

Small Molecule-Mediated Paralytic Effects on Movement Regulation in Symbiotic Dinoflagellates

○Carlos Augusto Loayza-Cassano¹, Hiroshi Yamashita², Yuta Tsunematsu¹, Masaki Kita¹

¹*Graduate School of Bioagricultural Sciences, Nagoya University*

²*Fisheries Technology Institute, Japan Fisheries Research and Education Agency*

Keywords: symbiotic dinoflagellate; host regulation mechanism; paralytic effect; inter-strain effect

Symbiotic dinoflagellates form essential relationships with diverse marine invertebrates, including corals, giant clams, and jellyfish. These dinoflagellates exhibit two distinct forms—motile and coccoid—with the latter being predominant within host animals¹. However, the mechanisms by which host organisms regulate these forms and the movement of dinoflagellates remain poorly understood, as do the interactions between different dinoflagellate strains.

In this study, methanolic extracts from different strains of dinoflagellates were tested to examine potential inter-strain effects. Notably, the extract of one strain induced a reversible paralytic effect, temporarily inhibiting movement in other dinoflagellates. This effect subsided within 24 hours of exposure and removal of the extract, indicating a non-toxic response. Fractionation revealed that the dichloromethane layer retained these paralytic properties, and further separation via open column chromatography identified specific fractions responsible for the effect. Interestingly, some alkaloids of plant origin were also found to exhibit similar reversible paralytic effects on dinoflagellates, suggesting the potential role of small molecules in influencing dinoflagellate behavior.

These findings highlight a non-lethal mechanism through which certain compounds might influence dinoflagellate behavior, potentially shedding light on inter-strain interactions and regulatory processes in symbiotic relationships.

1) Fujise, L., Yamashita, H., & Koike, K. (2014). Application of calcofluor staining to identify motile and coccoid stages of *Symbiodinium* (Dinophyceae). *Fisheries science*, 80, 363-368.