

CHROMOSOME NUMBERS IN TASMANIAN GOODENIACEAE AND BRUNONIACEAE

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(WITH 1 TEXT FIGURE)

ABSTRACT

Species of *Goodenia*, *Velleia*, *Selliera* and *Scaevola* have a basic chromosome number of 8, whilst *Dampiera* and *Brunonia* show a basic number of 9. With the exception of *Selliera radicans* which has diploid and hexaploid races, all others are diploid.

INTRODUCTION

Thirteen members of the Goodeniaceae and the monotypic *Brunonia australis* have been recorded from Tasmania. None are endemic. Four species are rare or are doubtful records. Four are restricted in distribution, while the other five are common species with wide distributions. With the possible exception of the sub-herbaceous Goodenias, the Tasmanian members offer few taxonomic difficulties. The principle interest lies in the relationships between genera and the position of *Brunonia* which has in the past been grouped with the Goodeniaceae.

At present there is no published account of chromosome numbers in this distinctive Australian group. However, P. Martin (University of Adelaide) is at present working on the Australian members.

MATERIALS AND METHODS

Only Tasmanian specimens were studied. Where possible material was obtained from different environments and from a wide range in the Tasmanian distribution. Morphological variants common in *Goodenia humilis*, *G. elongata* and *G. lanata* were investigated.

Meiosis in pollen mother cells was studied using aceto-orcein and aceto-lacmoid smear methods (Darlington and La Cour, 1947). Root tips were used for the study of mitosis, both untreated and with treatments of aqueous solutions of para-dichlorobenzene (Meyer, 1945) before fixation in acetic-alcohol. Acetic stains were used for most of the investigation. Feulgen staining was tried, but no satisfactory stain intensity was obtained.

OBSERVATIONS AND DISCUSSION

A summary of the counts determined and the origin of the material is given in Table I. Drawings of representative plates are provided in the text figure.

In the Goodeniaceae the chromosome complement is surprisingly uniform in both number and morphology. Apart from *Dampiera stricta* with $2n = 18$, the Tasmanian members investigated all have

the diploid number $2n = 16$, except in *Selliera radicans* where a hexaploid $2n = 48$ was found in addition to the diploid form. There do not appear to be any significant morphological differences between these two chromosome races, which were found in the same locality. The chromosome number of *Brunonia australis* is $2n = 18$. Meiosis was normal in all specimens and pollen fertility, as measured by stainable pollen, was high. There is no evidence of apomixis in the members studied.

The chromosomes are fairly small. In mitotic metaphase the chromosomes range from $2.5-4 \mu$ in length. Mitotic plates are small and compact. Narrow meiotic spindles are a feature of the Goodeniaceae, with cross sectional areas $1/20$ th that of the pollen mother cell section. This feature while common to all species of the Goodeniaceae studied is not found in *Brunonia australis*.

As mentioned above, the chromosome complement in the Goodeniaceae is markedly uniform. Although *Dampiera stricta* has a haploid complement of nine, studies of chromosome morphology indicate that eight of these are indistinguishable from the genome in other genera. All the chromosomes are metacentric, with four shorter chromosomes with a $5/4$ arm ratio. One of the four long members has a $1/1$ arm ratio while the ratio in the other three is approximately $3/2$. The long arm of one of these has a prominent trabant. In *Dampiera stricta* the complement appears to be identical apart from the addition of another short chromosome with a $1/1$ arm ratio. Martin (unpub.) has found polyploid series based on $x = 9$ in mainland members of *Leschenaultia* and *Dampiera*. *Brunonia australis* appears to possess eight members similar to that in the eight membered Goodeniaceae. There the additional member to the haploid set is a long chromosome with a $5/4$ arm ratio and a heterochromatic segment near the distal end of the short arm.

Practically all chiasmata are terminal or nearly so. In *Brunonia* the distal localization of chiasmata is most pronounced. *Brunonia australis* also differs from the members of the Goodeniaceae studied in having a larger cell size and a relatively larger spindle. With these exceptions the group appears to be homogeneous cytologically, based on $x = 8$ and $x = 9$, with some apparent uniformity in chromosome morphology.

I wish to acknowledge the kind assistance of Mr. T. E. Burns in collecting material in Northern Tasmania.

