SOME CHROMOSOME NUMBERS IN THE GESNERIACEAE

J. A. RATTER

Previous workers have reported chromosome numbers for only about 160 taxa of the *Gesneriaceae* so the family with over 1,200 described species remains a cytologically little explored field. The present study aims to investigate the cytology of the family with particular reference to the Old World species and is being made in conjunction with the taxonomic researches of Mr. B. L. Burtt. The following is an account of the results so far obtained.

MATERIALS AND METHODS

The plants used in this investigation are from the collection at the Royal Botanic Garden, Edinburgh. Many are of known wild origin and when this is the case they are marked with an asterisk in Table 1. Specimens of all collections investigated are in the herbarium of the Royal Botanic Garden, Edinburgh, under the numbers quoted in Table 1. All identifications have been made by Mr. B. L. Burtt.

Both squash preparations and sections were used at the beginning of the investigation but the former were found to be more satisfactory and sectioning was abandoned.

Flower buds to be used for pollen mother cell squashes were fixed in 3:1 ethanol/acetic acid and stored in fixative in a "deep-freeze" at –15°C. Root tips were taken from well-established plants and were usually given a four hour pretreatment in paradichlorobenzene before fixation. The fixation and storage of root tips to be used for squash preparations was as for flower buds. Squash preparations were stained with either iron acetocarmine or propionocarmine; the latter (prepared by dissolving 1 gm. of carmine in 100 ml. of warm 45% propionic acid) gave excellent differentiation of chromosomes and cytoplasm and has no tendency to precipitate. Propionocarmine has the disadvantage of rapid evaporation, and therefore the temporary preparations were ringed with rubber solution which makes an effective seal for a few hours and can be stripped off when the slide is to be made permanent. The freezing method of Schultz, MacDuffee and Anderson (1949) was used to remove the coverslip when making the squashes permanent and after dehydration the preparations were mounted in Canada Balsam.

Root tips for sectioning were fixed and stored in Navashin's fluid, embedded in 54°C. melting-point wax and sectioned at 10 μ. The sections were stained using Johanssen's Crystal Violet method.

A camera lucida was used to make the drawings which are reproduced at a magnification of x 1000.

TABLE I

	Herbarium Specimen Number	Meiotic Count (P.M. .) n	Mitotic Count (Root tip) 2n	Previous Counts n	Previous Counts 2n	Reference
SUBFAMILY GESNERIOIDEAE ENDL.						
TRIBE COLUMNEAE (BENTH.) K. FRITSCH						
Alloplectus domingensis Urban	C3772		18		18	Rogers, 1954.
Drymonia mollis Oersted	C3773		18			
Drymonia serrulata Mart.	C3774		18			
Drymonia sp. ML61 2000	C3775		18			
Episcia cupreata (Hook.) Hanst.	C2884		18		18	Fussell, 1958.
*Episcia sp. nov.? FP/60 3121	C3778	9				
Hypocyrta glabra Hook.	C3776		16			
Hypocyrta radicans Klotsch & Hanst.	C2913		16			
Hypocyrta selloana Klotsch & Hanst.	C3723		16			
Hypocyrta strigillosa Mart.	C3777		16			
Nematanthus longipes DC.	C2901		16		16	Fussell, 1958.
TRIBE MITRARIEAE B. L. BURTT						
Fieldia australis F. Muell.	C2672		±80			
Mitraria coccinea Cavan.	C2669		±74			
Sarmienta repens Ruiz & Pavon	C2670		±74			
TRIBE CORONANTHEREAE K. FRITSCH						
Rhabdothamnus solandri A. Cunn.	C2930		±74	37		Hair & Beuzenberg, 1960

*=Known wild origin. †=Mitotic count from anther tissue.

TABLE I (Contd.)

