

STUDIES IN THE FLORA OF MACARONESIA: SOME CHROMOSOME NUMBERS OF FLOWERING PLANTS

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Se han determinado el número de cromosomas en 18 especies de fanerogamas de la Macaronesia, de los cuales 12 eran desconocidos. El número de cromosomas del género endémico *Musschia* (Campanulaceae) de Madeira, es comunicado por primera vez, y también se incluyen los primeros cálculos para las plantas de las Islas Salvajes.

Se ha notado por vez primera poliploidia intra-específica en *Adenocarpus foliolosus*. (Leguminosae).

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INTRODUCTION

Though there have recently been enormous advances in our knowledge of the karyology of the Macaronesian flora, especially the endemic flora of the Canary Islands (Larsen 1960, 1962, 1963; Borgen 1969, 1970, 1974, 1975; Bramwell et al. 1971, 1972, etc...), there still remain considerable numbers of species whose chromosome numbers have yet to be determined.

The results obtained so far also show that there is a very important need for chromosomal information at the local population level especially in view of the variation in numbers found for individual species by Borgen (1969, 1974), Bramwell et al. (1972) and particularly Gagnieu, Linder & Voggenreiter (1973), indicating the possible occurrence of aneuploidy and dysploidy in some groups.

Our understanding of the special evolutionary situations encountered in island floras where vicariance, adaptive radiation and active epibionty have all played a major role in the evolution of local endemic species (Bramwell, 1972, 1975; Humphries

1975), can only be improved and the many pressing taxonomic problems solved using modern biosystematic and cytogenetic techniques.

The present paper is a further contribution to the knowledge of the cytology of the Macaronesian flora and includes the first records for plants from the Salvage Islands.

MATERIALS & METHODS

Chromosome counts were made from material of known wild origin cultivated in the Jardín Botánico Viera y Clavijo or from material collected directly in the field.

Somatic counts were made from root - tips which were pretreated with a saturated solution of paradichlorobenzene for two hours, fixed in acetic alcohol (1 : 3), hydrolyzed in normal (1 N) hydrochloric acid for 10 minutes at 60°C and squashed in acetic - orcein.

Meiotic counts were made from pollen - mother cells from buds fixed in acetic alcohol (1 : 3), hydrolysed for 3 - 10 minutes in a 1 : 1 mixture of concentrated acetic and hydrochloric acid and squashed in acetic - orcein. Drawings were made with the aid of a Reichert drawing apparatus.

OBSERVATIONS AND DISCUSSION

Dicotyledonae

CAMPANULACEAE

Musschia aurea (L.fil.) DC n = 16

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Madeira, Ponta Delgada, coll. E. R. Sventenius.

The genus *Musschia* is endemic to the island of Madeira where two species occur. *M. aurea* is a chasmophyte of the south coast and central (Curral) region. The chromosome number was previously unknown.

The base number $x=8$ occurs sporadically in other genera of the family Campanulaceae (*Campanula*, *Codonopsis*, *Edraianthus*, etc...).

COMPOSITAE

Tribus Anthemideae

Argyranthemum canariense (Sch. Bip.) Humphries n = 9

Material collected and fixed in the field, origin Gran Canaria near Los Pechos.

A very common and variable species, *A. canariense* occurs on Gran Canaria, Tenerife and Hierro. The Gran Canaria populations are extremely polymorphic and show clinal variation from broad - leaved forms on the north side of the islands to very narrow - leaved forms in the south. The material studied came from intermediate populations from the high, central region of the island.

