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LAMINARIACEAE OF THE KURILE ISLANDS

BY

KINGO MIYABE AND MASAJI NAGAI

The first contribution to our knowledge of the Kurile Laminariaceae was made in 1840 by POSTELS and RUPRECHT, who in "Illustrationes Algarum Oceani Pacifici imprimis septentrionalis" described *Alaria fistulosa* POST. et RUPR. growing in Kamtschatka and distributing from Saghalien to the Kuriles. Then, in 1848, RUPRECHT established *Arthrothamnus kurilensis* RUPR., taking as the type of the genus, from the Island of Urup of the Kuriles. In 1896, OKAMURA described *Laminaria gyrata* KJELLM. (= *Kjellmaniella gyrata* MIYABE) in his "On Laminaria of Japan", with the range of distribution from the Islands of Shikotan, Etorofu and Urup to Akkeshi in the Province of Kushiro. In 1902, MIYABE, the senior author reported in his "Laminariaceae of Hokkaido" the following species from the Kuriles: *Laminaria ochotensis* MIYABE, *L. diabolica* MIYABE (= *L. longipedalis* OKAM., var. *diabolica* MIYABE), *L. cichorioides* MIYABE (var. *sachalinensis* MIYABE = *L. sachalinensis* MIYABE), *L. longissima* MIYABE, *L. Ruprechtii* MIYABE (= *L. platymeris* DE LA PYL.), *L. yezoensis* MIYABE, *Kjellmaniella gyrata* MIYABE, *Arthrothamnus bifidus* J. AG., *Arth. kurilensis* RUPR., *Costaria Turneri* GREV. (= *C. costata* SAUNDERS), *Alaria fistulosa* POST. et RUPR., *A. corrugata* MIYABE (= *A. macroptera* YENDO), *A. macrophylla* MIYABE (= *A. macroptera* YENDO) and *Thalassiophyllum Clathrus* POST. et RUPR. In this and next year YENDO visited these islands (Etorofu in 1902, Shumushu in 1903) and reported nine species and two forms in several papers published in from 1903 to 1919. They are as follows: *Laminaria longipes* BORY, *L. dentigera* KJELLM., *L. bullata* KJELLM. f. *subsimplex* SETCH. et GARDN. (= *L. subsimplex* MIYABE et NAGAI), *L. bullata* f. *amplissima* SETCH. et GARDN., *Cymathaere triplicata* J. AG., *Hedophyllum Bongardianum* YENDO, *Alaria angusta* KJELLM., *A. lanceolata* KJELLM. (= *A. angusta* KJELLM.), *A. dolichorhachis* KJELLM. and *A. macroptera* YENDO.

For four years from 1929, the junior author visited these islands and collected the abundant materials of marine algae. Among these specimens, some algae of special interest belonging to the Laminariaceae have been several times reported by us until the present time. In this paper, we intend to enumerate all the species of the Laminariaceae thus far known from the Kuriles. The

authors wish to acknowledge their indebtedness for the fund granted by the Imperial Academy for carrying out this research.

Laminariaceae REICHENB.

Laminaria LAMOUR. (in part)

Key to the species

- A. Blade entire
 - a. Frond arising from creeping "rhizome" 1. *L. longipes*
 - b. Frond without creeping "rhizome"
 - α. Mucilage lacunae absent from stipe
 - I. Blade very long and tenaceous 2. *L. longissima*
 - II. Blade shorter and coriaceous 3. *L. coriacea*
 - β. Mucilage lacunae present in both stipe and blade
 - I. Hapteres in whorls 4. *L. sachalinensis*
 - II. Hapteres mostly in longitudinal rows
 - 1. Blade very broad (about 40 cm.) and rounded at the base ... 5. *L. longipediata*
 - 2. Blade narrower (15-20 cm.) and cuneate at the base 6. *L. ochotensis*
- B. Blade split into a few or several segments
 - a. Blade simple and more or less split at the outer end
 - α. Blade split into a few linear lobes at the upper end 7. *L. taeniata*
 - β. Blade split into two or more broad segments, sometimes nearly to the base
 - 8. *L. subsimplex*
 - b. Blade palmate
 - α. Holdfast composed of many branched hapteres
 - I. Stipe cylindrical to near the apex 9. *L. dentigera*
 - II. Stipe compressed upwards from $\frac{1}{4}$ - $\frac{1}{3}$ of the distance from the base
 - 10. *L. platymeris*
 - β. Holdfast scutate 11. *L. yezoensis*

1. *Laminaria longipes* BORY

in Dict. Class., IX, p. 189, 1826—J. AG., Sp. Alg. I, p. 133—Kütz., Spec. Alg., p. 574—ARESCH., Obs. Phyc. IV, p. 15—KJELLM., Beringhafv. Algfl., p. 43—SETCH., Alg. Pribilof Isl., p. 591, pl. 95; Kelps U. S. & Alaska, p. 150—SETCH. & GARDN., Alg. N. W. Amer., p. 260; Mar. Alg. Pacific Coast N. Amer. III, p. 597—YENDO, Notes Alg. new to Jap. I, p. 125; Kaisan Shokubutsugaku, p. 295—OKAM., Enum. Jap. Alg. 2nd Ed., p. 172—NAGAI, Seaweeds from the Kuriles, p. 43, pl. 1—MIYABE & NAGAI, Hedophyllum & Laminaria from N. Kuriles, p. 196.

Laminaria sacharina, f. *angustifolia* POST. et RUPR., Ill. Alg., p. 10, Tab. 11, 1840.

Lessonia repens RUPR., Tange des Och. Meer., p. 350, 1851.

Laminaria Ruprechtiana LE JOLIS, Examen, p. 71, 1855.

Arthrothamnus ? *longipes* J. AG., De Lamin., p. 26, 1867—DE TONI, Syll. Alg. III, p. 370.

JAP. NAME. *Hime-kombu*.

HAB. *Shimushir*: Broughton Bay (M. NAGAI, 1930). *Ketoi*: Minami-ura (M. TATEWAKI & K. TAKAHASHI, 1929). *Paramushir*: (Western Coast) Kaku-mabetsu (NAGAI, 1930, 1932), Kurosaki (NAGAI, 1932); (Northern Coast) Mura-

kami-wan (NAGAI, 1930); (Eastern Coast) Suribachi-wan (NAGAI, 1932). *Shu-mushu*: (Southern Coast) Kataoka-wan (NAGAI, 1930), Nagasaki (NAGAI, 1930); (W. C.) Tenjin-iwa (NAGAI, 1932); (E. C.) Kosekigawa (NAGAI, 1932). *Alaid*: Minami-ura (NAGAI, 1930).

DISTR. Saghalien, Bering Island, Aleutian Islands and Alaska.

2. *Laminaria longissima* MIYABE

Lamin. Hokkaido, p. 37, pl. 4, 1902—YENDO, Kaisei Shokubutsugaku, p. 367—OKAM., Enum. Jap. Alg. 2nd Ed., p. 173—NAGAI, Seaweeds from the Kuriles, p. 43.

JAP. NAME. *Naga-kombu*.

HAB. *Kunashiri*: (E. C.) Pontomari (NAGAI & SHIMAMURA, 1929), Seseki (NAGAI & SHIMAMURA, 1929), Chinomichi (J. TOKIDA, 1925; NAGAI & SHIMAMURA, 1929), Idashibenai (NAGAI & SHIMAMURA, 1929).

DISTR. Yezo.

3. *Laminaria coriacea* MIYABE

Lamin. Hokkaido, p. 40, pl. 11, 1902—OKAM., Enum. Jap. Alg. 2nd Ed., p. 173—NAGAI, Seaweeds from the Kuriles, p. 43.

