CHROMOSOMAL INTERCHANGE STOCKS IN *SESBANIA AEGYPTIACA* (POIR.) PERS.

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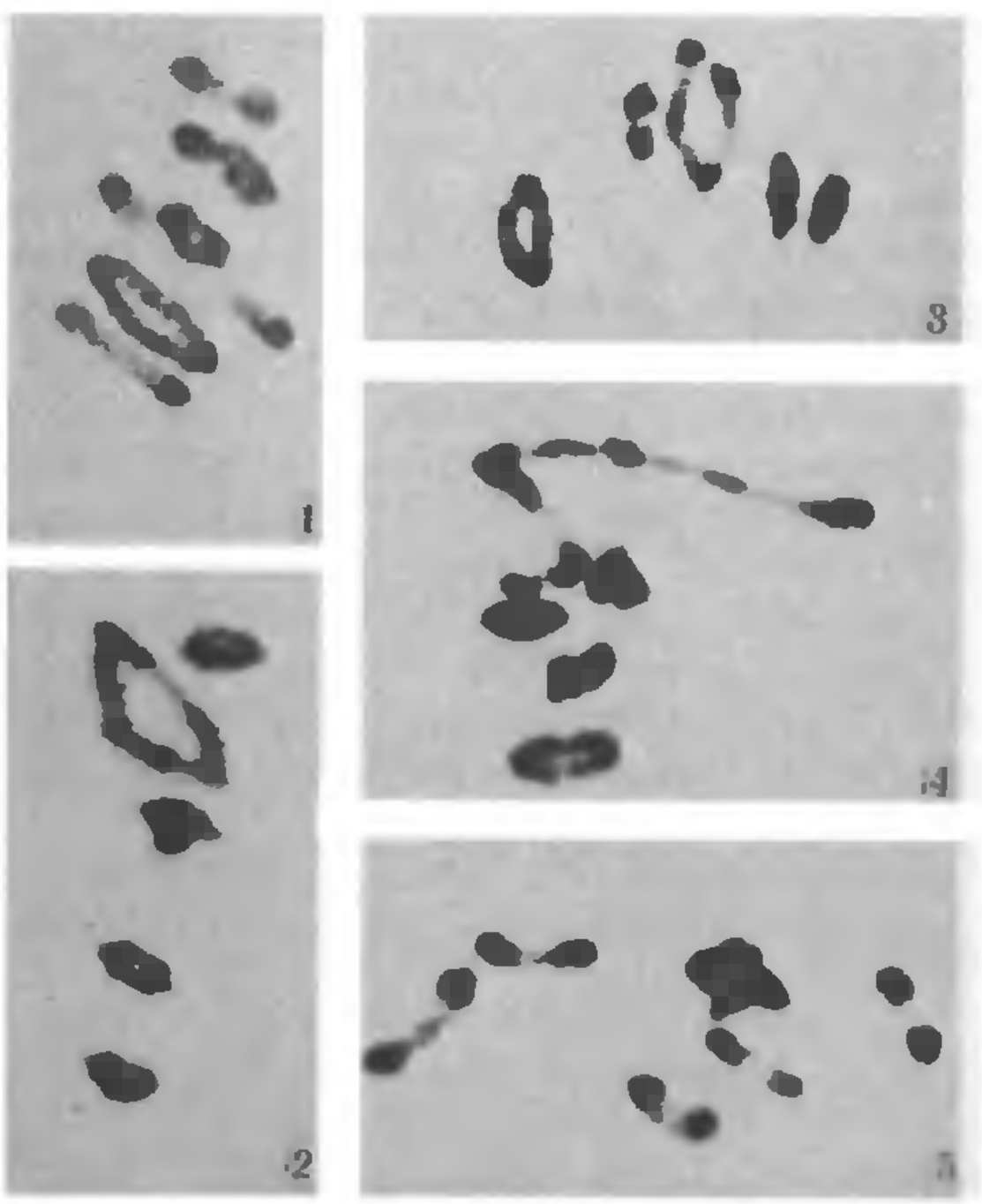
RECIPROCAL chromosomal interchanges have been effectively used in various genetic studies like determination of gene order and linkages on individual chromosomes, and breaking up of chromosomes to reallocate chromosome segments found in areas where recombination is very low[1]. A few interchange lines have been isolated in *Sesbania aegyptiaca* (Poir.) Pers. and are being maintained for genetical studies at this institute. The present studies were taken up to identify various chromosome pairs involved in these interchanges, based on the marker bivalents of the homozygous diploid.

