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Comparison of Chromosome Number and Karyotype of Two *Lepidozamia* Species (Zamiaceae, Cycadales)

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國府方吾郎[*]・近藤勝彦[**]・Lou M. Randall[***]: *Lepidozamia* 属（ザミア科，ソテツ目）2種における染色体数及び核型の比較研究

Lepidozamia (Zamiaceae, Cycadales; Stevenson 1992) is endemic to Australia, and consists of *L. hopei* Regel and *L. peroffskyana* Regel. Two species of *Lepidozamia* are enable to be recognized with the width of leaflet; *i. e.* the former has wider leaflet than the latter (Jones 1993).

The chromosome number and karyotype of *L. hopei* and *L. peroffskyana* was previously reported by Marchant (1968) and Moretti (1990). In certain cycad-taxa, however, there are some mistakes of their karyotype identification for the previous reports, and it is necessary to reinvestigate their of the chromosomal characters (Kokubugata *et al.* 1999). The aim of the present study is investigation of the chromosome number and karyotype of *L. hopei* and *L. peroffskyana* by the standard aceto-orcein staining method for the cytotaxonomical accumulations of *Lepidozamia*.

Materials and Methods

The taxonomical treatment follows Jones (1993). The plants investigated in the present study were collected in the each habit and exported under a CITES permit before cultivation in the greenhouse of the Tsukuba Botanical Garden (Table 1).

Root tips were harvested and pretreated in 4 mM 8-hydroxyquinoline at 4℃ for 10 hour. They were fixed in acetic ethanol (3:1) at 4℃ for 24 hour, and were transferred and stored in 70% ethanol at −20℃.

Fixed Root tips were macerated in a mixture of 1N HCl and 45% acetic acid (2:1) at 60℃ for 10 sec., put on glass slides, and then stained in 2% aceto-orcein at room temperature for 4 hour. Orcein-stained chromosomes were classified according to centromeric position defined using arm ratios (Levan *et al.* 1964).

Table 1. *Lepidozamia* species used in this study

Species	Origin	Accession no.
L. hopei	Australia, State of Queensland: El Arish	TBG126733
L. perffoskyana	Australia, State of Queensland: Caloundra	TBG122893

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Fig. 1. Chromosome complement of two *Lepidozamia* species at mitotic metaphase. **A.** *L. hopei.* **B.** *L. peroffskyana.* Bar indicates 10 μm.

Fig. 2. Somatic chromosome of two *Lepidozamia* species at mitotic metaphase. **A.** *L. hopei.* **B.** *L. peroffskyana.* Bar indicates 10 μm.

Table 2. Arm ratio and chromosome length in the complement of two *Lepidozamia* species at mitotic metaphase

Chrom. No.	Long arm (μm)		Long arm (μm)		Long arm (μm)		Arm ratio		Chromosomal classification	
	H	P	H	P	H	P	H	P	H	P
1	15.1	23.0	13.0	19.0	28.1	42.0	1.2	1.2	m	m
2	13.8	22.5	13.5	17.8	27.3	40.3	1.0	1.3	m	m
3	13.2	20.0	13.0	18.8	26.2	38.8	1.0	1.1	m	m
4	14.5	20.0	11.6	18.0	26.1	38.0	1.3	1.1	m	m
5	13.0	19.0	13.0	15.5	26.0	34.5	1.0	1.2	m	m
6	12.6	17.0	11.5	15.2	24.1	32.2	1.1	1.1	m	m
7	9.1	15.0	8.8	12.0	17.9	27.0	1.0	1.3	m	m
8	8.2	13.0	7.8	11.4	16.0	24.4	1.1	1.1	m	m
9	13.5	19.5	5.0	4.5	18.5	24.0	2.7	4.3	sm	st
10	12.8	18.5	5.1	5.0	17.9	23.5	2.5	3.7	sm	st
11	14.0	17.5	3.8	5.1	17.8	22.6	3.7	3.4	st	st
12	12.3	15.5	3.5	5.8	15.8	21.3	3.5	2.7	st	sm
13	12.2	16.9	3.4	3.8	15.6	20.7	3.6	4.4	st	st
14	12.1	17.0	3.0	3.5	15.1	20.5	4.0	4.9	st	st
15	14.9	20.5	0.6	0.5	15.5	21.0	24.8	41.0	t	t
16	14.5	20.0	0.7	0.5	15.2	20.5	20.7	40.0	t	t
17	10.0	12.8	4.2	4.2	14.2	17.0	2.4	3.0	sm	sm
18	10.0	12.7	3.6	4.1	13.6	16.8	2.8	3.1	sm	st

H: *L. hopei.* P: *L. peroffskyana.* m: median-centromeric chromosome. sm: submedian-centromeric chromosome. st: subterminal-centromeric chromosome. t: terminal-centromeric chromosome.

