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ON A NEW SPECIES OF SPHACELARIA

BY

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(With one Text Figure)

In the middle of April of the present year, Mr. H. OTANI collected for me certain species of sea-weeds at the Rumoe harbour on the coast of the Japan Sea in Hokkaido. Among these specimens, an interesting brown alga belonging to the genus Sphacelaria was found on a frond of *Iridaea laminarioides* BORY. As far as I know, six species of this genus have been recorded within our boundary until now, four from the warmer southern seas and two from the northern waters. Of the four species of the former, two of them have been reported by the foreign algologists (3) and the others by Dr. K. YENDO (9), and also by Dr. K. OKAMURA (3). Of the latter two, the one is *Sphacelaria variabilis* SAUV. which was enumerated by Dr. OKAMURA in the 2nd Edition of his Nippon Sorui Mei-i and afterwards found also by Dr. Y. YAMADA (8) in the Mutsu Bay near the Tsugaru Strait between Honshu and Hokkaido, and the another is *S. plumigera* HOLMES which was found by Prof. J. TOKIDA (7) in the Southern Saghalien. Now the present alga considered as a new species will be added to the above six.

The present alga grows epiphytic on the frond of *Iridaea laminarioides*, fixing the thallus by small disks. The thallus consists of more or less dense tufts of erect filaments forming the felt-like turf.

The erect filaments are sparingly branched, more or less cylindrical and gradually attenuate at the base. The old filaments probably broken at the tips are sometimes found developing further into one to three new ones by dichotomous or trichotomous branching at the apex. (fig. B) In this case, the membranes of the terminal segments are found remaining at the base of the new filaments. (fig. B) The main filaments are measured 36 to 45 μ in diameter and 1.8 to 3 mm. in height. The branches are 25.5 to 33 μ in diameter. They are olive brown in color. The segments of the filaments are divided into two or more small cells by the longitudinal sections, but not generally by

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the transverse ones. (fig. B and filaments in figs. D–I) In a rare case, I came across the filament in which a few segments are secondarily divided more or less transversely. (fig. A) The apical segments are usually larger than the other segments on the same filaments, always unicellular, clavate and rounded at the apex. (figs. A and B) They are measured 27 to 51 μ in diameter, and 54 to 135 μ in length.

The unilocular sporangia are produced on short, 1-celled pedicels, turning upwards, and arranged unilaterally on the main or branched filaments. (figs. D and E) The pedicels are often tapering gradually towards the base. The sporangia are mostly globular, rarely unequally obovoid when young, usually with thickened wall, measuring 51 to 75 μ in diameter.

The plurilocular sporangia are produced on 1–4 celled pedicels turning upward and arranged unilaterally on the main or branched filaments or rarely terminating on the branchlets. (figs. F–I) The cells of the pedicels are observed rarely divided lengthwise, and frequently swollen on one side in the uppermost ones. These sporangia are oblong to ellipsoidal oblong in shape, often once or twice constricted slightly in the middle portions, and plurilocular. The locules are cylindrical and long at first (the upper two sporangia in figs. G and I), and then divided into small cells of square-shape and of about 3 μ diameter when matured. (figs. F–I) These sporangia are olive yellow in color at full maturity. They are measured 36 to 66 μ in length and 14 to 30 μ in breadth.

The propagula and hairs, either subterminal or rhizoidal, are not found.

According to the key for the determination of the species given in SAUVAGEAU's 'Remarques sur les Sphacélariacées', the species in question is related to the following species, *S. ceylanica*, *S. intermedia*, *S. Hystrix* and *S. Harveyana* by the fact that the secondary transverse partitions are not found generally in the segments of the axes, and also by the absence of the propagula and hairs, and by the epiphytic habit.

For comparison with the related species, the essential characters are shown in the following table.

