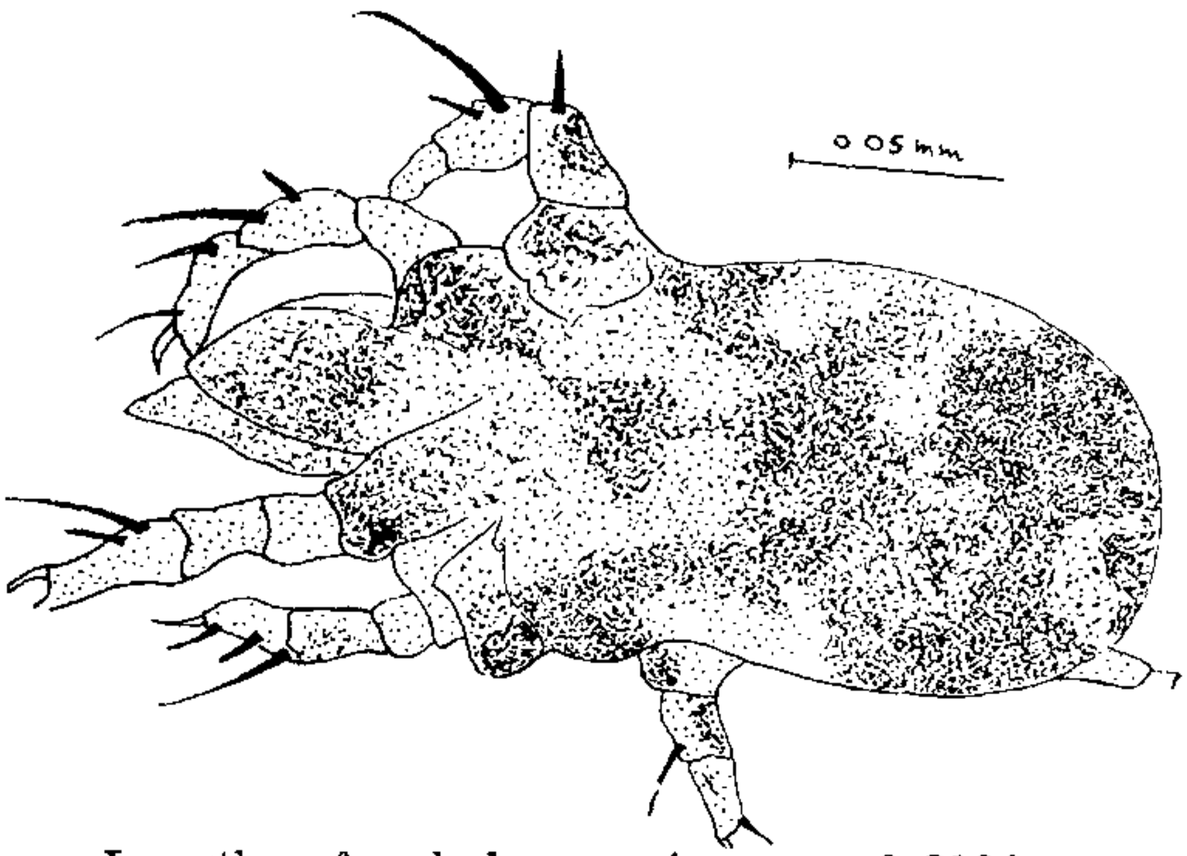
a half times as long as tarsus; claw a little less than half the length of the distal segment of the leg.



Length of whole specimen . . 0·2104 mm.
Width of whole specimen . . 0·0896 mm.

Type mounted in canada balsam prepared by the author from rock sample (*loc. cit.*).

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St. John's College,
Agra, *September* 26, 1966.

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CYTOLOGICAL STUDIES IN TWO SPECIES OF *CASSIA* AND THEIR HYBRID

THE Cassias are important avenue trees which are commonly grown in tropical gardens. Interesting variations were found in flowers and flowering habit of different species of *Cassia* (pink and yellow) growing in the garden of the National Physical Laboratory, New Delhi, which have already been reported.[1] These variants were found to be interspecific hybrids of *Cassia* on the basis of morphological character of leaves, flower structure, flowering habit, etc. One of the variants designated as Hybrid No. 1 and which was outstanding in beauty and flowering habit was thus taken up for cytological investigation along with the suspected parents *Cassia fistula* and *C. nodosa*.

