Observing bird behavior

Birds are the most diverse and arguably the most ecologically successful of the terrestrial vertebrates. Nearly 10,000 species have been described. Bird anatomy is more homogeneous than that of other vertebrate groups, because of the overriding structural and physiological constraints of flight. In spite of this homogeneity, birds inhabit a wide range of habitats and ecological niches, from flightless marine species to ground-dwelling, running species (both large and small), to large soaring predators and carrion feeders, to small, delicate, agile insectivores and nectivores. Birds have played an important role in the development of ideas about evolution, biogeography, and behavior, from Darwin's seminal observations on the finches of the Galapagos Islands and Mayr's studies of the birds of New Guinea, to the studies of Tinbergen and Lorenz (among many other classical ethologists), through the present when we are constantly learning new things about the ecology and behavior of these seemingly well known animals.

The scientific importance of birds stems in part from their inherent attractiveness and appeal to both professional biologists and to amateur birders. Birds are often common and conspicuous components of the fauna, and are often colorful, noisy, and active. They have complex behavior patterns, and in some ways are similar in these to humans. Kittiwake colonies (these birds nest on cliffs) resemble crowded high-rise apartments. Many city-dwellers can relate to the crowded and noisy conditions of a breeding colony of gulls or waterfowl. Many bird species are monogamous, a trait some humans emulate but one that is all too rare in many cultures. Most species care for their offspring in a diligent and almost "doting" way. Birds are often state and national symbols, because we anthropomorphically attach to them characteristics (e.g. strength, independence) we like to think represent our political ideals.

Another reason for the scientific importance of birds lies in their complicated and variable behavior patterns. For instance, courtship and mating involve a complex series of displays and vocalizations, and the result of courtship is frequently the formation of a pair-bond. This pair-bond has been thought of as stable and long-lasting, but we are learning that in many species both males and females routinely practice "infidelity". In many species, both parents cooperate to protect and provision the offspring, although we are now learning that "parents" may discriminate against young that do not share their genes. In some species offspring from previous years assist their parents in rearing younger siblings, seemingly models of altruistic cooperation. Birds feed on a wide variety of animal and plant material, and all have specialized ways of obtaining food. Most species migrate to some extent, even if it is only from areas of little food to richer foraging places. Some migrations are amazing feats of stamina and navigation. Many species live in flocks, although some are typically solitary. This variation and complexity of behavior and ecology provides much fodder for field biologists. Studies of bird biology have resulted in many general evolutionary, ecological, and behavioral principles.

Early studies of bird behavior concentrated on descriptions of "fixed action patterns", behavior patterns that are innate (are performed properly without prior experience or learning) and stereotyped (always performed the same way, and always carried to completion once elicited). Many visual displays (postures, movements) of birds fit into this category of behavior. Learning in birds was investigated by early comparative psychologists, who were interested in the abilities of birds to learn through "operant conditioning", the offering of reward or punishment for correct or incorrect behavior, respectively. Such studies were carried out in laboratory settings, for instance the infamous "Skinner Box". These studies of learning were extended to the natural setting with Lorenz's studies of imprinting, and with later studies of learning of song in many species of birds. Recent studies have shown that many bird species are capable of long-term spatial memory, for instance species that cache food for use during the winter, most notably jays and their relatives.

The methods by which birds obtain food are as diverse as the types of food they prefer. Many species use visual cues to locate fruits, seeds, and insects. Bird species that forage for flying insects on the wing, such as swallows and flycatchers, are agile and swift flyers. Many other insectivores are gleaners, searching for insects in vegetation or on the trunks of trees. Most "shorebirds" forage by probing into mud for various soft-bodied invertebrates. We will observe a number of different strategies

used by fish-eating birds. Some hover above a body of water and dive in, others wade and jab, and still others swim at or under the surface of the water. Some species specialize in stealing the prey of other species. Many falcons, hawks, and owls specialize in capturing avian or mammalian prey, and thus have excellent eyesight and are powerful and silent flyers.

Lots of bird species live in flocks, at least part of the time. Many species flock during the winter, but are territorial during the breeding season. Bird flocks are often competitive rather than cooperative assemblages. The benefits of flocking include increased vigilance for predators and greater foraging efficiency. Costs include increased transmission of parasites and increased competition for resources. The balance between costs and benefits determines whether and when a particular bird species will flock; this balance presumably changes over both ecological and evolutionary time.

Migration is a well-known component of bird behavior, but the evolutionary advantage of migration is poorly understood. A number of hypotheses have been proposed, but none is well-supported for all bird species. The feats of migration of some bird species are legendary. The Arctic tern, a small shorebird, breeds in northern Canada and winters in Antarctica. It makes an annual trek of about 25,000 km. Canada Geese may fly from Canada to Mexico (2700 km) in one flight of 60 hours or so, averaging 45 kph, at altitudes routinely of about 3,000 m (10,000 ft). Many familiar species of small North American songbirds (warblers, flycatchers, etc.) migrate from eastern North America across the western Atlantic Ocean to northern South America in one flight. The risk of mortality during migration is great; the evolution of migration in the face of this risk is one of the aspects of this behavior that still requires explanation.

Reproductive behavior, including courtship, nesting, breeding, and parental care, is one of the most complex and best studied aspects of bird behavior, but we are still uncovering surprises. A 1977 comparative study of avian breeding systems recognized several categories, including monogamy, polygyny, and polyandry, but with several variations on each theme. Recent evidence from DNA “fingerprinting” suggests that monogamous birds are a philandering lot, and that many offspring are cared for by individuals that are not their biological parents. Cuckoldry (males caring for young that do not bear their genes), extra-pair copulation by both males and females, and brood parasitism (females laying eggs in the nests of conspecifics) are rampant in some species, and many species have not been studied for these phenomena. Birds are not the model citizens of the animal world we once thought. With respect to parental care, many birds are "devoted" and "caring" parents (to be terribly anthropomorphic), but in some cases they condone and even facilitate siblicide, although for apparently adaptive reasons. Some species (e.g. cuckoos) lay their eggs in the nests of other species, and the heterospecific offspring dispatch their foster siblings from the nest, usurping their rightful position and appropriating the parental care of the foster parents. Such behavior is evolutionarily successful although morally repugnant (again being anthropomorphic).

The purposes of this lab exercise are i) to familiarize you with general aspects of the behavior of birds, ii) to familiarize you with specific behavior patterns of particular species, and iii) to further acquaint you with techniques of observation and data collection in which we observe from a distance. My aim is to show you several species that have similar ways of living and thus similar behaviors, but also to point out differences and to relate these differences in behavior to differences in ecology. We will practice focal animal sampling and will collect a specified set of data about each individual that we observe. We will practice observing and estimating elements of the microhabitat such as water depth, distance from shoreline or other microhabitat features, nature of aquatic and terrestrial vegetation, and characterizing behavioral phenomena such as number of individuals in a flock, proximity of an individual to a conspecific, and proximity of an individual to a heterospecific. Later in the semester we will collect quantitative data on specific foraging behaviors, such as number of steps taken per unit time while foraging, number of prey capture attempts per unit time, capture success rate, time spent in a particular foraging patch, etc.