Bird anatomy[ ]

Main article: Bird anatomy


Part of a wing. Albrecht Dürer, c. 1500–1512

Birds are tetrapods but though their hind limbs are used for walking or hopping, their front limbs are wings covered with feathers and adapted for flight. Birds are endothermic, have a high metabolic rate, a light skeletal system and powerful muscles. The long bones are thin, hollow and very light. Air sac extensions from the lungs occupy the centre of some bones. The sternum is wide and usually has a keel and the caudal vertebrae are fused. There are no teeth and the narrow jaws are adapted into a horn-covered beak. The eyes are relatively large, particularly in nocturnal species such as owls. They face forwards in predators and sideways in ducks.[]

The feathers are outgrowths of the epidermis and are found in localized bands from where they fan out over the skin. Large flight feathers are found on the wings and tail, contour feathers cover the bird's surface and fine down occurs on young birds and under the contour feathers of water birds. The only cutaneous gland is the single uropygial gland near the base of the tail. This produces an oily secretion that waterproofs the feathers when the bird preens. There are scales on the legs, feet and claws on the tips of the toes.[]

Mammal anatomy[ ]

Main article: Mammal anatomy

Mammals are a diverse class of animals, mostly terrestrial but some are aquatic and others have evolved flapping or gliding flight. They mostly have four limbs, but some aquatic mammals have no limbs or limbs modified into fins, and the forelimbs of bats are modified into wings. The legs of most mammals are situated below the trunk, which is held well clear of the ground. The bones of mammals are well ossified and their teeth, which are usually differentiated, are coated in a layer of prismatic enamel. The teeth are shed once (milk teeth) during the animal's lifetime or not at all, as is the case in cetaceans. Mammals have three bones in the middle ear and a cochlea in the inner ear. They are clothed in hair and their skin contains glands which secrete sweat. Some of these glands are specialized as mammary glands, producing milk to feed the young. Mammals breathe with lungs and have a muscular diaphragm separating the thorax from the abdomen which helps them draw air into the lungs. The mammalian heart has four chambers, and oxygenated and deoxygenated blood are kept entirely separate. Nitrogenous waste is excreted primarily as urea.[]

Mammals are amniotes, and most are viviparous, giving birth to live young. Exceptions to this are the egg-laying monotremes, the platypus and the echidnas of Australia. Most other mammals have a placenta through which the developing foetus obtains nourishment, but in marsupials, the foetal stage is very short and the immature young is born and finds its way to its mother's pouch where it latches on to a nipple and completes its development.[]

Human anatomy[ ]
Further information: Human body § Anatomy, and Outline of human anatomy

Modern anatomic technique showing sagittal sections of the head as seen by an MRI scan  In the human, the development of skilled hand movements and increased brain size is likely to have evolved simultaneously.[42]

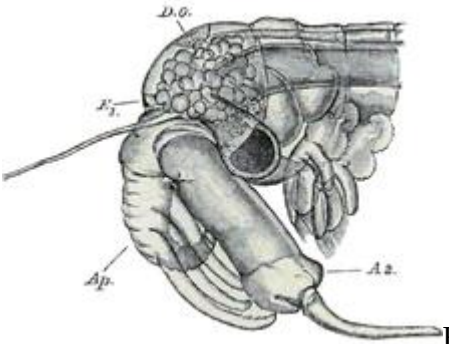
Humans have the overall body plan of a mammal. Humans have a head, neck, trunk (which includes the thorax and abdomen), two arms and hands, and two legs and feet.

Generally, students of certain biological sciences, paramedics, prosthetists and orthotists, physiotherapists, occupational therapists, nurses, podiatrists, and medical students learn gross anatomy and microscopic anatomy from anatomical models, skeletons, textbooks, diagrams, photographs, lectures and tutorials and in addition, medical students generally also learn gross anatomy through practical experience of dissection and inspection of cadavers. The study of microscopic anatomy (or histology) can be aided by practical experience examining histological preparations (or slides) under a microscope.[]

Human anatomy, physiology and biochemistry are complementary basic medical sciences, which are generally taught to medical students in their first year at medical school. Human anatomy can be taught regionally or systemically; that is, respectively, studying anatomy by bodily regions such as the head and chest, or studying by specific systems, such as the nervous or respiratory systems.[] The major anatomy textbook, Gray's Anatomy, has been reorganized from a systems format to a regional format, in line with modern teaching methods. A thorough working knowledge of anatomy is required by physicians, especially surgeons and doctors working in some diagnostic specialties, such as histopathology and radiology. []

Academic anatomists are usually employed by universities, medical schools or teaching hospitals. They are often involved in teaching anatomy, and research into certain systems, organs, tissues or cells.[]

Invertebrate anatomy[edit]



Head of a male *Daphnia*, a planktonic crustacean

Invertebrates constitute a vast array of living organisms ranging from the simplest unicellular eukaryotes such as *Paramecium* to such complex multicellular animals as the octopus, lobster and dragonfly. They constitute about 95% of the animal species. By definition, none of these creatures has a backbone. The cells of single-cell protozoans have the same basic structure as those of multicellular animals but some parts are specialized into the equivalent of tissues and organs. Locomotion is often provided by cilia or flagella or may proceed via the advance of pseudopodia, food may be gathered by phagocytosis, energy needs may be supplied by photosynthesis and the cell may be supported by an endoskeleton or an exoskeleton. Some protozoans can form multicellular colonies.[]

Metazoans are a multicellular organism, with different groups of cells serving different functions. The most basic types of metazoan tissues are epithelium and connective tissue, both of which are present in nearly all invertebrates. The outer surface of the epidermis is normally formed of epithelial cells and secretes an extracellular matrix which provides support to the organism. An endoskeleton derived from the mesoderm is present in echinoderms, sponges and some cephalopods. Exoskeletons are derived from the epidermis and is composed of chitin in arthropods (insects, spiders, ticks, shrimps, crabs, lobsters). Calcium carbonate constitutes the shells of molluscs, brachiopods and some tube-building polychaete worms and silica forms the exoskeleton of the microscopic diatoms and radiolaria.[48] Other invertebrates may have no rigid structures but the epidermis may secrete a variety of surface coatings such as the pinacoderm of sponges, the gelatinous cuticle of cnidarians (polyps, sea anemones, jellyfish) and the collagenous cuticle of annelids. The outer epithelial layer may include cells of several types including sensory cells, gland cells and stinging cells. There may also be protrusions such as microvilli, cilia, bristles, spines and tubercles.[]

Marcello Malpighi, the father of microscopical anatomy, discovered that plants had tubules similar to those he saw in insects like the silk worm. He observed that when a ring-like portion of bark was removed on a trunk a swelling occurred in the tissues above the ring, and he unmistakably interpreted this as growth stimulated by food coming down from the leaves, and being captured above the ring.[]