Trematodes

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Unlike other helminths, flukes are exclusively internal parasites and include liver flukes, intestinal flukes, blood flukes, and lung flukes (Ash and Orihel 2007). Their body has two suckers: the oral sucker used for feeding and the ventral sucker (acetabulum) used for attaching to the host. The majority of studies of parasitism in wild primates have focused on detection of gastrointestinal parasites from non-invasively collected fecal samples. As a result, our understanding of the diversity and impact of parasites on wild primates is heavily skewed toward those inhabiting the gastrointestinal tract. Unlike the majority of other helminths, trematode eggs are too heavy to rise in floatation solution and must be recovered via fecal sedimentation. Unfortunately, most previous studies of primate parasites only employed floatation, and, as a result, trematodes are less well understood compared to other primate parasites (Gillespie 2006).

Most previous studies of trematodes in wild primates have focused on potential reservoirs of *Schistosoma mansoni*, the agent responsible for schistosomiasis in humans. Natural infections of *S. mansoni* have been reported in olive baboons (*Papio anubis*) in Kenya, Tanzania, and Ethiopia. Schistosomes have also been found in Hamadryas baboons (*Papio hamadryas*) in Saudi Arabia and Guinea baboons (*Papio papio*) in Senegal. Natural infections of *S. mansoni* have been reported in vervet monkeys (*Cercopithecus aethiops*) in Tanzania and Ethiopia. Baboons and vervet monkeys are susceptible to schistosomiasis because they often come into contact with water. They also defecate promiscuously in water bodies, thereby maintaining the parasite's life cycle in areas where suitable intermediate host snails exist. Although high infection rates of *S. mansoni* have been reported from baboon groups interacting regularly with humans, it is not yet clear whether primate schistosomiasis can cross over into humans and vice versa (Bakuza 2012). Curiously, *S. mansoni* has not been observed in wild chimpanzees, despite its presence in sympatric baboons and its presence in captive chimpanzees.

Other trematodes infecting primates include *Paragonimus* species, which, although they generally affect humans (Ash and Orihel 2007), have been detected in drill (*Mandrillus leucophaeus*) in Cameroon and crab-eating monkeys in Malaysia. At Gombe, *Paragonimus* was first reported in baboons as an unidentified trematode, and later confirmed by Bakuza (2012). The confirmation of *Paragonimus* at Gombe in western Tanzania is of great significance as it indicates the parasite's wider distribution in wild baboons in areas east of the Congo basin (Bakuza 2012). Other trematode species of lesser importance that infect primates include members of the Strigeoidea family, which have been reported in guinea baboons in Mount Assirik, Senegal, and *Dicrocoelium* (family Dicrocoeliidae) in guenon monkeys in Uganda and chimpanzees in Lope Reserve, Gabon.

It is still unclear why fewer trematodes exist in primates compared to other helminths. It is probably a result of the complex life cycles of most trematodes, such as subclass Digenea that undergoes successive developmental stages in up to three intermediate hosts, which in most cases are invertebrates (Ash and Orihel 2007). The hosts may have to be eaten by primates for the parasite life cycle to continue. The primates' limited range of invertebrate diet may thus contribute to their dearth in trematode parasites.

Our current understanding of the zoonotic potential of *S. mansoni* and other trematodes in natural systems is limited; thus further work is needed to determine the risk of zoonotic impacts from trematodes on endangered primates and global health. Integration of standardized empirical data collection and DNA amplification-based molecular diagnostics has the potential to rapidly

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improve our knowledge of primate trematodes and the factors that influence infection.

SEE ALSO: Gastrointestinal Diseases

REFERENCES

Ash, L. R., and T. C. Orihel. 2007. *Ash and Orihel's Atlas of Human Parasitology*, 5th ed. Chicago: American Society for Clinical Pathology Press.

Bakuza, J. 2012. *Epidemiology of* Schistosoma mansoni *Infection in Sympatric Humans and Non-Human Primates in the Gombe Ecosystem, Tanzania*. Ph.D. thesis, University of Glasgow.

Gillespie, T. R. 2006. "Non-Invasive Assessment of Gastro-Intestinal Parasite Infections in Free-Ranging Primates." *International Journal of Primatology*, 27: 1129–1143.

FURTHER READING

Gillespie, T. R., C. L. Nunn, and F. H. Leendertz. 2008. "Integrative Approaches to the Study of Primate Infectious Disease: Implications for Biodiversity Conservation and Global Health." *Yearbook of Physical Anthropology*, 51: 53–69.

Nunn, C. L., and S. M. Altizer. 2006. *Infectious Diseases in Primates: Behavior, Ecology and Evolution*. Series in Ecology and Evolution. Oxford: Oxford University Press.

Standley, C. J., L. Mugisha, A. P. Dobson, and J. R. Stothard. 2012. "Zoonotic Schistosomiasis in Non-Human Primates: Past, Present and Future Activities at the Human–Wildlife Interface in Africa." *Journal of Helminthology*, 86: 131–140.

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ABSTRACT

Trematodes (class Trematoda), also known as flukes, are flatworms belonging to the phylum Platyhelminthes, characterized by a dorsal-ventrally flattened and unsegmented body. Surprisingly few trematode species are known from primates; however, commonly reported trematodes in wild primates include *Schistosoma mansoni*, *Fasciola hepatica*, *Dicrocoelium* species, and, less commonly, *Metagonimus yokogawai* and *Paragonimus* species. Integration of standardized empirical data collection and DNA amplification-based molecular diagnostics has the potential to rapidly improve our knowledge of primate trematodes and the factors that influence infection.

KEYWORDS

disease; parastites; pathogen