JAP. NAME. *Gakkara-kombu*, *Atsuba-kombu*.

HAB. *Kunashiri*: (E. C.) Furukamap (NAGAI, 1930), Pontomari (NAGAI & SHIMAMURA, 1929), Seoi (NAGAI & SHIMAMURA, 1929), Chinomichi (TOKIDA, 1925; NAGAI & SHIMAMURA, 1929).

DISTR. Yezo.

4. *Laminaria sachalinensis* MIYABE, sp. nov.

Radice ramosa, ramis cylindraceis vel sensim complanatis et multis dichotome ramosis, duplice vel triplice verticillatis; stipite brevi, 3.5–6.5 cm. longo, tereti et superne paulatim complanato, 4–6 mm. diametro, lacunis muciferis infra stratum corticale dense dispositis; lamina simplici, lineari-lanceolata, 54–128 cm. longa, in parte latissima 13–23 cm. lata, basi rotunda, ad fasciam mediam crassa et coriacea, bullis magnis longitudinaliter biserialiter insignentibus, ad marginem membranacea, subter plana et a medio valde undulata, lacunis muciferis in interiore cortice serialiter dispositis; fuliginose colorata; soro laminae a basi sursum ad partem mediam in irregulares vittas extendente.

The holdfast consists of two sometimes three, alternating whorls which are several times dichotomously branched. The branches are cylindrical below, becoming flattened gradually towards the tip and fastened to the substratum by their lower surface. The stipe is terete and somewhat compressed upwards, short, commonly 3.5 to 6.5 cm. long, 4 to 6 mm. in diameter. The mucilage

lacunae in the stipe are narrow and closely arranged just beneath the periphery. The blade is simple, linear-lanceolate with rounded base, and coriaceous in substance, thickened in the median fascia, but membranaceous on outer portions. Even in matured individuals, there appear often two rows of distinct, large bullae extending in the full length on the median portion. The membranaceous portions are often plane below, but become much undulated in the middle and upper regions. In the adult ones the blade is 54 to 128 cm. long, and 13 to 23 cm. wide at the broadest part, with the median portion of 5 to 8 cm. in width. The color is darkish brown. The mucilage lacunae in the blade are moderately large, and arranged in a row in the outer portion of the cortex. The sori are extended in patches on the median portion of the blade from near the base.

Laminaria cichorioides MIYABE, var. *sachalinensis* MIYABE, in Proc. 3rd Pan-Pacific Sci. Congr., p. 957, 1926—TOKIDA, Mar. Alg. Robben Isl., p. 9.

JAP. NAME. *Karafuto-tororokombu*.

HAB. *Kunashiri*: (W. C.) Nikishiro (NAGAI & SHIMAMURA, 1929), Shibetoro (NAGAI, 1931), Sokobetsu (NAGAI, 1931); (N. C.) Atoiya (NAGAI & SHIMAMURA, 1929).

DISTR. Saghalien and Yezo.

We are inclined at present to consider this alga as an independent species rather than as a variety of *Laminaria cichorioides* MIYABE, which is familiar to us on the western coast of Hokkaido. The present species differs from it by its blade being not crispate at the margin of the lower half and by its larger size. The blade attains often to the size of *L. ochotensis* MIYABE and resembles closely that species, when the bullations appear less distinctly in some cases. The present species, however, differs from it in having the verticillate hapteres and narrower stipe.

5. *Laminaria longipedalis* OKAM.

Laminaria Japan, p. 29, pl. 7, fig. 1-3, 1896; Enum. Jap. Alg. 2nd Ed., p. 170 (p. p.)—MIYABE, Lamin. Hokkaido, p. 30, pl. 8.

var. *diabolica* MIYABE

in Proc. 3rd Pan-Pacific Sci. Congr., p. 956, 1926.

Laminaria diabolica MIYABE, l. c., p. 29, pl. 7, 1902—NAGAI, Seaweeds from the Kuriles, p. 43.

JAP. NAME. *Oni-kombu*.

HAB. *Etorofu*: (W. C.) Rubetsu (NAGAI, 1930), Bettobu (NAGAI, 1930), Shibetoro (NAGAI, 1930).

DISTR. Yezo and Saghalien.

6. *Laminaria ochotensis* MIYABE

Lamin. Hokkaido, p. 23, pl. 2, 1902—YENDO, Kaisan Shokubutsugaku, p. 364, fig. 114—OKAM., Enum. Jap. Alg. 2nd Ed., p. 170.

JAP. NAME. *Rishiri-kombu*.

HAB. *Kunashiri*: (W. C.) Nikishiro (NAGAI & SHIMAMURA, 1929), Sokobetsu (NAGAI, 1931); (N. C.) Atoiya (NAGAI & SHIMAMURA, 1929). *Etorofu*: (W. C.) Rubetsu (NAGAI, 1930), Shibetoro (NAGAI, 1930).

DISTR. Yezo and Saghalien.

7. *Laminaria taeniata* POST. et RUPR.

Ill. Alg., p. 10, Tab. 38, fig. f, 1840—MIYABE & NAGAI, Hedophyllum & Laminaria from N. Kuriles, p. 197, fig. 1.

Laminaria Bongardiana POST. et RUPR., f. *taeniata* KJELLM., Beringhafv. Algfl., p. 44, 1889.

Laminaria platymeris DE LA PYL., f. *taeniata* SETCH. et GARDN., Mar. Alg. Pacific Coast N. Amer. III, p. 606, 1925.

JAP. NAME. *Hosoba-chasenkombu*.

HAB. *Paramushir*: (E. C.) Suribachi-wan (NAGAI, 1932), Chitose-wan (NAGAI, 1930). *Shumushu*: (S. C.) Nagasaki (NAGAI, 1930); (W. C.) Tenjin-iwa (NAGAI, 1932).

DISTR. Kamtschatka, Bering Island and Alaska.

8. *Laminaria subsimplex* MIYABE et NAGAI, sp. nov.

Radice ramosa, ramis cylindraceis vel sensim complanatis verticillatis et multis dichotome ramosis; stipite brevi, 3–8 cm. longo, infra tereti, supra paulatim complanato, 4–6 mm. diametro, lacunis muciferis inaequimagnis in orbem sub-corticalem secundum ambitum dispositis; lamina crassa, coriacea, late lineari, in basi cuneata vel raro plus minus rotundata, plana vel raro bullis longitudinalis secundum utrumque regionem mediam seriatim insigni, tota vel in duos plurasve latas lacinias ad tertiariam usque dimidiam distantiam ad basin vel profunde ad basin fissa, margine plus minusve undulata, 12–25, saepe 18–23 cm. lata, 76–219, saepe 88–128 cm. longa, lacunis muciferis in interiore cortice seriatim dispositis; fuliginose colorata; soro ad partem externam laminae ab medio usque superne in irregulares vittas extendente.

Laminaria cuneifolia J. AG., f. *subsimplex* SETCH. et GARDN., Mar. Alg. Pacific Coast N. Amer. III, p. 602, 1925—MIYABE & NAGAI, Hedophyllum & Laminaria from N. Kuriles, p. 199, fig. 2.

Laminaria bullata KJELLM., f. *subsimplex* SETCH. et GARDN., Alg. N. W. Amer., p. 257, 1903—YENDO, Notes Alg. new to Jap. I, p. 124—OKAM., Enum. Jap. Alg. 2nd Ed., p. 174.

JAP. NAME. *Chishima-satsumatakombu*.

