

**Two Korean species of *Spyridia* J. Agardh  
(Rhodophyta, Ceramiaceae)**

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**韓國產 紅藻 *Spyridia*屬 2種에 關하여**

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**ABSTRACT**

Two Korean species of *Spyridia* J. Agardh are investigated taxonomically. *Spyridia filamentosa* (Wulfen) Harvey collected at Wando-Islands in the southern coast is characterized by its regularly arranged internodal and nodal cells. *S. elongata* Okamura collected at Kangreung in the eastern coast is characterized by its irregularly arranged internodal cells and small fusiform branches around the axis. The latter species, collected for the first time in Korea, is very similar to *S. squalida* J. Agardh from the Southern Australia. Some important taxonomic characters of the two species are summarized.

**INTRODUCTION**

*Spyridia* is characterized by its terete thallus, discoidal holdfast, completely corticated axis and branches, secondary pit-connections among rhizoidal cortical cells, and deciduous brachyblasts corticated at node only, as well as spermatangia occurring at node of brachyblast, globular to bilobed cystocarp with a pericarp, and tetrahedral tetrasporangia occurring on brachyblast (Harvey, 1833; Feldmann-Mazoyer, 1940). It is well defined, but does not appear to be closely related to any other genera in Ceramiaceae (Feldmann-Mazoyer, 1940; Feldmann and Feldmann-Mazoyer, 1943; Krishnamurthy, 1968).

The genus was first established by Harvey (1833) on the basis of the plants from Adriatic Sea, which had been known as *Fucus filamentosa* Wulfen. On the taxonomic position of the genus Phillips (1924) provisionally placed it under Wrangeliaaceae. However, Feldmann and Feldmann-Mazoyer (1943) mentioned that because *Spyridia* showed both sympodial and monopodial branches, it should constitute a distinct family analogous to Dasyaceae. Hommersand (1963) concluded that *Spyridia* was a most specialized taxon in Crouanioideae, a new subfamily of Ceramiaceae established by him. Krishnamurthy (1968) reported that *Spyridia* showed affinities with Wrangeliaeae in vegetative structure, and with Callithamnieae in reproductive features.

In Korea, *Spyridia filamentosa* only has been known as floral lists (Kang, 1966; Yoo and Lee, 1980; Lee and Boo, 1982). *S. elongata* is collected and identified for the first time in Korea during

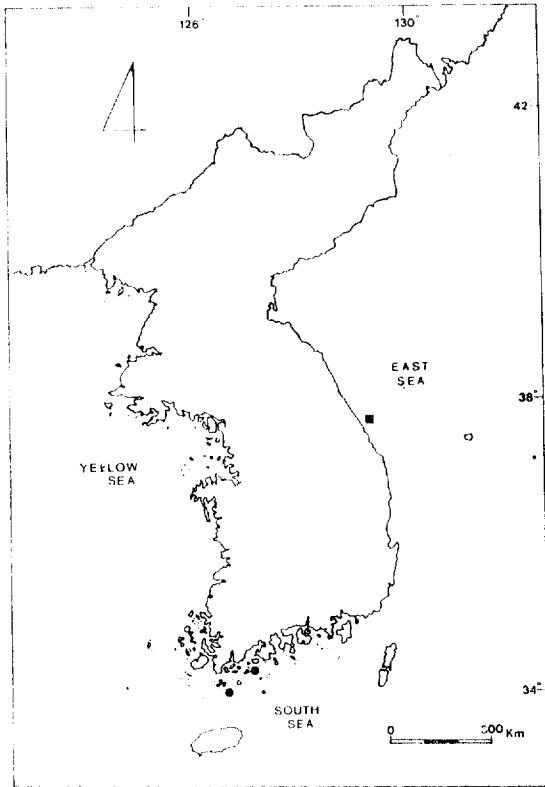


Fig. 1. Geographical distribution of *Spyridia filamentosa* (circle) and *S. elongata* (rectangular) along the coasts of Korea.