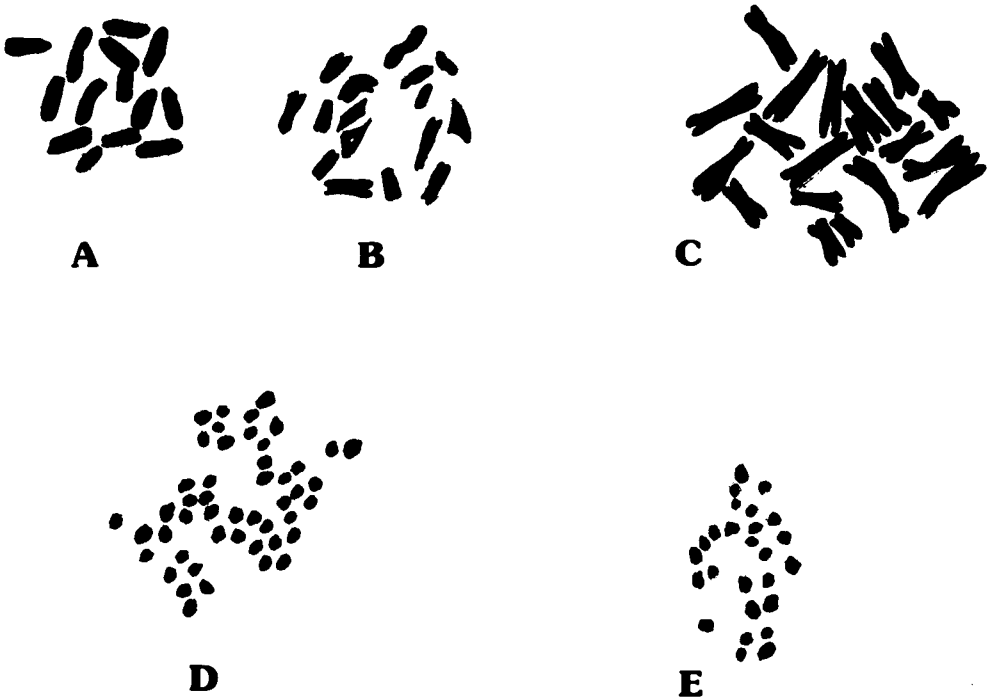


FIG. 1. A. *Vicia filicaulis* $2n=14$; B. *Musschia aurea* $n=16$; C. *Euphorbia lambii* $2n=20$; D. *Teline linifolia* $2n=48$; E. *Adenocarpus foliolosus* $2n=26$.

Argyranthemum sventenii Humphries & Aldridge $n=9$

Material cultivated at Jardín Botánico «Viera y Clavijo», origin El Hierro, Punta de Restinga, coll. Bramwell & Humphries.

This is the first report of the chromosome number of this species which is a recently discovered endemic of the island of Hierro. Its nearest relatives appear to be *A. haouarytheum* of La Palma and *A. callichrysum* of Gomera. The base number $x=9$ is found throughout the genus *Argyranthemum* and all the known species of this Macaronesian genus are diploid (Humphries, 1975).

Gonospermum canariense Less. $n=9$

Material cultivated in the Jardín Botánico «Viera y Clavijo», origin La Palma, Roque del Faro, coll. E. R. Sventenius.

Gonospermum canariense is found only on the island of La Palma where it is locally abundant on the northern slopes. Its chromosome number is here reported for the first time.

Borgen (1974) reports $2n=18$ for all the other known species of the genus except the closely related *G. elegans* where she found $2n=18+2B$. The genus *Gonospermum* is endemic to the Canary Islands and is diploid.

Tribus Cichorieae

Crepis canariensis (Sch. Bip.) Babcock

2n=8

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Fuerteventura, Pico de la Zarza, coll. Bramwell & Humphries.

Previous counts of the chromosome number of this species have all been determined from material originating from the Famara region of Lanzarote (Backcock & Jenkins, 1943; Borgen, 1970; Bramwell et al., 1971). The present report is the first for the species from the island of Fuerteventura.

Reichardia intermedia (Sch. Bip.) Hayek

n=8

Material cultivated at Jardín Botánico «Viera y Clavijo», origin El Hierro, Frontera, coll. Bramwell & Humphries.

The chromosome number of this species is reported for the first time from the Canary Islands. The genus *Reichardia* is a taxonomically difficult one in Macaronesia and is being further studied. The material investigated is provisionally placed in the Mediterranean species *R. intermedia* until further data are available.

Tolpis lagopoda Chr. Sm.

n=9

Material fixed in the field, origin Gran Canaria, Rincón de Tenteniguada, coll. J. Pérez de Paz.

This count confirms a previous report by Larsen (1963) for material originating from Tenerife.

