AMCOP 65, June 6-8, 2013
Purdue University
West Lafayette, Indiana

Contents

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The 65th Annual Midwestern Conference of Parasitologists offers 4 Continuing Education Credits (4 CE). Your registration confirmation is proof of your attendance.

Schedule

THURSDAY, JUNE 6, 2013

3:00-6:00 pm Dorm Check-in at Wood Hall

6:00 -9:00 pm Opening Mixer at Nine Irish Brothers – Traditional Irish Pub
119 Howard Ave., W. Lafayette.

FRIDAY, JUNE 7, 2013
Purdue University College of Veterinary Medicine
Lynn Hall, Room 1136

8:00amContinental Breakfast, Poster Setup, Silent Auction Set Up

8:30 Opening Remarks and Welcome

- Dr. Joe Camp, Program Officer
- Dr. Harm HogenEsch, Associate Dean for Research and Graduate Programs.

CONTRIBUTED PAPERS
(STUDENT PAPERS INDICATED BY *)

9:00 **1.*** Helminths of Wisconsin Bobcats **DOUGLAS GATES (UG)** and Dr. KIMBERLY BATES. Department of Biology, Winona State University, Winona, MN 55987

9:15 **2.*** Testing Alternate Hypotheses of Parasitic Communities and Aquatic Invasive Species Interactions in Green Bay, Lake Michigan. **DAVID CORDIE (UG)**, JUDITH HUMPHRIES (MP), BART DE STASIO (MP), Department of Biology, Lawrence University, Appleton, WI 54911

9:30 **3.*** Parasite Community Structure Within Anseriformes Collected From a Northern Minnesota Lake. **HOLLY BLOOM (GS)** and ROBERT SORENSEN (MP), Department of Biological Sciences, Minnesota State University, Mankato, MN, 56001.

9:45 **4.*** Preliminary investigation of community structure of Branchiobdellida (Annelid: Clitellata) associated with populations of signal crayfish (*Pacifastacus leniusculus*) in the Pacific Northwest. **KEVIN HORN (GS)** and FRANK ANDERSON (MP), Department of Zoology, Southern Illinois University, Carbondale, IL 62901.

10:00 Break & Silent Auction Bidding, Poster Setup.

10:15 **5.*** Assessment of an artificial infection method to induce equine protozoal myeloencephalitis in horses. **BREANNA GAUBATZ (GS)[1]**, AMANDA ADAMS[1], UNEEDA BRYANT[2], STEVE REED[3], CRAIG REINEMEYER[4], DANIEL HOWE (MP)[1], [1]M.H. Gluck Equine Research Center, Department of Veterinary Science, University of Kentucky, Lexington, Kentucky 40546, [2]Veterinary Diagnostic Laboratory, University of Kentucky, Lexington, Kentucky 40511, [3]Rood and Riddle

Equine Hospital, Lexington, Kentucky 40511, [4]Eastern Tennessee Clinical Research, Rockwood, Tennessee 37854.

10:30 **6.*** Does Host Exposure or Parasite Establishment Determine Helminth Burdens of *Eptesicus fuscus* (Chiroptera: Vespertilionidae)? **ELIZABETH WARBURTON (GS)** and MAARTEN VONHOF (MP), Department of Biological Sciences, Western Michigan University, Kalamazoo, MI 49008

10:45 **7.***Host Specificity of Juvenile White Grub (*Posthodiplostomum minimum centrarchi*) in Spring Lake, McDonough County, IL. **BETH LANE (GS)** and SHAWN MEAGHER (MP), Department of Biological Sciences, Western Illinois University, Macomb, IL 61455

11:00 **8***The life cycle, pathogenicity and genetic structure of *Deladenus proximus*, neotylenchid parasite of the woodwasp *Sirex nigricornis* (Hymenoptera). **ELLIOTT A. ZIEMAN (GS)**, JOHN REEVE (MP) AND F. AGUSTÍN JIMÉNEZ (MP), Department of Zoology, Southern Illinois University, Carbondale, Illinois 62901.

11:15 **9.***Transposable element dynamics in *Schistosoma mansoni* strains: new world vs. old world **BHAGYA K. WIJAYAWARDENA (GS)**, D. J. MINCHELLA (MP), J. ANDREW DEWOODY (MP), Purdue University, West Lafayette, IN47906

11:30 **10.***Do pesticides influence trematode transmission through impacts on snail hosts? **KYLE GUSTAFSON (GS)** AND MATTHEW BOLEK (MP), Department of Zoology, Oklahoma State University, Stillwater, OK 74078

11:45 Lunch

THE AMCOP SYMPOSIUM
Lynn Hall, Room 1136

1:00 **MARK FORBES, Carleton University**
Ecological parasitology of dragonflies: resistance to understanding

2:00 **SEAN LOCKE, Environment Canada**
Better understanding of the ecology of fish parasites with DNA barcodes

POSTER SESSION
Lynn Hall, Room 1192

3:45

11.* Identification of a TLR-NFκB Pathway in *Biomphalaria glabrata*. **BRIANA HARTER (UG),** HEATHER JOST (UG) and JUDITH HUMPHRIES (MP), Department of Biology, Lawrence University, Appleton, WI 54911.

12.* Neuropeptide Y Identification and Regulation in the *Biomphalaria glabrata.* **SAM LUEBKE (UG),** MELISSA MCLOED, RAY VERCELES, AND JUDITH HUMPHRIES (MP), Department of Biology, Lawrence University, Appleton, WI, 54911

13.* Functional characterization of the surface antigens (SnSAGs) in *Sarcocystis neurona*. **A.GAUTAM (GS),** S. DANGOUDOUBIYAM (PD), AND D.K. HOWE (MP), M.H. Gluck Equine Research Center, Department of Veterinary Science, University of Kentucky, Lexington, KY 40546.

14.* Experimental evidence for acquired immunity to *Halipegus* species in two species of freshwater snails. **HEATHER A. STIGGE (GS)** and MATTHEW G. BOLEK (MP), Department of Zoology, Oklahoma State University, Stillwater, Ok 74078

15.* Patterns of Helminth Community Dissimilarity in *Eptesicus fuscus* (Chiroptera: Vespertilionidae). **ELIZABETH WARBURTON (GS)** and MAARTEN VONHOF (MP), Department of Biological Sciences, Western Michigan University, Kalamazoo, MI 49008

16. Comparative evaluation of hemocytes from *Schistosoma mansoni*-susceptible and -resistant strains of *Biomphalaria glabrata* snails following parasite exposure. **MARILIA G. S. CAVALCANTI[1] (PD)**, FABIO A. BRAYNER[2], XIAO-JUN WU[3], and TIMOTHY P. YOSHINO[3] (MP), [1]Department of Physiology and Pathology, Federal University of Paraiba – Brazil, [2] Department of Parasitology, Aggeu Magalhães Research Center (CPqAM/FIOCRUZ) – Brazil, [3] Department of Pathobiological Sciences, School of Veterinary Medicine, University of Wisconsin, Madison, WI 53706.

17.* Protein mediators of *Biomphalaria glabrata* embryonic (Bge) cell-*Schistosoma mansoni* interactions. **UTIBE BICKHAM[1] (GS)**, JEREMY CHUNG[2], XIAO-JUN WU[2], and TIMOTHY P. YOSHINO[2] (MP), [1]Cellular and Molecular Pathology Graduate Program, Department of Pathology and Laboratory Medicine, School of Medicine and Public Health, [2]Department of Pathobiological Sciences, School of Veterinary Medicine, University of Wisconsin, Madison, WI 53706.

