



## Termites Digest Wood Thanks to Microbes

### OVERVIEW

[Termites Digest Wood Thanks to Microbes](#) is one of 12 videos in the HHMI series “I Contain Multitudes,” which explores the fascinating powers of the *microbiome*: the world of bacteria, fungi, and other microbes that live on and within larger life forms, including ourselves.

The termite gut teems with microbes that are essential for the digestion of cellulose. Without these microbial symbionts, termites would be unable to digest wood. This is an example of mutualism, in which both the termites and the microbes benefit. In [Termites Digest Wood Thanks to Microbes](#), award-winning author Ed Yong interviews Princeton scientist Xinning Zhang, who makes viewers aware of the interconnectedness of individual organisms and the multitudes of symbiotic microbes living in their digestive systems. She answers questions about why microbes are necessary for termite digestion of wood and how the microbes are passed from adult termites to offspring.

### KEY CONCEPTS

- Symbiosis is a close, long-term interaction between organisms belonging to two different species. One, both, or neither species may benefit from the relationship. When both species benefit, the relationship is called mutualism.
- Microbes can play important roles in maintaining the health of larger host organisms.
- Digestion consists of both the mechanical and chemical breakdown of food.
- Microbes can assist other organisms in the enzymatic, or chemical, phase of digestion.

### CURRICULUM CONNECTIONS

Standards	Curriculum Connections
NGSS (2013)	LS1.C, LS2.A, LS2.B
AP Biology (2015)	2.D.1, 4.B.2, 4.B.3
AP Environmental Science (2013)	II.A
IB Biology (2016)	4.1
IB Environmental Systems and Societies (2017)	2.1
Vision and Change (2009)	CC2

### PRIOR KNOWLEDGE

Students should

- have a basic understanding of the process of digestion;
- be familiar with the role of enzymes in the digestive process;
- know that carbohydrates are important nutrients in the diet of humans and other organisms;
- know that microbes can be beneficial, harmful, or neutral in their effects on other organisms;
- know the difference between a fact and an inference and the role of scientific investigation in providing evidence to support an observation being a fact.

### KEY REFERENCE

Warnecke, F., Luginbühl, P., ..., Zhang, X., *et al.* Metagenomic and functional analysis of hindgut microbiota of a wood-feeding higher termite. *Nature* 450 (2007): 560-565.