Except for the effect of CCC on the rate of mutation in bacteria and fruit flies[3], no systematic work on its effects on other biological systems, and on the dividing cells in particular, has been, so far as known to us, undertaken. We find that CCC, unlike many of the herbicides and pesticides[4-7], does not have much adverse effect on the structural integrity of the chromosomes as evinced by the absence of stickiness, fragmentation, bridges, etc. Almost similar results have been reported in the meiotic cells of sorghum and other plant materials following the application of Atrazin, a systemic herbicide[8]. The exact mechanism by which these chemicals bring about the cytological damages is not yet clear. However, in the absence of any marked differential effects on the chromosome structure *per se*, it is probable that these chemicals disturb the physiological/biochemical systems of the cells which eventually interfere with the spindle organization.

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SEXING THE PUPAE OF GRAM CATERPILLAR, *HELIOTHIS ARMIGERA* Hbn. (LEPIDOPTERA: NOCTUIDAE) IN RELATION TO CERTAIN MORPHOMETRIC CHARACTERS

SEXING insects in their larval and pupal stages can be advantageously used in studies like sex attractants, chemosterilants and male sterile technique. The position of genital opening is more often used to distinguish sex in pupae than other characters[1-3].

When the gram caterpillar, *Heliothis armigera*, was mass cultured, initially on the leaves of Bengal gram up to the third instar, and then individually on soaked Bengal gram seeds, several external morphological differences between the sexes of the pupae were noticed. The genital opening in the male was located on the posterior region of the 9th abdominal segment and was flanked by a pair of pads. The female pupae had their gonopore located on the anterior aspect of the 8th abdominal segment mid-ventrally, in the form of a dot-like cleft (Fig. 1). The determination of the segment on which the genital opening is located may be facilitated by pinpointing it from the wing pads which extend to the posterior margin of the fourth abdominal segments as shown in the figure.

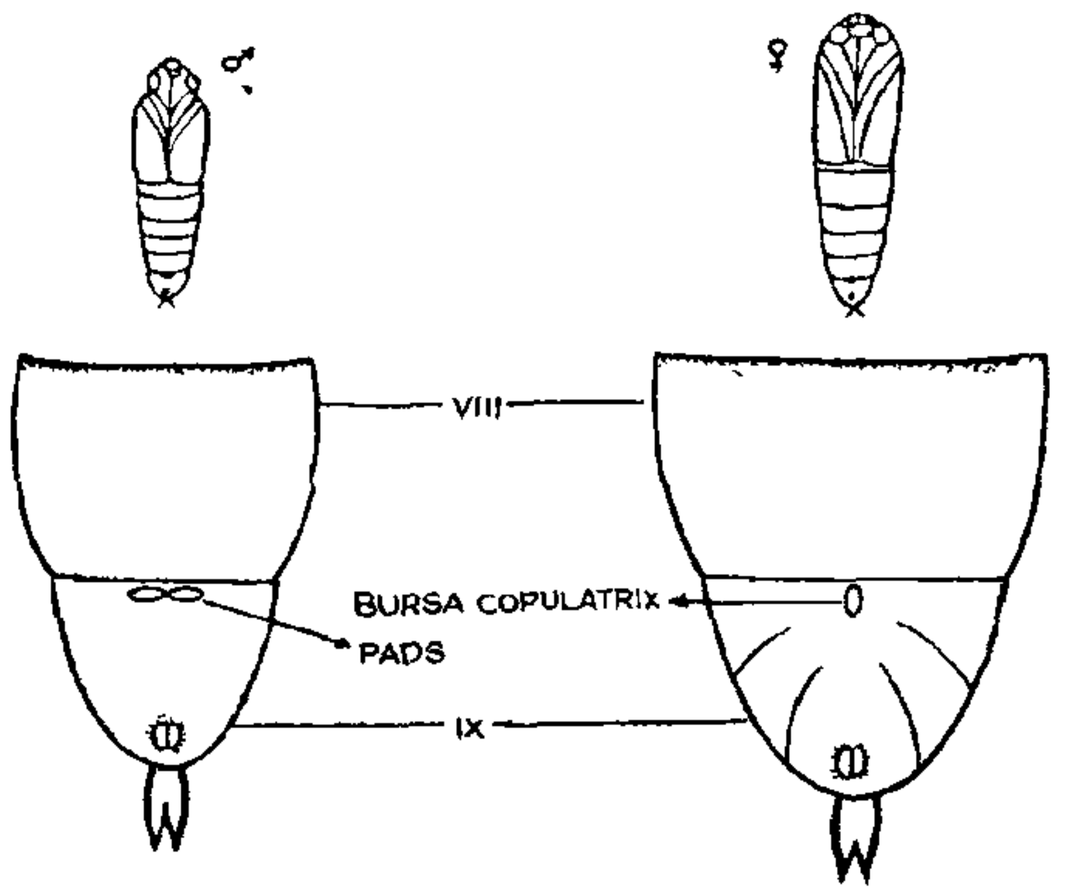

FIG. 1. Sexual dimorphsim in the pupa of *Heliothis armigera* Hbn.

