

Thème 1 – Génétique et évolution

1-B- La complexification des génomes : transferts horizontaux et endosymbioses

Insects and microorganisms symbiosis: the endosymbionts

Question : Explain the benefits of symbiosis using this example of gut* microbes.

Document 1: Gut microbes

Gut microbiota of insects is composed both of prokaryotes and eukaryotes that live outside the gut cells. They usually inhabit the hind part of insect's gut (hindgut*), either moving freely in its lumen or remaining attached to its walls. In some phytophagous insects, like termites and cockroaches*, the hindgut is a chamber without oxygen where the fermentation of cellulose and other complex sugars takes place.

In termites, this anaerobic chamber contains optional anaerobic prokaryotes (they can develop either with or without oxygen) and compulsory anaerobic prokaryotes (they can only develop without oxygen), such as spirochetes and methanogens, which aid in digestion. In addition, in some worker termites, this chamber also contains protozoans that play a major role in the digestion of wood?

Unlike other endosymbionts, gut microbes are horizontally transmitted between insects; that is, insects don't inherit gut microbes from their parents, but they can acquire them throughout their lives. In termites, the acquisition of gut microbes takes place through a process called trophallaxis: the workers, which are the only ones able to feed by themselves, digest the food and transmit the resulting product mixed with gut microorganisms to the rest of the colony members through their mouthparts.

Moreover, microorganisms are removed during molting* processes, so termites can acquire them again through trophallaxis.

Irene Lobato Vila - Nature Reviews Microbiology - 05/01/2018
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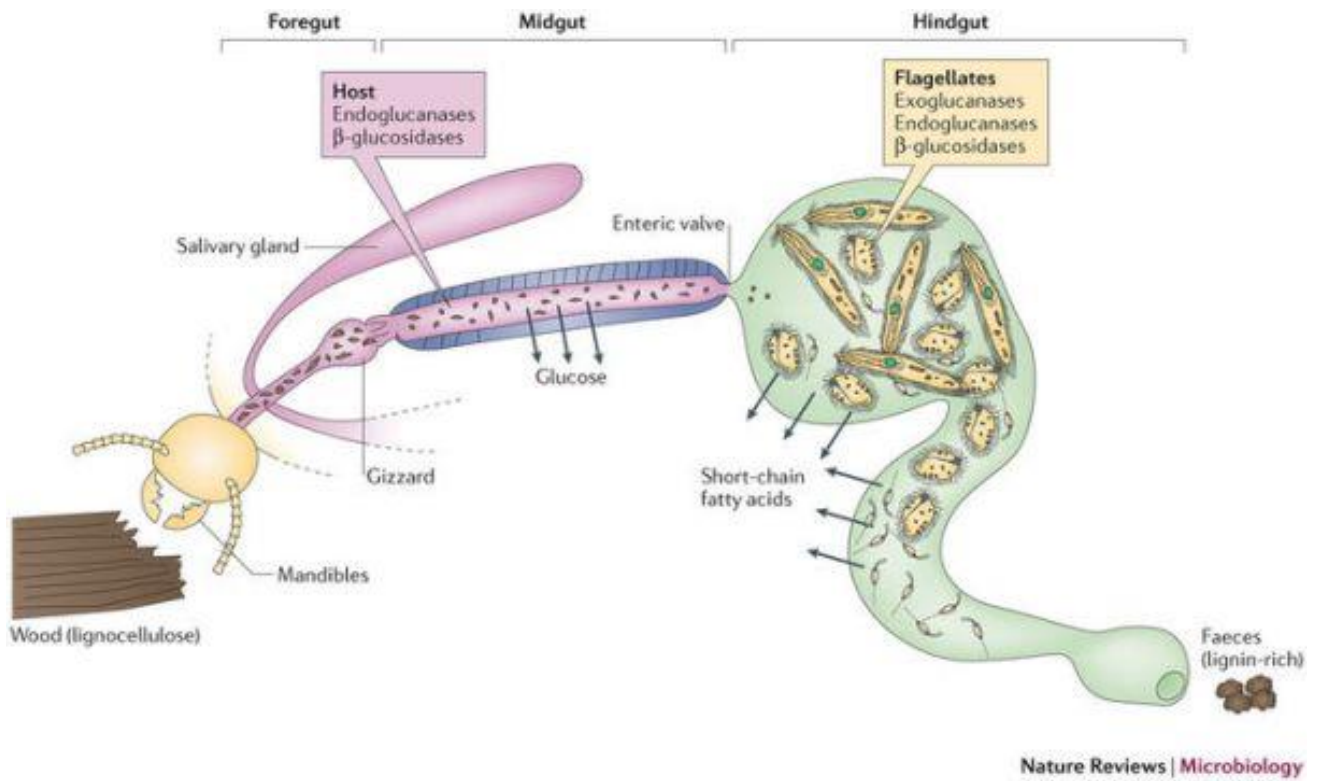
***Gut** : intestin

***Hindgut** : intestin postérieur

***Cockroaches**: blattes

***Molting**: mue

**Document 2: Worker termite gut; the green part corresponds to the hindgut*
without oxygen.**



Brune, A. (2014). Symbiotic digestion of lignocellulose in termite guts.

Nature Reviews Microbiology, 12(3), 168-180.