HAB. *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930). *Paramushir*: (W. C.) Kakumabetsu (NAGAI, 1930), Kamogawa (NAGAI, 1932), Arakawa (NAGAI, 1932); (N. C.) Murakami-wan (NAGAI, 1930); (E. C.) Suribachi-wan

(NAGAI, 1932). *Shumushu*: (S. C.) Kataoka-wan (NAGAI, 1930); (W. C.) Tenjin-iwa (NAGAI, 1932).

DISTR. Washington State.

We are now of an opinion that the present alga should better be treated as an independent species rather than as a form of *L. cuneifolia* J. AG. The present species differs from the latter in having the blade splitting often into two, three or more segments and with the scanty formation of the bullation.

9. *Laminaria dentigera* KJELLM.

Beringhafv. Algfl., p. 45, Tab. 2, fig. 10-14, 1889—DE TONI, Syll. Alg. III, p. 341—SETCH. & GARDN., Alg. N. W. Amer., p. 259; Mar. Alg. Pacific Coast N. Amer. III, p. 604—YENDO, Notes Alg. new to Jap. I, p. 124; Kaisei Shokubutsugaku, p. 293, fig. 95—SETCH., Kelps U. S. & Alaska, p. 151—OKAM., Enum. Jap. Alg. 2nd Ed., p. 174—MIYABE, in Proc. 3rd Pan-Pacific Sci. Congr., p. 955—MIYABE & NAGAI, Hedophyllum & Laminaria from N. Kuriles, p. 202, fig. 4.

Laminaria bullata NAGAI (not KJELLM.), Seaweeds from the Kuriles, p. 44, pl. 3, 1931.

JAP. NAME. *Kumade-kombu*.

HAB. *Paramushir*: (W. C.) Kakumabetsu (NAGAI, 1930, 1932), Kamo-gawa (NAGAI, 1932); (E. C.) Suribachi-wan (NAGAI, 1932). *Shumushu*: (E. C.) Kosekigawa (NAGAI, 1932). *Alaid*: Sekinezaki (H. ITO & G. KOMORI, 1926), Minami-ura (NAGAI, 1930).

DISTR. Saghalien, Bering Island and Alaska.

10. *Laminaria platymeris* DE LA PYL.

Fl. Terre-Neuve, p. 52, 1829—SETCH., Kelps U. S. & Alaska, p. 151 (p. p.)—SETCH. & GARDN., Mar. Alg. Pacific Coast N. Amer. III, p. 605 (excl. syn. *Laminaria Bongardiana* POST. et RUPR., *L. taeniata* POST. et RUPR., *L. fissilis* J. AG.)—NAGAI, Seaweeds from the Kuriles, p. 44, pl. 2—MIYABE & NAGAI, Hedophyllum & Laminaria from N. Kuriles, p. 201, fig. 3.

Laminaria Ruprechtii MIYABE (not ARESCH.), Lamin. Hokkaido, p. 42, pl. 14, 1902.

Laminaria dentigera KJELLM., f. *longipes* SETCH. et GARDN., Alg. N. W. Amer., p. 259, 1903; Mar. Alg. III, p. 604.

JAP. NAME. *Chishima-goheikombu*.

HAB. *Etorofu*: (E. C.) Chikohai (NAGAI, 1931), Moyoro (NAGAI, 1931), Hitokap-wan (NAGAI, 1930). *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930). *Ketoi*: Minami-ura (TATEWAKI & TAKAHASHI, 1929). *Paramushir*: (E. C.) Chitose-wan (NAGAI, 1930), Suribachi-wan (NAGAI, 1932). *Shumushu*: (E. C.) Kosekigawa (NAGAI, 1932). *Alaid*: Minami-ura (NAGAI, 1930), Sekinezaki (ITO & KOMORI, 1926).

DISTR. Alaska to Washington State and Arctic Region of Atlantic Ocean.

11. *Laminaria yezoensis* MIYABE

Lamin. Hokkaido, p. 41, pl. 12-13, 1902—OKAM., Enum. Jap. Alg. 2nd Ed., p. 174—NAGAI, Seaweeds from the Kuriles, p. 44.

Laminaria palmaeformis OKAM., in Records Oceanogr. Works in Japan I, p. 53, pl. 14, 1928—ARWIDSON, Higher Mar. Alg. hitherto known from Kamtschatka, p. 153.

JAP. NAME. *Gohei-kombu*, *Heisoku-kombu*.

HAB. *Etorofu*: (E. C.) Hitokap-wan (NAGAI, 1930). *Paramushir*: (E. C.) Chitose-Wan (NAGAI, 1930).

DISTR. Yezo and Kamtschatka.

Laminaria bullata KJELLM.

f. *amplissima* SETCH. et GARDN.

in YENDO Notes Alg. new to Jap. I, p. 125, 1909—OKAM., Enum. Jap. Alg. 2nd Ed., p. 174.

In the literature above noted, YENDO reported this alga as growing in Shumushu Island and he stated that "The present species resembles to a young stage of *Hedophyllum spirale* YENDO, from which, however, may be distinguished by the continuous circular arrangement of the lacunae in the stipe. The splitting of the lamina in this species seldom goes down till to the transition region." We have a specimen of this alga from Alaska, which was kindly distributed by Prof. GARDNER of the Department of Botany, California University. In this specimen, the blade is broad, ovate, 80 cm. long and 58 cm. wide; the stipe 2 cm. long in measurement. The bullations appear not in a row within each margin, but excessively all over the whole surface of the blade. So far as we have examined, however, we cannot find any specimen referable to the present alga among our collections.

Cymathaere J. AG.

Key to the species

- A. Blade membranaceous
 - a. Holdfast composed of branched hapteres; stipe with abundant mucilage lacunae 1. *C. fibrosa*
 - b. Holdfast scutate; stipe without mucilage lacunae 2. *C. triplicata*
- B. Blade coriaceous 3. *C. crassifolia*

1. *Cymathaere fibrosa* NAGAI

in Proc. Imp. Acad. IX, p. 521, fig. 2-6, 1933.

JAP. NAME. *Edane-misujikombu*.

HAB. *Etorofu*: (E. C.) Chikohai (NAGAI, 1931), Moyoro (NAGAI, 1931). *Urup*: (W. C.) Tokotan (NAGAI, 1930). *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930). *Paramushir*: (E. C.) Chitose-wan (NAGAI, 1930); (W. C.) Kakumabetsu (NAGAI, 1932). *Alaid*: Minami-ura (NAGAI, 1930).

DISTR. Endemic ?

2. *Cymathaere triplicata* (POST. et RUPR.) J. AG.

De Lamin., p. 30, 1867—ARESCH., Obs. Phyc. IV, p. 21—KJELLM., Beringhafv. Algfl., p. 43—DE TONI, Syll. Alg. III, p. 360—SAUNDERS, Alg. Harriman Exp., p. 430—SETCH. & GARDN., Alg. N. W. Amer., p. 264; Mar. Alg. Pacific Coast N. Amer. III, p. 608—GRIGGS, Cymathaere, p. 89, pl. 7—YENDO, Notes Alg. new to Jap. I, p. 123—SETCH., Kelps U. S. & Alaska, p. 154—OKAM., Enum. Jap. Alg. 2nd Ed., p. 177—NAGAI, Seaweeds from the Kuriles, p. 44, pl. 13, fig. A.

Laminaria triplicata POST. et RUPR., Ill. Alg., p. 10, pl. 10, 1840—J. AG., Spec. Alg. I, p. 136.

JAP. NAME. *Misuji-kombu*.

HAB. *Urup*: (W. C.) Tokotan (NAGAI, 1930), Ikema (Iema?) (K. JIMBO, 1891). *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930). *Paramushir*: (W. C.) Kurosaki (NAGAI, 1932). *Shumushu*: (S. C.) Kataoka-wan (K. YENDO, 1903), Nagasaki (NAGAI, 1930). *Alaid*: Uomizaki (ITO & KOMORI, 1926), Minami-ura (NAGAI, 1930).

