

ENVIRONMENT

Giants in Nature

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HUMAN beings appear to be obsessed with making things bigger. It seems as though the old saying "bigger is better" still stands.

We want bigger vehicles and bigger houses. But this desire for "big" has crossed over into nature.

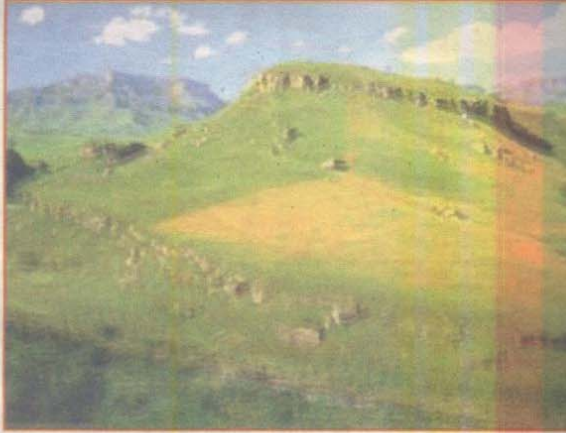
And instead of letting the environment and genetics decide how large an organism gets; we want to take this decision into our own hands. There are many reasons why science is encouraged to conduct research into making giant organisms. One such reason is our growing global population. So that a large fruit or vegetable or livestock animals, like cattle can yield more food and feed more people. While sadly in other cases, it is just done to test the limits of size manipulation or just to prove that humans can control this factor. However, in this article I will look at how our environment determines how big an organism gets and the advantages and disadvantages to being a giant in our world.

But why do some plants and animals attain large proportions while others remain small or minute? There are three important factors that determine the size of an animal; food, habitat and gravity. Let's look at some environmental factors that limit the size of animals. One such limiting factor is the size of the area it occupies. Larger animals need large areas of land to secure individual territories to acquire enough food to meet their needs; be it for grazing or that it contains prey for predatory animals. Therefore, given the same area an herbivore would become larger than a carnivore since its area would yield more food.

Gravity is another limiting factor when it comes to how big an organism can become. Organisms that are aquatic, for example, whales, are huge compared to our largest land animals, the elephant. This is because the water helps to support the weight of these huge animals.

Even being a giant means that one's shape is determined as well. Most large creatures, like whales, manatees look like a 'barrel', while those on land like elephants look like "a barrel supported on four tree trunks". However smaller animals need to be sleek, such as hawks, in order to chase rodents.

Being a giant in nature also means that you lead a different lifestyle compared to an organism of normal size. For instance, large animals tend to lead a relatively sedentary lifestyle as it is difficult for them to move about, but it is also quite dangerous, since their size and weight determines that if they fall they will hit the ground with a force



much greater than an organism of ordinary height, and most likely will result in fatality. Being big does not mean that they are impervious to attack. Their large size means that they move around slowly which makes them easy prey for small swift predators that hunt in groups. Therefore they have to protect themselves by travelling in groups, staying together to fend off attacks.

Larger animals also tend to lead longer lives than smaller animals and they also tend to have fewer offspring which develop at a slower pace. In some species larger individuals are actually favoured as mates since their size is taken as an indication of good health. Therefore larger individuals mate, while the smaller ones are rejected or given fewer opportunities to mate, therefore the members of a certain species or population in an area would mostly consist of large individuals.

Some animals have special features that allow them to maintain their large size. An example includes some large birds of prey that are capable of flight. They have special bones that are hollow which lessens their body weight so that they are able to fly.

Another example would be some giant species of prehistoric insects compared to the much smaller insects we know today. Recent studies have attributed this giant size to their respiratory system. With vertebrates, oxygen is delivered to the tissues via the circulatory system. It enters the blood cells through the walls of the blood vessels and is transported to the organs and again crosses over the walls of the blood vessels into the organ. However, with insects oxygen enters the tubules which are a set of open ended tubes that deposit oxygen directly to the organ. This system of delivery is inefficient in larger species of insects, except in cases where oxygen levels are high. This was the case in the late Palaeozoic Era when atmospheric oxygen levels were extremely high the large species at that time had more space in their body for tubules and received more oxygen.

There are disadvantages to being too big. For instance, the larger the animals, the larger its skeleton has to be in order to support its weight, so it will have bigger bones. It also needs to have larger muscles to move these heavy bones around.

There are animals that exhibit determinate growth; that means, when they reach a certain size they stop growing. Due to abnormalities in their biochemistry, they can show indeterminate growth. However, plants are organisms that show indeterminate growth naturally. To understand how growth occurs in a plant, think of a plant like a skyscraper and the leaves, stem and roots as rooms, separate from each other but still part of the building. Therefore, if they are sealed off or altered they do not affect the overall integrity of the building. This is beneficial for plants since they can shed their leaves, or lose fruit and flowers as needed for their survival. The objective is that once the plant is alive it will continue to grow.

Therefore we can see that giant animals and plants fascinate us whether they reach this size naturally or with the help of humans. There are three main factors that influence the size of animals, namely, the availability of food, space and gravity. However, abnormalities in an organism's biochemistry can cause an animal with determinate growth to grow indefinitely, while plants undergo indeterminate growth naturally. Being big can be advantageous in that it is taken as a sign of health in some species and therefore larger individuals acquire mates and are able to pass on their genetic material to their offspring.

There are also many disadvantages to being very big, such as health difficulties, for example a strain on bones and muscles carrying around this great weight, the danger of falling or being attacked by smaller, swifter predators. So as there are advantages and disadvantages to most things in life, there are advantages and disadvantages to being a giant in nature.

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