

## Development of a New Screening Method to Detect Environmental Pollutants in Coastal Seawater: A Bioassay Using Indian Medaka

Yoshifumi Horie

Faculty of Bioresource Sciences, Akita Prefectural University

### Summary

The potential adverse effects of environmental pollutants on aquatic ecosystems pose a serious global threat. Conventional studies on environmental pollutants employ the method of measuring the concentration of the environmental pollutants contained in water samples collected from the sites as well as the method of exposing aquatic organisms to environmental pollutants (ecotoxicity test). However, in the method of measuring the concentration of environmental pollutants, it is necessary to measure the concentration of each pollutant. This is because there is a high possibility of overlooking the detection of environmental pollutants other than the target. In addition, although the ecological effects of a target substance can be accurately evaluated by the ecotoxicity test method, a wide variety of pollutants discharged into the general environment cannot be detected in the aquatic environment by this method.

Therefore, the aim of this study was to develop a new screening method using a bioassay that can comprehensively detect and evaluate the ecological effects of the environmental pollutants contained in aquatic environments.

First, in order to ascertain the optimum developmental stage of the fish to be used in the bioassay, a short-term toxicity test using embryo-larva stage (before hatching) and a fish acute toxicity test (after hatching) were conducted using zinc chloride. The results showed that metals form white precipitates in coastal seawater and that the ecotoxicity value for marine environment is about 10 times different from that of freshwater environment (ecotoxicity value: freshwater < coastal seawater). Then, a bioassay employing the fish acute toxicity test as reference was performed. Water was sampled four times a year from two sites, a coastal area where wastewater flows from a thermal power plant (site 1) and a fishing port near a paper mill (site 2). The results revealed that no ecological effects were observed at sites 1 and 2 throughout the year. Additionally, the environmental pollutants that can adversely affect marine fish were not detected. Furthermore, there was a significant difference between the salinity of site 1 (20 - 25 PSU) and site 2 (1 - 8 PSU). Therefore, it is possible to perform bioassays in a wide range of coastal areas using salt medaka, a species with a high tolerance to seawater.