

and Sato respectively. A resembling variation has been recorded by Venkatakrishnan in the somatic chromosome number, that is $2n = 44$ in Shornur clone and $2n = 48$ and 56 in Malapuram clones of *Pancratium triflorum*. However, in the present species (*P. longiflorum*) no such deviation in chromosome number has been observed by the authors. Sharma and Ghosh (1954) studied an undetermined species of *Pancratium* and reported 48 somatic chromosomes of which six are long, twenty-eight medium and fourteen short. Sharma and Bal (1956) reported $2n = 22$ in *P. zeylanicum* and observed two pairs of long, five pairs of medium and four pairs of short chromosomes. From the present study it becomes obvious that the chromosome number in *P. longiflorum* is in agreement with that of *P. zeylanicum*⁴ and *P. illyricum*² but for the eight pairs of medium chromosomes and one pair of short chromosomes. The present record of three pairs of chromosomes with secondary constrictions of which a pair having secondary constrictions both on long and short arms in *Pancratium longiflorum* should be reckoned as the first for the genus *Pancratium*.

The basic chromosome number in the allied genera *Hymenocallis*, *Crinum* and *Eucharis* (subtribe Cyathiferae of Bentham and Hooker¹) is 11. From the available information it appears, as though, the lowest chromosome number for *Pancratium* is $2n = 22$ (Brumfield, 1941; Sharma and Bal, 1956; present report). Thus from the chromosome report and also from the occurrence of eleven types of chromosomes in the karyotype it seems reasonable to deliberate that 11 is the basic number for the genus *Pancratium*.

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Department of Botany, N. LAKSHMI,
Nagarjuna University,
Nagarjunanagar 522 510, and
Department of Botany, J. VENKATESWARLU,
Andhra University,
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PACHYTENE CHROMOSOMES IN AUTOTRIPLOID *BRASSICA CAMPESTRIS* VAR. *OLEIFERA* ($2n = 3x = 30$)

THE progeny of an autotetraploid *Brassica campestris* var. *oleifera* ($2n = 4x = 40$) contained an autotriploid with $2n = 3x = 30$. Since details of the chromosome complement of the diploid and of the related autotetraploid species are available^{12,13}, an attempt is made to study the behaviour of associations of homologous chromosomes at pachytene with respect to particular chromosomes of the complement in this autotriploid. Quantitative details regarding the frequency and position of exchange of partners, the relative distribution of exchanges in the eu- and heterochromatic regions, the mean number and mean length of the pairing blocks were gathered with respect to the chromosomes 1, 4, 5, 7, 8 and 10. In general the details in the autotriploid were found to agree with those of the related autotetraploid plant presented elsewhere¹³.

Although association is seen between all the three homologues at the heterochromatic segments flanking the centromere, in the euchromatic segments association is seen only between any two of them at any particular point the third one left unpaired as in the other triploids (Figs. 1 to 16). The mean number of exchanges ranged from 0 to 4. A positive correlation has been observed between the mean number of exchanges and the physical length of the chromosome (Fig. 17).

About 15.2% of the associations were with or without exchange of partners elsewhere on the chromosome but with association of heterochromatic segments of the three homologues at the centromeric region. The initial points of pairing as observed from the position of exchange of partners were found to fit to the 'Poisson' series, being distributed all along the length of the chromosome without any interference of one exchange on the chance formation of another. Although the occurrence of exchanges in the heterochromatic regions could not be seen due to lack of transparency in the material, this can however be inferred indirectly from the particular multivalent types met with at diakinesis.

The trivalents noticed at diakinesis conformed to the 7th, 8th, 9th and 10th types of Darlington (1937) in the autotriploid plant (Table I). The 7th type

TABLE I

Frequency of different trivalent types at diakinesis in autotriploid *Brassica campestris* var. *oleifera* ($2n = 3x = 30$)

Trivalent type	7th	8th	9th	10th	Total nuclei
Number of nuclei	6	10	19	8	43

requires a minimum of one exchange in the centromeric region followed by 2 chiasmata in the two arms. The ninth type of trivalent was observed also in *B. campestris* ($2n = 20 + 2$) plant⁴ tetrasomic for chromosome number 8. This chromosome is a short subterminal nucleolus organiser with a short arm of 0.8μ made of a proximal heterochromatic segment of 0.3μ and

