

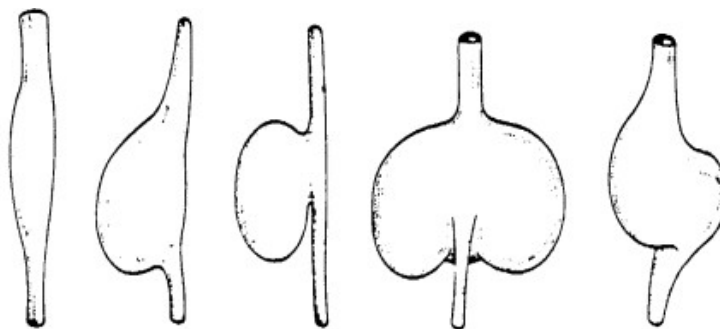
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## Digestion

Birds depend heavily on their digestive systems to remain nourished and healthy. Many birds can starve in hours if deprived of food, therefore, their digestive system is faster and more efficient than those of other vertebrate groups. Digestion in birds involves a lot of organs, each performing a specific function. It begins with entry of food via the beak and ends with waste exiting at the vent. Food is broken down and absorbed for use along the way.

The discussion of avian digestion begins with the mouth. **Bird beaks or bills** replace the lips and teeth of mammals and vary in shape, size, length and function according to the type of diet consumed. Seed-crackers such as finches have a short conical beak, while birds of prey such as hawks have a powerful hooked beak for tearing flesh ([see link on Bird Beaks](#)). The tongue of birds, just as the beak, is adapted to the type of food the bird consumes. Woodpeckers have a long narrow tongue which functions as a spear, allowing them to extract insects from holes they drill in dead wood. Birds of prey and finches have short, thick, fleshy tongues which allow them to manipulate their food. Fowl and pelicans have tongues which allow the food to be easily shoved to the back of the mouth for swallowing. A bird's mouth is relatively unimportant in eating and digesting food in comparison with, for example, the mammalian mouth. However, most birds do have salivary glands and the beak and tongue do help birds manipulate food for swallowing.

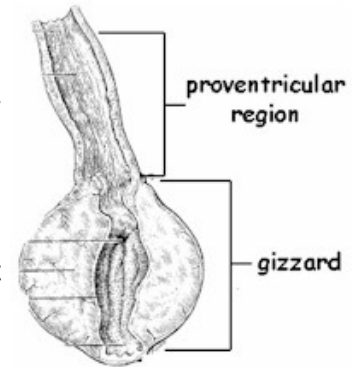
After leaving the mouth, food passes through the **esophagus** on its way to the stomach (in birds called the **proventriculus**). Many species of birds have an enlarged area of the esophagus known as a **crop**. The **crop** is well developed in most species and serves as a temporary storage location for food.



Crop shapes from various species of birds

The **crop** also allows food to be softened before it enters the stomach. Pigeons and doves produce "crop milk" that they feed to their young for the first two weeks after hatching. Other species, such as ospreys, will regurgitate food that has been stored and softened in their crops and feed it to their young.

Birds have a two part stomach, a glandular portion known as the **proventriculus** and a muscular portion known as the **gizzard**. Hydrochloric acid, mucus and a digestive enzyme, pepsin, are secreted by specialized cells in the proventriculus and starts the process of breaking down the structure of the food material. The food then passes to the second part of the stomach, the gizzard. The gizzard performs the same function as mammalian teeth, grinding and disassembling the food, making it easier for the digestive enzymes to break down the food. In most birds the gizzard contains sand grains or small rocks to aid the grinding process.



The **small intestine** is where food is digested and absorbed. The small intestine varies in length and structure depending on the diet of the species. Carnivorous birds tend to have shorter, less complex small intestines. Herbivorous birds have longer, more developed small intestines. Enzymes, produced in the pancreas, break down proteins and fats in the small intestine. Nutrients are then absorbed through the intestinal membranes and into the bloodstream. The avian **large intestine** is reduced to a short, featureless connection between the small intestine and the cloaca. The **cloaca** is the final holding area for the waste products of digestion until they are voided through the vent

To see a full a diagram of the digestive system [click here](#).

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## References

1. "Manual of Ornithology: Avian Structure and Function" by Noble S. Proctor
2. "Ornithology" by Frank Gill

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