AN ANALYSIS OF THE FLORA OF VICTORIA

by

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SUMMARY

The flora of Victoria is analysed and attention drawn to the high proportion of naturalized alien species. Diagrams illustrate the proportion of certain elements of the flora. Families with more than 0·5% of the total number of species in Victoria, and genera containing 15 or more species, are tabulated. The marked inverse relationship between numbers of genera and families is illustrated.

J. H. Willis's " Handbook to plants in Victoria " (1970, 1972) provide a convenient basis for an analysis of the flora. Several genera have been revised since the publication of Willis l.c. and these revisions, together with many new records for Victoria, have been taken into account in the analysis. There are now (Jan. 1976) 178 families, 918 genera and 3322 species of vascular plants, both indigenous and naturalized, recorded in Victoria. (Table 1).

	Families	Genera	Species
Pteridophyta	24	47	112 (1)
Gymnospermae	3 (1)	3 (1)	9 (3)
Angiospermae			
Monocotyledoneae	36 (5)	242 (66)	883 (181)
Dicotyledoneae	115 (14)	626 (201)	2318 (562)
Totals	178 (20)	918 (268)	3322 (747)

Table 1.—Proportional representation of Victorian Flora.

Figures in parentheses denote naturalized alien taxa. Thus, of the 178 families, 20 are represented by only naturalized species introduced to Victoria, 268 of the genera are also so limited, but the 747 naturalized species are divided between the 268 naturalized genera and genera which are represented by both native and introduced species.

Of the 178 families in Victoria, 24 (13·48%) are pteridophytes, 3 (1·69%) are gymnosperms, 36 (20·22%) are monocotyledons and 115 (64·61%) are dicotyledons (see Fig. 1.).

* National Herbarium of Victoria

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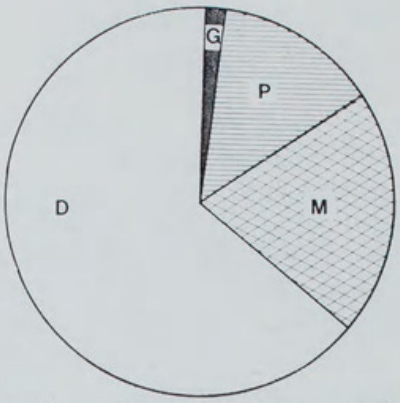

Fig. 1.—Proportional representation of gymnosperm, pteridophyte, monocotyledon and dicotyledon families in the Flora of Victoria. G = gymnosperms, P = pteridophytes, M = monocotyledons and D = dicotyledons.

The proportion of the Victorian flora is as follows:—

—	Number of families expressed as a percentage of the total		Number of genera expressed as a percentage of the total		Number of species expressed as a percentage of the total	
	Indigenous	Naturalized	Indigenous	Naturalized	Indigenous	Naturalized
Pteridophyta ..	13·48	0·00	5·12	0·00	3·34	0·03
Gymnospermae ..	1·12	0·56	0·22	0·11	0·18	0·09
Angiospermae ..	..	..	..	..	..	..
Monocotyledoneae	17·42	2·81	19·17	7·18	21·13	5·45
Dicotyledoneae ..	56·74	7·87	46·30	21·90	52·86	16·92
Totals ..	88·76	11·24	70·81	29·19	77·51	22·49

The present (Jan. 1976) total of 3322 species compares with the 3232 species recorded from Victoria in 1970 by Churchill and de Corona (1972 : 8). This increase of 90 species (includes new records, newly described species and newly naturalized species) during the last six years reflects a continuation of the rate of change in the Victorian flora noted by Churchill and de Corona during the forty years since the publication of Ewart's, Flora of Victoria (1931).

The naturalized aliens now (Jan. 1976) number 747 and form 22·49% of the total flora. Ewart, (1931 : 11), recorded that in 1909 there were 363 aliens and in 1928 there were 461, which represented an increase of "approximately one every 2 months or slightly more than five a year." Ewart noted that this rate of increase had been maintained with "remarkable uniformity during the past 60 years". The number of aliens recorded now represents an increase of 286 species during the 48 years since Ewart's calculations in 1928. This is an increase of almost six species per year during the past 48 years so the rate of increase has now been more or less uniform for over 100 years. Whereas the 461 aliens recorded by Ewart amounted to 17·60% of the

total flora, the 747 species now constitute 22·49% of the flora. Alien species are gradually forming an increasing percentage of the flora. Although the indigenous species outnumber the aliens by far, in many instances the distributions of the indigenous species are shrinking while those of the aliens are expanding. Some of the aliens, for example the pasture grasses, are valuable additions to the flora; others are noxious weeds.

