Para1

**Skeletal system**

*Main article:*[*Bird\_anatomy § Skeletal\_system*](https://en.wikipedia.org/wiki/Bird_anatomy#Skeletal_system)

The skeleton consists of very lightweight bones. They have large air-filled cavities (called pneumatic cavities) which connect with the [respiratory system](https://en.wikipedia.org/wiki/Respiratory_system).[[89]](https://en.wikipedia.org/wiki/Bird#cite_note-89) The skull bones in adults are fused and do not show [cranial sutures](https://en.wikipedia.org/wiki/Cranial_sutures).[[90]](https://en.wikipedia.org/wiki/Bird#cite_note-Gill-90) The [orbital cavities](https://en.wikipedia.org/wiki/Orbit_(anatomy)) that house the eyeballs are large and separated from each other by a bony [septum](https://en.wikipedia.org/wiki/Septum) (partition). The [spine](https://en.wikipedia.org/wiki/Vertebral_column) has cervical, thoracic, lumbar and caudal regions with the number of cervical (neck) vertebrae highly variable and especially flexible, but movement is reduced in the anterior [thoracic vertebrae](https://en.wikipedia.org/wiki/Thoracic_vertebrae) and absent in the later vertebrae.[[91]](https://en.wikipedia.org/wiki/Bird#cite_note-91) The last few are fused with the [pelvis](https://en.wikipedia.org/wiki/Pelvis) to form the [synsacrum](https://en.wikipedia.org/wiki/Synsacrum).[[90]](https://en.wikipedia.org/wiki/Bird#cite_note-Gill-90) The ribs are flattened and the [sternum](https://en.wikipedia.org/wiki/Sternum) is keeled for the attachment of flight muscles except in the flightless bird orders. The forelimbs are modified into wings.[[92]](https://en.wikipedia.org/wiki/Bird#cite_note-92) The wings are more or less developed depending on the species; the only known groups that lost their wings are the [extinct](https://en.wikipedia.org/wiki/Extinct) [moa](https://en.wikipedia.org/wiki/Moa) and [elephant birds](https://en.wikipedia.org/wiki/Elephant_bird)

Para2

### Excretory system

Like the [reptiles](https://en.wikipedia.org/wiki/Reptile), birds are primarily uricotelic, that is, their [kidneys](https://en.wikipedia.org/wiki/Kidney) extract [nitrogenous waste](https://en.wikipedia.org/wiki/Nitrogenous_waste) from their bloodstream and excrete it as [uric acid](https://en.wikipedia.org/wiki/Uric_acid), instead of [urea](https://en.wikipedia.org/wiki/Urea) or [ammonia](https://en.wikipedia.org/wiki/Ammonia), through the ureters into the intestine. Birds do not have a [urinary bladder](https://en.wikipedia.org/wiki/Urinary_bladder) or external urethral opening and (with exception of the [ostrich](https://en.wikipedia.org/wiki/Ostrich#Description)) uric acid is excreted along with faeces as a semisolid waste.[[94]](https://en.wikipedia.org/wiki/Bird#cite_note-94)[[95]](https://en.wikipedia.org/wiki/Bird#cite_note-95)[[96]](https://en.wikipedia.org/wiki/Bird#cite_note-coprodeum-96) However, birds such as hummingbirds can be facultatively ammonotelic, excreting most of the nitrogenous wastes as ammonia.[[97]](https://en.wikipedia.org/wiki/Bird#cite_note-97) They also excrete [creatine](https://en.wikipedia.org/wiki/Creatine), rather than [creatinine](https://en.wikipedia.org/wiki/Creatinine) like mammals.[[90]](https://en.wikipedia.org/wiki/Bird#cite_note-Gill-90) This material, as well as the output of the intestines, emerges from the bird's [cloaca](https://en.wikipedia.org/wiki/Cloaca#Birds).[[98]](https://en.wikipedia.org/wiki/Bird#cite_note-98)[[99]](https://en.wikipedia.org/wiki/Bird#cite_note-99) The cloaca is a multi-purpose opening: waste is expelled through it, most birds mate by [joining cloaca](https://en.wikipedia.org/wiki/Bird_anatomy#Reproduction), and females lay eggs from it. In addition, many species of birds regurgitate [pellets](https://en.wikipedia.org/wiki/Pellet_(ornithology)).[[100]](https://en.wikipedia.org/wiki/Bird#cite_note-100)

It is a common but not universal feature of [altricial](https://en.wikipedia.org/wiki/Altriciality) [passerine](https://en.wikipedia.org/wiki/Passerine) nestlings (born helpless, under constant parental care) that instead of excreting directly into the nest, they produce a [fecal sac](https://en.wikipedia.org/wiki/Fecal_sac). This is a mucus-covered pouch that allows parents to either dispose of the waste outside the nest or to recycle the waste through their own digestive system