CHAPTER 1

INTRODUCTION

The potential role of competition for space in a community depends on the arrangement of interaction relationships (Bak et al, 1982). Since Lang (1971) reported extracoelenteric digestion by mesenterial filaments of the Scleractinian corals, many studies on competitive aggression have been performed. Lang (1973) described that when the polyps of different corals touch each other, the species which are "Stronger" aggressor extrude mesenterial filaments over their less aggressive neighbor, dissolving those tissue within reach by extracoelenteric forms of digestion and the interaction of different species have a definite and consistent hierarchical structure. She also illustrated how digestion of competitors by this means provided Atlantic corals with an ecological benefit. She reported the number of subordinate species that each coral digested and obtained a rough linear hierarchy in which most aggression was shown by small, slow-growing forms.

As ecological aspects, Connell (1975) remarked on reciprocal interactions, environmental disturbance and reproductive, strategy as the factors offsetting the dominance of highly ranked species on reef flats in the Indo-Pacific Ocean. In the Caribbean, Richardson et al (1979) stated that sweeper tentacles extended by *Montastrea carvernosa* held at the bay of its congener, *M. annularis* which is dominant in terms of mesenteric filament digestion. Such tentacles appear to exist in many coral species including several shown to be dominant in interspecific conflicts on reefs (Wellington, 1980). Several authors suggested that sweeper tentacles of certain scleractinian corals are used in interspecific competitions (Richardson et al, 1979; Wellington, 1980; Bak et al, 1982; Chornesky, 1983) and intraspecific interactions (Hidaka and Yamazato, 1984). Such tentacles may be one mechanism cause of apparent reversals of dominance. Bak et al (1982) pointed out that after an initial contest through extracoelenteric digestion, at least two additional processes could be followed, which result in a reversal of dominancy. They were interference by epifauna and sweeper tentacles development.

Sheppard (1979) categorised 54 common Scleractinian coral species as dominance, intermediate and subordinate from observations of undisturbed corals on reefs of Chagos, Indian Ocean. From these results, several species showed both rapid growth and aggression, forming dense, sometimes monospecific zones, with abundance sometimes positively correlated to dominance. Moreover, Sheppard (1981) found a significant increase in the frequency of aggressive interactions of corals between 5 - 15 m. in depth on the Great Barrier Reef which was not a function of coverage or density. Bradbury and Young (1981, 1983) analysed the spatial patterns of corals at Heron Island, Great Barrier Reef, and concluded that coral interactions can play only a minor role in community structure. Bak and Creins (1982) studied the reaction within Acropora species by experimental grafting. They found no strong antagonistic reactions and assumed that were the strategies which were adopted by many species of corals.

As intraspecific interactions aspects, Potts (1976) examined growth interactions among morphological variants of Acropora palifera and described specific growth pattern response as 'overgrowth', 'filling' and "fusion". He stated that digestive aggression seems totally unimportant among different forms of this species. Rinkevich and Loya (1983) examined intraspecific interactions in a Red Sea coral, Stylophora pistillata, and stated that the outcome of interaction between two competing colonies is the synergistic effect of different aggressive response such as nematocyst discharge, overgrowth on branches or basal plates, a 'retreat growth' phenomenon, formation of special border lines between two alien tissue and abnormal growth forms. The outcome of the competition could be also affected by the differences in size of the contesting colonies (Rinkevich and Loya, 1983). Recently, they concluded that the competition involves a large investment in energy and thus slows down both somatic and germinal growth (Rinkevich and Loya, 1985).

As immunological aspects, immunological response between species and between different colonies of the same species could provide a component of the aggression complex when coral tissues were brought into contact with each other (Hildemann et al, 1975, 1977 a, 1977 b). Subsequently, clonal population structures of corals were examined by experimental grafting and concluded that grafting by simply placing seperate colonies in soft tissue contact can provided a highly discriminating method for assessing genetic diversity as well as the sexual vs. asexual origins of reef coral populations (Jokiel et al, 1983, Neigel and Avise, 1983). However, some authors reported the conflicting results from electrophoresis and histocompatibility (Heyward and Stoddard, 1985; Willis and Ayre, 1985; Resing and Ayre, 1985).

The species of Montipora are at the lower ranking of competitive ability (Sheppard, 1979; Cope, 1981; Yamazato and Yeemin, 1986). Previously, the studies on coral interactions have not been focused on the species of Montipora, although it contains relatively larger number of species, wide distribution and high abundance. Therefore the remarkable mechanism of reactions in this genus is still very much in questions. Sakai and Yamazato (1987) reported that there are 14 species of Montipora around Sesoko Island, East China Sea.

The aim of this study was to investigate the processes of interactions within and betaween certain species of genus Montipora which were found around Sesoko Island, East China Sea. Experimental grafting methods together with observation of populations on the natural reefs of Sesoko Island were conducted in order to clarify the following items: mechanisms and processes of interactions both inter and intra-specific interactions (i). The ranking of competitive ability among the four species of genus Montipora (ii) and genotypic diversity of populations by histoincompatibility bioassays (iii).