	Herbarium Specimen Number	Meiotic Count (P.M.C.) n	Mitotic Count (Root tip) 2n	Previous Counts n	Previous Counts 2n	Reference
TRIBE SINNINGIEAE K. FRITSCH						
Sinningia barbata (Nees & Mart.) Nichols	C1589	13			26	Fussell, 1958.
Sinningia hirsuta Nichols	C3763		26			
SUBFAMILY CYRTANDROIDEAE ENDL.						
TRIBE DIDYMOCARPEAE ENDL.						
Ramonda myconi (L.) Reichenbach cv. 'Wisley Rose'	C3764		48			
Ramonda nathaliae Pancić & Petrović	C3765		48	18		Glisic, 1924 (cited by Tischler, 1927).
*Briggsia aurantiaca B. L. Burtt	C3766		34			
Opithandra primuloides (Miq.) B. L. Burtt	C1591		34		34	Fussell, 1958.
*Chirita anachoreta Hance	C3718		18			
Chirita pumila D. Don	C3679	4				
*Chirita sericea Ridley			18			
Chirita trailliana Forrest & W. W. Sm.	C3768		18		18	Fussell, 1958.
Boea hygroscopica F. Muell.	C3769	8				
Streptocarpus caulescens Vatke	C1737	15		15		Lawrence et al, 1939.
*Streptocarpus gracilis B. L. Burtt	C3770	16		16		Lawrence et al, 1939.
*Saintpaulia grotei Engl.	C1731		30	15		Cox & Roberts, 1950.
					30	Wilson, 1951.
*Saintpaulia intermedia B. L. Burtt	C2007		30			
*Saintpaulia pendula B. L. Burtt	C1686		30			

TABLE I (Contd.)

	Herbarium Specimen Number	Meiotic Count (P.M.C.) n	Mitotic Count (Root tip) 2n	Previous Counts n	Previous Counts 2n	Reference
*Saintpaulia teitensis B. L. Burtt	C3771		30			
Petrocosmea kerrii Craib.	C1611		34		34	Fussell, 1958.
TRIBE TRICHOSPOREAE (G. DON) K. FRITSCH						
*Aeschynanthus ellipticus Diels.	C3742		64			
Aeschynanthus hosseussii Pellegrin	C1644		32			
Aeschynanthus longiflorus Blume	C2853		30		30	Fussell, 1958.
*Aeschynanthus nummularius G. Moore	C3781		64			
*Aeschynanthus parasiticus (Wall.) Spreng.	C3720		32			
Aeschynanthus parviflorus (D. Don) Spreng.	C2851		32			
Aeschynanthus pulcher (Blume) G. Don	C3780		64		60	Rogers, 1954.
					64	Eberle, 1956.
*Aeschynanthus sikkimensis Stapf.	C3779		32			
Agalmyla parasitica (Lam.) Kuntze	C2854		32	16		Fussell, 1958.
TRIBE CYRTANDREAE						
*Cyrtandra sp. (from Solomon Is.)	C3782		34			
*Rhynchotechum discolor (Maxim.) B. L. Burtt	C3711		20			
GENERA ANOMALA						
Rehmannia angulata (Oliver) Hemsley	C3783		28†	14		Suguira, 1936.
Titanotrichum oldhami (Hemsley) Solereder	C2900		40		±40	Fussell, 1958.

Results

Chromosome numbers are listed in Table 1 and illustrated in figures 1–3.

Chromosome size in the *Gesneriaceae* is generally small and in most taxa precludes any study of chromosome morphology. In this investigation the chromosome length observed at metaphase in root-tip cells fixed in 3:1 ethanol/acetic acid without any pretreatment ranged from less than 1 μ in *Rhabdothamnus solandri* A. Cunn. and the three members studied of the tribe *Mitrarieae* B. L. Burtt to 4·5 μ in *Hypocyrta glabra* Hook.

Discussion

The chromosome counts so far made in this investigation are too few to allow much discussion but a few interesting points emerge from them. For a fuller account of basic chromosome numbers in the family the reader is referred to Eberle (1956) and Fussell (1958).

The four species of *Hypocyrta* investigated all have a diploid number of $2n=16$ which contrasts with *Hypocyrta nummularia* Hanstein, the only other species of the genus for which information is available, in which Rogers (1954) records $2n=18$. A basic number of $x=8$ occurs in two other genera of the tribe *Columneae* (Benth.) K. Fritsch, *Codonanthe crassifolia* (Focke) Morton (Fussell, 1958) and *Nematanthus longipes* DC. (Fussell, 1958, and present investigation) whilst $x=9$ is known from *Alloplectus*, *Columnea*, *Drymonia* and *Episcia* (Rogers 1954, Fussell 1958, and present investigation). Both basic numbers recorded for the tribe therefore occur in *Hypocyrta*.

Previous chromosome counts have not been made in any members of the tribe *Mitrarieae*. *Mitraria coccinea* Cavan. and *Sarmienta repens* Ruiz. and Pavon have the same or very close diploid numbers ($2n=\pm74$) whilst *Fieldia australis* F. Muell. has $2n=\pm80$ and all three of these species have minute chromosomes. It is interesting to note that these species are all high polyploids.

