A Large Chromosome in the Antheridium of *Sargassum thunbergii* (Mertens ex Roth) Kuntze (Phaeophyta)

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Dioecious *Sargassum thunbergii* (Mertens ex Roth) Kuntze (Fucales, Phaeophyta) widely distributing along the whole coast of Japanese territory (cf. Fig. 25, p. 147, Yosida 1983) is common and populous from spring through late autumn on the rocks in the tidal zone. Yabu and Tokida (1966) once reported that aceto-iron-haematoxylin-chloral hydrate method devised and recommended by Wittmann (1965) showed excellent chromosome staining for various seaweeds including *S. thunbergii*. In their communication, however none of the cytological accounts were given except submitting only a photomicrograph showing the dividing nuclei in green alga *Chaetomorpha moniligela*. Since then *S. thunbergii* has been left untouched for cytology, so in order to determine the chromosome number of *S. thunbergii*, we carried out this study.

Material and methods

The maturing antheridial receptacles used had been taken from the male plants during the months from June to October in the years 1990–1994, at Usujiri or Shinori near or in Hakodate, Hokkaido. They were treated with the procedure of the above-mentioned aceto-iron-haematoxylin-chloral hydrate method. The best periods to find the dividing nuclei in the antheridia were late September through mid-October.

Results and discussion

Within the antheridia, we could count 32 chromosomes (Fig. 1) from late prophase to early metaphase in the first nuclear division known as Meiosis I, and one of the chromosomes was recognized as a large element (Fig. 2). The dividing nuclei in the following successive five nuclear divisions leading to the 64 spermatia formation were incapable for the count of definite chromosome numbers due to the dense gathering of chromosomes in the decreased area of the nuclear cavity, but sometimes displayed to have ca. 30 chromosomes. The metaphase nuclei in such successive divisions were also found to provide one large element (Figs. 3–5).

In the genus *Sargassum*, more than 350 species are said to comprise (May and Clayton 1991), however the chromosome number has been recorded only for the following six species, all from the localities in Japan: *S. confusum* ($n=32$, Abe 1933; $4n=64$, Yabu and Yasui 1983), *S. everve* ($n=32$, $2n=ca. 60$, Tahara and Shimotomai 1926), *S. horneri* ($n=16$, $2n=32$, Kunieda 1928; $n=32$, Okabe 1929; $2n=64$, Okabe 1930; $n=32$, Hiroe and Inoh 1954a), *S. patens* ($2n=64$, Hiroe and Inoh 1954a), *S. piluliferum* ($n=32$, $2n=64$, Inoh and Hiroe 1954a), *S. tortile* ($n=32$, Hiroe and Inoh 1956; $n=32$ Ogawa, Inoh and Ohmori 1969), and the chromosomes in these species were figured all as the spherical elements.

Those informations seem to suggest that the basic chromosome number for the *Sargassum*

Figs. 1-5. Dividing nuclei in the antheridia of *Sargassum thunbergii* (Mertens ex Roth) Kuntze from Shinori in Hakodate, Hokkaido. 1, 2. Metaphase in the first nuclear division. 1'. Drawing of Fig. 1. 3. Metaphase in the second nuclear division. 4. Metaphase in the fourth nuclear division. 5. Metaphase in the fifth nuclear division. Large chromosome is indicated by arrows. Bar = 10 μ m for all figures.

species is $n=32$ and $2n=64$. We confirmed in this study also $n=32$ chromosomes in the spherical shape for *S. thunbergii*. The presence of the same element as a large chromosome detected by us in *S. thunbergii* was already reported and figured as a somewhat larger gemini at meiosis in the oogonium of *S. horneri* by Okabe (1929). In our trials for *S. thunbergii*, we failed to examine the chromosome number and the presence of such a large chromosome in the dividing nuclei in the oogonium, to which we shall undertake the observations in the near future.

Summary

The chromosome number of *Sargassum thunbergii* (Mertens ex Roth) Kuntze (Fucales, Phaeophyta) was determined as $n=32$ at late prophase and early metaphase in the first nuclear divisions in the antheridia. One of the chromosomes was detected as a large element at metaphase in the nuclear divisions leading to the spermatia formation in the antheridia.

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