American Association of Veterinary Parasitologists:

HIGHLIGHTS FROM THE 60TH ANNUAL MEETING

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The American Association of Veterinary Parasitologists (AAVP) 2015 Annual Meeting took place July 11 to 14 in Boston during the American Veterinary Medical Association Convention. Organized as a joint meeting with both the Annual Livestock Insect Workers Conference (LIWC) and Biennial International Symposium on Ectoparasites of Pets (ISEP), the scientific sessions at this tripartite event described exciting advances in our understanding of companion animal parasitology.

As part of the NCVP’s ongoing commitment to advancing the understanding of parasitology in the veterinary profession, this article summarizes a few of the many clinically useful presentations shared at the meeting, including:

- Unusual parasites in unexpected places
- Increasing risk of parasites and vector-borne infections
- Previously unrecognized diversity of ticks in North America
- New and improved parasite diagnostic testing strategies.

To review the full program of presentations, visit the AAVP website at www.aavp.org.

UNUSUAL PARASITES IN UNEXPECTED PLACES

While the common happens, well, commonly, there are always those unusual cases that present to the clinic. Many of these patients’ diagnoses involve parasites imported from other areas due to translocation of pets, underscoring the importance of collecting a full travel history when providing patient care.

The novel parasites section of the AAVP meeting highlighted cases in which clinicians involved their veterinary parasitology colleagues to help make a difficult diagnosis of a rare or unexpected parasite.

First Report of Cylicospirura felineus in a Feral Domestic Shorthair Cat in North America

Michael Kent, MS, PhD, Oregon State University

- Cylicospirura felineus is a rare parasite seen primarily in the stomach of bobcats in North America; however, this case of C felineus infection in a cat from Louisiana marked the first case reported in a domestic cat in North America.1
- The main finding was several nodules located within the submucosal layer around the...
fundus of the stomach, each with red, slender nematodes protruding and, while an incidental finding, this parasite represents a differential diagnosis for multiple masses in the stomach of cats.

- Infection with this parasite can mimic feline gastrointestinal eosinophilic sclerosing fibroplasia.

**Eucoleus (Capillaria) boehmi in the Dog: Six Case Studies**

*Thomas J. Nolan, MS, PhD, University of Pennsylvania*

- *Eucoleus boehmi* is a nematode that inhabits the nasal mucosa of dogs (Figure 1); this presentation reviewed 6 reported cases in the mid-Atlantic region.

- Diagnosis of this parasite is accomplished either by identifying:
  » Eggs on fecal examination, correctly identifying them to species
  » Adult worms in the nasal cavity via rhinoscopy (with or without biopsy).

- The eggs of this parasite must be differentiated from those of the canine whipworm, *Trichuris vulpis*.

- In this limited sample, both milbemycin oxime (single dose of 2 mg/kg PO) and topical moxidectin at the label-approved dose appear to be successful at treating the infection, but veterinarians should follow up over time with fecal flotation or rhinoscopy as nasal polyps may return.2,5

**Canine Ocular Onchocerciasis in Western Canada: Adoption-Mediated Introduction of a Zoonotic Parasite**

*Guilherme Verocai, DVM, MSc, PhD, Diplomate ACVM, University of Calgary & University of South Florida*

- The causative agent of canine onchocerciasis is *Onchocerca lupi*, an ocular nematode of dogs and wild canids.4 While this case was diagnosed in Canada, the canine patient was from Arizona, an area where the infection is more common, albeit still considered relatively rare.

- Canine onchocerciasis commonly presents with conjunctivitis, lateral scleral thickening, and conjunctival masses.

- Treatment requires surgery, which may include removal of nodules or enucleation, and ophthalmology consults are often involved. Post surgery, a combination of high dose ivermectin and doxycycline has been used to target any microfilaria circulating in the skin.

- This case highlights the importance of considering full travel history when diagnosing novel parasites and infections.

**Parasites on the Move: Canine Peritoneal Larval Cestodiasis in a Colorado Dog**

*Lora Ballweber, DVM, MS, Diplomate ACVM, Colorado State University*

- Asexual multiplication of larval *Mesocestoides* species causes severe, life-threatening disease in dogs and, occasionally, cats. Aggressive treatment is necessary, and prognosis is grave.5

- This clinical case presentation described a dog that moved from Oregon to Colorado; developed abdominal distention, ascites, and diarrhea; and was diagnosed with diffuse granulomatous peritonitis.

