

Chemosynthesis occurring within the deep-sea hydrothermal shrimp *Rimicaris exoculata* symbiosis: a metagenomic approach



European project

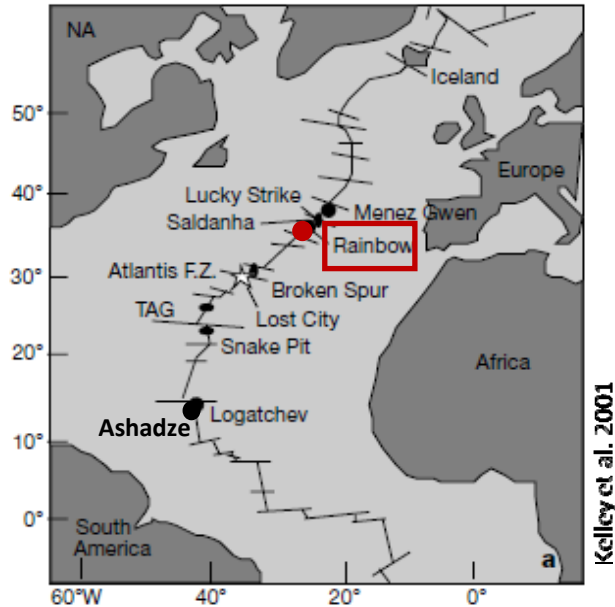
mamba

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R. exoculata samples details



Oceanographic cruise	MoMarDream-Naut 2008
Hydrothermal vent site	Rainbow (2320 m, 36° 14'N)
Sampling	Nautile – Pourquoi pas ?
Temperature in situ	5 - 25°C
Storage of the shrimps	-80°C
Concentrations in hydrothermal fluids	Methane: $\approx 2.5 \text{ mmol.kg}^{-1}$
	H ₂ : $\approx 16 \text{ mmol.kg}^{-1}$
	Iron: $\approx 24 \text{ mmol.l}^{-1}$



Rimicaris exoculata



The Model: *Rimicaris exoculata*, an hydrothermal shrimp, a double symbiosis

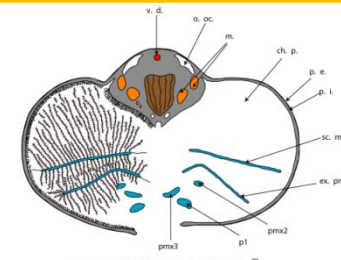
Rimicaris exoculata

Crustacea, Decapoda, Alvinocarididae



Endemic species of the Mid Atlantic Ridge (MAR) hydrothermal vent sites.

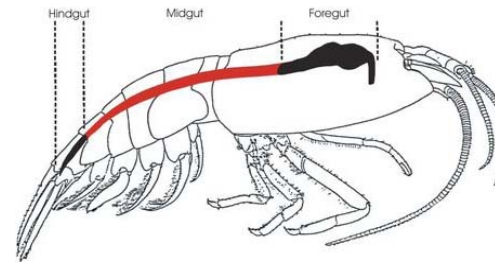
Gill chamber (branchiostegite, hypertrophied mouthparts)



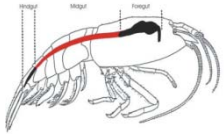
ch. p.: chamber 'branchiostegite'
m.: muscle
o. oc.: ocellus
p. e.: palp
p. l.: palp
sc. mx2: scaphognathite
ex. pmx1: exopodite
pmx2: pleopod
pmx3: pleopod

Segonzac *et al.*, 1993

Gut



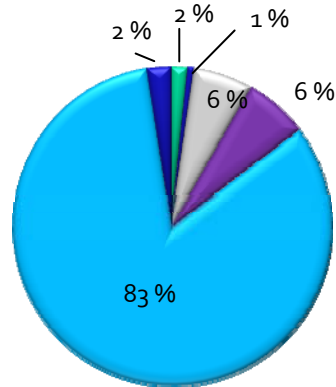
Modified from Williams and Rona, 1986



The Model: *Rimicaris exoculata*, an hydrothermal shrimp

What about both microbial communities ?

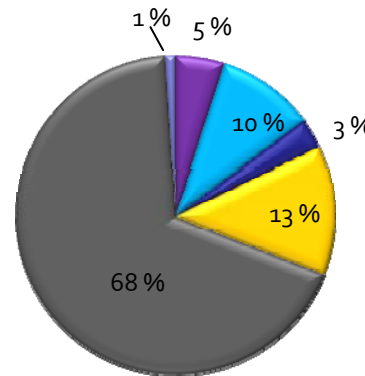
Bacterial community of the gill chamber



Gill chamber symbionts

Zbinden et al. 2008, Guri et al. in prep

≠ Bacterial community associated to the gut



Gut symbionts

Durand et al. 2010

- Alphaproteobacteria
- Betaproteobacteria
- Deltaproteobacteria
- Gammaproteobacteria
- Epsilonproteobacteria
- CFB
- Mollicutes
- Deferribacterales
- Firmicutes



Huge diversity of bacteria in the water but restricted diversity in the two symbiotic communities of *R. exoculata* (molecular analysis: rRNA 16S and genes function)

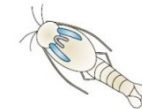


Existence of a control on the bacteria settled into the shrimp.

Metagenomic approach to highlight bacterial metabolisms of *R. exoculata* associated gill chamber symbionts and gut symbionts and to highlight enzymatic pathways and cell-cell communication.



Acknowledgements:



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