Cytological Studies in the Iridaceae

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The Iridaceae are a widespread family of the warm and temperate regions of the world. There are approximately sixty genera and one thousand species according to Swingle (1946), many of which are or have been cultivated. Despite their cosmopolitan nature, great numbers and extensive use as ornamentals, apparently less than four hundred species have been investigated cytologically. Most of those that have been analyzed are in the large, cultivated genera such as *Crocus*, *Gladiolus* and *Iris*. The present work deals with several South African genera and species apparently unreported hitherto.

Material and methods

All chromosome counts reported in the present work were obtained from the root tips of germinating seeds. The seeds were supplied by the National Botanic Gardens, Kirstenbosch, Newlands, Cape Province, South Africa. This organization also furnished the generic and specific names in each instance.

Before germination, the seeds were soaked, sterilized with mercuric chloride, washed in sterile water and plated out in sterile petri dishes. After some difficulty with germination sufficient root tips were obtained for cytological purposes. The material was fixed in Randolph's modified Navashin fluid for 20-24 hours. Following this treatment the material was embedded in paraffin and cut in serial sections at a thickness of 14 microns. The sections were stained with methyl violet-erythrosin following the schedule of Johansen (1940). These procedures give excellent fixation and very clearly stained chromosomes. Camera lucida drawings were made at a magnification of $1800\times$.

Results

Babiana erectifolia $2n=14$ (Figs. 1, 2). The fourteen chromosomes of this species may be divided into three groups on the basis of size. Four are quite long and stand out clearly because of their relatively great size. The ten remaining chromosomes may be further divided into six short ones and four slightly longer ones. Size differences in the group of ten chromosomes are not great.

Babiana tubiflora $2n=14$ (Fig. 3). There is a readily apparent simi-

larity between the chromosomes in this species and those of *B. erectifolia*. Four are very long. There are six short ones and four slightly longer chromosomes.

Geissorhiza secunda $2n=26$ (Fig. 8). The twenty six chromosomes are rather uniform in size and shape. It has proven impossible to separate them into groups on the basis of size.

Romulea latifolia $2n=27$ (Fig. 7). The chromosomes may be divided into three groups. There are six long, six short and fifteen intermediate in size. The difference in length is not as marked as it is in *Babiana*. One chromosome in the group of six short ones is quite small and may be fragmentary in nature. It was apparently not cut in the preparation of the sections.

Figs 1-8. 1, *Babiana erectifolia* $2n=14$. 2, *Babiana erectifolia* $2n=14$. 3, *Babiana tubiflora* $2n=14$. 4, *Romulea rosea* $2n=18$. 5, *Romulea rosea* $2n=18$. 6, *Romulea ochroleuca* $2n=18$. 7, *Romulea latifolia* $2n=27$. 8, *Geissorhiza secunda* $2n=26$.

Romulea ochroleuca $2n=18$ (Fig. 6). There are four long, two short and twelve intermediate chromosomes. The size differences are not very great in any instance.

Romulea rosea $2n=18$ (Figs 4, 5). Of the eighteen chromosomes in this species, two are long, 10 are slightly shorter and the remaining six are short and plump. Size differences are readily apparent only between the largest and smallest.

Romulea bulbocodioides $2n=c. 18$. The material available for this species has proven to be unsatisfactory for accurate analysis. There are apparently eighteen chromosomes but the exact number and the size groups cannot be distinguished with certainty.

Discussion

There can be little doubt, as far as the material herein reported is concerned, that the $2n$ number of both *Babiana erectifolia* and *B. tubiflora*

is 14. The plates are quite clear and the similarity of the chromosomes is marked. On the basis of this material, the basic number for the genus is seven. However, Brittingham (1934) has reported for *Babiana stricta* that $2n=12$. He states that Yamamoto also reports $2n=12$. In describing the chromosomes the former author states that "four are very long, four about a third as long, and four are quite short and plump". This agrees very well with the size relationships recorded for the genus in the present paper except that there are two short chromosomes in addition noted here.

On the basis of the three species now reported it is not possible to state definitely the basic number of the genus *Babiana*. The tentative number may be given as 6 or 7. It appears too early to attempt this when one considers that Thiselton-Dyer (1897) lists twenty six species in the genus in South Africa. It is quite possible that more than one basic number may be found as was the case in *Crocus* and *Iris*.

The chromosome number reported for *Geissorhiza secunda*, where $2n$ has been found to be twenty six, is apparently the first report for this genus. On this flimsy evidence the basic number indicated is thirteen. Thiselton-Dyer reports twenty nine species in South Africa.

In the genus *Romulea* five species now have been reported, including one with the chromosome number listed as tentatively established. *Romulea ochroleuca* and *R. rosea* have been found to have a $2n$ number of eighteen in the present work. *R. bulbocodioides* is tentatively reported to have a $2n$ number of about eighteen. From this evidence the basic number for the genus is apparently nine. *Romulea latifolia* is reported in the present paper to have a $2n$ number of 27. This species appears to be triploid in nature. The single small chromosome or, possibly, fragment needs further study before its role can be established.

There is only one previous cytological report in the genus *Romulea* which has come to the writer's attention. Matsuura and Suto in Darlington and Janaki-Ammal (1945) have reported the $2n$ number of *Romulea parviflora* to be about sixty. This number is assigned as an approximation by the researchers. Darlington assigns a tentative basic number of fifteen to the genus on the basis of this work. It seems probable in the light of the evidence presented here that *R. parviflora* is hexaploid in nature with $6x=54$ or heptaploid with $7x=63$. This is assuming that nine is the basic number and that the tentative sixty allows for so great a departure. The possibility that *Romulea* is a polybasic genus cannot be ruled out on the basis of the present meager evidence. Thiselton-Dyer lists about fifty species in Africa and Europe.

Summary

Chromosome counts and descriptions are given for some species of the genera *Babiana*, *Geissorhiza* and *Romulea* in the Iridaceae. On the basis

of three species of *Babiana* reported here and elsewhere, the basic number for the genus may be tentatively set at 6 or 7. From five species of *Romulea* so far reported, the basic number of the genus may be set at 9. A possible triploid species is reported. One species in the genus *Geissorhiza* reported here has a basic number of 13. Many other species of these genera and others in the Iridaceae remain to be investigated cytologically.

Literature cited

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