- Microscopic and molecular examination of tissue recovered during exploratory surgery confirmed canine peritoneal larval cestodiasis caused by *Mesocestoides*, a parasite that is more commonly reported from the West Coast.

**INCREASING RISK OF PARASITES & VECTOR-BORNE INFECTIONS**

Research continues to document the importance of parasites in ever-expanding geographic locales. This apparent spread of parasites is likely due to a number of different factors, including fluctuating climate patterns, changing habitat, movement of animals (and their parasites) to new areas, increased contact between animals, and even...
recognition of parasites where they likely have existed for some time.

A number of presentations focused on newly recognized geographic distributions of parasites and vector-borne disease agents.

**Geographic Distribution of Angiostrongylus cantonensis in Florida**
Heather Stockdale-Walden, MS, PhD, University of Florida
- The rat lungworm, *Angiostrongylus cantonensis*, can cause severe neurologic disease in a variety of aberrant hosts, including humans, dogs, horses, nonhuman primates, and other animals.
- New distribution locales for this parasite have recently been reported, suggesting it is likely much more widespread in the southern United States than previously recognized.
- This presentation shared current data on the widespread distribution of *Angiostrongylus cantonensis* in northern, central, and southern Florida as determined by sampling and testing rats, rat feces, and mollusk intermediate hosts throughout the state.

**Canine Infection with Borrelia burgdorferi, Dirofilaria immitis, Ehrlichia Species, and Anaplasma Species in Canada, 2013–2014**
Brian Herrin, DVM, Oklahoma State University
- Canada is considered newly endemic for Lyme borreliosis and canine serology provides an excellent sentinel system to document the geographic spread of the maintenance cycle for this disease agent.
- This presentation shared current data on the geographic distribution of the agent of Lyme disease and other vector-borne infections in Canada using recent data provided by veterinarians testing dogs in practice.
- Nationwide, 2.5% of dogs tested were positive for specific antibodies to *B. burgdorferi*, the causative agent of Lyme disease, with endemic foci of higher canine seroprevalence recognized in Nova Scotia, eastern Ontario, New Brunswick, and Quebec.

**Prevalence of Canine Gastrointestinal Helminths in Southeast Municipal Dog Parks**
Molly Savadelis, Researcher, University of Georgia
- As long suspected by veterinarians and parasitologists, parasitic infections are common in dog parks, and a significant number of fecal samples in dog parks contain nematode eggs.
- Fecal samples were collected from dog parks in 3 different southeastern states; after diagnostic evaluation, the data demonstrated that 27% of collected fecal samples harbored nematode eggs. Hookworms were most common, followed by whipworms and ascarids.
- Dog park use has been previously implicated as a risk for infection with *Giardia* and *Cryptosporidium* in dogs, and off-leash activity at dog parks was identified as a specific risk factor for infection.

**PREVIOUSLY UNRECOGNIZED DIVERSITY OF TICKS IN NORTH AMERICA**
The major tick species present in North America have been known for some time, but recent research has revisited the identity of some of these ticks using molecular as well as morphologic tools. Two presentations on this research were shared.

**Diversity of the Brown Dog Tick, Rhipicephalus sanguineus, in North America**
Livvy Jones, Veterinary Student (Class of 2017), Oklahoma State University
- One of the most common ticks found on dogs in the U.S. may actually be comprised of a complex of morphologically similar, but genetically distinct, populations of ticks.
- Not all subpopulations within this species complex are able to breed with other cohorts, supporting the concept that the group contains different, morphologically identical species.
- According to the initial data presented, at least 2 lineages of brown dog ticks appear to be infesting dogs in North America.
- The diversity seen in the ticks referred to as brown dog ticks may also affect the ticks’ ability to transmit certain infections, including *Ehrlichia canis*, to dogs.