(1975) p. 229; Itono (1977) p. 120.

Basionym : *Fucus filamentosa* Wulfen (1803) p. 64.

Synonyms : *Spyridia biannulata* J. Agardh (1876) p. 267.

*S. breviarticulata* J. Agardh (1876) p. 268.

*S. spinella* Sonder (1845) p. 53.

Korean Name: 사돈비단풀(선징)

Plants usually 7~10 cm high, epilithic to epiphytic, irregularly branched on all sides with longer and shorter branches intermixed, attached to substratum by rhizoids, commonly grey-red to red brown in living; rhizoids discoid, originated from basal cortical and rhizoidal cells; axis and lateral branches completely corticated, terete; axis 0.5~1 mm thick, tapering to branch, composed of axial and cortical cells; axial cells cylindrical, 0.5~3 times as long as broad, producing periaxial cells thirteen in main axis or ten to eleven in lateral branch, each cutting off two to three rhizoidal cortical cells basipetally; rhizoidal cortical cells elongate, twenty-one to twenty-seven in segment, covered axial cell in tiers, sometimes producing small cortical cells, thus forming cortex; cortical cells irregular in shape, small, connected with periaxial cell below by secondary pit-connections; segments usually clearly defined on axis or lateral branch, variable in demension, with bands of shorter nodal cell and longer internodal

this investigation. The morphology and anatomy of the two species are reinvestigated as a part of experimental taxonomic work on Korean Ceramiaceae.

## MATERIALS AND METHODS

*Spyridia filamentosa* was collected at littoral zone of Wando-Islands in the southern coast of Korea on August, 1982 and July, 1983 (Fig. 1). They were vegetative plants and 7~10 cm high. *S. elongata* was collected on July, 1984 at Kangreung in the eastern coast. They were cast ashore and tetrasporophytes up to 30 cm high.

Description and illustration were based on materials preserved in 5% formalin-seawater. Specimens examined were preserved in the Herbarium, Kangreung National University.

## RESULTS AND DISCUSSION

### *Spyridia filamentosa* (Wulfen) Harvey

(Text-fig. 2)

Harvey (1833) p. 336, (1844) p. 449; J. Agardh (1851) p. 340, (1876) p. 268; Børgesen (1917) p. 223; De Toni (1924) p. 502; Feldmann-Mazoyer (1940) p. 348; Hommersand (1963) p. 117; Kang (1966) p. 94; Krishnamurthy (1968) p. 42; Womersley and Cartledge