DISTR. Bering Island, Aleutian Islands, Alaska and Vancouver Island.

3. *Cymathaere crassifolia* (POST. et RUPR.) DE TONI

Syll. Alg. III, p. 360, 1895—MIYABE & NAGAI, in Proc. Imp. Acad. VIII, p. 123, fig. 1-4.

Laminaria crassifolia POST. et RUPR., Ill. Alg., p. 10, Taf. 38, fig. d, 1840—J. AG., Sp. Alg. I, p. 136—KÜTZ., Sp. Alg., p. 574—LE JOLIS, Genre Lamin., p. 311—ARWIDSON, Higher Mar. Alg. hitherto known from Kamtschatka, p. 156.

JAP. NAME. *Atsuba-misujikombu*, *Umanokarwa*.

HAB. *Kunashiri*: (E. C.) Seoi (NAGAI & SHIMAMURA, 1929), Odaibake (TOKIDA, 1925; NAGAI, 1931).

DISTR. Kamtschatka.

Kjellmaniella MIYABE

Kjellmaniella gyrata (KJELLM.) MIYABE

Lamin. Hokkaido, p. 44, pl. 15-16, 1902—YENDO, Kaisan Shokubutsugaku, p. 373, fig. 117-118—OKAM., Enum. Jap. Alg. 2nd Ed., p. 175; Icon. Jap. Alg. V, p. 88, pl. 223—NAGAI, Seaweeds from the Kuriles, p. 45.

Laminaria gyrata KJELLM., Ny Organisationstyp inom slägt. Lamin., p. 16, Taf. 1, 1892—DE TONI, Syll. Alg. III, p. 348—OKAM., Laminaria Jap., p. 91, pl. 7, fig. 6-10.

Kjellmaniella crassifolia NAGAI (not MIYABE), l. c., p. 44.

JAP. NAME. *Tororo-kombu*.

Key to the forms

- | | | |
|----------------------------|--------|-----------------------|
| A. Blade linear-lanceolate | | |
| a. 7-8 cm. in width | | 1. f. <i>linearis</i> |
| b. 10-17 cm. in width | | 2. f. <i>latioris</i> |
| B. Blade obovate | | 3. f. <i>obovata</i> |

f. *linearis* (OKAM.)

Laminaria Jap., p. 92; Enum. Jap. Alg. 2nd Ed., p. 175.

HAB. *Kunashiri*: (E. C.) Furukamap (NAGAI, 1930), Wennai (NAGAI & SHIMAMURA, 1929), Chinomichi (TOKIDA, 1925); (N. C.) Atoiya (NAGAI & SHIMAMURA, 1929). *Etorofu*: (W. C.) Rubetsu (YENDO, 1902), Bettobu (NAGAI, 1930); (E. C.) Hitokap-wan (NAGAI, 1930).

DISTR. Yezo.

f. *latioris* (OKAM.)

l. c., p. 92, fig. 6; Enum., p. 175.

Kjellmaniella gyrata MIYABE, var. *crispata* MIYABE, Lamin. Hokkaido, p. 45, pl. 16.

HAB. *Kunashiri*: (W. C.) Seseki (NAGAI & SHIMAMURA, 1929), Chinomichi (NAGAI & SHIMAMURA, 1929); (N. C.) Atoiya (NAGAI & SHIMAMURA, 1929). *Etorofu*: (W. C.) Rubetsu (YENDO, 1902; NAGAI, 1931), Arimoe (NAGAI, 1930), Bettobu (NAGAI, 1930), Shibetoro (NAGAI, 1931), Toshirari (NAGAI, 1931); (E. C.) Hitokap-wan (NAGAI, 1930), Moyoro (NAGAI, 1931). *Shikotan* (OKAMURA). *Urup* (OKAMURA).

f. *obovata* (OKAM.)

l. c., p. 93; Enum., p. 175.

HAB. *Kunashiri*: (W. C.) Chinomichi (NAGAI & SHIMAMURA, 1929), Shiranuka (NAGAI & SHIMAMURA, 1929). *Etorofu*: (W. C.) Rubetsu (NAGAI, 1930), Shana (S. FUJIMURA, 1890). *Shikotan* (OKAMURA). *Urup* (OKAMURA).

Costaria GREV.**Costaria costata** (TURN.) SAUNDERS

in Bot. Gaz. XX, p. 57, 1895—SETCH., Kelps U. S. & Alaska, p. 154—SETCH. & GARDN., Mar. Alg. Pacific Coast N. Amer. III, p. 610, pl. 56 B, 79 A.

Fucus costatus TURN., Fuci IV, p. 72, pl. 226, 1819.

Costaria Turneri GREV., Alg. Brit., p. xxxix, 1830—POST. et RUPR., Ill. Alg., p. 12, pl. 24—J. AG., Sp. Alg. I, p. 139—ARESCH., Obs. Phyc., p. 20—DE TONI, Syll. Alg. III, p. 361—SAUNDERS, Alg. Harriman Exp., p. 431—MIYABE, Lamin. Hokkaido, p. 50, pl. 20—COLLINS, Mar. Alg. Vancouver Isl., p. 109—OKAM., Enum Jap. Alg. 2nd Ed., p. 176; Icon. Jap. Alg. V, p. 99, pl. 226.

Costaria Mertensii J. AG., Sp. Alg. I, p. 140, 1848.

JAP. NAME. *Sujime*.

HAB. *Kunashiri*: (E. C.) Furukamap (NAGAI, 1930), Wennai (NAGAI & SHIMAMURA, 1929), Seseki (NAGAI & SHIMAMURA, 1929), Pontomari (NAGAI & SHIMAMURA, 1929), Chinomichi (TOKIDA, 1925; NAGAI & SHIMAMURA, 1929), Idashibenai (NAGAI & SHIMAMURA, 1929); (W. C.) Toshoro (NAGAI, 1931), Shibetoro (NAGAI, 1931), Sokobetsu (NAGAI, 1931). *Etorofu*: (W. C.) Rubetsu

(NAGAI, 1930), Shibetoro (NAGAI, 1930); (E. C.) Moyoro (NAGAI, 1931).

DISTR. Yezo, Saghalien, Honshu, Korea, Aleutian Islands and Alaska to California.

Agarum (BORY) POST. et RUPR.

Agarum cribrosum BORY

in Dict. Class. IX, p. 193, 1826 (p. p.)—SETCH., Kelps U. S. & Alaska, p. 155—MÜNSCHER, Key to Phaeophyceae, p. 260, fig. 12—SETCH. & GARDN., Mar. Alg. Pacific Coast N. Amer. III, p. 615, pl. 63—TOKIDA, Mar. Alg. Robben Isl., p. 10—ARWIDSSON, Higher Mar. Alg. hitherto known from Kamtschatka, p. 153.

Fucus Agarum TURNER, Fuci II, p. 10, pl. 75, 1809.

Fucus cribrosum MERTENS, in Linnaea IV, p. 52, 1829.

Agarum Gmelini POST. et RUPR., Ill. Alg., p. 11, pl. 20-21, 1840—J. AG, Sp. Alg. I, p. 141—SAUNDERS, Alg. Harriman Exp., p. 430, pl. 61.

