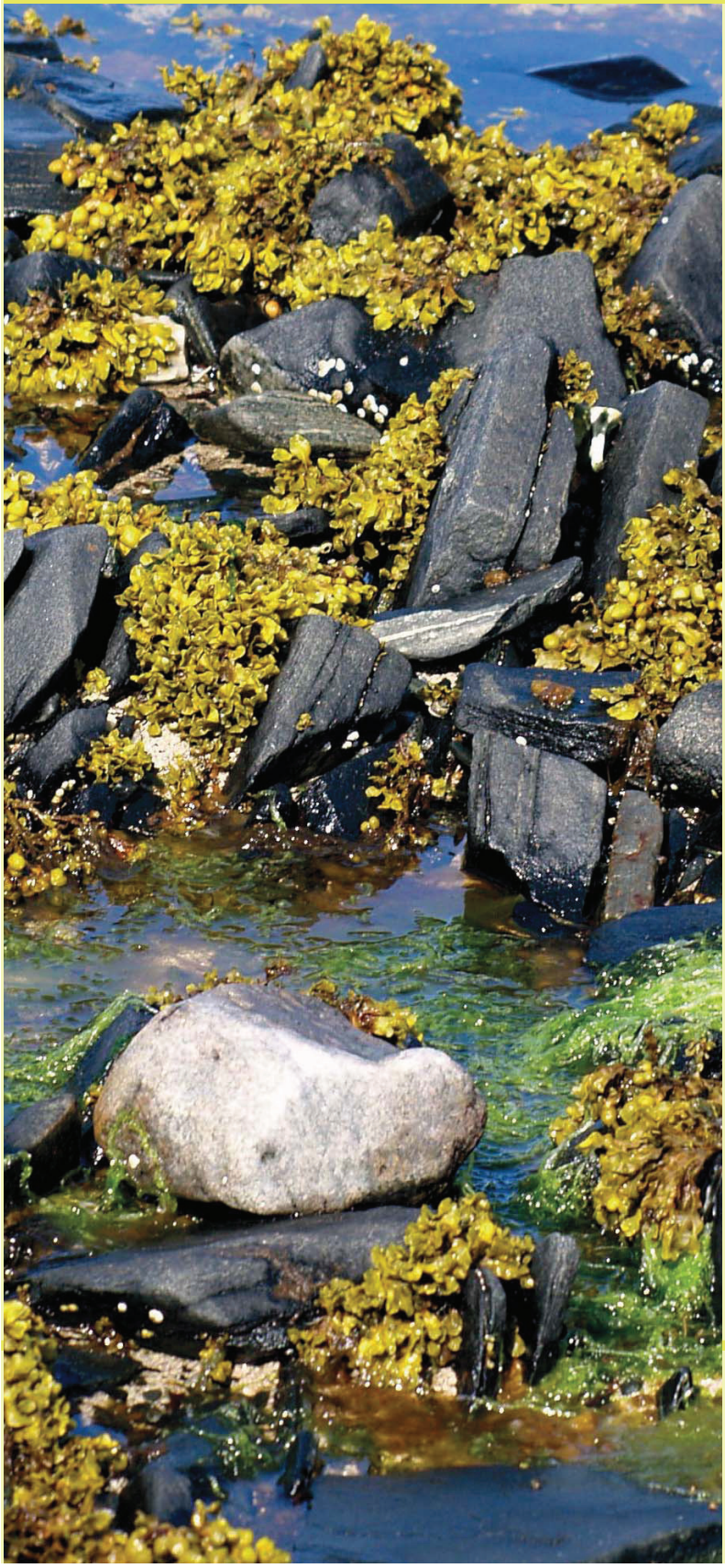
The 12th Symposium on Aquatic Microbial Ecology



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CO_2 INDUCED pH DECREASE: EFFECT ON PLANKTONIC MICROBES

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Carbon dioxide Capture and Storage (CCS) sites are considered as a valid option to 'permanently' store CO_2 from large anthropogenic point sources. Although significant leakage from CCS sites is not expected, if it did occur, it would potentially result in local high concentrations of CO_2, which could have a significant impact on organisms.
To test the pH decrease effect 2 mesocosm experiments have been carried on microbial plankton communities collected from the Gulf of Trieste (Northern Adriatic Sea) in dpring-summer (18°C) and for autumn-winter (10°C) conditions. During each experiment 3 mesocosms with different pH values were set up (6.5, 7 and an aerated control ~ 8). Experiments on plankton were conducted on 200 L initial volume. Every experiment was made up of 3 stages: short term effect (6 samplings within the first 2 days), long term effect (5 additional samplings; 21 days), and a recovery stage (21 days during which each mesocosm was treated with air bubbling). The analyses focussed on prokaryotic abundance and metabolism (degradation processes, carbon production, respiration).
Prokaryotic abundance, which have been previously reported as weakly sensitive to CO_2 induced pH decrease, have confirmed previous literature findings only at 18°C. Contrarily, at 10°C prokaryotes seemed to benefit from CO_2 addition after long term exposure (10- and 6-fold higher at pH 6.5 and 7, respectively). Some prokaryotic activities displayed pronounced differences when subjected to CO_2 injection. Heterotrophic C Production rates were faster at lower pH in both experiments. The degradation of lipids was quickly enhanced at the beginning of CO_2 supply both at 10°C and 18°C. Very different trends characterised phosphatase activity measured at pH 6.5 and 7 from the ones measured in the control. At lower pH values, in fact, it seemed that the activity of this enzyme was pronouncedly inhibited at both temperatures.