18.* Gut Helminthes of White Geese in Illinois. **EVAN C. BOONE (UG)** and J.R. LAURSEN (MP). Department of Biological Sciences, Eastern Illinois University, Charleston, IL 61920

19. Development of molecular tools for genetic manipulation of the apicomplexan parasite, *Sarcocystis neurona.* **SRIVENY DANGOUDOUBIYAM (PD) [1],** ZIJING ZHANG (UG) [1] and DANIEL K. HOWE (MP) [1], [1]Department of Veterinary Science, University of Kentucky, Lexington, KY, USA.

20.* Prevalence of *Baylisascaris procyonis* in non-raccoon procyonid hosts and assessment of risk of human exposure. **MAX C. PARKANZKY(GS)**, JOE CAMP, APRIL JOHNSON, JAN RAMER, KEVIN R. KAZACOS(MP) Department of Comparative Pathobiology, College of Veterinary Medicine, Purdue University, West Lafayette, IN, *Indianapolis Zoo, Indianapolis, IN

BANQUET
Marriott Hall, John Purdue Room
900 W. State Street, W. Lafayette.

Cash bar opens 5:30
Buffett begins at 6:00

DR. AGUSTIN JIMÉNEZ
Southern Illinois University

Biodiversity in the New World: "What is it?", still a relevant question.

SATURDAY, JUNE 8, 2012.
Lynn Hall, Room 1136

8:00 Continental Breakfast & Silent Auction Bidding

9:00 Silent Auction Bidding Closes

9:00 **21.** Novel techniques for biodiversity studies of gordiids and description of a new species of *Chordodes* (Gordiida, Nematomorpha) from Kenya, Africa. **MATTHEW G. BOLEK (MP)**, CLEO SZMYGIEL (GS), AUSTIN KUBAT (US), ANDREAS SCMIDT-RHAESA (MP), and BEN HANELT (PD). Department of Zoology, Oklahoma State University, Zoological Museum and Institute, Hamburg, Germany, and Department of Biology, University of New Mexico.

9:15 **22.** Genetic diversity of the large turkey louse (*Chelopistes meleagridis*) reveals limited movement of turkeys across the Mississippi River. KIMBERLY LECOMPTE (GS) and **SHAWN MEAGHER** (MP), Department of Biological Sciences, Western Illinois University, Macomb, IL 61455.

9:30 **23**. Helminth and Myxozoan Parasites of Fishes of the Great Smoky Mountains National Park (GSMNP). **SHERMAN S. HENDRIX,** Department of Biology, Gettysburg College, Gettysburg, PA 17325

10:00 Business Meeting and Award Presentations, **DR. KIMBERLY BATES** AMCOP Presiding Officer.

Abstracts

1 Helminths of Wisconsin Bobcats **DOUGLAS GATES (UG)** and Dr. KIMBERLY BATES. Department of Biology, Winona State University, Winona, MN 55987

Since 2004 WI has seen a significant decline in the native bobcat (*Lynx rufus superiorensis*) population (Rolley). The decrease in population could be from a number of factors; we looked at the relationship between intestinal parasites, age, gender, and geographic distribution. Through collaboration with the Madison branch of the Wisconsin Department of Natural Resources (WI DNR) a total of 111 Bobcat (*Lynx rufus superiorensis*) intestinal tracts were collected from the carcasses of the 2011 trapping season. Intestines were tied off and removed at the duodenum and rectum and frozen in ziplock bags. The intestinal tracts were examined for parasitic infections by dissection, filtration of fecal matter and examination under a dissecting scope. Parasites were removed and stored in 70% ethanol until identification and staining. Two species of nematodes were identified by the morphology of their cervical alae, *Toxocara cati* and *Toxascaris Leonia*. Cestodes were identified by scolex and proglottid morphology. Specific Teania species were identified by removing the hooks from the rostellum then photographing and measuring. The pictures and measurements were then compared to literature values (Riser) to determine species. Two cestodes were identified, *Taenia pisiformis* and*Diphylibothrium* species. Parasitic species were found within 76% of the intestines dissected. 30% contained T. cati, 13% contained T. Leonia, and 54% contained at least one of the species of tapeworms. The highest portion of bobcats infected with either roundworms or tapeworms came from Sawyer, Prince, Rusk, Lincoln, and Taylor. All of which are neighboring Counties.

2 Testing Alternate Hypotheses of Parasitic Communities and Aquatic Invasive Species Interactions in Green Bay, Lake Michigan. **DAVID CORDIE** (UG), JUDITH HUMPHRIES (MP), BART DE STASIO (MP), Department of Biology, Lawrence University, Appleton, WI 54911

Invasive species have the capability of altering ecosystems in dramatic ways. Invasive species like *Neogobius melanostomus,* round goby, have been introduced to the Wisconsin water system and due to its diet of fish eggs has altered the amount of game fish available to anglers. Three theories to explain their proliferation have been proposed that involve the parasitic load of the gobies: the enemy release, spillback and parasitic spillover hypotheses. Our research attempted to determine which of these hypotheses are most plausible in the invasion of *Neogobius*. Gobies were collected from the Upper Fox River and Green Bay region and dissected to determine parasitic loads of *Neogobius* compared to native fish. In addition, DNA sequencing was performed in order to identify parasite species, some of which could not be identified based on morphology. Initial results suggest that the parasitic load may be higher per gram of body mass in *Neogobius* then in native species, supporting a spillback mechanism, but further sampling must be performed.

3 Parasite Community Structure Within Anseriformes Collected From a Northern Minnesota Lake. **HOLLY BLOOM (GS)** and ROBERT SORENSEN (MP), Department of Biological Sciences, Minnesota State University, Mankato, MN, 56001.

Parasite community structure varies on several scales; within and across host species and even within individual hosts. Three Anseriformes species collected from a northern Minnesota lake during the fall migration in 2012 exhibited a diverse parasite community. Intestinal tracts from hunter harvested birds were collected from 14 blue-winged teal (*Anas discors*), 11 ring-necked duck (*Aythya collaris*), and 7 lesser scaup (*Aythya affinis*). All birds collected were considered to appear healthy and able to fly when they were harvested. Intestines and their rinsate were examined for parasites using a dissecting microscope. All visible helminths were counted and identified by type. Varying parasite infrapopulations and metapopulations were observed among the birds. Different parasites appeared to reside in different sections of the intestinal tract

within a single bird, showing some evidence resource partitioning among the various parasites detected. The birds collected for this research were collected from a lake containing *Bithynia tentaculata* snails, that have been shown to harbor *Sphaeridiotrema pseudoglobulus*—a trematode known to be associated with waterfowl mortality. As such, we were especially interested in the prevalence and abundance of this parasite in these birds. Of the three waterfowl species examined, all contained *S. pseudoglobulus*; however, some bird species seem to be more susceptible to infection than others, with infection rates ranging from 30% to 80%. We also noted differences in the maturity status of *S. pseudoglobulus* among these birds since only immature individuals were found in ring-necked ducks.

4 Preliminary investigation of community structure of Branchiobdellida (Annelid: Clitellata) associated with populations of signal crayfish (*Pacifastacus leniusculus*) in the Pacific Northwest. **KEVIN HORN (GS)** and FRANK ANDERSON (MP), Department of Zoology, Southern Illinois University, Carbondale, IL 62901.