It is evident from Table I that there was a significant difference in the weight, length and width of the pupae of both the sexes. The male pupae were much smaller than the female. Significant correlation

TABLE I

Sex differences in size and weight of pupae of H. armigera (*Mean of* 20 *observations*)

Sex	Weight (mg)	Length (mm)	Width (mm)	Duration (days)
Male	222·58	16·36	4·89	11·95
Female	283·22	18·11	5·43	10·10
Standard error (S.E.)	23·87	1·36	0·50	0·17

was found to exist among all the three characters in either sex. The strength of the association was maximum between the weight and the length, the correlation coefficient (r) being 0·83 and 0·48 in female and male respectively. Significant correlation was also found between width and weight and width and length of pupae of the sexes. The development period of the pupae also varied significantly in the sexes, It lasted 11-13 days with an average of 12·0 days in the male and 10–11 days with a mean of 10·1 days in the female. It was also noticed that the male pupae showed constant twisting and turning movements whereas females were inactive and displayed only occasional movements.

The above characters provided an accurate method of separation of the two sexes. The adults also showed dimorphism by way of their external colour variations, the male being paler than the female which is brown in colour.

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THE GRASS SEED INFESTING THRIPS *CHIROTHRIPS MEXICANUS* CRAWFORD ON *PENNISETUM TYPHOIDEUM* AND ITS PRINCIPAL ALTERNATE HOST *CHLORIS BARBATA*

MANY Gramineae and Cyperaceae in cultivated fields provide a perennial source of species of *Chirothrips*, *Anaphothrips*, *Bregmatothrips*, *Caliothrips* and *Haplothrips* to mention some of the major genera, are often of considerable importance in view of their build up in many crops at different stages of their growth. Species of *Chirothrips* have been known to feed on the ovarian tissues of many grass species destroying a good proportions of the seeds. Of such well-known species of *Chirothrips* are *C. mexicanus*, *C. falsus* Priesner producing a considerable decrease in the yield of Bermuda grass seed (Roney, 1949)[1] and Rhodes grass seed (Riherd 1954)[2] in the United States of America, of Timothy grass seed by *C. manicatus* Haliday and *C. hamatus* Trybom in Sweden (Johannson, 1946)[3] of meadow fox tail grass by *C. hamatus* in Finland (Hukkinen 1936)[4] and of cocksfoot seeds by *C. pallidicornis* Priesner in New Zealand (Doull, 1956[5]; Lewis, 1973[6]).

In so far as has been known the species *C. maximi* Ananthakrishnan, *C. ramakrishnai* Ananthakrishnan, *C. mexicanus* and *C. meridionalis* Bagnall form the major grass infesting thrips in India. While reporting for the first time the damage potential of the polyphagous cosmopolitan species *C. mexicanus* to young, growing ears of *Pennisetum typhoides*, observations presented herein also attempt at a correlation between their abundance in *Pennisetum* with that of its major alternative host *Chloris barbata*, abundant in *Pennisetum* fields. The incidence of this species in *Chloris barbata* is of the range of 25–30 individuals/branch of the four-branched spike, each with 44–50 spikelets, presenting an unusual preponderance of males to the extent of resulting in a sex ratio of 2:1 to 5:1 (males: females), appears to be of considerable interest suggesting an arrhenotokous partherogenetic mode of reproduction occurring side by side with normal sexual reproduction.

