October, 1981
Acta Phytotax. Geobot. 165

Taxonomic notes on *Odonthalia ochotensis* (Rupr.) J. Ag. and
*O. kamtschatica* (Rupr.) J. Ag. (Rhodophyta)

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増田道夫・山田家正：紅藻シノブハノコギリヒバと
カムチャッカノコギリヒバについて

*Odonthalia ochotensis* (Rupr.) J. Ag. and *O. kamtschatica* (Rupr.) J. Ag. were originally
described by Ruprecht (1850) under the genus *Atomaria* and later transferred to *Odonthalia*
by J. Agardh (1863). Both the species have been reported from various localities of the
North Pacific Ocean, the Sea of Okhotsk and Bering Sea (Okamura, 1902, 1916, 1923, 1932, 1933, 1936; Setchell and Gardner, 1903; Collins, 1913; Kylin, 1925; Tokida, 1932, 1934, 1950, 1954; Yamada, 1934; E. S. Zinova, 1940, 1954a, 1954b, 1954c; Nagai, 1941; Yamada and Tanaka, 1944; Scagel, 1957; A. D. Zinova, 1959; Chihiara, 1967; Blinova, 1968; Vozzhinskaya and Blinova, 1970; Vozzhinskaya and Selitskaya, 1970; A. D. Zinova and Perestenko, 1974; Perestenko, 1977). However, later investiga-
tors have not fully understood these circumscriptions given by Ruprecht (1850).
Tokida (1950) pointed out the similarity between both the species and stated as follows.
"If it is proved in future that the type specimens of these two species are specifically
identical with each other, the name *Odonthalia ochotensis* should take the place of
*Odonthalia kamtschatica* in conformity to the rule of priority." Perestenko (1977), who
examined the original specimens of both the species, reduced *O. kamtschatica* to the synonymy
with *O. ochotensis* for the following reason. Although they differ from each other in the
color and breadth of thalli and the breadth of fertile branches, they are identical with
each other in the appearance of determinate branches and characteristic midribs, and
in the position of cystocarps, tetrasporangia and maximum branch-breadth. In this
paper we present the clear distinction between *O. ochotensis* and *O. kamtschatica* through the
examination of the lectotype specimens.

Materials

*Odonthalia ochotensis*: A cystocarpic specimen was collected in Manga Bay, western
coast of the Sea of Okhotsk, on July 28, 1844 (Fig. 1) and is deposited in the Herbarium

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of the Komarov Botanical Institute of the Academy of Sciences, Leningrad (LE). This was designated as the lectotype on the label by L. P. PERESTENKO.

**Odonthalia kamtschatica**: A cystocarpic specimen was collected at Petropavlovsk (St. Petri et Pauli), Awacha Bay, south-east coast of Kamchatka Peninsula, in 1848 by WOSNESENSKY (Fig. 4) and is preserved in LE. This specimen is one of three herbarium specimens considered to be the original material of this species studied by RUPRECHT and cited as the type by PERESTENKO (1977). We designated here this specimen as the lectotype.

In addition, the following cystocarpic specimens of eight species of *Odonthalia* were examined to evaluate cystocarpic features. (1) Liquid-preserved specimens of *O. dentata* collected from Lawrencetown Beach, Halifax, Nova Scotia, on April 30, 1965 by J. McLACHLAN and T. EDELSTEIN. (2) Liquid-preserved specimens of *O. corymbifera* collected at Muroran, Hokkaido in Japan on August 29, 1970 by M. MASUDA. (3) Pressed specimen of *O. lyalli* collected from Fuca Strait, British Columbia, in March 1859 by D. LYALL (TCD*). (4) Pressed specimen of *O. floccosa* gathered from Whidbey Island, Washington, in July 1898 by N. L. GARDNER (Herb. YAMADA in SAP**). (5) Pressed specimen of *O. washingtoniensis* collected from Whidbey Island, Washington, in August 1899 by N. L. GARDNER (P. B. A. 941). (6) Pressed specimen (holotype) of *O. oregona* gathered from Curry County, Oregon, on July 3, 1944 by M. S. DOTY (Dudley Herb. in UC***). (7) Liquid-preserved specimens of *O. annae* collected at Rausu, north-eastern coast of Hokkaido, on May 16, 1968 by M. MASUDA. (8) Pressed specimen of *O. setacea* gathered in Glakovskaja Bay, Mednyi Isl., Commander Islands, on July 10, 1972 by L. PERESTENKO (SAP).

