spontaneous self-fertility was restored; in fact, in this respect the hybrids surpassed the commercial sample.

In the field, flowers may be pollinated by bees (similar to treatment *c*) or pods may be formed from unvisited flowers (as in treatment *a*). The results above suggest that although all types will be equally fertile after bee pollination, those plants arising from cross-fertilization in the previous year will set more seed from unvisited flowers than others in the population. As seed set in the absence of bee visitation must be entirely self-fertilized, this will mean that cross-bred plants will bear a higher proportion of selfed seed than plants derived from one or more generations of self-fertilization.

This unusual breeding behaviour has several important consequences:

(1) The ability of some plants to set seed on unvisited flowers ensures maintenance of the population even in years of low bee activity.

(2) The distribution of this self-set seed mainly on the more heterozygous members of the population restricts the rate of fixation of genetic variability under these conditions.

(3) The undiminished fertility of the inbred plants when pollinated by bees promotes rapid remixing of genetic material under favourable conditions.

The overall effect will be to maintain the population in a stable state of intermediate heterozygosity, in spite of disturbing factors such as seasonal variation in the level of bee activity, and the selective elimination of inbred plants under adverse environmental conditions.

The regulating mechanism described is of interest as it represents a means of maintaining a moderate degree of heterozygosity without complete dependence on insect pollinators.

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[1] Fyfe, J. L., and Bailey, N. T. J., *J. Agric. Sci.*, **41**, 371 (1951). Fyfe, J. L., *J. Agric. Sci.*, **45**, 141 (1954).

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## Cytogenetics of South American Orthoptera

This is a preliminary report of an investigation in progress dealing with cytogenetics of orthopteran insects of the southern hemisphere belonging to the family Acrididae and new to cytology. In this report the number of chromosomes is established, taking specially into account the existence of metacentric chromosomes. We have studied thirty-two species of four subfamilies, as shown in Table 1.

In *Aleuas brachypterus*, *Diponthus maculiferus*, *Ommaexecha servillei* and *Dichroplus pratensis*, the reduction of chromosome numbers has taken place by centric fusion of two acrocentric (rod-shaped) autosomes, whereas in *Tropinotus laevipes*, *Atrachalacris unicolor*, *Dichroplus bergi* and some forms of *D. pratensis* this evolutionary change took place between autosomes and sex chromosomes, producing in this case an $XY$–$XX$ sex-determining mechanism by formation of a neo-$Y$, neo-$X$ system in the male[1].

Particularly interesting is the genus *Dichroplus*, which shows interspecific variation in the number of chromosomes. As Table 1 shows, there is a numerical series ranging from the ancestral karyotype $2n$ (♂) $= 23$ to the surprising number of $2n$ (♂) $= 8$. Some forms of *D. pratensis* give 18 diploid chromosomes, while the number of major chromosome arms is not reduced, remaining 23. Other forms of this genus, on the contrary, have also 18, but the number of arms is reduced to 19, which means that four chromosomes have probably been lost.

Table 1

| Species | Diploid number $2n$ (♂) | No. of metacentrics | $X$-chromosome | No. of chromosome arms |
|---|---|---|---|---|
| Subfam. Acridinae | | | | |
| *Dichroatettix bohlsi* (Giglio-Tos) Rehn | 23 | — | free | 23 |
| *Hyalopterix rufipennis* Charpentier | 23 | — | free | 23 |
| *Staurorhectus longicornis* G. Tos | 23 | — | free | 23 |
| *Scyllinops bruneri* (Rehn) | 23 | — | free | 23 |
| *Scyllinops pallida* (Bruner) | 23 | — | free | 23 |
| *Rhammatocerus pictus* (Bruner) | 23 | — | free | 23 |
| *Amblytropidia australis* Bruner | 23 | — | free | 23 |
| *Parorphula graminea* Bruner | 23 | — | free | 23 |
| *Orphulella punctata* (De Geer) | 23 | — | free | 23 |
| *Dichromorpha australis* Bruner | 23 | — | free | 23 |
| *Sinipta dalmani* (Stal) | 23 | — | free | 23 |
| *Laplatacris dispar* Rehn | 23 | — | free | 23 |
| *Metaleptea brevicornis adspersa* (Blanch.) | 23 | — | free | 23 |
| *Allotruxalis strigata* (Bruner) | 23 | — | free | 23 |
| Subfam. Cyrtacanthacridinae | | | | |
| *Neopedies brunneri* (Giglio-Tos) Heb. | 23 | — | free | 23 |
| *Scotussa lemniscata* (Stal) Lieb. | 23 | — | free | 23 |
| *Aleuas brachypterus* Bruner | 19 | 4 | free | 23 |
| *Dichroplus punctulatus* (Thumb) | 23 | — | free | 23 |
| *Dichroplus conspersus* Bruner | 23 | — | free | 23 |
| *Dichroplus elongatus* Giglio-Tos | 23 | — | free | 23 |
| *Dichroplus bergi* (Stal) | 22 | 1 | fused | 23 |
| *Dichroplus pratensis* (Bruner) | 18 | 1 | free | 19 |
| *Dichroplus pratensis* ? | 18 | 5 | fused | 23 |
| *Dichroplus* sp. (brachypteran form) | 8 | 4 | $X$–$Y$ | 12 |
| Subfam. Romaleinae | | | | |
| *Xyleus fuscipennis* (Bruner) Gistel. | 23 | — | free | 23 |
| *Elaeochlora viridicata* (Serville) Stal | 23 | — | free | 23 |
| *Chromacris speciosa* (Thunberg) | 23 | — | free | 23 |
| *Zoniopoda tarsata cruentata* (Blanch) Rehn | 23 | — | free | 23 |
| *Tropinotus laevipes* (Stal) Gistel. | 22 | 1 | fused | 23 |
| *Diponthus maculiferus* (Walker) Stal | 21 | 2 | free | 23 |
| *Atrachalacris unicolor* | 22 | 1 | fused | 23 |
| Subfam. Ommexechinae | | | | |
| *Ommaexecha servillei* Blanchard | 21 | 2 | free | 23 |

The rather striking extreme case is the brachypteran form of *Dichroplus* that shows eight diploid elements, meaning that eleven chromosomes had been lost of the original complex. In these individuals the sex chromosome does not behave as an odd element, since it is associated with a small chromosome so as to form a heterozygous acrocentric bivalent, segregating in the first meiotic division as an $X$–$Y$ complex.

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