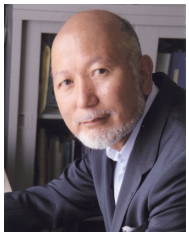
Introduction



Coral reef studies at Palau:

Dr. Siro Kawaguti, Palao Tropical Biological Station
and Palau International Coral Reef Center

by Dr. Makoto Omori*

I have learned about coral reef studies by Japanese young biologists at Palau before the Second World War from Professor Sigeru Motoda in 1959 when I was his student at Hokkaido University. His talk was very attractive to stir my desire to swim into coral reefs. The following introduction about the Palao Tropical Biological Station (PTBS) and people working there are mainly based on the Motoda's talk and writings.

Establishment of the PTBS has been initiated by Dr. Sinkisi Hatai, Professor at Tohoku Imperial University, who learned the importance of marine station and coral reef research during his stay at Tortugas Laboratory of the Carnegie Institution of Washington, Florida, in 1916 and 1917. Following after his earnest persuasion and proposal to the Japan Society for the Promotion of Science (JSPS), the JSPS decided opening of the new research station PTBS in June 1934, and Hatai was nominated as the Director. A small laboratory was built in March 1935 at inner coast of mangrove passage near Arabaketsu Village (Present name: Ngerbeched) of Koror Island, Palau that had been governed under the Japanese Mandate of the League of Nations (fig. 1).

fig. 1 Palao Tropical Biological Station (PTBS) in 1935

At the beginning, the space of laboratory allowed two or three scientists to work at one time. It was enlarged in 1938, and a small library and a motor boat for the collection of shore specimens were facilitated. The main field of research was the inner lagoon "Iwayama Bay (Present name: Nikko Bay)" which is enclosed by Koror Island and Olopshakal Island (Present name: Ulebsechel Island).

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The JSPS formulated major projects to be conducted by resident biologists at the station as follows:

1. Basic studies:
   - Geographical mapping of Iwayama Bay
   - Species of reef-building corals
   - Physical and chemical properties of the water in the Bay, and plankton fauna and flora and their functions
   - Animals and algae as related to the formation or distribution of coral reefs
2. Ecological studies of reef-building corals
3. Studies on the metabolism of reef-building corals
4. Studies on the breeding and development of reef-building corals
5. Relation between reef formation and environmental conditions.

A characteristic of the PTBS was that there was no full-time research staff stationed there. Research activities were kept by resident biologists who were supported by JSPS with short-term contracts. Most biologists were 25−35 years old and lectures, research assistants, or graduate students at various universities in Japan. The duration of individual stays varied from two months to four years depending on the nature of the project and other circumstances. Siro Kawaguti stayed at PTBS from June to October 1936 and from December 1939 to April 1940. He was young and spirited lecturer at Taihoku Imperial University, Taiwan where was under Japanese administration at that time (fig. 2).

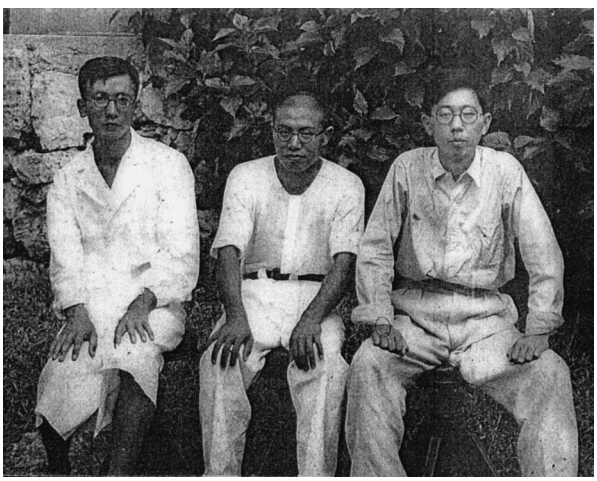

fig. 2 Dr. Sigeru Motoda, Dr. Siro Kawaguti, and Dr. Tokiharu Abe (from left to right) at PTBS in 1936

The studies were carried out by a total of 29 young Japanese scientists until closure of the PTBS in March 1943 when the station was taken over by the Japanese navy. The houses, equipment and literature in the library were lost due to confusion during the end of the War. In spite of the short life of the station, research activities there had made a memorable and significant contribution.

There was no freshwater supply in Palau at that time. People had to store rain water in a tank at each house. Electrical power was supplied only during the early night. Despite these hardships, young scientists enjoyed their life on this tropical island with its rich marine fauna and flora of the coral reefs.

Some notable works by the resident biologists are as follows: N. Abe studied life history of *Fungia*. M. Eguchi identified 116 species of 43 genera of Madreporaria from Iwayama Bay. Motoda discussed the relationship among coral growth, underwater light intensity and amount of suspended silt. K. Atoda and I. Kawakami studied breeding, larval development and sexual reproduction of the corals. Respiration, regeneration, phototropism, and function of pigments of symbiotic zooxantellae were studied by Kawaguti.

Results of these studies were published in an English report ("*Palao Tropical Biological Station Studies*", Vols.1 and 2) and a Japanese report ["*Kagaku Nanyo*" (*Science of the South Sea*), Vols. I−V and No. 15]. There are 66 papers contained in the former publication, and 116 papers in the latter. The titles of those literatures are listed in Omori and Yukihira (2007). It is noteworthy that, in spite of his two relatively short stays at the PTBS, Kawaguti wrote six papers in the *Palao Tropical Biological Station Studies* and five papers in the *Kagaku Nanyo*, respectively.

After the closure of PTBS, coral reef studies of Japan were paused for some time until opening of the Sesoko Marine Science Center (currently known as Sesoko Station) of the University of the Ryukyus in 1972. With warm spiritual supports by a number of former scientists at the PTBS, such as Motoda, Kawaguti and T. Abe (shown in fig. 2), Akajima Marine Science Laboratory (AMSL) was established in 1988. Their occasional visits encouraged coral reef studies at the AMSL.

In 1994, the importance of investigating the threat to coral reefs was recognized in the US-Japan Common Agenda. This led to the establishment of the International Coral Reef Initiative, a global partnership formed to draw attention to the severe plight of coral reefs. The excellent coral reef research at the PTBS was reconfirmed. Accordingly, upon request from the Government of Palau, the Government of Japan agreed to offer grant-in-aid for the project of establishing a new Palau International Coral Reef Center (PICRC) (fig. 3). The objective of PICRC is to promote scientific research and public awareness for the importance of the conservation of coral reef and its ecosystem through various activities. Japan's financial aid covered the cost of the construction of the laboratory, a visitor's center including a small aquarium, and equipment in the facilities. In addition, diving equipment, two boats, and various instruments for basic oceanographic research became available. Opening ceremony of the PICRC was held on January 18, 2001. Taking Motoda's desire in life into consideration and with donation of the PTBS Memorial Dedication Committee in Japan, a monument was set at former site of the PTBS on the same day (appear in Appendix 2-2).

Since then, a number of scientific/technological advisors have been dispatched from Japan to PICRC to assist with its operation and promotion of coral reef studies. Scientists from around the world also cooperate to enhance research activities at and promote public awareness of PICRC. On the occasion of Palau Coral Reef Conference at PICRC on July 23−26, 2003, the organizing committee invited Dr. Kawaguti to Palau as an honorable guest. He was 95 years old and presented plenary address "Motile zooxanthellae in reef corals and zooxanthelate bivalve molluscs". He enjoyed indeed both discussion at the conference and excursion in the beautiful island (appear in Appendix 4-10).

fig. 3 Palau International Coral Reef Center (PICRC) in Koror, Palau

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