**Observations and Discussion**

The original illustrations of *Odonthalia ochotensis* given by RUPRECHT (1850) show characteristic features of this species clearly. Our observations of the lectotype specimen (Fig. 1) correspond with RUPRECHT's description. The thallus is monopodial and de-compound-pinnate in a single plane. It has a main axis from which numerous lateral branches issue in an alternate-distichous manner. The majority of the lateral branches are indeterminate and expansive. Conspicuously developed midribs are evident on the lower to middle portions of the lateral branches and the main axis. Cystocarps are corymbose on short branches formed at the uppermost portion of the lateral branches. Mature cystocarps are urceolate in shape and possess short calcars (up to 160 μm in length) at the base and slightly elevated neck in the upper portion (Figs. 2, 3). They are 380–480 μm in length and 280–350 μm in diameter. These features are in accordance with the original illustrations of this species (RUPRECHT, 1850).

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* TCD: The Herbarium of Trinity College, University of Dublin, Dublin.
** SAP: The Herbarium of Faculty of Science, Hokkaido University, Sapporo.
*** UC: The Herbarium of University of California, Berkeley.
Figs. 1–3. *Odonthalia ochotensis* (Rupr.) J. Ag. 1. Lectotype specimen collected in Mamga Bay, western coast of the Sea of Okhotsk, on July 28, 1844 (LE). 2, 3. Mature cystocarps borne on short fertile branches (photomicrographs of the specimen shown in Fig. 1). Scale in Fig. 3 applies also to Fig. 2.

The cystocarpic specimen (lectotype) of *Odonthalia kamtschatica* (Fig. 4) is in agreement with the type description (Ruprecht, 1850). The specimen has many expansive lateral branches in a single plane. Conspicuously developed midribs are evident. Cystocarps are arranged on narrowly tapering branches in a flexuose-racemose manner (Fig. 5). Ripe cystocarps are urceolate in shape and possess long calcar (up to 600 μm in length) and elevated neck (Fig. 6). They measure 600–1100 μm in length and 480–840 μm in diameter. These features agree with those described by Ruprecht (1850).
Figs. 4–6. *Odonthalia kamschatica* (Rupr.) J. Ag. 4. Lectotype specimen collected at Petropavlovsk, southeast coast of Kamchatka Peninsula, in 1846 (LE). 5. Portion of the specimen in Fig. 4, showing arrangement of cystocarps. 6. Mature cystocarp (photomicrograph of the specimen shown in Fig. 4).

*Odonthalia ochotensis* and *O. kamschatica* are certainly similar to each other in having expansive thalli branched in an alternate-distichous manner, conspicuously developed midribs and urceolate cystocarps with calcar and elevated neck as pointed out by

Perestenko (1977). However, they differ from each other in the following reproductive features. (1) The cystocarp arrangement of _O. ochotensis_ is corymbose, but that of _O. kamtschatica_ is flexuose-racemose. (2) The cystocarps of _O. ochotensis_ are borne only on short branches formed at the uppermost portion of branches. However, those of _O. kamtschatica_ are borne on long and narrow branches which are transformed from the distal portion of broad branches. (3) The cystocarps of _O. ochotensis_ are small and can hardly be discriminated with the unaided eye, whereas those of _O. kamtschatica_ are large and about twice the size of the former. In addition, herbarium specimens of _O. kamtschatica_ can be distinguished from those of _O. ochotensis_ by the dark and opaque color as described by Ruprecht (1850) and Perestenko (1977). The aforementioned reproductive features have important taxonomic significance.

