

Molecular identification of canine hookworms from fecal and sewage Specimens from Durban, South Africa

Poster
number

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Ancylostoma caninum was the predominant zoonotic canine hookworm species

Shotgun metagenomic sequencing simultaneously identified *Ancylostoma ceylanicum*, *Ancylostoma braziliense*, and *Uncinaria stenocephala*

The first report of the identification of *U. stenocephala* and *A. ceylanicum* from stray dogs' fecal specimens from Durban, South Africa, using a shotgun metagenomic sequencing approach

BACKGROUND

Zoonotic canine hookworm species like *A. caninum*, *A. braziliense*, *A. ceylanicum*, and *U. stenocephala* significantly contaminate public spaces, especially in areas with many stray dogs and poor sanitation. Hookworm larvae in contaminated soils can cause percutaneous infections, which increases the risk of cutaneous larva migrans (CLM), a tropical and subtropical skin condition, Figure 1. Children, dog owners, and outdoor workers are vulnerable. Therefore, a comprehensive understanding of the epidemiology of canine hookworms is key to implementing targeted control and preventive measures.

METHODS

Fecal and sewage samples were systematically collected from various locations in Durban, South Africa, and subsequently processed to isolate helminth eggs. Genomic DNA (gDNA) was extracted from the recovered helminth eggs (n=28). These were subsequently analyzed using a shotgun metagenomic sequencing approach to enhance the taxonomic resolution of the detected organisms to species level. Taxonomic classification and estimation of relative abundance were performed utilizing Kraken2 with high-quality reads. The ggplot2 package was utilized for the generation of stacked bar graphs. The analyses of the microbial community were conducted utilizing the R statistical interface.

RESULTS

- The analysis of shotgun metagenomics data revealed a complex and diverse range of Eukaryotic pathogenic and non-pathogenic helminth species across all samples studied, Figure 2.
- U. stenocephala*, *A. caninum*, *A. ceylanicum*, and *A. braziliense*, were identified as zoonotic canine hookworms. *A. caninum* was the most dominant species, detected in 10 stray dog specimens, indicating a significant parasite prevalence in the sampled dogs. Figure 2 shows that five specimens had *A. ceylanicum*, two had *A. braziliense*, and one contained *U. stenocephala*.



Figure 1. Images of cutaneous larva migrans.

RESULTS CONTINUED

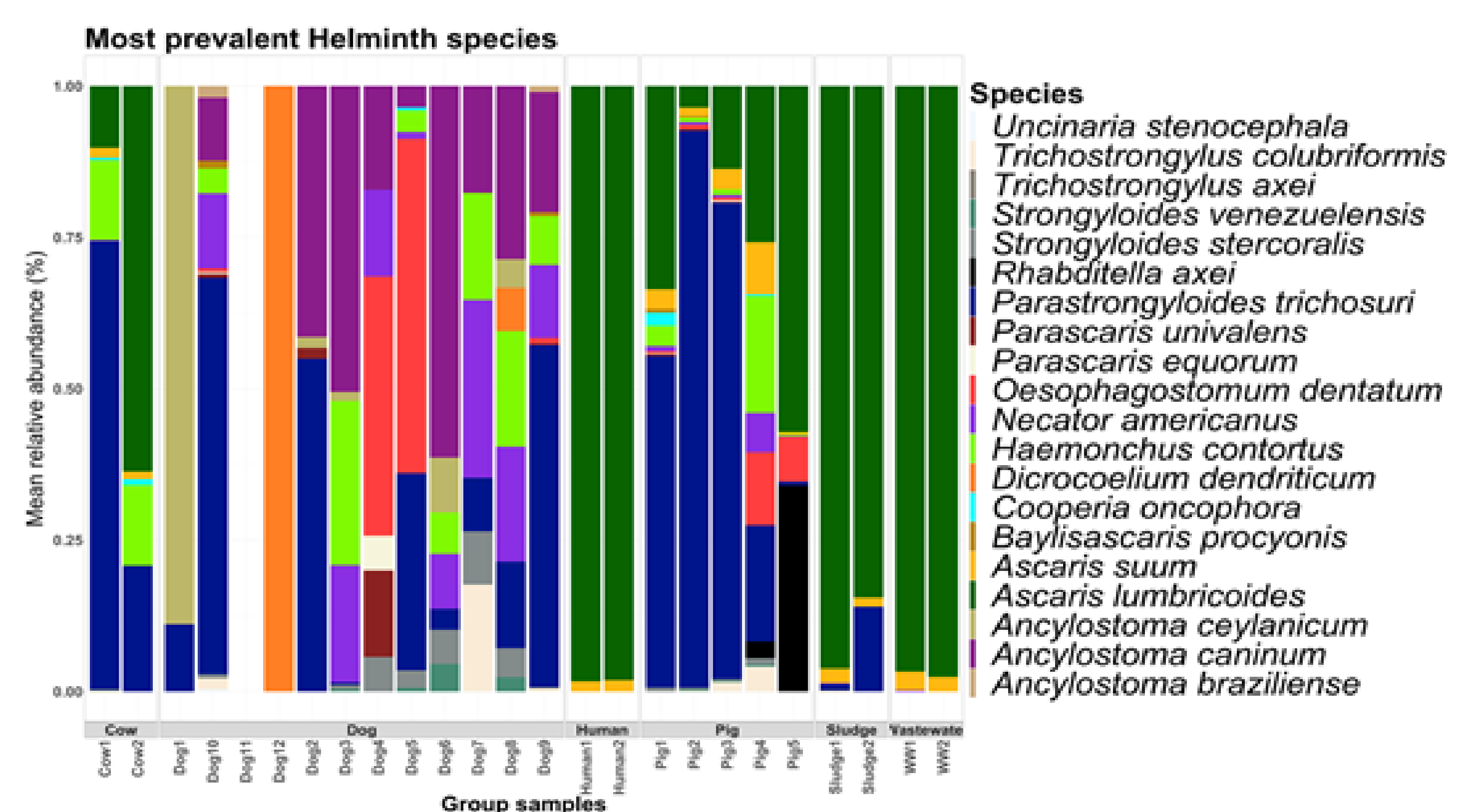


Figure 2. Prevalence and relative abundance of various helminths and canine hookworm species

CONCLUSIONS

- Canine hookworms, particularly *A. caninum*, were prevalent among the sampled dog population, posing a significant zoonotic risk to humans through environmental contamination.
- Though less widespread, presence of other canine hookworm species highlights the potential for zoonotic transmission of CLM in humans.
- The findings reinforce the importance of integrated approaches that include veterinary care (regular deworming of dogs), environmental sanitation (proper waste disposal and control of stray dogs), and public health education (to raise awareness about the risks of zoonotic infections) to mitigate the risk of zoonotic hookworm transmission.

ADDITIONAL KEY INFORMATION

Other Key Information:

<https://www.msmanuals.com/home/skin-disorders/parasitic-skin-infections/cutaneous-larva-migrans>

<https://www.healthline.com/health/cutaneous-larva-migrans>

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