

Figures 1, 2. 1. Early symptoms after artificial inoculation, note the fan-shaped mycelium and early production of Sclerotia. 2. Few infected fruits with abundant fluffy mycelium and dark Sclerotia.

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PRELIMINARY OBSERVATIONS ON THE OCCURRENCE OF B-CHROMOSOME IN THE SILKWORM *ANTHERAEA ROYLEI* (LEPIDOPTERA: SATURNIIDAE)

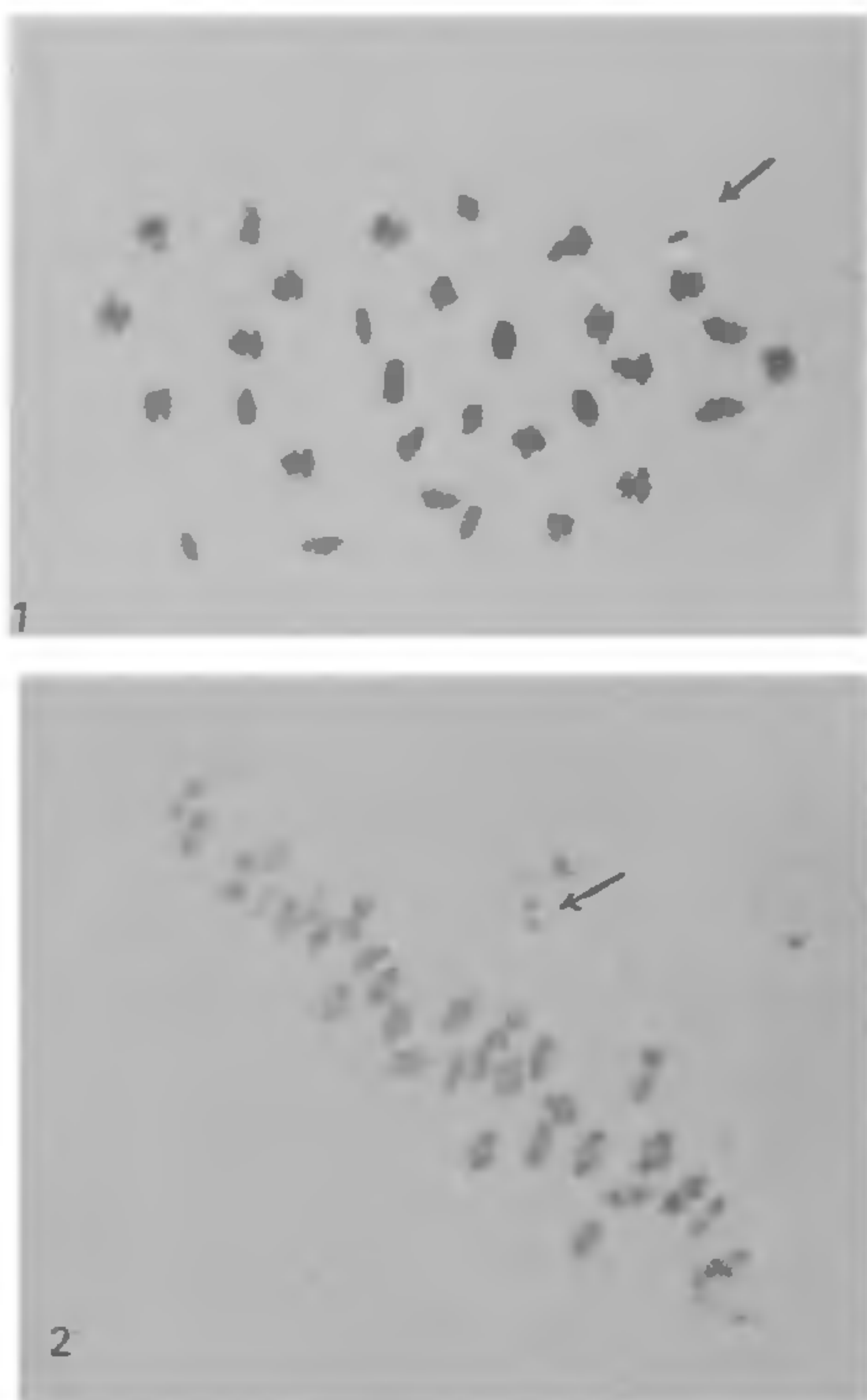
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SCRUTINY of cytogenetic literature of insects reveals that the occurrence of B-chromosomes is more frequent in the orders with monocentric chromosomes than in those with holokinetic chromosomes¹⁻⁴. Among the latter, the order Lepidoptera which includes a large number of species is exemplified by very few reports of B-chromosomes. The present communication reports the existence of a B-chromosome in a natural population of Saturniid moth *Antheraea roylei*.

Four males of *A. roylei* were collected from Batote (Jammu and Kashmir). The testes of the early pupal stages were removed after vivisection in insect Ringer's solution. Following the chromosome preparation technique⁵, meiotic chromosome preparations were made. Only metaphase-I cells were screened since no other stages of meiosis were discernible during the pupal stage. In addition to these four individuals from the natural population, fifteen F₁ male hybrid individuals derived from crosses of *A. roylei* females and *A. pernyi* males also constituted the material for cytological investigation. A quantitative survey of chiasma frequency of B-chromosome containing cells and non B-chromosome containing cells from the wild males has been made to study whether the presence



Figures 1, 2. 1. Meiotic metaphase-I in *Antheraea roylei* showing 31 bivalents and B chromosome. 2. Meiotic metaphase-I in the interspecific hybrid *A. roylei* ($n=31$) \times *A. pernyi* ($n=49$) showing B chromosome.

of B-chromosome has any effect on genetic recombination.

