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The observation of specimens of *Cladophora sauteri* from Toyama, Japan

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Some specimens of *Cladophora sauteri* from Toyama Prefecture in Japan were observed morphologically. The size distribution in both diameter and length of cells and the ratio of length to diameter of cells of the alga from Toyama agree with those of *Cladophora sauteri* (Nees) Kützing f. *sauteri*. Toyama specimens of *Cladophora sauteri* f. *sauteri* resemble f. *kurilensis* in the size distribution of cells, but the filament of cells of f. *sauteri* is harder than that of f. *kurilensis*. The filament of cells of the Toyama specimens was hard. Thus, the author concludes that the specimens from Toyama are *Cladophora sauteri* (Nees) Kützing f. *sauteri*.

Key Index Words: Cladophora—*Chlorophyceae*—*freshwater algae*—lake ball—*Marimo*.

Cladophora sauteri has been reported in the seven lakes of Hokkaido, northern Japan. However in the Honshu district, middle Japan, the alga has been reported only in two lakes, Lakes Yamanaka and Kawaguchi which lie close to Mt. Fuji, and one marsh Sakyounuma Marsh (Hirose and Yamagishi 1977).

A new found district where this alga grows in the Town Tateyama in Toyama Prefecture was reported by Nagai (1988). Dr. I. Yasuda (Toyama Prefectural College of Technology) and Mr. S. Nagai (Toyama Science Museum) separately gave the author some specimens for identification of the alga. The author identified the specimens according to morphological observations of the alga, especially the size distribution of cells of the alga.

Observations

The alga grows on gravel and stones, or is free-floating on the bottom of a pond (Nagai 1988, Fig. 1A and B). Individual filaments are 0.5-1.5 cm long, branched densely (Fig. 1C). Adventitious rhizoids descend from any portion of fronds and are attached to stones (Fig. 1F). Branches are alternate, sometimes opposite, composed of cylindrical or sometimes slightly clavate cells (Fig. 1D and E).

As shown in Figs. 2-4, the diameter of the cells of branches is 40-70 μm (mean, 55.9 μm) and the length of the cells is 200-600 μm (mean, 419.8 μm). The ratio of length to diameter of the cells of branches is 2-18 (mean, 7.72). Branchlets are composed of cylindrical cells. The diameter of the cells of branchlets is 40-60 μm (mean, 51.7 μm) and the length of the cells is 200-600 μm (mean, 406.9 μm). The ratio of length to diameter of the cells of branchlets is 4-12 (mean, 8.43).

Discussion

The results obtained were compared with the data on *Cladophora sauteri* previously reported from some lakes and marshes in Japan. Diameter, length and the ratio of length to diameter of cells of the alga from Toyama are similar to those of cells of *Cladophora sauteri* (Nees) Kützing f. *sauteri* from Lake Akan (Sakai 1964). The size distribution of cells of the Toyama specimens agrees with that of *C. sauteri* f. *sauteri* from Lake Shirarutoro and Takkobu Marsh (Kanda 1979, 1980).

Another forma, *C. sauteri* f. *kurilensis* Sakai, resembles *C. sauteri* f. *sauteri* in the size distribution of cells. The difference between

