

Kyoko SATO<sup>a</sup>, Daisuke KUMAGAI<sup>b</sup> and Yoshikane IWATSUBO<sup>c</sup>: **Chromosome Number of *Portulaca oleracea* (Portulacaceae) in Japan**

日本産スベリヒユ (スベリヒユ科) の染色体数 (佐藤杏子<sup>a</sup>, 熊谷大輔<sup>b</sup>, 岩坪美兼<sup>c</sup>)

*Portulaca* L. (Portulacaceae) comprises 40 species of trailing, mostly annual herbs (Mabberley 1997). In Japan, the following three species are recognized: *P. oleracea* L., *P. okinawensis* Walker & Tawada and *P. quadrifida* L. *Portulaca oleracea* is a cosmopolitan weed found all over the world, growing in open fields, roadsides, and gardens throughout Japan; while both *P. okinawensis* and *P. quadrifida* are found only in the Ryukyus (Momiyama 1982). Besides these three species, *P. pilosa* L. was recently discovered as naturalized in Japan (Takahashi 2003). In addition to these wild *Portulaca*, both *P. oleracea* var. *sativa* (Haw.) DC. and *P. grandiflora* Hook. are cultivated as garden flowers, and *P. oleracea* var. *sativa* is cultivated as a vegetable (Makino 1989).

Among the *Portulaca* taxa, *P. oleracea* is known to be variable in its chromosome numbers as follows:  $n = 9$  (Hagerup 1932, Sumarani and Kuriachan 1999), 12 (Trivedi

and Singh 1992), 18 (Khullar and Dutta 1973), 24 (Trivedi and Singh 1992), 26 (Sugiura 1936a, 1936b as *P. oleracea* var. *sativa*), 27 (Hagerup 1932, Cooper 1935, Khoshoo and Singh 1966, Khullar and Dutta 1973, Sanjappa 1978, Bir and Sidhu 1979 (in Goldblatt 1984), Sidhu 1979 (in Goldblatt 1984), Sharm 1987, Kim and Carr 1990, Trivedi and Singh 1992, Kim 1993 (in Goldblatt and Johnson 1996)),  $2n = 18$  (Rudyka 1995), 45 (Sharma and Bhattacharyya 1956, Santa Bárbara et al. 1994 as *P. oleracea* subsp. *papillato-stellulata* Danin & H. G. Baker), ca. 45 (Vogt and Oberprieler 1994 as *P. oleracea* subsp. *nitida* Danin & H. G. Baker), 54 (Steiner 1944, Heiser and Whitaker 1948, Bouharmont 1965, Khoshoo and Singh 1966, Podlech and Dieterle 1969, Uhrikova 1974, Auquier and Renard 1975, Bir and Sidhu 1980, Baquar 1986, Xu et al. 1992 (in Goldblatt and Johnson 1996)), ca. 54 (Mulligan 1961). However, the chromo-

Table 1. Collection localities and number of individuals examined of *Portulaca oleracea* var. *oleracea*

| Collection locality                                     | Number of individuals examined |
|---|--------------------------------|
| Iwate Pref., Oshu City, Esashi-ku, Odaki                | 6                              |
| Miyagi Pref., Ohsaki City, Sanbongi                     | 4                              |
| Toyama Pref., Toyama City, Ashu                         | 2                              |
| Toyama Pref., Toyama City, Chayamachi                   | 24                             |
| Toyama Pref., Toyama City, Gofuku                       | 42                             |
| Toyama Pref., Takaoka City, Fukuoka-machi, Goi          | 2                              |
| Toyama Pref., Toyama City, Nishinakanomachi             | 5                              |
| Ishikawa Pref., Nanao City, Notojimasusomachi           | 2                              |
| Kagawa Pref., Sanuki City, Ohkawa-machi, Tomidanaka     | 3                              |
| Tokushima Pref., Tokushima City, Tokushima-cho, Jonai   | 2                              |
| Tokushima Pref., Mima-gun, Tsurugi-cho, Sadamitsu       | 1                              |
| Tokushima Pref., Yoshinogawa City, Yamakawa-cho, Yudate | 5                              |
| Ehime Pref., Seiyo City, Kamimatsuba                    | 2                              |
| Kagoshima Pref., Kumage-gun, Minamitane-cho, Nishino    | 2                              |
| Total   | 102                            |