Branchiobdellidans, or crayfish worms, are a monophyletic group of leech-like clitellate annelids that have an obligate ectosymbiotic association, primarily with freshwater crayfish. Branchiobdellida, which consists of 20 genera and approximately 140 described species, is unusual among the clitellate annelids in that there are no known free-living species. Although branchiobdellidans have been observed in the lab to be able to survive for at least several days off their crayfish hosts, embryonic development only occurs when the cocoon is deposited on a living host, making the association obligate. While there have been observations of various species of branchiobdellidans primarily associating with specific species of crayfish, little is known in regards to host preference or selection. We collected branchiobdellidans from museum specimens of signal crayfish (*Pacifastacus leniusculus*) that had been used in a biogreographical study of the *P. leniusculus* in the Pacific Northwest region of the United States. Mitochondrial haplotypes of the crayfish sampled revealed cryptic genetic diversity and three distant genetic groups of *P. leniusculus* within the sampled range. Using partial COI sequence of the branchiobdellidans associated with these crayfish we are identifying the species composition and genetic structure of the branchiobdellidan populations on those crayfish populations.morphological and genetic analysis. The nematodes from both southern Illinois and Louisiana had identical DNA sequences of Cytochrome Oxydase 1 (CO1), indicating they are likely the same species. Further comparisons are needed to determine how closely the morphometric features match previously described species of *Deladenus*.

5 Assessment of an artificial infection method to induce equine protozoal myeloencephalitis in horses. **BREANNA GAUBATZ (GS)[1]**, Amanda Adams[1], Uneeda Bryant[2], Steve Reed[3], Craig Reinemeyer[4], Daniel Howe (MP)[1], [1]M.H. Gluck Equine Research Center, Department of Veterinary Science, University of Kentucky, Lexington, Kentucky 40546, [2]Veterinary Diagnostic Laboratory, University of Kentucky, Lexington, Kentucky 40511, [3]Rood and Riddle Equine Hospital, Lexington, Kentucky 40511, [4]Eastern Tennessee Clinical Research, Rockwood, Tennessee 37854.

Equine protozoal myeloencephalitis (EPM) is a progressive neurological disease of horses caused by the apicomplexan parasite *Sarcocystis neurona*. The development of an experimental EPM model would enhance our understanding of disease pathogenesis, which could lead to improved diagnostics and treatment therapies. Several previous attempts have been made to create EPM infection models using various strategies, each resulting in varied success. This study evaluated a previously described artificial infection method to induce EPM. Five horses were injected intravenously at 4 time points with autologous blood incubated with 1,000,000 *S. neurona* merozoites. Challenged horses progressively developed mild to moderate clinical signs and had detectable serum antibodies against *S. neurona* on day 42 post challenge. Based on cytokine mRNA analyses, it appeared that infection produced a Th1 immune response in the challenged horses. Notably, analysis of serum antibodies indicated that the horses cleared the infection by

the conclusion of the study on day 89, and no histopathological evidence of *S. neurona* infection was found within central nervous system tissue. This artificial infection method was not effective in replicating the severe clinical EPM seen in natural infections.

6 Does Host Exposure or Parasite Establishment Determine Helminth Burdens of *Eptesicus fuscus* (Chiroptera: Vespertilionidae)? **ELIZABETH WARBURTON (GS)** and MAARTEN VONHOF (MP), Department of Biological Sciences, Western Michigan University, Kalamazoo, MI 49008

In most host-parasite systems, variation in parasite burden among hosts is a major driver of transmission dynamics. Heavily infected individuals introduce disproportionate numbers of infective stages into host populations or the surrounding environment, this, in turn, may cause sharp increases in frequency of infection. Parasite aggregation within the host population may result from both heterogeneous exposure to infective propagules and heterogeneous establishment of parasites in the host. We sought to quantify the relative roles of exposure and establishment in producing variation in parasite burdens in order to predict which hosts are more likely to bear heavy burdens using *Eptesicus fuscus* and its helminths (parasitic worms) as a model system. We captured bats from seven colonies in Michigan and Indiana, assessed their helminth burdens, and collected data on variables related to both exposure (capture location, capture date, water contact) and establishment (host sex, age, body condition, immune function, genetic heterozygosity). Structural equation modeling revealed the best-fitting *a priori* models (AIC=11.704) for all parasite taxa and trematodes alone included host genetic diversity and distance of colony to nearest body of water. The best-fitting model for cestodes and nematodes (AIC=10.64) included month of capture and host genetic diversity. Differential host exposure and differential parasite establishment both appear to play significant roles in creating heterogeneous helminth burdens. However, variables that impact trematode burdens differ from those that impact cestode and nematode burdens. Thus, transmission dynamics are not one-size-fits-all and we must carefully consider biology of host and worm when attempting to predict helminth burdens.

7 Host Specificity of Juvenile White Grub (*Posthodiplostomum minimum centrarchi*) in Spring Lake, McDonough County, IL. **BETH LANE (GS)** and SHAWN MEAGHER (MP), Department of Biological Sciences, Western Illinois University, Macomb, IL 61455

Host specificity measures the number of host species a parasite can infect. White grub (*Posthodiplostomum minimum centrarchi)* is a parasite of many sunfish species (Family Centrarchidae), however, we do not know whether it displays specificity for particular centrarchid species. Understanding the host specificity of *P. minimum* could help control infection by this worm. Two centrarchids, bluegill (*Lepomis macrochirus*; n=82) and crappie (*Pomoxis annularis*; n=89), were collected from Spring Lake in McDonough County, IL. I determined the species, sex, age, length, and white grub burden for each fish. White grub prevalence was significantly higher in bluegills (100%) than in crappie (57%). Mean intensity was significantly higher in bluegill (1,474) than crappie (9), and infection levels increased with host length in both species. White grub in Spring Lake is more infective to bluegill than crappie, which is consistent with other studies that have measured white grub infection levels in sympatric centrarchids. Fish from the genus *Lepomis* have higher infection levels than other centrarchids, but there is also significant variation in infection among *Lepomis* species. Thus, *P. m. centrarchi* is not a generalist that infects all hosts equally well, but shows a high level of "structural" host specificity (that is, different infectivity to different hosts). Further studies are necessary to determine whether host differences in infection level are due to ecological differences that affect exposure to *P. minimum*, or physiological differences that affect host compatibility with this worm.

8 The life cycle, pathogenicity and genetic structure of *Deladenus proximus*, neotylenchid parasite of the woodwasp *Sirex nigricornis* (Hymenoptera). **ELLIOTT A. ZIEMAN (GS)**, JOHN REEVE (MP) and F. AGUSTÍN JIMÉNEZ (MP), Department of Zoology, Southern Illinois University, Carbondale, Illinois 62901.

Deladenus proximus (Neotylenchidae) is a nematode associated to pine trees and to the woodwasps, *Sirex nigricornis* (Hymenoptera), previous to this study little was known on the geographic distribution and variability of *D. proximus*. Herein we present information relative to their life cycle, pathogenicity, and variability. The life cycle is similar to that of other species of *Deladenus* in that it includes mycetophagous and entomopathogenous stages. Fertilized female nematodes penetrate siricid larvae and grow in the body cavity releasing thousands of larvae. These larvae invade the gonads, mycangia (sac containing symbiotic fungus) and eggs upon metamorphosis of the host. Females posit infected eggs and spores of fungus (*Amylostereum chailletii*) into stressed trees, nematodes mature and feed on the phloem, completing the life cycle of the nematode. Our study indicates variable prevalence across localities but in every infected wasps all eggs contained nematodes, thus were sterilized. Between 2009 to 2012 a total of 1,635 woodwasps were collected from Arkansas, Illinois, Louisiana, and South Carolina. Woodwasps were dissected and live nematodes were reared on cultures of *A. chailletii* and examined upon maturation. Reared nematodes were compared against type specimens of *D. ipini* and published descriptions of *D. proximus.* In addition we compared diagnostic characteristics of adult nematodes from each locality and found no significant difference in their size and structures depending on location. Reared specimens possess a conspicuous post uterine sac, which is the proposed diagnostic character of *D. ipini*. This and other morphometric differences including a,b,c, and V suggest that *D. ipini* is a junior synonym of *D. proximus*. DNA was isolated and amplified from individual nematodes including 18S, ITS, and CO1. Nuclear DNA was invariable from all 4 locations and had 99% identity to the invasive species *Deladenus siricidicola*. Analysis of mitochondrial DNA showed more variability and was used to evaluate the distinction of populations across these localities. The analysis of a portion of CO1 suggests the presence of 8 haplotypes and the absence of any geographic clusters or subpopulations. The lack of geographic structure may be due to the fact that each female wasp is infected with only one adult female nematode and therefore larvae within a wasp are siblings. With a generation time of 2 weeks these nematodes can have 20 generations without immigration or emigration, suggesting these nematodes are inbred. The pattern of transmission of this nematode and pathogenicity is similar to that of *Deladenus siricidicola*, which is used as a biocontrol against the invasive species *Sirex noctilio*. Experimental infections of *Deladenus proximus* in *Sirex noctilio* are recommended to test their viability as a biocontrol agent.

