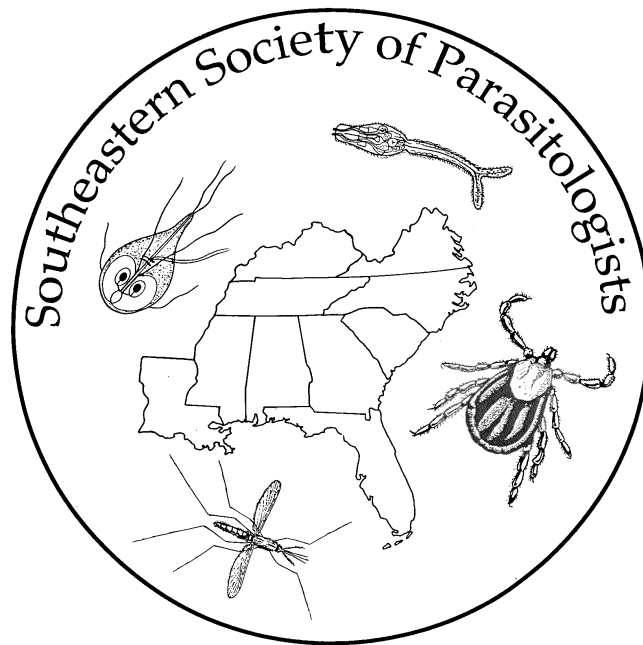


SOUTHEASTERN SOCIETY OF PARASITOLOGISTS

(Affiliate of The American Society of Parasitologists)

PROGRAM AND ABSTRACTS



April 16 – 18, 2008

Hosted by:

**Wofford College, Spartanburg, SC
and
Furman University, Greenville, SC**

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Acknowledgement of Program Sponsors: Significant financial support for the student members presenting their research in the *Byrd-Dunn Student Paper Competition* has been provided by Bayer Animal Health, Shawnee Mission, Kansas. We greatly appreciate their generous assistance and continued commitment to development of the next generation of Parasitologists.

Dr. Sharon Patton's gracious contribution to defray expenses associated with the annual meeting has been made in honor of the University of Tennessee Lady Vols "back to back" NCAA Women's Basketball National Championships.

Southeastern Society of Parasitologists 2008 Program Summary

Meeting Registration/Check In

Wednesday, 16 April 2008, 8:00 a.m. – 8:00 p.m.

Location: Marriot Lobby

SSP Executive Committee

Wednesday, April 16, 2008, 2:00 – 5:00 p.m.

Location: Spartan

SSP Presidential Symposium

Wednesday, April 16, 2008, 5:30 – 7:30 p.m.

Location: Wadsworth

Emerging Infectious Diseases in Recreational Settings

Presiding: Dr. Vina Faulkner, Department of Allied Health, Lincoln Memorial University, Harrogate TN

- 5:30 1 **MARCIANO-CABRAL, FRANCINE, MELISSA JAMERSON AND GUY CABRAL.** Virginia Commonwealth University School of Medicine—Free-living amoebae as emerging protozoan pathogens.
- 6:00 2 **KANIA, STEPHEN A., SHAWN L. LEWIS, AND JOHN C. NEW, Jr.** University of Tennessee, Knoxville—Detection of hantavirus in the Great Smoky Mountains National Park.
- 6:30 3 **YABSLEY, MICHAEL J.^{1,2}, AND LAUREL GARRISON³.** University of Georgia, Warnell School of Forestry and Natural Resources¹, University of Georgia, Southeastern Cooperative Wildlife Disease Study², and Georgia Division of Public Health³—Land-use changes and recreation: impacts on tick-borne diseases

PowerPoint Loading Session/Slide Preview.

Wednesday Evening following the Presidential Symposium.

Location – Wadsworth/ Marriot Lobby

Thursday Morning, April 17, 2008, 8:30 a.m. – 12:00 p.m.

**Byrd-Dunn Student Paper Competition
Southeastern Society of Parasitologists I**

Location - Wadsworth

*Presenting Author

†Byrd-Dunn Student Paper Competitor

Presiding: Dr. Alexa Rosypal, Department of Pathology and Laboratory Medicine, University of North Carolina at Chapel Hill

- 8:15 4[†] ***GROCE, CHAD AND CHERYL D. DAVIS.** Department of Biology, Biotechnology Center, Western Kentucky University-High prevalence of *Trypanosoma cruzi* infection in raccoons and opossums from Kentucky.
- 8:30 5[†] ***COFFMAN, CAROLINE, KATIE EDENFIELD, CAROL RUCKDESCHL¹, SAM POSEY, EMILY PIERCE, WHITNEY BULLARD, AND C. A. HALL.** Department of Biology, Berry College, Mount Berry, GA, ¹Cumberland Island Museum of Natural History, Cumberland Island, GA—A species diverse survey of Southeastern Georgia for the sylvatic distribution of *Trypanosoma cruzi*.
- 8:45 6[†] ***BROWN, EMILY L.^{1,2}, MOURAD GABRIEL³, MATTHEW GOMPPER⁴, RYAN MONELLO⁴, KRISTA M. WENNING⁵, AND MICHAEL J. YABSLEY^{1,2}.** ¹Southeastern Cooperative Wildlife Disease Study, College of Veterinary Medicine, University of Georgia, Athens, GA, ²Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA, ³Department of Veterinary Medicine and Epidemiology, Center for Vector-Borne Diseases, University of California Davis, Davis CA, ⁴Department of Fisheries and Wildlife Sciences, University of Missouri, Columbia, MO, and ⁵USDA-APHIS, Wildlife Services, Phoenix, AZ—Seroprevalence of *Trypanosoma cruzi* in mammals of the United States.
- 9:00 7[†] ***PIERCE, EMILY, KATIE EDENFIELD, SAM POSEY AND C. A. HALL.** Department of Biology, Berry College, Mount Berry, GA—Vertical transmission of type I and type IIa isolates of *Trypanosoma cruzi* from the southeastern United States in BALB/c mice.

- 9:15 8[†] ***ROELLIG, DAWN M.^{1, 2}, ANGELA E. ELLIS³, and MICHAEL J. YABSLEY^{2, 4}.** Department of Infectious Diseases, College of Veterinary Medicine, The University of Georgia¹; Southeastern Cooperative Wildlife Disease Study, Department of Population Health, College of Veterinary Medicine, The University of Georgia²; Athens Veterinary Diagnostic Laboratory, College of Veterinary Medicine, The University of Georgia³; D.B. Warnell School of Forestry and Natural Resources, The University of Georgia⁴—Infections with geographically and genetically different strains of *Trypanosoma cruzi* in two North American reservoir hosts induce dissimilar infection dynamics.
- 9:30 9[†] ***SHULMAN, MARISA ETTA, HOLLY J PETERS, ALYCIA CHAPMAN, CHARLES FAULKNER, GERI GECHEVA AND SHARON PATTON.** University of Tennessee College of Veterinary Medicine (UTCVM)—Prevalence of *Toxoplasma gondii* and *Dirofilaria immitis* in feral cats (*Felis catus*) in eastern Tennessee.
- 9:45 10[†] ***PETERS, HOLLY J, MARISA ETTA SHULMAN, AMANDA FANNING, ALYCIA CHAPMAN, AND SHARON PATTON.** University of Tennessee College of Veterinary Medicine—Prevalence of endoparasites in cats (*Felis catus*) in eastern Tennessee based on fecal examination.
- 10:00 **COFFEE BREAK: VISIT POSTERS**
- 10:30 11[†] ***STOCKDALE, HEATHER D.¹, SOREN P. RODNING², M. DANIEL GIVENS¹, A. RAY DILLON¹, JOSEPH C. NEWTON¹, JENNIFER A. SPENCER¹, CHRISTINE C. DYKSTRA¹, DAVID S. LINDSAY³, AND BYRON L. BLAGBURN¹.** ¹Auburn University College of Veterinary Medicine, ²Auburn University College of Agriculture, ³Virginia Tech V-M Regional College of Veterinary Medicine—Experimental infection of cats with *Tritrichomonas foetus* supports differences between isolates of bovine and feline origin
- 10:45 12[†] ***TACKETT, KRISTINA, MEGAN BOWLING, CHAD GROCE, AND CHERYL D. DAVIS.** Department of Biology, Biotechnology Center, Western Kentucky University—Raccoons and opossums as potential reservoir hosts for tick-borne zoonoses in Kentucky.

- 11:00 13[†] ***MURDOCK, JESSICA H.^{1,2} MICHAEL J. YABSLEY^{1,2}, CHANDRASHEKAR RAMASWAMY³, TOM O'CONNOR³, AND SUSAN E. LITTLE⁴.** University of Georgia, Warnell School of Forestry and Natural Resources¹, Southeastern Cooperative Wildlife Disease Study², IDEXX Laboratories³, Oklahoma State University Center for Veterinary Health Sciences⁴—Evaluation of white-tailed deer as natural sentinels for *Borrelia*
- 11:15 14[†] ***MERWAD, ABDULLAH¹, SHEILA MITCHELL^{2*}, ANNE ZAJAC², GEORGE FLICK² AND DAVID LINDSAY².** Zagazig University, Zagazig, Egypt¹ and Virginia Tech² — Effect of high pressure processing on *Hymenolepis diminuta* eggs.
- 11:30 15[†] ***JONES, REBECCA D. AND STEPHEN C. LANDERS.** Troy University—Morphological analysis of the trematode parasite *Alloglossidium*.
- 11:45 16[†] ***SHEEHAN, KATE L.^{1, 2}, JUST CEBRIAN^{1, 2}, JOHN F. VALENTINE^{1, 2}, AND JACK O'BRIEN¹.** University of South Alabama¹, Dauphin Island Sea Lab²—Spatial and seasonal variability of parasite assemblages of the common grass shrimp in Mobile Bay

12:00 – 1:30 p.m. Lunch Break

Thursday Afternoon, April 17, 2008, 1:30 p.m. – 4:40 p.m.

