

aphids of all stages, their moults, their excreta and the honey-dew; the whole plant is thus destroyed and the crop fails completely. Besides attacking mustard it also attacks many other cruciferous plants, e.g., radish, cabbage, etc. It has also been recorded that the aphid transmits a number of virus diseases, viz., *Brassica virus* 3—causing mosaic of Brassicæ, *Matthiola virus* 1—causing mosaic in stocks, *Phaseolus virus* 1—causing common mosaic in leaves, *Allium virus* 1—causing yellow dwarf in onions. The aphid appears to be of a very great economic importance.

In the beginning of December the *Sexuales*, i.e., the winged males and females appear which copulate and the latter lay eggs on their host plant, i.e., mustard or other cruciferous plants. This is the only time during their whole life-cycle when males appear and the females are oviparous. From the eggs emerge nymphs which are all females and no males at all. The females so produced are apterous, viviparous and parthenogenetic, and are known as *Fundatrices*. The apterous females are not so well developed as the winged females. The sense organs, antennæ and legs are much reduced, and this reduction of the parts is perhaps correlated with their increased reproductive capacity. The fundatrices in their turn lay nymphs which also develop only in apterous, parthenogenetic and viviparous females known as the *Fundatrigeniæ*, without producing any males as in the former case. There are generally three generations of fundatrigeniæ while the fourth generation develops into *Migrants* which are winged, viviparous and parthenogenetic females, and here again there is no reproduction of males. The migrants seldom lay nymphs on the same host, i.e., the host of their mother, and even when the nymphs are laid on the same host, they seldom develop into adults. In fact the migrants always fly to some secondary host where they lay nymphs and perhaps remain there till the end of November, and thus the migrants are responsible for their propagation. The nymphs laid by the fundatrices moult four times before they become fundatrigeniæ whose nymphs also moult four times to become migrants. In the first fortnight of March these moults are completed in eight to ten days. The adults begin to reproduce, i.e., begin to lay nymphs two to three days after the last moult. During the second fortnight of February and the first fortnight of March both the fundatrigeniæ and the migrants are found in the field. Sometimes the population of the migrants becomes so high that the whole vegetation and the sky round about the mustard fields become covered with them. The migrants which are lucky enough so as to reach their suitable host similarly reproduce on their own account. The observations show that the progeny of the migrants of whatever age it may be, is unable to feed itself on mustard even though they may be young and green, therefore it may be said that the migrant stage of the aphid is not a pest of mustard.

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A detailed study of the aphid is in progress and will be presented in due course.

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A STUDY ON THE LIFE CYCLE OF *BRUCHUS ANALIS* FEB., THE COMMON PULSE BEETLE

THE life-cycle was studied under laboratory conditions at a constant temperature of 92° F. The data given below have been recorded at this temperature.

Duration of the egg stage.—The average of twenty-five cases studied was 5½ days with 5 days as the minimum and 6 days as the maximum.

Duration of the larval stage.—It is an interesting fact that the duration of this stage was very much longer when it was fed exclusively on *Cicer arietinum* than when it was fed on various species of *Phaseolus*. The under-mentioned observations were recorded.

TABLE I

Grain on which larva was fed	Average larval period in days	Number of cases studied
<i>Phaseolus mungo</i>	11½	15
<i>Phaseolus radiatus</i>	11½	14
<i>Phaseolus acontifolius</i>	11½	5
<i>Cicer arietinum</i>	17½	7

Duration of the pupal period.—The actual pupation took place about 24 hours after the formation of the lid-like exit for the adult. The following data were recorded.

TABLE II

Pupal period in days	Number of cases studied
7	3
8	11
9	7
10	1
	TOTAL 22

The average pupal period at 92° F. worked out to be 8³/₁₁ days.

The adult stage period was studied in a large number of cases. The average for the female was 9.5 days and for the male 9 days. The beetles were fed on powdered grain.

