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CELL STRUCTURE

Much has been learned about the visible structure of the cell since the days of Schleiden and Schwann. At the same time, the cell physiologist, the biochemist, the geneticist and many others have helped the cytologist to understand how, the various components of the cell function and how they are related to each other and to the total cell.

As stated earlier a cell is a mass of protoplasm enclosed within a limiting membrane, whose activities are controlled and directed by a nucleus.

The two basic and essential components of the cell are: the nucleus and the cytoplasm, including its organelles. The nucleus, although it is not distinct in some forms (bacteria, and blue-green algae), is suspended in the cytoplasm and usually located near the center of the cell. The mass of protoplasm that constitutes a cell is enclosed within a plasma membrane, and in plants within an additional cell wall.

BLOOD CELLS, PLASMA, AND SERUM

Blood is composed of a fluid part termed plasma and corpuscles or cells which float in the plasma. Three classes of blood cells are recognized: erythrocytes or red cells, leukocytes or white cells, and thrombocytes or platelets. The red color of blood is due to the erythrocytes and not to the plasma, for the latter is yellow to colourless, depending on the quantity examined and the species. In any animal, plasma is colourless when examined in thin layers. In some species it is colourless or only slightly yellow even when seen in large quantities; this applies to the cat, dog, sheep, and goat. In the cow and especially in the horse the plasma has a higher colour.

The yellow colour of plasma is due chiefly to bilirubin, although carotene and other pigments are contributing factors.

The icterus index is a measure of the yellow colour in blood plasma. The index is determined by comparing the colour of plasma with that of standard solutions of potassium dichromate. Since the yellow colour of plasma is due chiefly to bilirubin, the icterus index is generally a measure of the concentration of this pigment in plasma. However, in horses and cattle, in which species the colour of the plasma is influenced by other pigments, the test may be of limited value.

Coagulation is a characteristic process that occurs in shed blood. Following coagulation, the blood clot usually shrinks, thereby squeezing out a clear, watery liquid termed serum. This substance may be defined as the fluid part of blood after clotting has occurred, whereas plasma is the fluid part before clotting has occurred.

ORGAN SYSTEMS

As the various tissues in the plant and animal **body** differentiate, they become associated with each other to form organs that carry out particular functions. Organs which are related by function are grouped **into organ systems**. It is the

coordinated functioning of all organ **systems** that enables an individual organism to maintain itself in **its** environment and to reproduce.

Although organs and organ systems exist in all multicellular forms, this level of differentiation is probably better illustrated in animals than in plants.

The association of organs with each other to carry out particular functions results in organ **systems**. Ten such systems are commonly recognized in animals.

The digestive system is composed of such organs as the esophagus, stomach, small intestine, **large intestine**, pancreas, and liver. All of these organs function **together**, primarily through the action of digestive **enzymes**, which break down food particles into molecules that are small enough to be absorbed into the blood stream.

The circulatory system is **composed** of the heart, the blood vessels, blood, the lymphatic vessels, and lymph. This system transports materials from one part of the body to another. The circulatory system also transports hormones and has a role in the regulation of body temperature and in protecting the body against disease.

MAMMALS

When man, the dominant species on earth, looks around him, he must realize at once that he shares his home, our planet, with a vast number of other living things.

Man himself is a mammal and also are many of the animals with whom he is most closely associated: the dogs and cats which often share his life; the cows and sheep and pigs upon which he feeds; the oxen, donkeys and horses which, until very recently, pulled his ploughs, carried his burdens and gave him his most effective means of transport; and the rats and mice which, even in an age when hygiene has become a fetish, still manage to appear as unwelcome guests in his home.

Quite apart from such familiar creatures, a richly varied cast of wild mammals is still spread in astonishing diversity over the face of the earth.

In the first place, all mammals belong to the important division of the animal kingdom as the Vertebrata, or "backboned animals". But reptiles, birds, amphibians and fishes are vertebrates too. All animals have lungs and breathe atmospheric air. But so do birds and reptiles, as well as most adult amphibians. Practically every mammal gives birth to living young, but many reptiles and fish also do this. Mammals are warm-blooded, but we can say the same of birds. How then do mammals differ from their Vertebrate cousins? What **are** the typical mammalian qualities that they share among themselves?

A most important distinction between mammals and other vertebrates is that all mammals—and only mammals—produce milk with **which** they feed their young.

THE CHICKEN

The chicken (*Gallus gallus domesticus*) is a domesticated fowl, a subspecies of the Red Junglefowl. As one of the most common and widespread domestic animals with a population of more than 24 billion in 2003,^[1] there are more chickens in

the world than any other species of [bird](#). Humans keep chickens primarily as a source of food, consuming both their [meat](#) and their [eggs](#).

