Kagoshima University Research Center for the Pacific Islands Occasional Papers No.39, 83-86, 2003
Section 2, Report 9. The Progress Report of the 2000 and 2001 Survey of the Research Project
"Social Homeostasis of Small Islands in an Island-zone"

CIGUATERA FISH POISONING IN ULITHI ATOLL, YAP STATE, MICRONESIA

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Abstract

Ciguatera toxification of herbivorous marine fish has been known in Fassarai Is. and Falalop Is., Ulithi Atoll in Micronesia since the 1950s. From the coral reef of these islands, the brown alga *Turbinaria conoides* was collected and an epiphitic dinoflagellate *Gambierdiscus toxicus*, that is known to synthesize ciguatera toxin, was identified on the surface of algal thalli in Oct. 2001. Some outbreaks of fish poisoning occurred every year in the atoll, however no victims were reported during the last few years. Recent victims took a fresh extract of *Messerschmidia argentea* called *Lipii* in Ulithi Atoll. This leaf-extract is believed to have the highest curative qualities in all cases of ciguatera poisoning in the atoll.

Keywords: ciguatera, fish poisoning, Ulithi, *Turbinaria, Gambierdiscuss, Messerschmidia*

Introduction

Ciguatera is a type of fish poisoning known in tropical South Pacific regions such as French Polynesia, Papua New Guinea, Fiji, Micronesia and Palau (YASUMOTO et al. 1977; INOUE 1987, 1992; INOUE et al. 1985, 1995, 1996). This toxification paralyzed foudroyantly and caused fever and diarrhea in those who ate herviborous coastal marine fish such as *Plectropomus leopardus* (Fig. 1) or *Variola louti* (Serranidae). The mortality rate was sometimes rather high, especially for children and older people.

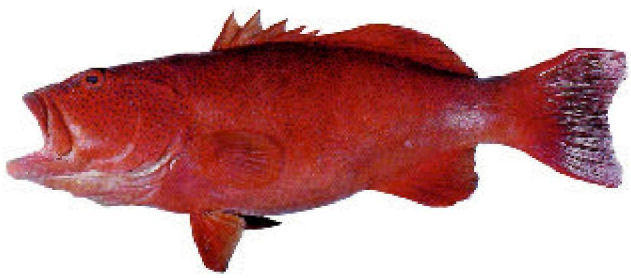

Fig. 1. *Plectropomus leopardus* (Serranidae) or *lap-lap*, poisonous fish in Ulithi Atoll, Yap, Micronesia

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The cause of the ciguatera was revealed to be a neurotoxin synthesized by the epiphitic dinoflagellate *Gambierdiscus toxicus* Adachi *et* Fukuyo, which attaches to the surface of brown and red algae in coral reefs and were accumulated by algae-eating fish (ADACHI and FUKUYO 1979; YASUMOTO et al. 1977a, b).

During the Ulithi Research Expedition conducted by Kagoshima University Research Center for the Pacific Islands in 2001, the authors had an opportunity to study the current state of Ciguatera poisoning in Ulithi Atoll of Yap state, Federated States of Micronesia.

Materials and Methods

Benthic macro algae were collected along the coasts of Mogmog Is., Asor Is., Falalop Is. and Fassarai Is. of Ulithi Atoll, Yap, Micronesia, from 19 to 27 October 2001 as shown in TERADA et al shown in these occasional papers. Among these algal specimens, the brown alga genus *Turbinaria* which is thought to be the host seaweed of the epiphytic *Gambierdiscus toxicus* was examined by microscope on the research vessel *MV Keiten-maru*.

Results and Discussion

Fish poisoning in Ulithi Atoll.

Reliable statistical data about fish poisoning was not available at the dispensary of the islands. According to the islanders, at least one or two people suffered from fish poisoning after eating a marine fish called *lap-lap* (Fig. 2), possibly *Plectropomus leopardus or Variola louti* (Serranidae). While detailed information on the survival rate of the patients was obscure, the number of deaths may be small in the atoll. Most of the poisonous fish, *lap-lap*, was caught near Falalop Is. and Fassarai Is. of Ulithi Atoll. The people recognized that ciguatera fish poisoning was prominent after the 1950s but there were no records of poisoning occurring before that period.

