

## Reproductive Biology and Polysaccharide Chemistry of the Red Alga *Catenella* (Caulacanthaceae, Gigartinales)

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### Abstract

The reproductive biology of five isolates of *Catenella caespitosa* from France, Puerto Rico and Brazil and seven isolates of *C. nipae* from Australia and the Philippines was investigated in culture. Most isolates exhibited a *Polysiphonia*-type life history and bisexual gametophytes. Mixed-phase reproduction occurred in one *C. caespitosa* isolate from Puerto Rico and one *C. nipae* isolate from Australia in which female segments of bisexual gametophytes developed zonately-divided tetrasporangia. In *C. caespitosa*, male and female segments were very similar in size and shape, whereas in *C. nipae* the segments were sexually dimorphic: the male segments being long, narrow and ringed by successive spermatangial sori, the female segments being short and round. Male and female gametangia were rarely produced together on individual segments. Tetrasporophytes and gametophytes of all isolates of *C. caespitosa* and *C. nipae* from field and culture samples contained iota-carrageenan, in contrast to *C. nipae* from Burma that Zablackis and Santos based their initial description of alpha-carrageenan.

### Introduction

*Catenella* is widely distributed on mangroves of tropical and temperate coasts and is also known in temperate salt marshes and rocky habitats, including dikes and seawalls. Presently 4 species are recognized:

1. *Catenella caespitosa* (Withering) L. Irvine is the type species and the most widely distributed (Europe; Africa; S. E. Asia including Indonesia, Malaysia, Australia, New Zealand; N. and S. America), according to Taylor (1960), Post (1963), Prudhomme Van Reine, *et al.* (1983), Wynne (1986) and Tanaka and Chihara (1988).

2. *Catenella impudica* (Montagne) J. Agardh is recorded in N. and S. America (Taylor 1960, Wynne 1986, Ganesan 1989), Indonesia (Tanaka and Chihara 1988) and Hong Kong (Tseng 1942).

3. *Catenella nipae* Zanardini is considered to be most common in S. E. Asia and is recorded in Bangladesh, Burma, India, Indonesia, Malaysia, Singapore, South Africa and Tanzania (Silva *et al.* 1993).

4. *Catenella subumbellata* Tseng is recorded from Hong Kong (Tseng 1943) and Mozambique (Pocock 1958, Silva *et al.* 1993).

Although there is much literature on the ecology and distribution of *Catenella* species, the systematics of the genus remains quite unclear. The terete to compressed morphology of the axes is apparently variable in all species as are the branching and hapteron pattern of the segments. Min-Thein and Womersley (1976) stated 'The main vegetative and reproductive features of *C. nipae* are similar to those of the type species *C. opuntia* (*C. repens*) ...', a synonym of *C.*