

Parasites Infecting *Bombus* in the Intermountain Region

Maxwell Packebush¹, Christine Bell¹, Paul Ayayee² and Lusha Tronstad¹

¹Wyoming Natural Diversity Database, University of Wyoming, Laramie, WY 82071

²Ecosystem Science and Management, University of Wyoming, Laramie, WY 82071

Introduction

- The decline of bumble bees (*Bombus* sp.) is being observed globally.
- Disease-causing microbial pathogens may be a main cause of *Bombus* decline.
- The pathogens infecting *Bombus* populations in the Intermountain region of North America are very poorly studied.
- Many pathogens are easily transmissible and inhabit the gut or reproductive tract of bumble bees.
- Research into the pathogens infecting bumble bees would assist in the management and protection of these vital organisms.

Figure 1. *Bombus* spp. worker in Medicine Bow National Forest



Questions

1. To what degree are pathogens infecting bumble bees in the Intermountain region of the US?
2. What pathogens are most prevalent in bumble bees?
3. How dense are infections of microbial pathogens in bumble bees?
4. Are infection rates of microbial pathogens in bumble bees influenced by the temperature, elevation, oxygen concentration, or other bumble bees?
5. Do bumble bees in urban areas have higher infection rates than in natural areas?

Methods

- Collected bumble bees using a net in the Snowy and Laramie Mountains, and an urban area in southeastern Wyoming during summer 2020.
- Identified all *Bombus* sp. and extracted their gut from their head, thorax, and abdomen.
- Extracted all microbial DNA present from each bee.
- Perform various PCR tests to estimate which microbes are present.

Results

- Collected ~500 bumble bees
- Processed 75 bumble bees to date
- 100% of bumble bees were positive for prokaryotic DNA
- We observed nematodes in few bumble bee samples.
- We observed cocci in few bumble bee samples.

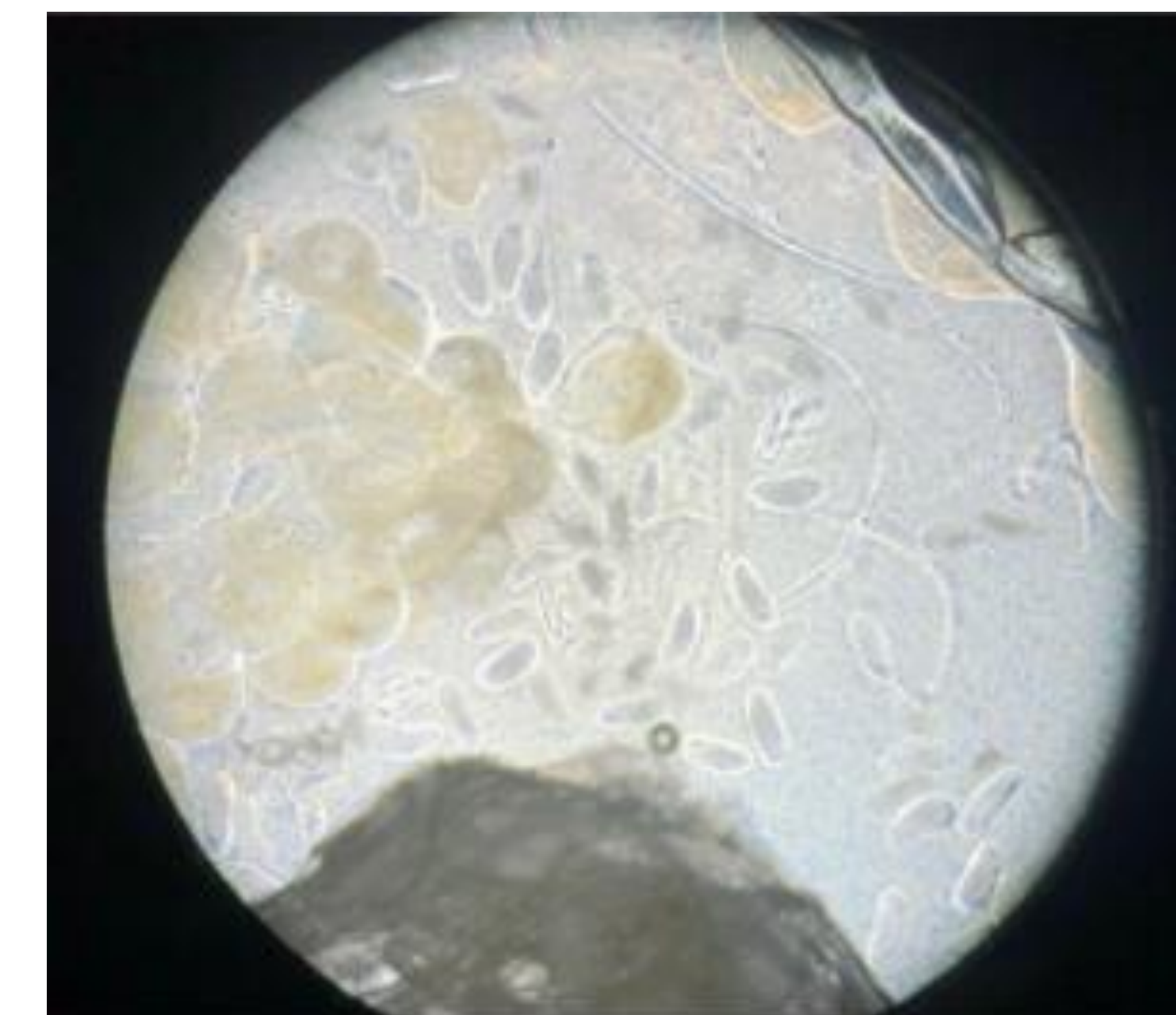


Figure 2. Unidentified cocci present in *Bombus* spp. Guts.