At present, eleven species are ascribed to this genus. These are 1) _Odonthalia dentata_ (L.) Lyngb., the type species, 2) _O. corymbifera_ (Gmel.) Grev., 3) _O. lyrillii_ (Harv.) J. Ag., 4) _O. ochotensis_ (Rupr.) J. Ag., 5) _O. kamtschatica_ (Rupr.) J. Ag., 6) _O. floccosa_ (Espér) Falkenb., 7) _O. washingtoniensis_ Kylin, 8) _O. oregona_ Doty, 9) _O. annae_ Perest., 10) _O. teres_ Perest., and 11) _O. setacea_ (Rupr.) Perest. Of these species, _O. teres_ should be transferred to _Rhodomela_ on account of spiral branching and trichoblasts (Masuda, unpublished). We examined cystocarpic plants of the other species and summarized the shape, size, arrangement and position of cystocarps in Table 1. This table shows clearly that these reproductive features have taxonomic significance. The cystocarp shape is characteristic in each species; urceolate, ovoid, globose or semiglobose; with calcar or without calcar. Each species shows a uniform range of the cystocarp dimension. Two kinds of the cystocarp arrangement are found in the genus. The species with small cystocarps show the corymbose arrangement and those with large cystocarps show the flexuose-racemose arrangement. The cystocarp position is also characteristic. In _O. dentata_ and _O. washingtoniensis_ the cystocarps are borne only on short adventitious branches. Some species can be distinguished from each other by vegetative features; thallus breadth, nature of main stem and midribs. However, it is difficult to distinguish closely related species only by vegetative features.

The reported occurrence of _O. ochotensis_ and _O. kamtschatica_ from various localities needs verification. We examined voucher specimens of both the species on which the following Japanese phycologists' reports were based: Okamura (1923, 1932, 1933), Tokida (1932, 1934, 1950, 1954), Nagai (1941) and Yamada and Tanaka (1944). Okamura's specimens of _O. ochotensis_ differ from genuine _O. ochotensis_ in having large cystocarps arranged in a flexuose-racemose manner and are identical with _O. kamtschatica_. The following cystocarpic specimens deposited in Herb. Okamura in SAP are referable to _O. kamtschatica_: (1) Chirie, east coast of Sakhalin (June 15, 1912); (2) Robben Island, east coast of Sakhalin (June 25, 1905; July 1930, _Tokida 440_); and (3) Shumsh Island, north Kuriles. The other tetrasporangial and sterile specimens collected from east coast of Sakhalin are similar in gross morphology to the specimens cited above. Tokida's _O. kamtschatica_ is in agreement with genuine _O. kamtschatica_ in every respect. The speci-
mens collected from south Sakhalin and preserved in the Herbarium of Faculty of Fisheries, Hokkaido University, Hakodate, were examined. The following cystocarpic specimens are referable to *O. kamtschatica*. (1) Kitashiretoko (August 1, 1935); (2) Robben Island (July 1932); (3) Higashishiraura (July 20, 1931, *Tokida 535*) and (4) Hota (August 13, 1932, *Tokida 660*). Furthermore, the following tetrasporangial and sterile specimens seem to be identical with *O. kamtschatica*: (1) Nairo (September 7, 1906); (2) Higashisoya (April 29, 1929); (3) Minabetsu (August 24, 1933); (4) Otai (July 14, 1906); (5) Kushun-nai (August 9, 1906); (6) Ushiro (June 8, 1906); (7) Sokorai (August 13, 1906).

