidemiology of Swine Trichinosis: Could Both Zenker and Leuckart be Right?,

PO=P.W. Pappas, ST=G. Garoian,
H=R.L. Lavy, L=H.K. Forton,
S=Physiological Ecology of Parasites

1986 Univ. of Missouri, Columbia, MO (XXXVIII) ..... G.D. Cain

R.C. Tinsley, Correlation of Host Biology in Polystomatid Monogenea.

PO=L. Uhazy, ST=D.M. Miller
H=M.C. Lewis, H=I.G. Welsford, L=D.A. Leiby, ,
S=Gene Expression in Helminth Development

1987 Southern Illinois Univ., Edwardsville, IL (XXXIX) P.M. Nollen
K. Kazacos, *Baylisascaris* Nematodes-Their Biology and Role in Larva Migrans Disease.
PO=D. Myer, ST=D.M. Miller,
H=D.A. Leiby, L=V.A. Conners,
S=Modern Systematics in Parasitology

1988 Purdue University, West Lafayette, IN (XL) ..... G. Garoian
W.H. Coil, Forty Years of AMCOP, Laying a Foundation.
PO=K. Kazacos & D. Minchella, ST=D.M. Miller,
H=R.A. Bautz, L=R.R. Mitchler,
S=Host Parasite Genetics

1989 Miami Univ., Oxford, OH (XLI) ..... A.E. Duwe
G. Castro, A Physiological View of Host-parasite Interactions.
PO=R.A. Grassmick, ST=D.M. Miller,
H=S.R. Morris, S=Parasites in the Immune Suppressed

1990 Univ. Illinois, Urbana, IL (XLII) ..... J. H. Hubschman
G. Cross, Phosphatidylinositol Membrane Anchor and/or Transfection of Protozoa.
PO=G. McLaughlin, ST=D.M. Miller,
H=L.D. Morton, L=S.R. Morris,
S=Defining the Limits of Integrated Pest and Disease Management.

1991 University of South Dakota, Vermillion, SD, (XLIII) K. R. Kazacos
M. Dryden, What You Always Wanted to Know About Fleas on Fluffy and Fido but were Afraid to Ask.
PO=A. D. Johnson, ST=D.M Miller,
H=D. Royal, L=R. Clopton,
S= Host Specificity

1992 Univ. Wisconsin-Eau Claire, WI, (XLIV) ..... Omer Larson
PO=D. Wittrock, ST=D.M.Miller,
H=S. Storandt, L=D. K. Howe,
S=Teaching of Parasitology-New Methods

1993 St. Mary's, Notre Dame, IN, (XLV) ..... R. A. Grassmick
J. Crites, AMCOP Peragrare Anni, Homines, Exitus
PO=T.R Platt, ST=D.M.Miller,
H=M. S. Schoen, L=B. J. Davids,
S="Ain't Misbehavin'": Ethology, Phylogeny and Parasitology

1994 Murray State Univ. Murray, KY (XLVI) ..... Gary Uglem
E. Christiansen, Come out, come out, we know you are in there.
PO=L. Duobinis-Gray, ST=D. J. Minchella,
H=J. Rosinski,L=R. Garrison, S=Parasite Ecology: Population and Community Dynamics

1995 Univ. of Wisconsin-Milwaukee (XLVII) ..... Darwin Wittrock
E.S. Loker, Schistosomiasis in Kenya: a Copernican point of view
PO= J. Coggins, ST=D.J. Minchella;

H=J. Curtis; L=M. Dwinnell
S=Water-borne Diseases

1996 Northeast MO State Univ., Kirksville, MO (XLVIII) Daniel Snyder
PO=L. C. Twining, ST=D.J. Minchella,
H= V. G. Mehta, L=H. Yoder,
S=Immune Aspects of Protozoan Infections: Malaria and Amoebiasis