Rhabdothamnus solandri (tribe *Coronantherae* K. Fritsch) which is the only New Zealand representative of the family is also a high polyploid. In this investigation $2n=\pm74$ was counted in root tip squashes whilst Hair and Beuzenberg (1960) have found $n=37$ in sporocytes.

The lowest chromosome number yet recorded in the *Gesneriaceae* occurs in *Chirita pumila* D. Don with $2n=8$. This differs from the other species of *Chirita* investigated which have a basic number $x=9$ and it will be interesting to see if $x=4$ is discovered in other species in the future.

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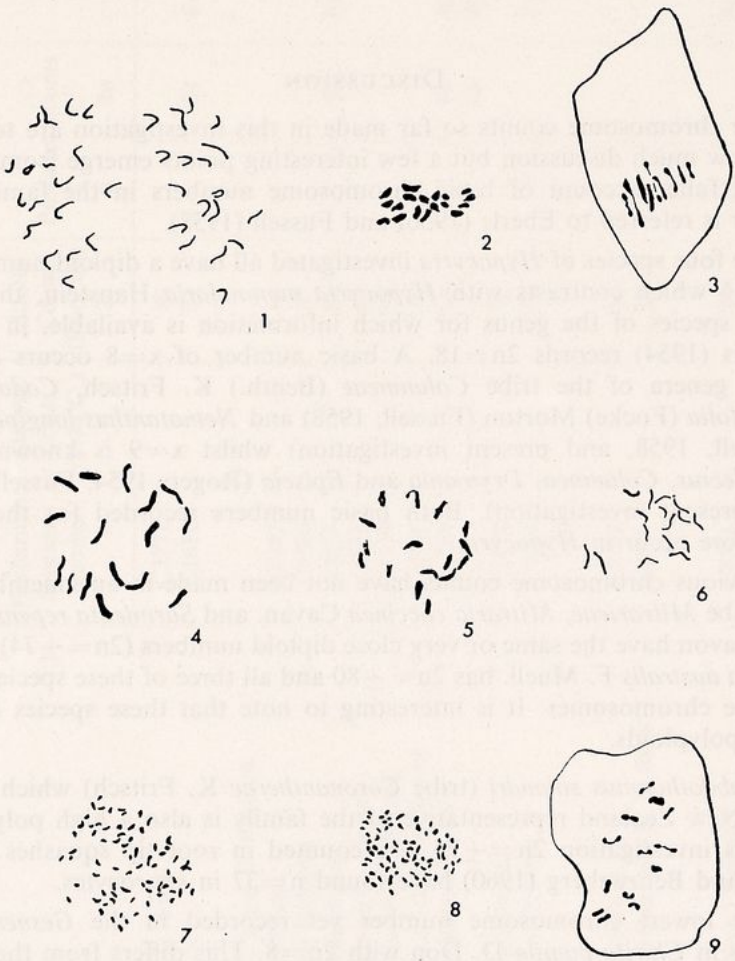

FIG. 1. Camera lucida drawings of squash preparations × 1000.
1. *Alloplectus domingenis*, 2n=18, anaphase. 2. *Drymonia serrulata*, 2n=18. 3. *Episcia* sp. nov.?, FP/60 3121, P.M.C., 9 bivalents. 4. *Hypocyrta glabra*, 2n=16. 5. *Hypocyrta strigillosa*, 2n=16. 6. *Nematanthus longpipes*, 2n=16. 7. *Mitraria coccinea*, 2n=74. 8. *Rhabdothamnus solandri*, 2n=74. 9. *Sinningia hirsuta*, P.M.C., 13 bivalents. (Unless otherwise stated drawings in Figs. 1, 2, and 3 are of root-tip mitosis.) (P.M.C.=pollen mother cell).