**Byrd-Dunn Student Paper Competition (continued)
Southeastern Society of Parasitologists II**

Location – Wadsworth

*Presenting Author

†Byrd-Dunn Student Paper Competitor

Presiding: Dr. Chris Hall, Department of Biology, Berry College, Mount Berry GA

- 1:30 17[†] ***HILSINGER, K. CLAIRE, MIRANDA PAGE AND DANA NAYDUCH.** Georgia Southern University—Analysis of *Skrjabinoptera phrynosoma* burden on stomach-flushed *Phrynosoma platyrhinos*.
- 1:45 18[†] ***GERHOLD, RICHARD W.¹, ANDREW B. ALLISON¹ AND JOHN F. ALDERETE².** Southeastern Cooperative Wildlife Disease Study, College of Veterinary Medicine, The University of Georgia¹ and The University of Texas Health Science Center at San Antonio²—Failure to detect intracellular double-stranded RNA viruses in *Trichomonas gallinae* and identification of a novel sequence of a *Trichomonas vaginalis* virus.

- 2:00 19† ***DENNIS, MATT, HOWARD WHITEMAN AND CLAIRE FULLER.** Murray State University —Encapsulation ability of dragonfly nymphs, *Plathemis Lydia*, is affected by water pollution.
- 2:15 20 ***CARLETON, RENÉE E¹. AND MICHAEL J. YABSLEY².** Berry College¹ and University of Georgia²—Parasites of eastern bluebirds (*Sialia sialis*): A review and survey of a population nesting within a grass-dominated agricultural habitat in Georgia.
- 2:30 21 ***FAULKNER, CHARLES T.¹, ALYCIA CHAPMAN¹, RANDALL JUNGE², GRAHAM CRAWFORD³, AND CHARLES WELCH⁴.** ¹University of Tennessee College of Veterinary Medicine, ²St. Louis Zoo, ³San Francisco Zoo, and ⁴The Madagascar Fauna Group—Host distribution of endoparasitic helminths of Malagasy lemuroids.
- 2:45 22 ***KYLE, DENNIS E.,¹⁻³ KOSOL YONGVANITCHIT³, JENNIFER M. PETERS,⁴ NANHUA CHEN,³ MICHELLE GATTON,⁵ QIN CHENG,⁴ AND H. KYLE WEBSTER.^{2,3}** University of South Florida,¹ Walter Reed Army Institute of Research,² Armed Forces Institute for Medical Sciences,³ Australian Army Malaria Institute,⁴ and Queensland Institute of Medical Research.⁵—Artesunate and dihydroartemisinin induce dormancy in ring stages of *Plasmodium falciparum*: implications for a mechanism of recrudescence.
- 3:00 **COFFEE BREAK: VISIT POSTERS**
- 3:30 23 ***WEST, ANDREW¹, MARIELLE POSTAVA-DAVIGNON², REBECA ROSENGAUS² AND CLAIRE FULLER¹.** Murray State University¹ and Northeastern University² — Susceptibility to fungal infection in the Caribbean termite is affected by habitat and colony of origin.
- 3:45 24 ***PUNG, OSCAR J.¹, MICHAEL WALKER² AND WHITNEY L. BARFIELD¹.** Georgia Southern University¹ and Armstrong Atlantic State University²—The trematode *Microphallus turgidus* cultured *in vitro* produces eggs infective to hydrobiid snails.
- 4:00 25 ***LANDERS, STEPHEN C.** Troy University—Staining improvements for apostome ciliates using a modified Chatton-Lwoff technique.
- 4:15 26 ***NAYDUCH, DANA.** Georgia Southern University—Temporal progression of *Herpetomonas muscarum* (Kinetoplastida: Trypanosomatidae) in the midgut of the housefly, *Musca domestica* (Diptera: Muscidae).

- 4:30 27 ***STROBL, JEANNINE¹, RANA NAGARKATTI² AND DHARMENDAR RATHORE²**.¹Biomedical Sciences, Edward Via Virginia College of Osteopathic Medicine, and ²Virginia Bioinformatics Institute, Blacksburg, VA— Nullscript, an apicomplexan selective inhibitor.

SSP Business Meeting/ Breakfast

Friday Morning, April 18, 2008, 7:30 a.m - 9:00 a.m.

Location – Wadsworth

Friday Morning, April 18, 2008, 9:15 a.m. – 11:00 a.m.

Southeastern Society of Parasitologists III

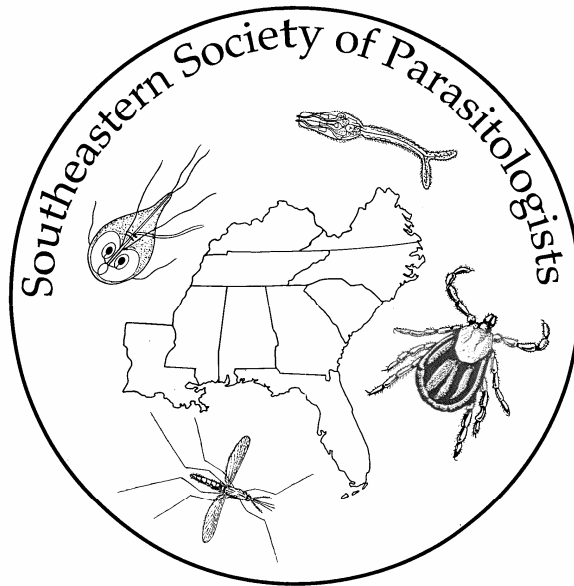
Location – Wadsworth

*Presenting Author

Presiding: Dr. Vince Connors, Department of Immunology and Molecular Biology, University of South Carolina Upstate, Spartanburg SC.

- 9:15 28 **BURON, ISAURE de ¹, SCOTT FRANCE ², WILLIAM A. ROUMILLAT³, LAM TSOI ⁴, VINCENT A. CONNORS⁵, AND TIMOTHY BRYAN¹**. College of Charleston, Charleston SC, ²University of Louisiana, Lafayette LA, ³ South Carolina Department of Natural Resources, Charleston SC, ⁴ Medical University of South Carolina, Charleston SC, ⁵ University of South Carolina Upstate, Spartanburg SC— The philometrids of the southern flounder: An update
- 9:30 29 **HERRON, BROOKE, TIFFANY G. BAKER, AND ISAURE DE BURON**, College of Charleston, Charleston SC, ² Medical University of South Carolina, Charleston SC— Population dynamics of a monogenean parasite of the esophagus of the Atlantic croaker, *Micropogonias undulatus*, in the South Atlantic Bight and inshore waterways.
- 9:45 30 **LAURSEN, JEFF, AND ANDREW CLAXTON**. Eastern Illinois University —Impact of coal mine effluent on fish parasite assemblages in southern Illinois streams.
- 10:00 **COFFEE BREAK: VISIT POSTERS**
- 10:30 31 **ZELMER, DEREK A.¹ AND THOMAS R. PLATT²**. University of South Carolina Aiken¹ and St. Mary's College²—Structure and similarity of helminth communities of six species of Australian turtles.

- 10:45 32 **ROSYPAL, ALEXA C.¹, J. A. CORTÉS-VECINO²,
SOLANGE M.GENNARI³, J.P. DUBEY⁴, RICHARD R.
TIDWELL¹, AND DAVID S.LINDSAY⁵.** ¹University of North
Carolina at Chapel Hill, ²Universidad Nacional de
Colombia-Sede Bogotá, Bogota, Colombia, ³Departamento
de Medicina Veterinária Preventiva e Saúde Animal, USP,
São Paulo,SP, Brazil, ⁴United States Department of
Agriculture, Animal Parasitiseases Laboratory, Beltsville,
MD, ⁵Virginia Tech—Prevalence of antibodies to of
Leishmania infantum and *Trypanosoma cruzi* in dogs
from urban areas of Brazil and Colombia.
- 11:00 33 **GOODWIN, DAVID G.¹, JEANNINE STROBL², SHEILA M.
MITCHELL¹, ANNE M. ZAJAC¹, AND DAVID S. LINDSAY¹.**
Virginia Tech¹ and Edward Via Virginia College of
Osteopathic Medicine²—Evaluation of mood stabilizing and
anti-psychotic drugs for activity against *Toxoplasma gondii*.



PROGRAM ABSTRACTS

1. MARCIANO-CABRAL, FRANCINE, MELISSA JAMERSON AND GUY CABRAL. Virginia Commonwealth University School of Medicine –Free-living amebae as emerging protozoan pathogens.

Free-living amebae of the genera *Naegleria* and *Acanthamoeba* are found worldwide in diverse water habitats. These amebae serve as reservoirs for pathogenic bacteria. *N. fowleri* and species of *Acanthamoeba* cause fatal infections in humans. *N. fowleri* is causative of Primary Amebic Meningoencephalitis (PAM), a rapidly fatal disease of the central nervous system that occurs generally in previously healthy children and young adults with a history of exposure to contaminated recreational, domestic, or environmental water sources. Since 1990, the number of human cases of PAM has increased worldwide including in the United States. The majority of these occurred in individuals who had been swimming and diving in freshwater lakes and ponds. In the summer of 2007 six fatal cases of PAM were reported in Florida, Texas, and Arizona. *Acanthamoeba* is causative of granulomatous amebic encephalitis (GAE) and amebic keratitis (AK). GAE is a chronic fatal disease of the brain that occurs in debilitated patients while AK is a painful sight threatening infection that affects immune competent individuals. The incidence of GAE has increased due to a greater number of individuals whose immune systems are compromised, including those infected with HIV or who have received organ transplants. The incidence of AK has increased due to use of contact lenses and poor contact lens hygiene. Free-living amebae constitute a group of emerging pathogens that present an increasing higher risk to human health. Thus, there is a need to monitor recreational and domestic water sources for the presence of these pathogenic free-living amebae.

