

## **DETERMINATION OF RAPTOR AND SEABIRD FOOD HABITS WITH STABLE ISOTOPES ANALYSES OF BLOOD AND FEATHER SAMPLES**

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### **PURPOSE**

Predators may play a key role in the functioning of arctic tundra ecosystems and could potentially control the abundance of their prey. Avian predators, mostly raptors and seabirds, are the most diverse groups of predators in the Arctic and range from highly specialists to highly generalists. Quantifying the annual variation in their diet according to the availability of their prey will help us better understand trophic interactions in the tundra. Depending on the study site and bird species, two methods will be used to determine their food habits. Methods describe here will relate only to the collection of blood and feather samples for stable isotopes analyses (the other method relies on the collection of regurgitated pellets and prey remains at nests and is described in another protocol).

### **TIME PERIOD**

The best time to collect blood and feather samples of raptors and seabirds is during the period where chicks are present at the nest and adults can be captured. On Bylot Island, this period usually extend from 15 June to end of July for raptors and from the second week of July to the beginning of August for seabirds. Dates may need to be adjusted at other sites depending on the latitude and the bird species.

### **PROCEDURE**

All raptor and seabird species described in the abundance protocols are of interest. However, those most likely to be encountered are:

- Snowy Owl (SNOW)
- Rough-legged Hawk (RLHA)
- Peregrine Falcon (PEFA)
- Gyrfalcon (GYFA)
- Glaucous Gull (GLGU)
- Long-tailed Jaeger (LTJA)
- Parasitic Jaeger (PAJA)
- Pomarine Jaeger (POJA)

These samples can be collected from either adults or young. Capture of young at the nest is relatively easy during the first 2 or 3 weeks of life, as young can be hand-picked at the nest, or around it. In some species, young may leave the nest at some point after hatch and hide in the vegetation, sometimes up to 100 m from the nest. Depending of the species, this can happen fairly quickly after hatch (e.g. ~ 1 week in jaegers), or later during growth (e.g. in owls, young leave gradually the nest starting with the oldest one first around 3 weeks of age).

For chicks, the collection of blood and feathers samples should occur during visits to the nest to monitor reproductive success (see protocol on reproductive success of these species) to minimize disturbance. Whenever possible, we recommend sampling each nest twice (or more for species where young stay 3 weeks or more at the nest). Ideally, nests should be sampled every 10 days, starting a few

days after hatching of the chicks (e.g. 3-6 days) until fledging (or death) of all chicks. All accessible nests should be considered for this monitoring. At each visit, sample only one chick in the nest and try to use different chicks at every visit whenever possible (you can recognize chicks using various methods, e.g. by age difference among chicks, recognizable individual marks, taking pictures or marking chicks). To minimize stress on individual chicks, blood and feather samples should not be taken more than twice during the breeding period.

Adults are much more difficult to capture. This will require setting up a trap on the nest and waiting in a blind nearby until the adult return and sit on the nest. Thus, it is quite time-consuming. Usually, this level of effort should only be invested if you plan to mark the adults. Collection of blood or body feather from adults should therefore be combined with marking activities. However, an alternative to capturing adults could be the collection of feathers from the nest or the immediate surrounding. However, one has to be relatively certain that feathers collected are from the adults attending the nest, and that they are relatively fresh (i.e. not old feathers from previous years; these feathers are usually worn, dirty and bleached by the sun). Although feathers can be easily collected, their reliability is not yet proven. A potential problem is that feathers can grow when individuals are away from the Arctic tundra (e.g. in winter or during migration). Therefore, **blood remains the preferred sampling method.**

