Calcification in hermatypic corals is based on direct seawater supply to the biomineralization site

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Corals are major $CaCO_3$ producers the ocean and their skeletons contain a unique archive of paleo-environmental information based on their isotope and trace element composition. The physiological process of biomineralization in corals, however, is not well understood, thus limiting our ability to predict their resistance to global changes, and lowering the reliability of paleo-environmental reconstructions. We investigated the biomineralization processes in the hermatypic coral species *Pocillopora damicornis* and *Stylophora pistillata* using fluorescent dyes with laser confocal microscopy. Colonies growing flatly on glass Petri dishes and small colonies completely covered with tissue (microcolonies) allowed direct in vivo microscopic observations on the actively growing crystals at the calcification site. The fluorescent cell impermeable dyes Calcein and FITC-Dextran which were added to seawater were incorporated to the aragonite skeletons of micro-colonies during short incubations of several hours. This suggests direct seawater supply into the calcification site. The seawater probably passes through the calicoblastic epithelium in narrow paracellular pathways between cells. The size of these narrow pathways is probably between 20 nm and 1 μm based on the incorporation of fluorescent plastic spheres into the growing skeleton of micro-colonies.. Previous studies demonstrated the involvement of membranal Ca^{2+} channel and Ca-ATPase in the calcification process of corals. We propose that in addition to the activity of these channels and pumps, Ca^{2+} and CO_3^{2-} ions are supplied to the calcification process directly with the seawater. The activity of Ca-ATPase may be very important to elevate the pH of the seawater at the calcification site, thus increasing the CO_3^{2-} and facilitating diffusion of inorganic and respiratory CO_2(aq) into the calcification site. Our findings explain both the high sensitivity of corals to ocean acidification and their high fidelity in recording pale-environmental proxies of ocean chemistry.

Environmental pollution originated from open dumping of solid waste in the cities of Eastern Black Sea

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Almost all municipalities dispose and discharge their wastes and wastewaters into the shallow sea water and the coast, mostly without treatment and outfall systems in the countries on the Black Sea coast. About 450-500 tons solid waste is generated in a day and more than 70 percent of solid waste having high organic and inorganic strength is disposed to the open dumps, land, sea and the rivers in the coastal cities of the Eastern Black Sea Region, Turkey. In the coastal cities of Eastern Black Sea Region, collection and transportation stage of solid wastes are generally well organized, but not disposal of municipal, industrial and agricultural wastes. All municipalities and industrial factories have disposed their solid wastes with together hospital and hazardous wastes to the nearest lowlands and river valley or directly into the sea environment without any prior treatment. This solid waste management strategy applied for a long time has threatened environmental health. Due to these solid waste and wastewater management strategies, coastal cities of Eastern Black Sea are faced with serious environmental and administrative challenges in recent years. In this study, an overview of the current solid waste management situation in Eastern Black Sea Region and provides a brief discussion of the future challenges are analyzed, the environmental, technical, social goals are discussed.

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