The oviposition started on the day following emergence. The male and the female that emerged on the same day were taken as a pair

TABLE III
The Rhythm and Duration in Days of Oviposition of *B. analis* Fab.

Sl. No.	Date of emergence of pair	Date of 1st egg laying	The rhythm of Egg laying on days											Total eggs laid	Last date of egg laying	Total egg laying period in day
			I	II	III	IV	V	VI	VII	VIII	IX	X	XI			
1	4.2.1944	5.2	5	8	8	9	11	11	8	6	3	—	—	69	13.2	9
2	4.2.1944	do	6	12	16	17	15	14	10	8	2	—	—	100	do	9
3	do	do	6	8	11	11	17	12	10	5	3	—	—	83	do	9
4	do	do	6	10	12	11	20	14	6	3	—	—	—	82	12.2	8
5	5.2.1944	6.2	27	16	13	15	15	10	6	2	—	—	—	104	13.2	8
6	do	do	15	15	10	10	11	8	5	3	—	—	—	77	do	8
7	do	do	17	17	13	13	11	9	2	1	1	—	—	84	14.2	9
8	do	do	4	16	13	13	13	11	9	3	—	—	—	82	13.2	8
9	6.2.1944	8.2	—	8	8	15	10	10	10	7	—	9	2	79	16.2	9
10	do	7.2	8	9	9	17	10	13	9	6	—	—	—	81	14.2	8
Average say 84													84.1		8.5 days	

for further study. They all mated on the same day as they emerged. The pair continued to lay eggs for about 9 days. The average number of eggs laid by a pair was 84 with 69 as the minimum and 104 as the maximum. The maximum number of eggs laid by a pair on any one day was 27. The pairs continued to lay eggs for 8 to 9 days.

The rhythm of oviposition was observed in 10 pairs as detailed in Table III. Ten fresh grains of white gram were offered every day to each pair for noting the number of eggs laid on that day. The bruchid, as far as possible, made an even distribution of its quota on the grain. Mostly one, otherwise two eggs were laid on each grain.

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OSTEOMETRIC DETERMINATION OF SEX FROM THE HEAD AND THE LOWER END OF THE FEMUR

FIGURES for osteometric determination of sex from the head of the femur and its lower end are available for English bones.^{1,2} As similar figures in Indians would provide interesting records for medico-legal workers, 186 fresh,

TABLE I

Sex of bone	Diameter of the head							
	Maximum				Minimum			
	Highest		Lowest		Highest		Lowest	
	mm.	%	mm.	%	mm.	%	mm.	%
Male	56	0.6	41	5.4	51	2.7	40	8.2
Female	43	12.8	35	2.5	43	5.1	34	2.5

TABLE II.

Sex of bone	Maximum diameter of the lower end			
	Highest		Lowest	
	mm.	Percentage	mm.	Percentage
Male ..	83	0.9	67	1.8
Female ..	69	7.7	59	15.3

adult bones (of both sexes) were examined. Maximum and minimum diameters of the head, and maximum width of the lower end (excluding epicondyles) were recorded in millimetres. The results are given in Tables I and II.

Evaluation of these results, after allowing for sources of error, makes it possible to draw the following conclusions:—

(1) A bone with a maximum or minimum diameters of the head above 44 mm., and width of the lower end above 70 mm. is most likely to be that of a male.

(2) A bone with similar diameters below 40 mm. and 70 mm. is just as likely to be that of a female.

(3) A bone with the above diameters of the head between 40 mm. and 44 mm., and of the lower end between 66 and 70 mm., may belong to either sex. Osteometry is of no use in such cases.

As the bones for investigation, under report, were from the British Indians (Punjabis) the results would be applicable primarily to the residents of the Punjab.

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1. Frazer, Buchanan's *Manual of Anatomy*, 1937, 346 and 354. 2. Parson, *J. Anat. Phys.*, 1913, 14, 253.