NON-INDIGENOUS AQUATIC SPECIES OF CONCERN FOR ALASKA

Fact Sheet 15 — Tunicate

Botrylloides violaceus

BIOLOGY & PHYSIOLOGY

Physical Description: The Tunicate is a sessile (non-mobile) colony. The colony consists of very small zooids (each zooid measuring just over 1/10 of an inch in diameter) arranged in loose circles, rows, or dense clusters. Zooids are embedded in a transparent tunic and are all connected to one another by a network of blood vessels that terminate in sausage-shape ampullae (small sac-like structures) at the periphery of the colony. The colonial vascular system plays an essential part in the integration of the colony as a whole. In young Tunicates, the ampullae are situated exclusively along the edges, but as colonies grow they move to the interior. A Tunicate is comparatively thick and the marginal ampullae are often several rows deep. Their color varies from bright orange to reddish or dull purple. A Tunicate usually has 8 branchial tentacles and 11 rows of stigmata.

Photo by: MIT Sea Grant College Program

Nutrition Requirements: Tunicates are suspension feeders, filtering small organisms such as phytoplankton, unicellular algae and bacteria from the water column.

Reproduction: The Tunicate reproduces both sexually and asexually. All species within the Botrylloides genus are hermaphrodites with sexual reproduction that can be either viviparous or ovoviviparous. The Tunicate's sexual reproduction is viviparous meaning that the parent gives birth to living offspring that develop within the parent body. The gonads of both sexes develop on either side of the zooid with the ovary situated behind the testis. The egg is ovulated into a specialized sac-like organ or brood pouch that forms as an outgrowth of the body wall. Within the brood pouch, the egg is fertilized and develops until the larva escapes. When released, larvae are relatively large (0.08-0.12 inches long) and are brightly colored. The testis does not carry mature sperm until the day after the egg is ovulated. The Tunicate's gestation period lasts for more than a month. In this species, sexual reproduction does not affect the succession of asexual reproductive cycles. Among botryllids, the Tunicate is the only species having embryos segregating into the tunic immediately after fertilization and undergoing development completely independently of the mother zooid. Asexual reproduction in Tunicates occurs through budding which produces colonies of genetically identical zooids. Studies have shown that small substrates limit asexual reproduction and induces sexual reproduction.

Lifecycle Stages: Once the Tunicate larva is liberated from the brood pouch, it takes only a few hours until metamorphosis begins. On the following day, three buds are visible, two on the right side and one on the left side of the oozoid. All botrylliodes of the same generation appear, grow, and die synchronously. Both the zooids bearing embryos and the sterile zooids of the oldest generation begin to disintegrate and are eventually reabsorbed into the common vascular system.

Habitat: The Tunicate can be found along marine coastal protected areas in the shallow sub-tidal zones and attached to substrates such as rocks, docks and boats.

DISPERSAL POTENTIAL

Historical and Current Introduction/Spread: The Tunicate is believed to have originated from Japan. It was first recorded on the Pacific Coast in 1973 and in Puget Sound in 1977. It is also a fouling organism commonly found on the East Coast of the United States. It is common along the West Coast from Baja California to British Columbia. It was first recorded in Prince William Sound in 1999 where it is currently established. Observations have shown the Tunicate to be abundant at the Sitka Sea Farm near Sitka, Alaska. This species is also found in the Mediterranean Sea.

Dispersal Methods: Tunicate introductions to new areas can occur through the release of oyster shells and spat from the oyster industry. Short and long distance dispersal of Tunicate colonies can also occur by rafting on broken leaves and other debris to which they are attached. Some studies show evidence that rafting events occur frequently, and thus may have a substantial effect on population dynamics. Tunicate colonies attach to new substrata and spread by growing or crawling.

IMPACTS AND CONTROL

General Impacts: Very few species will settle on living colonies of Tunicates. The inability of other species to settle on Tunicate colonies reduces the available space for other fouling species, both native and introduced. Tunicates have short range larval dispersal that allows them to build up abundant local populations and thus are able to invade local communities. Some Tunicate species are known to reduce local post-settlement survivorship and growth of oysters.

Management Information: The Tunicate is morphologically very similar to the *Botrylloides diegensis* (California Tunicate). Organisms that are morphologically similar are typically similar in physiology and ecology. A study conducted in the Gulf of Maine showed that the California Tunicate became one of the dominant encrusting species in fouling communities within four years of being introduced (1981). By 1985 the pattern changed; while it remained a dominant competitor, the area invaded by the California Tunicate decreased by 50%. This study shows that the California Tunicate, like many invaders, is capable of invading and initially dominating a community, but will then experience a period of reduction before settling into a balanced state with other native and non-native encrusting species. Another study conducted on the California Tunicate showed that although this species had become a dominant and a conspicuous member of many shallow-water protected harbors from Connecticut to Maine, its presence appears to have had no major effect on the biodiversity of the fouling species assemblages found in southern New England harbors. Ecological knowledge gained from the above studies (and other similar studies) may indicate that the Tunicate (*B. violaceus*), once introduced, may become a permanent member of the community but is not likely to replace native species already present. Therefore, management and/or eradication efforts for the Tunicate may not be necessary if it has indeed established an ecological balance with the native community. Furthermore, once established, eradicating or controlling Tunicates may be impossible.

Key Notes: Tunicates exhibit colony specificity, meaning that zooids from one Tunicate will not fuse with another Tunicate. Genetic control experiments have supported this finding.