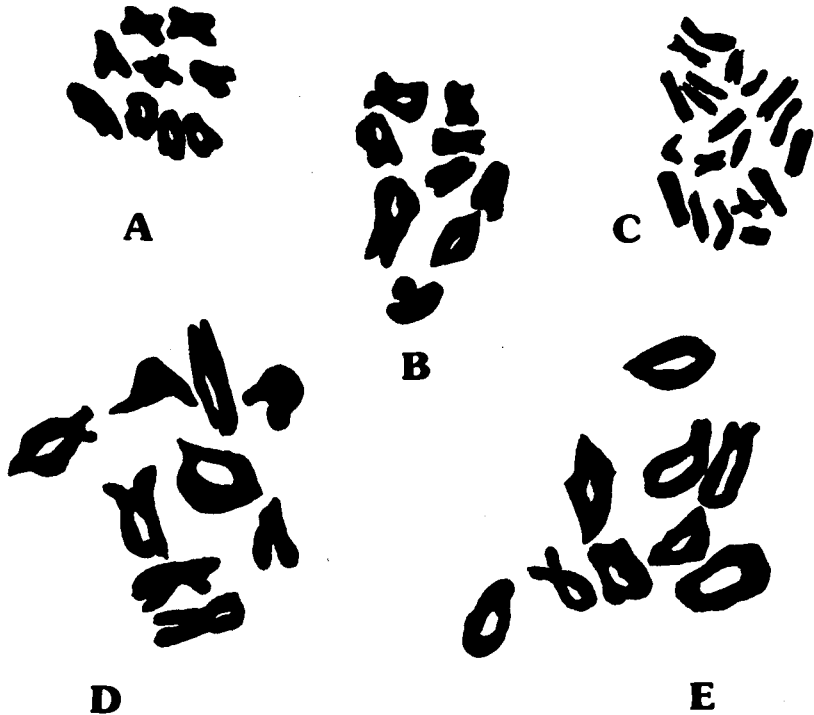


FIG. 2. A. *Argyranthemum canariense* n=9; B. *Argyranthemum canariense* n=9; C. *Carlina canariensis* 2n=20; D. *Argyranthemum sventenii* n=9; E. *Argyranthemum sventenii* n=9.

Tolpis proustii Pitard n = 9

Material cultivated at Jardín Botánico «Viera y Clavijo», origin El Hierro, Frontera, coll. Bramwell & Humphries.

A distinctive member of the *T. laciniata* complex, this species is found only on Hierro and Gomera. Its chromosome number is reported for the first time.

The genus *Tolpis* is a Mediterranean/East African one which has a major centre of evolution in Macaronesia. A number of species including *T. barbata* from the Mediterranean region and *T. succulenta* from Madeira were studied by Stebbins et al. (1953) and all have the same diploid somatic number $2n = 18$. The small East African group of *Tolpis* species is not known cytologically at the present time.

Tribus Cynareae

Carlina canariensis Pitard 2n = 20

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Gran Canaria, coll. E. R. Sventenius.

This is apparently the first report of the chromosome number of an endemic Canarian species of *Carlina*. *C. canariensis* is confined to the island of Gran Canaria.

EUPHORBIACEAE

Euphorbia lambii Svent. 2n = 20

Material cultivated at Jardín Botánico «Viera y Clavijo», origin La Gomera, Chorros de Epina, coll. E. R. Sventenius.

The chromosome number of this rare species of the section *Pachycladae* is reported for the first time. Other Macaronesian endemic species have the same diploid somatic number (Michaelis, 1964; Bramwell et al., 1972).

E. lambii, discovered by E. R. Sventenius, is found only in forest areas of the island of La Gomera.

LEGUMINOSAE

Adenocarpus foliolosus (Ait.) Webb & Berth. 2n = 26

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Gran Canaria, Cruz de Tejada, coll. E. R. Sventenius.

Previous reports of the chromosome number of this species by Sañudo (1973), give $2n = 52$. This appears to be a clear case of intra-specific polyploidy and the study of populations of *Adenocarpus* from the different islands of the Canarian archipelago is now in progress.

Teline linifolia (L.) Webb & Berth. 2n = 48

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Gran Canaria, Camino Pinar de Sanson to San Pedro, coll. E. R. Sventenius.

The plants studied do not fit into any of the infra-specific taxa described in the recent monograph of the genus by Gibbs & Dingwall (1971). The chromosome number is the same as that reported by Borgen (1974) for other species of *Teline*.

