

Chromosome numbers of *Utricularia bremii* and *Utricularia dimorphantha* (Lentibulariaceae)

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Abstract. The somatic chromosome number of $2n=36$ for *Utricularia bremii* Heer ex Kolliker and that of $2n=44$ for *U. dimorphantha* Makino were recorded here for the first time.

Keywords : Chromosome numbers, Lentibulariaceae, *Utricularia bremii*, *Utricularia dimorphantha*

Introduction

Utricularia, the family Lentibulariaceae distributed throughout the world, is the largest genus among the carnivorous plant kingdom with 214 species (Taylor, 1989). *Utricularia bremii* Heer ex Kolliker and *U. dimorphantha* Makino are commonly belonged to section *Utricularia* and free-floating, aquatic. They are similar to each other by having basifixed bracts, globose ovary and no bracteoles and rhizoids. They are taxonomically distinct from each other by peduncle character: *U. dimorphantha* has peduncle of chasmogamous inflorescence with a cleistogamous flower at its base while *U. bremii* has peduncle without a cleistogamous flower at its base. *Utricularia bremii* is distributed in Central and Western Europe, Belgium, Denmark, France, Switzerland, Germany, Northern Italy, Czech, Slovakia, Hungary and Ukraine, while *U. dimorphantha* is restricted to Japan.

Documentation of chromosome number in the genus was first carried out probably by Reese (1952) in *Utricularia australis* ($n=18-20$), *U. minor* ($n=18-20$) and *U. vulgaris* ($n=18-20$) in section *Utricularia*. After only 13% of the members of the genus have shown chromosome numbers, no report in chromosome number has been shown in the most standard references [Goldblatt and Johnson (eds.), 1990–1995] due to some reasons listed as follows: i) Chromosomes are very

small; ii) The plants of any species in the genus does not have any root (rhizome apex and shoot apex are used for somatic chromosome counts); iii) Chromosomes are difficult to be stained with the standard dyes such as orcein, carmine and Giemsa; and iv) Most of the species of *Utricularia* are not horticulturally meritorious (Kondo, 1971).

Materials and methods

Plants of *Utricularia dimorphantha* were collected in Minami Soto Village, Akita Prefecture, Japan and were kindly sent and supplied by Prof. S. Komiya and Dr. C. Shibata. They were grown in a bat at the Laboratory of Plant Chromosome and Gene Stock, Graduate School of Science, Hiroshima University, Japan. Seeds of *U. bremii* were obtained in ~~Dukelska City~~ **TREBON**, the Czech Republic and were sown and germinated *in vitro* in 1/2 strength of B5 culture medium (Gamborg's B5; Gamborg *et al.*, 1968) at the Laboratory of Plant Chromosome and Gene Stock, Graduate School of Science, Hiroshima University.

Shoot tips were collected and pre-treated with cold water at 4°C for 24 h and fixed in 3 : 1 ethanol glacial acetic acid for 24 h at 4°C. Then, they were macerated in a mixture of 45% acetic acid and 1 N HCl (2 : 1) for 20 sec at 60°C. After stained with 2% aceto-orcein for about 40 min they were squashed and their chromosomes were observed at mitotic stages.

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Results and discussion

Utricularia bremii and *U. dimorphantha* showed very

Table 1. Chromosome numbers of *Utricularia* in the section *Utricularia* counted previously and present

Species	Chromosome number	References
<i>Utricularia aurea</i>	n=21	Subramanyam and Kamble 1968 ; Casper and Manitz 1975
	2n=80	Tanaka and Uchiyama 1988
<i>U. australis</i>	n=18, 19, 20, 22	Casper and Manitz 1975
	n=18-20	Reese 1952
<i>U. bremii</i>	2n=36	Present study
<i>U. dimorphantha</i>	2n=44	Present study
<i>U. foliosa</i>	n=21	Kondo 1973 as <i>U. vulgaris</i> ; Casper and Manitz 1975
<i>U. gibba</i>	n=14	Kondo 1972a ; Casper and Manitz 1975
<i>U. inflata</i>	2n=18, 36	Casper and Manitz 1975 ; Lewis <i>et al.</i> 1962
<i>U. intermedia</i>	n=22	Casper and Manitz 1975
	2n=44	Löve and Love 1982 ; Pogon <i>et al.</i> 1990
<i>U. macrorhiza</i>	n=22	Löve 1982
	2n=40	Löve 1954
<i>U. minor</i>	n=18-20	Reese 1952
	n=22	Casper and Manitz 1975
	2n=c.40	Löve and Löve 1956; Tanaka and Uchiyama 1988
	2n=44	Löve and Löve 1982
<i>U. ochroleuca</i>	n=22, 23, 24	Casper and Manitz 1975
<i>U. radiata</i>	n=14	Kondo 1972a ; Casper and Manitz 1975
<i>U. stellaris</i>	n=20	Sarker <i>et al.</i> 1980
	n=21	Subramanyam and kamble 1968
	2n=42	Siddiqui 1959
<i>U. striata</i>	2n=28	Kondo 1972a ; Casper and Manitz 1975
<i>U. vulgaris</i>	n=18-20	Reese 1952
	n=22	Casper and Manitz 1975
	2n=40	Löve 1954
	2n=c.44	Pogon <i>et al.</i> 1987

small chromosomes at mitotic prophase. Chromosome numbers of these two species are depicted in Table 1. *Utricularia bremii* had the somatic chromosome number of $2n=36$ while *U. dimorphantha* had the chromosome number of $2n=44$ (Fig. 1). These chromosome numbers were reported here for the first time.