Beadle, Evans and Carolin, Flora of the Sydney Region (1972: 9), recorded that "the number of indigenous species is about 2000 and to this have been added almost 450 exotic species which have become naturalized . . . .". Thus the naturalized aliens in this area form about 22·50% of the flora which is

Family	No. of species	No. of species expressed as a percentage of the total	No. of genera	No. of genera expressed as a percentage of the total
Compositae	361	10·87	105	11·44
Gramineae	323	9·72	106	11·55
Papilionaceae	202	6·08	42	4·57
Orchidaceae	175	5·27	25	2·72
Cyperaceae	168	5·06	21	2·29
Myrtaceae	138	4·15	13	1·42
Chenopodiaceae ..	101	3·04	18	1·96
Mimosaceae	94	2·86	2	<0·5
Cruciferae	80	2·41	39	4·25
Proteaceae	66	1·99	10	1·09
Epacridaceae	60	1·81	15	1·63
Umbelliferae	57	1·72	24	2·61
Labiatae	51	1·54	19	2·07
Scrophulariaceae ..	51	1·54	19	2·07
Liliaceae	49	1·48	23	2·51
Rutaceae	49	1·48	10	1.09
Caryophyllaceae ..	48	1·44	20	2·18
Solanaceae	48	1·44	9	0·98
Rhamnaceae	47	1·41	6	0·65
Goodeniaceae	42	1·23	6	0·65
Rubiaceae	39	1·16	8	0·87
Juncaceae	37	1·11	2	<0·5
Ranunculaceae	34	1·05	5	0·54
Euphorbiaceae	33	0·99	13	1·42
Rosaceae	32	0·96	12	1·32
Polygonaceae	31	0·94	4	<0·5
Boraginaceae	29	0·87	12	1·32
Iridaceae	29	0·87	17	1·86
Malvaceae	27	0·81	10	1·09
Thymelaeaceae	24	0·72	2	<0·5
Geraniaceae	23	0·69	3	<0·5
Haloragaceae	23	0·69	3	<0·5
Amaranthaceae	21	0·66	3	<0·5
Dilleniaceae	21	0·66	1	<0·5
Myoporaceae	18	0·54	2	<0·5
Aizoaceae	17	0·51	10	1·09
Onagraceae	17	0·51	6	0·65
Santalaceae	17	0·51	6	0·65

Table 2.—Synopsis of the families whose species, both indigenous and naturalized, comprise more than 0·5% of the total number listed in order of numerical importance, together with the number of genera in each family.

similar to the percentage recorded from Victoria. The number of naturalized aliens recorded in the A.C.T. by Burbidge and Gray (1970 : 4) was 289 or 27·92% of the flora. On the other hand, Chippendale (1972 : 266) found that introduced species form only 4·17% of the flora of the Northern Territory.

Those families with more than 0·5% of the total number of species are listed in order of numerical importance in Table 2. The number of genera in these families is also reflected in Table 2 but, as family position is determined by the total number of species, the arrangement of genera follows no strict sequence.

Family	No. of indigenous species	No. of indigenous species expressed as a percentage of the total No. of species in the family	No. of naturalized alien species	No. of naturalized aliens expressed as a percentage of the total No. of species in the family
Compositae	268	74·24	93	25·76
Gramineae	198	61·30	125	38·70
Orchidaceae	175	100·00	0	0·00
Cyperaceae	159	94·64	9	5·36
Papilionaceae	142	70·30	60	29·70
Myrtaceae	137	99·28	1	0·72
Chenopodiaceae ..	91	90·10	10	9·90
Mimosaceae	89	94·68	5	5·32
Proteaceae	66	100·00	0	0·00
Epacridaceae	60	100·00	0	0·00
Rutaceae	49	100·00	0	0·00
Umbelliferae	48	84·21	9	15·79
Liliaceae	46	93·88	3	6·12
Rhamnaceae	46	97·87	1	2·13
Goodeniaceae	42	100·00	0	0·00
Cruciferae	40	50·00	40	50·00
Labiatae	35	68·63	16	31·37
Rubiaceae	32	82·05	7	17·95
Juncaceae	31	83·78	6	16·22
Scrophulariaceae ..	26	50·98	25	49·02
Ranunculaceae ..	25	73·53	9	26·47
Euphorbiaceae	24	72·73	9	27·27
Thymelaeaceae	24	100·00	0	0·00
Haloragaceae	22	95·65	1	4·35
Solanaceae	21	43·75	27	56·25
Dilleniaceae	21	100·00	0	0·00
Caryophyllaceae ..	19	39·58	29	60·42
Polygonaceae	19	61·29	12	38·71
Myoporaceae	18	100·00	0	0·00
Santalaceae	17	100·00	0	0·00
Malvaceae	16	59·26	11	40·74
Geraniaceae	13	56·52	10	43·48
Boraginaceae	12	41·38	17	58·62
Amaranthaceae ..	12	57·14	9	42·86
Onagraceae	12	70·59	5	29·41
Rosaceae	9	28·13	23	71·88
Iridaceae	9	31·03	20	68·97
Aizoaceae	9	52·94	8	47·06

Table 3.—Synopsis of the families with more than 0·5% of the total number of species showing the proportion of indigenous species to naturalized species within each family, the families listed in order of the numerical importance of the indigenous species.

