

The Encyclopedia of Life (EOL) **(An excerpt from a book)**

Defining Birds

Birds form a class of animals that includes over 10,000 species worldwide (Clements 2007). These species were traditionally divided into 30 orders (Peters et al. 1931–1987) but more recent lists (in part based on molecular studies) group birds into 23 to 40 orders (Clement 2007, Gill and Donsker 2012). Passeriformes, commonly called perching birds or songbirds, are the most diverse order.

Birds range in size from the Small Bee Hummingbird (*Mellisuga helenae*) to the large flightless Ostrich (*Struthio camelus*). Compared to mammals, which range in size from shrews to the blue whale, birds that fly have a restricted size range. This restriction is imposed by the mechanical constraints of flight: the larger the bird the more muscular energy needed to stay airborne. Flightless birds have no such limit. Some extinct flightless birds, such as *Diatrymia gigantea*, were 7 feet tall, and the giant carnivorous ground birds of South America, the phororhacids, were also large.

Habitat, Physiological Characteristics, and Behavior

Birds live in a wide range of environments, from tropical rainforests to the polar regions, though no one species is as widespread as *Homo sapiens*. The Barn Owl (*Tyto alba*) is one of the more widespread species, found on every continent except Australia and Antarctica. In the tropics, there are a large number of species that have a restricted range.

Birds are oviparous—they reproduce by laying eggs rather than giving birth to live young. These eggs are adapted to survive in a terrestrial environment, and have a porous shell made of calcium carbonate. Birds are also homeothermic (warm-blooded)—a trait they share with mammals—but that evolved independently. They all have bills (beaks) and are toothless, and swallow food without chewing. They have two-part stomachs: a glandular stomach and a gizzard. Many species swallow rocks or shells that collect in the gizzard and pulverize food. Bird forelimbs have evolved into wings for flight. Their bones are hollow, decreasing their body weight. All birds also have feathers, something that makes them unique among living animals.

Feathers

Feathers are made of keratin, just like human fingernails and hair. They may have evolved for thermoregulation and/or to trap prey, but later were adapted for flight. Wings made of feathers are adjustable, and their lack of blood supply means that birds don't lose a lot of heat through their wings. The rigidity of feathers gives wings the necessary stiffness to fly. A damaged feather is also easy to repair as it is renewed in the next molt. Different types of feathers serve different purposes. Rigid, long, contoured feathers help birds fly. Fluffy down feathers keep them warm. Colorful plumes attract mates. Feathers provide a windproof and waterproof covering.