9 Transposable element dynamics in *Schistosoma mansoni* strains: new world vs. old world **BHAGYA K. WIJAYAWARDENA** (GS), D. J. Minchella (MP), J. Andrew DeWoody (MP), Purdue University, West Lafayette, IN47906

Transposable elements (TEs) are mobile DNA sequences with an intrinsic ability to move within and among genomes. TE proliferations are associated with “genomic stress”, such as invasion of new habitats and merging of distinct genomes (e.g. hybridization). We attempted to quantify TEs in different strains of the trematode parasite, *Schistosoma mansoni* (New world strains, Puerto Rican: NMRI, PR-1, Brazilian: LE and old world strain, Egyptian: EGY), to identify strain specific differences. Parasites of the trematode genus *Schistosoma* are the causative agents of schistosomiasis, a widespread tropical disease causing severe morbidity and mortality in infected individuals. The genomes of all three major human infecting schistosomes (*S. japonicum*: in South East Asia, *S. haematobium*: Africa, and *S. mansoni*: South America and Africa) are relatively large and loaded with transposable elements (TEs); approximately 40% -50% of each genome is composed of TEs. For our analysis we selected six TEs of *S. mansoni*, Merlin, SmTRC1, Perere-1, Saci-1, Saci-2 and Saci-3. To evaluate the copy number of TEs in the genomes, we used a SYBR Green qPCR assay with an internal control gene, GAPDH (Glyceraldehyde-3-phosphate dehydrogenase).

Our results indicate extensive TE proliferations in new world strains compared to the old world strain. Phylogenetic analysis indicates *S. mansoni* expanded from Asia to Africa and then into South America through the slave trade. Increased TE activity facilitates emergence of new genes, modifies gene expression patterns and promotes chromosomal re-arrangements that can contribute to the evolution of traits that increase adaptability of the lineages. Therefore, high TE content in new world strains of *S. mansoni* may have facilitated the invasion of new world habitats through genome dynamism.

10 Do pesticides influence trematode transmission through impacts on snail hosts? **KYLE GUSTAFSON (GS)** and MATTHEW BOLEK (MP), Department of Zoology, Oklahoma State University, Stillwater, OK 74078

Pesticides are widespread and abundant throughout the United States and have been shown to immunosuppress host organisms, increasing the abundance of metacercariae in 2nd intermediate hosts. However, we do not know if pesticides actually influence the number of cercariae being transmitted in contaminated wetlands. Reports have shown that pesticides significantly alter the immunophysiology of snails, which could influence the number of snails that get infected by miracidia and the number of snails that survive to release cercariae. Our goal is to test the effects of ecologically-relevant concentrations of atrazine (a ubiquitous herbicide commonly applied to corn and sorghum) on snail life-history characteristics and the production of cercariae from pond snails, *Physa gyrina*. Thus far, we have identified significant negative effects of atrazine on snail reproduction. Additionally, we have identified significant negative relationships between the number of *Halipegus eccentricus* eggs/miracidia exposed to snails and snail size, reproduction, and survival. Future experiments will focus directly on whether atrazine facilitates the establishment of trematode infections and whether pesticide-trematode interactions will reduce the probability of snails surviving the trematode prepatent period and actually releasing cercariae.

11 Identification of a TLR-NFκB Pathway in *Biomphalaria glabrata*. **BRIANA HARTER (UG),** HEATHER JOST (UG) and JUDITH HUMPHRIES (MP), Department of Biology, Lawrence University, Appleton, WI 54911.

Biomphalaria glabrata is the intermediate host of the parasitic trematode *Schistosoma mansoni*, which partially matures in the snail before exiting and infecting humans, causing the disease schistosomiasis. It has been shown that gene expression patterns in the snail change during infection with *S. mansoni,* although the exact mechanisms regulating gene expression are not known. The TLR-NFκB pathway has been studied in vertebrates and shown to regulate genes involved in immune responses in these species. The TLR-NFκB pathway appears to contain highly conserved components as recently homologues have been identified in invertebrates. Therefore we are interested in identifying components of this pathway in *B. glabrata*. Using preliminary data from the *B. glabrata* genome sequencing project, we discovered members of the TLR-NFκB pathway in the snail including NEMO, MyD88 and a TLR. Future studies will examine the functionality of these components and determine their potential role in *B. glabrata*'s immune response with particular regards to *S. mansoni* infection.

12 Neuropeptide Y Identification and Regulation in the *Biomphalaria glabrata.* **SAM LUEBKE (UG),** MELISSA MCLOED, RAY VERCELES, AND JUDITH HUMPHRIES (MP), Department of Biology, Lawrence University, Appleton, WI, 54911

Helminth parasites have evolved mechanisms to not only evade the host immune system, but also to exploit the neuroendocrine system of the host to benefit their own growth and reproduction. Furthermore, the parasite may secrete factors that alter the host's hormone levels. Neuropeptides may be affected by parasitism, and in snails the nervous, neuroendocrine, and immune system are functionally linked.

Neuropeptide Y (NPY) plays a key role in regulating energy budgeting concerning food intake, reproduction, and growth in vertebrates. Previous research found that there was an up-regulation of NPY expression in the snail *Lymnaea stagnalis* during *Trichobilharzia ocellata* infection. Interestingly, when infected with the parasite *Schistosoma mansoni*, *Biomphalaria glabrata* display a similar phenotype to *T. ocellata*-infected *L. stagnalis.* Elevated levels of NPY may explain the phenotype of infected *B. glabrata*. We recently cloned and identified BgNPY (*B. glabrata* neuropeptide Y; accession no. JX013957) and preliminary immunocytochemical studies support the localization of BgNPY in the brains of nonparasitized *B. glabrata.* Additionally, preliminary real-time PCR data confirm the presence of BgNPY and suggest possible upregulation of BgNPY in snail tissues during infection.

13 Functional characterization of the surface antigens (SnSAGs) in *Sarcocystis neurona*. **A.GAUTAM (GS)**, S. DANGOUDOUBIYAM (PD), AND D.K. HOWE (MP), M.H. Gluck Equine Research Center, Department of Veterinary Science, University of Kentucky, Lexington, KY 40546.

Sarcocystis neurona is a protozoan parasite that causes the serious neurologic disease equine protozoal myeloencephalitis (EPM). The *S. neurona* merozoite surface is covered by multiple related proteins, which are orthologous to the surface antigen (*SAG*) gene family of *Toxoplasma gondii*. The SAG surface antigens in *T. gondii* and another related parasite *Neospora caninum* seems necessary for parasite transmission and persistence of infection. The present study was conducted to assess the role of SnSAGs in host cell attachment and/or invasion by *S. neurona*. Serum neutralization assays were conducted using heat inactivated polyclonal serum raised against SnSAG1, SnSAG2, SnSAG3, and SnSAG4. Preliminary data obtained from these assays suggest a potential role of SnSAG1 and SnSAG4 in host cell attachment and/or invasion. However, results obtained for SnSAG2 and SnSAG3 were inconsistent. Studies are underway to develop alternative methods to examine antibody inhibition of surface antigen function. In addition, SnSAG1 and SnSAG2 gene knockout (KO) plasmids were constructed and transfected into *S. neurona* in order to produce parasites that are deficient for these two proteins. The transfected parasites are presently being grown in selection medium to isolate transgenic clones. The SnSAG-KO parasites will provide additional data about the role of SnSAGs in host cell attachment and/or invasion. Collectively, the information acquired will help to understand the importance of the SnSAG proteins for parasite survival and could lead to improved methods for EPM prevention and/or treatment.

