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The Importance of Health Monitoring of Migrating Raptors

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INTRODUCTION

Migration is defined in the Concise Oxford Dictionary as to "move from one place to another, come and go with the seasons". In ornithological parlance it is either taken to mean only "movements of bird populations occurring at predictable times of each year, between breeding and one or more non-breeding areas" (Campbell & Lack 1985) or movement in a broader sense, including dispersal, emigration and irruption.

Whatever the definition of migration, there is no doubt that birds of prey which move from one area to another are subject to many threats. Chief amongst these are human persection (e.g. shooting) and poisoning. One aspect which has attracted little attention to date is disease.

Factors which may predispose migrating raptors to disease include: -

1) large numbers and high densities of birds - possibly facilitating the spread of pathogenic organisms
2) contact with infected prey
3) a variety of stressors associated with migration, e.g. fatigue, competition, extremes of temperature, use of body reserves.

There is a considerable body of data on the behavioural and physiological changes which take place in birds prior to migration. The main energy resource is fat (Blem 1980) but some non-raptorial species also show an increase in muscle mass. Kirkwood (1985) proposed methods for estimating the amount of food required by raptors to sustain flight of known duration while Smith, Goldstein and Bartholomew (1986) postulated that certain species, which exhibit long-distance, long-term soaring, might do so using only stored fat. The effects of food deprivation have been studied by a number of authors - for example, Shapiro and Weathers (1981).

Surprisingly little research has been carried out on the incidence/prevalence of infectious disease in migrating raptors. Redig, Fuller and Evans (1980) sampled Goshawks (*Accipiter gentilis atricapillus*) which had been trapped as they migrated south through Minnesota (USA). In the fall of 1972 they isolated fungi of the genus *Aspergillus* from 26 of 49 birds (53%) and confirmed aspergillosis in eight out of twelve (67%) trapped goshawks. They suggested that this apparent epizootic (epidemic) of aspergillosis was attributable to a reduction in immunocompetence in the birds following exposure to stressors associated with migration, such as reduced numbers of prey in the breeding areas and intraspecific competition.

Kirkpatrick and Trexler-Myren (1986) sampled migrating raptors for *Salmonella* spp. and suggested that birds of prey might maintain and disseminate species of bacteria that are infective for humans and domestic animals.

More data are needed on the role of diseases in migrating raptors and ornithologists could do much to help provide them. The following would prove particularly valuable: -

1) information on clinical condition, coupled when possible with the taking of laboratory specimens, from migrating birds which are trapped for ringing (banding) or radio-telemetry

2)*post-mortem* data on raptors which are found dead or have to be killed during or following migration. Even if there is an obvious cause of death, e.g. trauma or starvation, detailed pathological investigation may reveal underlying or concurrent lesions of infectious or parasitic disease
3)statistics on numbers and age/sex distribution of migrating raptors. This information, coupled with clinical and/or post-mortem data, could help throw light on mortality factors - for example, the susceptibility of first year birds to stressors, such as those described by Redig *et al.* (1980) in goshawks. However, as Titus and Fuller (1987) have emphasised, it is important that data are analysed properly and appropriate allowance made for observer error and bias.

Suggested protocols for clinical and post-mortem examination are given in Figures 1 and 2. The former is adapted from a screening programme originally proposed by Cooper and Greenwood (1981). It has primarily been used for monitoring captive populations but is increasingly proving applicable to free-living raptor populations, especially threatened species. Both protocols are described and discussed in more detail by Cooper (1987).

Figure 1. Clinical screening of migrating raptors.

Basic

Observation and examination

1) Presence or absence of:
   a. clinical signs of disease
   b. injuries or external lesions
   c. ectoparasites

2) a. bodyweight
   b. carpal length
   c. condition score

3) Gross appearance of:
   a. faeces
   b. pellets

Laboratory tests

1) Presence or absence of protozoan and metazoan parasites in faeces
2) Presence of absence of parasites or cellular abnormalities in blood smears

Additional investigations, if personnel and facilities permit

1) Bacteriological examination of swabs from:
   a. trachea
   b. cloaca

2) Examination of blood (in anticoagulant) with particular reference to:
   a. PCV (haematocrit)
   b. total protein

3) Examination of serum for antibodies (serology)

Figure 2. ***Post-mortem*** **investigation of migrating raptors.**

Basic

1) Gross examination:
   a. bodyweight
   b. carpal length
   c. condition score
   d. appearance of internal organs
   e. presence or absence of fat
   f. presence or absence of ectoparasites on plumage
   g. presence or absence of endoparasites in alimentary or respiratory tract

2) Toxicology - submission or retention (frozen) of carcase or tissues for analysis (e.g. for chlorinated hydrocarbon pesticides, heavy metals).

Additional investigations, if personnel and facilities permit

1) Bacteriology:
   a. heart blood
   b. intestinal contents
   c. any significant lesions

2) Histopathology:
   a. lung
   b. liver
   c. kidney
   d. any significant lesions

3) Other tests - submission or retention (frozen/fixed) of tissues for virology, mycoplasmology, electronmicroscopy etc.

Some of the investigative techniques may be carried out by field workers or amateur ornithologists: others will require the advice and help of a veterinarian, avian pathologist or wildlife biologist. Prolonged restraint and manipulation can prove stressful to raptors (Busch, de Graw & Clampitt 1978); sampling must, therefore, be carried out rapidly and proficiently. The selection and taking of diagnostic samples from *post-mortem* specimens are described by Cooper (1983, 1987).

CONCLUSIONS

More information is required on the role of infectious and parasitic diseases in migrating raptors. Those working with these birds can assist by contributing clinical, *post-mortem* and statistical data. A close liaison needs to be developed between ornithologists, wildlife biologists, veterinarians and avian pathologists.

The collation of data will serve not only to provide useful information on the part played by pathogens in migrating raptors and the possible role of such birds in disseminating micro-organisms. It may also contribute substantially to our understanding of the normal biology of a number of avian species.

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