Gastropod biodiversity in submerged soft and rocky bottoms from the Algarve, South Portugal.

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INTRODUCTION: Marine diversity is currently one of the most studied topics in ecology, especially within the framework of global and regional changes due to environmental and human impacts. The importance of well known benthic faunas for study areas or geographical regions is the first and most important step towards proper characterization and management. Within the Algarve region in south Portugal, very few studies dealing with marine molluscs associated with permanently submerged sand and rock ecosystems have been carried out to date. Here, we provide a brief and broad description of the gastropod biodiversity, sampled and identified between May 2003 and April 2006 in the Central Algarve region.

METHODS: In this study, sampling was stratified by depth (0-10, 10-20, 20-30 m) and a total of 97 different stations were analyzed seasonally. Two indirect methods, beam trawl and Van Veen dredge were used in sand, shell and gravel bottoms. Visual censuses with direct collecting by scuba diving were applied in sand, shell and gravel bottoms as well as in rock and submerged rock bottoms.

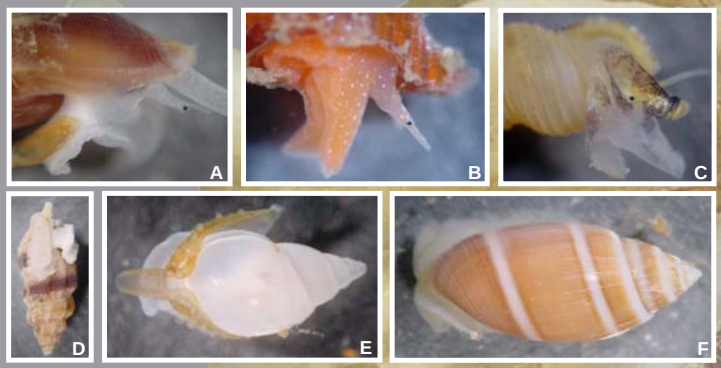

Figure.1 – A) TURRIDAE, ***Haedropleura septangularis*** (Montagu, 1803); **B)** MURICIDAE, ***Ocinebrina aciculata*** (Lamarck, 1822); **C)** CERITHIIDAE, ***Cerithidium submamillatum*** (De Rayneval & Ponzi, 1854); **D)** CONIDAE, ***Mangelia cf. unifasciata*** (Deshayes, 1834); **E)** RINGICULIDAE, ***Ringicula auriculata*** (Menard de la Groye, 1811); **F)** ACTEONIDAE, ***Acteon tornatilis*** (Linnaeus, 1758).

RESULTS: A total of 151 different gastropods species were recorded. Of these, 117 are now fully identified and 34 are still under proper taxonomic study. Clear differences in species composition were observed between all substrate types as well as in different depths ranges.

Figure.2 – A) CAECIDAE, ***Caecum trachea*** (Montagu, 1803); **B)** TROCHIDAE, ***Jujubinus montagui*** (Wood, 1828); **C)** EULIMIDAE, ***Mellanela*** **sp.**.

SANDY BOTTOMS sampled by Van Veen dredge had a total of 26 gastropod species and revealed that the dominate micro-mollusc, with more then 84% of the number of individuals, was *C. trachea* (figure. 2A). The second most important gastropod found was *C. submamillatum* (figure. 1C).

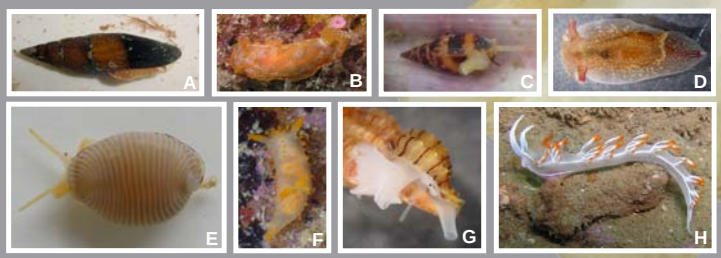

Figure.3 – A) MITRIDAE, ***Mitra zonata*** Marryat, 1818; **B)** DENDRODORIDIDAE, ***Doriopsilla areolata*** Bergh, 1880; **C)** COLUMBELLIDAE, ***Mitrella bruggeni*** Von Aartsen, Menkhorst & Gittenberger, 1984; **D)** PLEUROBRANCHIDAE, ***Pleurobranchaea meckelii*** Leue, 1813; **E)** TRIVIIDAE, ***Trivia arctica*** (Pulteney, 1798); **F)**; POLYCERIDAE, ***Crimora papillata*** Alder & Hancock, 1862; **G)** CONIDAE, ***Raphitoma linearis*** (Montagu, 1803); **H)** FLABELLINIDAE, ***Flabellina affinis*** (Gmelin, 1791).

GRAVEL AND SHELLY BOTTOMS were found to be species-rich, sharing faunas found both on rocky and sandy spots, serving this way, as possible jumping points for colonization. Here, (TROCHIDAE) *Jujubinus exasperatus* (Pennant, 1777) and *O. aciculata* (figure. 1B) were quite abundant. (MURICIDAE) *Trophon muricatus* (Montagu, 1803), (TROCHIDAE) *Gibbula fanulum* (Gmelin, 1791), (NASSARIIDAE) *Nassarius heynemanni* (Maltzen, 1884) and *J. montagui* (figure. 2B) were linked specifically to these bottom types.