**Genetic Diversity of Amblyomma Species in the Southern United States**
Amanda Blom, DVM, Oklahoma State University
- In recent years, the Gulf Coast tick, *Amblyomma maculatum* (Figure 2, page 54), has expanded its range across the southern U.S.
- At the same time, entomologists determined that some ticks, which morphologically appear to be *A. maculatum*, are actually *A. triste*, a species more commonly found in Central and South America.
This presentation described the genetic analysis and genetic diversity of *Amblyomma* species, specifically *A. maculatum*, collected from several southern states. Higher than expected sequence diversity was present in wild ticks, while colony ticks demonstrated homogeneity; it was not possible to distinguish between *A. triste* and *A. maculatum* with the sequences used.

**NEW & IMPROVED PARASITE DIAGNOSTIC TESTING STRATEGIES**

Diagnosing parasites accurately is a key component of clinical parasitology. Several presentations focused on the creation and validation of novel assays to enhance identification of parasitic infections in practice.

**False Negative Antigen Tests in Dogs Infected with Heartworm (*Dirofilaria immitis*): An Update & Case Series**

*Jeff Gruntmeir, Researcher, Oklahoma State University*

- Heat treatment of serum prior to testing for heartworms has been shown to disrupt immune complexes, improving detection of heartworm antigen.
- As many as 5% to 10% of dogs in animal shelters and more than 50% of dogs on slow kill protocols that initially test negative convert to positive after immune complexes are removed by heat treatment. ¹³,¹⁴
- This presentation shared data from a study in which 34 dogs suspected of being infected with heartworm initially tested negative for antigen. However, after heat treatment to disrupt immune complexes, antigen was detected in 22/34 (64.7%) of the samples; microfilariae were also present in whole blood from some, but not all, of the dogs with blocked antigen.
- The importance of clinical judgment in making an accurate diagnosis was highlighted because, in these patients, veterinarians suspected heartworm infection, despite the negative antigen test, due to:
  - Presence of microfilaria in whole blood (*Figure 3*)
  - History of poor or no preventive use
  - Clinical signs consistent with heartworm infection (e.g., coughing, murmur)
  - Radiographic evidence of disease.

**Diagnosis of Feline Whipworm Infection in Southern Florida**

*Jinming Geng, DVM, MS, PhD, IDEXX Laboratories, Inc*

- Feline whipworms, *Trichuris campanula* and *Trichuris serrata*, are considered common in much of the world but are rarely identified in North America, except in Florida and the Caribbean Islands.
- Data were presented from a study that identified *Trichuris* species in a high proportion of feral cats from Florida.
Centrifugal fecal flotation documented eggs of Trichuris species in 26% of feral cat samples, while enzyme-linked immunosorbent assay (ELISA) detected Trichuris species antigen in 39% of fecal samples. These data underscore both the importance of this parasite in cats in this Florida region and the utility of fecal ELISA for identifying whipworm infections.15

Evaluating Schistosoma mansoni Point-of-Care Immunodiagnostic Tests for Detection of Heterobilharzia americana Antigen in Dogs
Jessica Rodriguez, DVM, Texas A&M University

Heterobilharzia americana is a schistosome (trematode) of raccoons that occasionally infects dogs and horses (Figure 4).16 Diagnosis is generally made by identification of eggs in fecal saline sedimentation or by fecal polymerase chain reaction, but intermittent egg shedding may make these tests insensitive. This presentation provided information from a study that evaluated the ability of point-of-care immunodiagnostic tests designed for the human parasite, Schistosoma mansoni, to detect H. americana. While the assay was successful at detecting infection in some samples, diagnosis was most likely determined when this approach was combined with the aforementioned microscopic and molecular techniques.

IN SUMMARY
As shown in this brief review, the presentations at the AAVP Annual Meeting were focused on the future, highlighting novel parasites, geographic distributions, and diagnostic techniques. The AAVP continues to strive to provide evidence-based recommendations that clinicians can put into practice.

AAVP = American Association of Veterinary Parasitologists; ELISA = enzyme-linked immunosorbent assay; ISEP = International Symposium on Ectoparasites of Pets; LIWC = Livestock Insect Workers Conference

References

FIGURE 4. Heterobilharzia americana: Fecal sedimentation with saline demonstrating H. americana eggs from a dog; these eggs are approximately 74 to 113 mcm by 60 to 80 mcm and contain fully formed miracidia. Intermittent egg shedding makes fecal sedimentation an insensitive test for diagnosing this parasite. Courtesy National Center for Veterinary Parasitology

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