2. KANIA, STEPHEN A., SHAWN L. LEWIS, AND JOHN C. NEW, Jr. University of Tennessee, Knoxville-Detection of hantavirus in the Great Smoky Mountains National Park.

New world hantaviruses are transmitted by rodents and are endemic to many regions of the United States. Strains affecting humans can cause hantavirus pulmonary syndrome (HPS) which has a high mortality rate. A survey for the presence of hantavirus in national parks was conducted by the Centers for Disease Control and Prevention in 1994 and 1995. This survey, of limited samples and sites, detected the virus in the Great Smoky Mountains National Park (GSMNP). We conducted a more extensive sampling of rodents in the GSMNP to determine the strain or strains of virus, identify animal reservoirs, and examine the geographical distribution of the virus. To facilitate this study a synthetic peptide based enzyme linked immunosorbent assay (ELISA) and a reverse transcriptase real-time polymerase chain reaction (RT-qPCR) test was developed. The ELISA used a 59 amino acid epitope derived from the nucleoprotein. The RT-qPCR targets a highly conserved region of the small (S) genomic segment. The development of these tests, test results, and biological safety considerations for dealing with potentially infected rodents in field studies will be presented.

3. YABSLEY, MICHAEL J.^{1,2}, AND LAUREL GARRISON³. University of Georgia, Warnell School of Forestry and Natural Resources¹, University of Georgia, Southeastern Cooperative Wildlife Disease Study², and Georgia Division of Public Health³ –Land-use changes and recreation: impacts on tick-borne diseases

Tick-borne diseases are emerging throughout the world and in the past 40 years and numerous tick-transmitted diseases have emerged in the US since the mid-1900's. Three pathogens (*Borrelia burgdorferi*, *Anaplasma phagocytophilum*, and *Babesia microti*) are transmitted by *Ixodes* species and utilize rodents, primarily white-footed mice as reservoirs. In the southern US, the lone star tick (*Amblyomma americanum*) is the most common human-biting tick and can transmit at least three pathogens, *Ehrlichia chaffeensis*, *E. ewingii*, and a newly discovered *Ehrlichia* sp. that is closely related to *E. ruminantium*. All three of these utilize white-tailed deer as a reservoir. Land use changes, such as suburbanization and reforestation, have significantly increased the risk of tick-borne diseases by providing more suitable habitat for ticks and reservoir hosts. All of these pathogens utilize reservoirs that are highly adaptable and can utilize highly fragmented and degraded habitats. Furthermore, an increase in the amount of time that people, especially those that are immunosuppressed or elderly, spend conducting recreational activities has increased the risk of tick-borne diseases. For example, a recent survey in Georgia found that the majority of people who had ticks attached were participating in recreational activities such as gardening, playing outside, picnicking, or mountain biking. In recently years, the documented distribution of the lone star tick has expanded dramatically and as a result, ehrlichiosis cases in the northern US are expected. Future changes in climate, land-use, and human behaviors are expected to have dramatic effects on the risk of tick-borne diseases.

4. CHAD GROCE AND CHERYL D. DAVIS. Department of Biology, Biotechnology Center, Western Kentucky University–High prevalence of *Trypanosoma cruzi* infection in raccoons and opossums from Kentucky.

While only 6 autochthonous cases of human Chagas' disease have been documented in the U.S., it has been estimated that as many as 50/1000 immigrants in the U.S. may be infected with *Trypanosoma cruzi*. The parasite has been isolated from a wide variety of mammals indigenous to the southern U.S., but it has not been reported from the state of Kentucky. The principal goal of the present study was to determine if the sylvatic cycle of *T. cruzi* infection occurs in the state, and if present, to assess the prevalence of infection in Warren and Barren counties. Raccoons and opossums were live-trapped between June and December, 2007. Animals were anesthetized using an inhalant anesthesia, and blood samples were collected using a vacutainer system. Sera were frozen at -80°C for subsequent analysis, and whole blood samples were inoculated in duplicate into liver infusion tryptose (LIT) medium and cultured at 27°C. To date, eighteen *T. cruzi* isolates from raccoons have been positively identified by hemoculture. No opossum blood samples have yielded positive hemoculture results, however, 15/49 opossum sera were identified as positive by immunofluorescence antibody test (IFAT). A total of 18/46 raccoon samples were judged to be seropositive by IFAT. We are currently optimizing a parasite-specific ELISA to measure antibody titers in seropositive raccoons and opossums. To our knowledge this is the first time *T. cruzi* has been reported in Kentucky. The partial support of NIH Grant Number 2 P20 RR-16481 from the National Center for Research Resources is gratefully acknowledged.

5. COFFMAN, CAROLINE, KATIE EDENFIELD, CAROL RUCKDESCHEL¹, SAM POSEY, EMILY PIERCE, WHITNEY BULLARD, AND C. A. HALL. DEPARTMENT OF BIOLOGY, BERRY COLLEGE, MOUNT BERRY, GA. 30149, ¹CUMBERLAND ISLAND MUSEUM OF NATURAL HISTORY, CUMBERLAND ISLAND, GEORGIA—A species diverse survey of southeastern Georgia for the sylvatic distribution of *Trypanosoma cruzi*.

Specimens (n =110) representing fifteen different mammalian species were collected to evaluate the host diversity of *Trypanosoma cruzi* in southeastern Georgia. Tissues were harvested and subjected to PCR analysis using the *T. cruzi* specific TCZ primers. A positive result was generated from 117 (71%) of the samples, representing fourteen of the fifteen species tested. Cotton mice (*P. gossypinus*) emerged as a significant reservoir species with 21 of 29 individuals testing positive. High prevalence rates were also found in raccoons (*P. lotor*), armadillos (*D. novemcinctus*), opossums (*D. virginiana*), Eastern moles (*S. aquaticus*), and Short-tailed shrews (*B. carolinensis*). Interestingly, of the five species of bats tested, all generated at least one positive result. This confirms that *T. cruzi* is widely distributed throughout the sylvatic mammalian population in southeast Georgia, with significant prevalence rates in most of the species tested.

6. BROWN, EMILY L.^{1,2}, MOURAD GABRIEL³, MATTHEW GOMPPER⁴, RYAN MONELLO⁴, KRISTA M. WENNING⁵, AND MICHAEL J. YABSLEY^{1,2}. ¹Southeastern Cooperative Wildlife Disease Study, College of Veterinary Medicine, University of Georgia, Athens, GA, ²Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA, ³Department of Veterinary Medicine and Epidemiology, Center for Vector-Borne Diseases, University of California Davis, Davis CA, ⁴Department of Fisheries and Wildlife Sciences, University of Missouri, Columbia, MO, and ⁵USDA-APHIS, Wildlife Services, Phoenix, AZ—Seroprevalence of *Trypanosoma cruzi* in mammals of the United States.

Trypanosoma cruzi, the causative agent of Chagas' disease, is a substantial public health problem in Latin America. In the US, many species of wildlife are infected, but domestic animal and human cases are relatively rare. The two primary reservoirs in the US are believed to be raccoons (*Procyon lotor*) and opossums (*Didelphis virginiana*). Mammals from five states across the natural geographic range were tested for anti-*T. cruzi* antibodies using the indirect immunofluorescent antibody test. From Georgia and Florida, antibodies were detected in raccoons (36%, 201/559), opossums (30%, 122/403), bobcats (*Lynx rufus*) (4.2%, 2/48), and coyotes (*Canis latrans*) (4.4%, 1/23), but not in 15 gray fox (*Urocyon cinereoargenteus*) or 5 red fox (*Vulpes vulpes*). In Missouri, 69% of 108 raccoon serum samples were positive for antibodies to *T. cruzi*. In Arizona, one raccoon (20%), 3 striped skunks (9%), and one ringtail (100%) were seropositive, while 20 domestic dogs and one hooded skunk (*Mephitis macroura*) were negative. From northern California, 10 ringtails, 21 fishers (*Martes pennanti*), 3 raccoons, 10 striped skunks, and 10 gray fox were all negative. Seroprevalence rates for raccoons and opossums from Georgia and Florida were similar to each other but were higher compared to culture-based prevalence rates (difference significant only for opossums). These data suggest that opossums have similar exposure rates to raccoons but maintain lower parasitemias or have shorter patent periods. This comprehensive serologic survey shows the relative importance of different species as reservoirs, as well as regional differences in *T. cruzi* prevalence.

7. PIERCE, EMILY, KATIE EDENFIELD, SAM POSEY AND C. A. HALL. Department of Biology, Berry College, Mount Berry, GA 30149–Vertical transmission of type I and type IIa isolates of *Trypanosoma cruzi* from the southeastern United States in BALB/c mice.

The dynamics of *Trypanosoma cruzi* transmission in the southeastern United States are poorly understood. Mathematical models suggest that the high prevalence in sylvatic reservoir populations in the region cannot be supported by vector transmission alone. We have compared regionally acquired Type I (n = 3), and Type IIa isolates (n = 3), for their ability to be vertically transferred in BALB/c mice. Effects of infection on fecundity were also noted. Consistent with our previous findings, pups (n=127) born to Type IIa infected female mice were more likely to provide a positive *T. cruzi* specific PCR result than pups (n=56) born to females infected with regional Type I isolates, with prevalence values of 75% and 53.5 respectively. The Type IIa infected mice also birthed more pups over the period of study. This was largely due to an increase in the number of litters compared to Type I infected female mice and mortality in the Type I infected females. These data confirm that the Type IIa strains of *T. cruzi* in the southeast are more highly adapted to placental transmission than the Type I strain. This may explain in part the described strain dichotomy in regional host preference.