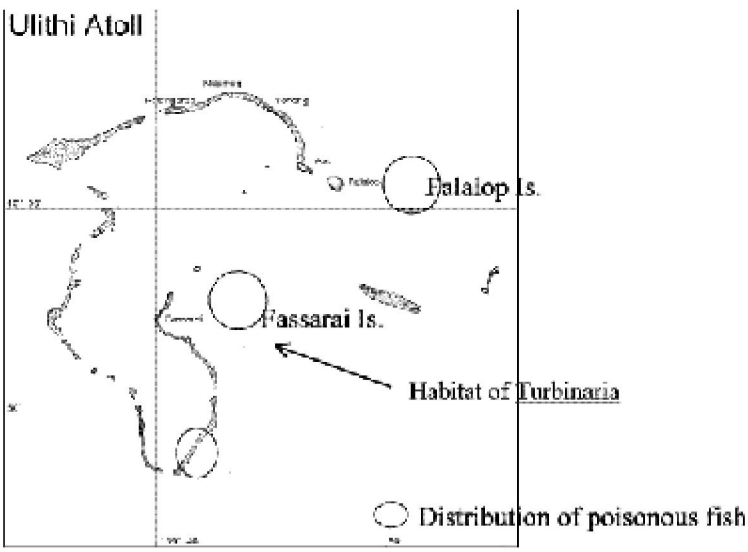

Fig. 2. Distribution of poisonous fish, *lap-lap* in Ulithi Atoll. Ciguatera poisoning of *lap-lap* was restricted in the coral area near Falalop Is. and Fassarai Is. Toxic dinoflagellates, *Gambierdiscus toxicus* was found on the thalli of the brown alga *Turbinaria conoides* in the south of Fassarai Is.

Cause of Fish poisoning in Ulithi Atoll.

On all of the islands, where algal flora was studied in our field trip, *Turbinaria conoides* was often seen cast up on shore (Fig. 3–4). While this brown alga may be distributed on the reef edge of the atoll, the authors could not collect live specimens by snorkeling. The outer edge of the atoll was washed by strong waves caused by a typhoon during the field trip. The dinoflagellate *Gambierdiscus toxicus* that is known as the cause of ciguatera fish poisoning, was detected on the thalli of these semi-dried *Turbinaria* on the beach (Fig. 4). Fortunately the authors had an opportunity to collect *Turbinaria* on the southern beaches of Fassarai Is. and several cells of *Gambierdiscus toxicus* were identified attached to the surface of the algae. East of Ulithi Atoll, near the fishing grounds of Falalop Is. and Fassarai Is., the possibility of *Gambierdiscus toxicus* attached to benthic brown alga may have contributed to the poisoning of ciguatera associated fish.

Fig. 3. Brown alga *Turbinaria conoides* cast up on shore of Mogmog Is., Ulithi Atoll

Fig. 4. *Turbinaria conoides* on a coral beach of Mogmog Is.

Fig. 5. *Messerschmidia argentea* collected from Asor Is., Ulithi Atoll. Local name called *lippi*.

Antidote locally used for fish poisoning.

In Ulithi Atoll, extract from a tree was used as an antitoxin for ciguatera fish poisoning. The plant was called *lippi* in the islands and velvet-like young leaves were homogenized in a stone mill. The extracted fresh juice was given to the victims of fish poisoning. According to the local doctor at the dispensary, the effect of the herb was quite conspicuous and the patients recovered in several hours after they took the extract. A specimen was collected at a beach of Asor Is. shown in Fig. 5 and classified as *Messerschmidia argentea Lippi* is a common tree in Yap State, but only the islanders of Ulithi Atoll use it as an antidote for the fish poisoning.

In the halophilic habitat of *lippi*, this tree may have a mechanism to exude absorbed salt externally. The expected sodium pump of the cell or metabolism of the cell may have a possibility of reducing ciguatera toxicity to the human neural system. More physiological and biochemical studies may be required.

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