

## A glimpse of coral reef studies in pre-westernized Japan

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Description of corals and coral reefs can be found in Japanese folklore and myths. In ancient times, ruby coral (*Corallium rubrum*; imported from the Mediterranean, via China) was used in one of the Seven Treasures, and limestone from uplifted reefs was used to build castle walls, bridges, and pavements. The first identification of scleractinian coral coincided with the advent of western-style natural history in Japan. Hard corals were originally assigned to rock during the Nara Period (710-784) and then as a plant under the Edo Period (1603-1867) of herbalism. In 1775-1776, a Swedish scientist, Thunberg, staying in Nagasaki, recognized *Acropora* corals as an animal (Kajishima 1997). He was recommended visiting Japan by Linne (Linnaeus), his Mentor and the founder of modern taxonomy (Japan Academy 1960). Thereafter, scleractinian corals were classified in a kind of shellfish by virtue of their hard skeletal tissue. Not until the late Edo Period was it recognized that corals thrived along the coast of Japan (Suzuki 1999). The Japanese names of coral species referable to *Favia*, *Fungia* and *Acropora* are seen in the herbalist literature of the Edo Period. The first accounts of corals in markets were documented in late Edo Period, when traded species included *Corallium japonicum kishinouye* and *C. elatius ridley*, harvested from adjacent waters along Honshu, the main island of Japan. Corals were first exported from Japan at the end of the nineteenth century.

Reports and hydrographic charts from the late eighteenth and early nineteenth centuries show reefs and uplifted reefs on the Ogasawara and Ryukyu Islands (Okinawa) (Konishi 2004). In "Structure and Distribution of Coral Reefs", Darwin (1842)

refers to the voyage records of Hall (1811) and Beechey (1831). The Tokugawa government, while responsible for the naval defense of the Japanese coast, revised a map of Japan in the Genroku Era (1688-1704) (Culture Division Okinawa Prefecrural Board of Education 1992), from a Shouhou Era (1644-1648) map drawn half a century before (Culture Division Okinawa Prefecrural Board of Education 1991; Tokyo National Museum, and The Historiographical Institute, The University of Tokyo 2001, 2002). This map illustrates the coral reef distribution of Okinawa in the Ryukyu Islands in fair detail.

A portion of the Miyako Archipelago can be seen in a map made during the Shouhou Era (Fig.1). The Yaebishi (Yabiji) reefs, 5-15 km north of Ikema Island, can be clearly seen, stretching approximately 7 km from east to west (Konishi 2002). It has been believed that the 400-ton sloop vessel "Providence" was stranded there on 17 May 1797, with 115 crews onboard including W.R. Broughton. A map from the Genroku Era showing Sekisei Lagoon within the Yaeyama Archipelago indicates coral development as extensive as present (Fig. 2). In 1972, a part of the Yaeyama region was designated as Iriomote National Park. Five years later, the area was named a Marine Park Zone. This area currently plays a major role in coral reef research in Japan, including investigation of reef rehabilitation. The area acts as a base field for surrounded by six research institutes: the Seikai National Fisheries Research Institute, International Coral Reef Research and Monitoring Center, WWF Coral Reef Conservation and Research Center, Yaeyama Marine Park Research Station, Iriomote Branch of the Tropical Biosphere Research Center



Fig.1. Map of the Shouhou Era (1644-1648), showing the Yaebishi (Yabiji) reefs north of Ikema and Miyako Islands of the Miyako Archipelago.



Fig. 2. Map of the Genroku Era (1688-1704), showing the reefs of Sekisei Lagoon, which is surrounded by the islands of Yaeyama Archipelago; Ishigaki on the east; Kuroshima on the south; and Iriomote on the west.

of University of Ryukyus, and Okinawa Regional Research Center, Tokai University. Other associated organizations include the Yaeyama Fisheries Cooperative, Yaeyama Coral Reef Conservation Association, and Yaeyama Diving Association.

Both maps of Shouhou and Genroku Periods were complemented with the help of the Satsuma Domain, which ruled the former maritime Kingdom of the Great Lew Chew. The knowledge required to make these maps must be supplied by people in Ryukyus, who traded with neighboring countries as early as the twelfth to fourteenth centuries (through to the Dynasty Era in the fifteenth to seventeenth centuries) and that they had an extensive knowledge of coral reef distribution, developed through sailing and fishing (Konishi 2002). Okinawan fishermen (*uminchu*) from Ikema Island used to call Yabiji a 'marine farmland'. They had a detailed understanding of the topography of individual patch reefs and channels in Yabiji, as well as the associated distribu-

tion of fish habitats (Setoguchi 2003).

Studies of coral reefs in Japan are now comparable to those of the western world. Like coral habitats worldwide, the reefs (especially in Okinawa) are suffering from the threats of interactive stresses by global climatic changes and anthropogenic activities (e.g., over-fishing, unchecked tourism).

In Sekisei Lagoon, it has begun to protect and restore local reefs, in order to save there as refugia for corals and keep to recruit the larvae to rehabilitate deteriorated habit (Buddemeier *et al.* 2004). Scientists, managers, policymakers, and local communities will accomplish such goal with multiple efforts (Hughes *et al.* 2003), through international collaboration (Wilkinson 2002). We, *Homo sapiens*, can look back what coral reefs have taught us, and think over what shall be learned from them. The time has come.