

ON THE ABNORMAL CELLED FEMALE LAC INSECT

Mahdihassan (1923, 1948a, 1948b) reports and describes with a beautiful illustration (1948a) an abnormal form of crown-shaped lac cell in one of the South Indian lac insects, which he named as *Lakshadia communis*—an insect of doubtful identity and regarded as “undetermined and questionable species” by Chamberlin (1925), and as “a form or sub-species of *Kerria lacca* (Kerr) (Syn. *Laccifer lacca* (Kerr))” by Takahashi (1949). Mahdihassan contends, without evidence, that this insect exhibits alternation of sexual and asexual generations. Thus, according to him, the winter generation reproduces sexually to give rise to an almost entirely male progeny in the summer generation which when dispersed grow in isolation, reverse their sex to become crown-shaped abnormal female lac cells and in turn reproduce parthenogenetically the sexual forms in the winter generation. This would imply that the species is saved from extinction which he associates with the abnormal lac cells through the mechanism of sex-reversal and parthenogenetic reproduction in the summer generation. The present author, while working on the breeding and genetic aspects of lac insects, also came across “abnormal” celled female lac insects and has studied them in the light of Mahdihassan's contentions which forms the subject matter of this paper.

The crown-shaped female lac cells were observed in the Institute plantation at Namkum in almost every summer generation of the lac insect, although these were recorded in insignificantly low numbers growing in isolation as well as in groups along with the normal lac cells. The lac insects having crown shaped cells were observed in three forms viz., (1) The crimson form of *Rangeeni* strain of *K. lacca*, (2) The yellow form of *Rangeeni* strain of *K. lacca*, (3) The crimson form of *Kusmi* strain of *K. lacca*.

The abnormal celled female lac insects were observed on, *Butea monosperma* (Lamk.) Taub., *Schleichera oleosa* (Lour.) Oken., *Zizyphus mauritiana* Lamk., *Zizyphus xylopyra* Willd., *Acacia catechu* Willd., *Acacia farnesiana* Willd., *Albizia lucida* Benth., *Cajanus cajan* (Linn.) Millsp. and *Moghania macrophylla* (Willd.) O. Ktze.

The breeding experiments were carried out on potted plants of *M. macrophylla*. The lac insects were grown in family lines under cover of 80 mesh wirenet to check the entry of insects from outside and 30—50 isolated insects at random raised in each family. The males from each family were collected in the pupal stage, kept separately and matings allowed by choice on their emergence.

Of the 768 females reared in the *Baisakhi*, 1960-61 season from 20 mother cells, only 19 of these from 7 families (1—4 in a family) developed the cell abnormality. This abnormality appeared in all cases just after the final moult as was also observed by Mahdihassan (1923). The strict isolation of sexes and the appearance of the cell abnormality before matings provided an opportunity to test the mode of reproduction in the abnormal celled females. Ten of these were developed as virgin females while the remaining were made to be impregnated by males of their own family. The course of development of the two types of mother cells was regularly observed till they reproduced or died.

While all the impregnated females reproduced their progeny at the usual time, the virgins showed poor post-mating development, lived generally longer than their impregnated counterparts and finally all died without issue. These results do not lend any support to Mahdihassan's claim of parthenogenetic reproduction in the abnormal celled female but show that the abnormal behaves like the normal celled female and reproduces only sexually (Teotia and Chauhan, 1964).

The impregnated abnormal celled females were used to raise their progenies in family lines for two subsequent generations but in no case did the observed cell abnormality reappear in any of the generations. There is little evidence, therefore, that the observed cell abnormality is inherited.

The data in the following table provides no evidence to any difference in the proportion of males in the progenies of the normal and abnormal celled mothers.

Mahdihassan's contention of almost entirely male progeny in the summer generation of the abnormal mother cells finds no support from present studies. Extremely rare occurrences of almost hundred per cent male progenies have been recorded in certain seasons in the field but there is no evidence to ascribe this to the abnormal celled females since the abnormal cells are recorded only in the summer generation and are observed in insignificantly low numbers along with the normal lac cells.

The evidence from general observations and the experimental tests show the following :—

(1) The crown shaped abnormal female lac cells are of general occurrence in the summer generation and this abnormality does not appear to be characteristic of any particular lac insect or the host plant, (2) the abnormal like the normal celled female reproduces only sexually and not parthenogenetically as claimed by Mahdihassan, (3) there is no evidence to suggest that the observed cell abnormality is inherited, (4) the abnormal behaves like the normal celled female with regard to the sex ratio of its progeny.

Mahdihassan's claim of sex reversal, however, could not be checked since it had not been possible to distinguish with certainty the sexes in the newly emerged larvae. However, once the sexes were distinguished no further change was noted during the rest of their life irrespective of whether these were growing in isolation or in groups.

TABLE 1
Per cent males in progenies from the normal and abnormal celled mothers

Generation	Per cent males			
	From normal mother cells	From abnormal mother cells	Difference	P
Katki, 1962 (Winter generation)	21	18	3	0.4
Baisakhi, 1962-63 (Summer generation)	33	38	5	0.3

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