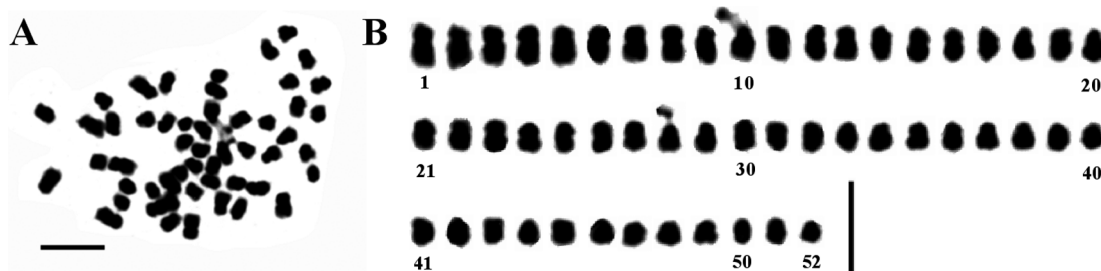


Fig. 1. Mitotic metaphase chromosomes (A) and a karyogram (B) of *Portulaca oleracea* var. *oleracea* ( $2n = 52$ ) collected from Toyama Pref., Toyama City, Gofuku. Bars represent 5  $\mu\text{m}$ .

some number of Japanese *P. oleracea* has remained unexamined in var. *oleracea*, while var. *sativa*, a garden vegetable, is known to have  $n = 26$  chromosomes (Sugiura 1936a, 1936b).

Our investigation aimed to increase knowledge of the chromosomes of the genus *Portulaca* by examining the somatic chromosome number of *P. oleracea* var. *oleracea* that grows in Japan.

This study was based on 102 individual plants of *P. oleracea* var. *oleracea* collected from 14 localities in Japan (Table 1). These plants were first grown in vinyl pots at the experimental garden of the University of Toyama. The newly formed root tips, harvested from the potted plants, were pre-treated in a 2 mM 8-hydroxyquinoline solution for 1 hour at 25°C, and kept at 6°C for approximately 15 hours. They were then fixed in freshly mixed Carnoy's fixative (ethyl alcohol: acetic acid = 3:1) for 1 hour, soaked in 1N HCl for several hours, and macerated in 1N HCl at 60°C for approximately 10 minutes. After being immersed in tap water, the meristems were stained in 1 drop of 1.5% lacto-propionic orcein on the glass slide, and a common squash technique was applied for the examination of somatic chromosome numbers. Voucher specimens are deposited in the Herbarium of Department of Biology, Faculty of Science, University of Toyama.

The somatic chromosome counts of *P. oleracea* var. *oleracea* studied yielded, without exception,  $2n = 52$  chromosomes (Fig. 1). The metaphase chromosomes had a range of 0.9  $\mu\text{m}$  to 1.9  $\mu\text{m}$  in length. This chromosome count corresponded to  $n = 26$  of *P. oleracea* var. *sativa* reported by Sugiura (1936a, 1936b), but was different from the counts of *P. oleracea* reported previously outside of Japan (Hagerup 1932, Cooper 1935, Steiner 1944, Heiser and Whitaker 1948, Sharma and Bhattacharyya 1956, Mulligan 1961, Bouharmont 1965, Khoshoo and Singh 1966, Podlech and Dieterle 1969, Khullar and Dutta 1973, Uhrlikova 1974, Auquier and Renard 1975, Sanjappa 1978, Bir and Sidhu 1979 (in Goldblatt 1984), Sidhu 1979 (in Goldblatt 1984), Bir and Sidhu 1980, Baquar 1986, Sharm 1987, Kim and Carr 1990, Trivedi and Singh 1992, Xu et al. 1992 (in Goldblatt and Johnson 1996), Kim 1993 (in Goldblatt and Johnson 1996), Santa Bárbara et al. 1994, Vogt and Oberprieler 1994, Rudyka 1995, Sumarani and Kuriachan 1999).

