Notes on Algae New to Japan. Concluding Remark.

By

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The number of algae enumerated in the present Notes count 178 in all, species, varieties and formae together. Among them 106 are Rhodophyceæ, 29 Phæophyceæ, and 43 Chlorophyceæ. There are reasons to believe that the number of algae still to be added to the Notes may amount to dozens. These will be mostly the parasitic forms, as well as various species of Ectocarpaceæ and of the callithamnioids. It is a hope of the present writer that he may be able to publish before long some additional reports to the Notes.

The floristic character of the marine algae of Japan and its relationships to that of the adjacent regions have not been satisfactorily persued. The first paper written on the subject was by OKAMURA[1] in Japanese in the year 1892. Our knowledge on the algal inhabitants of Japan has been much poorer at that time than at present and his view can not be naturally of an apprehensive one. Later on, the same author treated on the same subject as the material has increased, but always in Japanese. In 1901, I wrote a short note on the distribution of the marine algae in Japan which appeared in the Year Book of the Minnesota Seaside Station, "Postelsia," Vol. I. It is understood that on the south-western coasts there are no less number of the equatorial and the Australian species, and that

1) OKAMURA: On the Distribution of Marine Algae in Japan. (Bot. Mag., Tokyo. Vol. VI. No. 60)

on the north-eastern coasts still greater number of the North Pacific forms. This is undoubtedly due to the influence of the branch of the North Equatorial Current, i.e., the Black Current, and the Behring Current on the said regions respectively.

Most of the European algologists who have touched to the North Pacific algae were in the attitude to treat them separate from, or as less related to, the Atlantic members. Some of them went so far as to claim a new specific position for an alga which is hardly different from an European species, merely by its very far distant locality. Another was inclined to describe one and the same plant in separate specific positions as the localities differed. It is natural for them to regard the marine flora of Japan to be quite isolated from that of Europe. Most of the species hitherto reported from Europe and Japan in common have been taken as cosmopolitic.

Botanists always notice that there are number of synonyms for the European marine algae. The synonyms might have been multiplied by the gradual changes of the generic limitations or conceptions. But there are many which have been the results of combinations of more than two specific names into one. They have continuously ascertained that mere superficial variations of a plant, due to the ages, localities or sexes, have been described as separate species. The increase of the synonyms from such circumstances is a result of more extended researches on ample material or of careful observations in the field, in a word, a progress of science.

The extra-European species of the algae, especially of the Pacific, have mostly a few or no synonyms, This may be ofcourse due to the fact that they are described after the generic limitations of the algae have been fixed as they now stand. But I do not hesitate to say that it is also due to the incomplete material on which the species have been described, eventually entertaining too much multiplication of the species. An actual example of this is in the Fucaceous algae of Japan. The species of *Sargassum* assigned to Japan, reported and described by the European algologists, numbered as many as 39. On studying them carefully on ample material collected at various

seasons in many parts of Japan, I[1] could reduce them to 19 species. One and the same plant has been passing under several separate specific names, one being based on the upper part of frond and the other on the lower part. Male and female form have had different names; young and old form have had a specific position for each; and vegetative and fertile form have stood for many years as two valid species. I have reasons to say that a similar example, however in less degree, may be met with in other families.

In the present Notes the reader might have surprised to find nearly 38 species of algae hitherto regard as common in, but peculiar to, the Atlantic or the Mediterranean coasts to have occur in Japan also. Some of them are found pretty distributed on the coasts of Japan, and some, known widely at only limited localities.

It was a very interesting discovery to algologists as well as to plant-geographers that *Bonnemaisonia hamifera* HARIOT, formerly known as indiginous species of Japan, has been found on the Atlantic coast of France and on the south-western coast of England[2]; and that *Biddulphia sinensis* GREV., a diatom peculiar to the Pacific coast of Asia, has suddenly made its appearance in the North Sea in the year 1903. These examples are regarded by the authorities as resulted from the Euro-Asiatic navigations. The algal flora of Japan were practically unknown when the European steamers have commenced their regular calls to Japan. In 1895, DE TONI[4] enumerated 299 species of the marine algae, excluding Cyanophyceæ and Bacillariaceæ, as known from Japan. In 1916, OKAMURA[5] counted them 655. His list includes some manuscript names and excludes many imperfectly reported species. As far as I could

1) YENDO: Fucaceæ of Japan. (Journ. of the Coll. Sci., Imp. Univ. Tokyo. Vol. XXI. Art. 12.) 1907.

2) HOLMES: Bonnemaisona, a naturalized Japanese Seaweed. (Trans. Nat. Hist. Soc. of Glasgow. Vol. VI, N. S. Part III.) 1902.

3) OSTENFELD: On the Immigration of Biddulphia sinensis Grev., &c. (Meddelelser Komm. Havunders. Ser. Plankton, Bd. 1.) 1908.

4) DE TONI: Phyceæ Japonicæ Novæ, &c. 1895.

5) OKAMURA: Nippon Sorui Meii, Ed. II.

refer to, the number of marine algae, excluding Cyanophyceæ and Bacillariaceæ, recorded up to date for Japan, amounts 258 brown, 207 green and 580 red,—1045 in all. About 260 of them have been added by myself. This speedy increase of number is ofcourse mainly due to the progress of the investigation, but no one will be able to point out of them the immigrants to Japan carried by the steamers.

The two examples mentioned above persuade us to admit that some European algae might have been introduced into Japan. These, however, may not count very many. The majority of the 38 species must be regarded as common in both the Pacific and the Atlantic Ocean. A more thorough research of the Indian Ocean may perhaps throw a more light for the solution of the problem.

Beside the 38 European species, the present Notes contain 21 species hitherto known from the north-western region of the North America only, 18 species from the Indian Ocean and the southern China, and 28 species from New Zealand and Australia. These discoveries may alter the opinions of some algologists who are inclined to take the Japanese water as an isolated or detatched floristic region, or at least may convince them of a more intimacy between the Japanese and the foreign algal floras.

A comparison of the Japanese algal feature with more detailed data with that of other parts of the world will be interesting and welcome to botanists. As a concluding remark of the present Notes, however, I shall here confine myself in mentioning as above the general characters of the species reported in them.

Addenda.

Under *Lomentaria umbellata* H. et H., Notes V., p. 258, *Catenella procera* J. Ag. : Anal. Alg. II, p. 74—Toni : Syll Alg., IV, p. 321, should be brought in the synonymous position. The original specimen at Lund can never be specifically different from that of *Chylocladia Ramsayana* J. Ag. What the describer takes as cystocarpic ramulets are nothing but stichidia.

Sapporo, 21. May, 1918.

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