8. ROELLIG, DAWN M.^{1, 2}, ANGELA E. ELLIS³, and MICHAEL J. YABSLEY^{2, 4}. Department of Infectious Diseases, College of Veterinary Medicine, The University of Georgia¹; Southeastern Cooperative Wildlife Disease Study, Department of Population Health, College of Veterinary Medicine, The University of Georgia²; Athens Veterinary Diagnostic Laboratory, College of Veterinary Medicine, The University of Georgia³; D.B. Warnell School of Forestry and Natural Resources, The University of Georgia⁴–Infections with geographically and genetically different strains of *Trypanosoma cruzi* in two North American reservoir hosts induce dissimilar infection dynamics.

Trypanosoma cruzi, etiologic agent of Chagas disease, is capable of infecting a variety of mammalian hosts within a wide geographic range in the Americas. In addition, *T. cruzi* is genetically and biologically diverse with molecular associations occurring between strain type and host origin. The objective of the present study was to determine dynamics of *T. cruzi* infection in *Didelphis virginiana* and *Procyon lotor* and to provide experimental evidence for an observed host species-parasite strain dichotomy. Based on previous molecular typing and hemoculture evidence from wild-trapped animals, we hypothesized that raccoons would have a longer patent period than opossums, and raccoons would be more competent reservoirs for all genotypes of *T. cruzi* compared with opossums. Individuals (n=2 or 3) of each species were intraperitoneally or intravenously inoculated with 1×10^6 culture-derived *T. cruzi* trypomastigotes of Type IIa (North America-raccoon), Type I (NA- opossum), Type IIb (South America-human), or both Type I and IIa. One animal in each group was euthanized during acute (1 and/or 2 months) and chronic stages (4 months) and tissues collected for PCR and histopathology. Opossums had a more gradual increase in parasitemia, peaking around 35DPI, and a rapid decline by week six; raccoons quickly reached peak parasitemia at 18-21DPI and maintained relatively high parasitemia for 5 weeks. Additionally, raccoons became infected with all *T. cruzi* strains, while infection was not detected by PCR, serology, or hemoculture in opossums inoculated with either Type II strain. Serology as determined by IFA demonstrated raccoons seroconverted sooner (3-7dpi) than opossums (10dpi).

9. SHULMAN, MARISA ETTA, HOLLY J PETERS, ALYCIA CHAPMAN, CHARLES FAULKNER, GERI GECHEVA AND SHARON PATTON. University of Tennessee College of Veterinary Medicine (UTCVM)—Prevalence of *Toxoplasma gondii* and *Dirofilaria immitis* in feral cats (*Felis catus*) in eastern Tennessee.

The term “feral cats” usually refers to cats that were once domestic, but now live in the wild. In conjunction with a larger study of eastern TN feral cat populations (ETFCP), serum samples collected between 2005 and 2007 were titered for *Toxoplasma gondii* antibodies (modified agglutination test) and *Dirofilaria immitis* antigen and antibody (Synbiotics DiroCHEK and Heska Solo Step). Results were analyzed using the Epi Info Software package. Almost half the cats tested (1111/254, 43.7%) were positive for *T. gondii* antibody. Chi Square and Odds Ratio (OD) statistics showed no significant difference in the prevalence of *T. gondii* between males and females, but adults were almost twice (1.9) as likely to be positive as juveniles. Compared to the 31% (87/283) prevalence in pet cats tested at UTCVM during 2005-2007, the ETFCP was 1.75 as likely to be positive as pet cats and perhaps a major source of oocyst contamination for birds, domestic and wild animals. For *D. immitis*, 16% (26/162) were antibody positive and 0.4% (1/162) antigen positive. The antigen positive cat was also antibody positive. There was no significant difference in prevalence between males and females or adults and juveniles. Comparing the 8.6% prevalence (48/560) from our previous study in pet cats from eastern TN to the 16% in feral cats reported here, feral cats may be at greater risk of *D. immitis* infection than pet cats. This study was funded in part by the UTCVM Center of Excellence Student Research Program.

10. PETERS, HOLLY J, MARISA ETTA SHULMAN, AMANDA FANNING, ALYCIA CHAPMAN, AND SHARON PATTON. University of Tennessee College of Veterinary Medicine—Prevalence of endoparasites in cats (*Felis catus*) in eastern Tennessee based on fecal examination.

The prevalence of endoparasites in cats being held in shelters was estimated using Sheather's sucrose and zinc sulfate centrifugal flotation methods and *Giardia* ELISA antigen detection kits. During the summer of 2007, 336 fecal samples were collected and processed from 4 shelters in eastern Tennessee. Parasites were detected in over half the samples (58.9%). The most prevalent parasites, based on centrifugal recovery, were the nematodes: the ascarid *Toxocara cati* (38.4%), the hookworm *Ancylostoma tubaeforme* (19.3%), and capillarids (10.4%). The only other nematode found was the lungworm *Aelurostrongylus abstrusus* (1.5%). Tapeworms recovered were Taeniid species (3.9%), *Dipylidium caninum* (3.3%), and, in one sample, *Mesocestoides* sp (0.3%). Protozoal parasites included *Isospora felis* (10.7%), *Isospora rivolta* (10.1%), *Giardia* sp (10.3% by ELISA, 1.5% by flotation), *Cryptosporidium* sp (0.6%), *Sarcocystis* sp (0.6%), and *Toxoplasma gondii*-like oocysts (0.6%). The *T. cati*, *A. tubaeforme*, *D. caninum*, and perhaps *Mesocestoides*, *Cryptosporidium* sp, *Giardia* sp, and *Toxoplasma gondii*-like oocysts are zoonotic. The benefits of pet ownership are well established, and house cats are excellent pets that enrich the lives of their owners. The prevalence of parasites found in the felids in this study supports the need for prevention and control practices including keeping cats indoors, good personal hygiene, and cleaning up pet feces regularly to reduce environmental contamination. Parasite testing and strategic deworming for cats and kittens, especially those adopted from shelters is necessary to maintain healthy cats and healthy people. This study was funded in part by the UTCVM Center of Excellence Student Research Program.

11. STOCKDALE, HEATHER D.¹, SOREN P. RODNING ², M. DANIEL GIVENS¹, A. RAY DILLON ¹, JOSEPH C. NEWTON¹, JENNIFER A. SPENCER¹, CHRISTINE C. DYKSTRA ¹, DAVID S. LINDSAY ³, AND BYRON L. BLAGBURN¹. ¹Auburn University College of Veterinary Medicine, ²Auburn University College of Agriculture, ³Virginia Tech V-M Regional College of Veterinary Medicine—Experimental infection of cats with *Tritrichomonas foetus* supports differences between isolates of bovine and feline origin.

Tritrichomonas foetus is recognized as the causative agent of bovine trichomoniasis, resulting in fetal death, infertility and pyometra, and feline trichomoniasis, manifests as chronic, large-bowel diarrhea. The hypothesis that *T. foetus* is the causative agent of both diseases is supported by morphological characteristics and genomic sequencing data. To verify this hypothesis, cross-transmission experiments were performed. Our earlier results indicated that infection dynamics in cattle infected with either the bovine (D-1) or feline (AUTf-1) isolate of *T. foetus* are comparable however the disease induced by the AUTf-1 isolate of *T. foetus* was less severe. Our second experiment involved eight cats less than one year of age experimentally infected with *T. foetus* via orogastric intubation. Six cats were infected with the D-1 isolate of *T. foetus*, one cat was infected with the AUTf-1 isolate and one cat was not infected with either isolate, serving as a negative control. Of the six cats infected with the D-1 isolate, only one was fecal culture positive occurring on the final day of sampling (PI day 32), while the cat infected with the AUTf-1 isolate was fecal culture positive by PI day 16. Of the intestinal contents collected at necropsy, the cat infected with the AUTf-1 isolate was culture positive in the ileum, cecum, medial and posterior colonic sections. Two cats infected with the D-1 isolate were culture positive in the cecum only. The results of post-necropsy in vitro cultivation and fecal cultures from each cat further support differences between the D-1 and AUTf-1 isolates.

12. KRISTINA TACKETT, MEGAN BOWLING, CHAD GROCE, AND CHERYL D. DAVIS. Department of Biology, Biotechnology Center, Western Kentucky University—Raccoons and opossums as potential reservoir hosts for tick-borne zoonoses in Kentucky.

The incidence of tick-borne zoonoses such as Ehrlichiosis, Rocky Mountain Spotted Fever, and Lyme Disease has steadily increased in the southeastern United States in recent years. According to the CDC, the southeastern states accounted for 515 cases of the 19,931 total reported Lyme Disease cases in the US in 2006. Although *Ixodes scapularis* is the most commonly recognized vector for *Borrelia burgdorferi*, the causative agent of Lyme disease, *Dermacentor variabilis* (a common vector for Rocky Mountain Spotted Fever) also has been shown to be a viable host for this pathogen. The goal of the present study was to evaluate the potential for raccoons and opossums to serve as reservoir hosts for tick-borne diseases in Kentucky. Raccoons and opossums were trapped in Barren and Warren counties of Kentucky between June and December, 2007. Ticks were removed and placed into 70% ethanol. Four different tick species were obtained from raccoons; *Dermacentor variabilis*, *Haemaphysalis sp.*, *Amblyomma sp.*, and *Ixodes sp.* *Dermacentor variabilis* was the only tick species found on opossums. Although ticks were abundant in the summer months, their numbers declined dramatically in the fall, and no ticks were recovered from animals trapped in October through December, 2007. To determine if the ticks were infected with zoonotic agents such as *Ehrlichia chaffeensis*, *Rickettsia rickettsiae*, and *Borrelia burgdorferi*, DNA will be isolated using Qiagen mini kits and PCR based detection methods will be employed. The partial support of NIH Grant Number 2 P20 RR-16481 from the National Center for Research Resources is gratefully acknowledged.