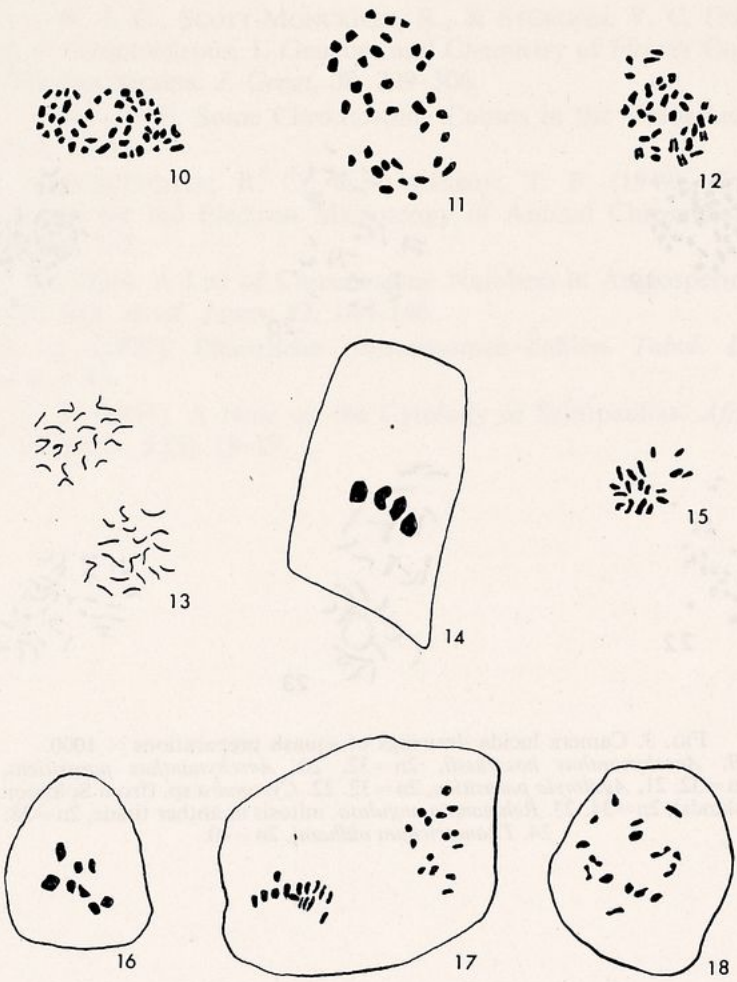

FIG. 2. Camera lucida drawings of squash preparations × 1000. 10. *Ramonda myconi*, 2n=48. 11. *Briggsia aurantiaca*, 2n=34. 12. *Opithandra primuloides*, 2n=34. 13. *Chirita anachoreta*, 2n=18, *anaphase*, 14. *Chirita pumila*, P.M.C., 4 bivalents. 15. *Chirita trailliana*, 2n=18. 16. *Boea hygroscopica*, P.M.C., 8 bivalents. 17. *Streptocarpus caulescens*, P.M.C., n=15. 18. *Streptocarpus gracilis*, P.M.C., 16 bivalents.

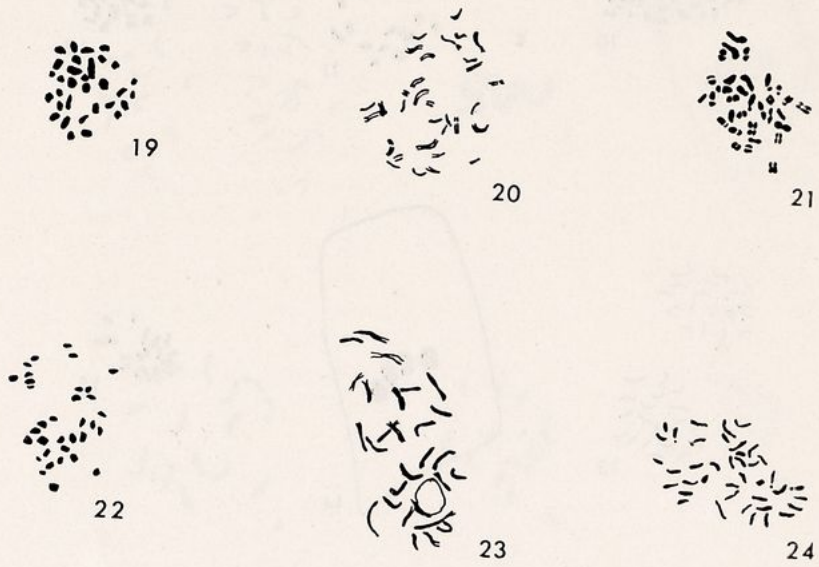

FIG. 3. Camera lucida drawings of squash preparations × 1000. 19. *Aeschynanthus hosseussii*, 2n=32. 20. *Aeschynanthus parasiticus*, 2n=32. 21. *Agalmyla parasitica*, 2n=32. 22. *Cyrtandra* sp. (from Solomon Islands), 2n=34. 23. *Rehmannia angulata*, mitosis in anther tissue, 2n=28. 24. *Titanotrichum oldhami*, 2n=40.

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