Production and Decomposition Mechanisms of Re e Oxygen Species by Red-tide Causing Phytopl to — Case Study for Hydrogen Peroxide.

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In this doctor's thesis, the distrib□□□□□□□□□□□□□□□□□□□□□□□□□□□□xygen Species S (mainly hydrogen peroxide (H_2O_2)) in the ocean was studied. I have studied the biological generation of H_2O_2 as well as the production by photochemical processes. Especially the phytoplankton that may cause harmful□□□□□□□□□□ □□ □□□□□□□□ □□□□□□□□□□□□□ultured fish and bivalves, in late spring t earl s mmer in the Seto Inland Sea and other coastal seas in Japan were investigated for their ability of ROS production and decomposition by analyzing of natural red t de e ter d t red es.

Firstly, previous studies of production, distribution and decomposition of H_2O_2 in the environment mainly in the atmosphere and the ocean was summarized and on the basis of previous studies, the aim and significance of this study were described.

Secondly, the concentration and the behavior of H_2O_2 in the Hiroshima Bay seawater was investigated during 8 cruises in 1996 to 2002 (except 2000). H_2O_2 was characterized as higher concentrations at the surface water with decreasing trend with depth. The H_2O_2 concentration showed higher during the daytime (140-450 nmol L^{-1} at 5:00-19:00) than during the nighttime (85-260 nmol L^{-1} at 20:00-4:00) and suggested that H_2O_2 at the surface seawater was generated by photoch ic ctio so partly by biological production on the process of photosynthesis by phytoplankton. The correlation of H_2O_2 with environmental factors such as salinityi w si mi i lri min

H_2O_2 was prevented by filtration of seawater before the incubation, suggesting that the decomposition was taken place by microorganisms including phytoplankton in seawater.

Thirdly, biological production of H_2O_2 in HiH o i a i a a a a p a p a a e a a a H a a p a u a a f a u a

bloom period biological processes may be the dominant for H_2O_2 generation. It is clear that at some species of red tide in Japan and other countries have the specific mechanism of H_2O_2 production and decomposition. Considering significant fishery damage reported by this species, further clarification of production and decomposition processes of ROS is needed.