

## A CURCULIONID WEEVIL WITH THE LOWEST CHROMOSOME NUMBER (CURCULIONIDAE : COLEOPTERA)

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Most of the cytological work on the curculionid weevils comes from Suomalainen<sup>1,2</sup> & Takenouchi<sup>3,4,5-10</sup>. About 400 species are on record. The cytology of the Curculionid weevil *Echinocnemus* belonging to the sub-family Hyperinae has been presented in this paper.

Only the male weevils provided the satisfactory results. The testicular material was taken out in the hypotonic solution (sodium citrate). After the fixation in Carnoy's, the slides were prepared and stained in carbol fuchsin (Carr and Walker<sup>1</sup>). Mounting was done in Euparal.

The spermatogonial metaphase, though not very good, yet showed a diploid number of 16. All the chromosomes stained darkly. Morphometric details of the chromosomes could not be made out at this stage.

At metaphase-I (Fig. 1) there are eight elements, seven of which are the autosomal and the remaining one is the sex bivalent. Chromosomes are in the form of rings, rods and dumbbells. Sex-bivalent, although not clear, is probably of Xyp type.

As the result of the first reductional division, two types of metaphase-II plates are formed. One of the plates is with the X chromosome (Fig. 2) while the other is with the dot-shaped y chromosome (Fig. 3). The morphology of the chromosomes can be made out from metaphase-II plates. Five pairs are clearly, metacentric while the remaining are sub-metacentric to acrocentric.

*Echinocnemus* sp. of the sub-family, Hyperinae has been worked out for the first time. The lowest number of the chromosomes for the above sub-family, till now was shown by *Hyperarumicis*, *H. mongolicus* and *H. viciae* (Takenouchi<sup>7</sup>). All the above species represented 22 as the diploid number.

So far, the family Curculionidae is concerned, *Euops unctostriate* of the sub-family Attleabinae, (Takenouchi<sup>6</sup>) and *Byctiscus venustus* of the sub-family Rhychitinae (Takenouchi<sup>4</sup>) are on record with the haploid chromosome number of 9 which is most probably the lowest. It is *Echinocnemus* sp. which shows the lowest haploid chromosome number.

Most of the species of the family Curculionidae show an increase in the chromosome number but

the decrease shown by the *Echinocnemus* sp. may be due to the centric fusion where the autosomal fusion results in a decrease in the chromosome number. Cytotaxonomically and phylogenetically sub-family Hyperinae is considered to be primitive and different from other sub-families. This sub-family also shows a constant diploid number of 22 chromosomes like the sub-family Otiorrhynchinae. This proves the close relationship of the sub-family Hyperinae and sub-family Otiorrhynchinae.



FIGS. 1-3. Fig. 1. Metaphase-I,  $\times 3000X$ . Fig. 2. Metaphase-II with X chromosome,  $\times 3000X$ . Fig. 3. Metaphase-II with Y chromosome,  $\times 3000X$ .

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#### FERTILITY OF CHEMOSTERILIZED HOUSEFLIES IN RELATION TO DENSITY

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HOUSEFLIES are maintained routinely in various laboratories for experimental purposes, but considerable variations exist in published data concerning the optimum density of flies with respect to space available in the cages. Adult densities that have been recommended for the satisfactory development of the flies include 0.26; 0.41; 0.43; 1.0; 1.5 and 4.1 flies per inch cube<sup>1-6</sup>. It has also been observed that

the fecundity of *Musca domestica* L. cannot be reduced by increasing adult densities upto 4.77 flies/inch<sup>3</sup>. Females in densely crowded conditions lay a larger number of eggs than the ones reared under uncrowded conditions<sup>7</sup>.

During the present studies an attempt was made to observe the effects of crowding on the fertility of normal and chemosterilized *Musca domestica nebulosa* Fabr., an effective vector of a number of enteric infections in India. Tests were also performed to obtain base line data on the optimum housefly density for rearing flies under laboratory conditions.

Flies used during the present tests were obtained from a normal laboratory colony maintained at a temperature of  $28 \pm 1^\circ \text{C}$  and 60–70% R.H., and were reared after the manner earlier described by Khan and Khan<sup>8</sup>. On emergence they were sexed, and when 3-day old, the flies were topically treated with 0.03125 per cent thiotepa solutions in acetone. The number of normal flies in the four cages (20 cm × 20 cm in size) were 100, 250, 500 and 750. Similar numbers of treated flies were kept in four other cages. Care was taken to ensure that adequate supplies of sugar and milk were available to the flies at all times. Random samples of about 100 eggs were taken from each of the eight cages to determine the hatch rate. Per cent sterility and per cent net sterility were calculated after the manner described by Hair and Adkins<sup>9</sup>.

It seems that as an ecological factor, crowding plays an important part in the fertility of *M.d. nebulosa*. The per cent sterility in the normal groups at a density of 0.19, 0.47, 0.97 and 1.4 flies/inch<sup>3</sup> was found to be 19.5, 19.9, 21.7 and 23.95 respectively. Similarly, in the treated groups a per cent sterility of 80.5, 83.1, 90.08 and 93.4 was obtained when the adult density was 0.19, 0.49, 0.97 and 1.4 flies/inch<sup>3</sup> respectively (Table I).

TABLE I

Effects of crowding on the fertility of normal and chemosterilized males of *Musca domestica nebulosa*†

Chemosterilant	Number of flies in a cage	Number of eggs		Per cent sterility	Per cent net sterility
		Observed	Hatched		
Thiotepa	100	1322	259	80.5	75.5
	(100)	(1566)	(1284)	(19.5)	
	250	1891	321	83.1	78.9
	(250)	(1900)	(1539)	(19.9)	
	500	2226	201	90.08	89.04
	(500)	(2540)	(2092)	(21.7)	
	750	2483	164	93.4	91.4
	(750)	(2472)	(1880)	(23.95)	

† A dose of 0.0018 ml was applied to each fly. Figures in parenthesis are from normal groups.

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