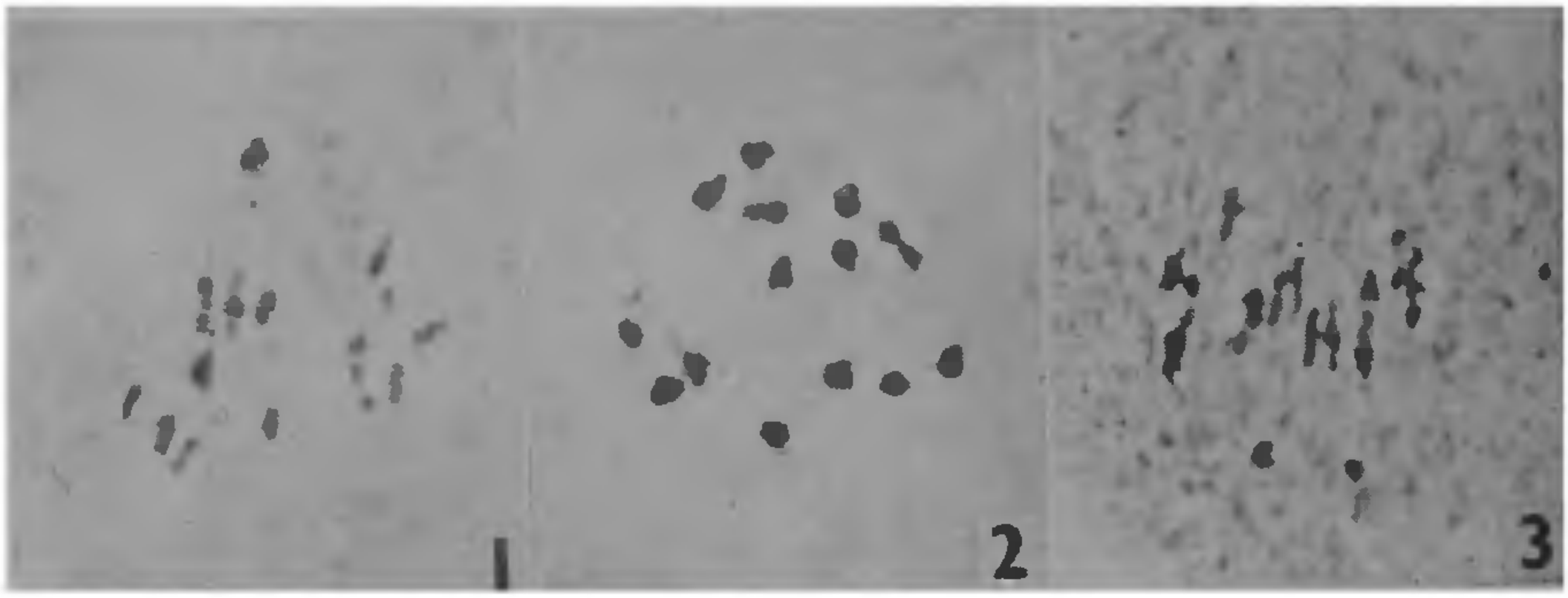
Young flower-buds were fixed in Carnoy's fixative (6 : 3 : 1 of absolute alcohol, chloroform and acetic acid) for about 2 to 4 hours and subsequently transferred to acetic alcohol (1 : 3 of acetic acid and ethyl alcohol) in which the acetic acid was saturated with ferric acetate for 3 to 4 days at 10° C. Acetocarmine squashes were made and the photographs were taken from temporary preparations.

Detailed morphological characters of different species of *Cassia* together with the superiority of the Hybrid No. 1 has already been discussed.[1] Cytological studies on different species of *Cassia* have been made by various workers.[2-4] Cytology of *C. fistula* was studied and the diploid chromosome number was reported to be $2n = 24$ or 28.[2] The chromosome number of *C. nodosa* was found to be $2n = 24$.[3] Both these parental species were studied in the present investigation and cytological analyses were carried out in detail. It was noted during the meiotic study that in *C. fistula*, $2n = 28$ with distinct 14 bivalents at metaphase-I (Fig. 1). 14 chromosomes could also be seen at each pole at anaphase-I. This finding confirms the previous report[2] partially. Almost no variation could be observed in this material collected from the vicinity of the N.P.L. garden.