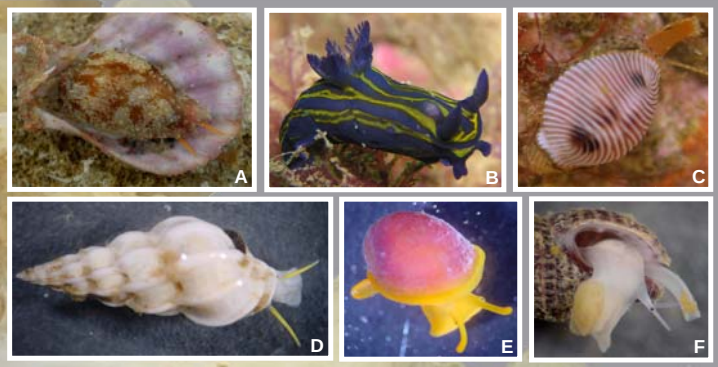

Figure.4 – A) CYPRAEIDAE, ***Zonaria pyrum*** (Gmelin, 1791); **B)** GYMNODORIDIDAE, ***Roboastra europaea*** García Gómez, 1985; **C)** TRIVIIDAE, ***Trivia monacha*** (da Costa, 1778); **D)** EPITONIIDAE, ***Epitonium jolyi*** (Monterosato, 1879); **E)** ***Velutina*** **sp.**; **F)** BUCCINIDAE , ***Chauvetia retifera*** (Brugnone, 1880).

ROCK AND SUBMERGERD ROCK BOTTOMS showed a high biological diversity, with over 100 species sampled species. *N. spelta* (figure. 5C), (NASSARIIDAE) *Nassarius incrassatus* (Ström, 1768), *C. retifera* (figure. 5F), (TROCHIDAE) *Calliostoma zizyphinum* (Linnaeus, 1758), *Clanculus cruciatus* (Linnaeus, 1758) and *Gibbula cineraria* (Linnaeus, 1767) were found in almost all the sampling stations. *E. cornea* (figure. 6D) and *R. europaea* (figure. 4B) showed specific habitat and depth distribution. (MURICIDAE) *Ocinebrina nicolai* Monterosato, 1884 is reported for the first time for Portuguese waters and populations of *Z. pyrum* (figure. 4A) and *M. zonata* (figure. 3A), both protected species in the Mediterranean Sea by the Bern Convention, are now well documented and their habitat may be carefully monitored.

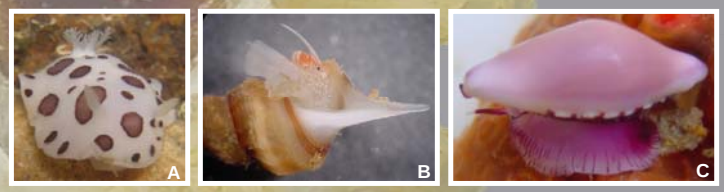

Figure.5 – A) DORIDIDAE, ***Discodoris atromaculata*** (Bergh, 1880); **B)** APORRHAIIDAE, ***Aporrhais pespelecani*** (Linnaeus, 1767); **C)** OVULIDAE, ***Neosimnia spelta*** (Linnaeus, 1758).

REMARKS: With this brief qualitative study we hope to contribute to a better knowledge of the mollusc fauna found in this important geographic region within the Iberian Peninsula. We also hope that a national on-line biodiversity species network may be available in a near future with contributions from all biodiversity groups.

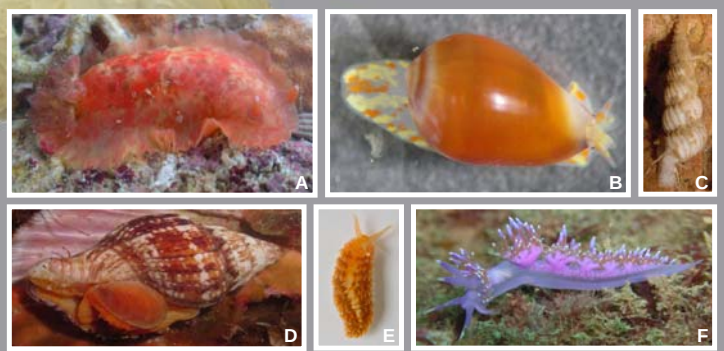

Figure.6 – A) DENDRODORIDIDAE, ***Dendrodoris grandiflora*** Rapp, 1827; **B)** CYSTISCIDAE, ***Gibberula oryza*** (Lamarck, 1822); **C)** EPITONIIDAE, ***Epitonium pulchellum*** (Bivona, 1832); **D)** BUCCINIDAE, ***Euthria cornea*** (Linnaeus, 1758); E); AEOLIDIIDAE, ***Aeolidiella sanguinea*** (Norman, 1877); **F)** FLABELLINIDAE, ***Flabellina affinis*** (Gmelin, 1791).