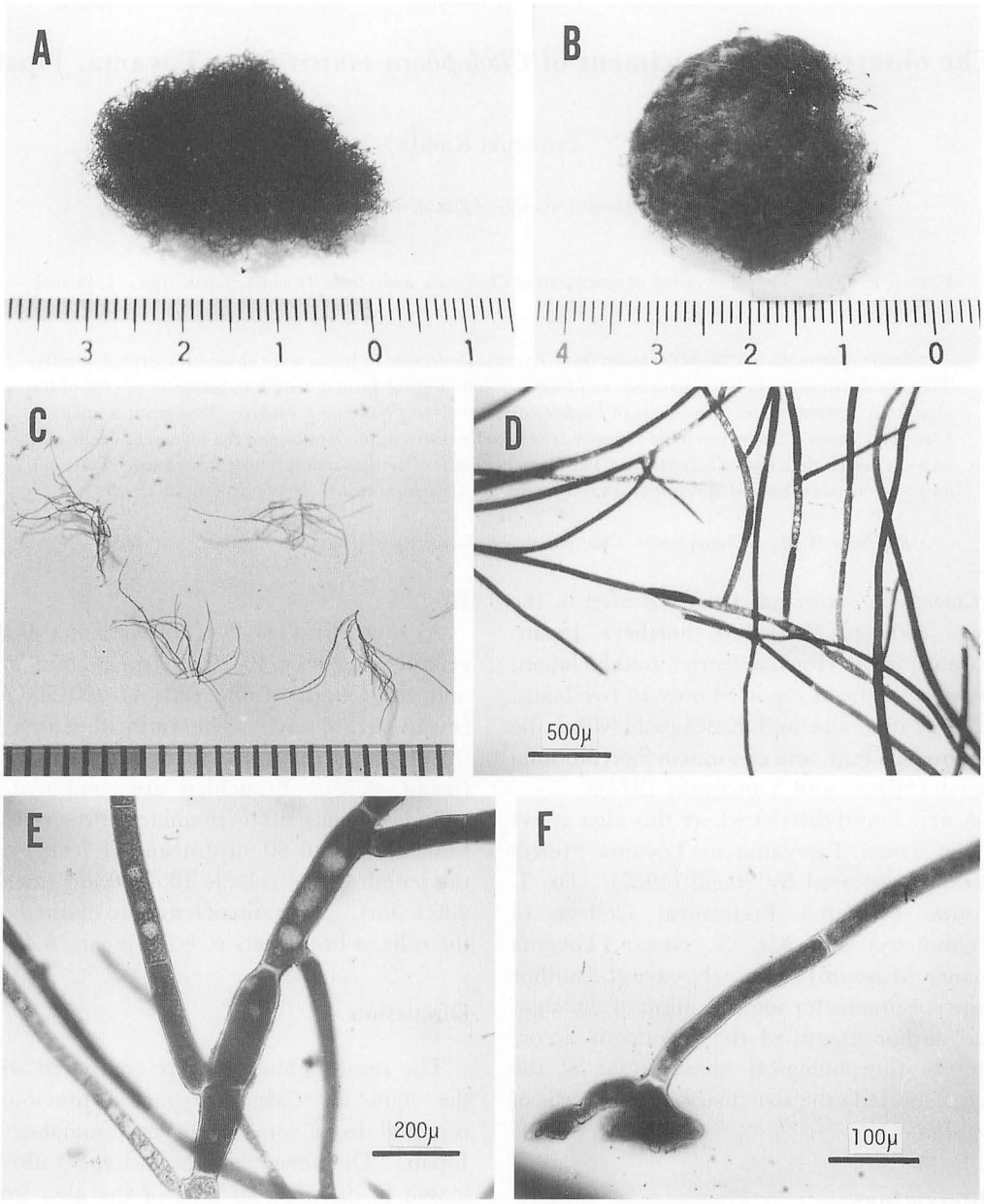

Fig. 1. A. *Cladophora sauteri* f. *sauteri* collected from the bottom of a pond of Toyama Prefecture, Japan. B. The alga growing on a stone. C. Filaments. D. Middle portion of a filament. E. Cells of a branch and branchlets. F. Rhizoid.

C. sauteri f. *sauteri* and f. *kurilensis* is in the hardness of filaments, namely the filament of f. *sauteri* is harder than the filament of f. *kurilensis* (Sakai 1964). On this point, the author compared the filament among the specimens of *C. sauteri* f. *sauteri* from Lake Shirarutoro, the specimens of *C. sauteri* f. *kurilensis* from Lake Yamanaka and the Toyama specimens. As a result, filaments of the Toyama specimens are clearly hard. Thus, the author concludes the Toyama specimen is *Cladophora sauteri* (Nees) Kützing f. *sauteri*.

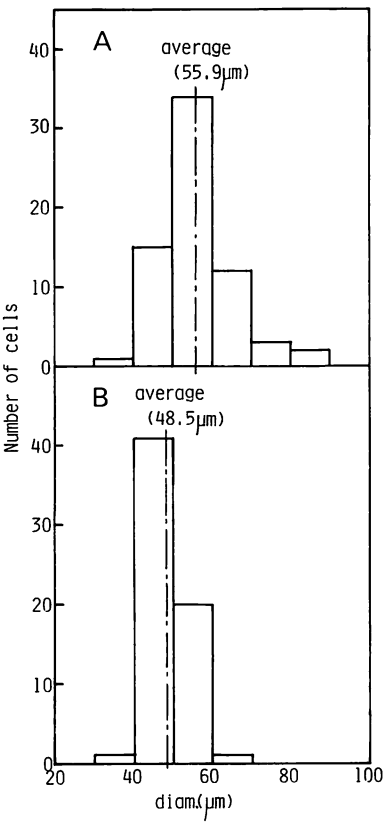

Fig. 2. Distribution of the diameter of filaments of *Cladophora sauteri* f. *sauteri* from Toyama. A. Cells of branches. B. Cells of branchlets.

However, there are some differences between the Toyama specimens and *C. sauteri* f. *sauteri* from other places. *C. sauteri* f. *sauteri* from Lake Akan, Lake Shirarutoro and Takkobu Marsh is free floating algae on the bottom of the lakes and the marsh, whereas, a part of the alga from Toyama was attached to stones. In addition, the manner of branching of filament of the alga from Toyama is rather irregular as compared to the algae from other places.

