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Entomology, Ornithology & Herpetology: Current Research

Perspective

Basic Anatomy and Physiology of Birds

Yuuka Murakami*

Department of Biology, Utkal University, Odisha, India

DESCRIPTION

Birds belong to a group of warm-blooded vertebrates. Birds come under the class Aves, categorised by feathers, impotent beaked jaws, hard-shelled eggs, a high metabolic rate, a four-chambered heart, and the type of skeleton. Many birds can run, hurdle, swim, and dump. Some birds, like penguins, have retained their wings but have lost the ability to fly. Birds originated worldwide and in all environments. The largest bird in the world is the nine-foot-tall ostrich. The smallest bird in the world is the two-inch-long bee hummingbird.

Anatomy and physiology

The anatomy of a bird reflects its ability to fly. For example, the wings are formed to create lift. The primary edge is thicker than the back edge, and they are enclosed in feathers that are slight to a point. Airplane wings are moulded after bird wings. The bones and muscles of the wing are also extremely specific. The main bone of the bird is the humerus, which is similar to the superior arm of a mammal but is hollow rather than solid. It also attached to the bird's air sac system, which, in turn, was associated with its lungs. The controlling flight muscles of the shoulder attach to the keel of the bird. The tail feathers are used for routing. Bird physiology is distinctive and closely related to the active difficulties of flying. Birds have higher body temperatures and higher metabolisms than other organisms. Their respiratory systems are highly modified to allow effective oxygen into their bodies during flight. A heart pumps oxygen into the circulation system to deliver important compounds around the body. Birds are heated by the heat generated by their metabolisms. Their high body temperature gives birds faster reflexes and muscle contractions, which are important attributes for flying. Many birds have specific digestive systems based on their particular diets and the toxins they are essential to digest. The respiratory systems of birds are completely different from those of mammals, mostly. A bird's respiratory system consists of the nostrils, windpipe, bronchi, two small lungs, and a network of interrelated air sacs. The process of air circulation through a bird's body has two breathing cycles in one direction. This process can be divided into four steps. The majority of birds inhale air through their nostrils that travels over the windpipe. The windpipe is divided into two primary bronchi, which are further divided into multiple minor stems. In the first step of the respiration cycle, birds inhale air through nostrils, which passes over the windpipe, primary bronchi, and finishes up in the posterior air sacs. In the second step, the bird exhales and inhales air from the previous breath that passes from the posterior air sac into the lungs. During this step, the oxygen in the air is exchanged with CO_2 in the blood. In the third step, the bird inhales again, and the air inside the lungs travels into the anterior air sacs located near the front of the body while the freshly inhaled air is passed to the posterior air sacs. In the final step, the bird exhales for the second time, and the air is transported from the anterior air sacs out via the windpipe. The circulatory system of birds must be very significant as it helps in regulating the respiratory system and the bird's metabolism. The blood is responsible for carrying significant compounds such as fats, glucose, and other metabolic wastes throughout the body. In order to maintain the transport of such compounds, large volumes of blood are pumped around the bodies of birds. The blood plays a main role in transporting oxygen and CO_2 around the body and regulating the respiratory system. Birds usually have larger hearts than mammals, which have smaller sizes. They also have higher metabolic heart rates when compared with mammals, at 160-360 beats per minute. In small birds, heart rates can reach 1200 beats per minute. Most of the blood is passed to main organs such as the liver, kidneys, lungs, and intestines. The metabolism is defined as a set of chemical reactions that keep a bird alive and plays an important part of a bird's physiology. Birds have a high metabolic rate when compared to other animals and organisms. The excretory system exists in all birds in order to aid the removal of nitrogen-rich minerals as well as other waste products. Exchanging nitrogen is useful to birds and reptiles because their bodies are able to excrete these waste substances with minimal loss of water. In the case of cold-blooded animals, as well as many birds, they must be preserved as much as possible.

Correspondence to: Yuuka Murakami, Department of Biology, Utkal University, Odisha, India, E-mail: y.mura@gmail.com

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