Two of the four wild males of *A. roylei* and one out of fifteen hybrid males revealed that 3.07% of 65 metaphase-I cells in the wild males (figure 1) and 1.15% of 260 metaphase-I cells in the F_1 males (figure 2) contained B-chromosomes. There was never more than one B-chromosome in any of the B-chromosome containing cells. The B-chromosome found in the wild males as well as in the F_1 male was similar in their morphology and staining properties. The B-chromosome was smaller than the smallest member of the chromosome complement. It seems to be margin-

ally negatively heteropycnotic at metaphase-I. In the majority of the B-chromosome containing cells, the B-chromosome clearly showed a bipartite nature. Invariably, it moved precociously in metaphase-I thereby forming an accessory plate. Quantitative analysis of chiasma frequency in B-chromosome containing cells showed a value of 31.

Saturniid moths have been the object of karyological analysis for more than eight decades because of their economic importance⁶⁻¹⁵. Despite such an extensive analysis, existence of B-chromosome has not yet been reported. The B-chromosome in *A. roylei* does not occur in all the meiotic cells signifying thereby its mitotic instability. Since only meiotic cells were examined, it is not presently known whether the mitotic instability is confined to the germline alone or extends to the soma too. The B-chromosome encountered in the F_1 hybrid, by its apparent morphology and staining behaviour suggests that it is derived from the female *A. roylei* parent. Data on the chiasma frequency of B-chromosome and non B-chromosome carrying cells indicate that there is no variation between them at the metaphase stage. It is possible that it may also be true for the earlier stages. Therefore, it can be inferred that the B-chromosome does not have any impact on the mode and number of chiasmata as found in several Acridids¹⁶. Thus the B-chromosome of *A. roylei* conforms to the general pattern of B-chromosome architecture and behaviour of individuals belonging to such orders as Homoptera whose chromosomes are holokinetic.

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ARRANGEMENT OF COTYLEDONS IN *CITRUS MEDICA* LINN.

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CITRUS MEDICA Linn. (Rutaceae) produces multiple embryos in seed. Each seed contains one large dicotyledonous embryo and 4–6 adventive embryos of nucellar origin. As the seed germinates a cluster of seedlings (large and small) results from both the zygotic and non-zygotic embryos. The non-zygotic embryos show a high frequency of variations in the number of cotyledons and their arrangement. A laboratory study of the seedlings revealed many interesting variations.

Seeds were obtained from mature fruits of plants growing in the Botanic Garden of Madurai Kamaraj University. Individual seeds were cut open to expose

the zygotic and non-zygotic embryos. The isolated embryos of each seed were grown in a separate petri dish on filter paper pads moistened with Hoagland's mineral solution. The petri dish with embryos was exposed to daylight in the laboratory and the growth of the seedlings observed periodically. Several sets of petri dishes were maintained.

The embryos which were pale green in colour initially, turned green in three days. Roots were formed in six days and the epicotyl developed in ten days. After fifteen days the seedlings were transferred to sand cultures in plastic containers and watered regularly. After 40 days the seedlings were fixed in FAA for anatomical studies. The zygotic embryo (largest in the seed) developed two oppositely placed cotyledons. The non-zygotic embryos (small in size) had variable number of cotyledons (see figures 1–4 and table 1). Such seedlings developed 'intercotyledonary internode'. Opposite and subopposite cotyledons were also seen in the population of non-zygotic seedlings. Another variation concerns the arrangement of first foliar leaves (simple seedling or juvenile leaves). These were located at one node (opposite phyllotaxy) in the zygotic seedlings, and alternately in a few non-zygotic seedlings (figure 3). The internal structure of the intercotyledonary internode was studied in transverse sections. It was similar to any internode developed subsequently thereby indicating that the alternate condition of the cotyledons is a natural phenomenon.

Earlier¹ experiments with the embryos of *Azadirachta* (Meliaceae) recorded the development of intercotyledonary internode as a result of injury. However, a renewed investigation indicates that in *Azadirachta* also non-zygotic embryos are produced and that the seedling populations are heterogeneous. Nair and Kanta² reported the occurrence of non-zygotic embryos in *Azadirachta*.

It is possible that the non-zygotic embryos of *Citrus* which resemble embryoids of tissue culture origin

Table 1 Characters of seedlings of *Citrus medica*

Set* Number	Number of Embryos			Number of seedlings with		
	Zygotic	Non-zygotic	Total	Opposite cotyledons	Alternate cotyledons**	Single cotyledon
1.	3	10	13	5 (38%)	7 (54%)	1 (8%)
2.	3	12	15	4 (27%)	9 (60%)	2 (13%)
3.	3	10	13	6 (46%)	7 (54%)	—
4.	3	8	11	4 (36%)	6 (55%)	1 (9%)
5.	3	11	14	8 (57%)	4 (29%)	2 (14%)

* One set of 3 petri dishes. ** Including sub-opposite.