



CONFERENCE/WORKSHOP ORGANISER'S REPORT

“Microsporidia in the Animal to Human Food Chain: An International Symposium to Address Chronic Epizootic Disease”

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Brief Description of what the conference/workshop was about

The symposium focused on the interaction of microsporidian pathogens with food and feed-related host systems. Expert speakers addressed the potential for epizootics in managed systems, and zoonoses with potential of transmission to humans and other animals within global food chains, as well as the issue of pathogen emergence related to other stress factors in food chains. We identified unifying characteristics of the interactions of these pathogens with their hosts in causing disease in high density systems to advance research efforts. Presentations were focused on Microsporidia infecting edible aquatic invertebrates; fish; pollinators and other beneficial insects such as biological control agents; and mammals, including humans, food animals and companion animals.

Participation – details of total number of participants, countries they came from, backgrounds (academia, industry, etc.)

Approximately 50 persons attended the one-day symposium. Countries represented included Argentina, Australia, Brazil, Canada, China, Germany, Malaysia, Pakistan, Switzerland, Taiwan, United Kingdom, and USA. Backgrounds of attendees included academia, industry, and state and federal agencies.

Major highlights from the presentations

Zoonoses:

- Microsporidia are increasingly identified in persons undergoing transplant rejection therapy or malignancies.
- Children affected by malnutrition, poor hygiene practices, and co-infection with other parasites carry higher burdens of microsporidiosis.
- Microsporidiosis may surface in the growing population undergoing age-related immune-senescence.
- It is likely that animal to human and human to animal transmission of at least four microsporidian species occur.

Aquatic food animals:

- Lesions caused by microsporidia have resulted in some misdiagnoses of toxicopathic changes in fish.
- Increased concern about microsporidia in wild fishes as sources of infection in finfish aquaculture
- Emergence of commercially significant microsporidian pathogens in shrimp aquaculture
- Microsporidia in laboratory zebrafish are important with the increase in their use as a biomedical model.
- Close relationship between crustacean infecting taxa and the most important human pathogen *E. bienersi*.

Beneficial invertebrates:

- Microsporidia can devastate insects that are mass-reared for human food and biocontrol agents of crop pests.
- Increasing prevalence of microsporidia in honey bees adds a stress factor related to colony declines.
- Wild pollinators may be at increased risk of microsporidiosis due host switching.

Major outcomes/conclusions in terms of policy relevance

The symposium headlined the 48th Annual Meeting of the Society for Invertebrate Pathology (SIP) and the discussion was continued in a second symposium on current research efforts within the SIP meeting program on Monday, August 10. The symposium elicited increased interest in the microsporidia as a globally emerging pathogen group in a diverse and international assembly of invertebrate pathologists. We identified microsporidia as significant factors that limit current and future food supply, both directly by infecting edible crabs, shrimp, fish and



insects, and indirectly by compromising managed pollinators and mass-reared biological control agents. Both invertebrate and vertebrate pathogens, including microsporidia, are likely to become increasingly important in food systems and transmission to human consumers is more likely to occur. Scientific evidence concerning important and emerging disease agents in agriculture and fisheries, including the Microsporidia; the potential for their transfer to humans in water, soil and commodity products (the food chain); the potential for their control, detection and eradication; and the importance of closer linkage between currently disparate scientific disciplines were central themes of this symposium. A major issue is the intractability of this pathogen group to molecular manipulation that would allow exploration of safe treatment regimes and better understanding of vulnerabilities that could be exploited. Development of methodologies to conduct the appropriate research and to manage microsporidia in food systems is needed, as well as funding for appropriate research efforts.

Relevance to CRP theme(s)

Food production systems are becoming more globalized, production levels are increasing, and trans-boundary movement of animals and their products between nations increases the potential for production collapse due to disease. In addition, climate changes may be associated with intensification of disease transmission and zoonoses among food animal species and to human consumers. Microsporidia are an understudied pathogen group, primarily because their importance as pathogens of humans, fish, edible invertebrates, biological control agents and pollinators has not been well documented until recently.

Website for further details – please also indicate if the presentations are/will be available on the website

The Proceedings will be posted on the website of the Society for Invertebrate Pathology by November 15, 2015 and linked from the Home Page for approximately 6 months, then accessible via the SIP Resources page. The SIP website URL is: www.sip.org. The presentations will be reviewed in a paper (submitted on 6th October 2015) set to be published in the high impact journal *Trends in Parasitology*. The journal is “open access” and will be available to all interested parties.