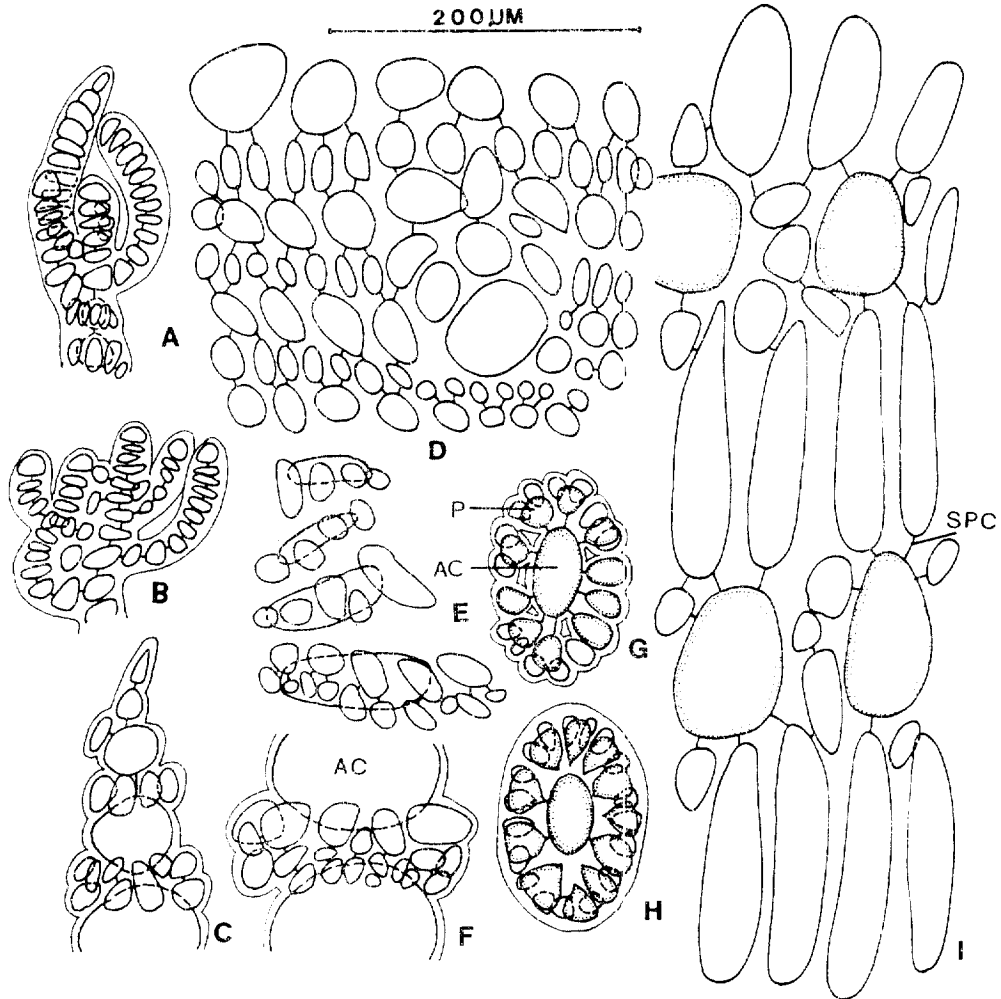


Fig. 2. *Spyridia filamentosa* (Wulfen) Harvey.

A-C. Actively dividing apice. D. Tier of cortical cells. E-F. Development of cortex.

G-H. Cross section showing periaxial cells and cortical rhizoids. I. Secondary pit-connections between cortical cells (AC, axial cell; P, periaxial cell; SPC, secondary pit-connection).

cells alternately; lateral branches indeterminate, originated alternately from periaxial cell, regular in every 6-7 nodes, multifarious, rebranched as primary branch; branchlet determinate, corticated in node only, originated from periaxial cell in whorl or alternately in all sides of axis or lateral branch, dense in upper and rare in lower portions of frond; rhodoplasts numerous, linear, scattered; reproductive structures not observed.

Habitat : Epiphytic on other algae, or epilithic on rock in lower littoral zone.

Materials : South coast; Jangae (July, 1978), Maando (August, 1982), Bokildo (August, 1982), Yejakdo (August, 1982), Neobdo (August, 1982), Soando (July, 1983).

*Spyridia filamentosa* distributes widely from tropical to temperate zones and has been recognized as a variable species (Børgesen, 1917; Feldmann-Mazoyer, 1940; Dawson, 1962; Hommersand, 1963; Womersley and Cartledge, 1975). This species was first described by Wulfen (1803) as *Fucus filame-*

*ntosa*, and combined with *Spyridia* by Harvey (1833). The species has been investigated by many workers (Phillips, 1924; Feldmann-Mazoyer, 1940; Feldmann and Feldmann-Mazoyer, 1943; Hommersand, 1963; Krishnamurthy, 1968; Womersley and Cartledge, 1975; Itono, 1977). Among them Womersley and Cartledge (1975), carrying out monographic study on Australian *Spyridia*, concluded that *S. biannulata* J. Agardh (1876), *S. breviarticulata* J. Agardh (1876), and *S. spinella* Sonder (1855) are conspecific to this.