Agarum Turneri POST. et RUPR., l. c., p. 12, pl. 22—J. AG., l. c., p. 141—RUPR., Tange d. och. Meer., p. 353—ARESCH., Obs. Phyc. IV, p. 17—KJELLM., Alg. Arct. Sea, p. 222; Beringhav. Algfl., p. 42—SAUNDERS, l. c., p. 431—MIYABE, Lamin. Hokkaido, p. 59, pl. 27—OKAM., Enum. Jap. Alg. 2nd Ed. p. 167; Icon. Jap. Alg. V, p. 90, pl. 225; Alg. from Kamtschatka, p. 53—WORONICHIN, Meeresalg. Kamtschatkas (Transl. in Jap.), p. 133—NAGAI, Seaweeds from the Kuriles, p. 46, pl. 11.

JAP. NAME. *Aname*.

HAB. *Kunashiri*: (W. C.) Furukamap (NAGAI & SHIMAMURA, 1929), Chinomichi (NAGAI & SHIMAMURA, 1929), Shiranuka (NAGAI & SHIMAMURA, 1929); (N. C.) Atoiya (NAGAI & SHIMAMURA, 1929). *Etorofu*: (W. C.) Rubetsu (NAGAI, 1930, 1931), Shana (NAGAI, 1930), Bettobu (NAGAI, 1930), Shibetoro (NAGAI, 1930, 1931); (E. C.) Moyoro (NAGAI, 1931).

DISTR. Yezo, Saghalien, Kamtschatka, Aleutian Islands, Alaska, Arctic Sea and Atlantic coast of N. America.

Hedophyllum SETCH.

Hedophyllum Bongardianum (POST. et RUPR.) YENDO

Notes Alg. new to Jap. II, p. 269, 1909 (excl. syn. *Hafgygia Ruprechtii* ARESCH., *Laminaria Ruprechtii* DE TONI, *L. Ruprechtii* MIYABE, *L. crassifolia* POST. et RUPR., *L. nigripes* KJELLM.)—OKAM., Enum. Jap. Alg. 2nd Ed., p. 168 (excl. syn. *Laminaria Ruprechtii* MIYABE)—NAGAI, Seaweeds from the Kuriles, p. 45, pl. 4—MIYABE & NAGAI, Hedophyllum & Laminaria from N. Kuriles, p. 194, pl. 5.

Laminaria Bongardianum POST. et RUPR., Ill. Alg., p. 10, Tab. 13-14, 1840—KJELLM., Beringhav. Algfl., p. 43 (excl. f. *taeniata* KJELLM.).

Hafgygia Bongardianum KÜTZ., Spec. Alg., p. 577, 1849—ARESCH., Obs. phyc. IV, p. 5.

Laminaria digitata RUPR., Tange d. och. Meer., p. 352, 1851 (p. p.).

Arthrohamnus Bongardianus J. AG., De Lamin., p. 28, 1867—DE TONI, Syll. Alg. III, p. 370.

Hedophyllum subsessile (ARESCH.) SETCH., Notes on Algae I, p. 122, 1901—SAUNDERS, Alg. Harriman Exp., p. 430—SETCH. & GARDN., Alg. N. W. Amer., p. 263, pl. 20; Mar. Alg. Pacific Coast N. Amer. III, p. 618.

Hedophyllum spirale YENDO, in Bot. Mag. XVIII, p. 165, pl. 6, fig. 1-6, 1903—OKAM., Alg. from Kamtschatka, p. 54, fig. 1, pl. 15.

JAP. NAME. *Nejire-kombu*.

HAB. *Paramushir*: (W. C.) Kakumabetsu (NAGAI, 1930), Arakawa (NAGAI, 1932); (N. C.) Murakami-wan (NAGAI, 1930); (E. C.) Chitose-wan (NAGAI, 1930), Suribachi-wan (NAGAI, 1932). *Shumushu*: (S. C.) Kataoka-wan (NAGAI, 1930); (W. C.) Tenjin-iwa (NAGAI, 1932).

DISTR. Kamtschatka, Bering Island, Aleutian Islands, Alaska and Washington State.

Arthrothamnus RUPR.

Key to the species

- A. Stipe standing, long, cylindrical; holdfast of branched hapteres, which are borne verticillately at the very base of the stipe as in *Laminaria* 1. *A. kurilensis*
- B. Stipe decumbent, short, complanate; holdfast of branched hapteres, which are borne on both outer-sides of the basal part of the stipe 2. *A. bifidus*

1. *Arthrothamnus kurilensis* RUPR.

Bemerk. d. Bau. u. Wachstum Alg.-Stämme, p. 67, Taf. 6, 1848—DE TONI, Syll. Alg. III, p. 369—MIYABE, Lamin. Hokkaido, p. 49, pl. 19—YENDO, Kaisan Shokubutsugaku, p. 407—OKAM., Enum. Jap. Alg. 2nd Ed., p. 178; Icon. Jap. Alg. V, p. 103, pl. 228—NAGAI, Seaweeds from the Kuriles, p. 45, pl. 6.

JAP. NAME. *Chishima-nekoashikombu*.

HAB. *Etorofu*: (W. C.) Bettobu (NAGAI, 1930), Shibetoro (NAGAI, 1931), Toshirari (NAGAI, 1931); (E. C.) Hitokap-wan (NAGAI, 1930), Moyoro (NAGAI, 1931). *Urup*: (W. C.) Tokotan (NAGAI, 1930). *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930).

DISTR. Saghalien.

2. *Arthrothamnus bifidus* (GMEL.) J. AG.

De Lamin., p. 28, 1867—DE TONI, Syll. Alg. III, p. 369—MIYABE, Lamin. Hokkaido, p. 47, pl. 18—SETCH. & GARDN., Alg. N. W. Amer., p. 267; Mar. Alg. Pacific Coast N. Amer. III, p. 620—YENDO, Kaisan Shokubutsugaku, p. 407, fig. 127—OKAM., Enum. Jap. Alg. 2nd Ed., p. 178; Icon. Jap. Alg. V, p. 100, pl. 227—NAGAI, Seaweeds from the Kuriles, p. 45, pl. 5.

Fucus bifidus GMEL., Hist. Fuc., p. 201, pl. 29, fig. 2, 1768.

Laminaria bifida AG., Sp. I, p. 122, 182c—POST. et RUPR., Ill. Alg., p. 10, pl. 15—J. AG., Sp. Alg. I, p. 131.

Arthrothamnus radicans RUPR., Bemerk. d. Bau u. Wachstum Alg.-Stämme, p. 68, 1848.

JAP. NAME. *Nekoashi-kombu*.

HAB. *Kunashiri*: (E. C.) Chinomichi (TOKIDA, 1925), Rebun-iso (NAGAI & SHIMAMURA, 1929), Idashibenai (NAGAI & SHIMAMURA, 1929); (N. C.) Atoiya (NAGAI & SHIMAMURA, 1929). *Shimushir*: (N. C.) Broughton Bay (NAGAI,

1930). *Ketoi*: Minami-ura (TATEWAKI & TAKAHASHI, 1929). *Paramushir*: (W. C.) Kakumabetsu (NAGAI, 1930, 1932), Kamogawa (NAGAI, 1932); (N. C.) Murakami-wan (NAGAI, 1930); (E. C.) Chitose-wan (NAGAI, 1930), Suribachi-wan (NAGAI, 1932). *Shumushu*: (S. C.) Kataoka-wan (NAGAI, 1930); (E. C.) Kosekigawa (NAGAI, 1932). *Alaid*: Uomizaki (ITO & KOMORI, 1926), Minami-ura (NAGAI, 1930).

DISTR. Yezo, Kamtschatka, Bering Island and Aleutian Islands.

Thalassiophyllum POST. et RUPR.

Thalassiophyllum Clathrus POST. et RUPR.

