
Florometra serratissima

Feather star

Phylum: Echinodermata
Class: Crinoidea
Order: Comatulida
Family: Antedonidae

Autumn Pruzynski

Taxonomy: *Florometra serratissima* was first described by A. H. Clark in 1907, who originally named the species *Antedon perplexa*. Synonymized names include *Antedon perplexa* A. H. Clark, 1907 and *Florometra perplexa* (A. H. Clark, 1907) (WoRMS 2021).

It belongs to the family Antedonidae, which are unstalked, feathery-armed, free-moving crinoids (Clark 2007). The genus *Florometra* contains 15 species (WoRMS 2021). Crinoids are commonly found in ancient fossil records and the genus *Florometra* has its origin in the Jurassic period (Puniwai 2002).

Description

Size: Average adult has a diameter of about 25 cm with arms spread out (Fretwell 2015). In a study off the Oregon coast, arm lengths ranged in size from 1.6 cm to 3.0 cm, with an average of 11.3 cm (Puniwai 2002).

Color: Primarily red in color, also some tan coloration.

General Morphology: Unlike most echinoderms, crinoids have a looped gut. Both their mouth and their anus are on the upper surface of the central portion of their body (Campbell and Dawes 2004). This central portion is slightly cup shaped and is called a calyx (Coleman 1991). The bottom surface of the calyx is covered in small frill-like appendages called cirri (Fig.1) that allow the organism to grasp hard substrate on the seafloor (Barnes 1980). *Florometra Serritissima* has 5 feathery arms radiating horizontally from its calyx, each with hundreds of pinnules (Fig. 1). Each arm splits in two, giving the appearance of 10 arms (Comeau et. al. 2017). Pinnules are used to maximize surface area for suspension feeding and to propel while swimming.

Mouthparts: The mouth is located in the center of the top surface of the calyx, with ambulacral grooves running from each arm to the mouth. Tiny food particles suspended in

the water are grabbed by the pinnules on the arms and moved into the mucus filled ambulacral grooves and into the mouth (Coleman 1991).

Stalk: Adults of this species are unstalked. There are three larval stages, the latter two of which have developed stalks. (Comeau et. al. 2017)

Arms: Individuals of this species have 5 autonomous arms that appear feather-like due to the presence of hundreds of wispy pinnules. Each arm bifurcates, giving the appearance and function of 10 arms in adult morphology. The arms are used for swimming and suspension feeding. Crinoids are able to regenerate their arms, pinnules, and cirri, much like members of Asterozoa and Ophiurozoa (Barnes 1980). Arms are supported by articulating vertebral ossicles (Fig. 2, Barnes 1980).

Cirri: 20-30 thin spindly appendages that are attached to the bottom surface of the calyx, used for grasping onto substrate and for "walking" along the seafloor.

Pinnules: Feathery wispy portion of the arm. Used for suspension feeding and can also contain the ends of the genital canal where gametes are released (Barnes 1980).

Podia: The small terminal branches of the water vascular system, podia are arranged in groups of three along the pinnular ambulacra (Messing and Dearborn 1990). Each group has a primary, secondary, and tertiary podia that descend in size and are used to pass tiny food particles to the ambulacral grooves which transport food to the mouth (Byrne and Fontaine 1981).

Anal Cone: Located on the upper surface of the calyx, toward the edge near an arm (Barnes 1980).

Possible Misidentifications *Florometra asperrima* and *F. serratissima* are often used interchangeably (Carlton and Roth 1975). Current DNA analysis is being done and may

confirm that they are two distinct species. They are currently accepted as distinct species (Messing 2018). It is not clear how to definitively distinguish between the two visually, it seems *F. asperrima* is only found in deep water, whereas *F. serratissima* occupies a wider depth range (Fretwell 2015).

Ecological Information

Range: *Florometra serratissima* are found primarily in the north eastern pacific (WoRMS 2021) from northern Alaska to northern Mexico (Fretwell 2015). They have also recently been found further south in the Gulf of California and off the Pacific Coast of Mexico (Valdes De Anda *et. al.* 2018).

Local Distribution: Locally found on the continental shelf of Oregon, as well as in shallower subtidal waters (Puniwai 2002). *Florometra serratissima* is the only crinoid commonly found off the Oregon coast, although *F. asperrima* and several species of stalked crinoids have also been found (Carlton and Roth 1975). The OIMB Deep-Sea Biology course has collected *F. serratissima* near the Cape Arago rocky reef (~100 m) and Stonewall Bank (~120 m).

Habitat: They are often found attached to rock and other hard substrate, although they can release and swim freely through the water column and over sandy bottoms. They prefer areas with a mild current (Puniwai 2002).