TABLE I

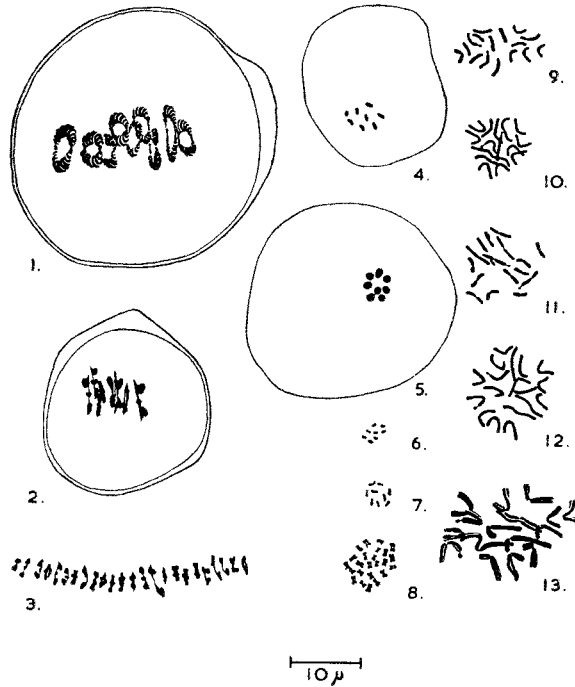
Chromosome numbers of Tasmanian Goodeniaceae and Brunoniaceae.

Species	Collecting locality and altitude		Remarks	Chromosome number	
				2n	n
GOODENIACEAE					
<i>Velleia</i> , Sm.				16	8
<i>V. montana</i> , Hook. f.	King William Saddle	2,800	robust lvs. 10 cm.	16	8
	Interlaken	2,600	reduced lvs. 4-5 cm.	16	8
<i>V. paradoxa</i> , R.Br.	Springfield, Glenorchy	200	robust lvs. 14 cm. glabrous	16	8
	Georgetown	100	lvs. 7 cm. hairy entire \pm	16	8
<i>Goodenia</i> , Sm.					
<i>G. ovata</i> , Sm.	Tolosa St., Glenorchy	200	typical	16	8
	St. Marys	800	typical	16	...
<i>G. amplexans</i> , F.v.M.	Not collected				
<i>G. barbata</i> , R.Br.	Not collected				
<i>G. geniculata</i> , R.Br.	Not collected				
<i>G. lanata</i> , R.Br.	Mt. Nelson	300	typical	16	8
	Murdunna	50	lvs. 3 cm. x 2.5 cm.	16	8
	Low Head	50	lvs. 4 cm. x 1.5 cm.	16	...
<i>G. elongata</i> , Labill.	St. Helens	50	hairy reduced	16	8
	Low Head	100	\pm glabrous robust	16	8
<i>G. humilis</i> , R.Br.	Low Head	20	typical lvs. 3 cm.	16	8
	Low Head	20	robust lvs. 5 cm. x 0.5 cm.	16	8
<i>Selliera</i> , Cav.					
<i>S. radicans</i> , Cav.	Glenorchy	...	typical	16	8
	Glenorchy	...	typical	48	24
<i>Scaevola</i> , Linn.					
<i>S. hookeri</i> , F.v.M.	Mt. Wellington	4,000	reduced	16	8
	Collins Cap	1,900	robust	16	...
<i>Dampiera</i> , R.Br.					
<i>D. stricta</i> , R.Br.	Bicheno	50	typical	18	9
BRUNONIACEAE					
<i>Brunonia</i> , Sm.					
<i>B. australis</i> , Sm.	Queechy Hill, Laun.	50	typical	18	9

REFERENCES

- DARLINGTON, C. D. AND LA COUR, L. F., 1947.—The Handling of Chromosomes. London, Allen and Unwin.
- MEYER, J. R., 1945.—Prefixing with Paradichlorobenzene to Facilitate Chromosome Study. *Stain Technology*, 20, 121-125.

FIGURE 1



Side View

Metaphase I

1. *Brunonia australis* $n = 9$
2. *Goodenia ovata* $n = 8$
3. *Selliera radicans* $n = 24$

Polar View

Metaphase II

4. *Goodenia humilis* $n = 8$
5. *Velleia montana* $n = 8$
6. *Goodenia ovata* $n = 8$
7. *Dampiera stricta* $n = 9$
8. *Selliera radicans* $n = 24$.

Polar View

Mitotic Metaphase

9. *Velleia montana* $2n = 16$
10. *Goodenia lanata* $2n = 16$
11. *Goodenia elongata* $2n = 16$
12. *Dampiera stricta* $2n = 18$
13. *Scaevola hookeri* $2n = 16$

