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The Distribution of Diatoms in Yoronjima and Application of the Diatom Test for the Diagnosis of Death by Drowning in Open Sea Islands

Kazutoshi AGO, Mihoko AGO and Mamoru OGATA

Department of Legal Medicine, Graduate School of Medical and Dental Sciences,
Kagoshima University, 8-35-1 Sakuragaoka, Kagoshima 890-8544, Japan

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Abstract

The distribution of diatoms in Yoronjima was investigated as a model study to evaluate the application of diatom testing for the diagnosis of death by drowning off islands located in the open sea. Sea water samples were collected at 10 sites off Yoronjima. The numbers of diatom varied owing to the difference of location, the distance from shore, the depth of sea and the tide. These results suggest that analysis of the putative drowning medium is essential for an accurate diatom test for drowning in islands like Yoronjima located in the open sea.

Key words: Legal medicine, Drowning, Diatom test, Open sea island, Yoronjima

Introduction

Diatom testing is the most reliable method to diagnose death by drowning. The diatom test for drowning is based on inhalation of diatom-laden water in the alveolus and embolization to internal organs[1]. If diatoms are detected from organs such as the liver, spleen and kidneys of cadavers, the diagnosis of drowning is confirmed. Diatoms have silica-based frustules which are resistant to acid digestion so that the recovery of diatoms from a cadaver is possible. Diatoms proliferate broadly and abundantly distribute all the year in rivers, lakes, ponds and the sea, but their numbers decrease rapidly in the open sea[2]. Therefore, in the case of drowning at sea, there is the possibility of getting a false negative result by diatom testing. In this study we investigated the distribution of diatoms in Yoronjima as a model study to evaluate the application of the diatom test for the diagnosis of drowning off islands located in the open sea.

Materials and methods

As shown in Fig. 1, Yoronjima is situated in the most southwestern part of Kagoshima Prefecture. About 6,000 people live in Yoronjima. The shoreline is 23.65 km and the area of the island is 20.49 ㎢. Sea water samples

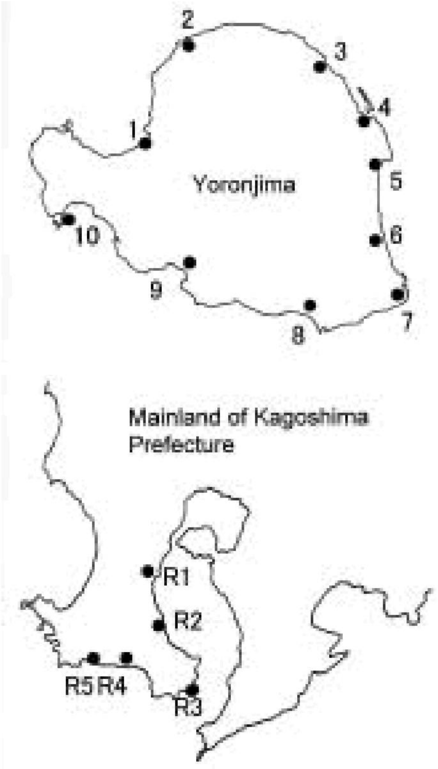

Fig. 1. Map of the sites collected sea-water samples in Yoronjima and the mainland of Kagoshima Prefecture. 1: Tyabana (Harbor), 2: Ukachi (Beach), 3: Kurohana (Beach), 4: Minata (Beach), 5: Funakura (Beach), 6: Oganeku (Beach), 7: Akasaki (Harbor), 8: Maehama (Beach), 9: Hakibina (Beach), 10: Yoron/Tomori (Harbor), R1: Taniyama (Harbor), R2: Nukumi (Beach), R3: Yamagawa (Harbor), R4: Ei (Harbor), R5: Makurazaki (Harbor).