NAGAI's *O. ochotensis* is nothing but *O. annae* (= *O. aleutica sensu Okamura*, cf. MASUDA and YAMADA, 1980) as pointed out by Tokida (1950). However, seven of the specimens reported as *O. lyallii* are similar in gross morphology to *O. kamtschatica*. These specimens deposited in the Herbarium of Faculty of Agriculture, Hokkaido University, Sapporo (SAPA) are as follows: (1) Suribachi-wan, Paramshir Isl., north Kuriles (August 3, 1932); (2) Odomari, Onnekotan Isl., middle Kuriles (August 15, 1935); (3) Yamato-wan, Matsuwa Isl., middle Kuriles (August 14, 1935); and Kitajima, Ushishir Isl., middle Kuriles (August 12, 1935). They do not possess any reproductive structures, and so we can not identify them as *O. kamtschatica* with certainty. *O. kamtschatica* reported from

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**Table 1. Comparative features of cystocarps for ten species of *Odonthalia*.** The data is derived from observations of the authors.

<table>
<thead>
<tr>
<th>Species</th>
<th>Shape</th>
<th>Size</th>
<th>Arrangement</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>O. dentata</em></td>
<td>pitcher-shaped with calcar</td>
<td>430-600×320-520</td>
<td>corymbose</td>
<td>short, marginal and axillary adventitious branches</td>
</tr>
<tr>
<td><em>O. corymbifera</em></td>
<td>ovoid with calcar</td>
<td>360-420×270-350</td>
<td>corymbose</td>
<td>short, both ordinary and marginal adventitious branches</td>
</tr>
<tr>
<td><em>O. lyallii</em></td>
<td>ovoid without calcar</td>
<td>600-900×420-700</td>
<td>flexuose-racemose</td>
<td>ordinary branches</td>
</tr>
<tr>
<td><em>O. ochotensis</em></td>
<td>urceolate with calcar</td>
<td>380-480×280-350</td>
<td>corymbose</td>
<td>short, ordinary branches (restricted to uppermost portion of branches)</td>
</tr>
<tr>
<td><em>O. kamtschatica</em></td>
<td>urceolate with calcar</td>
<td>600-1100×480-840</td>
<td>flexuose-racemose</td>
<td>narrowly tapering ordinary branches</td>
</tr>
<tr>
<td><em>O. floccosa</em></td>
<td>semiglobose without calcar</td>
<td>775-1000×875-1100</td>
<td>flexuose-racemose</td>
<td>ordinary branches</td>
</tr>
<tr>
<td><em>O. washingtoniensis</em></td>
<td>almost globose without calcar</td>
<td>300-390×290-380</td>
<td>corymbose</td>
<td>short, axillary adventitious branches</td>
</tr>
<tr>
<td><em>O. oregona</em></td>
<td>broadly ovoid without calcar</td>
<td>500-750×520-710</td>
<td>racemose</td>
<td>ordinary branches</td>
</tr>
<tr>
<td><em>O. annae</em></td>
<td>semiglobose with calcar</td>
<td>950-1150×975-1200</td>
<td>flexuose-racemose</td>
<td>ordinary branches</td>
</tr>
<tr>
<td><em>O. setacea</em></td>
<td>urceolate without calcar</td>
<td>825-1175×550-1050</td>
<td>flexuose-racemose</td>
<td>ordinary branches</td>
</tr>
</tbody>
</table>
Akkeshi, east coast of Hokkaido in Japan (SAP 12354, 12446, 12447, 25002) by Yamada and Tanaka (1944) is distinguished from genuine *O. kantschatica* in having barrel-like cystocarps without well-developed calcar and is considered to be an undescribed species (Masuda, unpublished). Furthermore, we examined two herbarium specimens identified as *O. ochotensis* by Perestenko (1977) and presented to SAP: (1) Sarannaja Bay, south-east coast of Kamchatka Peninsula and (2) Korfa Gulf, Gek Bay, north-east coast of Kamchatka Peninsula. The specimens are destitute of reproductive structures, but they are in agreement with the lectotype specimen of *O. kantschatica* in gross morphology.

