Polyploidy of Persicaria japonica（Polygonaceae）in Toyama Prefecture, central Japan

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Yoshikane Iwatsubo[1], Tomohiro Suzuki[1,2] and Naohiro Naruhashi[1] : **Polyploidy of *Persicaria japonica* (Polygonaceae) in Toyama Prefecture, central Japan**

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Persicaria japonica (C.F.W. Meissn.) H. Gross, a perennial herbaceous plant in the Polygonaceae, is distributed in Japan, China, and the southern part of the Korea Peninsula (Kitagawa 1982). In Japan, this species is growing in vast areas from Ryukyu to Hokkaido (Kitagawa 1982 ; Ohwi and Kitagawa 1983). The first cytological study of this species by Sugiura (1928) reported 2n=44 chromosomes, thereafter, the distinct number of chromosome, 2n=40 chromosomes was found by Doida (1960 a,b, 1962). The two different chromosome counts reported previously suggest that this species may have two kinds of the basic chromosome numbers, i.e. x=10 and 11. In order to clear the conflict between these findings, the authors studied the chromosome number of *P. japonica* widely collected in Toyama Prefecture situated on the Japan Sea side of central Honshu, Japan.

Materials and methods

A total of 73 individuals of *P. japonica* collected from 40 sites in Toyama Prefecture, were used to observe the chromosomes (Table 1). The plants were grown in plastic pots at the experimental garden of Toyama University. The actively growing root tips were pretreated in a 2m M 8–hydroxyquinoline aqueous solution for

Table 1. Chromosome numbers, collection localities and number of individuals examined (in parentheses) of *Persicaria japonica* in Toyama Prefecture

Chromosome number	Collection locality
2n=40	**Nakaniikawa-gun** : Banbajima, Kamiichi-machi, (1) . **Toyama City** : Gofuku, (1) ; Komami, (1). **Imizu-gun** : Nakaoida, Kosugi-machi, (1).
2n=49	**Toyama City** : Gofuku, (1).
2n=50	**Shimoniikawa-gun** : Miyazaki, Asahi-machi, (3) . **Toyama City** : Inarimotomachi, (1) ; Yo kogoshi, (1) ; Komami, (2) ; Gofuku, (6) ; Takada, (1) ; Teramachi, (5) ; Mizuhashi-shinbo, (1) ; Mizuhashi-machibukuro, (1) ; Mizuhashi-tsujigado, (1) ; Kusajima, (1) ; Chayamachi, (1) ; Hatanaka, (3) ; Hyakuzuka, (1) ; Hamakurosaki, (1) ; Minatoirifunecho, (1) ; Hiyodorijima, (4). **Nei-gun** : Yasuda, Fuchu-machi, (2) ; Sasakura, Fuchu-machi, (1) ; Kamiisawa, Fuchu-machi, (1) ; Fukuro, Fuchu-machi, (1) ; Tomosaka, Fuchu-machi, (1) ; Iguridani, Yatsuo -machi, (1) ; Ida, Yatsuo-machi, (1). **Imizu-gun** : Gobuichi, Kosugi-machi, (1) ; Jyodoji, Kosugi -machi, (4) ; Nakaoida, Kosugi-machi, (1) ; Kitano, Ooshima-machi, (3) ; Biwakubi, Daimonmachi, (6). **Shinminato City** : Bando, (1). **Takaoka City** : Iwatsubo, (1) ; Yotsukaichi, (1) ; Nakada, (1) ; Donohashi, (1). **Himi City** : Miyada,(1) ; Horita, (1). **Higashitonami-gun** : Onogami, Shougawa-machi, (2). **Oyabe City** : Ishizaka, (1) ; Hirata, (1).

1 hr at 25℃ and subsequently kept for 15 hr at 6℃. They were fixed in a mixture of glacial acetic acid and absolute ethyl alcohol (1 : 3) for 1 hr, and then soaked in 1 N HCl for a few hours. After being macerated in 1 N HCl at 60℃ for about 10 min, they were immersed in tap water. The meristems of root tips were stained in a drop of 1.5% lacto-propionic orcein on the slide glass and ordinary squash technique was applied in preparation. Voucher specimens are deposited in the herbarium of Toyama University.

Results and discussion

The sampling sites and chromosome numbers of the materials used in this study are shown in Table 1. Of 73 individuals examined, 4 (5.5%) from four sites had 2n=40, one (1.3%) from a site 2n=49 and 68 (93.2%) from 39 sites 2n=50 chromosomes respectively (Table 1). Figure in parenthesis indicates the frequency. The chromosome count of 2n=40 (Fig. 1 A) is in agreement with the previous reports by Doida (1960 a, b, 1962), while other two counts of 2n=49 and 50 (Fig. 1 B) chromosomes are the first record in this species. Basic chromosome number of the genus *Persicaria* has remained unknown as yet, though that of *Polygonum* s.l. including *Persicaria* is reported to have a serial number of x=8, 9, 10,11, and 12 (cf. Darlington and Wylie 1955 ; Doida 1960 a, b, 1962). Among the five kinds of basic chromosome numbers, x=10 seems to be most suitable for the basic chromosome number of *P. japonica*. For this reason, x=10 is a divisor of the prevailing chromosome numbers, 2n=40 and 50. Consequently the plant with 2n=40 reported by Doida (1960 a, b, 1962) and also found in the present study are considered to be the tetraploid, and those with 2n=50 found in the present study are regarded as the pentaploid. The plants with 2n=44 reported by Sugiura

