Commensalism is a relationship between two species where one species derives a benefit from the relationship and the second species is unaffected by it. Several examples of commensalism are given below.

- Cattle Egret
- Anemonefish
- Barnacles
- Pseudoscorpions
- Monarchs and Viceroyos
- Burdocks

Commensalism is much more difficult to demonstrate than mutualism. For true commensalism, the second species must be unaffected by the presence of the first, but commonly a detailed study of the relationship will show some affect on the second species. For example in the barnacle example, the scallop appears to be unaffected. However scallops feed on essentially the same planktonic plants and animals as does the barnacle. Therefore there may be competition for food between the two species. In addition it is difficult to prove that the weight of the barnacles does not inhibit the movements of the scallop shells. On the other hand the presence of a covering of barnacles could reduce predation on the scallop by marine gastropods (snails) that drill holes in the scallop shells to get to the animal within. It is difficult to prove or disprove these possibilities.

The Cattle Egret (*Bubulcus ibis*) forages in pastures and fields among livestock such as cattle and horses, feeding on the insects stirred up by the movement of the grazing animals. The egrets benefit from the arrangement, but the livestock, generally, do not. However as in most cases of commensalism, there is a "but". Cattle Egrets have been observed perching on the top of cattle picking off ticks, lending a slight tinge of mutualism to the arrangement.
Cattle Egrets are originally from Africa where they were adapted to following the large herds of herbivores as they moved across the savannah. They first appeared in South America in the 19th century and have since spread to the eastern United States and California. The Cattle Egret breeds in colonies near water (as almost all herons do), but feeds almost exclusively with herds of cows and horses.

Anemonefishes (sometimes called clownfishes) are a beautiful group of tropical, reef fishes from the Pacific and Indian Oceans. Almost all of the species belong to the genus *Amphiprion*. These fishes are unusual because they have a close relationship with sea anemones. Sea Anemones belong the class Anthozoa which includes the hydras, corals, and jellyfish. The simple structure of the sea anemone consists of a hollow cylinder surrounded by a crown of tentacles. The tentacles are equipped with specialized cells called nematocysts. Nematocysts are shaped and function like small harpoons and contain a poison sufficient to paralyze or kill small fish and other reef inhabitants.

The anemonefish lives among the forest of tentacles of an anemone and is protected from potential predators not immune to the sting of the anemone. The anemonefish is protected from the sting of the anemone tentacles by a substance contained in the mucous on its skin. The exact nature of this protective substance is not known, but is believed to be a combination of a partial natural secretion and chemicals the fish harvests by rubbing up against the anemone’s tentacles. Whatever the case may be, the anemone treats the fish as part of itself and does not sting it.

Some consider this relationship to be a case of mutualism, claiming that the anemonefish chases away other fish that might prey on the anemone. However this aspect of the relationship is not well documented.

Barnacle are sedentary, highly modified crustaceans resembling conical pyramids. Barnacles live by using long, feathering appendages to sweep the surrounding water for small, free-floating organisms. The critical resource for barnacles is a place to stay. Barnacles attach to rocks, ships, shells, whales, and just about anywhere else they can gain a foothold. In the example on the left the two barnacles are attached to the shell of a scallop. The barnacle gains a place to live and, presumably, the scallop is not harmed by the presence of the barnacles. Therefore the relationship is commensalism.

Just as a curiosity, the bottom photograph on the left shows a fossil of the extinct scallop *Chesapecten* from the Miocene (15 million years ago) complete with barnacles. The more things change, the more they stay the same.
Pseudoscorpions are small, predaceous arthropods, mostly less than 1 centimeter in length. These scorpion-like animals have pincers (chelicera) like scorpions, but lack a sting. Pseudoscorpions are common, but usually overlooked because of their small size and because they are concealed in the soil or under the bark of trees.

A few species of pseudoscorpions disperse by concealing themselves under the wing covers (elytra) of large beetles such as the cerambycid beetle shown below. The pseudoscorpions gain the advantage of being dispersed over wide areas while simultaneously being protected from predators. The beetle is, presumably, unaffected by the presence of the hitchhikers.

The Monarch butterfly (*Danaus plexippus*) feeds as a larva on species of milkweeds (*Asclepias* spp.). The milkweeds contain a group of chemicals called cardiac glycosides. Cardiac glycosides are poisonous to vertebrates (although not to invertebrates). The larvae...
store these cardiac glycosides and the later adult contains them as well. If a bird (or other vertebrate such as a mouse or frog) eats a Monarch it finds them distasteful to begin with and is later sick. Experimentally birds learn to avoid Monarchs. The Monarch advertises its inedibility by a bright orange and black coloration.

The Viceroy (*Limenitis archippus*) is not distasteful and does not contain cardiac glycosides. However by mimicking the the pattern of the Monarch it is also avoided by birds and other vertebrates that have learned to avoid the Monarch. This particular relationship is called Batesian Mimicry.

The Viceroy, therefore, is protected from vertebrate predation by mimicking the Monarch, but the Monarch populations are unaffected. However if the Viceroy is much more common than the Monarch, the vertebrate predators may not learn that the Monarch is to be avoided leading to increased mortality to the Monarchs.

A critical phase in the life cycle of plants is the proper dispersal of its seeds. Many wonderful or strange adaptations have evolved to insure this dispersal. One of these adaptations is the evolution of recuved spines on the seeds or seedpods to attach the seeds to the fur of passing vertebrates who carry the seeds away from the parent plant. In the case of humans, fur is replaced by pants, sweaters, socks, and other pieces of clothing. Plants, therefore, anticipated the invention of velcro from several million years. The plant benefits from the relationship by the dispersal of its seeds. The vertebrates are not affected except, perhaps, by being annoyed.

One of the most famous examples are the burdocks, common weeds found along roadsides and in empty lots and fields. The species on the left is the Great Burdock (*Arctium lappa*). The seed heads (burs) of burdocks long spines with hooked tips. The hooked tips catch onto the hair of passing vertebrates (cows, deer, dogs, humans) and the burs are carried elsewhere until they finally drop off or are pulled off by the carriers.

Similar structures have evolved in other many other plant groups.