



# Cellulose digestion without the help of intestinal flora: not everyone can

<sup>1,2</sup>Marian Proorocu

<sup>1</sup> Department of Environmental Engineering and Protection, Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania;

<sup>2</sup> Enviromep SRL, Colonia Făget, Cluj, Romania. Corresponding author: M. Proorocu, mproorocu@yahoo.com

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Cellulose is a complex carbohydrate, specifically a polysaccharide, composed of repeating glucose units linked together by beta-1,4-glycosidic bonds. It is one of the main structural components of plant cell walls, providing strength, rigidity, and support to plant cells.

The glucose molecules in cellulose are arranged in long chains, and these chains form bundles called microfibrils. The linear and rigid structure of cellulose gives it high tensile strength and resistance to degradation by most enzymes (Chatterjee et al 2015). While animals, including humans, lack the necessary enzymes to digest cellulose directly, some microorganisms, such as bacteria and fungi, as well as certain specialized animals (like certain mollusks), have cellulase enzymes that can break down cellulose into simpler sugars through hydrolysis (Koopmans 1969).

Cellulase is an enzyme that breaks down cellulose, a complex carbohydrate found in plant cell walls (Singhania et al 2021). Many animals, particularly herbivores, rely on cellulase to digest cellulose-rich plant material. However, not all animals produce cellulase themselves; some depend on symbiotic relationships with microorganisms, such as bacteria or fungi, to produce cellulase on their behalf.

Ruminant animals, such as cows, sheep, and deer, are examples of animals that harbor cellulase-producing bacteria in their stomachs (specifically in the rumen). These bacteria aid in the breakdown of cellulose, allowing the host animal to extract nutrients from plant materials. Similarly, some insects, like termites, have symbiotic relationships with cellulase-producing microorganisms in their guts.

There are, however, a few examples of animals that produce cellulase without relying on bacterial flora. Some wood-eating mollusks, such as certain species of snails, are known to produce their own cellulase enzymes (Yonge 1925). These enzymes assist in breaking down the cellulose present in wood as part of their digestive process.

**Conclusions.** While many animals rely on symbiotic relationships with cellulase-producing microorganisms, there are exceptions such as certain mollusks that produce cellulase on their own.

**Conflict of interest.** The author declares no conflict of interest.

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Authors:

Marian Proorocu, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Agriculture, Department of Environmental Engineering and Protection, 3-5 Calea Mănăştur Street, 400372 Cluj-Napoca, Romania, e-mail: mproorocu@yahoo.com

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