1.1. = STUDY ON *POSIDONIA OCEANICA* (L.) DELILE ROOTS GROWING ON DIFFERENT SUBSTRATA BY ISTO-ANATOMICAL AND MICRO-MORPHOLOGICAL ANALYSIS

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Posidonia oceanica (L.) Delile grows on different substratum types, ranging from sand, which is easily penetrable by the roots, to rock, in which they are able to enter through crevices (1). In this study a survey was carried out on roots of plagiotropic rhizomes growing on sand (*matte*), and rock (dolonstone and calcarenite), to assess difference in morphological and anatomical features. In particular, for each substratum, nine rhizomes were randomly sampled by scuba diver at 10 meters of depth. In each rhizome histological and morphometric data (2, 3) were recorded on roots up to the second lateral order. Roots on rock were isolated from their substratum by chemical dissolution. Data analysis exhibited differences in roots anatomy and histology between substrata. The adventitious and second order lateral roots showed larger diameter on sandy sediment (from 3,111.88 ± 571.76 μm to 924.64 ± 146.11 μm) compared to ones growing on rocky substratum (from 2,695.14 ± 703.75 μm to 786.36 ± 168.18 μm). The outer cortex of roots was on average thicker on sand (229.41 ± 263.66 μm) than rock (123.49 ± 198.42 μm). Conversely, rhizodermis and mechanical hypodermis were thicker on rock (from 37.17 ± 5.97 μm to 233.19 ± 81.55 μm) than sand (from 30.66 ± 5.34 μm to 139.29 ± 74.04 μm). Similar trends in inner cortex and stele thickness were also found. In adventitious roots, the medulla was rich of well-lignified sclerenchymatic fibers, as they are responsible of the tensile strength, both on rock and sand, while variable results were obtained in first and second order lateral roots. Structures of adhesion have been detected (Fig. 1), very similar to ones discovered in seedlings (4), allowing to identify micro adhesive patterns. In particular, the root hairs genesis was reconstructed on rhizodermis, highlighting the attachment strategies to the substratum based on distal part of root hairs. The penetration strategy of adventitious roots (Fig. 2) was finally observed. Biochemical dissolution of carbonate cements in dolonstone or disintegration of particle components in calcarenite are used by the roots to penetrate into the rock for improving the anchoring capacity and the substrate exploration.

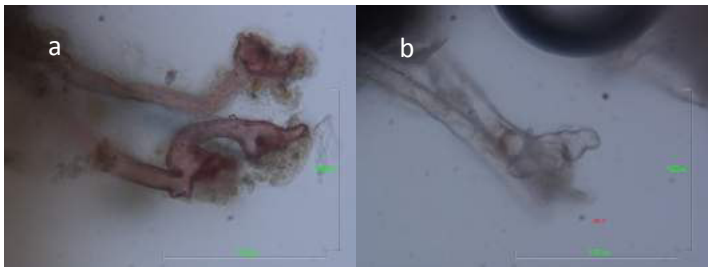

Fig. 1. Adhesion structures of *P. oceanica* root hairs: distal part of root hair on calcarenite (a) and on sand (b).

Fig. 2. Cross-section of calcarenite with roots system above

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