14 Experimental evidence for acquired immunity to *Halipegus* species in two species of freshwater snails. **HEATHER A. STIGGE (GS)** and MATTHEW G. BOLEK (MP), Department of Zoology, Oklahoma State University, Stillwater, Ok 74078

Larval trematodes can cause extensive pathology in snails. Previous studies show that some snails clear infections of sporocysts and reverse castration; whereas castration caused by rediae is likely permanent. Recent field work suggests that wild snails can lose infections with rediae of *Halipegus occidualis*. Therefore, *Halipegus* species are good model systems to examine if snails infected with rediae are capable of self-curing and reversing castration. The goals of this study were to determine if *Helisoma trivolvis* and *Physa gyrina* are able to clear infections of closely related *Halipegus* species, document the rates for recovery and castration reversal for each snail species, and investigate the susceptibility of snails to reinfection after a primary infection is lost. A total of 500 lab reared *H. trivolvis* and *P. gyrina* were isolated, starved, and fed eggs of a *Halipegus* species. Snails were isolated and observed for cercariae. Dead snails were examined for rediae and gonads. Snails that stopped releasing cercariae were challenged with a second infection by re-exposing them to eggs 21 days later, and then they were dissected after an additional 90 days. A total of 274 *H. trivolvis* were infected. Impressively, 91 of them cleared the primary infection. None became reinfected and 25 snails laid eggs. In contrast, 379 *P. gyrina* were infected, but only 18 stopped

releasing cercariae. It seems plausible that the recovery of *H. trivovlis* could be an adaptation to increase fitness. *Helisoma trivolvis* in our laboratory cultures are long-lived (2-3 years); therefore, the ability to live through the infection and reverse castration can greatly increase its fitness over its entire lifespan. In contrast, the populations of *P. gyrina* that were the source of our laboratory cultures live only 3 months; hence, it may be more beneficial to for these snails invest in reproduction during prepatent periods.

15 Patterns of Helminth Community Dissimilarity in *Eptesicus fuscus* (Chiroptera: Vespertilionidae). **ELIZABETH WARBURTON (GS)** and MAARTEN VONHOF (MP), Department of Biological Sciences, Western Michigan University, Kalamazoo, MI 49008

Ecological communities often vary though space and many of these communities are characterized by distance-decay, where similarity in species composition between communities varies with the geographic distance that separates them. Although both bats and parasites are widespread, no one has investigated community dissimilarity of bat parasites, even though this could help elucidate spatial patterns of infection and local adaptation of parasite resistance. We sought to determine if geographic distance or environmental distance would best describe patterns of parasitic helminth communities inhabiting *Eptesicus fuscus* by assessing helminth burdens of 380 bats from 13 colonies in three states. We quantified geographic distances based on capture locations and environmental distances by assessing dissimilarity in landcover types and climate near colonies via ArcGIS and weather station data. Geographically neighboring bat colonies had dissimilar parasite communities and geographic distance did not significantly account for these dissimilarities (Mantel's r=0.082, p=0.665). Redundancy analysis revealed that environmental distance could explain community dissimilarity (F=2.3565, p=0.003). Two canonical axes of the redundancy analysis model were highly significant (developed open spaces, F=6.1895, p=0.003 and high-intensity developed spaces, F=5.1701, p=0.0031) while two axes approached significance (cultivated crops, F=4.2238, p=0.0504 and woody wetlands, F=1.8643, p=0.078). Thus, environmental variables seem to generate helminth community dissimilarity and anthropogenic patterns of land use may significantly influence parasite communities. Perhaps, without man-made disturbance, geographic dissimilarity would provide a greater contribution to community dissimilarity; however, our data suggest that certain categories of land use promote a suite of specific parasitic infections in *E. fuscus*.

16 Comparative evaluation of hemocytes from *Schistosoma mansoni*-susceptible and -resistant strains of *Biomphalaria glabrata* snails following parasite exposure. **MARILIA G. S. CAVALCANTI**[1] **(PD)**, FABIO A. BRAYNER[2], XIAO-JUN WU[3], and TIMOTHY P. YOSHINO[3] (MP), [1]Department of Physiology and Pathology, Federal University of Paraiba – Brazil, [2] Department of Parasitology, Aggeu Magalhães Research Center (CPqAM/FIOCRUZ) – Brazil, [3] Department of Pathobiological Sciences, School of Veterinary Medicine, University of Wisconsin, Madison, WI 53706.

After infection by the human blood fluke *Schistosoma mansoni*, hemocytes of susceptible (NMRI) and resistant (BS-90) strains of the snail host *Biomphalaria glabrata* exhibit stark differences in their encapsulation responses to the same parasite. Although the two strains already being widely studied, this is the first work to describe the kinetics of circulating hemocytes following short and long-term infection, including an evaluation of cell behavior. For the kinetic studies, individual BS-90 and NMRI snails (8-10 mm) were bled, and 10 µL samples were evaluated at 0 hr (unexposed), and then at 2 hr, 15 days (d) and 30 d postexposure (PE) to 10 *S. mansoni* miracidia each. Evaluation consisted of total and differential counts of hemocytes using a Neubauer chamber. To evaluate hemocyte behavior after *S. mansoni* exposure, pooled hemolymph samples from 5 snails were obtained from unexposed and 2 hr PE groups, pooled, and examined under a brightfield inverted microscope. The total number of circulating hemocytes in BS-90 and NMRI strains did not differ in unexposed control snails (318 ± 131 vs. 304 ± 56 cells/µL, respectively). In

contrast, while hemocyte numbers did not change as a result of parasite exposure in BS-90 snails, the number of circulating cells in NMRI snails exhibited a significant decrease from 2 hr to 30 d PE. Five morphological hemocyte cell-types [blast-like cell (Bl), granulocytes (Gr), and Type I, II and III hyalinocytes (Hy)] were observed in the hemolymph of BS-90 and NMRI snails and, the kinetics of these circulating cell-types in the two snail strains is complex. However, one notable significant strain difference is the simultaneous decrease in Bl cells and increase in Type I Hy at 15 d PE in BS-90, and the mirror opposite kinetic profile by NMRI hemocytes at 15 d PE. This strongly suggests not only a possible morphological/developmental linkage between the Bl and Type I Hy cell populations, but also a functional linkage as well. Finally an *in vitro* behavioral assessment of BS-90 and NMRI hemocytes revealed the presence of spread adherent cells (mostly Type I Hy) and some cell aggregates after 2 hr in control preparations of both snail strains. However, after 2 hr PE, the level of cell adhesion/aggregation was higher in BS-90 and NMRI exposed than in their respective controls, supporting the involvement of Type I Hy and the role of cell adhesion as important parts of the immune defense system against this parasite. Despite being subjected to the same pathogen, BS-90 and NMRI *B. glabrata* strains present variations in cellular responses (kinetic and behavioral) that may be associated with their host susceptibility or resistance phenotypes.