13. MURDOCK, JESSICA H.^{1,2} MICHAEL J. YABSLEY^{1,2}, CHANDRASHEKAR RAMASWAMY³, TOM O'CONNOR³, AND SUSAN E. LITTLE⁴. University of Georgia, Warnell School of Forestry and Natural Resources¹, Southeastern Cooperative Wildlife Disease Study², IDEXX Laboratories³, Oklahoma State University Center for Veterinary Health Sciences⁴-Evaluation of white-tailed deer as natural sentinels for *Borrelia*

Assessing the risk of exposure to Lyme disease can be difficult and laborious. Lyme disease, caused by the spirochete *Borrelia burgdorferi*, is common in the northern and western United States and is transmitted by the blacklegged tick (*Ixodes scapularis* and *Ixodes pacificus*). Although endemic in southern rodents and ticks, confirmed Lyme cases in humans are rare, and a Lyme-like disease is commonly seen. This syndrome may be caused by *B. lonestari* which is transmitted by the lone star tick (*Amblyomma americanum*) and naturally infects white-tailed deer (*Odocoileus virginianus*). To date, 628 white-tailed deer from 20 eastern states were tested for anti-*Borrelia* spp. antibodies using an indirect immunofluorescent antibody test (IFAT), of which 133 (21.2%) were seropositive at a 1:64 dilution. Using a highly specific *B. burgdorferi* IDEXX 4Dx SNAP test, 67 (10.7%) deer were positive. Thirty-eight (6.1%) were positive by both assays, but 95 (15.1%) were IFAT positive and SNAP negative, suggesting exposure to another *Borrelia* spp. The majority of *B. burgdorferi*-positive deer were from northern-tier states, corresponding with the known risk of human exposure to Lyme disease. These data suggest that deer are exposed to at least two *Borrelia* spp., including *B. burgdorferi*, and could be used to delineate areas of Lyme disease risk. Furthermore, these data provide additional evidence that *B. burgdorferi*, although endemic in rodents and ticks in the South, rarely infects deer. This corresponds with a lack of human and canine cases in the region. The reason for this dichotomy is unclear and deserves further research.

14. MERWAD, ABDULLAH¹, SHEILA MITCHELL^{2*}, ANNE ZAJAC², GEORGE FLICK² AND DAVID LINDSAY². Zagazig University, Zagazig, Egypt¹ and Virginia Tech²—Effect of high pressure processing on *Hymenolepis diminuta* eggs.

Hymenolepis diminuta is a rodent parasite with beetle intermediate hosts that are commonly found in storage areas of grain and other dry foods. Humans, usually children are accidental hosts of *H. diminuta* and become infected through ingestion of cysticercoids infected beetles. High hydrostatic pressure processing (HPP) is an effective non-thermal alternative food processing treatment. The present study identified the efficacy of HPP on the viability of *H. diminuta* eggs. One thousand unhatched *H. diminuta* eggs in Hanks balanced salt solution were packaged in Kapak[®] pouches and exposed to 100-600 megapascals (MPa) for 60 seconds in a commercial HPP unit. Treatments were done in duplicate. Eggs were hatched using an alpha-amylase and trypsin hatching solution. Trypan blue was added to the hatched oncospheres to determine viability. Non-viable oncospheres stained blue. Eggs treated at 200 MPa had a viability rate between 28-61%. No viable eggs were observed when treated at 300-600 MPa. Treatment at 400 MPa and above caused rupturing of the oncosphere. Results from this study indicate that HPP is a possible treatment method for *H. diminuta* eggs. Treatment of dry goods, such as cereals and grains with HPP should be considered to prevent future human infections.

15. JONES, REBECCA D. AND STEPHEN C. LANDERS. Troy University—Morphological analysis of the trematode parasite *Alloglossidium*.

Alloglossidium renale is a trematode found in the antennal glands of the freshwater shrimp, *Palaemonetes kadiakensis*. Unlike many trematodes this species develops to maturity in the invertebrate host. The parasite was originally described from *P. kadiakensis* in Louisiana and has recently been observed in the same host from southern Alabama. Shrimp were collected

from the Conecuh River in Pike County, Alabama, where we found 22 of 71 shrimp infected. The average size of infected shrimp was larger than the average size of uninfected animals. Trematodes and infected shrimp tissue were fixed in 5-10% formalin, and prepared for paraffin sectioning. Whole mount animals and sections were stained with Gill's hematoxylin with or without fast green counterstaining. The average length and width of the whole worms was 897 X 340 μm (N= 10), which is smaller than the original species description. The average size of the ova was 22 X 14 μm (N=30). To date, we have not observed moribund or dead worms within the antennal glands as previously reported. We have observed only healthy worms within the antennal glands and ova within the nephridial tubules for release to the outside of the host.

16. SHEEHAN, KATE L.^{1 & 2}, JUST CEBRIAN^{1 & 2}, JOHN F. VALENTINE^{1 & 2}, AND JACK O'BRIEN¹. University of South Alabama¹, Dauphin Island Sea Lab²—Spatial and seasonal variability of parasite assemblages of the common grass shrimp in Mobile Bay

The common grass shrimp, *Palaemonetes pugio* is a common prey species to economically and ecologically important fishes and crustaceans in estuarine habitats. *P. pugio* is host to a number of obligate, facultative, and transient symbionts. A survey consisting of twenty-two sites was conducted around Mobile Bay, AL during the winter (January) spring (May) and summer (September) of 2007 to determine the general prevalence and distribution of *P. pugio* parasites. The obligate parasites documented are those easily observed on or within live hosts with the aid of dissecting microscope (microphallid trematodes, haplosporidian hyperparasites, loricate ciliates, and bopyrid isopods). Overall abundance and frequency of all parasites was compared among seasons and parasite assemblages were analyzed using multivariate techniques for examining community ecology. Results suggest parasite frequency and abundance does not change seasonally, however seasonal changes in parasite assemblages are common. After the spatial and temporal variability was documented, the prevalence of the most common *P. pugio* parasite, the trematode *Microphallus turgidus*, was compared at two particular sites in Mobile Bay with greater temporal resolution over a twenty-one month period. These surveys are useful for developing a better understanding of the natural history of these organisms and this data will aid in the development of sound manipulative experiments in the future.

17. HILSINGER, K. CLAIRE, MIRANDA PAGE AND DR. DANA NAYDUCH. Georgia Southern University—Analysis of *Skrjabinoptera phrynosoma* burden on stomach-flushed *Phrynosoma platyrhinos*.

Skrjabinoptera phrynosoma is a Spirurid nematode parasite of a number of lizards across the US, and a common gastric parasite of the horned lizard *Phrynosoma platyrhinos*. When ready to reproduce, the gravid female worm exits the lizard via the cloaca and is carried by foraging *Pogonomyrmex* spp to the ant's nest and fed to the larval ants. As these ants develop into adults, the larval *S. phrynosoma* develops into its infective stage inside the ants. The life cycle is completed when the infected ants are eaten by the lizard definitive host. Twenty-two *P. platyrhinos* were stomach-flushed in the Alvord Basin of the Great Basin Desert in southeastern Oregon and the resultant *S. phrynosoma* were analyzed for sex ratio (male, female, and juvenile), and worm burden and sex ratio in relation to host sex and size. There was no significant difference between worm burden and composition in relation to host sex. *P. platyrhinos* are not sexually dimorphic, so males and females were grouped together when analyzing worm burden in relation to snout-vent length. Larger lizards had significantly more worms overall, but female worms were more numerous in larger lizards, while male and juvenile worms did not become more numerous as lizard size increased. While *S. phrynosoma* exhibit

an interesting life cycle, little is known of the worm burden on the infected lizards. These data and more to be collected in 2008, will help to explain the interaction between the host and parasite in this system.

18. GERHOLD, RICHARD W.¹, ANDREW B. ALLISON¹ AND JOHN F. ALDERETE². Southeastern Cooperative Wildlife Disease Study, College of Veterinary Medicine, The University of Georgia¹ and The University of Texas Health Science Center at San Antonio²—Failure to detect intracellular double-stranded RNA viruses in *Trichomonas gallinae* and identification of a novel sequence of a *Trichomonas vaginalis* virus.

To determine if intracellular double-stranded RNA (dsRNA) viruses exist in *Trichomonas gallinae*, virus purification via ultracentrifugation was followed by gel electrophoresis of extracted RNA, reverse transcriptase-polymerase chain reaction, and transmission electron microscopy. Double-stranded RNA viruses were not detected in any of the twelve examined *T. gallinae* isolates. Sequence analysis of a dsRNA virus from a previously determined virus-infected *T. vaginalis* positive control isolate revealed a unique sequence of the RNA-dependent RNA polymerase gene of *Trichomonas vaginalis* virus (TVV) or related virus.

19. DENNIS, MATT, HOWARD WHITEMAN AND CLAIRE FULLER. Murray State University --Encapsulation ability of dragonfly nymphs, *Plathemis Lydia*, is affected by water pollution.