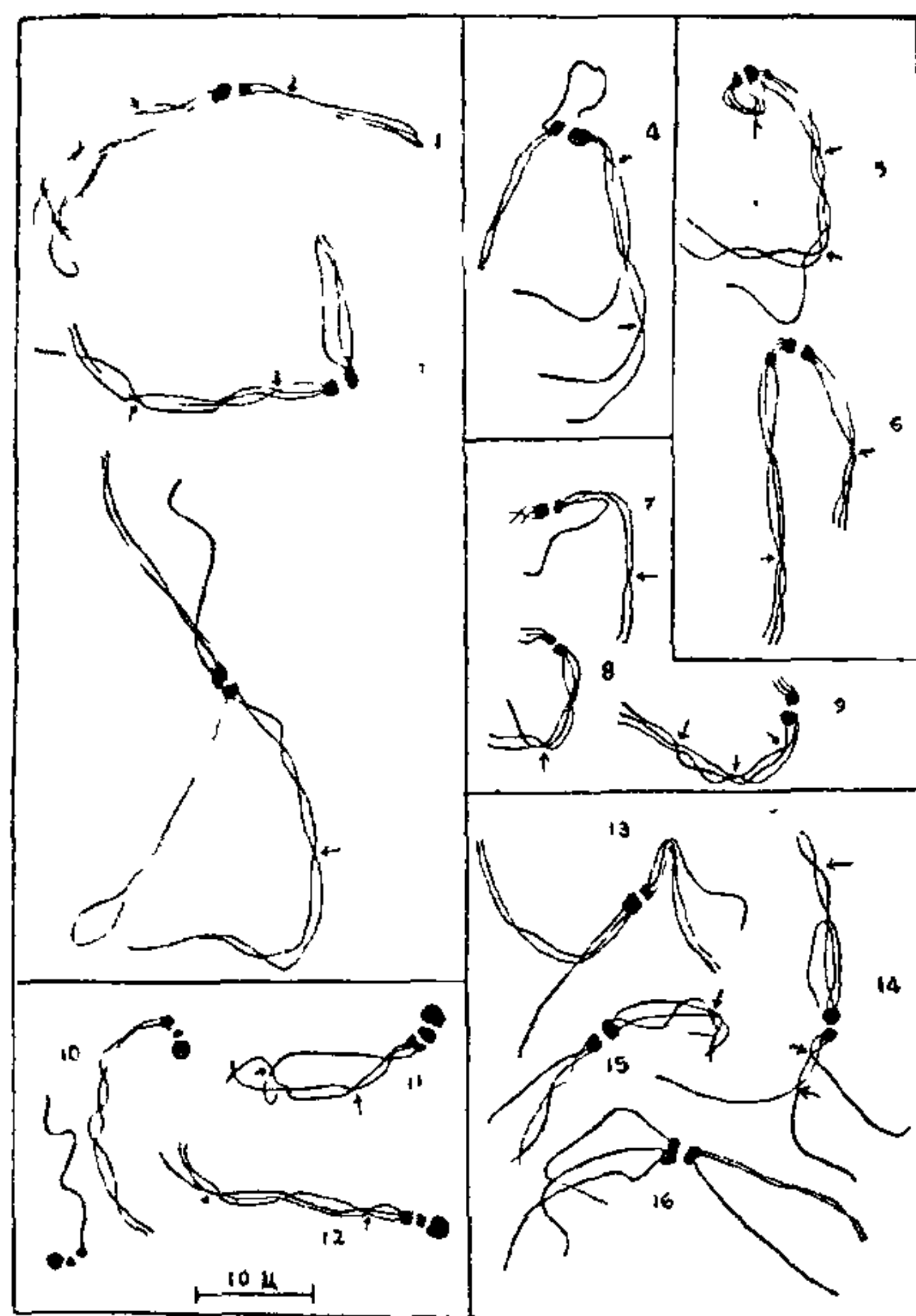
a distal hemispherical heterochromatic satellite of 0.5μ size. The ninth type requires a minimum of one chiasma in the two arms with one exchange in one of the arms. The 10th type of trivalent requires at least one exchange in each arm followed by an appropriate number of chiasmata at pachytene, proving thereby the occurrence of more than one exchange in the *Brassica* chromosomes. A quadrivalent of the 17th type of Darlington (1937) occurred in a greater frequency of the nuclei in autotriploid *B. campestris* var. *oleifera* ($2n = 3x = 30$), which requires a minimum of one exchange in the region including the centromere, with a minimum of 4 chiasmata in the two arms. It can be considered that although *Brassica* is having differentiated chromosomes, the exchanges of partners are not confined to the euchromatic regions alone and that they occur in the heterochromatic regions also as opposed to the generalisation made earlier by Venkateswarlu¹¹ based on the material available upto that time. Reddi^{5,6} also reported an appreciable number of exchanges in the heterochromatic segments of tetraploid *Sorghum* species.

The mean number of the effective pairing blocks increased with increase in the mean length of the chromosome upto some length beyond which it decreased (Fig. 17) as has been noticed in other triploids and tetraploids^{1-6,9,10,12}. The mean length of the chromosome which showed the maximum number of pairing blocks is 41μ in both the autotriploid and autotetraploid *B. campestris* var. *oleifera*.

