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PROGRAM AND ABSTRACTS

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## BENTHIC COMMUNITIES OF THE BAY OF SÃO VICENTE (SÃO MIGUEL, AZORES)

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As part of the project "Biodiversidade no Arquipélago dos Açores" (JNICT: PRAXIS/2/2.1/BIA/169/94 and PRAXIS XXI/BIC/2788/96), the benthic marine communities of the bay of São Vicente (São Miguel island, Azores) were described. All sampling took place in July 1996 and July 1997. A permanent intertidal transect was established, and the zonation of the main organisms recorded by counts (motile animals) and estimates of percentage cover (barnacles and algae). Quantitative collections (three replicates) from each of the major algal zones were taken by scraping attached plants from 100 cm<sup>2</sup> into a fine mesh net bag. Additional, qualitative collections of algae and invertebrates were made from the entire intertidal zone. To sample the subtidal, a line transect was laid from 0m down to 30m depth. The bottom topography was determined by divers swimming along the transect and recording at each meter the depth and type of substratum. Percentage algal cover was estimated at pre-determined depths along the transect (3, 8, 10, 12, 15, 20, 25, 30 m) and all echinoderms, within a 1m area on each side of the transect line, were counted. Quantitative collections were made at each depth by scraping an area of 2500 cm<sup>2</sup>. Qualitative collections of algae and invertebrates were made by swimming around the area and collecting representative specimens. In the laboratory, samples were sieved (1mm, 0.5mm; 0.25mm mesh sizes), and animals were removed from the algae, labeled and preserved in 70% ethanol. Molluscs (from the 1mm mesh) were sorted into species. Other invertebrates were sorted into major groups. Algae were weighed and identified to species. The relative abundance of each algal species was determined using a semi-quantitative scale (D: dominant; A: abundant; F: frequent; O: occasional; R: rare). Distribution data from the intertidal transect indicated the presence of three distinct and well established zones, although some overlap was present. The highest zone was dominated by littorinids (*Littorina striata* and *Melaraphe neritoides*). The upper boundary of the second zone (eulittoral) was marked by the presence of barnacles (*Chthamalus stellatus*). This second zone was dominated by algal turf species (*Caulacanthus ustulatus*) and some small plants of *Ulva rigida*, *Gelidium pusillum*, *Ralfsia verrucosa*, *Enteromorpha* spp. and *Gelidium microdon*. The third zone comprised an extensive area dominated by *Gelidium pusillum*, *Centroceras clavulatum* and *C. ustulatus*, together with a few plants of *Chondria* sp. and *Pterocladia capillacea*. In the adjacent subtidal area, the algal community changed along the depth gradient. *P. capillacea*, *Ulva* spp., *Stypocaulon scoparia*, *Hypnea musciformis* and *Asparagopsis armata* dominated the shallow depths, while *Zonaria tournefortii*, *Acrosorium* spp. and *Dictyota dichotoma* dominated in deeper water. With the exception to *Bittium* sp., that



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## INTRODUCTION

As part of the project "Biodiversidade no Arquipélago dos Açores" (UNICT: PRAXIS/2/2.1/BI/169/94 and PRAXIS XXI/BI/C/2788/96), the benthic marine communities of the bay of São Vicente (São Miguel island, Azores, Fig. 1) were described. The biological richness of this location in the island context was the main reason for its choice as the study area. The main aims of this study were to characterise the littoral communities, to establish the zonation patterns of the main organisms from the intertidal zone down to 30m depth, and to identify and describe the main biological associations.

## MATERIAL AND METHODS

Sampling took place in July 1996 and July 1997. A permanent intertidal transect was established, and the zonation of the main organisms recorded by counts (motile animals) and estimates of percentage cover (barnacles and algae, Fig. 2).



Fig. 2. Intertidal readings.

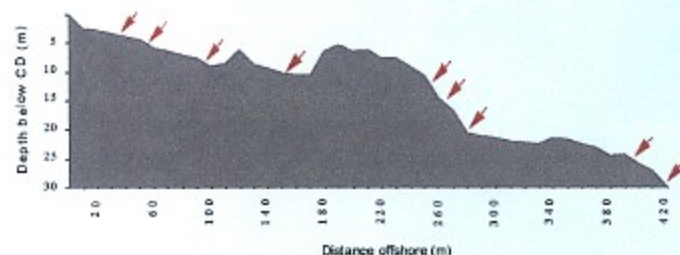


Fig. 3. Profile of the subtidal transect with indication of the collecting points (arrows).