Blood samples should only be taken by trained persons. Blood samples (1 ml) are collected from the brachial vein (see figure 1 below) in both adults and chicks using a 1 or 3-ml syringe with a 25-gauge needle. For very small chicks, the 1-ml syringe (with a 25-gauge needle) should be preferred. The volume of blood sampled (in milliliters) should never exceed 1% of the body mass (in grams) of an individual. Therefore, if an individual weighs less than 100 g (e.g. a young chick), reduce the quantity of blood taken accordingly. The skin area to be sampled should be cleaned with alcohol, as well as the feathers. Rubbing the feathers with alcohol will make it easier to move them aside and expose the skin above the brachial vein. A new sterile syringe should be used for each sample. Those manipulations should be done by 2 persons. The first one holds the bird, ensuring that it breaths correctly, and holds the wing to be sampled half-opened. The other person samples the vein by placing the syringe at an angle (45°) and over the skin by gently entering the vein. A little suction is applied on the syringe piston to suck up the blood. When the required blood volume is reached, a dry cotton swab is applied on the puncture spot and the syringe is then slowly removed. Maintain a pressure on the dry cotton swab for 3 minutes after the syringe has been removed. Observers must check that the bird is not bleeding and that no internal bleeding occurs before release. Blood samples should be transferred to 1.5 ml endorf tubes with 0.4 ml of ethanol 70%.

Finally, 1-2 fully grown body feathers should be collected from the individual before release and stored in plastic bag.

Blood and feather samples should be store at room temperature in a dry place until lab analyses. All samples must be clearly identified with observer's name, nest number, date of visit (including year) and number of samples collected. Record the same information in your fieldbook, adding the mass of the sampled individuals and its identity (or criteria used to identify it in chicks). If you resample an individual, note this information again.

## MATERIAL

- Map of the sector and field book
- GPS
- Envelopes
- 1.5 ml ependorf tubes (with 0.4 ml ethanol 70%)
- Syringes, alcohol tissue swabs and dry cotton swabs
- Spring scale (100, 300, 1000 or 3000 g depending on the species or if it's a young or an adult)

If adults are sampled:

- A burlap bag to weigh the birds
- Bow nest trap
- Triggering device for the trap
- A blind to observe the nest

## DATA MANAGEMENT

It is important to keep an inventory of all samples collected on data sheets. These data sheets should include all information recorded in your fieldbook and/or on the bags, as well as the name of the person who made the collection and any additional relevant information (e.g. feather collected in the nest rather than directly from a bird). This inventory will ensure that no samples are lost and will be useful to determine when nests need to be visited again for further collections.

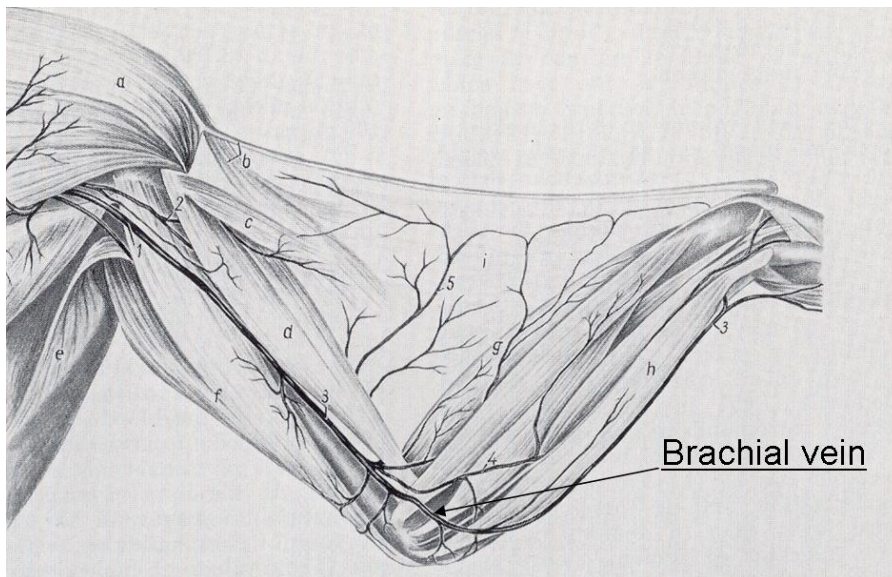


Figure 1. Illustration of the brachial vein (taken from Koch, T. 1973. Anatomy of the chicken and domestic birds. Iowa State University Press).