In an induced allopolyploidisation programme in the genus *Sesbania*, the seeds of *S. aegyptiaca* were subjected to gamma irradiation with doses of 10, 20, 30, 35, 40 and 45 Krad at BARC, Bombay. The M_1 plants were scored for pollen stainability and plants with partially stainable pollen were subjected to detailed meiotic analysis. Three interchange heterozygotes, one each from 35, 40 and 45 Krad treatments, were identified and isolated. Each of these stocks exhibited a multiple chromosomal association of four chromosomes, in varying frequencies (table 1) indicating, thereby, a reciprocal chromosomal interchange involving two non-homologous pairs of chromosomes in each case.

S. aegyptiaca is a diploid species with twelve chromosomes in its complement based on $x = 6$. Karyotypic analysis from mitotic metaphase plate from root tip squashes show that chromosomes can be grouped into 6 pairs. There is a regular gradation of absolute size of chromosomes from largest to the smallest pair, the largest pair of chromosomes being twice as big as the smallest pair. The largest and the smallest bivalents can easily be identified at meiotic metaphase-I (figure 1). Keeping this marker character in view, it has been possible to identify atleast one pair of chromosomes involved in reciprocal translocation in each of these cases. The largest bivalent of the complement was found to be involved in the interchange stock, 35-1 (figure 2). However, this bivalent was not involved in the other two interchange stocks 40-4 and 45-8 (figures 3–4). Furthermore, in 40-4, the smallest bivalent is not involved, while the same appears to be involved in 45-8. Thus it is apparent that in all the three stocks, different pairs of chromosomes are involved. The interchanged segments appear to be largest in 35-1 and shortest in 45-8 as indicated by the frequency and type of interchange multiples (table 1) together with formation of chiasmata in the interstitial segment. Formation of interchange multiple in 100% cells in 35-1, out of which 81.25% exhibited ring multiple configuration, indicated that interchanged

Table 1 *Frequency of interchange multiples at metaphase-I in various translocation stocks*

Chromosomal associations	Number of cells		
	35-1	40-4	45-8
6 II	—	15 (30%)	6 (12%)
○4 + 4 II	52 (81.25%)	29 (58%)	—
C_4 + 4 II	12 (18.75%)	6 (12%)	11 (22%)
C_3 + 4 II + 1 I	—	—	5 (10%)
1 IV + 4 II	—	—	16 (32%)
1 III + 4 II + 1 I	—	—	12 (24%)



Figures 1–5. 1. Metaphase I showing six normal bivalents. **2.** ○4 involving the largest pair + 4 II in 35-1. **3.** ○4 + 4 II (largest and smallest pairs not involved) in 40-4. **4.** C_4 involving smallest pair + 4 II in 45-8. **5.** 1 IV resulting from interstitial chiasma formation 4 II in 45-8.

segments in this line were large enough to allow chiasmata formation in all the pairing segments which, in turn, was manifested in multiple configuration. In 40-4 multiples were realized in 70% cells, out of which 58% cells exhibited ring multivalents and 12% had chain configuration. Rest of the 30% cells exhibited regular bivalent formation. The absence of ring multivalents in 45-8 indicated that a small chromosomal segment was involved in interchange. The absence of rings and predominance of chain multiples could be due to small pairing segments where chiasma formation does not take place between all pairing segments (table 1). Furthermore, existence of smaller pairing segments results in larger interstitial segments, resulting in the formation of interstitial chiasmata (figure 5). This aspect is being confirmed by karyotypic analysis which is likely to throw some more light on actual point of interchange.

As is evident from the above discussion, the chromosome pairs involved in the three interchange stocks are different. Now it will be possible to synthesize translocation heterozygotes involving more than two pairs of chromosomes by intermating these stocks and screening the partially fertile plants in the resulting progenies. Larger chromosome rings have been built in *Campanula persicifolia* by crossing different interchange stocks and reselecting plants with larger rings for further crossing[2]. An interchange stock in annual chrysanthemum in which 12 out of 18 chromosomes of the complement were involved was synthesized following a programme of recurrent irradiation and planned hybridization[3]. Recurrent irradiation and hybridization has also been used to synthesize interchange stocks of pearl millet which involves all the 14 chromosomes of the complement[4]. Thus raising interchange stocks with different breakage points and involving different chromosomes, could eventually be used in allopolyploidisation programme and/or genetical studies in *sesbania aegyptiaca*.