Temperature: They can live in both shallow and deep waters, between about 6°C and 20°C. These numbers are based off of the depths where they have been collected and the general temperatures for those depths.

Depth: They are found between 11 m and 1252 m deep (WoRMS 2018), at an average depth of about 285 m (Byrne and Fontaine 1981).

Abundance: Overall abundance is unclear. They are found in dense aggregations that may move or disappear from year to year (Puniwai 2002).

Life-History Information

Reproduction: Details of reproduction and gametogenesis, including seasonal reproduction have been described by Mladenov (1986). For cold-water crinoids like *F. serratissima*, gametes are generated in the genital canal which runs along the inside of the arms and into the pinnules, spawning

occurs when gametes rupture from pinnules into the sea or into saclike invaginations along the arms or pinnules (Barnes 1980).

Larval Stages: *Florometra serratissima* undergo three larval stages: doliolaria, cystidean, and pentacrinoid. The doliolaria stage is a stalkless planktonic larva. In the cystidean stage the larva settle on hard substrate and grow a stalk. The pentacrinoid stage grows a longer thinner stalk and 5-arms (Mladenov and Chia 1983).

Juvenile: The transition from larval to juvenile form occurs when the stalk is lost (Comeau *et. al.* 2017).

Longevity: Lifespan of the species is unknown, and very little is documented past larval development.

Growth Rate: Growth rate is not well documented beyond larval stages, and such reports vary greatly in time, number, and appearance of calyx and plate growth (Comeau *et. al.* 2017).

Food: *Florometra serratissima* are suspension feeders that use their arms, pinnules, and podia to maximize surface area and passively grab tiny food particles out of flowing water. Diatoms and organic debris have been found in their guts (Byrne and Fontaine 1981).

Predators: Although there are no documented predators of *F. serratissima* it is likely they are eaten by echinoids (Stevenson *et. al.* 2017)

Behavior: These crinoids live in aggregated distributions. They are mobile and able to swim through the water column or walk along the seafloor. They also grasp hard substrate using cirri. Aggregations were found to be much denser at night than during the day (Puniwai 2002).

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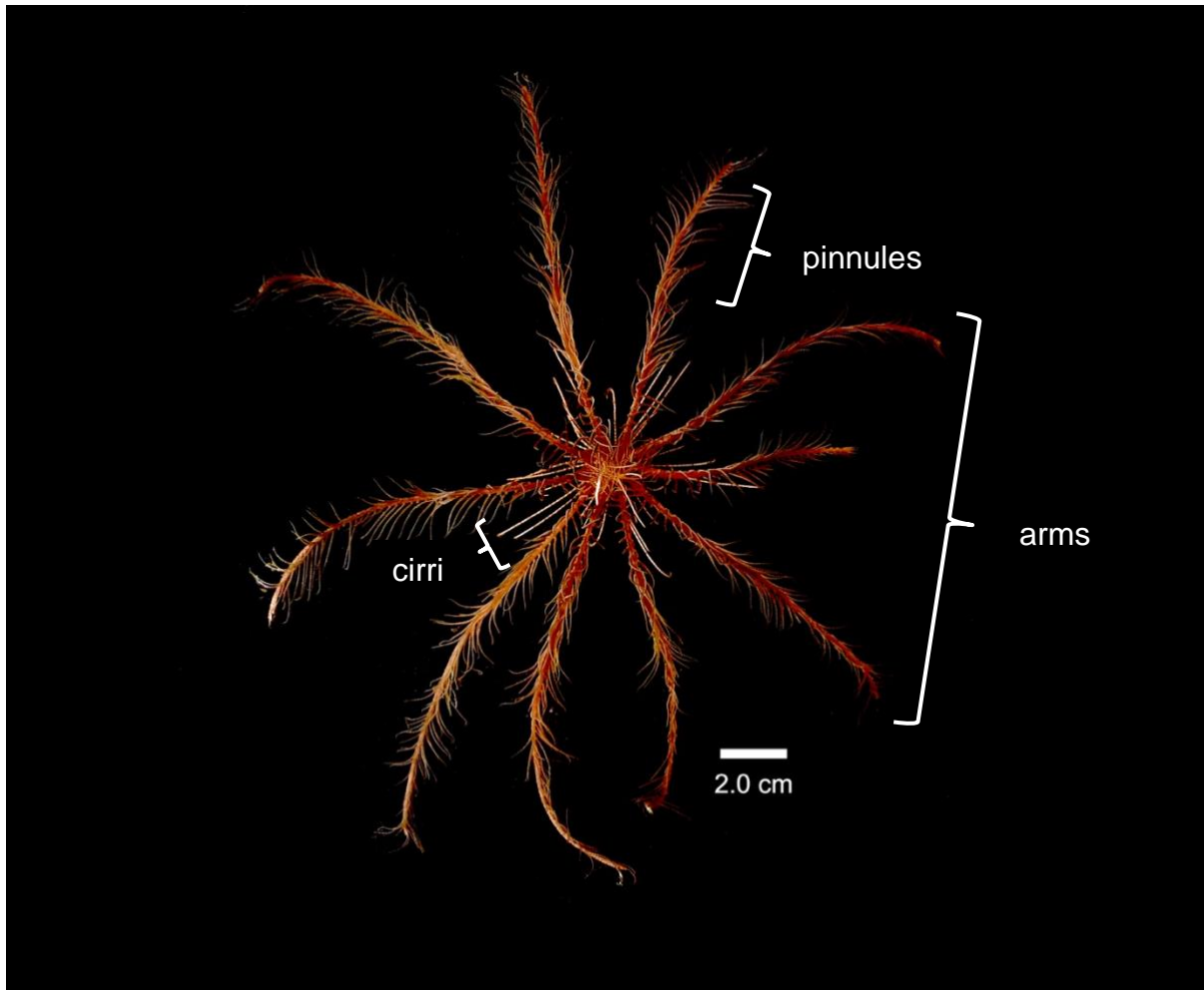