The traditional poultry farming view of the domestication of the chicken is stated in Encyclopædia Britannica (2007): "Humans first domesticated chickens of [Indian](#) origin for the purpose of cockfighting in Asia, Africa, and Europe. Very little formal attention was given to egg or meat production... "[2] Recent genetic studies have pointed to multiple maternal origins in Southeast, East, and South Asia, but with the [clade](#) found in the Americas, Europe, the Middle East and Africa originating in the [Indian subcontinent](#). From India the domesticated fowl made its way to the [Persianized](#) kingdom of [Lydia](#) in western Asia Minor, and domestic fowl were imported to Greece by the fifth century BC.[3] Fowl had been known in Egypt since the [18th Dynasty](#), with the "bird that gives birth every day" having come to Egypt from the land between [Syria](#) and [Shinar](#), [Babylonia](#), according to the annals of [Tutmose](#)

A PIG

A pig is any of the animals in the [genus](#) *Sus*, within the [Suidae family](#) of [even-toed ungulates](#). Pigs include the [domestic pig](#) and its ancestor, the common Eurasian [wild boar](#) (*Sus scrofa*), along with other species; related creatures outside the genus include the [babirusa](#) and the [warthog](#). Pigs, like all [suids](#), are native to the [Eurasian and African continents](#). Juvenile pigs are known as piglets.[1] Pigs are [omnivores](#) and are highly social and intelligent animals

A typical pig has a large head with a long snout which is strengthened by a special prenasal bone and by a disk of [cartilage](#) at the tip.[3] The snout is used to dig into the soil to find food and is a very acute sense organ. There are four [hoofed](#) toes on each [trotter](#) (foot), with the two larger central toes bearing most of the weight, but the outer two also being used in soft ground.[4]

The [dental formula](#) of adult pigs is 3.1.4.33.1.4.3, giving a total of 44 [teeth](#). The rear teeth are adapted for crushing. In the male the canine teeth form [tusks](#), which grow continuously and are sharpened by constantly being ground against each other.

THE HORSE

The horse (*Equus ferus caballus*)[2][3] is one of two [extant subspecies](#) of *Equus ferus*, or the [wild horse](#). It is an [odd-toed ungulate mammal](#) belonging to the taxonomic family [Equidae](#). The horse has [evolved](#) over the past 45 to 55 million years from a [small multi-toed creature](#) into the large, single-toed animal of today. Humans began to [domesticate](#) horses around 4000 BC, and their [domestication](#) is believed to have been widespread by 3000 BC. Horses in the subspecies *caballus* are domesticated, although some domesticated populations live in the wild as [feral horses](#). These feral populations are not true [wild horses](#), as this term is used to

describe horses that have never been domesticated, such as the endangered [Przewalski's horse](#), a separate subspecies, and the only remaining true [wild horse](#). There is an extensive, specialized vocabulary used to describe equine-related concepts, covering everything from [anatomy](#) to life stages, size, [colors](#), [markings](#), [breeds](#), [locomotion](#), and behavior.

Horses' anatomy enables them to make use of speed to escape predators and they have a well-developed [sense of balance](#) and a strong [fight-or-flight response](#). Related to this need to flee from predators in the wild is an unusual trait: horses are able to sleep both standing up and lying down. Female horses, called [mares](#), carry their young for approximately 11 months, and a young horse, called a [foal](#), can stand and run shortly following birth. Most domesticated horses begin training under [saddle](#) or in [harness](#) between the ages of two and four. They reach full adult development by age five, and have an average lifespan of between 25 and 30 years.

Horse breeds are loosely divided into three categories based on general temperament: spirited "hot bloods" with speed and endurance; "cold bloods", such as [draft horses](#) and some [ponies](#), suitable for slow, heavy work; and "[warmbloods](#)", developed from crosses between hot bloods and cold bloods, often focusing on creating breeds for specific riding purposes, particularly in Europe. There are more than 300 breeds of horse in the world today, developed for many different uses.

SHEEP

Sheep (*Ovis aries*) are [quadrupedal](#), [ruminant mammals](#) typically kept as [livestock](#). Like all ruminants, sheep are members of the order Artiodactyla, the [even-toed ungulates](#). Although the name "sheep" applies to many species in the genus [Ovis](#), in everyday usage it almost always refers to *Ovis aries*. Numbering a little over one billion, domestic sheep are also the most numerous species of sheep. A male sheep is called a ram and a female sheep is called a ewe (pronounced "yoo").

Sheep are most likely descended from the wild [mouflon](#) of Europe and Asia. One of the earliest animals to be domesticated for [agricultural](#) purposes, sheep are raised for [fleece](#), meat (lamb, hogget or mutton) and [milk](#). A sheep's [wool](#) is the most widely used animal fiber, and is usually harvested by [shearing](#). [Ovine](#) meat is called [lamb](#) when from younger animals and [mutton](#) when from older ones. Sheep continue to be important for wool and meat today, and are also occasionally raised for [pelts](#), as [dairy](#) animals, or as [model organisms](#) for science.

[Sheep husbandry](#) is practised throughout the majority of the inhabited world, and has been fundamental to many civilizations. In the modern era, [Australia](#), [New Zealand](#), the southern and central [South American](#) nations, and the [British Isles](#) are most closely associated with sheep production.

THE GOAT

The domestic goat (*Capra aegagrus hircus*) is a subspecies of goat [domesticated](#) from the [wild goat](#) of [southwest Asia](#) and [Eastern Europe](#). The goat is a member of the family [Bovidae](#) and is closely related to the [sheep](#) as both are in the [goat-antelope](#) subfamily [Caprinae](#). There are over 300 distinct breeds of goat.^[1] Goats are one of the oldest domesticated species, and have been used for their [milk](#), [meat](#), hair, and skins over much of the world.^[2]

In the 20th century, they have gained popularity as [pets](#).^[3]^[not in citation given] Female goats are referred to as "does" or "nannies", [intact](#) males as "bucks" or "billies", and their [offspring](#) are "kids". [Castrated](#) males are "wethers". [Goat meat](#) from younger animals is called "kid" or cabrito (Spanish), and from older animals is simply known as "goat" or sometimes called chevon (French), or in some areas "[mutton](#)" (which more often refers to adult [sheep](#) meat)