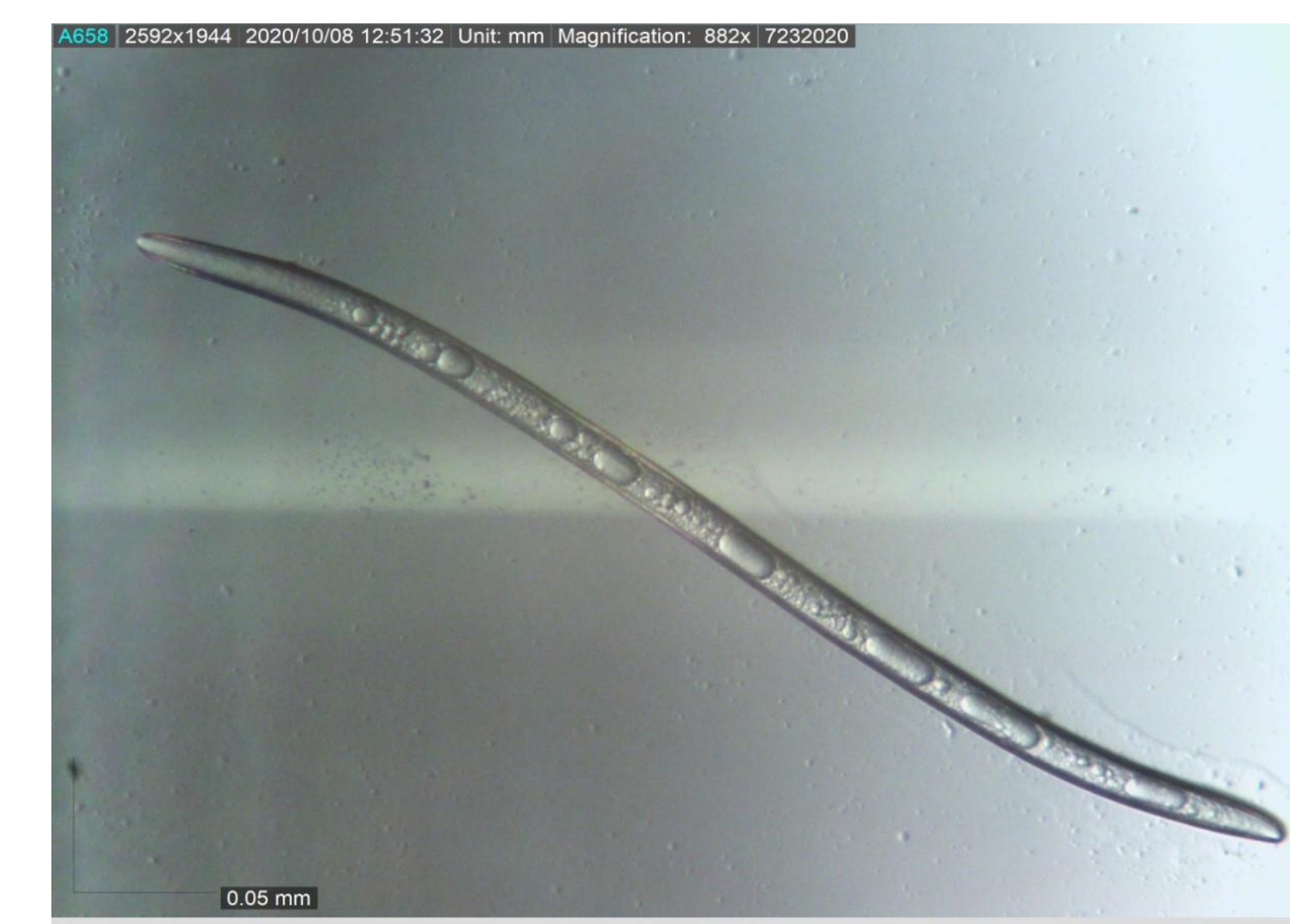


Figure 3. Unidentified Nematode observed inside *Bombus* spp. Gut

Discussion

- Preliminary results show that pathogens are infecting *Bombus* in the Intermountain region of the US.
- We are currently working to identify what pathogens infect bumble bees, but we have observed prokaryotic, nematodes and cocci in bees.
- We are currently analyzing data with more results to follow.

Figure 4. *Bombus* spp. worker in Medicine Bow National Forest



Literature cited

- Cameron, S, Sadd, B 2020, 'Global trends in bumble bee health', *Annual Review of Entomology*, vol. 65, pp. 209-232.
- Cameron, S, lozier, J, Strange, J, Koch, J, Cordes, N, Solter, L, Griswold, T 2011, 'Patterns of widespread decline in North American bumble bees', *Proceedings of the National Academy of Sciences of the United States of America*, vol. 108, no. 2, pp. 662-667.
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