Table 1. Essential characters of the alga in question and the related species

Algae	*S. ceylanica*	*S. intermedia*	*S. Hystrix*	*S. Harveyana*	The species in question
Substrata	Parasitic and epiphytic on *Turbinaria vulgaris*; when parasitic, penetrated into frond deeply with a bundle of thin filaments	Parasitic and then epiphytic on *Turbinaria triquetra* with a shallow disk of a bundle of short and thick filaments	Parasitic and epiphytic on *Cystoseira ericoides* with entangled mass of filaments	Parasitic on *Cystophora*	Epiphytic on *Iridaea laminarioides* with a shallow disk, not penetrating into frond
Filaments	Simple or ramified, indistinguishable between axes and branched filaments, 3 mm. high, 12–20 μ in diam.	2–4 mm. high, variable in diameter-range, 20–80 μ in diam.	1–10 mm. (2–4 mm. after REINKE) high; 2 kinds: primary (short and thin, soon degenerating, 35–45 μ in diam.) and secondary filaments (long and thick, remaining longer, 60–100 μ in diam.) sometimes intermediate form present	1–3 mm. high, 40–60μ in diam.	Sparingly branched, 1.8–3 mm. high, 36–45 μ in diam. in main filaments, 25.5–33 μ in branched ones
Unilocular sporangia	Unknown	Globular, 60–90 μ in diam.	Globular	Globular, 60–70 μ in diam.	Globular, 51–75 μ in diam.
Plurilocular sporangia	Long, cylindrical, 50–60 × 15–20 μ Pedicels 1-celled	Long, 50–60 × 30–45 μ Pedicels 1-celled	Cylindrical, brown colored, with larger locules, 55–85 × 45–65 μ Pedicels 1–2 celled	40–50 × 32–36 μ	Oblong, ellipsoidal oblong, constricted slightly once or twice in the middle portion, olive yellow at maturity, 36–66 × 14–30 μ Pedicels 1–4 celled
Antheridia	Unknown	Unknown	Shaped as in Plurilocular sporangia, orange colored, with smaller locules than those of pl. sporangia, 55–90 × 45–52 μ	Present	Unknown
Propagula	Unknown	Unknown	Consist of 3 fusiform rays	Unknown	Unknown
Hairs	Sessile	Soon degenerating; sessile	Present or absent		Unknown
Rhizoids			Present	Absent	Unknown

Comparing with *S. ceylanica*, the present alga is separable from it in the thicker filaments and the many celled pedicels of the plurilocular sporangia. In the next species, *S. intermedia*, the filaments are said to be very variable and widely ranged in diameter according to SAUVAGEAU (6). But in the present species, the thickness of the filament is not so variable and less wide as in the case of *S. intermedia*. In the smaller size of the unilocular sporangia and in the many celled pedicels of the plurilocular sporangia, the present alga is also distinguishable from the latter.

S. Hystrix is one of the well studied species in the genus. According to SAUVAGEAU, the filaments of *S. Hystrix* is said to consist of two kinds, the one short, thin and soon degenerating, and the another long, thicker and persistent. Such two kinds of the filament are not found in our alga. There are some further differences between them in the other characters mentioned below. In *S. Hystrix* two kinds of the plurilocular organs, the plurilocular sporangia and the antheridia are found, while the plurilocular sporangia only are known to exist in our alga. The plurilocular sporangia of *S. Hystrix* are much larger than those of the present species. In regard to the propagula and hairs, they are known to be present in the former, while not found in our alga, as far as I have studied.

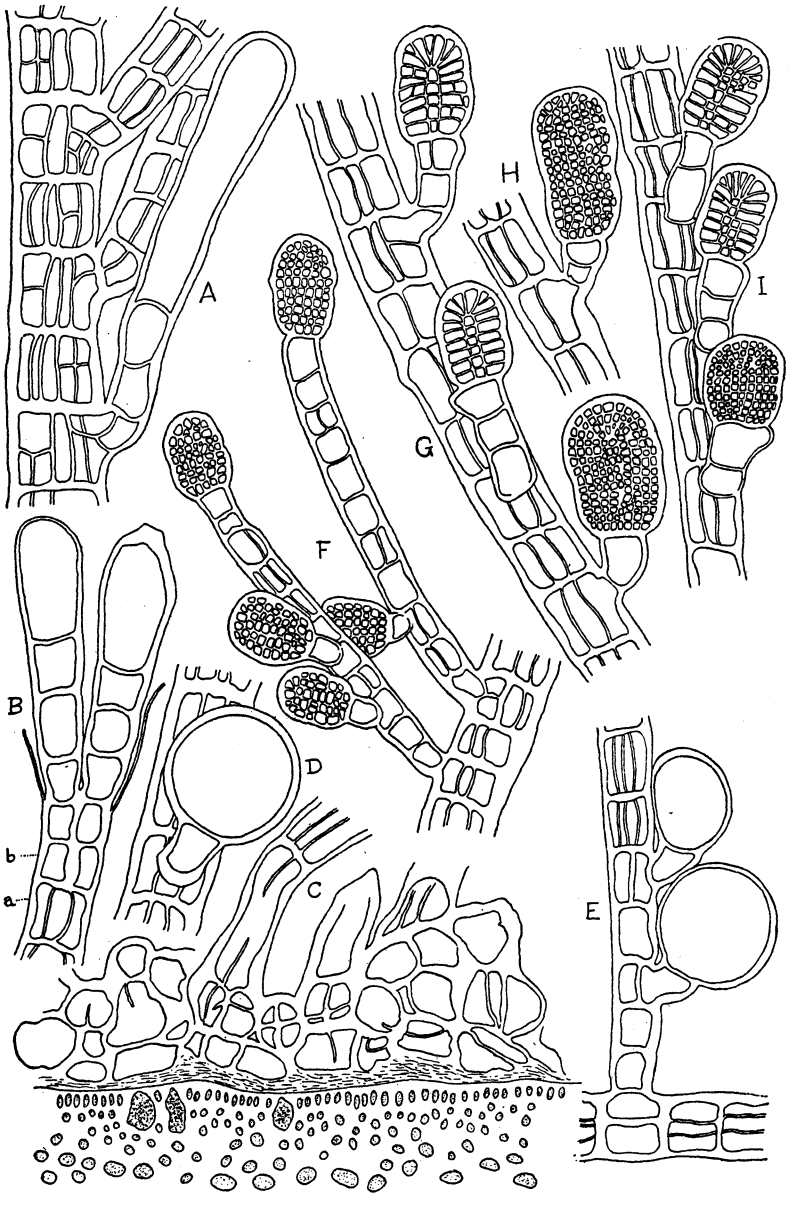
Finally, the species in question is apparently different from *S. Harveyana* in having the more delicate filaments and the thinner plurilocular sporangia.