17 Protein mediators of Biomphalaria glabrata embryonic (Bge) cell-Schistosoma mansoni interactions.
UTIBE BICKHAM[1] (GS), JEREMY CHUNG[2], XIAO-JUN WU[2], and TIMOTHY P. YOSHINO[2] (MP), [1]Cellular and Molecular Pathology Graduate Program, Department of Pathology and Laboratory Medicine, School of Medicine and Public Health, [2]Department of Pathobiological Sciences, School of Veterinary Medicine, University of Wisconsin, Madison, WI 53706.

The recognition of specific carbohydrates associated with the tegumental surface of larval S. mansoni is thought to elicit internal defense mechanisms in the invertebrate snail (Biomphalaria spp.) host of the parasite. Primary effector immune cells, hemocytes, of B. glabrata express both surface membrane and secrete proteins that may be involved in the recognition and binding to the parasite, resulting in the death of the parasite in resistant snails. However, susceptible snails exhibit a differential response in which the parasite is not recognized by hemocytes and undergoes normal development, leading to the production of human infective cerceriae. The following study seeks to isolate and identify possible hemocyte proteins that may be involved in the binding/recognition of the parasite by the snail immune cells. A snail cell line, the B. glabrata embryonic (Bge) cell line, which shares functional characteristics with hemocytes is being used as a surrogate for the snail immune cells. Previous in vitro studies of Bge cell-larval S. mansoni interactions have shown that Bge cells attach to and encapsulate in vitro transformed sporocysts of S. mansoni and that this binding interaction is inhibited by fucoidan (a sulfated polymer of fucose). Thus, aminated fucoidan was cross-linked to cyanogen bromide activated sepharose beads and used to isolate fucoidan-reactive Bge cell proteins from an enriched Bge cell membrane extract. Isolated proteins were then eluted sequentially with various carbohydrate (CHO)-containing elution buffers comprising of dextran (Dex), dextran sulfate (DexS), or fucoidan (Fuc) (all at 1 mg/ml concentrations) and finally 1M NaCl or Fuc/DexS/NaCl. The control column was not cross-linked to aminated fucoidan. Eluted fractions were subjected to SDS-PAGE followed by silver staining analysis. The eluted protein profiles suggest that Bge cell proteins differentially bind to fucoidan based on the CHO type and the sequential order of CHO buffers used in elutions. First elution with Dex released no bound proteins, whereas first elutions with DexS and Fuc released different patterns of isolated Bge proteins. Interestingly, following DexS and Fuc first elutions, no Bge proteins were detected in the second elutions, irrespective of the CHO buffer used. Future experiments will be the identification of the isolated Bge cell proteins using nanoLC-MS/MS (ion trap-Orbitrap MS) and their involvement in the host cell-larval parasite interactions.

18 Gut Helminthes of White Geese in Illinois. **EVAN C. BOONE (UG)** and J.R. LAURSEN (MP). Department of Biological Sciences, Eastern Illinois University, Charleston, IL 61920. Poster/Demonstration.

The digestive tracts of 38 lesser snow geese (*Chen caerulescens*) and 10 Ross geese (*Chen rossii*) collected during the 2012 spring migration in Raymond, IL were examined for helminthes. These species share breeding grounds and co-migrate, so we hypothesized that they would share parasites. A total of eight helminth species (4 nematodes, 2 cestodes, and 2 trematodes) were recovered from the two hosts. Nematodes, including 2 Gizzard worms (*Epomidiostomum* and *Amidostomum*), the cecal worm (*Heterakis dispar*), and *Trichostrongylus tenuis* dominated the parasite assemblage with prevalences of 98%, 35%, 48% and 75%, respectively. *Trichostrongylus tenuis* mean intensity was significantly higher in juvenile Ross geese. One Hymenolepid cestode was common (46%) in combined hosts, and a second was only found in 4% of lesser snow geese. Trematodes (*Echinostoma* sp, and *Zygocotyle lunata*) were also only recovered from lesser snow geese and were rare, found in only 6% and 2% of hosts respectively. Overall, trematode and cestode prevalence varied between hosts, possibly due to low numbers. However, except for *T. tenuis*, there were no significant differences in nematode infections between these 2 species of snow geese.

19 Development of molecular tools for genetic manipulation of the apicomplexan parasite, *Sarcocystis neurona.* **SRIVENY DANGOUDOUBIYAM (PD)** [1]**,** ZIJING ZHANG (UG) [1] and DANIEL K. HOWE (MP) [1], [1]Department of Veterinary Science, University of Kentucky, Lexington, KY, USA.

Sarcocystis neurona is an obligate intracellular apicomplexan, the primary etiological agent of equine protozoal myeloencephalitis and an emerging pathogen of marine mammals. With the genome and transcriptome of *S. neurona* now sequenced, gene discovery is expected to accelerate. In addition, the availability of appropriate molecular genetics tools for transfection and gene manipulation will allow for improved investigation of *S. neurona* biology. Methods for basic DNA transfection into *S. neurona* have been established previously. With an objective of developing new molecular tools for gene targeting, two selectable markers were analyzed. The first selectable marker evaluated was the hypoxanthine-xanthine-guanine phosphoribosyl transferase (HXGPRT), a key enzyme of the purine salvage pathway. Similar to *Toxoplasma gondii*, *S. neurona* uses two pathways for purine uptake from its host cell, which can be exploited for positive-negative drug selection. A parasite line, Sn3ΔHXGPRT, was generated by targeted disruption of the HXGPRT locus in *S. neurona*. The Sn3ΔHXGPRT parasites were resistant to 6-thioxanthine, a toxic analog of xanthine, which can be used for negative selection. Restoration of HXGPRT activity in Sn3ΔHXGPRT parasites was achieved using the TgHXGPRT mini gene from *T. gondii*. Positive transformants were selected in growth medium containing the positive selection drug mycophenolic acid, which blocks the alternative purine salvage pathway. Thus, this selection system can be used for gene knock out (KO)/replacement and efficient selection using either of the drugs. A second selectable marker under evaluation is Phleomycin, a drug from the bleomycin family of antibiotics. Resistance to these drugs is conferred by the *S*h Ble gene. Experiments are underway to determine the optimal conditions for parasite selection using the Phleomycin/Ble system. In addition to development of selectable markers, a *S. neurona* strain is under development to enhance targeted gene disruption. Similar to *T. gondii*, *S. neurona* preferentially utilizes a non-homologous end-joining (NHEJ) pathway to repair DNA breaks and therefore displays a low frequency of homologous gene targeting. However, by disrupting SnKu80, a key enzyme of the NHEJ pathway, we believe that gene targeting by homologous recombination can be greatly improved. The SnKu80 locus was identified based on homology to the *T. gondii* gene, and a Ku80 KO plasmid was constructed and transfected into Sn3ΔHXGPRT parasites. Screening of the clones to identify Ku80 KO parasites is in progress. Availability of Sn3ΔHXGPRT and Sn3ΔHXGPRTΔKu80 strains should greatly promote functional studies investigating the parasite biology and host-parasite interactions.