1997 Butler University, Indianapolis, IN, (XLIX) ..... Joe Camp
R. Hengst, Paleoparasitology,
PO=D. Daniell; ST=D.J. Minchella;
H=A. Bierberich, L=S. Kappe, S=Molecular Biology in Solving Problems in Parasitology

1998 Indiana State University, Terre Haute, IN (L)..... Jim Coggins
W. Coil, J. Crites, & T. Dunagan, AMCOP 50 - Fifty Years Revisited;
PO=F. Monroy & D. Dusanic; ST=D. Wittrock;
H=M. Bolek; L=K. Page
S= Cytokines and Parasitic Diseases; Visit by ASP President John Oaks

1999 Wilmington College, Wilmington OH (LI) ..... Dennis Minchella
P. LoVerde, Molecular Biology of Schistosomes,
PO= D. Woodmansee,ST=D. Wittrock;
H= J.B.Green; L=J. Curtis;
S=Parasite Biochemistry by J.D. Bangs and C.F. Fioravanti.

2000 University of Notre Dame, Notre Dame, IN (LII)... Peter Pappas
J.A. Oaks – Zen and the Art of Tapeworms
PO= J. H. Adams; ST= D. Wittrock;
H= A. Eppert; L= M. Bolek; HM= C. Dresden-Osborne & K. VanBuskirk
S=Life Style Choices of Parasitic Protozoans by T. Sinai and J. Lebowitz

2001 Eastern Illinois University, Charleston, IL (LIII).... Lin Twining
R.D. Smith - Environmental contamination with *Cryptosporidium parvum* from a dairy herd.
PO= J. Laursen; ST= D. Wittrock;
H= B. Foulk; L= M. Michalski ; HM= M. Gillilland III; B. Balu and P. Blair
S= Use of Molecular Data in Parasite Systematics by M. Mort and M. Siddall

2002 Millikin University, Decatur, IL (LIV) ..... David Williams
P. Brindley – Mobile genetic elements in the schistosome genome
PO=Tom McQuistion; ST= D. Wittrock;
H= Stacy Pfluger; L= Greg Sandland;
HM= Kelly VanBuskirk and Michelle Steinauer
S= Parasite Transmission and Control in Domesticated Animals
by M. McAllister and L. McDougald

2003 Michigan State University, East Lansing (LV) ..... Tom Platt
Robert Pennock – Darwin and the Parasitic Wasp: Teaching Evolutionary Design;
PO= Pat Muzzall; ST= Darwin Wittrock;

H= Luis Gondim; L= Michelle Steinauer; HM= Shawna Cook and Ahmed Sayed; C= Katie Reif; S= Vector Borne Diseases of Michigan and Adjacent States by Ned Walker and Hans Klompen

2004 Minnesota State University, Mankato, MN (LVI).. Patrick Muzzall
Richard Clopton – Publishing with pain: The editor doesn't really hate you.
PO= Robert Sorensen, ST= Darwin Wittrock
H=Rebecca LaBorde; L= Maria Castillo;
HM= Angie Kuntz and Laura Duclos; C=Jenna Rodgers
S= Molecular phylogenetics of parasites by Vasyl Tkach and Ramon Carreno

2005 Wabash College, Crawfordsville, IN (LVII).... Douglas Woodmansee
John Adams - In a changing world of malaria research, can an old dog learn new tricks?
PO= Eric Wetzel, ST= Darwin Wittrock
H= Amy McHenry; L= Laura Duclos;
HM= Jillian Detwiler and Julie Clennon; C= Kristin Giglietti;
S= Molecular Phylogenies in Nematoda by Virginia Ferris and Microbial Community Ecology of Tick-borne Human Pathogens by Keith Clay

2006 Winona State University, Winona, MN (LVIII)..... Thomas McQuistion
Matthew Bolek - Amphibian parasites: The cool, the bad and the ugly.
PO= Kim Bates; ST= Doug Woodmansee;
H= Andrew Claxton; L= Kristin Herrmann; C= Lindsey Stillson;
HM= Brenda Pracheil, Kristin Giglietti;
S= Parasites of Wildlife of the Midwest by Rebecca Cole and Darwin Wittrock