Regular collections of *Chloris barbata* inflorescence as well as on the young growing, maturing and scenescent earheads of *Pennisetum*, provided evidence of the abudnance of *Chirothrips mexicanus* with population counts ranging from 30–48 in young earheads and decreasing to 22–32 in ripening earheads/25 beats, with scarcely an individual in the seenscent earheads the corresponding population counts in *Chloris barbata* range from 10–197 adults/25 beats (Fig. 1)

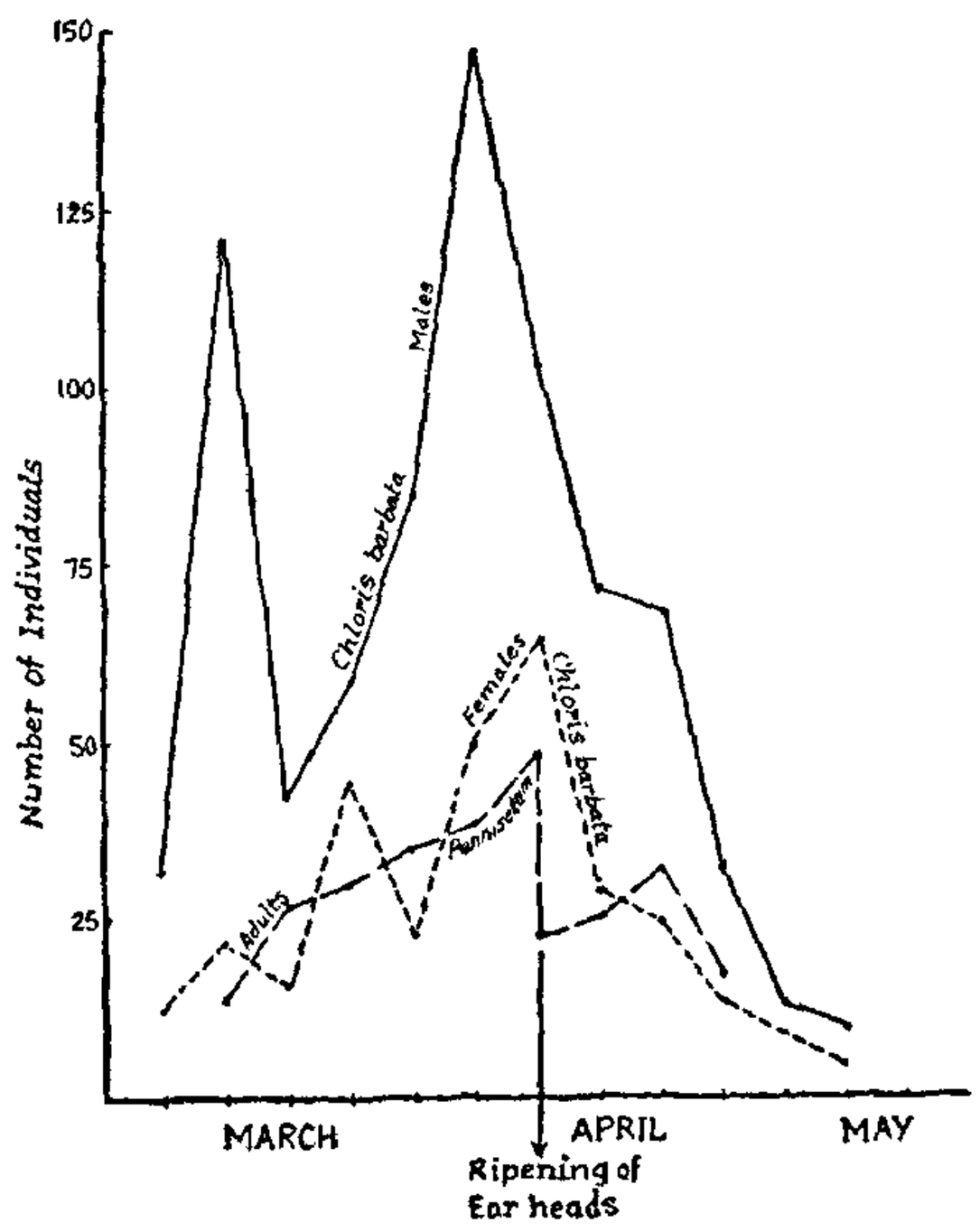

FIG. 1. Trends of infestation of *Chirothrips mexicanus on Pennisetum typhoides* and *Chloris barbata*

Only one egg is laid per floret, the larva feeding on the growing ovarian tissue, preventing seed formation. It was earlier reported in *C. pallidicornis* (Doull, 1956)[6] that, when the populations of *Chirothrips* reach 20/inflorescence, 30% cocksfoot seeds got destroyed. Examination of the inflorescence of *Chloris barbata* reveal all stages of development from egg to pupa with one individual per flower. Of 176–200 florets of *Chloris barbata* examined on a complete branched spike, 57–75 individuals of *C. mexicanus* occurred in various stages of development, there being only one individual per floret. The overall seed damage in *Pennisetum* was of the order of 5–10% of the cases, while in *Chloris barbata* the very heavy incidence