Out of 35 sections classified by Taylor (1989), section *Utricularia* showed the highest number of species covered by chromosome counting lies ; 13 species covering 38.2% of the section. The highest chromosome number of $2n=80$ was counted in *U. aurea* (Tanaka and Uchiyama, 1988) and in contrast the least number was recorded in *U. inflata* (Lewis *et al.* 1962 ; Casper and Manitz, 1975). The chromosome number of $n=22$ was found in *U. australis*, *U. intermedia*, *U. macrorhiza*, *U. minor* and *U. vulgaris* (Casper and Manitz, 1975 ; Löve, 1982) whereas $n=21$ was detected in *U. aurea* (Casper and Manitz, 1975), *U. foliosa* (Kondo, 1973 as *U. vul-*

garis), and *U. stellaris* (Subramanyam and Kamble, 1968). The gametic chromosome number of $n=18-20$ was shown in *U. australis* by Reese (1952) and Casper and Manitz (1975). The least gametic number of chromosomes $n=14$ was observed in *U. gibba* and *U. radiata* in the section *Utricularia* recorded by Kondo (1972a) and Casper and Manitz (1975). The highest gametic number of $n=24$ in this section was counted in *U. ochroleuca* (Casper and Manitz, 1975). Considering the diploid chromosome number of $2n=44$ was reported in *U. intermedia*, *U. minor* and *U. vulgaris* (Löve and Löve, 1982 ; Pogon *et al.*, 1987, 1990). Chromosomes of *U. minor* investigated by Tanaka and Uchiyama (1988) showed affinity with Löve and Löve (1956) where $2n=40$ but differed from Löve and Löve (1982) while $2n=44$.

Utricularia uniflora in the section *Pleiochasia* showed the chromosome number of $n=28$ (Kondo and White-

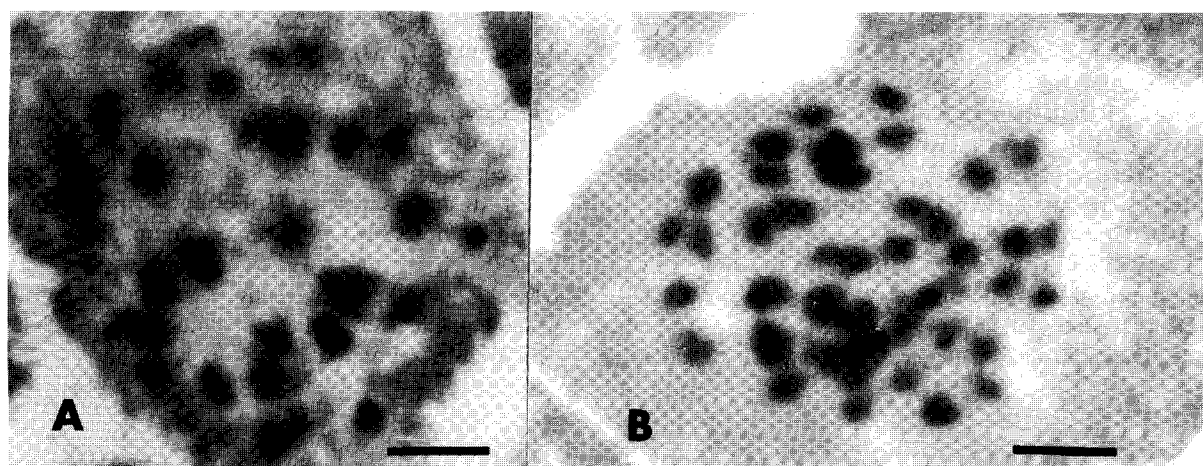


Figure 1. Mitotic-prophase chromosomes of *Utricularia bremii* (A; $2n=36$) and *U. dimorphantha* (B; $2n=44$). Bar = $5\ \mu\text{m}$.

head, 1972) and the least number was found in *U. scandens* of the section Oligocista where $n=6, 7$ (Casper and Manitz, 1975). In the largest section Oligocista with 37 species, only four species bear the chromosome numbers indicating around 11% of the members of the section. It is noteworthy that chromosomes have been counted 100% in the section Stomoisia although it contains only *U. cornuta* and *U. juncea* which were investigated by Kondo (1972b) followed by Casper and Manitz (1975). The section Orchidioides possesses nine species in which two species received chromosomal investigation. Only 3.03% of the member of the third largest section Pleiochasia comprising 33 species was covered by chromosome count. Chromosome numbers were reported in one species each in the sections Australes, Calpidisca, Foliosa, Lenticula, Meionula, Nigrescentes and Setiscapella, covering 33.3, 10, 33.3, 50, 33.3, 33.1 and 11.1% of the members of the sections respectively.

The present study revealed the chromosome number of *U. bremii* and *U. dimorphantha* indicates that *U. bremii* shows the affinity in chromosome number with *U. inflata* and *U. caerulea* while the chromosome number of *U. dimorphantha* resembles with *U. intermedia*, *U. minor* and *U. vulgaris*. According to our study *U. bremii* might be a tetraploid if the basic number of $x=9$ is accepted. The same basic chromosome number of $x=9$ was found in *U. alpina* Jacq (Kondo, 1969) and *U. inflata* Walter (Lewis *et al.*, 1962). *Utricularia dimorphantha* might also be a tetraploid with the basic chromosome number $x=11$. Due to lack of chromosome information on many other species of the genus, it is premature to assess the taxonomic and evolutive value of the chromosomes in *Utricularia*. However, the variation in basic chromosome number might be interesting to justify a more cytological analysis of the genus.

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