

NON-INDIGENOUS AQUATIC SPECIES OF CONCERN FOR ALASKA

Fact Sheet 11

North East Pacific Red Alga *Rhodophyta (Ceramium sinicola)*

BIOLOGY & PHYSIOLOGY

Physical Description: There are approximately 4,000 species of red algae and most are found in marine habitats; however, some are located in fresh water. As their name suggests, red algae are commonly reddish (some can be black in deep waters and more greenish in shallow waters) because of an accessory pigment called phycoerythrin. There are approximately 10 species in the Genus *Ceramium*; about half of these are rare or exclusively subtidal. Most species are small, less than 0.75 inches long, but some reach up to 4 inches in length. *Ceramium sinicola* (North East Pacific Red Alga) has a small and densely corticated (specialized outer layer) on its thallus (plant body which includes the holdfast, stipe, and blades) and is epiphytic on *Codium* species (to grow on the surface of another plant for support, in this case the *Codium* species). The basic axis of this alga is one cell wide, interspersed with narrow clusters of smaller cells (see diagram). This arrangement results in a banding pattern that is visible to the naked eye. The branch tips are frequently pinched in. It has incomplete cortication in the lower thallus. The thallus is delicate and rose-pink in color. North East Pacific Red Alga has root-like structures called rhizoids that serve for absorption and attachment. These rhizoids are slender, branched and non-bulbous. They are known to produce extensions in bundles on the species *Codium fragile*.

Nutrition Requirements: North East Pacific Red Alga acquire nutrients from photosynthesis and by absorbing dissolved nutrients from the surrounding water.

Reproduction: All reproductive bodies (eggs, sperm and spores) of red algae lack flagella which are used for locomotion; thus, their gametes and spores lack mobility. Most species in the family Ceramiaceae are dioecious (separate male and female plants) and the male plants are frequently smaller than the female. North East Pacific Red Alga sexual reproduction is exclusively oogamous (fusion of eggs and sperm).

Lifecycle Stages: The life history of an alga is of critical importance in any consideration of its biology, ecology or geographical distribution. Life cycles are especially diverse among the red algae. The life cycle of red algae typically involves an "alternation of generations" between diploid (a cell containing two sets of chromosomes, one set inherited from each parent) and haploid (a cell with one set of chromosomes) cells. Unlike other multi-cellular



Specimen from the Genus *Ceramium*
Photo courtesy of: Druehl, L.D. "Pacific Seaweeds"

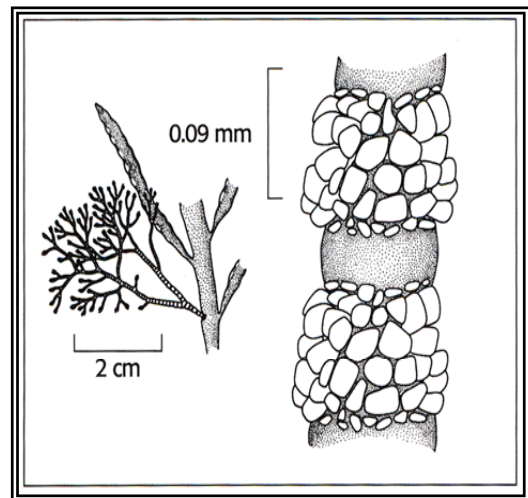


Diagram showing a *Ceramium* growing as an epiphyte on a *Codium* species (left) and the arrangement of cells on the axis of *Ceramium* (right). Drawing used with permission from: Druehl, L.D. "Pacific Seaweeds"

algae, red algae have no flagellated stages in their life cycles. A flagella is a structure used for locomotion. Eggs and sperm rely on water currents to get together. Algae can live for many years.

Habitat: North East Pacific Red Alga can be found in the mid- intertidal, low-intertidal and subtidal regions from Alaska to Mexico. They prefer to attach to substrates such as rocks, man-made structures, and other algae.

DISPERSAL POTENTIAL

Historical and Current Introduction/Spread: North East Pacific Red Alga's original distribution is the North East Pacific including California, Baja California, and the Gulf of California. This red alga was found growing on the species *Codium fragile* near Green Island, in Prince William Sound, Alaska.

Dispersal Methods: Like most algae, red algae can reproduce and disperse from fragmentation of plant parts which then can be carried by ocean currents or humans. Short distance dispersal can occur by the gametes (eggs and sperm) being carried on ocean currents.

IMPACTS AND CONTROL

General Impacts: Algal invasions can be of great concern because introduced species can have serious ecological consequences by competing with native algae. Introduced species can eventually lead to changes in community structure and food webs. As fouling organisms, red algae can have ecological consequences when introduced to new habitats.

Management Information: It is only very recent that invasions by algal species have received attention. Identifying the type and ecology of an invasive algal species can be very difficult but essential to understanding how to reduce or eradicate the invasive. Currently, molecular techniques that use DNA markers are being used to help identify and trace the origin of invasive species. There are no known eradication techniques currently being used for the North East Pacific Red Alga.

Key Notes: The degree of cortication has been used as a significant diagnostic feature for species level taxonomy in the genus *Ceramium*, although it may depend on season and microhabitat in some species. North East Pacific Red Alga is similar to *Ceramium interruptum* in gross morphological features, habitat and distribution. Therefore, ecological data for *C. interruptum* may be useful information for the North East Pacific Red Alga.