2007 University of Wisconsin-Oshkosh, Oshkosh, WI (LIX) Jason Curtis
David Williams – The Genomics Revolution in Parasitology.
PO= Shelly Michalski, ST= Doug Woodmansee;
H= Christine Hsiao; L= Shriveny Dangoudoubiyam
HM= Peter Ziniel, Nathan Peterson; C= Emily Doucette,
S= Tropical Disease by Gary Weil and Peter Fischer

2008 University of Illinois at Urbana-Champaign (LX)... Robert Sorensen
Dennis Minchella – P.C. (Post Cable) Parasitology at Purdue.
PO= Milton McAllister, ST= Doug Woodmansee;
H= Nathan Peterson; L= Erica Mize
HM= Apichat Vitta, Jillian Detweiler; C= Kyle Luth,
S= Parasitic Protists by Laura Knoll and Alexa Rosypal.

2009 Ohio Wesleyan University, Delaware, OH (LXI) Daniel Howe
Eugene Lyons - Hookworms (*Unicaria* spp.) in Pinnipeds with Notes on the Biology of Northern Fur Seals.
PO= Ramon Carreno, ST= Doug Woodmansee;
H= Sriveny Dangoudoubiyam; L= Elizabeth Thiele, HM= Matthew Brewer; C= Cailee Smith;
S= Ectoparasites by Susan C. Jones and Glen R. Needam

2010 Western Illinois University, Macomb, IL (LXII) Jeffrey Laursen
Tim Yoshino - Frankenflukes: Parasitic GMO's.
PO= Shawm Meagher, ST=Doug Woodmansee;
H=Kathryn Coyne; L=Philip Scheibel; HM= Kathy Johnson; C= Bryan Rolfsen;
S= Can Parasitic worms treat autoimmune disorders? by David Elliott and John O. Fleming.

2011 Saint Mary's College, Notre Dame IN (LXIII) ..... Shelly Michalski
Bruce Christensen – Programmes for control of lymphatic filariasis: perspectives from a vector biologist.
PO= Tom Platt, ST= Doug Woodmansee;
H=Daniela Cortese; L=Ablesh Gautam HM= Jenica Abrudan, Elizabeth Warburton; C= Markah Frost, Sarah Johnson; S=Parasitonomics by Mary Ann McDowell and Mike Ferdig.

2012 Truman State University, Kirksville, MO (LXIV).. Shawn Meagher
Scott D. Snyder - Parasite Biodiversity: Reflections, Challenges and Opportunities.
PO=Lin Twining , ST= Doug Woodmansee
H= Utibe Bickham; L= Heather Stigge; C= Michael Lehrke; HM= Shelby Heistand;
S= The importance of the unimportant. & Understanding the histories of parasites of Galapagos birds.
by John Janovy and Patricia Parker.

2013 Purdue University, West Lafayette, IN (LXV)..... Kimberly Bates
Agustin Jimenez - Biodiversity in the New World: "What is it?", still a relevant question.
PO=Joe Camp , ST= Doug Woodmansee
H= Heather Stigge; L= Elizabeth Warburton HM= Ablesh Gautam and Bhagya Wijayawardena; C= David Cordie;
S=DNA Barcoding in Parasitology Research by Sean Locke and Mark Forbes

2014 The University of Kentucky, Lexington, KY (LXVI) Agustin Jimenez
Thomas Platt - A Life in Small Science (with Undergraduates).
PO=Daniel Howe, ST= Robert Sorensen
H= Alyssa Gleischner; L= Miranda White; HM= Leah Peng and ElizabethWarburton; C= Allison Young;
S= Parasite adaptation and anthelmintic resistance by Martin K. Nielsen and Craig R. Reinemeyer