20 Prevalence of *Baylisascaris procyonis* in non-raccoon procyonid hosts and assessment of risk of human exposure. **MAX C. PARKANZKY(GS),** JOE CAMP, APRIL JOHNSON, JAN RAMER, KEVIN R. KAZACOS(MP) Department of Comparative Pathobiology, College of Veterinary Medicine, Purdue University, West Lafayette, IN, *Indianapolis Zoo, Indianapolis, IN

Baylisascaris procyonis (*Bp*) is a large roundworm of the common raccoon (*Procyon lotor*) which serves as the definitive host. *Bp* is an important cause of clinical larva migrans, such as severe neurological disease, across numerous taxa including humans. Other procyonids, as well as occasionally dogs, can act as definitive hosts. Many of these animals are becoming more common as household pets, posing a risk to people who come in contact with these animals. We are investigating if patent *Bp* infection exists in captive non-raccoon procyonids and if humans who contact these animals are at risk of infection. Fecal samples from captive animals will be examined using standard flotation methods in Sheather's sugar solution and examined for *Bp* eggs. Fecal samples are being provided by pet owners, breeding facilities, and zoos for examination. Treatment of infected animals with anthelmintics will be directed in order to obtain the adult worms when they are expelled. The species of *Baylisascaris* will be confirmed morphologically and molecularly. An epidemiological survey will assess risk of human exposure to *Bp*. Initial findings suggest that many pet owners and zoological facilities are aggressive with preventive treatment and parasitic infection is not common. Samples have been examined from 17 kinkajous, 25 coatis, 17 captive raccoons, and three ring-tail cats thus far. Of the samples examined, one raccoon and one kinkajou have been positive for *Bp* eggs. In addition to the previous species listed, numerous samples have been obtained from other small carnivores that are housed in the same home or facility with other procyonids. The group of interest which will be studied further is breeding facility animals. This is because outdoor housing of breeding animals that many of these facilities utilize allows for the potential exposure to wildlife. Several cases of baylisascariasis in pet procyonids have also been traced back to breeding facilities. Recent findings of high seroprevalence of *Baylisascaris* sp. in people supports further studies in those who own or work closely with procyonids.

21 Novel techniques for biodiversity studies of gordiids and description of a new species of *Chordodes* (Gordiida, Nematomorpha) from Kenya, Africa. **MATTHEW G. BOLEK (MP)**, CLEO SZMYGIEL (GS), AUSTIN KUBAT (US), ANDREAS SCMIDT-RHAESA (MP), and BEN HANELT (PD). Department of Zoology, Oklahoma State University, Zoological Museum and Institute, Hamburg, Germany, and Department of Biology, University of New Mexico.

We collected a new species of gordiid as cysts in aquatic snails (*Biomphalaria pfeifferi*) from Lake Victoria Basin, Kenya Africa and cultured them in the laboratory. We describe the free-living male and female worms using morphological and molecular data as well as the life cycle, mating and oviposition behavior, egg strings, eggs, larvae, and cysts of this new species. *Chordodes* **n. sp.** belongs to a group of African *Chordodes* in which simple areoles are smooth or structured less so than "blackberry" areoles. Present among the simple areoles are clusters of bulging, crowned and circumcluster areoles along with thorn and tubercle areoles. In laboratory-reared crickets worms developed and emerged within 53–78 days post exposure. Adult male and female of this new species of *Chordodes* initiated typical Gordian knots and males deposited masses of sperm on the cloacal region of females. Females oviposited and attached egg strings in a continuous zigzag pattern on small branches or air-hoses but never free in the water column. Larvae hatched within two to three weeks, and cysts developed in laboratory-reared and exposed snails within 14–24 days. Morphological characteristics of egg strings, eggs, larvae and cysts of the new species of *Chordodes* were most similar to other gordiids in the genus *Chordodes* but differed morphologically from other gordiid genera for which similar information is available. We review recent advances in the use of non-adult cyst stages and new culturing techniques of gordiids which can help overcome current difficulties in nematomorph biodiversity studies.

22 Genetic diversity of the large turkey louse (*Chelopistes meleagridis*) reveals limited movement of turkeys across the Mississippi River. KIMBERLY LECOMPTE (GS) and **SHAWN MEAGHER** (MP), Department of Biological Sciences, Western Illinois University, Macomb, IL 61455

Molecular genetic data from parasites can reveal information about parasite dispersal abilities as well as movement patterns of their hosts. In this study, mitochondrial cytochrome oxidase I (COI) DNA sequences of the large turkey louse (*Chelopistes meleagridis*) were investigated to determine louse dispersal abilities and wild turkey (*Meleagris gallopavo*) movement within the Midwest. DNA was extracted from 190 lice found on 26 turkeys sampled from 4 states across the Midwest. A 356 base pair sequence was amplified via PCR, aligned with Clustal W, and analyzed with DnaSP v4.20 and GenAlEx v6.1 software. Eighteen haplotypes were found, differing at 35 polymorphic sites. High levels of louse diversity on turkeys suggests higher than expected horizontal transmission in this species. Two distinct COI haplotype lineages (revealed by a neighbor-joining tree and a haplotype network) indicate that *C. meleagridis* may consist of two unrecognized cryptic species. Levels of genetic divergence between these lineages are compatible with a late Pleistocene origin. Interestingly, the two lineages display a geographical split across the Mississippi River: members of one clade tend to occur west of the Mississippi River, and members of the other clade, east of the river. AMOVA analysis supports the West and East clade split across the Mississippi River. A Mantel test revealed no correlation between genetic distance and linear geographic distance. Our data indicate that there is little gene flow between *C. meleagridis* populations on opposite sides of the river, which also suggests that *M. gallopavo* movement across the river is either limited or absent. While the mechanism maintaining the geographical distribution of the haplotype lineages is unclear, these data hint at a more complicated host-parasite history than expected.

23 Helminth and Myxozoan Parasites of Fishes of the Great Smoky Mountains National Park (GSMNP). **SHERMAN S. HENDRIX,** Department of Biology, Gettysburg College, Gettysburg, PA 17325

Helminth parasites of fishes in the GSMNP are largely unknown with only a few species of hosts examined heretofore. During July and September, 2010, fishes were collected by seine or electroshocking at 10 sites in 8 mostly eastern and southern park streams, identified, and fixed in 1:4000 formalin for 30-45 minutes followed by10% formalin at the park collection sites. One-hundred sixteen of 175 fishes, or 66%, of the 21 fish species examined at Gettysburg College were found to have at least one parasite species present. Only the 6 *Salmo trutta* examined were uninfected. Five metazoan parasite phyla were present in GSMNP fishes. Members of three classes of Platyhelminthes (Trematoda, Monogenoidea and Cestoidea) were the most common parasites encountered either as adults, immature adults or metacercariae, e.g. *Neascus pyriformis*. Moreover, several fishes were infected with adult and juvenile intestinal nematodes (eg. *Rhabdochona* sp.) or harbored encysted larvae on their viscera. Leeches, acanthocephalans, mussel glochidia and myxozoans appeared to be relatively rare in the fishes collected in 2010. Most of these parasites constitute new locality records for GSMNP. Some represent probable new host records. No parasitic copepods were collected during this study.

Summary of the 64rd Annual Midwestern Conference of Parasitologists.

The 64th Annual Midwestern Conference of Parasitologists was held on June 7-9, 2012, at Truman State University in Kirksville, Missouri. Dr. Shawn Meagher of Western Illinois University served as Presiding Officer and Dr. Linda Twining of Truman State made local arrangements and served as Program Officer. Thirty two persons registered for the conference. Fifteen platform presentations and 6 posters were presented. The C. A. Herrick Award and $300 for outstanding poster was awarded to Utibe Bickham of the University of

Wisconsin, Madison for her poster "Cellular immune interactions between larval blood flukes, *Schistosoma mansoni*, and its snail invertebrate host *Biomphalaria galbrata.*" The G. R. LaRue Award and $300 for outstanding platform presentation was awarded to Heather Stigge of Oklahoma State University for her presentation "The influence of anuran host species on site fidelity of *Halipegus occidualis*" Michael Lehrke of Winona State University was awarded the R. M. Cable undergraduate award and $200 for his poster "Development of a Real-time PCR protocol for the detection of Lyme disease and babesiosis." An Honorable Mention award and $100 was given to Shelby Heistand of the Southern Illinois University for her poster entitled "Helminth parasites of Illinois bobcats." All 4 of the students who won awards are invited to claim an additional $200 to support travel to another scientific meeting before the next AMCOP. Heather Stigge was chosen as the AMCOP nominee for the American Society of Parasitologists' student travel grant award for 2013.