At present, *S. filamentosa* is found only at Wando-Islands in the southern coast of Korea. Kang (1966) has reported tetrasporophytes in September from the islands. Although we could find no reproductive structures, our plants agreed well to the previous descriptions (Harvey, 1833; Feldmann-

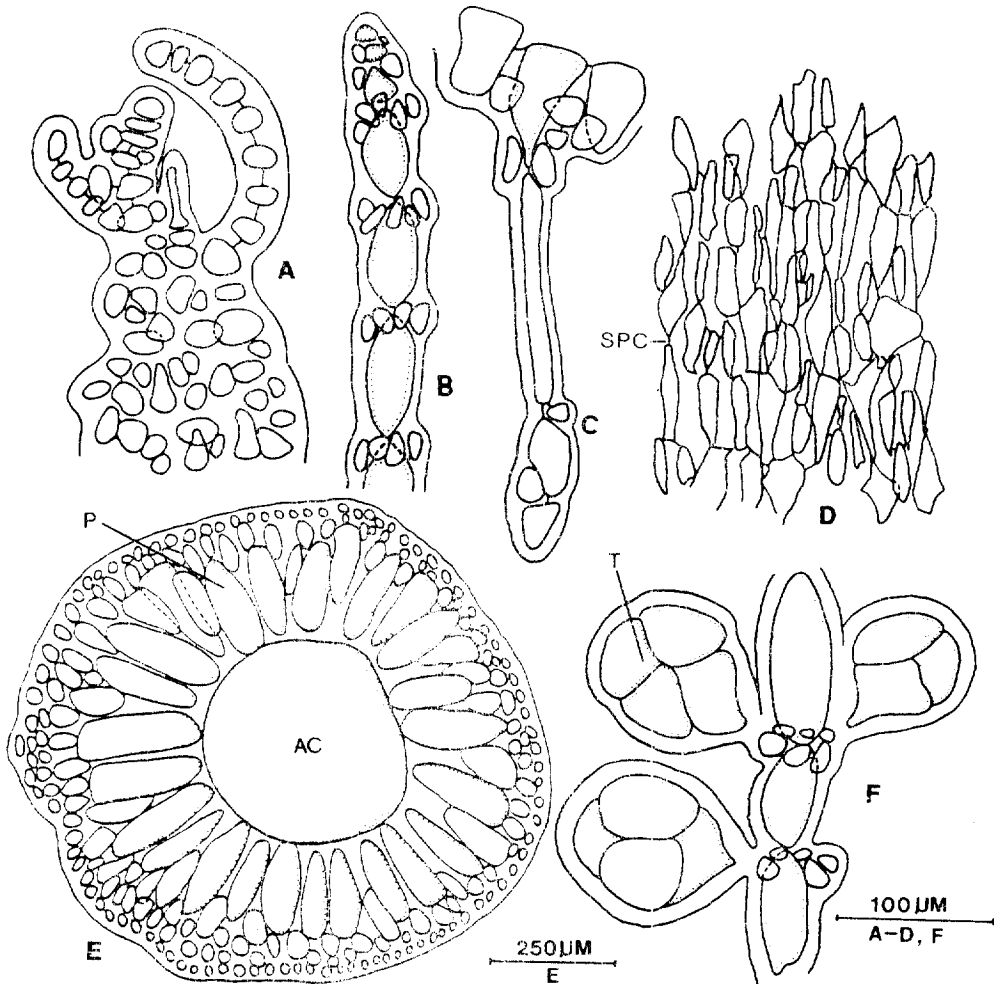


Fig. 3. *Spyridia elongata* Okamura.

A. Actively growing apex. B. Apical portion of a branchlet. C. Rhizoid. D. Inner rhizoidal cortical cells with secondary pit connections. E. Cross section showing periaxial and cortical cells. F. Development of tetrasporangia (AC, axial cell; P, periaxial cell; SPC, secondary pit-connection; T, tetrasporangium).

