Eating Bark to Survive

Tree-bark is not very nutritious though a large number of animals, ranging from mites to elephants, rely on bark for their sustenance especially during periods of food scarcity. This article takes a look at some such animals that feed on bark.

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UNDER the onslaught of the vagaries of nature, animals often survive by adapting their food habits. Sometimes even the very tough and dead bark of a tree can serve as food in times of food scarcity. Termites feast on the bark and even the largest land animal elephant is included in the consumer list.

‘Bark eater’ is an English translation of the Mohican word ‘Adirondack,’ a term the Mohawk once used for Algonquian-speaking tribes who were said to eat the inside of the bark of the white pine when food was scarce. But the human race has now successfully relinquished its habit of devouring bark.

The human digestive system is not suitable for consuming raw bark and wood of plants. As a result, we avoid direct consumption of these materials. Of course, some bark is taken as medicine. Cinnamon bark is used in our cuisine quite indiscriminately as a condiment. However, Australopithecus sediba, believed to be an early relative of modern-day humans, enjoyed a diet of bark along with leaves, fruits and nuts. This finding also proves that in the Early Pleistocene, our ancestors probably lived in a more wooded environment than is generally thought and they had a tradition of eating the bark.

Many animals of the geologic past would use tree-barks as their food. For instance, *Lufengosaurus huenei*, an extinct prosauropod dinosaur that lived during Late Triassic to Early Jurassic period in Southwestern China. The fossil gastroliths (stones held inside the gastrointestinal tract) recovered from the rock beds reveal that *Lufengosaurus* used stones to grind tough plant matters including bark.

Cinnamon bark is the chief source of commercial cinnamon

Edible Bark

Bark or rhytidome refers to the dead corky layers wrapping the stems and roots, which protects the woody plant from outside stresses to some extent. All the tissues outside the vascular cambium are contemplated as bark. In this regard, the living phloem or food-conducting tissue of a tree trunk is also regarded as bark, and it can be referred as the living bark or inner bark.

The living cells of the inner bark contain nutrient-laden cell sap, organelles, and stored starch. Most importantly, the phloem cells with their sugary contents are located here. The inner bark is the chief target for animals that feed on the bark. Young twigs and branches are preferred because they have a higher proportion of inner to outer bark and lower concentrations of anti-digestive compounds like lignin and phenol.

Barks of some trees and shrubs satiate the taste of a large array of animals. So, an animal gnawing at the bark and soft wood of trees and shrubs is not a malicious act or evidence of a neurotic condition. Instead, it is often a normal means by which some animals acquire food.

However, the bark is basically the less nutritious part of a tree. It is mainly
FEATURE ARTICLE

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Bark beetles and wood borers bore through the bark to eat the tasty nutrients in the inner bark and cambium layers. The giant African snail, the Asiatic rhinoceros beetle and some grasshoppers as well as millipedes are also keen bark-eaters. However, the most consummate wood feeders are the termites that literally seek living trees in the forests to devour aggressively and relentlessly. Bark eating caterpillars of a lepidopteran moth *Indarbela tetraonis* feed on bark during night. In the next day morning, the attack by this pest is characterized by the presence of long winding, thick, blackish or brownish ribbon-like masses composed of small chips of wood and excreta.

Irrespective of their sizes, scale insects are voracious eaters

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A Feast of Tree Bark

Many mammals ranging in size from the mice to elephants consume bark and woody branches. In the temperate forests of North America and Europe, smaller mammals like voles (Microtus agrestis), badgers (Taxidea taxus), rabbits (Lepus californicus) and porcupines (Erethizon dorsatum) often eat bark at the base of trees, sometimes leaving individual marks of biting on the tree trunk.

Squirrels prefer to gnaw the bark of sumac, crab apple and some bushy species of roses. The bark of aspen and willow is an important food source for the European beaver (Castor fiber).

Beaver is the only animal that chews away large chips of wood in order to fell trees. Larger herbivores such as goat, deer, tapir (Tapirus bairdii), rhinoceros, giraffe, etc., often eat the bark of tree branches. Deer usually bite off twigs and chew bark which they rip off in strips. During this practice, deer also damage bark by fraying their antlers on it to shed the velvet coating. Unlike other animals, giraffe can easily reach higher branches further above the ground.

The largest land animal elephant eats a huge amount of forage every day. A major part of elephant’s diet is composed of various types of tree-bark and woods, viz., acacia, baobab, elephant apple, silk flower, rain tree, etc. Primates generally avoid eating bark although gorilla and golden monkey (Cercopithecus kandti) seldom eat tree-bark. Even some marsupial mammals like koala (Phascolarctos cinereus), tree kangaroo (Dendrolagus ursinus) and opossum (Didelphis marsupialis) are very fond of eating bark of inhabiting trees.

In the alpine forests of North America and Europe certain animals like elk or moose face starvation mainly during the winter fall. At that time the bark of spruce, beech, balsam fir, tag alder, ash, oak, witch hazel, birch, white cedar, maple, jack pine, etc., become the chief diet of these animals. Polar bears (Ursus maritimus) have also been found to eat bark of true fir, redwood, lodge pole pine, douglas fir and so on, preferably during the period of food scarcity.

Certain gnawing mammals, such as striped squirrel, crested porcupine, hispid hare, small flying squirrel and Malabar giant squirrel inhabiting mainly in the tropical forests of India, largely rely on the bark of black plum, ben teak, dhaman, hog plum, laurel, mango and teak.

Animal Gut

Although certain micro-organisms and insects (sometimes empowered by protozoans inhabiting their digestive tracts) can consume bark and wood of trees easily, it is quite difficult to digest such food items by the larger animals. To assimilate bark and wood as food, animals must possess specialized digestive systems and necessary enzymes.

For animals, the breakdown of foodstuffs is accomplished through a combination of mechanical grinding and enzymatic processes beginning in the mouth. In carnivores and omnivores, adapted to eating meat as well as fruits and nuts with their concentrated food value, the digestive system is relatively simple. Strict herbivores have a big challenge since the vegetation they consume is a far less concentrated food, more difficult to digest, and often protected by defensive chemical compounds like alkaloids and other secondary metabolites. In addition, the rigid cell walls of plant material (comprising complex carbohydrate macromolecules) must be broken down to gain access to proteins and carbohydrates inside the living cells.

Further degradation of ingested bark and woody material occurs within...
special compartments of the stomach, or coecum, or an exceptionally long intestine, or an enlarged colon with the aid of inhabiting microbes and protozoans by a process known as fermentation. Millions of such microorganisms secrete cellulases, hemicellulases and other digestive enzymes that in turn release sugars, organic acids, and amino acids from the woody materials ingested by the host animal during feeding.

The stomach of herbivorous animals may be of two distinct types – monogastric, i.e., made up of a single sac-like compartment and digastric, i.e., complexly subdivided into various chambers. In monogastric herbivores such as horses, rhinoceroses, rodents, and rabbits, cellulosic material is digested by microorganism-aided fermentation in the intestine, often modified to have either a coecum or enlarged colon. In digastric animals like antelope, deer, moose, camels, sheep, goats, and cattle, the stomach is divided into four chambers, containing symbiotic microorganisms.

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These animals only partially chew their food as they quickly gather it for the first time. Later when resting, they regurgitate and re-chew it. The cellulosic material is digested by microbes and protozoans residing within the rumen. Certain monogastric mammals like rodents and rabbits exhibit another phenomenon to increase the digestion of their food by eating 25 to 60 per cent of their faeces. This is known as coprophagy. For such practice microorganisms within the gut get enough opportunity to digest the coarse food particles.

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