TECHNIQUES FOR DETERMINING SOME BIO-MEDICAL PARAMETERS

OF MIGRATING RAPTORS

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Birdwatchers, and hawkwatchers in particular, have long been aware of the ease with which one could observe a variety and quantity of raptors at hawk migration concentration points (Broun 1939, Hoflund 1958, Ward and Berry 1972). With more and more people taking an interest in hawk-watching, lookouts and sanctuaries have been established, and records of the details of hawk migration have been kept. The information provided by observations at hawk migration concentration points helps us understand factors of migration such as weather and time of year (Haugh and Cade 1966, Mueller and Berger 1967). Additionally, these data provide valuable information about the populations and life histories of raptors. The quantitative aspects of age composition, dispersal, population numbers and population trends can be greatly expanded by observations made at hawkwatches. The banding operations in areas of hawk migration concentrations will continue to increase the probability of returns and the data that come with returns.

Similarly, we believe that knowledge about bio-medical parameters of raptors can be greatly increased by sampling at migration concentration points. In light of the conditions man imposes on raptors through habitat destruction, pollution, and slaughter, positive steps should be taken so that bio-medical parameters can be used to help assess the status of populations and help formulate meaningful management policies. Bio-medical irregularities cannot always be detected, let alone treated, without detailed, quantitative data to work from. The bio-medical parameters now in use by managers of poultry, and even by waterfowl and upland game managers, come from information on thousands of birds. The sample sizes from which "normal" raptor parameters can be established will indeed be hard to obtain from these species, since they exist in relatively low numbers at the top of the ecological food chain. The task, if attempted only by sampling from nestlings and locally trapped birds, might never be satisfactorily accomplished. However, utilization of certain techniques, at points of hawk migration concentrations, should most efficiently give us these bio-medical data on free-living populations.

As an example, we would like to present some results obtained from two years of sampling, at Hawk Ridge in Duluth, Minnesota, in relation to a study of aspergillosis. Aspergillosis has long been known to zoo keepers and poultry men as a disease responsible for mortality among birds. All birds apparently are susceptible to this fungal disease of the respiratory tract. Dr. J. E. Cooper (a British veterinarian devoting much time to birds of prey) and falconers and others have found it to be the greatest cause of mortality in captive raptors (Cooper 1973), especially the gyrfalcon (Falco rusticolus) and the Goshawk (Accipiter gentilis) (Peeters and Jameson 1970). For a long time it was considered to be a disease of captive birds only; however, scattered reports from post-mortem examinations of free-living birds suggested it might be present in wild populations (O'Meara and Witter
1971). This was not unreasonable because Aspergillus fumigatus, the fungal organism which causes the disease, is ubiquitous in nature, being found in the soil, litter, and food of many species (Rosen 1964).

To assess the incidence of aspergillosis in a free-living species, Goshawks were captured and sampled during the "invasions" of 1972 and 1973 at Duluth, Minnesota. The techniques for sampling included taking cultures from the pharynx and trachea and the withdrawal of 2-3 cc. of blood from the brachial vein. The pharyngeal and tracheal swabs were streaked on Sabarouds dextrose agar, incubated for 48 hours and examined for Aspergillus colonies. Serum was harvested from the blood samples and tested for the presence of antibodies to Aspergillus sp. by gel-precipitation hemagglutination. These techniques were performed by Dr. John Thurston of the National Animal Disease Laboratory. In addition, parallel studies were performed on Goshawks captured and held in captivity during these two years. Records were also kept on post-mortem examinations of Goshawks found dead or injured from a variety of causes. The complete results of these analyses are presented in another paper (Aspergillus sp. in free-living Goshawks, Redig, Fuller, Evans, to be published). The following statements briefly summarize these results. There was a significant difference in the recovery of Aspergillus spores from the tracheal swabs between the years 1972 and 1973. In 1972, 53% of the Goshawks we sampled carried Aspergillus sp. in their tracheas. In 1973, Aspergillus sp. organisms were recovered from only 3.6% of those sampled. There was a significant difference in mortality among captive birds in these two years. Additionally, there were three clinical cases of aspergillosis--birds actually ill--recorded from wild birds in 1972 and none in 1973. These techniques will be utilized in the future to continue monitoring the incidence of aspergillosis in free-living Goshawks, in hopes of shedding more light on its role in the population dynamics of this species.

In addition to this specific example, there are many standard analyses, used in the evaluation of the health of humans and other animals, including birds, which could be applied to raptors once normal values for raptors are established. Blood sampling could supply the material for several analyses, including packed cell volume, total plasma protein, complete blood count and differential count. Data from these parameters could then be used in comparing Goshawks in invasion years versus non-invasion years, or weakly migratory species versus definitely migratory species, or in assessing possible bio-medical problems in migratory populations showing low numbers or unusual age or sex ratios. Other tests from blood samples, such as blood chemistries and metabolic profiles, are difficult to perform reliably and to interpret, but research conducted from captive raptors may provide the basic data and experience necessary to make these tests feasible for use on large samples from migrating raptors. Dr. Ulysses Seal of the U.S. Veterans Administration Hospital is cooperating with us in blood analyses. Antigen testing from blood serum is another technique that may eventually prove very useful in diagnosing diseases such as tuberculosis, mycoplasma, and aspergillosis.

Chromosome karyotyping--i.e. the analysis of genetic or chromosomal material from white blood cell cultures of raptors--can be of taxonomic value and possibly provide information about the genetic composition of migrating populations. Dr. Robert Schoffner of the Animal Science Department of the University of Minnesota is currently karyotyping in an effort to develop a blood test that will help us determine sex in raptors. The availability of safe, short-acting anesthetics allows the use of laparotomy as another means of sexing (Bailey 1953) a large sample of raptors.
Measurements of these birds could later be correlated with their sex, thus providing more reliable standards for sexing by external measurements only.

An indication of the relative parasite load may be obtained by placing a catheter in the cloaca, injecting saline, and then analyzing the washings for parasite eggs by fecal flotation. These data may reveal the occurrence and incidence of parasites in migrating raptor populations.

Analyses of stomach and crop contents, through the use of emetics, could be obtained from statistically significant samples at hawk migration concentration points. If one had the logistic support for analyzing biopsies, important data could be obtained about the levels of pesticides and heavy metals being carried in the population (Hickey 1969).

Thus, it can be seen that, through sampling at hawk-banding stations, the opportunity exists for documenting many bio-medical parameters of raptors. The cooperative efforts of several institutions and many individuals have allowed the authors to gain some insight regarding the feasibility of collecting these data. Dr. Gary Duke of the College of Veterinary Medicine at the University of Minnesota has obtained funding for a research project dealing with such bio-medical parameters, so we look forward to continuing our research and gaining more knowledge about these parameters and the life histories of raptors.

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