According to a check of the specimens cited above, it is conceivable that *O. ochotensis* and *O. kantschatica* show peculiar ranges of non-overlapping distribution (Fig. 7). The present known range of *O. ochotensis* is restricted within narrow limits, ranging from Larga Angra (Ayan) to Mamga, Tugurskii Bay, western coast of the Sea of Okhotsk as reported by Ruprecht (1850). On the other hand, *O. kantschatica* is widely distributed from north Kamchatka Peninsula to south Sakhalin. As to geographic distribution of both the species further check of herbarium specimens and field study are needed.

We wish to express our gratitude to Prof. M. Kurogi, Hokkaido University, and Prof. J. A. West, University of California, Berkeley, for reading the manuscript. We wish to thank Prof. D. A. Webb, Trinity College, Dr. K. L. Vinogradova and Dr. L. P. Perestenko, Komarov Botanical Institute, Dr. J. McLachlan and the late Dr. T. Edelstein, Atlantic Regional Laboratory, Dr. West and Dr. P. C. Silva, University of California, Berkeley, Prof. T. Masaki and Prof. E. Shikata, Hokkaido University, for loan of the specimens.

This study was supported in part by a Grant-in-Aid for Scientific Research No. 374218 from the Ministry of Education, Science and Culture of Japan. The second
author, I. YAMADA, is grateful to the Japan Society for the Promotion of Science and the Academy of Sciences of the USSR for giving him an opportunity to examine specimens at Leningrad Herbarium in 1978.

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OKAMURA, K. 1916. Nippon srsui meii. 2nd ed. Tokyo (In Japanese)
抄録
田村道夫編 日本の植物 259頁 1981年 培風館 1600円。

近年分類学関係の本も出版される傾向が多くなった。この本もその一つで、大阪大学で月一回もされた研究会のメンバーを中心に14人の執筆者らが共同研究をしている問題について書かれる。特に日本の植物相が豊富でしかも複雑であることとその研究史が概説され、シデコブシ、トリカブト、キツネノボタン、オウレン、サクラ、イヌピサ、ニガナ、ヒヨドリバナ、シラン、マムシグサ、マイズルソウ、ヤプカンソウなど14の植物群のつもつ問題が多岐にわたって論議されている。なじく近く見渡している庭や公園、道端の植物もじっくり調べればふいの面白問題をもっているものと改めて感じさせられる。分類地理の読者には一読の価値がある。

巻頭に美しいカラー写真があり、説明図も多く、高度な内容を理解するのに役立っている。ただ論議の展開の過程で駄騒がない植物名目もが多く出てくることは困る。などがこのように写真と凸版が整備されている場合は一方を省略してジューシーソニア属やジャオソウ属の図が入っていた方が読者にとって親切ではなかったか。花、花序、葉などの図解があるが、あまりにも初歩的過ぎ、この本の内容を理解するためにはあまり役立っているとは思わない。葉の説明では葉の形や葉の配列で葉の側脈とトガクソウにおける花被の側脈との関係などにまで言及する必要があったのではないか。

次に私が気になったことを23節しておこう。日本の固有属としてイナモリソウ属が見過ごされているし、ケイビランはユリ科である。などがこの紹介型学者は教科書的には穂生植物型となるのではないか。などが現在積雪と関係した特殊な環境に生育している。筆者が芸がいるように、温暖であった古第三紀には現在よりも形態が収斂していたのだから、過去にはどんな環境に生育していたのだろうか。などが生長するような環境は積雪と関係してむしろ新しく形成されたのではないか。などが、雄しごし、花粉、果実など特殊化した形質の方がむしろ多くみられ、などががを単純に残存植物だとする意見には賛成できない。

ソウの含まれるニワトコ属は科として独立させる見解もあるほどスイカザラ科の中では異質なものである。材の形態からこの問題についてもふれて欲しかった。　（福島　誠行）