

Autotrophic uptake by mesophilic heterotrophic bacterial isolates from Sino-Pacific marine sediments

Cao Wenrui¹, Das Anindita^{1,2*}, Saren Gaowa¹, Jiang Mingyu¹, Yu Xinke¹

¹ Institute of Oceanology, Chinese Academy of Sciences, 7th, Nanhai Road, Qingdao- 266071, P.R. China; caoyubeibei@126.com

² National Institute of Oceanography, Council of Scientific and Industrial Research, Dona Paula, Goa-403004, India; anindita.ocean@gmail.com

Microbial carbon fixation is a paramount process in marine sediments especially below the photic zone. Autotrophic microbes that fix carbon dioxide are renowned. However the question whether heterotrophs can also fix carbon is intriguing. Ten heterotrophically isolated, identified bacterial isolates from the Sino-Pacific marine sediments were test for autotrophic uptake potential with and with electron donor spiking. Nine of the ten isolates showed carbon uptake capacity without the addition of any other substrate except autoclaved sea-water, although at very low rates in the order of 10^{-8} to 10^{-4} fmol C cell⁻¹ hr⁻¹. The addition of manganese and ammonium at 1mM final concentration had an uptake enhancing potential while reduced iron (10^{-6} to 10^{-5} fmol C cell⁻¹ hr⁻¹) and sulphide (10^{-5} fmol C cell⁻¹ hr⁻¹) had an opposite respiration enhancing potential. A possibility of anapleurotic reactions is prominent in most isolates. The inter-play of oxidative cycles of manganese and ammonia with that of reductive cycle of iron and sulphur by the same isolates may indicate the multi-tasking capacity of these microbes and there “toggle-switch”-like role in mineral recycling processes in these sediments.