Many organisms are facing major changes in their environments with respect to pollutants and these pollutants can result in non-viable habitats. Current indicators of environmental quality, particularly in aquatic habitats, focus on the presence or absence of key species: i.e., if such a species has become locally extinct, the water is too polluted. We are looking for a more sensitive indicator of water quality – one that can be easily detected before the indicator species begins to die. Insect immune systems can provide such an indicator because they are sensitive to environmental change and some aspects, such as encapsulation, are easy to measure. We measured encapsulation in the nymphs of the dragonfly *Plathemis lydia*. These animals spend up to one year in ponds, are common and large enough to manipulate easily, thus have the potential to be excellent indicators. Nymphs (N = 59) were collected from 13 ponds in Western KY. A piece of monofilament was inserted into the hemocoel of each nymph and retrieved 24 hrs later. The area of encapsulation was measured for each monofilament. Water quality variables from each pond included PCB and pesticide concentration as well as levels of 14 inorganic elements. We found that encapsulation was significantly negatively correlated with the presence of pesticides. Levels of four inorganic elements (Mg, Al, Ca and Cu) were also significantly correlated with the ability of animals to encapsulate the foreign object. Thus, sampling animals for encapsulation may provide a much-needed indicator of environmental quality before species become locally extinct.

20. CARLETON, RENÉE E¹. AND MICHAEL J. YABSLEY². Berry College¹ and University of Georgia²—Parasites of eastern bluebirds (*Sialia sialis*): A review and survey of a population nesting within a grass-dominated agricultural habitat in Georgia.

A review of parasites associated with eastern bluebirds (*Sialia sialis*) is dated and excludes many species reported since 1977. We compiled an updated list using reports from the literature and database searches. Because bluebirds are subject to infection with many generalist parasites, additional species were likely to be reported. Additionally, we surveyed parasite communities associated with a population of eastern bluebirds nesting on a grass-

dominated agricultural habitat in northern Georgia during the 2004, 2005, and 2006 breeding seasons by live examination, fecal examination, necropsy, pcr technique, and examination of nesting material. Fifteen species of parasites were detected including seven species not previously reported in eastern bluebirds: *Plagiorhyncus cylindraceus*, *Capillaria* sp., a species of Strongyloid nematode, a species of Spiruroid nematode, *Carnus floridensis*, a *Sarcocystis* sp., and an *Atoxoplasma* sp. Prevalence based on pooled data over 3 years varied by species and ranged from 0.7% to 71.4%.

21. FAULKNER, CHARLES T.¹, ALYCIA CHAPMAN¹, RANDALL JUNGE², GRAHAM CRAWFORD³, AND CHARLES WELCH⁴. ¹University of Tennessee College of Veterinary Medicine, Knoxville TN, USA 37996,²St. Louis Zoo, St. Louis MO, USA 63110, ³San Francisco Zoo, San Francisco CA, USA 94132, and ⁴The Madagascar Fauna Group, Betampona Reserve, Tamatave, Madagascar—Host distribution of endoparasitic helminths of Malagasy lemuroids.

Fecal samples (n=229) representing 7 genera of wild-caught and captive Malagasy lemuroids were examined for diagnostic products of endoparasitic helminths as part of the Madagascar Fauna Group's health monitoring program (<http://www.savethelemur.org>). Individuals in the host genus *Eulemur* accounted for most of the infections and 55/229 specimens were positive for at least 1 endoparasite species. Eggs of *Callistoura* sp. were predominate in 29/55 infected *Eulemur* spp., and 5/17 infected *Varecia* spp. Strongylate-type eggs probably from *Lemurostrongylus* sp. (62x38um) and *Pararhabdonema* sp. (75x40um) had a broader host-distribution in *Eulemur* spp., *Varecia* spp., *Indiri indiri*, *Hapalemur* spp., and *Propithecus* spp. Pinworm eggs from the genus *Lemuricola* were found in *Eulemur* spp, *Varecia* spp., and *Lepilemur* spp, and *Propithecus*. Spiruroidea eggs (50x30um, thick-shelled with larva), presumably *Mastophorus muris*, were found only in 2 samples from *Daubentonia madagascariensis*, and likely reflect the insectivorous dietary habits of the host. *Trichuris* spp eggs (90x45um) occurred in feces of 15/55 infected *Eulemur* spp.. The dimensions of these eggs are much larger than other *Trichuris* spp. from primate hosts and may represent an undescribed species unique to *Eulemur*.

22. KYLE, DENNIS E.,¹⁻³ KOSOL YONGVANITCHIT³, JENNIFER M. PETERS,⁴ NANHUA CHEN,³ MICHELLE GATTON,⁵ QIN CHENG,⁴ AND H. KYLE WEBSTER.^{2,3} University of South Florida,¹ Walter Reed Army Institute of Research,² Armed Forces Institute for Medical Sciences,³ Australian Army Malaria Institute,⁴ and Queensland Institute of Medical Research.⁵—Artesunate and dihydroartemisinin induce dormancy in ring stages of *Plasmodium falciparum*: implications for a mechanism of recrudescence.

Artemisinin antimalarial drugs derive from Qinghaosu, an ancient Chinese herbal extract of *Artemisia annua* (sweet wormwood). Derivatives from this class (e.g., artesunate) are the most effective drugs currently used for the treatment of malaria. Artemisinin drugs produce rapid clearance of parasites in peripheral blood and reduction of malaria symptoms, yet when used alone recrudescence infections occur frequently. The reasons why such potent antimalarial drugs are associated with a high rate of recrudescence are unknown. Here we show that exposure of ring stage *Plasmodium falciparum* to artesunate or dihydroartemisinin (DHA) induces a dormant parasite that survives for 6-8 eight days *in vitro* before resuming growth. Other commonly used antimalarial drugs did not produce this effect. Recovery of ring stages from DHA-induced dormancy was time of exposure and dose dependent. These observations suggest that dormant ring stage parasites are the forms that survive artemisinin drug treatment to initiate recrudescence infections. Selection of combination partner drugs must encompass a strategy for interdicting artemisinin-induced dormancy in *P. falciparum*.

23. ANDREW WEST¹, MARIELLE POSTAVA-DAVIGNON², REBECA ROSENGAUS² AND CLAIRE FULLER¹. Murray State University¹ and Northeastern University² -- Susceptibility to fungal infection in the Caribbean termite is affected by habitat and colony of origin.

Termites are one of the most important degraders of woody debris in tropical and subtropical environments. Environmental change (e.g., warming temperatures) that impacts termites could also affect wood recycling and soils. Our previous work suggests that temperature is negatively related to one aspect of immunity (phenol oxidase activity) in the Caribbean termite, *Nasutitermes acajutlae*. Here we examine the affect of temperature and habitat on susceptibility to the pathogenic fungus, *Metarhizium anisopliae*. Termites were collected from 10 colonies in each of 2 habitats (cool/moist and hot/dry). Termites were exposed to one of 4 levels of fungus (Control, 10³, 10⁵, 10⁷ conidia per ml), then kept in either warm (31.4 C) or cool (27.8 C) conditions. Termites were maintained in social groups (6 animals) or alone; both soldiers and workers were exposed. Temperature after exposure (warm or cool) did not significantly affect survival. However, exposure level, group living, caste and habitat of origin all significantly affected termite survival (P < 0.001 for all variables). Termites maintained alone had a hazard ratio 1.5 times greater than termites living in groups; workers had a hazard ratio of 1.7 compared to soldiers. Termites from cool/moist habitats had a hazard ratio 1.5 times greater than those from hot/dry habitats. While temperature after exposure did not impact survival, temperature during development (i.e., habitat) may. However, differences in genetic structure in populations from different habitats could also explain our results.

24. PUNG, OSCAR J.¹, MICHAEL WALKER² AND WHITNEY L. BARFIELD¹. Georgia Southern University¹ and Armstrong Atlantic State University²—The trematode *Microphallus turgidus* cultured *in vitro* produces eggs infective to hydrobiid snails.

The successful *in vitro* cultivation of trematodes could obviate the need for vertebrate hosts in the laboratory and facilitate studies on the basic biology of the parasites and the development of antihelminthic drugs. Metacercariae of the trematode *Microphallus turgidus* cultured *in vitro* mature into egg-secreting adults. Our goal was determine if these culture-produced eggs are infective to hydrobiid snails, the first intermediate host of *M. turgidus*. To do so, wild-caught grass shrimp, *Palaemonetes pugio*, were dissected to obtain metacercarial cysts. Metacercariae were excysted in warm saline, washed and incubated 4 days at 37° C in RPMI-1640 medium supplemented with 20% horse serum. Eggs were counted on a hemacytometer, transferred to seawater and embryonated 0-30 days at 30° C. Wild-caught hydrobiid snails, *Spuwinkia salsa* and *Onobops jacksoni*, were maintained at 30° C in seawater in 24-well tissue culture plates (1 snail/well) and examined for trematode cercariae twice a week for 5 weeks. Infected snails were discarded. Uninfected snails were fed 5 to 40 embryonated *M. turgidus* eggs and checked twice a week for 8 weeks for the presence of microphallid cercariae. Seven of 52 (13.5%) egg-fed snails began to shed microphallid cercariae after 4-6 weeks. Control snails remained uninfected in the same time interval indicating that culture-produced *M. turgidus* eggs are infective to snail hosts. Five of the 7 infected snails were fed 20 or 40 eggs embryonated 21 or 30 days. Experiments designed to further optimize the infection process are in progress.

25. STEPHEN C. LANDERS. Troy University—Staining improvements for apostome ciliates using a modified Chatton-Lwoff technique.