Ill. Alg., p. 11, pl. 18-19, 1840—J. AG., Sp. Alg. I, p. 139—KJELLM., Beringhafv. Algfl., p. 42—SETCH., Alg. Pribilof Isl., p. 592; Post-emb. Stages, p. 123, pl. 13, fig. 6-13; Kelps U. S. & Alaska, p. 156—MIYABE, Lamin. Hokkaido, p. 60, pl. 28—SETCH. & GARDN., Alg. N. W. Amer., p. 266; Mar. Alg. Pacific Coast N. Amer. III, p. 613, pl. 72—OKAM., Enum. Jap. Alg. 2nd Ed., p. 168; Icon. Jap. Alg. V, p. 104, pl. 229; Alg. from Alaska, p. 87—WORONICHIN, Meeresalg. Kamtschatkas (Transl. in Jap.), p. 135—NAGAI, Seaweeds from the Kuriles, p. 47, pl. 12.

Fucus Clathrus GMEL., Hist. Fuc., p. 211, pl. 33, 1768.

JAP. NAME. *Kikuishi-kombu*.

HAB. *Urup*: (W. C.) Tokotan (NAGAI, 1930). *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930). *Paramushir*: (W. C.) Kakumabetsu (NAGAI, 1932); (N. C.) Murakami-wan (NAGAI, 1930); (E. C.) Chitose-wan (NAGAI, 1930), Suribachi-wan (NAGAI, 1932). *Shumushu*: (S. C.) Kataoka-wan (NAGAI, 1930). *Alaid*: Uomizaki (ITO & KOMORI, 1926).

DISTR. Kamtschatka, Aleutian Islands, Alaska and Bering Island.

Alaria GREV.

Key to the species

- A. Midrib fistulose at intervals 1. *A. fistulosa*
- B. Midrib solid throughout
 - a. Sporophylls narrow
 - α. Sporophylls usually fasciculate on short rhachis 2. *A. angusta*
 - β. Sporophylls usually pinnate on longer rhachis 3. *A. doichorhachis*
 - b. Sporophylls broader
 - α. Sporophylls mostly fasciculate on rather short rhachis 4. *A. macroptera*
 - β. Sporophylls usually pinnate on rather long rhachis 5. *A. tenuifolia*

1. *Alaria fistulosa* POST. et RUPR.

Ill. Alg., p. 11, Tab. 16, 1840—J. AG., Spec. Alg. I, p. 144—KJELLM., Beringhafv. Algfl., p. 40—SAUNDERS, Alg. Harriman Exp., p. 426, pl. 57—MIYABE, Lamin. Hokkaido, p. 52, pl. 21—SETCH. & GARDN., Alg. N. W. Amer., p. 275; Mar. Alg. Pacific Coast N. Amer. III, p. 644—YENDO, Kaisan Shokubutsugaku, p. 405; Monogr. Alaria, p. 76, pl. 1—SETCH., Kelps U. S. & Alaska, p. 163—XIBBE,

Structure of *Alaria fistulosa*, p. 43, pl. 7-9—OKAM., Enum. Jap. Alg. 2nd Ed., p. 164—NAGAI, Seaweeds from the Kuriles, p. 46, pl. 10.

Phasganon fistulosa RUPR., Tange d. och. Meer., p. 355, 1851.

JAP. NAME. *Oni-wakame*, *Kairoppa*.

HAB. *Etorofu*: (W. C.) Toshirari (NAGAI, 1931); (E. C.) Hitokap-wan (NAGAI, 1930), Chikohai (NAGAI, 1931), Moyoro (NAGAI, 1931). *Urup*: (W. C.) Tokotan (NAGAI, 1930). *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930). *Paramushir*: (W. C.) Kakumabetsu (NAGAI, 1930, 1932); (N. C.) Murakami-wan (NAGAI, 1930); (E. C.) Chitose-wan (NAGAI, 1930), Suribachi-wan (NAGAI, 1932). *Shumushu*: (E. C.) Kosekigawa (NAGAI, 1931). *Alaid*: Minami-ura (NAGAI, 1930).

Key to the forms

- A. Sporophylls short, obovate 1. f. *stenophylla*
 B. Sporophylls long, narrow 2. f. *platyphylla*

f. *stenophylla* SETCH.

in SETCH. & GARDN. Alg. N. W. Amer., p. 276; Mar. Alg., p. 645.

HAB. *Etorofu*: (E. C.) Moyoro. *Urup*: (W. C.) Tokotan. *Paramushir*: (N. C.) Murakami-wan.

f. *platyphylla* SETCH.

in SETCH. & GARDN., l. c.

HAB. *Shimushir*: (N. C.) Broughton Bay. *Paramushir*: (W. C.) Kakumabetsu. *Alaid*: Minami-ura.

DISTR. Saghalien, Bering Island, Aleutian Islands and Alaska.

2. *Alaria angusta* KJELLM.

Beringhafv. Algfl., p. 38, Tab. 3, fig. 1-4, 1889—YENDO, Monogr. Alaria, p. 123, pl. 15—NAGAI, Seaweeds from the Kuriles, p. 46, pl. 9.

Alaria lanceolata KJELLM., l. c., p. 39, Tab. 5, fig. 1-3—SAUNDERS, Alg. Harriman Exp., p. 426, pl. 53—SETCH. & GARDN., Alg. N. W. Amer., p. 275; Mar. Alg. Pacific Coast N. Amer. III, p. 642—SETCH., Kelps U. S. & Alaska, p. 162—YENDO, l. c., p. 129, pl. 17.

Alaria laticosta KJELLM., l. c., p. 40, Tab. 6—DE TONI, Syll. Alg. III, p. 331—SAUNDERS, l. c., p. 425, pl. 55.

Alaria esculenta POST. et RUPR., Ill. Alg., p. 11, 1840 (p. p.).

Alaria dolichorhachis COLLINS, HOLDEN & SETCHELL, Phyc. Bor.-Amer. (Exsicc.), No. XLI (not KJELLM.).

JAP. NAME. *Hosoba-wakame*.

HAB. *Etorofu*: (W. C.) Toshirari (NAGAI, 1931), Kamuiwakka (Collector unknown, 1894); (E. C.) Chikohai (NAGAI, 1931), Ukaboi (Collector unknown, 1894). *Urup*: (W. C.) Tokotan (NAGAI, 1930). *Shimushir*: (N. C.) Brough-

ton Bay (NAGAI, 1930). *Ketoi*: Minami-ura (TATEWAKI & TAKAHASHI, 1929). *Paramushir*: (W. C.) Kakumabetsu (NAGAI, 1930, 1931); (N. C.) Murakami-wan (NAGAI, 1930). *Shumushu*: (S. C.) Kataoka-wan (NAGAI, 1930); (W. C.) Tenjin-iwa (NAGAI, 1932). *Alaid*: Minami-ura (NAGAI, 1930), Sekinezaki (ITO & KOMORI, 1926).

DISTR. Saghalien, Bering Island, Aleutian Islands and Alaska.