The AMCOP symposium was presented by Dr. John Janovy of the University of Nebraska, Lincoln who spoke on "The importance of the unimportant." and Dr. Patricia Parker of the University of Missouri, Saint Louis who spoke on "Understanding the histories of parasites of Galapagos birds." The banquet speaker was Dr. Scott Snyder who spoke on "Parasite Biodiversity: reflections, challenges and opportunities." The annual silent auction was also held.

AMCOP 65 will be held in 2013 at Purdue University, West Lafayette, IN. Additional future meeting sites as determined by the Meeting Sites Committee are:

AMCOP 66 – 2014: The University of Kentucky, Lexington KY
AMCOP 67 – 2015: Lawrence University, Appleton, WI
AMCOP 68 – 2016: Southern Illinois University, Carbondale IL
AMCOP 69 – 2016: Wilmington College, Wilmington OH

Secretary-Treasurer Woodmansee presented the treasurer's report for 2011 and the interim financial report for 2012. These reports were approved.

At the business meeting the AMCOP Student Research Grant Committee (S. Meagher, M. Bolek, A. Jimenez, T. Yoshino, K. Bates) reported its decisions for the first round of AMCOP-sponsored research grants. The awardees are: David Cordie, Lawrence University, "Testing Alternate Hypotheses of Parasitic Communities and Aquatic Invasive Species Interactions in Green Bay, Lake Michigan." ($250); Heather Stigge, Oklahoma State University, "Evaluating the Biological and Ecological Factors Influencing Transmission of Larval Digenetic Trematodes: A Test of Second Intermediate Host Specificity of Two *Halipegus* Species in North America." ($500); Elizabeth Warburton, Western Michigan University, "Determining Relative Roles of Host Exposure and Parasite Establishment in Big Brown Bats." ($250).

The membership approved the following procedures related to the Student Research Grant Committee and the Student Research Grant Program: 1. the program is a 3-year trial, to be evaluated after the 3rd year. 2. The committee will consist of 5 individuals, with rotating 2 year-terms. The initial 5 members will serve again in 2013, and after that, 2 or 3 members will be replaced by members chosen at the annual meeting. 3. Committee members should be chosen to ensure coverage of a variety of areas of expertise in parasitology. 4. When the annual "Call for Proposals" goes out in spring, it should be transmitted to the American Society of Parasitologists Secretary-Treasurer, so that it can be advertised to the parent organization.

The following committee reports were received and approved: Auditing (Andy Brittingham, Tim Yoshino), Symposium Suggestions (Elliott Zieman, Justin Wilcox), Meeting Sites (Jeff Laursen, Tom Platt), Nominating (Shawn Meagher, Doug Woodmansee), and Resolutions (Agustin Jimenez, Kim Bates).

Officers elected for 2012 were: Dr. Kim Bates, Winona State University: Presiding Officer; Dr. Joe Camp, Purdue University: Program Officer. Dr. Douglas Woodmansee, Wilmington College will serve the second year of a two-year term as Secretary-Treasurer.

Prepared June 12, 2012.
Douglas B. Woodmansee
AMCOP Secretary-Treasurer

THE ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS (AMCOP)

OBJECTIVES AND ORGANIZATION

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

NAME

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

AFFILIATION

The Conference 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.

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. A registration fee is charged during registration at annual conferences. The amount of this fee will be decided for each Conference by a committee composed of the Presiding Officer, the Secretary/Treasurer, and the Program Officer, who is to serve as its chair. Dues are established by the Policy Committee and collected by the Secretary/Treasurer.

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.

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 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) Judging Committee,

(f) Audit Committee,

(g) such other *ad hoc* committees as may be required.

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.

5. The Secretary/Treasurer shall issue annual dues notices and about four months prior to each Conference a call for participants in the program for each Conference; inform the new Presiding and Program Officers concerning their duties and the members of the Policy Committee of their tenure and the Secretary of the American Society of Parasitology within three weeks after the annual election; serve as member without vote and the Secretary of the Policy Committee: and supervise all funds of the Conference.

6. 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.

7. 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.

8. The Conference confers three major awards during its annual meeting to student participants. These are the Chester A. Herrick Award, sponsored by the Eli Lilly Co., 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 except for the Herrick Award are supported by donations from the AMCOP membership.

9. (a) The winner of each award will be selected by a 3-person committee appointed at each annual meeting by the Presiding Officer. The criteria for judgment will be established each year by the committee.

(b) The size of the Herrick and LaRue awards shall traditionally be $300.00. The Cable undergraduate award 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 both awards while a student in different years.

SUMMARY OF AMCOP MEETINGS 1949-PRESENT

Year Meeting Site (Conference No.) ..... Presiding Officer
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

1949 Univ. Wisconsin, Madison, WI (AMCOP I) ..... Harley J. VanCleave
J.C. Baer,
ST=J. R. Lincicome

1950 Univ. Michigan, Ann Arbor, MI (II) ..... R.V. Bangham
W.W. Cort, Trends in Helminthological Research.
PO/ST=R. J. Porter

1951 Purdue University, Lafayete, IN (III) ..... L.O. Nolf
J.E. Ackert, Some Observations on Hookworm Disease.
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.

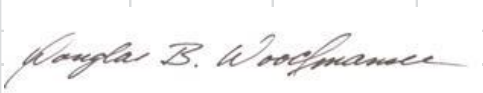
2013 Purdue University, West Lafayette, IN (LXV)..... Kimberly Bates
Agustin Jimenez - Biodiversity in the New World: "What is it?", still a relevant question.
PO=Joe Camp , ST= Doug Woodmansee
H=?; L=? HM= ?; C= ?;
S=DNA Barcoding in Parasitology Research by Sean Locke and Mark Forbes

2014 The University of Kentucky
PO=Daniel Howe
H=?; L=? HM= ?; C= ?;
S=?

2012 AMCOP Final Financial Report

Cash on Hand 1/1/12		**$5,476.22**	
Expenses			
	AMCOP 64 Program Duplication	$101.92	
	Postage	$12.75	
	Certificates & Holders	$82.88	
	Herrick Award	$300.00	
	LaRue Award	$300.00	
	Cable Award	$200.00	
	Honorable Mention Awards	$100.00	
	Bank Fees	$0.00	
	Office Supplies	$0.00	
	Speaker Expenses	$0.00	
	2011 Student Travel Awards	$200.00	
	2012 Student Travel Awards	$400.00	
	Research Grants Program	$1,000.00	
	Web Site Expense	$23.76	
	Total Expenses	**$2,721.31**	
Income			
	2012 Dues Payments	$370.00	
	2012 Member Contributions	$575.00	
	Lilly Donation	$300.00	
	ASP Support	$250.00	
	Silent Auction Revenue	$75.00	
	Interest Income	$51.81	
	AMCOP 64 Surplus (Loss)	($260.90)	
	Total Income	**$1,360.91**	
Cash on Hand 12/31/2012		**$4,115.82**	
Operating Surplus (Loss) for 2012			**($1,360.40)**
Value of CD (as of 2/10/2013)		**$7,021.16**	
End of Year Net Worth		**$11,136.98**	

Submitted By:



Douglas B. Woodmansee
Secretary/Treasurer

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(Dues Paid in Either 2012 or 2013)

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Elliott Zieman University of Southern Illinois ezieman@siu.edu	

NOTES

NOTES

2013 AMCOP DUES

Name _____

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Phone # _____

Email _____

DUES
Faculty & Emeriti ($10), Student ($5): $_____

CONTRIBUTION to student awards: $_____

TOTAL $_____

****
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****

Send this form and your check via US Mail to:

Dr. Douglas Woodmansee
AMCOP Secretary/Treasurer
Pyle Center Box 1263
Wilmington College
1870 Quaker Way
Wilmington, OH 45177

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www.amcop.org