

Diet of crustacean species associated to deep-sea wood falls

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Found one hundred years ago and considered first like a simple zoological curiosity, deep-sea wood falls are now regarded as an important food source for deep-sea organisms. These sunken woods are decomposed by anaerobic heterotrophic microorganisms creating reducing chemosynthetic environment and inhabited by diversified endemic macrofauna, among which Crustaceans are the second important taxonomic group.

Questions arise about the diet of these crustaceans, their trophic dependence on wood and/or microorganisms. Several oceanographic cruises (BOA1-2005, SantoBOA-2006, SalomonBOA-2007) were recently organised by French institutions (IFREMER, IRD and MNHN) in order to study deep-sea wood falls ecosystems. They provided a lot of samples of uncommon crustaceans species.

The observation of the gut content and morphology of several species of crustaceans from South-Pacific deep-sea wood falls by scanning and transmission electron microscopy (SEM and TEM) allow us to give first answers to these questions. The elemental composition of mineral structures in gut contents was identified by X-ray microanalysis. The results showed that, among the 14 species examined, 3 ingest wood fragments and feed at least partially on wood, 4 feed on free-living microorganisms, and 4 possess a digestive symbiotic microflora that especially developed in the wood-eating species. The diet of the most representative species can be summarized as follows.

The deep-sea squat lobster *Munidopsis andamanica* appears a deposit-feeder partially xylophage and bacteriophage. Its gut contains huge quantities of large wood particles (up to 100 µm) and harbours resident bacteria and fungi that can help in the digestion of wood. *M. andamanica* would also graze on the biofilm at the surface of wood because foraminifers, siliceous spines of sponges and compacted balls of rod-shaped bacteria were also found in some specimens. Intermediate between deposit- and suspension-feeder, the thalassinid shrimp *Callianassa amboinensis* is also xylophage. Its gut content is mainly composed of a homogeneous organic matter, mineral particles and fragments of vegetal cells walls. As *M. andamanica*, it harbours a resident microflora composed of 4 morphotypes of bacteria and 2 morphotypes of fungi. In contrast, *Munida pagesi*, another deep-sea squat lobster, would be an exclusive bacteria-feeder. The gut of specimens of this species appeared to be filled with agglomerates of round-shaped bacteria. Finally, two hermit crabs, typically residents of the sunken woods, seem to be predators. *Xylopagurus caledonicus* exhibits only few recognizable elements in its gut which is filled by slashed organic matter. Surprisingly, *Pylocheles incisus*, a symmetric hermit crab, has a gut content rich in intact foraminifer tests, suggesting that this species has a very particular food regime.

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