

SHELLS OF THE LIMPET *PATELLA ASPERA* AS HABITAT FOR EPIBIONTS

J Faria^{1,2}, GM Martins^{1,2}, M Furtado^{2,3}, AI Neto^{1,2}

(1) CIIMAR/CIMAR - Interdisciplinary Centre of Marine and Environmental Research, University of Porto.
 (2) Center for Research in Natural Resources (CIRN), University of Azores.
 (3) Faculty of Sciences, University of Lisbon.

ABSTRACT Although limpets can control the abundance and distribution of algae and other organisms, their shells can offer a refuge for the establishment of diverse assemblage that would otherwise be excluded. In this study, we make a preliminary analysis of the epibiota growing on shells of the limpet *Patella aspera*. Individuals of *P. aspera* were collected in all islands of the Azores and the biota on their shells was identified and quantified to species level. A total of 192 species was identified. The composition of the epibiota assemblage varied among islands and among locations within islands. A positive and highly significant correlation was also found between epibiota richness and shell length. This study adds to the literature by showing that the shells of *P. aspera*, an over-exploited species in the Azores, support a very rich community of algae and invertebrates and that this is controlled by processes operating at multiple spatial scales ranging from metres (among individuals) to 100's of Kilometres (among islands).

METHODS

- A total of 707 individuals of *P. aspera* were collected in two sites from all islands of the archipelago of Azores (Fig.1).
- Individuals were labelled and preserved in 96% ethanol. Samples were hydrated in water for epibiont identification.
- Epibionts were identified to species level or lowest possible taxon, using a lupe and/or an optical microscope. When needed, small sections of individuals were selected for identification of diagnostics features.
- A 3-way hierarchical ANCOVA was used to examine patterns of spatial variation. Factors were: group of islands (random, 3 levels), island (random, 9 levels) and site (random, 2 levels), using shell length (SL) as covariate.



Figure 1. Map of the archipelago of Azores showing number of samples.



RESULTS

- A total of 192 species was identified, with *Lithothamnium* being the most frequent and present in more than 50% of the samples (Fig.2). Five animal taxa were also identified (limpet, barnacles, chitons, sponges and hydrozoans).
- The composition of the epibiota assemblage varied among islands and among sites within islands (Fig.3).
- A positive and highly significant correlation was also found between epibiota richness and shell length (Fig.4)



Figure 2. Occupancy (%) of epibiont taxa in all samples of *P. aspera*.

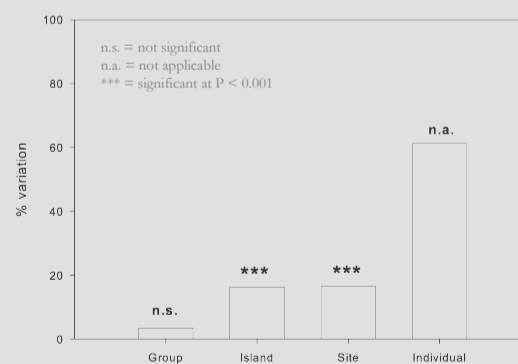


Figure 3. ANCOVA variance components for epibiont composition in *P. aspera*, at individual, site, island and group levels.

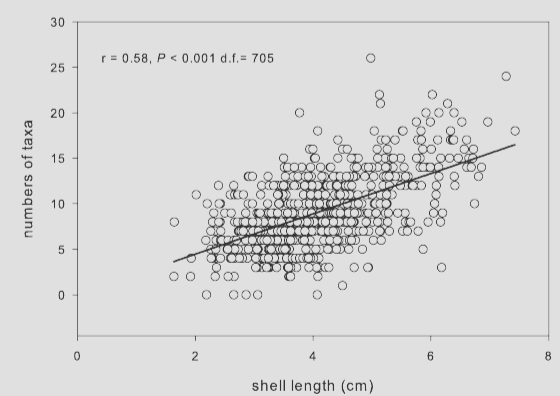


Figure 4. Correlation between number of taxa and shell length.

CONCLUSIONS

- The shells of *P. aspera* act as a refuge from grazing, supporting a very rich epibiont assemblage. This study found a total of 192 epibionts compared to the 20 species of marine algae found by Fralick *et al.* (1985, Arquipélago, VI: 39-43) on *Patella* shells from the Azores. As expected, the larger the individual limpet, the highest number of taxa it supports.
- Island and local, but not regional, scale processes influence the composition of epibionts. Moreover, most of the variation was found to be at individual level.
- This study suggests that besides the top-down control of algae communities by limpets, they also have a bottom-up effect via the habitat provided by their shells.

predation pressures on hermit crabs, while at the same time increased the cost for crabs of traveling with their portable home—the gastropod shell. Natural selection therefore favored crabs that remodeled their shells, creating thinner, less protective shells that were lighter to carry.

Mechanistically, crabs seem to accomplish remodeling via a chemical-mechanical sculpting of the shell interior, which erodes the columella as well as much of the inner calcium-carbonate matrix.

Ultimately, crabs' niche construction has created novel evolutionary pressures on them, specializing them to inhabit remodeled shells and consequently ratcheting up their level of sociality for stealing the remodeled products of fellow conspecifics.

Gastropod shells represent the central ecological theatre for this evolutionary play among hermit crabs, a theatre that the hermit crabs themselves redesigned to their own specifications.