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POLYGAMY IN A CARTON NEST BUILDING TERMITE, *MICROCEROTERMES CHAMPIONI* (ISOPTERA; TERMITIDAE; AMITERMITINAE)

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DURING the course of study on population structure of a carton nest building termite *viz Microcerotermes championi* (Snyder), an interesting phenomenon of polygamy was observed.

The observations were made in a tropical sal forest situated at an altitude of 329 m above sea level in the foothills of Kumaun Himalaya, at a place called Chorgalia in Nainital district. The density of carton nest on this site was 44 nests/ha. A total of 17 nests were sacrificed for the study of population during November 1981 to October 1982. In one of these nests studied in October 1982, we came across a royal chamber having one king and six queens (figure 1).

Normal nests (with one king and one queen) did not differ from this particular nest (with one king and six queens) in volume and weight (table 1). The diameter of the royal chamber was similar in both cases. However, against an average of 111.5 mg body weight of a normal queen, the six queens in the polygamous nest had 24, 23, 25, 25, 27 and 24 mg weight per queen. The length of the polygamous queens was also smaller as compared to the normal queen (table 1).

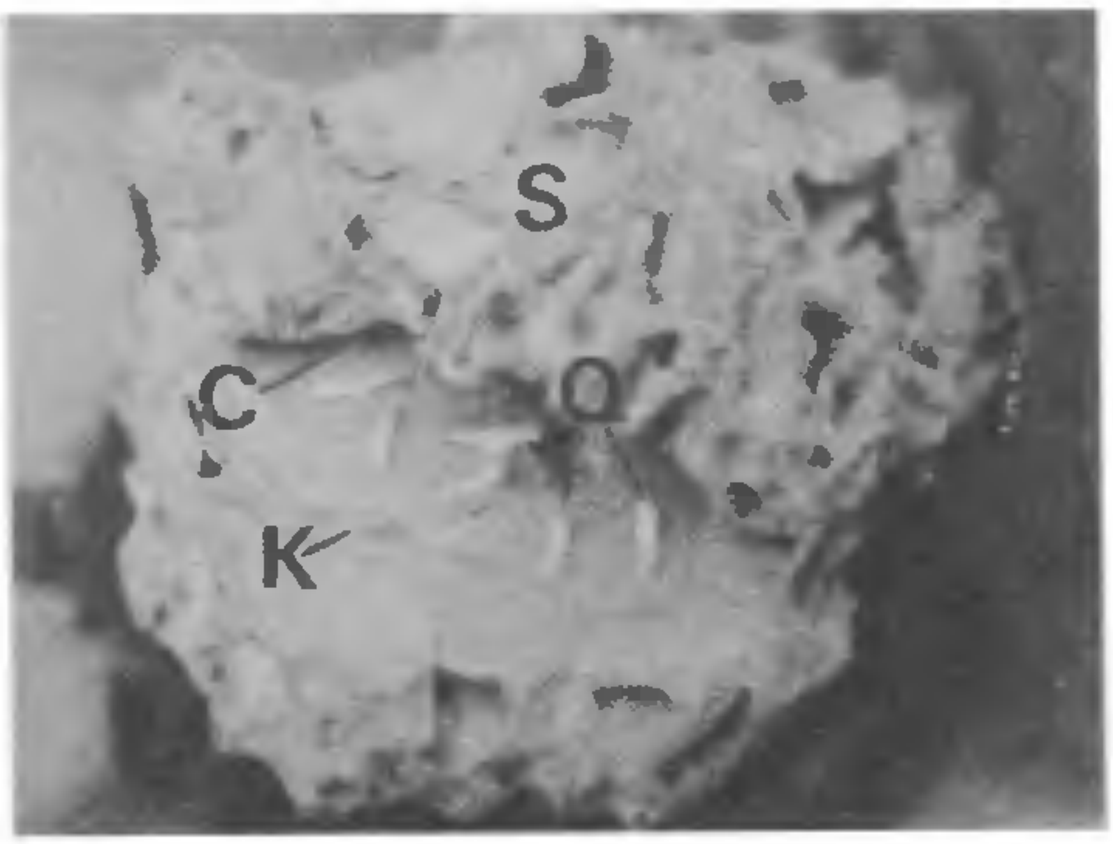

Figure 1. Royal chamber of *Microcerotermes championi* showing one king and six queens. (C) cavity of royal chamber, (K) king, (Q) queens, (S) surface of royal chamber.