## RESULTS

Distribution data from the intertidal transect indicated the presence of three distinct and well established zones, although some overlap was present (Fig. 5). The highest zone was dominated by littorinids (*Littorina striata* and *Melanthapha neritoides*). The upper boundary of the second zone (eulittoral) was marked by the presence of barnacles (*Chthamalus stellatus*). This second zone was dominated by algal turf species (*Caulacanthus ustulatus*) and some small plants of *Enteromorpha* spp., *Gelidium microdon*, *Ulva rigida* and *Ralfsia verrucosa*. The third zone comprised an extensive area dominated by *Centroceras clavulatum* and *C. ustulatus*, together with a few plants of *Corallina elongata* and *Pterocladia capillacea*. The lower limit of this zone exhibited a few plants of *Asparagopsis armata*.

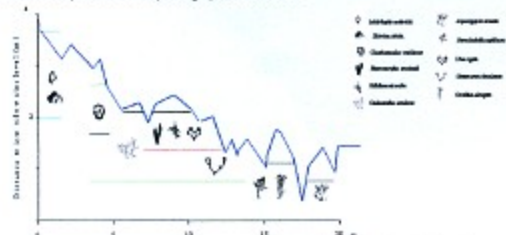


Fig. 5. Intertidal schematic profile with the vertical distribution of the dominant organisms. Light blue lines delimitate the upper zone, green lines the eulittoral level and red lines the lower level.



Fig. 1. Aerial view of the bay of São Vicente: the line represents the transect location; insight: general view of the bay.

Quantitative collections (three replicates) from each of the major algal zones were taken by scraping attached plants from 100 cm<sup>2</sup> into a fine mesh net bag. Qualitative collections of algae and invertebrates were made from the entire intertidal zone. Subtidally, a line transect was laid from 0m down to 30m depth and the bottom topography determined by divers swimming along the transect and recording at each meter the depth and type of substratum. Percentage algal cover was estimated at pre-determined depths along the transect (3, 8, 10, 12, 15, 20, 25, 30 m, Fig. 3) and all echinoderms, within a 1m area on each side of the transect line, were counted. Quantitative collections were made at each depth by scraping an area of 2500 cm<sup>2</sup> (Fig. 4). Representative qualitative collections of algae and invertebrates were also made. Samples were sieved (1mm, 0.5mm; 0.25mm mesh sizes), and animals were removed from the algae, labeled and preserved in 70% ethanol. Molluscs (from the 1mm mesh) were sorted into species. Other invertebrates were sorted into major groups and stored. Algae were weighed and identified to species. The relative abundance of each algal species was determined using a semi-quantitative scale (D: dominant; A: abundant; F: frequent; O: occasional; R: rare).



Fig. 4. Subtidal scraping.

In the adjacent subtidal area (Fig. 6), the algal community changed along the depth gradient. *Pterocladia capillacea*, *Ulva* spp., *Stypocaulon scoparia*, *Hypnea musciformis* and *Asparagopsis armata* dominated the shallow depths, while *Zonaria tournefortii*, *Acrosorium* spp. and *Dictyota dichotoma* dominated in deeper water. No major differences were detected between the two years. With the exception to *Bittium* sp., that was found everywhere, differences in the invertebrate fauna were also observed along the depth gradient.

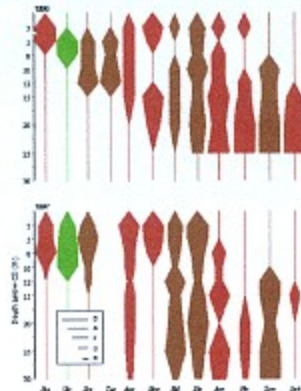


Fig. 6. Relative abundance of the more common algal species at each depth level in 1996 and 1997. Green color: Chlorophyta; Brown color: Phaeophyta; Red color: Rhodophyta. Pte: *Pterocladia capillacea*; Ulv: *Ulva* spp.; Sty: *Stypocaulon scoparia*; Teo: *Teonia stomaia*; Asp: *Asparagopsis armata*; Hyp: *Hypnea musciformis*; Hal: *Halopteris filicina*; Dic: *Dictyota dichotoma*; Acr: *Acrosorium* spp.; Plo: *Plocamium cartilagineum*; Zon: *Zonaria tournefortii*; Sph: *Sphaerococcus coronopifolius*.

Studies of the crustaceans, echinoderms and molluscs are now in progress to identify their associations with the algae and to establish their vertical distribution in the bay.