Results and Discussion

Lepidozamia hopei and *L. peroffskyana* showed the chromosome number of 2n=18 (Fig. 1), which was consistent with those of the previous reports (Marchant 1964; Moretti 1990).

The karyotype of *L. hopei* consisted of eight median-, four submedian-, four subterminal- and two terminal-centromeric chromosomes (Figs. 2A and 3A, Table 2). On the other hand, those of *L. peroffskyana* consisted of eight median-, two submedian-, six subterminal- and two terminal-centromeric chromosomes (Figs. 2B and 3B, Table 2). The arm ratio value of four submedian-centromeric chromosomes of *L. hopei* and two submedian-centromeric chromosomes of *L. peroffskyana* were very close to 3.1, the lowest extreme of the arm ratio range of the subterminal-centromeric chromosome according to Levan *et al.* (1964). Thus, the karyotypes of two *Lepidozamia* species in the present investigation were very similar to each other, and was very similar to the karyotype of eight median-, four submedian- (or subterminal-) and two terminal-centromeric chromosomes of two *Lepidozamia* species reported by Marchant (1968) and Moretti (1990).

It has been reported that members of Cycadales show the stable karyotype within the each genus (Marchant 1968; Moretti 1990), excepting *Zamia* (Norstog 1980; Vovides 1983; Moretti and Sabato 1984) and *Bowenia* (Kokubugata *et al.* 1999). The present investigation indicated that the two *Lepidozamia* species are the same chromosome number, 2n=18 and similar karyotype. These results

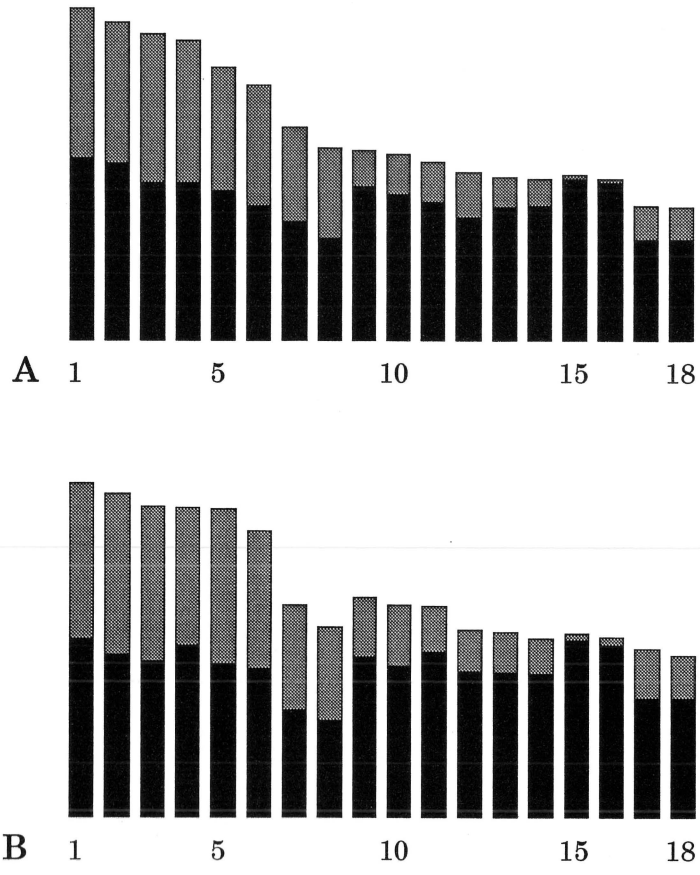

Fig. 3. Ideogram of two *Lepidozamia.* species **A.** *L. hopei.* **B.** *L. peroffskyana.* Solid areas show long arm. Stippled areas show short arm.

intimate that there must be no karyomorphological arrangements in the speciation between two *Lepidozamia* species.

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Summary

Somatic chromosomes at mitotic metaphase of *Lepidozamia hopei* and *L. paroffskyana* were investigated by the standard aceto-orcein staining method. They showed the chromosome number of 2n=18 and the karyotype consisted of eight median-, eight subterminal- (or submedian-) and two terminal-centromeric chromosomes.

摘　要

Lepidozamia 属2種，*L. hopei* と *L. peroffskyana* の体細胞染色体をアセトオルセイン染色法により観察した。*Lepidozamia* 2種は，ともに染色体数が2n＝18であり，核型は8個の中部動原体型染色体，8個の次端部（或いは次中部）動原体型染色体，2個の端部動原体型染色体から構成されていた。

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