A Cytological Study on *Skimmia japonica* Thunb. (*Rutaceae*) from Kunashiri Island, the South Kurils

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A cytological study on *Skimmia japonica* Thunb. (*Rutaceae*) from Kunashiri Island, the South Kuriles, is performed. The chromosome number is $2n = 30$, with no satellites and supernumerary chromosomes. The karyotype is not bimodal, and the largest chromosome pair shows metacentric type. The chromosome number and the karyotype are similar to those in the populations northward from Kyushu as in Sakhalin, Hokkaido, Honshu, and Shikoku. Chromosome numbers with different counts, previously reported for the northernmost population of the species, are not supported.

**Key words:** Chromosome number, Karyotype, Kunashiri, the Kuril Islands, *Rutaceae*, *Skimmia*.

*Skimmia japonica* Thunb. (*Rutaceae*) is distributed in Sakhalin, the Kuril Islands, Hokkaido, Honshu, Shikoku, Kyushu, the Ryukyu Islands, and Taiwan (Ohba 1999). Gurzenkov (1973) reported the chromosome number of the species as $2n = 16$ from Sakhalin, and Rudyka (1990) reported $2n = 30–32$ from Kunashiri Island, the South Kurils. From the results of these reports Probatova et al. (2007) speculated that the chromosome number of *S. japonica* in the Kurile Islands might be $2n = 32$.

Fukuda et al. (2007) carried out extensive cytological research on *S. japonica*, covering nearly the whole range of distribution of the species except the Kurile Islands. The result indicated that chromosome number was $2n = 30$ except those in Taiwan, having 0–2 supernumerary chromosomes, and karyotypes are variable for the populations southward from Kyushu to Taiwan, while fairly stable for the populations northward from a part of Kyushu, including Sakhalin, Hokkaido, Honshu and Shikoku. The study revealed that the plants from Sakhalin also have chromosome number of $2n = 30$ but not $2n = 16$, and have similar karyotype as those plants northward from Kyushu. However, we could not investigate plants from the Kurile Islands, having no plant material from the region.

In 2013, some of the present authors had an
opportunity to visit Kunashiri Island, the South Kurils, and collected material for cytological investigations for *S. japonica*. This paper reports cytological characteristics of *S. japonica* from Kunashiri Island.

### Materials and Methods

A cytological investigation was performed on two individuals from two localities (Table 1). The methods for chromosome observation followed Fukuda et al. (2007) with some modifications. Karyological terms follow Levan et al. (1964). Voucher specimens are housed in the Institute of Biology and Soil Science, Far Eastern Branch, Russian Academy of Sciences in Vladivostok (VLA).

### Result and Discussion

Chromosome number of *Skimmia japonica* from Kunashiri Island was 2n = 30 with no supernumerary chromosomes (Fig. 1). Chromosomes were 2.2–5.0 μm in length, gradually reduced in size, without clear modality. Satellites were not observed. Complements of the chromosomes were formulated as 2n = 30 = 8m + 16sm + 6st (Table 2).

Previous study (Fukuda et al. 2007) revealed that the karyotypes of the plants in the populations southward from a part of Kyushu to Taiwan were fairly variable, for the largest chromosome pair showed from metacentric to submetacentric with arm ratio 1.2–2.4. On the other hand, karyotypes of the plants in the populations northward from a part of Kyushu including Sakhalin, Hokkaido, Honshu and Shikoku were not apparently varied for the largest chromosome pair as metacentric with arm ratio 1.0–1.2. Karyotype of the plants from Kunashiri Island was similar to the latter populations, and the largest chromosome pair showed metacentric with arm ratio 1.1 and 1.0 (Fig. 1B, arrows). In our previous result (Fukuda et al. 2007), karyograms of these populations northward from Kyushu are often bimodal and tend to have satellites on the short arm of eighth chromosome pairs (e.g., Nopporo, Hokkaido; Miyako, Miyagi Pref.), but karyogram of Kunashiri had not clear bimodality and satellites.

### Table 1. *Skimmia japonica* Thunb. from Kunashiri Island, used in the present study

<table>
<thead>
<tr>
<th>Locality in Kunashiri Island</th>
<th>Habitat</th>
<th>Latitude &amp; longitude</th>
<th>Date</th>
<th>Voucher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 W of Furukamappu (Yuzhno-Kurilsk)</td>
<td>Under <em>Picea glehnii</em> forest</td>
<td>44°02′14″N 145°48′54″E</td>
<td>25 VII 2013</td>
<td>T. Fukuda Sk-KN-1 (VLA)</td>
</tr>
<tr>
<td>2 Mt. Tomari (Golovnina), along Ichibishinai (Ozemnaya) river</td>
<td>Under coniferous forest</td>
<td>43°52′56″N 145°02′49″E</td>
<td>21 VII 2013</td>
<td>T. Fukuda Sk-KN-2 (VLA)</td>
</tr>
</tbody>
</table>

### Table 2. Arm length, ratio and chromosome type for every chromosome

<table>
<thead>
<tr>
<th>Chromosome pair No.*</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long arm (μm)</td>
<td>2.57</td>
<td>2.35</td>
<td>2.39</td>
<td>3.23</td>
<td>2.89</td>
<td>2.86</td>
<td>2.48</td>
<td>2.54</td>
</tr>
<tr>
<td>Short arm (μm)</td>
<td>2.39</td>
<td>2.35</td>
<td>1.70</td>
<td>1.49</td>
<td>0.74</td>
<td>0.73</td>
<td>1.17</td>
<td>1.05</td>
</tr>
<tr>
<td>Arm ratio</td>
<td>1.1</td>
<td>1.0</td>
<td>1.6</td>
<td>1.6</td>
<td>4.4</td>
<td>4.0</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Chromosome type**</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>st</td>
<td>st</td>
<td>sm</td>
<td>st</td>
</tr>
</tbody>
</table>

*Chromosome pair number correspond to those in Fig. 1B.

**m. Metacentric. sm. Submetacentric. st. Subtelocentric.
It is possible that some small local rearrangement of chromosomes has occurred for the plants of Kunashiri Island.

Gurzenkov (1973) reported $2n = 16$ for *Skimmia japonica* from Sakhalin, and Rudyka (1990) $2n = 30–32$ from Kunashiri Island. Probatova et al. (2007) speculated that the chromosome number of *S. japonica* in the Kuril Islands as $2n = 32$ from these results. However, from the results of Fukuda et al. (2007) and the present study, we have concluded that the chromosome number of *S. japonica* in the northernmost populations, including Sakhalin and the South Kurils, is $2n = 30$ as in the northern population of the species range from Hokkaido to Kyushu.

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References


Probatova N. S., Barkalov V. Yu. and Rudyka E. G. 2007. Caryology of the Flora of Sakhalin and the Kurile
福田知子 a, A. Loguntsev b, M. Antipin b, 梶 光一 c, 池田 博 d: 南千島・国後島産ミヤマシキミ（ミカン科）の染色体解析

千島列島・国後島産のミヤマシキミの染色体を調べた。2か所の個体を調べた結果、染色体数は $2n = 30$ であり、過剰染色体は観察されなかった。核型は、明らか
なバイモーダル（双峰型）を示さず、最大の染色体対は中部動原体型であった。この染色体数と核型は、九州以
北の集団（樺太、北海道、本州、四国、および九州の一部）で見られるものと似ていた。分布最北端の樺太、南

千島ではこれまで異なる染色体数の報告があったが、いずれも支持されなかった。

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