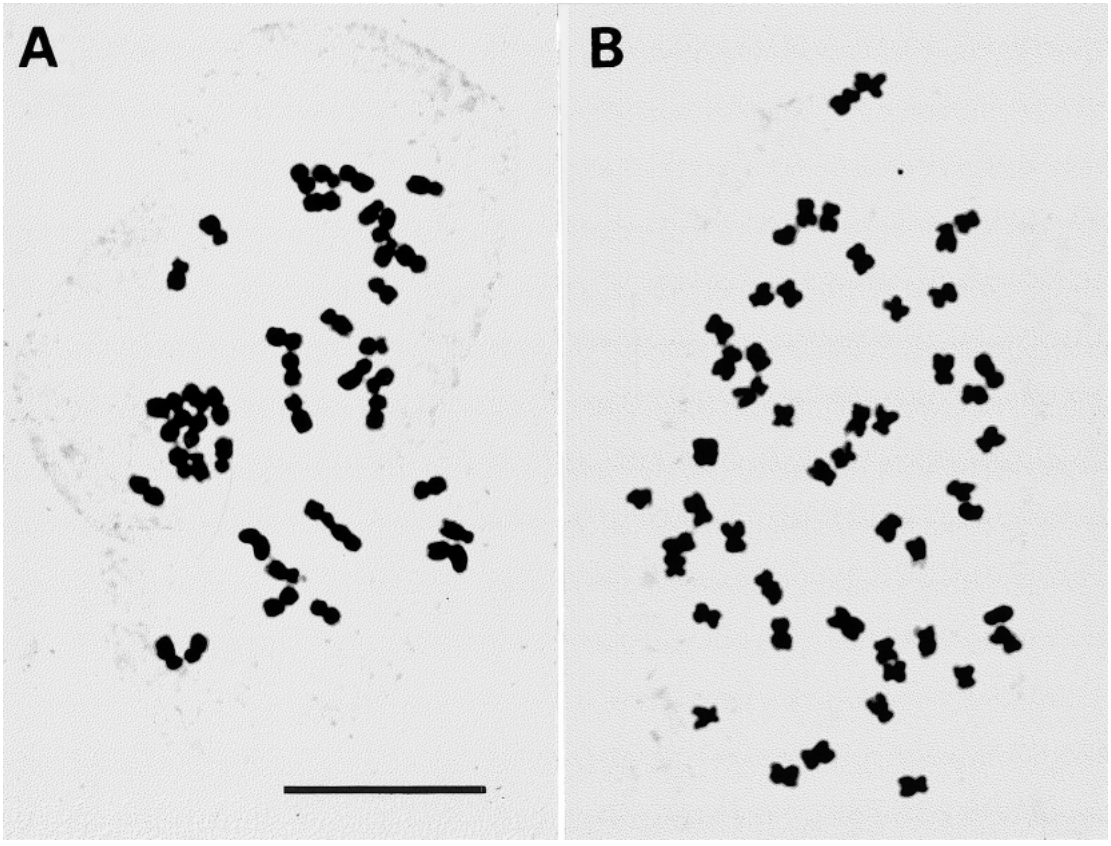

Fig. 1. Somatic metaphase chromosomes of *Persicaria japonica*. A, 2n=4x=40 ; B, 2n=5x=50. Bar = 10 μm.

(1928) and one plant with 2n=49 found in the present study are interpreted as the hypertetraploid and hypopentaploid respectively. These aneuploid plants may have spontaneously occurred in respective mother populations.

In the present study, the majority of *P. japonica* was the pentaploid with 2n=50 chromosomes. At present any kind of cytological mechanisms which can produce a 2n=50 plant immediately from an 2n=40 plant is unknown. The reverse phenomenon in which a 2n=40 plant is produced from an 2n=50 plant is not conceivable, because polyploidization naturally occurs with an irreversible trend from lower to higher levels. In order to make clear the origin of 2n=50 plants of *P. japonica*, a cytological study on the karyotype analysis and meiosis in the two chromosome races, 2n=40 and 50, should be undertaken. In such studies further findings of diploid and additional polyploids in addition to the tetraploids and pentaploids reported here will be expected hereafter.

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岩坪美兼[1]・鈴木朋宏[1,2]・鳴橋直弘[1]：富山県産シロバナサクラタデの染色体数

シロバナサクラタデは，日本，朝鮮半島南部，それに中国に分布する多年草（Kitagawa 1982）で，これまでに染色体数の報告は2n=44（Sugiura 1928）と2n=40（Doida 1960 a，b，1962）の2例だけである。

富山県内の40カ所から採集された合計73個体について，染色体数を調べたところ，4カ所からの4個体（5.5%）は2n=40，1カ所からの1個体（1.3%）は2n=49，そして39カ所からの68個体（93.2%）は2n=50であり，2n=40が上記のDoidaの報告と一致した。タデ属の染色体基本数には，x=8，9，10，11，12が知られている。シロバナサクラタデの染色体数は，2n=40，50が一般的であることから，本種の染色体基本数はx=10と推定される。したがって今回観察された2n=40，49，50は，それぞれ四倍体，低五倍体，五倍体と判断される。またSugiura（1928）の報告による2n=44の植物は高四倍体と考えられる。本研究によって，富山県内の本種には五倍体がもっとも多いことが判った。この五倍体（2n=50）が四倍体（2n=40）から直接出現したとは考え難い。その起源を明らかにするためには，2n=40，50双方の植物について，核型分析と減数分裂の観察とともに，未だ知られていない二倍体や新たな倍数体の関与も予想されることから，さらに広範な調査が必要である。

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