PARASITE LABS

This is one instance when the lab handout will have to be read before the actual lab. We will be examining actual wild birds that presumably died from a variety of reasons. This differs from laboratory-raised animals in several ways. First, we will be using several species. Second, the condition of these birds will be more variable. Third, and of particular interest for the lab, these birds will carry a "normal" parasite fauna.

The dissection is simple. We will examine the digestive, respiratory, urogenital systems. However, while we do that we will also collect a number of parasites. It is necessary to do both together, and hence read this before starting, because the process of collecting parasites from some tissues will require destroying those tissues.

Parasitism is the lifestyle most common in the animal kingdom. Parasitology courses will usually focus in a few phyla in which parasitism is common (Platyhelminthes and nematoda, for instance), but parasitic lifestyle is present in nearly all major phyla. Parasites can be defined ecologically and functionally as "organisms that at some point during their life cycle live in or on a heterospecific animal (the host), draw their nutrients primarily from the host, and have the potential to reduce its fitness". This definition includes both endoparasites and ectoparasites, but excludes micropredators or animals that use their hosts solely for shelter. Second, both macroparasites (helminths, arthropods) and microparasites (viruses, bacteria, protozoa, fungi) are included. Finally, parasites need not be harmful all the time, or even most of the time. Parasites can often coexist with their hosts without causing any measurable deleterious effects, but parasites are also opportunistic, and can quickly increase in numbers and overwhelm a host weakened by other forms of stress, such as malnutrition or reproduction.

In this lab we will be dealing solely with macroparasites, not because they are necessarily more important, but because they are more readily evident given our constraints. Parasites can have significant effects on host populations. When these effects are suspected and before sampling, it is useful to familiarise oneself with the "normal" or "expected" parasitic fauna of a population or a species. This includes both the prevalence (proportion of individuals infected) and intensity (number of parasites per host) of the "usual" parasites in and age and sex-structured population.

We will be using birds that have been frozen soon after death. Therefore it will be highly unlikely that we will find any external parasites (fleas, mites, ticks), which usually evacuate the body soon after it dies. In a proper post-mortem exam (we will pretend this is one) we would record all potentially relevant information about the host and the conditions of death, including location, sex, age, weight, external lesions, preservation technique (e.g., frozen, refrigerated, how long after death) any odd behaviour observed prior to death. The exact details of ANY post-mortem exam depend specifically on the REASONS why it is being conducted.

During the dissection you will search for, collect, examine and preserve macroparasites as outlined below. All specimens will the individually kept in small vials, properly labelled with the host's information. You will tabulate all the parasites you have encountered in your specimen and hand it in to me, which will NOT be the last time you see or hear about these data.

Collection of helminths

Given that not everyone will get the same parasites, please share your parasites. That is, if you find something neat, make sure everyone gets to see it

Skin.- Trematodes are sometimes found in cysts, often around the cloaca. Microfilaria are smaller and usually visible only under a dissecting microscope.

Subcutaneous.- Filarial nematodes can live between the skin and musculature. Depending on the species they can be large enough to be seen with the naked eye (up to 3 cm). They can look like nerves, except for their location, or be in connective or lymphatic tissues.

Muscles.- Filarial nematodes and larvae are rare in muscles. If a lesion is present, examine it carefully under a dissecting microscope.

Brain.- Filarial nematodes have been found in starlings, grackles, blue jays, etc. Remove the birds "scalp" and cut off the top of the skull. Take the brain out and examine externally; then cut off sections and examine each carefully under the microscope.

Eyes.- check for nematodes under the nictitating membrane. Slit the eyelids with scissors (not a scalpel) and examine inside the orbits. It is actually possible to remove eye worms from live birds by simply irrigating the eye with saline and picking them out.

Nasal passages.- Snip the nares up to the eye orbits. You will see the turbinates (purpose of which is?) and examine the nasal passages for nematodes and trematodes using forceps (That is YOU using forceps, not the parasites).

Digestive tract.- Nematodes and trematodes. After you have examined the digestive tract cut it open to reveal the inside. Make the cut on one side, starting with the mandible and going (for now) all the way to the proventriculus. If necessary, remove the oesophagus completely and place it separately in a dissecting pan. Examine the exposed areas visually with the aid of a microscope. Some worms will be embedded in the host's tissues so you will need to make a longitudinal incision parallel and beside the worm to be able to remove them.

Nematodes, cestodes and trematodes can be present in the proventriculus and gizzard. The procedure is similar to that above. In addition, look for any ulcerations or blood clots; they may actually be parasites.