In 1889, KJELLMAN reported on nine species of *Alaria* in "Beringhafvets Algflora". Among these species, *Alaria angusta* KJELLM. that bears narrow, metasoric and fasciculate sporophylls and also *A. lanceolata* KJELLM., similiar to the former, but having more long sporophylls are noted. According to KJELLMAN, the blade of the former species is narrow lanceolate, measuring 1 meter in length, only 7 cm. in width, while that of the latter lanceolate, and 1.25 meter in length and 15 cm. in width, in a specimen of each species. The sporophylls of the former are characteristic in the slenderness and measuring 10 to 15 cm. long in ordinary sizes, and never exceeding over 1 cm. in width. They are lanceolate, linear-spathulate in shape, petiolate at the base and having rather long sterile portions upwards. In the latter species, they are usually very long, and comparatively narrow, and in measurement, they reach even to 1 meter in length and 3 to 4 cm. in width. They are covered with sori on nearly the whole surface except the terminal portion and the narrow border along the margin. These species are enumerated by YENDO in his monograph of the genus *Alaria* as growing also in the North Kuriles. In the North as well as in the southern Kuriles, but limited to the region washed by the cold current, the junior author found also an *Alaria* that bears the fasciculate narrow sporophylls growing on the reefs exposed at ebb-tide. The blade is linear or linear-lanceolate with acute or cuneate base, and much narrower, but rather shorter than in the other species. It is often split and sometimes decaying in the upper portion, retaining the midrib behind. The stipe is short. The sporophylls are linear or rarely linear-lanceolate, narrow, usually fasciculate, and having sterile portions upwards. The sterile portions are rather long and sometimes attain even to a half or two thirds of the full length of the sporophylls, but rarely the sori extend further upwards, leaving rather short sterile portions on the tip. The sporophylls are at least 11 cm., mostly 20 to 50 cm. and rarely up to 74 cm. in length. In width they are measured mostly 1.5 to 3 cm., but sometimes in the younger specimens 4 to 5 mm. wide even at the broadest parts. Among the abundant specimens from the Kurile Islands, there are found many individuals according well with *A. angusta*, as well as also with *A. lanceolata*. There are also found the intermediate forms between them. After the consideration, we came to the conclusion that these two species should

better be amalgamated into one species. As to the other synonyms, we follow here tentatively the opinion of YENDO and SETCHELL and GARDNER.

3. *Alaria dolichorhachis* KJELLM.

Alg. Arct. Sea, p. 217, pl. 20-21, 25, fig. 11-18, 1883; Beringhafv. Algfl., p. 36—DE TONI, Syll. Alg. III, p. 328—SETCH. & GARDN., Alg. N. W. Amer., p. 272; Mar. Alg. Pacific Coast N. Amer. III, p. 642—SETCH., Kelps U. S. & Alaska, p. 162.

Alaria elliptica KJELLM., Alg. Arct. Sea, p. 221, pl. 23, 25, fig. 25-26—DE TONI, l. c., p. 329.

Alaria crispa KJELLM., Beringhafv. Algfl., p. 37, Tab. 3, fig. 5-7—DE TONI, l. c., p. 330.

Alaria taeniata SETCH. (not KJELLM.), Kelps, p. 162, 1912.

Alaria proelonga NAGAI (not KJELLM.), Seaweeds from the Kuriles, p. 46, pl. 7, 1931.

JAP. NAME. *Enaga-wakame*.

HAB. *Etorofu*: (W. C.) Rubetsu (YENDO, 1902; NAGAI, 1930), Arimoe (NAGAI, 1930), Shana (YANAGAWA, 1895), Bettobu (NAGAI, 1930), Shibetoro (NAGAI, 1930, 1931), Toshirari (NAGAI, 1931); (E. C.) Hitokap-wan (NAGAI, 1930). *Urup*: (W. C.) Tokotan (NAGAI, 1930). *Paramushir*: (W. C.) Kurosaki (NAGAI, 1932); (N. C.) Murakami-wan (NAGAI, 1930); (E. C.) Chitose-wan (NAGAI, 1930), Suribachi-wan (NAGAI, 1932). *Shumushu*: (S. C.) Kataoka-wan (NAGAI, 1930); (W. C.) Tenjin-iwa (NAGAI, 1932).

DISTR. Saghalien, Bering Island, Aleutian Islands, Kamtschatka, Alaska and Spitzbergen.

f. *longipes* MIYABE

in Proc. 3rd Pan-Pacific Sci. Congr., p. 957, 1926.

HAB. *Etorofu*: (W. C.) Rubetsu. *Paramushir*: (W. C.) Kurosaki. *Shumushu*: (W. C.) Tenjin-iwa.

DISTR. Saghalien.

4. *Alaria macroptera* (RUPR.) YENDO

Monogr. Alaria, p. 79, pl. 2, fig. 1-5, 1919.

Phasganon macropterum RUPR., Tange d. och. Meer., p. 353, 1851.

Phasganon longipes RUPR., l. c., p. 353.

Alaria esculenta, f. *latifolia* POST. et RUPR., Ill. Alg., p. 11, pl. 17, 1840.

Alaria esculenta, f. *pinnatifida* POST. et RUPR., l. c., p. 11 (p. p.).

Alaria corrugata MIYABE, Lamin. Hokkaido, p. 55, pl. 24, 1902—YENDO, Kaisan Shokubutsu-gaku, p. 405.

Alaria macrophylla MIYABE, l. c., p. 56, pl. 25—NAGAI, Seaweeds from the Kuriles, p. 46.

JAP. NAME. *Chishima-wakame*.

HAB. *Kunashiri*: (E. C.) Chinomichi (NAGAI & SHIMAMURA, 1929), Idashibenai (NAGAI & SHIMAMURA, 1929); (N. C.) Atoiya (NAGAI & SHIMAMURA, 1929). *Etorofu*: (W. C.) Rubetsu (NAGAI, 1930), Arimoe (NAGAI, 1931), Shana

(FUJIMURA, 1890), Bettobu (NAGAI, 1930), Shibetoro (I. ÔNO, 1929), Toshirari (NAGAI, 1931), Kamuiwakka (Collector unknown, 1894); (E. C.) Chikohai (NAGAI, 1931), Moyoro (NAGAI, 1931), Ukaboi (Collector unknown, 1894). *Urup*: (W. C.) Tokotan (NAGAI, 1930). *Paramushir*: (N. C.) Murakami-wan (NAGAI, 1930); (E. C.) Chitose-wan (NAGAI, 1930). *Shumushu*: (S. C.) Kataoka-wan (NAGAI, 1930).

DISTR. Kamtschatka.

5. *Alaria tenuifolia* SETCH.

in COLLINS, HOLDEN & SETCHELL, Phyc. Bor.-Amer., No. XLV—SETCHELL & GARDN., Alg. N. W. Amer., p. 272; Mar. Alg. Pacific Coast N. Amer. III, p. 638—SETCHELL, Kelps U. S. & Alaska, p. 162.

Alaria Pylaii YENDO (not GREV.) Monogr. Alaria, p. 97, pl. 7, 1919.

Alaria corrugata NAGAI (not MIYABE), Seaweeds from the Kuriles, p. 46, pl. 8, 1931.

f. *typica* SETCH.

in COLLINS, HOLDEN & SETCH., l. c.—SETCHELL & GARDN., Alg. N. W. Amer., p. 273, pl. 22; Mar. Alg., p. 638—WORONICHIN, Meeresalg. Kamtschatkas (Transl. in Jap.), p. 128—NAGAI, Meeresalg. aus Kamtschatka, p. 15.

JAP. NAME. *Maruba-chishimawakame*.

HAB. *Etorofu*: (E. C.) Wenbetsu (ÔNO, 1929), Moyoro (NAGAI, 1931). *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930). *Paramushir*: (E. C.) Chitose-wan (NAGAI, 1930).

DISTR. Kamtschatka, Aleutian Islands and Alaska.

We have obtained the present species in the localities above noted from the Kuriles. The stipe is 7.5 to 11.5 cm. long, cylindrical at the base, becoming flattened gradually upward towards the rhachis of about 2 to 6 cm. in length. The sporophylls are linguiform to obovate, and taper evenly towards the base. They are 5 to 20 cm. long, 3 to 5 cm. wide at the broadest part. They are commonly produced more or less separately from each other in alternate or subopposite arrangement on the rhachis and usually 14 to 32 in number in an individual. The sori occupy both surfaces of the lower half or two thirds of the full length of the sporophylls. The blade is linear-oblong with broadly cuneate to rounded base, membranaceous and more or less richly plicated on the surface. It is measured 50 to 150 cm. in length and 7 to 14 cm. in width. Our specimens are compared with the specimen in the Exsiccatae of COLLINS, HOLDEN and SETCHELL and accord with it very well in important characters.

