

Field Work: A walk in the Park

This blog post was originally posted on a University of Calgary Helminths Blog page that is currently being revamped and moved so please check back here or with me on twitter, @bvanparidon for more information about this great graduate student blogging project. It also appeared on [Science Borealis](http://scienceborealis.ca/) (<http://scienceborealis.ca/> this is the url to link the highlighted words too) a Canadian science blogging community, check them out and here is my piece about field work titled Field Work: A walk in the park.

One of the great things about working with parasites and especially those using wildlife hosts is the chance to leave the lab and do some field work. For me, a PhD student working at both the University of Lethbridge and Calgary, this means a trip to the Cypress Hills Interprovincial Park in southeastern Alberta. This park spans the border between Alberta and Saskatchewan and is somewhat of an anomaly as it is an island of sorts in the middle of the vast prairie landscape of the Canadian west. Cypress Hills is an area that was not covered and flattened by the glaciers of the last ice age, resulting in hills that rise 1400 meters above the prairies. This creates an island ecosystem protruding from the seas of wheat and suitable habitat for many species of animals. The park boasts a large population of elk and deer, which in turn feeds a healthy population of roughly 30 cougars. It also houses many species of birds and is a welcome stopover in the migratory routes of many bird species each year. Arguably the most interesting inhabitant to the park however is the liver fluke (Trematoda) *Dicrocoelium dendriticum*.

This small fluke is believed to have been introduced to North America and subsequently Cypress Hills from Europe where it is reported to be endemic. The incredible thing about this parasite though is the life cycle. *Dicrocoelium* has a complex life cycle involving three hosts. Adults living in the livers of final hosts produce eggs that end up in the hosts feces where they are ingested by a terrestrial snail. In the snail the parasite develops, grows and divides into many individual cercaria (tiny, fork-tailed trematode life cycle stage produced through asexual division) and are coughed out of the snail in a mucous encased "slime ball" (it is actually referred to as a slim ball in some of the literature). Now this is where it gets truly interesting. Ants will come along and presumably bring this slime ball back to the nest where they all chow down on it. Once inside the ant the majority of the parasites move to the abdomen and encyst there as metacercariae (the stage infective to the final hosts) where they wait to get passed on to the final host.

The final host in this case is any number of grazing ruminants and in the park specifically it can be deer, elk or domestic cattle that are grazed there. So how do trematodes in ants get into the livers of elk?

Remember how I just said that the majority of parasites in an ant go to the abdomen? The minority, in this case one, makes its way to the bundle of nerves in the ant's head that constitutes the ant brain. Here it sets up shop by wrapping around the nerve bundle. Ants infected with *Dicrocoelium* all have a parasite in the brain and all begin to act, shall we say, clingy but not towards other ants they may have a crush on but rather towards plants. During parts of the day that are cool and won't dry out an ant sitting in the open the infected ants climb up plants and lock onto leaves and flowers with their jaws. Here they remain waiting to be accidentally ingested by a grazing animal so they can get to the oh so tasty liver. This is an amazing example of host manipulation by a parasite and yes, this guy exists in Alberta less than an hour south of Medicine Hat.



Infected ants clinging to dandelions in Cypress Hills (Brad van Paridon)

Naturally someone needs to be investigating this oddball and that means someone has to get out there and collect samples of this thing from the park. Naturally that sounds like a pretty sweet time so I took up the cause and have been working on this system since 2011, which brings me back to the joys of field work. My latest trip to the park was November 2013 and the goal was to collect fresh livers and adult parasites from elk that are killed in the annual elk management hunt. We do so with lots of help from the Alberta Parks Staff, Conservation Officers and of course the hunters themselves. Basically any time an animal is shot in the park it needs to be called in to the CO's who come out and verify the tag. We just tag along, show up at the kill and get a fresh liver.



Myself next to the gut pile from a recently deceased elk, and you thought they smelt bad on the outside. (Brad van Paridon)

I have been touting the joys of field work this whole post and we always have a great time. How could we not with scenery such as this to enjoy.



However, during one foray out into the park to find some hunters that had just called in a kill, things became slightly less pleasant. As is normal in the park a thick fog descended onto the flat prairie like plateau of the hills. The three photos above that look as though they could have been snapped on the prairies are actually the plateau of the hills and are at an elevation of 1400 m where fog and clouds come and go quickly. Blanketed in fog it looks something like this.



Aside from the obvious driving hazards associated with travelling in thick fog, we must remember that hunting is also going on in these areas and although it is technically illegal to shoot into fog, poor decisions are made on a daily basis. So this is where we found ourselves. Outside the truck, standing in the middle of a field, surrounded by fog so thick we can't see more than a few meters in any direction and trying in vain to locate the hunting party that has just taken down an elk. Just then we got in touch with the hunters via cell phone and things were looking up. We concluded we were in the right area but then the man on the other end of the phone stops and says "I gotta go they're (meaning the elk herd) are coming back around and we are going to take another shot" and then he hangs up. Well, we quickly put it together that this was for sure time to leave the area as we might get caught in the middle of a live fire exercise. Needless to say we made a quick exit and upon returning to the area in an hour so found three kills about 100 m apart and no more than 200 m from where we were originally standing. One of these kills too had not been claimed and was being investigated by the officers present, a situation that might occur if someone did not know they had killed multiple animals until the fog lifted. Hmmmm, makes you think.

Now, I don't think we ever really came close to being shot, I never heard gunfire while out in that field, but it did make me think that field work really isn't just a walk in the park. It also made me reflect on other situations I got myself into in the name of field work. One time while searching for infected ants I disturbed a wasp nest and was stung more than seven times on my face, chest and neck while running away. I have exposed myself to swimmers itch while collecting aquatic snails, thankfully never got it though. There was the time I stumbled across what appeared to be an ideal cougar den complete with bones from the last meal. This time I was thankful that no one was home. But these things could happen to anyone who frequents the outdoors right? That is what I told myself as walked through the pitch black of the Cypress Hills night, alone, carrying bags of liver sections, that would surely entice one of the many cougars in the park, over to the cougar garbage bins. On second thought maybe I am bringing some of this on myself.

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