In protozoological studies the Chatton-Lwoff technique uses silver nitrate to stain the surface of the cell and reveal the ciliary patterns. The technique is simple, but inconsistent with some ciliated protozoan groups. For this study, a modification of the Chatton-Lwoff technique was used to increase the reliability of the stain, as applied to the study of apostome ciliates. The symbiotic apostome *Hyalophysa bradburyae* was obtained from the freshwater grass shrimp *Palaemonetes kadiakensis* collected locally in Pike County, Alabama. This ciliate has a complex life cycle involving separate feeding, divisional, migratory, and phoretic stages. After fixation in 1-2% glutaraldehyde, all stages of the life cycle were stained using the protocol published by Chatton and Lwoff (1935) or using a slight modification in which salt was added to the wash water during silver reduction. The salt concentration (1 drop of 30 ppt seawater/ml wash water or ~0.1% sea salts) was the same concentration as recommended for the saline gelatin solution by Chatton and Lwoff (1 drop seawater/ml gelatin solution). The results demonstrated a greater success in staining the various life cycle stages than experiments with distilled wash water, though silver precipitate in the gelatin blanket was increased. This study was supported by a Faculty Development grant awarded by Troy University.

26. NAYDUCH, DANA. Georgia Southern University—Temporal progression of *Herpetomonas muscarum* (Kinetoplastida: Trypanosomatidae) in the midgut of the housefly, *Musca domestica* (Diptera: Muscidae).

Herpetomonas muscarum is a kinetoplastid protozoan symbiont of the housefly, *Musca domestica*. Unlike parasitic, heteroxenous genera (*Trypanosoma*, *Leishmania*), this symbiont is monoxenous, being transmitted between flies via contaminated feces. Although this organism eventually resides in the fly hindgut/rectum, its temporal location/transition within the fly midgut has been understudied. In this study, the location of *Herpetomonas*, in reference to the peritrophic matrix (PM), and mid- and hindgut was examined. The housefly PM is a double-layered, open-ended physical protection barrier that separates ingested food from the midgut epithelium. Previous studies showed that microbes such as bacteria remain within the inner layer of the PM in the midgut, are lysed by digestive enzymes, and compacted into fecal pellets within 12-24 h. In contrast, *Herpetomonas* initially resides within the inner PM, but many move to the inter-PM space within a few hours. Additionally, viable protozoa rapidly progress to the open end of the PM at the midgut/hindgut junction, in as little as 4-6 h post-ingestion, and attach to the epithelium. Thus, *Herpetomonas* likely needs to hasten progression to the hindgut to avoid being immobilized, lysed and enclosed in a fecal pellet by the inner PM. While flies do not have permanent bacterial “flora” (since bacteria cannot escape the PM and are lysed), this protozoan has found a way to circumvent this fate, and establish as a permanent hindgut symbiont. These results have applicable relevance to human-parasitic trypanosomatids that utilize stercorarian (posterior station) transmission from vectoring insects, such as *Trypanosoma cruzi* in Triatomine bugs.

27. STROBL, JEANNINE¹, RANA NAGARKATTI² AND DHARMENDAR RATHORE².¹Biomedical Sciences, Edward Via Virginia College of Osteopathic Medicine, and ²Virginia Bioinformatics Institute, Blacksburg, Virginia 24060--Nullscript, an apicomplexan selective inhibitor.

Toxoplasmosis and malaria are widespread diseases caused by apicomplexan parasites, *Toxoplasma gondii* and *Plasmodium falciparum*, respectively. More effective treatments are needed particularly for young children, pregnant women, and immunocompromised persons. *T. gondii* and *P. falciparum* possess histone deacetylase enzymes (HDAC) and HDAC inhibitors

interfere with their growth and survival suggesting that this enzyme is a potential apicomplexan drug target. To test this hypothesis, we compared the anti-apicomplexan activity of scriptaid, a mammalian HDAC inhibitor, and nullscript, a congener inactive in mammalian cells. For anti-proliferative assays, human cells and apicomplexan-infected human cells were treated for 48 hours with identical drug stocks diluted to 0.015-2 μM in culture medium. Normal human fibroblasts (HS68) and human breast cancer cells (MDA-MB-231) were 100% resistant to 2 μM nullscript, while 2 μM scriptaid reduced cancer cell numbers by 73% ($\text{IC}_{50} \sim 1 \mu\text{M}$). Normal HS68 cells were completely resistant to scriptaid as expected due to the tumor-selective effects of HDAC inhibitors. In contrast, the apicomplexans showed remarkable sensitivity to both nullscript and scriptaid. *T. gondii* tachyzoites propagated in HS68 cells were inhibited 100% by 2 μM scriptaid ($\text{IC}_{50} < 0.031 \mu\text{M}$) and 2 μM nullscript ($\text{IC}_{50} \sim 0.8 \mu\text{M}$). In *P. falciparum*, nullscript was more active than scriptaid; 2 μM nullscript reduced parasitemia by 80%. In conclusion, nullscript shows significant activity against apicomplexan parasites while its inactivity in host cells suggests that it may be specifically targeting parasite HDAC.

28. BURON, ISAURE de ¹, SCOTT FRANCE ², WILLIAM A. ROUMILLAT ³, LAM TSOI ⁴, VINCENT A. CONNORS⁵, AND TIMOTHY BRYAN¹. College of Charleston, Charleston SC, ²University of Louisiana, Lafayette LA, ³ South Carolina Department of Natural Resources, Charleston SC, ⁴ Medical University of South Carolina, Charleston SC, ⁵ University of South Carolina Upstate, Spartanburg SC— The philometrids of the southern flounder: An update

The southern flounder *Paralichthys lethostigma* is host to two species of philometrid nematodes in the estuarine systems of South Carolina. Individuals of the species *Philometroides paralichthydis* are associated with the bones of the buccal cavity of the fish, as well as among muscles that control its dorsal and anal fin rays. Individuals of the species *Philometra overstreeti* are located between the teeth and inside the bony portion of the branchial arches of the fish. Sequencing of part of the CO1 gene split the species into two clades each, with 3.62% and 6.71% variation between the closest and furthest apart clades, respectively. Significantly, each clade was found to correspond exactly to each location of the parasite in the host. Histological studies confirmed that the host-parasite interface varied according to each location and thus to each clade. Moreover, the population dynamics was different for each clade, with 68%, 22%, 30%, and 17% of the flounders being infected by the buccal bone, fin muscle, teeth socket, and gill arch worms, respectively. Further, the buccal bone associated worms infected flounders of all sizes, whereas those from the gill arches, fin muscles, and teeth sockets did not infect fish smaller than 50 mm total length (TL). Teeth socket worms were found to infect fish over 300 mm TL, whereas fin worms were almost never found in those large fish and mostly infected fish from 151-300 mm TL. These data provide evidence to support the contention that the four genetic clades are likely four distinct species.

29. HERRON, BROOKE, TIFFANY G. BAKER, AND ISAURE DE BURON, College of Charleston, Charleston SC, ² Medical University of South Carolina, Charleston SC—Population dynamics of a monogenean parasite of the esophagus of the Atlantic croaker, *Micropogonias undulatus*, in the South Atlantic Bight and inshore waterways.

The monogenean *Diplectanotrema* sp. is a parasite found in the esophagus of the Atlantic croaker, *Micropogonias undulatus*, and is known so far only from the South Atlantic Bight (SAB). Its absence offshore during the spring in fish returning to the estuaries, where they spend the summer, led us to the hypothesis that recruitment of this parasite occurs inshore and that its life cycle happens in the estuaries. To address this, the population dynamics of the monogenean was studied in the SAB and in South Carolina estuaries from Winyah Bay to the ACE basin

National Estuarine Research Reserve. Preliminary data showed that estuarine fish were infected only in the Charleston Harbor estuary. Further, young of the year (YOY) fish were not infected when migrating down the low salinity rivers that feed the estuary but were infected once in the higher salinities of the lower estuary. Although this data at first appears to support our hypothesis, a large component of the monogenean's life cycle may in fact occur offshore where prevalences, abundances, and intensities of the worm were found to be significantly higher. Alternatively, the life cycle may occur inshore with the higher numbers of parasites offshore reflecting a loss of individuals in the parasite population. Additionally, the finding of these parasites only in the Charleston Harbor estuary remains problematic. In conclusion, the life cycle of this monogenean remains at this point enigmatic and will require further investigation involving understanding of the host biology.

30. LAURSEN, JEFF, AND ANDREW CLAXTON. Eastern Illinois University—Impact of coal mine effluent on fish parasite assemblages in southern Illinois streams.

This study was designed to determine the impact of coal mine effluent on the helminth community structure in fish from the Saline River Basin in Illinois. Sunfish (*Lepomis spp.*) were collected from three sites upstream, and three sites downstream of a mine effluent point source, below which the Illinois EPA has documented a “dead zone” extending for several miles. Distributions of both fish host species and parasites varied in relation to coal mine effluent. Bluegills (*L. macrochirus*) and Green sunfish (*L. cyanellus*) were common in all sites, but Long ears (*L. megalotis*) were significantly more common upstream. Twelve genera of adult helminthes were recovered. These included 3 Acanthocephalans (*Neoechinorhynchus*, *Eocollis*, *Acanthocephalus*); 5 Nematodes (*Spinitectus*, *Camallanus*, *Capillaria*, *Spiroxys*, *Contracaecum*); 2 Cestodes (*Bothriocephalus*, *Proteocephalus*); and 2 Trematodes (*Pisciamphistoma*, *Crepidostomum*). The majority of these parasites were too rare to use in analysis, but common parasite taxa responded differently to coal mine impact. For example, *Spinitectus*, which use mayflies as intermediate hosts, were significantly more common upstream and may be useful as bio-indicators of quality habitats. *Eocollis*, which typically use crustacean intermediates, were more common downstream and may be indicative of stressful habitats. *Camallanus*, which use copepod intermediate hosts, did not follow any clear trend related to coal mine effluent. These differences may be due to changes in intermediate host assemblages above and below the point source, diet shifts associated with intermediate host prey availability or fish gape size limits due to growth retardation, or the effect of physiologic stress on host fish.