The largest family is Compositae with 361 species (10·87%) followed by Gramineae with 323 species (9·72%) and Papilionaceae with 202 species (6·08%). These three largest families contribute 886 species or 26·67% of the total number of species, while the ten largest families contribute 1709 species or 51·45% of the total. Neither pteridophytes nor gymnosperms are represented amongst the families in Table 2.

The proportion of indigenous species to naturalized aliens in those families with more than 0·5% of the total number of species is shown in Table 3, the families being listed in order of the numerical importance of the indigenous species. When indigenous species alone are considered the sequence of families in Table 3 differs significantly from the sequence in Table 2. Compositae and Gramineae remain the largest and second largest families respectively but Papilionaceae slips from the third to the fifth largest. Several families, namely, Orchidaceae, Proteaceae, Epacridaceae, Rutaceae, Goodeniaceae, Thymelaeaceae, Dilleniaceae, Myoporaceae and Santalaceae are represented by only indigenous species, whilst more than half of the species in Rosaceae, Iridaceae, Caryophyllaceae, Boraginaceae and Solanaceae are naturalized aliens. Almost 72% of the Rosaceous species in Victoria are naturalized aliens.

Seventy-nine families (44·38%) are represented by only one genus, 36 families (20·23%) by two genera, 14 families by three genera, 8 families by four genera and 9 families by five genera. Only 32 (17·98%) of the 178 families have six or more genera each. The proportion of the families with six or fewer genera each is shown in Fig. 2.

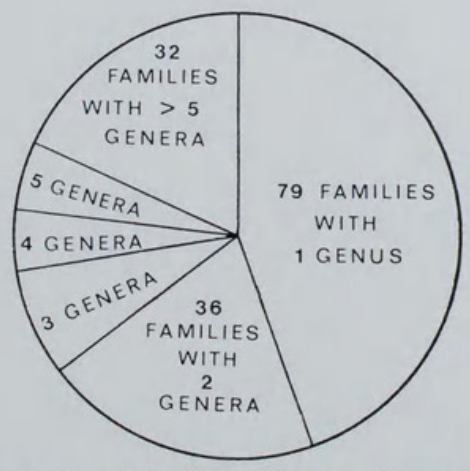

Fig. 2.—Proportional representation of families with six or fewer genera each.

Thirty-eight families (21·35%) are represented by only one species, 22 families (12·36%) by two species, 19 families (10·67%) by three species, 7 families by four species and 9 families by five species. Only 83 (46·63%) of the 178 families have six or more species each. The proportion of the families with six or fewer species each is shown in Fig. 3.

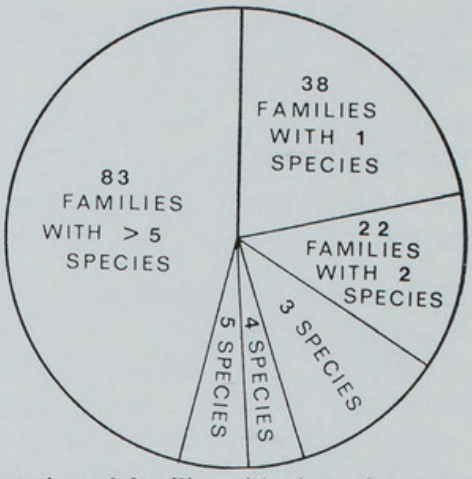

Fig. 3.—Proportional representation of families with six or fewer species each.

Wittsteinia F. Muell. and *Choristemon* H. B. Williamson, both of which are monotypic, are endemic in Victoria. *Choristemon* is a member of the Epacridaceae and *Wittsteinia* a member of Ericaceae although until recently it too was included in Epacridaceae.

The marked inverse relationship between the number of genera and families is shown in Fig. 4. Most families are seen to have few genera and only very few families have many genera. A similar inverse relationship exists between the number of species and genera. The ratio of genera to species in Victoria is 1 : 3·6187.