T20.P9 OLD HOSTS, NEW GUESTS - EUROPEAN SNAILS HOSTING AMERICAN LIVER FLUKES. AN INTERIM REPORT

Helmut Sattmann¹, Christoph Hörweg¹, Larissa Gaub^{1,2}

¹Natural History Museum Vienna, Burgring 7, 1010 Wien, Austria helmut.sattmann@nhm-wien.ac.at, christoph.hoerweg@nhm-wien.ac.at

²Medical University Vienna, Institute of Specific Prophylaxis and Tropical Medicine, Kinderspitalgasse 15, 1090 Wien, Austria larissa.gaub@gmail.com

The giant liver fluke *Fascioloides magna*, an invasive trematode (Digenea) species originating from North America, was recorded in Europe first time in 1875 in Italy. In Austria it was detected in the wild for the first time in the year 2000 at River Danube. The lesser pond snail *Galba truncatula*, an autochthonous snail, evidenced to act as snail intermediate host in Austria; cervids were reported as final hosts. For assessing the risks of spreading it is essential to get data about abundance and ecology of hosts and epidemiology of worms. Approximately 14,000 *G. truncatula* snails have been investigated parasitologically by dissecting. Morphology and genotyping was used for species delimitation.

G. truncatula is abundant in all parts of the investigated Danube flood plain area, preferably at shores of slow running branches of the river. Main cercarial shedding of *F. magna* happens in mid-sized individuals and occurs in mid-summer. Prevalence of *F. magna* in snails is low (0.03-0.2%) compared with prevalence in deer (20-100%). *G. truncatula* occurs also in adjacent areas at River Leitha, but no fasciolids were found in appr. 1,000 individuals collected there. Until now, only *G. truncatula* has been verified as intermediate host species in Austria. But a number of other lymnaeid species are known as hosts from the literature. Since snail hosts must be considered to play an important role in parasite dispersal, other potential hosts have been investigated. First investigations of *Lymnaea stagnalis*, *Stagnicola* sp. and *Radix* sp. did not evidence fasciolids, neither in Danube flood plains nor in neighbouring areas. Nevertheless these native species, but also potential invaders like *Pseudosuccinea columella* should be considered as intermediate hosts. Investigations will be continued.

T20.P10 SHELLS OF THE LIMPET *PATELLA ASPERA* AS HABITAT FOR EPIBIONTS

João Faria^{1,2}, Gustavo M. Martins¹, Miguel A. Furtado^{3,4}, Ana I. Neto^{1,2}

¹Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR/CIMAR), Rua dos Bragas 289, 4050-123 Porto, Portugal jfaria@uac.pt, gmartins@uac.pt, aneto@uac.pt

²CIRN & Grupo de Biologia Marinha, Universidade dos Açores, 9501-801 Ponta Delgada, Açores, Portugal

³Universidade de Lisboa, Faculdade de Ciências, Campo Grande, 1749-016 Lisboa, Portugal mafurtado@hotmail.com

⁴Grupo de Biologia Marinha, Universidade dos Açores, 9501-801 Ponta Delgada, Açores, Portugal

Although limpets can control the abundance and distribution of algae and other organisms, their shells can offer a refuge for the establishment of diverse assemblage that would otherwise be excluded. In this study, we make a preliminary analysis of the epibiota growing on shells of the limpet *Patella aspera*. Individuals of *P. aspera* were collected in all islands of the Azores and the biota on their shells was identified and quantified to species level. A total of 144 species was identified. The composition of the epibiota assemblage varied among islands and among locations within islands. There was also significant variation in epibiota richness at the scale of locations, but not at the scale of islands. A positive and highly significant correlation was also found between epibiota richness and shell length. This study adds to the literature by showing that the shells of *P. aspera*, an over-exploited species in the Azores, support a very rich community of algae and invertebrates and that this is controlled by processes operating at multiple spatial scales ranging from metres (among individuals) to 100's of kilometres (among islands).

T20.P11 WHEN MALACOLOGY MEETS MYCOLOGY: MICROFUNGAL COLONISATION OF EMPTY *CEPAEA* SHELLS

Dagmar Řihová¹, Zedněk Janovský², Ondřej Koukol²

¹Department of Zoology, Charles University in Prague, Faculty of Science, Viničná 7, CZ-128 44 Prague, Czech Republic Branta.bernicla@seznam.cz

²Department of Botany, Charles University in Prague, Faculty of Science, Benátská 2, CZ-128 01 Prague, Czech Republic ZedenekJanovsky@seznam.cz, o.koukol@seznam.cz

Soil and litter colonizing fungi can degrade many natural materials, including highly resilient proteinaceous compounds of animal origin. The shells of terrestrial gastropods are formed from such a compound combined with inorganic calcium carbonate. Nevertheless, the colonization of empty shells by fungi has been hitherto overlooked. We investigated fungal communities colonizing empty shells of the terrestrial gastropod *Cepaea hortensis*. Shells were cultivated on the surface of litter from four different forest types under identical conditions, and the fungi were surveyed and identified in four 3-month periods.

We found and identified 35 fungal species and one genus of filamentous bacterium colonizing the shells. Multivariate analysis revealed a significant effect of the litter type on the fungal community. Known cellulolytic and nonspecific degraders dominated over keratinophilic species. Humidity and pH at the locality are likely to be more important for determining the fungal community than the proteinaceous material of the shell.

AÇOREANA

Revista de Estudos Açoreanos



book of abstracts



world congress of
malacology

ponta delgada | azores 2013 | july 21 | 28

SOCIEDADE AFONSO CHAVES



SUPLEMENTO 8 JULHO DE 2013

AÇOREANA

Revista de Estudos Açoreanos

SUPLEMENTO 8

JULHO DE 2013

WORLD CONFRESS OF MALACOLOGY 2013

Book of Abstracts

*Ponta Delgada, São Miguel, Açores
July 22-28, 2013*

Organized by



Sponsored by



Edited by

António M. de Frias Martins
Ana Cristina Costa
Regina Tristão da Cunha
Sérgio Ávila
Sandra Cármen Monteiro
Pedro Raposeiro



Sociedade Afonso Chaves
Ponta Delgada