

Modular Design in a Bird

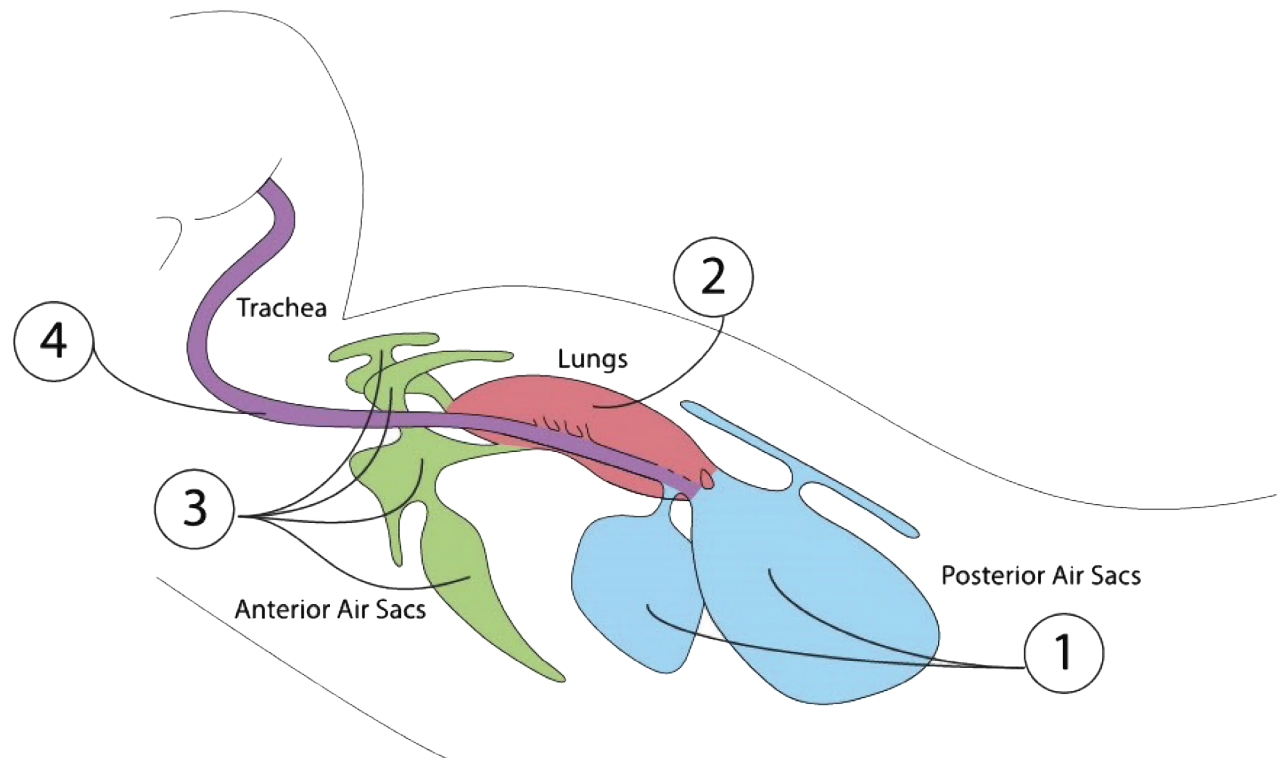
Birds share the vertebrate pattern of limb bones, in combination with unique features, such as the beak, feathers, and respiratory system.

The respiratory system is unique, with fresh air delivered to the lungs both while inhaling and while exhaling.

Birds have many design features for flight, such as rapid digestion, lack of a bladder, contoured body shape, lightweight skeleton and flight surfaces, keeled sternum, strong flight muscles, etc.

The Avian Respiratory Cycle

1. In the 1st inspiration, outside air travels in to the posterior air sacs.
2. In the 1st expiration, air moves forward from the posterior air sacs into the lungs.
3. In the 2nd inspiration, the air moves from the lungs to the anterior air sacs.
4. In the 2nd expiration, air moves from the anterior air sacs out through the trachea.



Unique respiratory system of birds

Image: Danny Schimpf, GRI