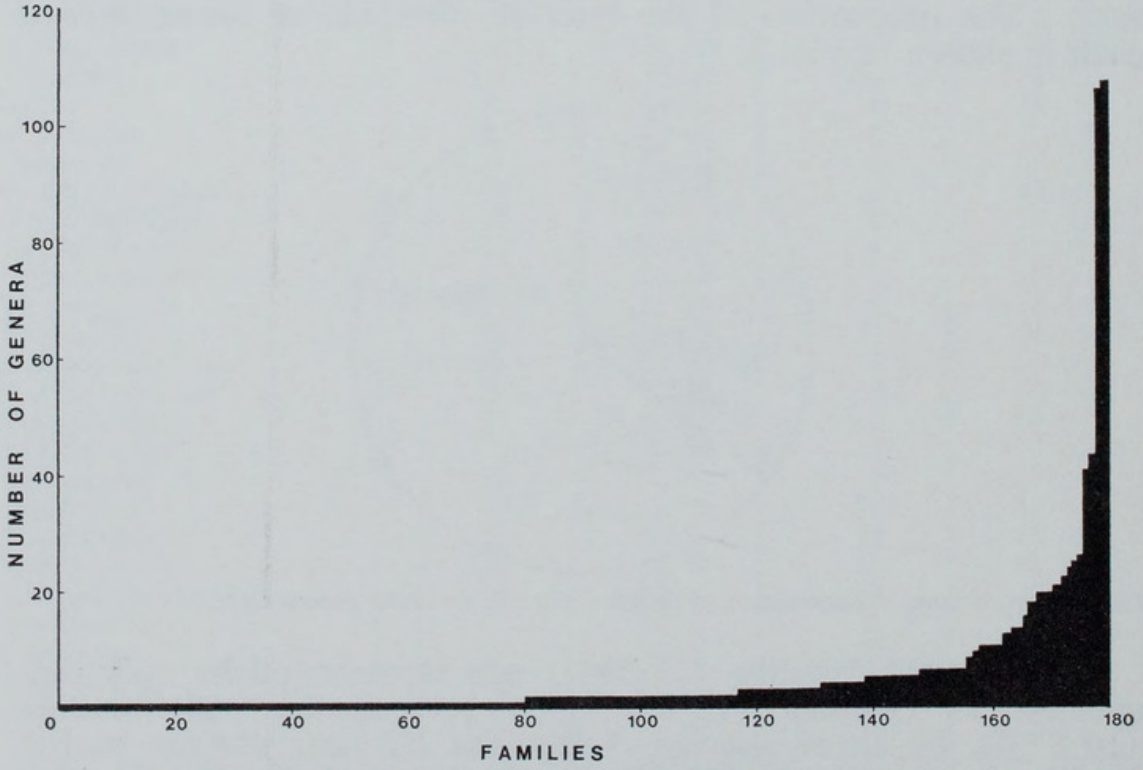

Fig. 4.—Histogram showing the marked inverse relationship between number of genera and families.

The genera with the largest number of species are listed in order of numerical importance in Table 4. Figures in parentheses indicate the number of naturalized aliens. If the naturalized aliens are excluded the relative positions of several genera are changed significantly and only 34 of the present 42 genera in Table 4 would still have fifteen or more species.

Although the Victorian flora is relatively well known, new species and new records are still being found. In addition, aliens continue to become naturalized and the naturalized species are

Genus	Number of species
Acacia	93 (4)
Eucalyptus	79 (1)
Pultenaea	47
Pterostylis	39
Olearia	37
Brachycome	34
Helichrysum	31
Pomaderris	31
Juncus	31 (6)
Carex	30 (4)
Prasophyllum	29
Scirpus	29 (3)
Ranunculus	28 (8)
Senecio	27 (4)
Grevillea	26
Leucopogon	26
Solanum	25 (13)
Thelymitra	24
Danthonia	24
Atriplex	24 (3)
Cyperus	24 (2)
Pimelea	23
Stipa	23 (1)
Caladenia	22
Goodenia	22
Hibbertia	21
Trifolium	20 (20)
Maireana	19
Lepidium	19 (5)
Poa	18 (4)
Deyeuxia	17
Lepidosperma	17
Hydrocotyle	16
Leptospermum	16
Schoenus	16
Plantago	16 (4)
Helipterum	15
Phebalium	15
Prostanthera	15
Chenopodium	15 (6)
Rubus	15 (11)
Veronica	15 (6)

Table 4.—Synopsis of the genera with 15 or more species listed in order of numerical importance.

forming an ever increasing percentage of the flora. It will be interesting to establish whether species continue to become naturalized at the same uniform rate that has prevailed during the previous hundred years.

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