Thus the data in the autotriploid *Brassica campestris* var. *oleifera* agree in general with those seen in the autotetraploid plant presented elsewhere¹³ showing that the pairing behaviour of pachytene chromosomes in the autotetraploids is an extension of that which takes place at the triploid level.

Department of Botany,
Andhra University,
Waltair, March 1, 1976.

T. KAMALA.



FIGS. 1 to 16. Associations of three homologous chromosomes belonging to chromosomes 1, 4, 5, 7, 8 and 10. Position of exchanges of partners indicated by arrow mark. Figs. 1 to 3. Chromosome 1. Fig. 4. chromosome 5. Figs. 5 and 6. Chromosome 7. Figs. 7 to 9. Chromosome 10. Figs. 10 to 12. Chromosome 8. Figs. 13 to 16. Chromosome 4.

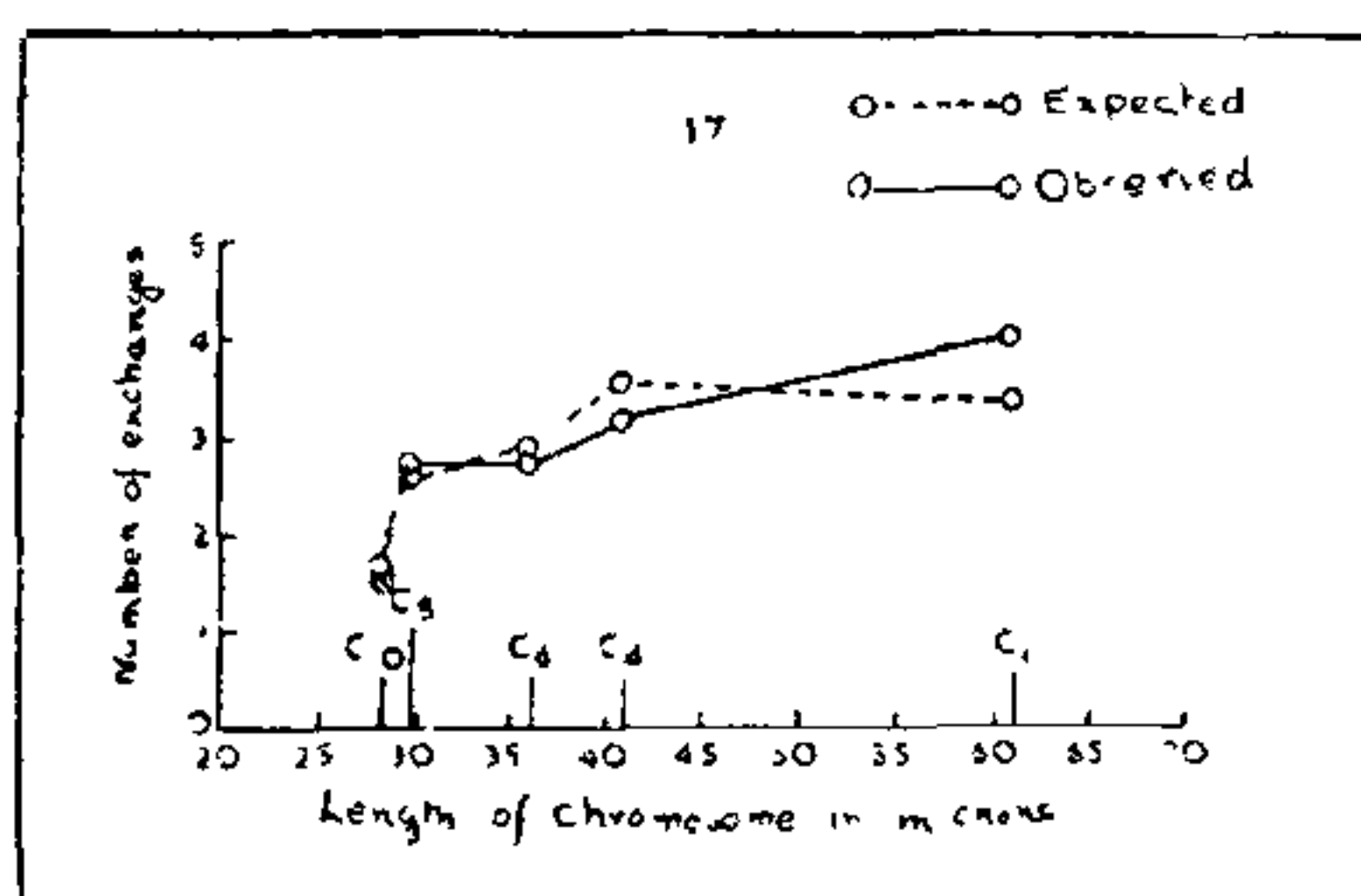


FIG. 17. Graph indicating the positive correlation between the frequency of exchanges and the physical length of chromosome in autotriploid *B. campestris* var. *oleifera* ($2n = 3x = 30$).

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