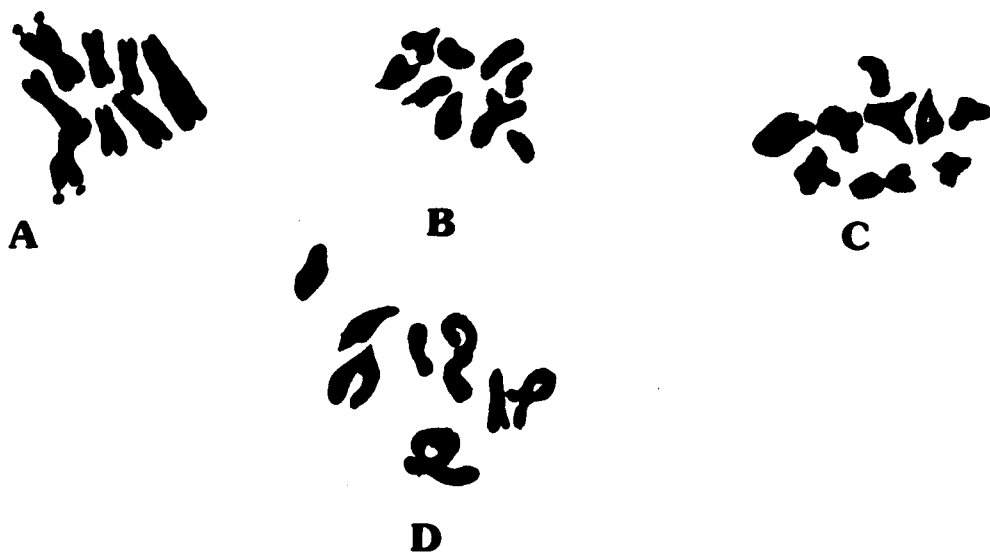


FIG. 3. A *Crepis canariensis* $2n=8$; B. *Tolpis proustii* $n=9$; C. *Tolpis lagopoda* $n=9$; D. *Reichardia intermedia* $n=8$.

Vicia filicaulis Webb & Berth.

$2n = 14$

Seed material collected at Barranco de Ayaguales, Gran Canaria, by E. R. Sventenius.

The chromosome number $2n = 14$ has been reported for other Canarian *Vicia* species (Larsen, 1960; Bramwell et al., 1972; Van Loon, 1974).

Monocolyledonae

LILIACEAE

Tribus Asparageae

Asparagus scoparius Lowe

$n = 10$

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Gran Canaria, Barranco de Guinguada, coll. E. R. Sventenius.

Borgen (1969) also reports $2n = 20$ for this species.

Asparagus stipularis Forsk. (*A. horridus* L. fil.)

$2n = 20$

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Fuerteventura, coll. E. R. Sventenius.

The same chromosome number for this Mediterranean/N. African species has previously been reported by Reese (1957) from the Saharan region and Borgen (1969) from the Canary Islands.

Asparagus nesiotus Svent.

$n = 30$

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Salvage Islands, coll. E. R. Sventenius.

This species, endemic to the island of Gran Piton in the Salvage Islands, and first described by Sventenius (1968), appears to be hexaploid. The chromosome number was previously unknown.



FIG. 4. A. *Semele androgyna* $2n=40$; B. *Asparagus scoparius* $n=10$; C. *Asparagus stipularis* $2n=20$.

Tribus Scilleae

Scilla maderensis Mnzes. var. *melliodora* Svent. $2n=20$

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Salvage Islands, coll. E. R. Sventenius.

The type variety of *Scilla maderensis* is from the Madeira Archipelago but the variety *melliodora*, first described by Sventenius (1968), is endemic to the Salvage Islands situated between Madeira and the Canary Islands. Its chromosome number has not previously been reported.

Tribus Rusceae

Semele androgyna Kunth. ssp. *androgyna* $2n=40$

Material cultivated at Jardín Botánico «Viera y Clavijo», origin Tenerife, Vueltas de Taganana, coll. J. Pérez de Paz.

The same number is reported by Borgen (1969) for ssp. *gayae* from Gran Canaria. The ssp. *androgyna* which has the flowers usually, but not always, at the margin of the leaf is found in the Western Canaries, Tenerife, La Palma, Gomera and Hierro.

SUMMARY

Chromosome numbers have been counted for 18 endemic Macaronesian species, 12 of them for the first time.

The chromosome number of the Macaronesian endemic genus *Musschia* (Campanulaceae) was previously unknown as was the number for *Carlina* subgenus *Carlowitzia* (Compositae) which is also endemic.

In the case of *Adenocarpus foliolosus* intra-specific polyploidy has been detected on Gran Canaria and studies of populations on other islands are in progress.

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