

Pathogenic bacteria associated with lesions and thallus bleaching symptoms in the Japanese kelp *Laminaria religiosa* Miyabe (Laminariales, Phaeophyceae). *Hydrobiologia*

Abstrak

During early Spring (April–May) when the seawater salinity drops suddenly and the seawater temperature increases drastically, severe lesions and thallus bleaching were observed in the *Laminaria religiosa* population at Oshoro Bay, Otaru, Hokkaido, Japan. The healthy and diseased kelp blades were collected and subjected to enumeration of total number of culturable bacteria and bacterial species. Bacterial enumerations were done using 3 different media formulations; high-nutrient media (Media 1), low-nutrient media (Media 2) and modified low-nutrient media with 5% kelp extract (Media 3). Seven bacterial species were isolated from the healthy kelp. These were *Alcaligenes aquamarinas*, *Alteromonas* sp., *Azomonas agilis*, *Azotobacter beijerinckii*, *Escherichia coli*, *Halobacterium* sp. and *Halococcus* sp. All 7 bacterial species were isolated on Media 2 and Media 3, but only 5 species were isolated using Media 1 with the absence of *Halobacterium* sp. and *Halococcus* sp. Highest total number of culturable bacteria was 2050 CFU/cm² on Media 3. Eight species of bacteria were isolated from the diseased kelp thallus with the addition of *Erwinia amylovora*. All 8 bacteria grew on Media 2 and Media 3, but only 6 species were isolated using Media 1 with the absence of *Halobacterium* sp. and *Halococcus* sp. Highest total number of culturable bacteria was 5830 CFU/cm² on Media 3. However, only 3 species were isolated from the lesioned area. The most abundant species was *Alteromonas* sp. followed by *Halococcus* sp. and *Alcaligenes aquamarinas*. The surface bacteria showed best growth on Media 3. Scanning Electron Microscopic images of the healthy and diseased thallus gave distinctive evidence of the severity of the lesions as well as the relative abundance in the bacterial population. In an effort to identify the symptoms causative organism, the isolated bacterial species were cultured and used to test Koch's postulates. Out of the 8 species, only *Alteromonas* sp. induced lesions on the axenic kelp blades. The inoculated

bacteria were also re-isolated without any significant contamination. Hence, *Alteromonas* sp. is suggested as the possible disease causing organism.