

When nature strikes! An unusual parasitic infection in a child from New Orleans, LA

Susanne Straif-Bourgeois PhD, MPH¹, Julio Figueroa MD², Joseph Taboada DVM, DACVIM³, David Baker DVM, PhD, MPA, MS, DACLAM³

¹ Louisiana State University, School of Public Health, New Orleans, LA

² Louisiana State University, School of Medicine, New Orleans, LA

³ Louisiana State University, School of Veterinary Medicine, Baton Rouge, LA

1. Components of the One Health Framework to be addressed with the above case study:
 - The role and mechanisms of cross-species infection in the emergence of new diseases
 - Long standing and re-emergent diseases
 - The impact of natural environmental exposures, including air, food and water, on human health and disease transmission
 - Habitat alterations and other long-term ecosystem changes, especially as they relate to urbanization, and their impact on human health

2. Student audiences that could benefit from our case study:
 - Professional students in Public Health, Medicine, and Veterinary Medicine curricula

3. Case Synopsis:

A four-year-old boy of African American descent is admitted to a hospital in New Orleans, LA, with a history of sudden onset of headache, right arm pain and emesis. He has sickle cell disease and so receives an extensive medical evaluation. The boy has not travelled outside the US. He has an unremarkable pathogen exposure history, including no pets at home and no history of raw seafood consumption. The child's symptoms worsen and on day 5 the patient is diagnosed with eosinophilic meningitis, suggestive of parasitic infection. Public Health officials and School of Veterinary Medicine faculty are consulted to identify a potential causative agent for this yet unconfirmed infection. On day 12 serological test results are positive for *Baylisascaris procyonis*, the raccoon roundworm. Despite an unusual full recovery from the eosinophilic meningitis, the interdisciplinary team consisting of physicians, veterinarians and infectious disease epidemiologists, is faced with a wide range of questions and concerns from the City Health Department and the media. The Mayor of New Orleans requests a public hearing to address the concerns of his constituents and tasks the team to include a feasible and sustainable solution to control and prevent the spread of this potentially deadly parasite in New Orleans. Students from the different disciplines will assume their respective roles and work together to develop their presentation including a control plan. The case study is based on the first confirmed case of *Baylisascaris procyonis* meningitis in Louisiana.

STUDENT MATERIAL

When nature strikes! An unusual parasitic infection in a child from New Orleans, LA

Students are expected to have read the case and some of the additional references before class and be prepared to discuss the issue with the whole class before splitting into interdisciplinary groups to work on their presentation and control plan.

Assignment:

- Prepare one team presentation for the public hearing. This should include the epidemiology of *Baylisascaris procyonis* in easily understandable language and an outline/proposal to control the spread of this zoonotic disease in New Orleans. Presenters should be prepared to answer question from the audience. The target audience will include the Mayor and his/her staff, the seven member New Orleans City Council, concerned citizens and business owners, members of the family of the sick child, the Director of Tourism, and representatives from the media. Students will be graded based on the case's grading rubric (see following page).

When nature strikes! An unusual parasitic infection in a child in New Orleans, LA

Case Study Grading Rubric

Each item is rated on the following rubric:

1= Very poor, 2 = Poor, 3 = Adequate, 4 = Good, 5 = Excellent

Group Members: _____

Date: _____

Item	Score				
	1	2	3	4	5
1. Evidence of preparation (organized presentation, presentation/discussion flows well between different health professionals, no inclusion of awkward pauses or confusion from the group, evidence of contribution from each member of the group)					
2. Content (group presented accurate & relevant information, appeared knowledgeable about the case and the topic discussed, identified potential approaches for a feasible and sustainable prevention plan)					
3. Delivery (clear and logical organization, effective introduction and conclusion, creativity, transition between interdisciplinary speakers, oral communication skills, including eye contact)					
4. Discussion (team members responded to their discipline-specific questions and concerns from the public professionally and correctly, no confusion from the group regarding which team member was the most appropriate to answer the question)					
5. Interdisciplinary Teamwork (group members assumed their distinctive roles as SMEs and demonstrated professional teamwork and leadership qualities)					

Total Score: _____ (sum of Items 1-5)

Total Score X 4: _____ (to make the assignment of 100 points)

Comments:

Learning Objectives: After the training period the learner will be able to:

- Describe the Public Health implications of this first ever reported human *Baylisascaris* case in Louisiana in language understandable by the lay public, yet sufficiently robust to inform public health officials.
- Discuss in terminology understandable by the lay public, intervention and/or prevention measures of this zoonotic diseases in both animals and humans in the Greater New Orleans area that will reduce public exposure to zoonotic pathogens. Include specific instructions to the lay public that will allow them to protect themselves and their children from infection with *B. procyonis*.
- Communicate their findings and recommendations to New Orleans residents, the Mayor, City Council, other public health officials, and the media by developing a PowerPoint presentation to be delivered in a public hearing. In your presentation, identify the different and overlapping roles and responsibilities of physicians, veterinarians and Public Health officials as they pertain to this and future cases, and how “One Medicine” concepts apply to building the most effective prevention and response team.