The pond in which the Toyama specimens grow was artificially made about 35 years ago (Nagai 1988). Thus, it seems that the alga was transferred from other places. There are some possibilities as regards transfer of the alga to this small pond. One is transference through the underground stream flowing into the pond. In this case, there may exist a lake

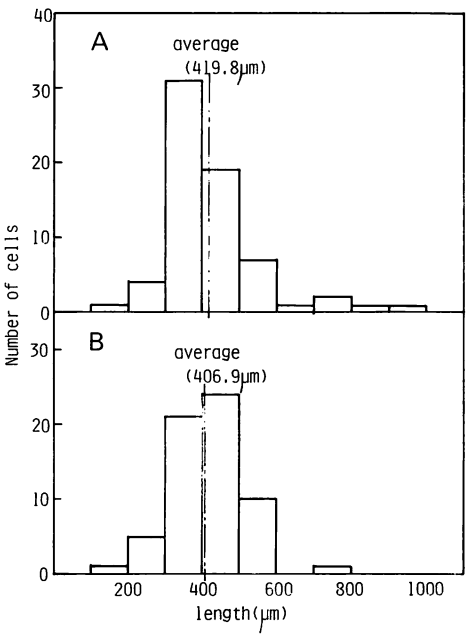

Fig. 3. Distribution of the length of cells in *Cladophora sauteri* f. *sauteri* from Toyama. A. Cells of branches. B. Cells of branchlets.

or a marsh in which the alga grows above the stream. Another possibility is transference by water-birds or animals (including human

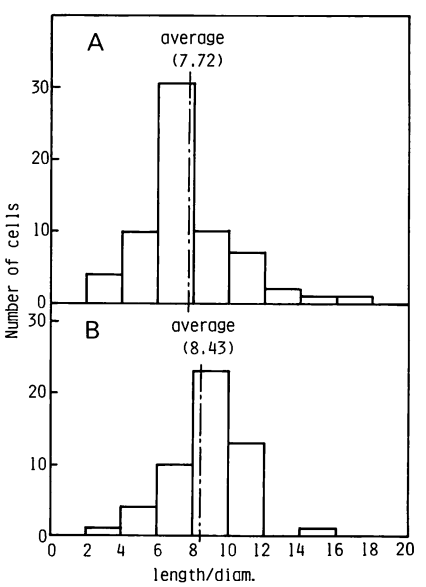

Fig. 4. Distribution of the ratio of length to diameter of cells in *Cladophora sauteri* f. *sauteri* from Toyama. A. Cells of branches. B. Cells of branchlets.

beings) from its original habitat.

Since *Cladophora sauteri* f. *sauteri* in this pond in the Toyama district seems to grow very well, the pond may have good environmental condition for growth of this alga as stated by Nagai (1988). This is interesting in view of the ecology for *Cladophora sauteri*.

Acknowledgement

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神田房行：富山で発見されたマリモの観察

1987年富山県の立山町でマリモ様藻が発見された（長井 1988）。その後，富山女子短期大学安田郁子助教授と富山市科学文化センター長井真隆氏からそれぞれ生標本とホルマリン漬標本が送られて来て，同定を依頼された。これらの標本に基づいて詳しい形態の観察を行った。富山で発見された標本を，これまでわが国の各地から採集されているマリモ類と比較してみると，糸状体が堅くてしっかりしていることや細胞のサイズ分布が阿寒湖や釧路湿原の湖沼から採集されたマリモ (*Cladophora sauteri* (Ness) Kützing f. *sauteri*) の細胞のサイズ分布と非常によく一致していた。富山のマリモ様藻は浮遊状のものの他に石に付着しているものがあることや，糸状体の分枝の仕方が不規則な点で他の湖沼のマリモと異なるところもあるが，マリモ (*Cladophora sauteri* (Nees) Kützing f. *sauteri*) であると結論された。

富山でマリモが発見されたのは，立山町の民家の池に於てであった（長井 1988）。この池は，今から約35年ほど前に作られたもので（長井 1988），マリモが自生していたものとは考えられない。この池には，地下水をたえず流し込んでおり，その地下水によってもたらされた可能性が考えられる。その場合には地下水の水源か経路にマリモが生育している可能性がある。他の可能性としては，水鳥などの生物（人間も含めて）によってもたらされたことも考えられる。この池でのマリモの生育状態は非常によいようなので（長井，1988），マリモにとっての生育環境条件が整っているように思われる。マリモの生態を探るうえで興味深い。（085 北海道釧路市城山 北海道教育大学釧路分校生物学教室）