Pleuropterum MIYABE et NAGAI

Pleuropterum paradiseum MIYABE et NAGAI

in Proc. Imp. Acad. VIII, p. 127, fig. 1-2.

Key to the forms

- A. Stipe long 1. *f. typica*
 B. Stipe short 2. *f. brevipes*

f. typica MIYABE et NAGAI, f. nov.

Stipite 40–60 cm. longo; lamina 7–15 cm. lata, 80–135 cm. longa; sporophyllis et sterilibus pinnis normalibus.

JAP. NAME. *Fūcho-wakame*, *Alaid-wakame*.

HAB. *Urup*: (W. C.) Tokotan (NAGAI, 1930). *Alaid*: Sekinezaki (Iro & KOMORI, 1926), Minami-ura (NAGAI, 1930).

DISTR. Endemic.

This form is based upon the original specimens from the Island of Alaid.

f. brevipes MIYABE et NAGAI, f. nov.

Stipite brevi, ca. 15 cm. longo; lamina latiore, 15–17.5 cm. lata, 300–370 cm. longa; sporophyllis aequae in *f. typica* formantibus; sterilibus pinnis paucis.

HAB. *Shimushir*: (N. C.) Broughton Bay (NAGAI, 1930).

In this form, the stipe is shorter than that of *f. typica*, and measures about 15 cm. in length. The blade is rather wider and not much split on the upper and middle portions. It measures 15 to 17.5 cm. in width and 200 to 370 cm. in length. The sporophylls are formed more or less fasciculately on rather short rhachis of the stipe. The sterile pinnae are mostly found less in number compared with *f. typica*.

摘 要

千 島 産 昆 布 科 植 物

宮 部 金 吾・永 井 政 次

著者の一人永井は1929より4年間千島列島の各地に航し、海藻類の採集研究に従事せり。其の得たる標品中特に昆布科植物に就き學術上興味深きものに關しては既に數回著者等の研究發表せる處あり。今回夫等の種類及其他の總てを取り纏め茲に報告せんとす。尙本研究を遂行するに當り必要なる補助を與えられたる帝國學士院に對し深く感謝の意を表す。

千島産昆布科植物の種類は次の如し。

- 1 ヒメコンブ (*Laminaria longipes* BORY)
- 2 ナガコンブ (*L. longissima* MIYABE)
- 3 ガツカラコンブ (*L. coriacea* MIYABE)
- 4 カラフトトロロコンブ (*L. sachalinensis* MIYABE) 本種は國後西岸及樺太に産し、從來北海道西岸に普通見らるゝチマミコンブの一變種とせられたりしが、今回別種として取扱ふに至當と考へ茲に一新種として發表せり。

- 5 オニコンプ (*L. longipedalis* OKAM., var. *diabolica* MIYABE)
- 6 リシリコンプ (*L. ochotensis* MIYABE)
- 7 ホソバチャセンコンプ (*L. taeniata* P. et R.)
- 8 チシマサツタコンプ (*L. subsimplex* MIYABE et NAGAI) 本種は北及中部千島に産し、曩に著者等は北米西岸に産する *L. cuneifolia*, f. *subsimplex* SETCH. et GARDN. に當てたるものなり。其後 *L. cuneifolia* の一變種として取扱ふよりも獨立種と爲すに至當と考へ茲に一新種として記述せり。
- 9 クマデコンプ (*L. dentigera* KJELLM.)
- 10 チシマゴヘイコンプ (*L. platymeris* DE LA PYL.)
- 11 ゴヘイコンプ (ヘイソクコンプ) (*L. yezoensis* MIYABE)
- 12 *L. bullata* KJELLM., f. *amplissima* SETCH. et GARDN. 本種は曩に遠藤博士が占守島に産する事を報ぜられしが、著者の採集標品中是れに該當するものを得ざりき。此處には單に博士に従ひて其の種名を收録せり。
- 13 エダネミスチコンプ (*Cymathaere fibrosa* NAGAI) 本種は体脆弱、根は糸狀、莖に細小なる粘液腔導を有す。糸狀根は屢々充分に發達せずして二三の微小なる糸狀突起に終る事あり。北及中部千島に産し、又次のミスチコンプ下に記述せる事實に依り恐らく北米沿岸にも分布せるに非らざるやと考へらる。
- 14 ミスチコンプ (*C. triplicata* J. AG.) 本種は前種同様体脆弱、根は盤狀、莖に粘液腔導を缺く。本邦にては前種と同一區域内に産し、ベーリング島、アリウシヤン群島、アラスカ、バンクーバー島に分布す。北米産のものに於て GRIGGS, SETCHELL 及 GARDNER 氏等の莖の粘液腔導存否に就きて論争あり。著者等は教室指葉庫所蔵のアラスカ産及千島産の標品を検せる結果、本種には全く粘液腔導の存せざる事を知れり。唯本種の盤狀根は通常ゴヘイコンプの如く高度の發達を爲さずして、其の發育不充分なるものにては屢々小豆大の塊に過ぎざる事あり。而も千島にては屢々前種と共に發見せらるゝを以て、斯かるものは前種の根部發育不良なるものに見よく類似し是れを誤認し易し。
- 15 アツバミスチコンプ (*C. crassifolia* DE TONI)
- 16 トロロコンプ (*Kjellmaniella gyrata* MIYABE) 本種は千島産のものに三變種あり。
- 17 スヂメ (*Costaria costata* SAUNDERS)
- 18 アナメ (*Agarum cribrosum* BORY)
- 19 ネジレコンプ (*Hedophyllum Bongardianum* YENDO)
- 20 チシマネコアシコンプ (*Arthrohammus kurilensis* RUPR.)
- 21 ネコアシコンプ (*A. bifidus* J. AG.)
- 22 キクイシコンプ (*Thalassiphyllum Clathrus* P. et R.)
- 23 オニワカメ (カイロツバ) (*Alaria fistulosa* P. et R.) 本種は千島産のものに二變種あり。
- 24 ホソバワカメ (*A. angusta* KJELLM.) KJELLMAN 氏が初めて記述せる *A. lanceolata* KJELLM. は後に遠藤博士が北千島にも産する事を報ぜしが、著者等は千島産の多數の標品に依りて全く本種の一形態なりと考へ是れを本種に編入せり。但し *A. lanceolata* の形態は本種の正常形にして *A. angusta* は其の異常形と思考せらるれども、命名規約法に従ひ止むを得ず上記の種名を採用せり。
- 25 エナガワカメ (新稱) (*A. doichorhachis* KJELLM.) 本種は其の正常形以外他に一變種あり。
- 26 チシマワカメ (*A. macroptera* YENDO)
- 27 新バチシマワカメ (新稱、本邦新産) (*A. tenuifolia* SETCH., f. *tyfica* SETCH.) 本種は樺提、新知、幌筵島に産し、阿留シヤン群島、アラスカに分布す。
- 28 フウチヨウワカメ (アライトワカメ) (*Pleuropterum paradiseum* MIYABE et NAGAI) 本屬本種は北千島阿賴度島に初めて發見せられ、その後新知島にも産する事を知れり。但し新知産のものは莖部短く、不稔性小葉の數割合に少く、是れを原産地のもの一變種とせしめず。