Questions for class discussion:

- What are the main concerns of New Orleans residents regarding this case?
- What are the clear and concise messages to be given at the public hearing?
- What questions do you anticipate during the public hearing?
- What is the life cycle and mode of transmission of *B. procyonis*?
- What are different approaches to include in your control plan which you will have to present at the public hearing? These should take into consideration the biology of the parasite. Which approaches might be the most feasible and most likely to succeed? Which are most likely to be accepted by the public and the City health officials? What are the long term and short term goals?
- Are you aware of other potential local zoonoses that could be considered and incorporated into mitigation plans?
- What specialties might be represented among physicians, veterinarians, and other public health officials that could better position the City to prevent and respond to the threat of zoonotic infections in the community? Relatedly, did you identify any deficiencies in knowledge, skills, or experience of the response team that could be strengthened to help prevent future occurrences of zoonotic diseases?
- What research should be done to provide the information needed about *B. procyonis* that could assist in controlling the spread or in treating cases of this disease?
- In what ways do you think the simple knowledge of the presence of zoonotic diseases impacts community well-being?
- Can you suggest a governmental organizational structure that could facilitate sharing of information and other professional collaboration among and between the various professions represented in the response team that might improve the ability of public health officials to prevent and/or respond to zoonotic threats?

References:

1. Full recovery from *Baylisascaris procyonis* eosinophilic meningitis, EID June 2007: 928 – 930
2. CDC website Raccoon Roundworm Baylisascaris:
<http://www.cdc.gov/parasites/baylisascaris/index.html>
3. Raccoon Roundworm Eggs near Homes and Risk for Larva Migrans Disease, California Communities, EID Journal 2003
http://wwwnc.cdc.gov/eid/article/9/12/03-0039_article
4. CDC podcast on *Baylisascaris procyonis*: www2c.cdc.gov/podcasts/player.asp?f=8625103
5. Raccoon latrines: Identification and Cleanup **See attachment, pdf also found at:**
<http://www.cdc.gov/parasites/baylisascaris/index.html>
6. Raccoon Roundworm Encephalitis --- Chicago, Illinois, and Los Angeles, California, 2000
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5051a1.htm>

Additional useful information:

- The City of New Orleans mandates that captured and caged wildlife such as raccoons have to be euthanized at the Louisiana Society for the Prevention of Cruelty to Animals (LA SPCA) facility and not released back into nature.
- As in other U.S. metropolitan areas there is an increase of wildlife such as raccoons and coyotes living in close proximity to humans. Hurricane Katrina might have exacerbated this problem in New Orleans.
- A map of New Orleans showing green spaces such as Audubon Park, City Park and the levees is provided (see Appendix).
- Both Louisiana State and New Orleans city budgets are in the reds and mid-year budget cuts are a normal occurrence.
- Raccoon infection with *B. procyonis* can be readily diagnosed using standard fecal floatation procedures.
- Though often found in urban environments, raccoons are wild animals capable of inflicting severe bites if members of the public attempt to handle or capture them. Rabies is an important zoonotic disease associated with raccoon populations.
- Raccoons commonly identify “latrine” areas to which they repeatedly return to defecate, thereby concentrating the environmental burden of infective parasite ova.
- Anthelmintic treatment regimens will effectively eliminate *B. procyonis* in raccoons.

Authors:

Susanne Straif-Bourgeois PhD, MPH is an Associate Professor in Epidemiology at the LSU School of Public Health. After having worked on malaria and cancer studies in Africa and Europe, Dr. Straif-Bourgeois was the Louisiana Assistant State Epidemiologist for 13 years. In this capacity she worked with on numerous outbreaks and epidemics, the surveillance of reportable infectious diseases and the occurrence of emerging and re-emerging infectious diseases such as *Naegleria fowleri* and *Baylisascaris procyonis*. Her current research focuses on healthcare acquired infections, meaningful use of healthcare data but she is also currently the Principal Investigator (PI) on a prevalence study of zoonotic diseases found in raccoons from New Orleans, LA.

Julio Figueroa MD is associate professor of clinical medicine in the division of infectious disease at LSU School of Medicine. He is the infectious disease fellowship program director for the division. In addition, he consults for several hospitals in New Orleans in the areas of clinical microbiology, antibiotic stewardship and infection prevention. Over the years, he has developed a particular interest in identification and treatment of zoonotic infections.

Joseph Taboada DVM is a Professor of Small Animal Internal Medicine at the LSU School of Veterinary Medicine and the Associate Dean of Veterinary Education and Student Affairs. His expertise is on hepatic and infectious diseases of companion animals and has published on fungal and protozoal diseases of dogs and cats. He works extensively with veterinary students and the pedagogy associated with veterinary medical education.

David Baker DVM, PhD is a Professor of Laboratory Animal Medicine at the LSU School of Veterinary Medicine. He also administers the Division of Laboratory Animal Medicine and serves as Attending Veterinarian for LSU. Dr. Baker's primary area of training and expertise is parasitic and other infectious diseases of animals. He has published extensively on bovine ostertagiasis, canine giardiasis, swine toxoplasmosis, and several other parasitic diseases of animals.