Mazoyer, 1940; Hommersand, 1963; Itono, 1977), except for the number of periaxial cells. They are thirteen in Korean plants in contrast to fourteen in European and American plants (Feldmann-Mazoyer, 1940; Hommersand, 1963). Itono (1977) reported that the number of periaxial cells differed from thirteen to sixteen according to the habitat.

### *Spyridia elongata* Okamura

Okamura (1921) p. 4, (1936) p. 735; De Toni (1924) p. 503.

Korean name : 큰사촌비단풀(신칭)

Plants usually 30-35 cm high, epiphytic, branched all sides with longer and shorter ones intermixed, attached to substratum by rhizoids, commonly dull pinkish to brickish red in living, thick, soft-cartilaginous in texture; rhizoids discoid, originated from rhizoidal cortical cells; axis and lateral branch completely corticated, terete; axis 1.5~2 mm thick, tapering to branch, composed of axial and cortical cells; axial cells cylindrical, producing periaxial cells circularly; periaxial cells 20-23, each cutting off rhizoidal cortical cells basipetally; rhizoidal cortical cells elongate, covered axial cells completely, producing small cortical cells; cortical cells irregular in shape, connected with periaxial cell below by secondary pit-connection; segments obscure; lateral branches indeterminate, originated from periaxial cells dichotomously to irregularly, rebranched as primary branch; fusiform-branches small, occurring on axis and lateral branches multifariously, constricted at base and apices, corticated completely, determinate, rarely rebranched; branchlets determinate, corticated at node only, fibrous, occurring around axis and branches, never rebranched, dense in upper and rare in lower portions of frond; tetrasporangia spherical, occurring on axial cell of branchlets, first adaxially and later in whorl, divided tetrahedrally, 50~60  $\mu\text{m}$   $\times$  70~80  $\mu\text{m}$ ; cystocarp short-stalked, globular, 500  $\mu\text{m}$  in diam.

Habitat : Epiphytic on other algae, cast ashore.

Materials : East coast; Kangreung (July, 1984).

*Spyridia elongata* Okamura is characterized by its elongate thallus, alternate-dichotomous branching,

**Table 1.** A comparison of some taxonomic characters between *Spyridia elongata* Okamura and *S. squalida* J. Agardh

Characters	<i>S. elongata</i>	<i>S. elongata</i>	<i>S. squalida</i>
Habitat	cast ashore	cast ashore	in deep water
Rhizoid	discoid	discoid	discoid
Main axis	1~1.5 mm in diam.	1.5~2 mm in diam.	1.5~2.5 mm in diam.
Branch	dichotomo-alternate multifarious	dichotomo-alternate multifarious	irregular, multifarious
Fusiform-branch	constricted at base, fully corticated, multifarious	constricted at base, fully corticated, multifarious	constricted at base, fully corticated, multifarious
Branchlet	one celled node	1-3 celled node	1-3 celled node
Periaxial cells	—	20~23	16
Cortical cell	irregular in row	irregular in row	irregular in row
Spermatangia	covered inner side of branchlet	—	covered lower 2~6 cells of branchlet
Cystocarp	short-stalked, globular	short-stalked, globular	short-stalked, globular to bilobed
Tetrasporangia	sessile on branchlet, adaxial(?), tetrahedral	sessile on branchlet, adaxial to whorled tetrahedra, 50~60 $\mu\text{m}$ thick	sessile on branchlet, largely adaxial tetrahedral, 40~60 $\mu\text{m}$ thick
References	Okamura (1921)	This paper	Womersley & Cartledge (1975)

fusiform-branches, soft-cartilaginous in texture, and globular cystocarp (Okamura, 1921, 1936). He (1921) described this species on the basis of materials cast ashore at Enoshima, Boshu, Kadzusa and Hitachi in Japan. The plants from Korea agreed well with the original description (Okamura, 1921). They were cast ashore and 30~35 cm high with tetrasporangia or cystocarps. The morphological characters of *S. elongata*, however, are much similar to those of *S. squalida* J. Ag., as summarized in Table I. Further comparative studies on both species are necessary in future.

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