

Chromosome Number of *Lobelia nummularia* (Campanulaceae) in Taiwan and the Philippines

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Abstracts. Chromosome number of eight plants of *Lobelia nummularia* collected from Taiwan and the Philippines were observed using the standard orcein squash method. The eight plants had the chromosome number of $2n = 28$. The present counts on this species were disagreed with that of $2n = 12$ on a Taiwanese plant reported by Hsu (1967), and support the basic chromosome number of $x = 7$ suggested by Lammers (1993) in subfamily Lobelideae.

Introduction

Lobelia nummularia G. Forster is a perennial in subfamily Lobelideae, family Campanulaceae (Fig. 1), and widely distributed from China to India extending to Australia and New Zealand (e.g. Lammers 1998). A chromosome number of $2n = 12$ on a plant collected from a locality in Taiwan was previously reported for this species (Hsu 1967). However, Murata (1995) mentioned that the chromosome number reported by Hsu (1967) might be miscount, because its allied species had the basic chromosome number of $x = 7$ (Lammers 1993, Murata 1995). Aim of the present study is to investigate chromosome number in eight plants of *Lobelia nummularia* collected from Taiwan and the Philippines.

Materials and Methods

Eight plant materials were collected from eight populations, seven in Taiwan and one in the Philippines (Table 1). Voucher specimens were deposited in herbaria of National Science Museum, Tokyo (TNS). The taxonomic treatment of Lammers (1998) was taken up for the cytological present study.

Root tips were cut out from each accession and pretreated in 2 mM 8-hydroxyquinoline at 20°C for 2h, then fixed in acetic ethanol (1:3) at 4°C for 2 h at least. The fixed root tips were macerated in a mixture of 1 N hydrochloric acid and 45% acetic acid (2 : 1) at 60°C for 10 sec. Somatic chromosomes at mitotic metaphase were stained in 2% aceto-orcein for 2h, and spreaded by the standard squash method.

Results and Discussion

Eight individuals of *Lobelia nummularia* collected from Taiwan and the Philippines commonly

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Fig. 1. Plant of *Lobelia nummularia* (Goro Kokubugata 3895; Mt. Xiaozishan, Pingchi Hsiang, Taipei, Taiwan; on May 15, 2004).

Table 1. Plant materials of *Lobelia nummularia* investigated

Locality	Voucher specimen*	Reference**
TAIWAN, Taipei: entrance of Mt. Caigongkeng-shan, Sanchih Hsiang	GK 8384	A
TAIWAN, Taipei: hiking trail, foot of Mt. Xiaozhi-shan, Pingchi Hsiang	GK 3895	B
TAIWAN, Taipei: Mt. Tataoshan, Wulai Hsiang	GK 4231	C
TAIWAN, Taichung: Mt. Baimao-shan, Hoping Hsiang	GK 8744	D
TAIWAN, Nantou: Mt. Peitungyen-shan, Jenai Hsiang	GK 8746	E
TAIWAN, Hualien: trail to Tali, Hsiulin Hsiang	GK 6294	F
TAIWAN, Nantou: Shalinch Forest Recreation Area, Liku Hsiang	GK 8747	G
PHILLIPPINES, Luzon Island: ca. 5 miles north from Banaue, Ifugao	GK 8740	H

*GK; personal number of Goro Kokubugata (TNS).

**Used in Fig. 1 to indicate each individual.

showed the chromosome number of $2n = 28$ (Table 1 and Fig. 2). A pair of chromosomes had satellite in a chromosome complement of the eight plants at mitotic metaphase (Fig. 2, arrows).

Hsu (1967) reported a chromosome number of $2n = 12$ in *L. nummularia* (as *Pratia nummularia* (Lam.) A. Braun & Asch.) collected from a locality in Taipei, Taiwan. The present count disagreed with that of $2n = 16$ in reported by Hsu (1967). There is a possibility that the chromosome number counted by Hsu (1967) could be miscount as Murata (1995) mentioned. Lammers (1993) reported that members of subfamily Lobelideae including *L. nummularia* has basic chromosome number of $x = 7$. The present study supports his hypothesis (Lammers 1993), and then suggests that the eight individuals of *L. nummularia* could be the tetraploid cytotype with $x = 7$.