2015 Lawrence University, Appleton, WI (LXVII) ..... Trudy Aebig
Shelly Michalski - *Acanthacheilonema viteae* as a research model and 'tick on tick' violence.
PO=Judith Humphries, ST= Robert Sorensen
H= Justin Wilcox; L= Elliot Zieman HM= Heather Toman, Evan Boone; C= Erik Rodriguez and John Lopez;
S= Wildlife Disease by Dr. Rebecca Cole and Dr. Shelly Dubay

2016 Southern Illinois University, Carbondale, IL (LXVIII) Kim Bates

Karl Reinhard - Archaeoparasitology 2015-2020: Transitions in Theory and Crises in Diagnosis.
PO=Agustín Jimenez, ST= Robert Sorensen
H= Sarah Marshall; L= Christina Anaya; HM= Tyler Achatz and Trevor Vanatta; C= Zachary Heimark;
S= Physiology of mosquitoes in the anti-pathogen response AND interactions among geohelminths and the human gut micorbiome by Dr. Julián Hillyer Vanderbilt University and Dr. Makedonka Mitreva Washington University in St. Louis

2017 Wilmington College, Wilmington, OH (LXIX) ..... Matt Bolek
Sarah Orlofske - Dead ends are just the beginning: Predation on Parasites in Aquatic Ecosystems.
PO=Douglas Woodmansee, ST= Robert Sorensen
H= Christina Anaya ; L= Ryan Koch; HM= Ryan Shannon; C= Robyn Hauschner;
S= Parasitoid associations by Dr. Norman Johnson, Ohio State University, and Dr. Michael Sharkey, University of Kentucky.

2018 Eastern Illinois University, Charleston, IL (LXX)... Sarah Orlofske
Jason Hoverman - Exploring the complexities of disease risk in amphibian populations.
PO=Jeff Laursen, ST= Robert Sorensen
H= Ryan Koch; L= Tyler Achatz; C= Chi Peng;
S= Molecular and Life History Data: can they work together? by Dr. Vasyl Tkach, University of North Dakota, and Dr. Matt Bolek, Oklahoma State University.

2019 MN State University Mankato, Mankato, MN (LXXI) Vasyl Tkach
Bobbi Pritt - Worms you won't find in your garden.
PO= Robert Sorensen, ST= Robert Sorensen
H=; L=; HM=; C=;
S= Influences of Biogeography and Ecology on Parasite-Host Diversity by Dr. Jillian Detweiler, University of Manitoba, and Dr. Jeffrey Bell, University of North Dakota.

FINANCIAL REPORTS

2018 AMCOP Financial Report
Jan. 1, 2018-December 31, 2018

Balance 12/31/17 Savings ($5657.69); Checking ($2179.76)			**$7837.45**
Date	**Expenses**		
4/6/18	MN Sec. of State (Nonprofit organization status)	$21.00	
5/15/18	GoDaddy.com (amcop.org ownership)	$40.34	
5/30/18	AMCOP 69 Speaker Travel Reimbursement	$374.76	
5/30/18	AMCOP 70 Program Photocopying (MN State)	$53.29	
5/31/18	Certificates & Holders (Walmart)	$4.83	
6/2/18	Herrick Award	$300.00	
6/2/18	LaRue Award	$300.00	
6/2/18	Cable Award	$200.00	
6/2/18	2018 ASP Student Travel Grant	$250.00	
6/2/18	Research Grants Program (2 x $500)	$1,000.00	
6/7/18	AMCOP Travel Grant	$200.00	
6/6/18	AMCOP 70 Speaker Travel Reimbursement	$165.24	
6/12/18	AMCOP 70 Speaker Travel Reimbursement	$374.32	
Total Expenses			**$3,283.78**
Income			
5/29/18	2018 Meeting Member Payments -2018 Dues Payments ($530) -2018 Member Contributions ($840)	$1,370.00	
5/14/18	Eli Lilly Co. Sponsorship	$300.00	
5/14/18	W. Nuhsbaum Inc Donation	$250.00	
5/14/18	PLoS Sponsorship	$500.00	
6/11/18	ASP Support ($250)	$250.00	
6/2/18	Silent Auction Revenue -	$428.00	
12/31/18	Savings Interest Income	$5.67	
12/31/18	Checking Interest Income	$1.09	
Total Income		**$3,104.76**	
Operating Surplus (Loss) for 2018-2019		($179.02)	
Balance Available 12/31/18 Savings ($5663.36); Checking ($1995.07)		$7,658.43	