C. nodosa was studied in detail and it showed that the diploid chromosome number in this species was 28 and not 24 as reported earlier.[3] Metaphase-I showed 14 bivalents very clearly (Fig. 2). Anaphase-I also showed 14 chromosomes going towards each pole. This study does not agree with the previous report of $2n = 24$ in *C. nodosa*.[3] In *C. javanica*, another pink *Cassia* which is very much allied to *C. nodosa* (at times *C. nodosa* and *C. javanica* are bracketed into one species), the diploid chromosome number was observed to be $2n = 28$.[4] Thus it seems fairly certain that the chromosome number of *C. nodosa* is 28 and not 24. Both the parental species showed a fair amount of stability from the cytological point of view. Meiosis in them was quite regular with 14 bivalents in each at metaphase.

The present investigation showed that in the case of the Hybrid No. 1, the diploid chromosome number was 28. Meiosis was quite irregular. Although no multivalents could be seen, 11 to 13 bivalents were usually found in metaphase-I (9 bivalents were noted in one cell only). Univalents varied mostly from 2 to 6 and the mean cytological configuration per cell was estimated to be $11{\cdot}27_{II} + 3{\cdot}81_{I}$. This explains the high percentage of pollen sterility in this plant. Chromosomes at metaphase are shown in Fig. 3.

Thus, from this study we confirmed the chromosome number of *C. fistula* to be $2n = 28$. The chromosome number of *C. nodosa* was



FIGS. 1–3. Figs. 1 & 2. Metaphase-I in *C. fistula* and *C. nodosa* respectively showing 14 bivalents in each case. Fig. 3. Metaphase-I showing 12 bivalents and 4 univalents, in the hybrid.

established to be $2n = 28$ and not 24 as reported earlier. On the basis of several morphological and cytological studies, the plant named as Hybrid No. 1 now seems definitely a hybrid between C. *fistula* and C. *nodosa*.

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Division of Botany, Indian Agricultural Research Institute, Delhi-12 (India), *September* 18, 1966.

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GROWTH OF EXCISED ROOTS OF *PHASEOLUS AUREUS*, Roxb., *TRIGONELLA FOENUM-GRAECUM*, Linn., *PISUM SATIVUM*, Linn., AND *CICER ARIETINUM*, Linn., ON NUTRIENT AGAR SLANTS AND STABS

THE rate of growth of the excised roots of *Phaseolus aureus*, Roxb., was different when grown in test-tubes as stabs and slants in a synthetic medium containing agar.[1] Since the seeds used were commercial varieties showing high variability, it was thought desirable to extend the observations to a larger number of roots and compare their performance with those of the excised roots of *Trigonella fœnum-græcum*, Linn., *Pisum sativum*, Linn., and *Cicer arietinum*, Linn., grown under comparable conditions. The procedures followed for the sterilization of the seeds and their germination and the composition of the medium used have been described earlier.[1] The medium had a pH of 5·0. The excised roots were grown in bacteriological test-tubes containing about 5 ml. of the medium for slants and 10 ml. for the stabs. The length of the roots inoculated varied from 4–6 mm. and the graphs are based on several experiments.

The averages obtained for the total growth at the end of five days in the different experiments showed the following variations:—

TABLE I

Range of averages of total growth in mm. at the end of the fifth-day in different experiment

	P. aureus	*T. fœnum-græcum*	*P. sativum*	*C. arietinum*
Stabs	7·3–37·9	16·0–33·6	11·0–25·5	10·3–31·1
Slants	43·4–63·9	14·6–32·3	15·9–24·6	9·4–23·7

A perusal of Graph 1 of the total length on succeeding days would show the wide difference in the rate of growth of the excised roots of *P. aureus* on stabs and slants. The roots of *P. sativum* and *C. arietinum* exhibited relatively better growth on slants. The exception was *T. fœnum-græcum*. On slants, its root tips had a tendency to curl away from the medium leading to an inhibition of growth. Omission of such instances is responsible for the relatively low number (43) of roots analysed.

Graph 2 of the growth per day reveals some interesting details. The excised roots of *P. aureus* alone showed an increasing growth rate in slants from the first day. In both slants (A′) and stabs (A) there was a sharp fall in the rate between the fourth and fifth days. If the slowing down of the growth rate between