The same procedure applies for helminths in the rest of the intestine, except that it is useful to separate the intestine into its components (duodenum, ileum, jejunum, cecum, and large intestine, all the way tot he cloaca) before starting to remove parasites just so you can keep track of what parasite came from which section. After the intestines have been separated remove the ingesta with water or saline and pass it (the ingesta) through sieve (the hole size, will, of course, determine the minimum size that will pass through). Then examine the mucosa under a microscope, first intact, and then by scraping it.

Liver.- remove the liver and gall bladder, place them in a Petri dish and examine them under a dissecting microscope. Open the gall bladder and search for trematodes.

If you have a large bird, examine each liver lobe separately. Under a microscope scrape ways at the liver with a scalpel, removing fine layers until the bile ducts are exposed. In the absence of trematodes the bile ducts will be clear and translucent; otherwise they will be distended and seemingly clogged and yellow-green. If you are one of the lucky ones, then dissect the bile ducts longitudinally and search for trematodes. Pick them with forceps or just wash them with water or saline.

Kidneys.- Work on the kidneys as you did with the liver. The trematodes will likely be smaller, and more difficult to find.

Heart.- Filiarial nematodes might be found around the pericardium

Oviduct.- Open the oviduct longitudinally and examine it for trematodes as you did with the intestine.

Coelom.- Some nematodes and trematodes live "freely" in the coelom. The whole carcass should be placed under a dissecting microscope and examined carefully.

Good hunting. I have included a "standard" dissection form. There is no such thing, really, but it might help you to keep a tack of what you find and where you find it. The one below is adapted from one I used when dissecting kestrels. We were not looking for parasites, but rather collecting various tissues for methyl mercury analyses. In our case, the purpose is to get a hopefully complete assessment of an animal's macro-parasitic fauna This is not a veterinary course, so we will not be determining disease or causes of death (although in some cases it they will be obvious).

Under all circumstances, keep all macroparasites, carefully labelled with:

Host Species
Tissue(s) where the parasite was found
ID #.- so they can be linked to a particular bird/dissection
Dissection ID # : just in case we have to check what other parasites this animal had.

So sufficient information to make some sense of the individual's parasitic fauna.

AVIAN NECROPSY FORM

ID_____ Today's Date _____

Examiner's name(s)_____ Date found_____

Location found: City _____ Province _____

Lat_____Long_____ Found/brought by _____

Species_____Sex_____ Age_____ Aged by _____

Carcass Condition (Fresh/frozen/decomposing) _____

Mass_____g

Tarsus_____mm

Wing Chord_____cm

Culmen _____mm

Beak Depth_____mm

Beak Width_____mm

Mark X for no gross lesions (please describe), O for not examined, Include all parasites and their ID number.

External exam:

___Carcass condition (autolyzed) 1 2 3 (fresh)

___Body condition (emaciated) 1 2 3 (good)_____

___Body openings_____

___Wing bones_____

___Feather condition (poor) 1 2 3 (good)_____

___molting yes no_____

___skin_____

___subcutaneous fat (poor) 1 2 3 (good)_____

___general muscle condition (poor) 1 2 3 (good)_____

__external parasites - _____

Internal exam:

GI System:

___Peritoneum, mesentery_____

___Proventriculus_____

___Gizzard (ventriculus)_____

___Small intestine_____

___Large intestine_____

___Liver_____

___Gall bladder_____

___Spleen_____

___Pancreas_____

___Abdominal fat (none) 1 2 3 (lots)_____

___Parasites (none) 1 2 3 (lots)_type:_____

Cardiovascular System:

___Heart_____

___Pericardium_____

___Major vessels_____

___Coronary fat (none) 1 2 3 (lots)_____

Respiratory System:

___Nasal cavity_____

___Trachea_____

___Syrinx_____

___Lungs_____

___Airsacs_____

Urogenital Systems:

___Kidneys_____

___Cloaca_____

___Ovary_____

___Testis, _____

___Eggs_____

Musculoskeletal System:
___Pectoral muscles (little) 1 2 3 (lots)_____

___Bones_____

___Joints_____

Samples Saved:

Breast Feathers_____2nd 2°_____ Wing_____ Histopathology_____

Parasites or Foreign Bodies_____

Photographs_____

Stomach contents: _____(organic)_____(rocks)_____(lead)

Summary of gross findings:

_____

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Other Comments:_____

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