31. DEREK A. ZELMER¹ AND THOMAS R. PLATT². University of South Carolina Aiken¹ and St. Mary's College²—Structure and similarity of helminth communities of six species of Australian turtles.

Patterns of infracommunity structure and infra- and component community similarity were examined for helminths of 6 species of turtles (*Elseya latisternum*, *Emydura krefftii*, *Em. macquarii dhara*, *Em. m. macquarii*, *Chelodina longicollis*, and *C. oblonga*) collected from Australia in 1993 and 1994. Local parasite species richness was not correlated with host geographical range. Differences in parasite diversity among host species were related primarily to differences in evenness; a pattern attributed to habitat characteristics, rather than species-specific differences. Ordination and Analysis of Similarity demonstrated the patterns of infracommunity structure of *Chelodina* spp. to be distinct from those of the other host species sampled, which demonstrated considerable overlap among patterns of infracommunity

structure. In spite of overlap with the component communities of *Em. krefftii* and *El. latisternum*, the component communities of *Em. m. dhara* and *Em. m. macquarii* were more distinct from one another, than either was to the component communities of *Em. krefftii* or *El. latisternum*.

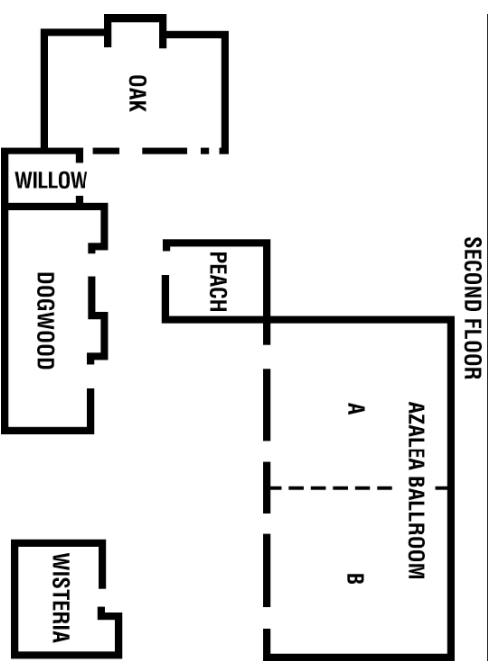
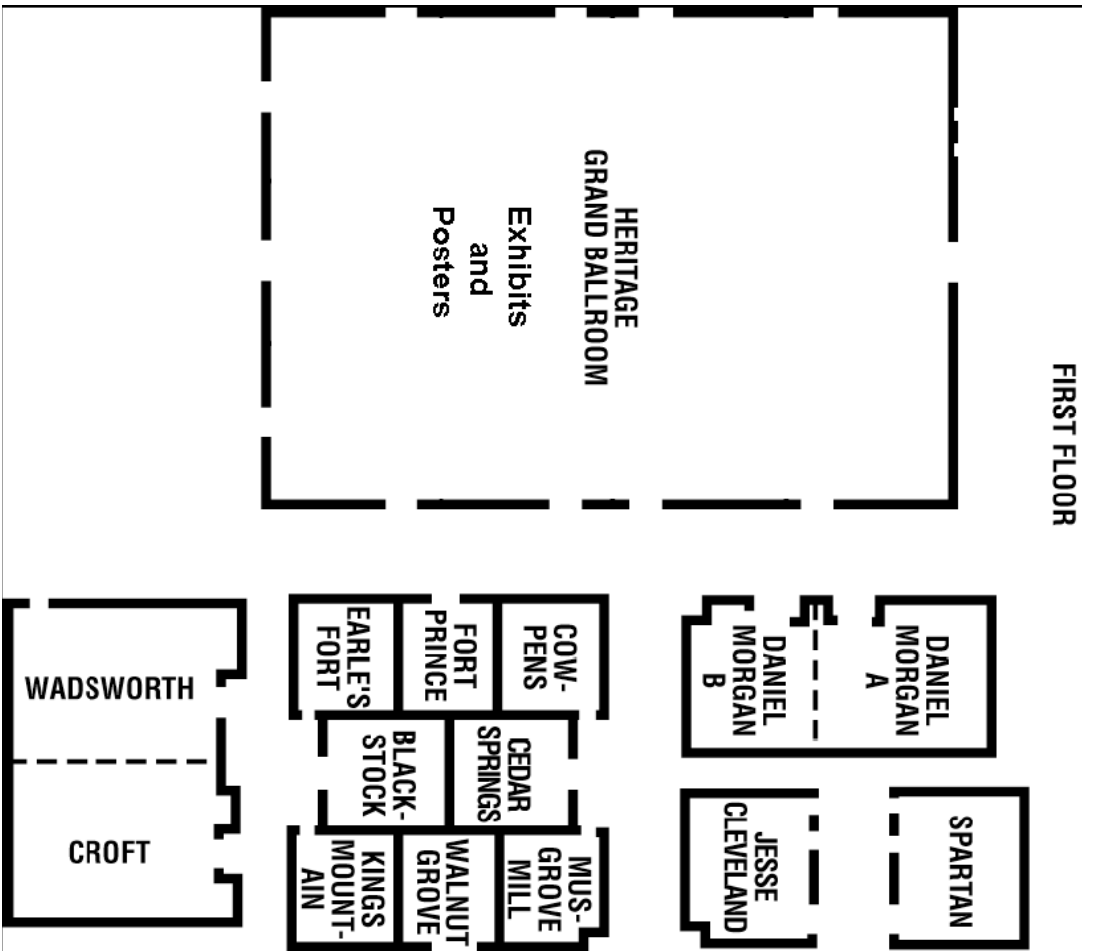
32. ROSYPAL, ALEXA C.¹, J. A. CORTÉS-VECINO², SOLANGE M. GENNARI³, J.P. DUBEY⁴, RICHARD R. TIDWELL¹, AND DAVID S. LINDSAY⁵. ¹University of North Carolina at Chapel Hill, Chapel Hill, NC, USA ^bUniversidad Nacional de Colombia-Sede Bogotá, Bogota, Colombia, South America, ^cDepartamento de Medicina Veterinária Preventiva e Saúde Animal, USP, São Paulo, SP, Brazil, ^dUnited States Department of Agriculture, Animal Parasitic Diseases Laboratory, Beltsville, MD, USA, ⁵Virginia Tech, Blacksburg, VA, USA-Prevalence of antibodies to *Leishmania infantum* and *Trypanosoma cruzi* in dogs from urban areas of Brazil and Colombia.

Leishmania infantum and *Trypanosoma cruzi* are zoonotic parasites that are endemic throughout many parts of Latin America. Infected dogs play an important role in transmission of both parasites to humans. A serological survey of *Leishmania* and *Trypanosoma* infection was conducted on 365 dogs from São Paulo, Brazil and Bogotá, Colombia, South America. Serum samples were examined by the indirect immunofluorescent antibody test (IFAT). Anti-*Leishmania* IgG antibodies were detected in 5 of 107 from Brazil (4.7 %) and in 4 of 258 dogs (1.6 %) from Colombia. Titers ranged from 1:25 to 1:100. Anti-*T. cruzi* antibodies were not detected in any of the dogs from either Brazil or Colombia. The results show a low prevalence of anti-*Leishmania* antibodies and no antibodies against *T. cruzi* in these canine populations. Our study suggests that dogs play a limited role in the spread of *L. infantum* and *T. cruzi* in these urban areas of Brazil and Colombia.

33. GOODWIN, DAVID G.¹, JEANNINE STROBL², SHEILA M. MITCHELL¹, ANNE M. ZAJAC¹, AND DAVID S. LINDSAY¹. Virginia Tech¹ and Edward Via Virginia College of Osteopathic Medicine²—Evaluation of mood stabilizing and antipsychotic drugs for activity against *Toxoplasma gondii*.

Traditional thought is the obligate intracellular, two host, cyst forming parasite *Toxoplasma gondii* is usually benign for the immunocompetent intermediate host. Recent research suggests *T. gondii* has significantly higher antibody prevalence within the schizophrenic population. Clinically, a drop in antibody titers to *T. gondii* has been observed in some cases of schizophrenia after initial treatment with anti-psychotic drugs. The purpose of this study was to evaluate antipsychotic drugs for anti-parasitic properties. Drug testing is performed with an in vitro screening assay that evaluates cell monolayer destruction and tachyzoite replication. Cell monolayer evaluation is accomplished using a crystal violet stain for better visualization of monolayer lesions. Supernatant tachyzoites are counted using SYBR green. Valproic acid, Halperidol, Clozapine, Trifluoperazine, Pimozide, and Fluphenazine were tested with varying results. To achieve a dose response curve all drugs are tested with a positive, negative control and at 6 different concentrations, ranging from 0.5 M to 10 M. Drug concentration range was contingent on the results of previous drug screens. The results varied widely among the drugs sampled. Some antipsychotic drugs decrease tachyzoite counts and protected the cell monolayer. While other drugs offered no cell monolayer protection from tachyzoites and at lower doses (6 M) the drugs appear toxic to the cells. The mechanism of anti-toxoplasmic activity is yet to be elucidated, but evidence exists some anti-psychotic/mood stabilizing drugs do work in vitro. Fluphenazine a common anti-psychotic drug, displayed the highest level of activity against *Toxoplasma*, suggesting a link between antipsychotic treatment and a decrease in antibody titer seems plausible

NOTES



Floor Plan of Meeting Rooms

**Spartanburg Marriott at
Renaissance Park**

Southeastern Society of Parasitologists

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