Consequently I came to the conclusion that the species in question is not referrable to any known species in the genus.

The diagnosis is given as follows:—

Sphacelaria Iridaeophytica NAGAI, sp. nov.

Thallo pusillo, filamentis erectis caespitosis, discis basilaribus matrici adfixis; filamentis plus minusve cylindraceis, ad basim gradatim attenuatis, non multum lateraliter ramosis, olivaceo-brunneis, in axibus principalibus 36–45 μ, in axibus ramosis 25.5–33 μ diametris, 1.8–3 mm. altis; cellis terminalibus filamentorum clavatis vel cylindraceis, apud apices rotundatis, 27–51 μ diametris, 54–135 μ longis; cellis aliis longitudinaliter atque rarissime secundario transverse divisis; sporangiis unilocularibus globosis vel in juventute raro obovoideis, 51–75 μ diametris, pedicellis unilocularibus; sporangiis plurilocularibus oblongis vel oblongo-ellipsoideis, in partibus mediis semel vel bis sensim constrictis, 14–30 μ latis, 36–66 μ longis, maturescentibus olivaceo-flavis coloratis, pedicellis 1–4 locularibus; pilis et propagulis ignotis.



A. A part of main filament bearing three branches, in which the segments are divided lengthwise and secondarily transversely into smaller cells.

B. Terminal portion of the old filament developing further into two new ones by dichotomous branching, indicating *a* the segment belonging to the old filament and *b* the basal cells of the newly formed branched filaments.

C. Basal portion of the thallus epiphytic on *Iridaea laminarioides*.

D. E. Unilocular sporangia on the main and branched filaments.

F–I. Plurilocular sporangia on branched filaments (F) and main axes. (×320)

Hab. Ad frondem *Iridaeae laminarioidis*, in litore prope Rumoe ad oram maris Japoniae in Yesso.

Finally, I wish to express here my heartiest thanks to Prof. Emer. K. MIYABE and Prof. S. ITO for their valuable directions and constant encouragement. My gratitude is due to Prof. Y. YAMADA of the Faculty of Science who gave me valuable suggestions and allowance to use the books in the library under his management. My thanks are also due to Prof. J. TOKIDA in the School of Fishery for his good advices and critisisms in the present study, and to Mr. H. OTANI for his kind help in obtaining the material.

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摘　　要

褐藻くろがしら属の一新種に就きて

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今春四月大谷廣直君留萌地方に遊び歸學後其の採集せる若干の海藻標本を余に示せり。大部分は北海道近海に普通なる種類なりしが、唯一種ギンナンサウ (*Iridaea laminarioides* BORY) の体上に着生せる矮小にして珍奇なる褐藻の一種を見出せり。種々調査の結果之れは先に時田教授が本誌にて發表せられしクロガシラ属 (*Sphacelaria*) の一種にして SAUVAGEAU 氏の研究せる *S. ceylanica* SAUV., *S. intermedia* SAUV., *S. Hystrix* SUHR., 及 *S. Harveyana* SAUV. の四種に最も近き種類なる事判明せり。依つて以上の四種と夫々其の形態特徴を比較研究せる結果全く其の何れにも該當せざる事を知れり。故に是れに對して *Sphacelaria Iridaeophytica* NAGAI なる種名を與へ其の形態を記せり。