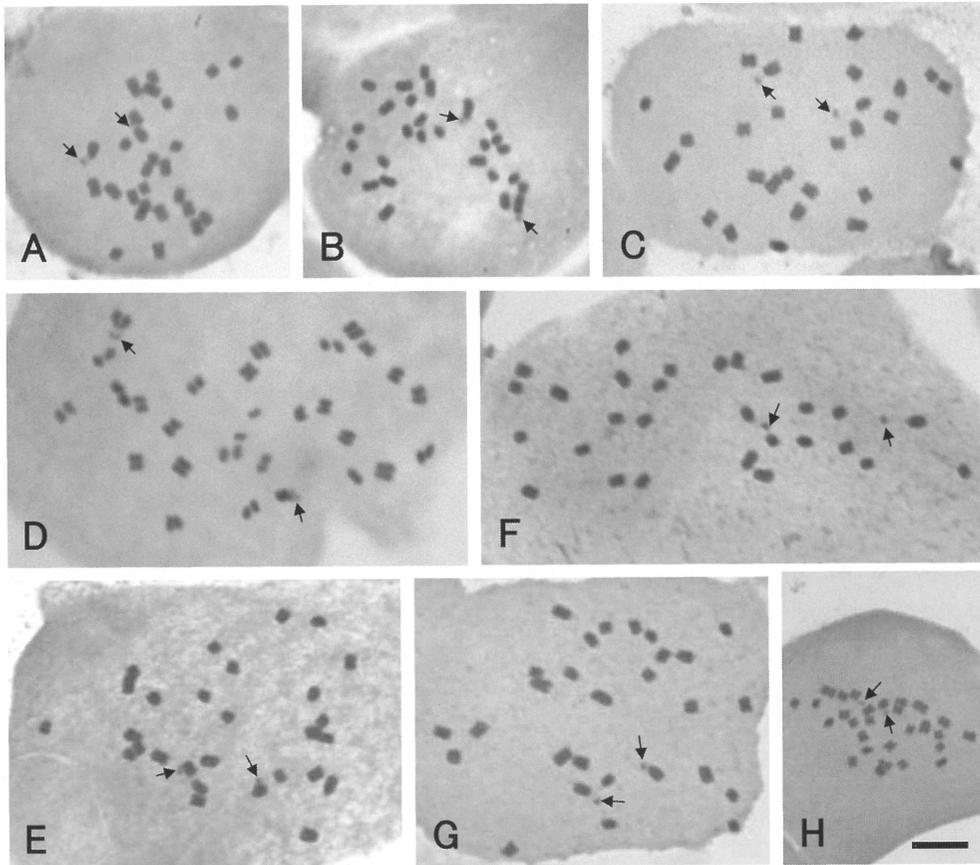


Fig. 2. Somatic chromosomes in eight individuals of *Lobelia nummularia*. Each letter refers to a locality list in Table 1.

In this study, we took up a taxonomic treatment of Lammers (1998) for the present study, but some taxonomists treated *L. nummularia* as a synonym of *L. angulata* G. Forster distributing from China to New Zealand (e.g. Lammers 1992). Previously two chromosome numbers of $2n = 70$ as the decaploid cytotype (10x; Beuzenberg and Stiefkens 1959, Murray and Cameron 1990, Murray *et al.* 1992) and 140 as the icosaploid cytotype (20x; Murray and Cameron 1990, Murray *et al.* 1992) were reported for the plants identified as *L. angulata*. Even if *L. nummularia* is a synonym of *L. angulata*, namely if eight individuals investigated are treated as *L. angulata*, the tetraploid cytotype with $2n = 28$ is for the first time in *L. angulata sensu lato*.

The present study detected two visual satellites in a chromosome complement at mitotic metaphase of the eight individuals being thought as the tetraploid cytotype. The lack of satellite number might be due to one of two possible factors. One of thinkable factors is satellite disappearing following polyploidization from $2x$ to $4x$. This phenomenon has been reported in the other plant taxa, for instance in *Gossypium L.* (Malvaceae) by Hanson *et al.* (1996), *Inula L.* (Compositae) by Kokubugata and Koyama (1999) and Saito *et al.* (2005). Another possible factor is that the tetraploid cytotype might be originated from ancestral diploid cytotype having a heteromorphism of satellite in a chromosome complement. Saito *et al.* (2004) reported that only one satellite was detected in a plant of the diploid species of *L. fulgens* Humpl. & Bonpl.

ex Willd with $2n = 14$.

Further investigation using the fluorescence *in situ* hybridization might clarify a mechanism in the lack of satellite number in the tetraploid cytotype of *L. nummularia*.

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摘 要

台湾産及びフィリピン産 *Lobelia nummularia* 計 8 個体において、アセトオルセイン染色法により体細胞中期の染色体を観察した。8 個体全てにおいて染色体数は $2n = 28$ で、2 個の付随体が観察された。算定された染色体数は過去に Hsu (1964) により報告された $2n = 16$ とは異なった。一方、Lammers (1993) により提唱された本属の基本数 $x = 7$ を支持する結果となった。これらの個体は *L. angulata* と取り扱われることもあるが、その場合でも 4 倍体は初めての報告である。

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