Submitted By:

Robert E. Sorensen

Robert E. Sorensen
Secretary / Treasurer

Financial Report Approved by

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Auditing Committee Members

2019 Interim AMCOP Financial Report
Jan. 1, 2019-June 4, 2019

Balance 12/31/18 Savings ($5663.36); Checking ($1995.07)			**$7,658.43**
Date	**Expenses**		
6/5/19	AMCOP 71 Program Photocopying (budgeted)	$60.00	
6/4/19	Certificates & Holders (Walmart)	$6.95	
6/8/19	Herrick Award (budgeted)	$300.00	
6/8/19	LaRue Award (budgeted)	$300.00	
6/8/19	Cable Award (budgeted)	$200.00	
6/8/19	Honorable Mention Awards (2 x $100) (budgeted)	$200.00	
6/8/19	2019 ASP Student Travel Grant (budgeted)	$250.00	
6/8/18	Research Grants Program (2 x $500) (budgeted)	$1,000.00	
6/8/19	Lodging		
	10 double rooms @ 57/night x 2 nights	$570.00	
	11 single room @ 74/night x 2 nights	$814.00	
	1 single room @ 74/night x 1 night	$37.00	
	Catering		
	1 Continental Breakfast @ $204.50	$204.50	
	30 Banquet meals @ $13.70	$411.00	
6/8/19	return Registration Fee and Banquet cost to Platt	$55.00	
Total Expenses			**$4,408.45**

Income		**received**	**due**
duedue6/4/19	2018 Meeting Member Payments	$2,427.00	$1253.00
	-2019 Dues Payments ($500 due; $320 received)		
	-2019 Member Contributions ($730 due; $515 rec.)		
6/4/19	Registration Payments ($640 due; $375 received)		
6/4/19	Lodging Payments ($1330 due; $917 received)		
6/4/19	Dining Payments ($480 due; $300 received)		
6/8/19	Eli Lilly Co. Sponsorship ($300) (projected)		$300
6/8/19	PLoS Sponsorship ($500) (projected)		$500
6/8/19	ASP Support ($250) (projected)		$250
6/8/19	Silent Auction Revenue -		
6/4/19	Savings Interest Income	$2.34	
6/4/19	Checking Interest Income	$0.40	

Total Income	**$4,732.74**
Operating Surplus (Loss) for 2018-2019	$324.29
Balance Available 5/30/19 Savings ($5659.55); Checking ($4,050.72)	**10081.22**

Submitted By:

Robert E. Sorensen

Robert E. Sorensen
Secretary / Treasurer

Financial Report Approved by

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Auditing Committee Members

Membership Email Directory (Dues paid in either 2018 or 2019)

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Elliott Zieman University of Southern Illinois ezieman@siu.edu	

NOTES

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2020 AMCOP DUES

Name _____

Address_____

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Phone # _____

Email _____

DUES
Faculty & Emeriti ($20), Student ($10): $_____

CONTRIBUTION to student awards: $_____

TOTAL $_____

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Please make checks payable to AMCOP.
****

Send this form and your check via US Mail to:

Dr. Robert Sorensen
AMCOP Secretary/Treasurer
Department of Biological Sciences
Minnesota State University Mankato
Trafton Science Center South, S-277
Mankaton MN 56001

This form also available at
www.amcop.org

Robert Sorensen
AMCOP Sec/Tres
Trafton Science Center, S-277
Dept of Biological Sciences
MN State University Mankato
Mankato, MN 56001

On the Cover:
SEM image of an unidentified ixodid tick collected by Dr. Tkach in the Nyika Reserve of Malawi in 2009.