*Portulaca* is known to be a polybasic genus with  $x = 4$  and 9 (Darlington and Wylie 1955). The present count of  $2n = 52$  is considered tridecaploid with  $x = 4$  or hypohexaploid of  $2n = 54$ . The present chromosome study reports a unique chromosome count for Japanese *Portulaca oleracea* var. *oleracea*.

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スベリヒユ *Portulaca oleracea* の染色体数は、 $n = 9, 12, 18, 24, 26, 27$ , および  $2n = 18, 45, 54$  が知られている。わが国では Sugiura (1936a, 1936b) が野菜として栽培されたタチスベリヒユ *P. oleracea* var. *sativa* において  $n = 26$  を報告している。わが国の14カ所から採取した102個体のスベリヒユ *P. oleracea* var. *oleracea* を対象に染色体の観察を行ったところ、すべて  $2n = 52$  であり、染色体の長さは  $0.9\text{--}1.9\ \mu\text{m}$  であった。この属の染色体基本数は、 $x = 4, 9$  とされていることから、観察を行ったスベリヒユは  $x = 4$  を基本数とする十

三倍体か、あるいは  $x = 9$  を基本数とする  $2n = 54$  の低六倍体であると判断される。今回の日本産スベリヒユで観察された染色体数 ( $2n = 52$ ) は、国外では報告されておらず、日本産のスベリヒユが独特の染色体数を持つことが判った。

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エゾノチャルメルソウの南限と東北地方における分布 (上野雄規<sup>a</sup>, 大橋広好<sup>b</sup>)

Yuki UENO<sup>a</sup> and Hiroyoshi OHASHI<sup>b</sup>: Distribution of *Mitella integripetala* H. Boissieu (Saxifragaceae) in Northern Honshu, Japan

**Summary:** *Mitella integripetala* H. Boissieu is endemic to Hokkaido and northern Honshu, Japan. Distribution of the species in northern Honshu is mapped with a new record for the southernmost locality and a rediscovered locality in Miyagi Prefecture.

エゾノチャルメルソウは北海道と本州北部に分布し、本州では宮城、山形両県以北に分布するとされている (上野1991)。しかし TUS に1993年に福島県郡山市で採集された標本があり、この地点を南限としてここに報告する。また、この機会に東北地方におけるエゾノチャルメルソウの分布を整理した。本種の分布図では若林 (1973) が東北地方から7地点を印したが、その後の採集記録も増加したので、その分布図をまとめてみた (Fig. 1)。TUS 所蔵標本に加えて各県の博物館所蔵標本目録等 (文献に引用) を参照した。日本海側では山形県吾妻連峰白布峠付近が南限である。

次に、宮城県で本種の分布が再確認されたことを報告したい。エゾノチャルメルソウは「宮城県植物目録」(青森営林局 1935) に「横川」と記録されているだけで、その標本も具体的な産地も不明であった。宮城県植物目録2000 (宮城植物の会・宮城県植物誌編集

委員会 2001) には「船形連峰：白髪山」を太平洋側南限として記録しているが、この証拠標本と思われる Ogura 658 (TUS69062) は Uzen: Mt. Shirahige で採られたもので、この産地は山形県内である。しかし、2006年葛西英明氏が蔵王連峰不忘山西斜面横川の海拔760 m の地点でエゾノチャルメルソウを再発見した。この生育地は71年前に村井が記録した「横川」の範囲に入る地域であると思われる。上野の現地調査では、生育地は急な斜面を横川へ落ちるように流れ込む小さな沢で、エゾノチャルメルソウは露出したでこぼこの岩の上にへばり付いて生えていた。最も大きな個体では一塊となって50 cm × 70 cm の範囲に拡がり、21本の花茎を出し、最長の花茎は長さ51 cm であった。同地点で点々と分布する30個体を確認し、そのうち10個体が開花していた。いずれも花は終期であった。

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