Fig. 1. Oral surface of an adult *Florometra serrastissima* collected from ~120 m depth near Stonewall Bank offshore of Newport, OR. Photo by M. Hainey.

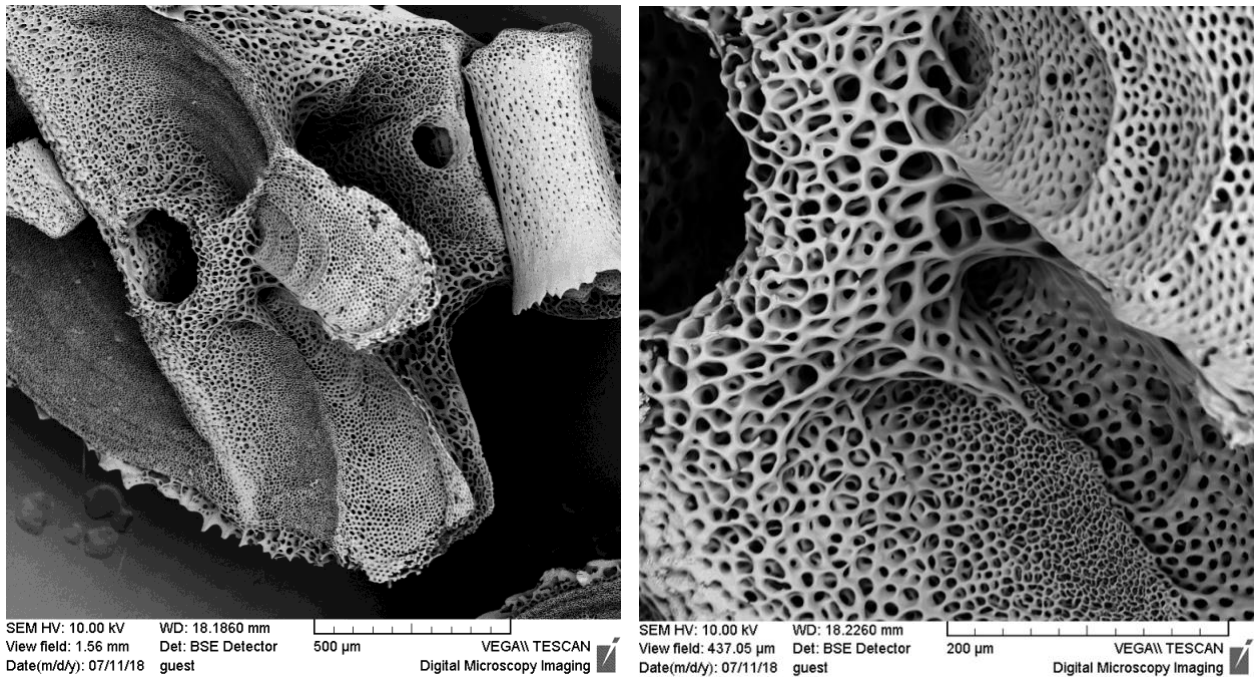


Fig. 2. Scanning electron microscope (SEM) images of an arm vertebra from an adult *Florometra serrastissima* individual collected from 104 m offshore of Cape Arago, OR.