EASTERN LIMIT OF THE 1943 SWARMING OF THE DESERT LOCUST, *SCHISTOCERCA GREGARIA* (FORSKAL), IN INDIA*

PRUTHI[1] (1944) has stated Patna (lat. 25° 41′ N., long. 85° 17′ E.) in Bihar as the most eastern Indian limit reached by Desert Locust swarms in 1943.

Several months ago Mr. J. C. Mukerji, of Khardah, 24-Parganas, Bengal, brought to me a male specimen of the Desert Locust that he had collected on June 25, 1943, from a swarm at Deogarh (lat. 24° 30′ N., long. 86° 42′ E., Santal Parganas, Bihar), where the swarm was observed on two days (June 24 and 25, 1943), passing from the S.W. to the N.E. without stopping at Deogarh. Mr. Mukerji's specimen was one of the few stray individuals which, however, did alight. It has been deposited in the Zoological Survey of India (Reg. No. 1231/H5), and is a typical yellowish *phasis gregaria* male of *Schistocerca gregaria*. The above swarm has also been independently confirmed by the Subdivisional Officer of Deogarh.

The Deogarh record extends the Patna limit by about ninety miles farther east.

Mr. D. R. Bhatia (New Delhi) recently informed me that since the publication of Pruthi's note, he had information of the 1943 swarms reaching Pothia area (lat. 25° 33′ N., long. 87° 15′ E., Bhagalpur District, Bihar), which means that the Deogarh limit is extended by some thirty miles to the east. Deogarh, however, remains the most southern point of the eastern limit reached by the Desert Locust in 1943.

Zoological Survey of India, M. L. ROONWAL.
December 18, 1944.

* Published with the permission of the Director, Zoological Survey of India.

1. Pruthi, H. S., *Curr. Sci.*, 1944, 13, 174.

LARGE-SCALE APPLICATION OF MERCURY FOR PREVENTION OF INSECT PESTS IN STORED FOOD GRAINS

It was pointed out by the author[1] that since mercury vapour is the active reagent in sterilising insect eggs and killing small larvæ, a very small quantity of mercury is necessary for preservation of grain. Vapour pressures of mercury at ordinary temperatures are very small and the quantity required to saturate a particular space with mercury vapour is also very small; *e.g.*, 12 mgms. of mercury per cu. metre) is the equilibrium concentration at 25° C., and 40 mgms. at 35° C. It was also pointed out that since vapour pressure of mercury is a function of temperature, the point of prime importance is the rapid attainment of the equilibrium concentration of mercury vapour at that temperature in the space in which the grain is stored. A simple way of facilitating this process is to disperse the mercury so as to expose as large a surface as possible for its evaporation. This was achieved by spreading mercury between ribbons of porous paper or converting it into very fine dust. After making sufficient allowance for the loss of mercury by diffusion it was expected that about one gram of mercury per bag of 240 lbs. of grain would suffice to preserve it from insect attack for about one year (Dole, *loc. cit.*).

It was also pointed out[2] that mercury vapour is acting as a fumigant and not as a contact or stomach poison, so all means to conserve the mercury vapour would prove effective against breeding of insects.

These expectations were fulfilled in small-scale experiments and, therefore, they were tried on a large-scale at Kirloskarwadi (Dist. Satara, Bombay Presidency) in the godown owned by Messrs. Kirloskar Brothers, Ltd. In all 408 bags of different grains were treated with the dust and stored for a period of five months, *i.e.*, from the end of June to the beginning of December 1944. The preserved bags consisted of the following grains:—

Jowar 216 bags, gram 92 bags, wheat 50 bags, tur dal 50 bags. Each bag weighed about 200 to 225 lbs. They were stored in a godown of 65 ft. × 30 ft. ×15 ft. and besides the above bags there were about 1,500 bags of untreated and infested grain. Treated bags were kept separate and an equal number or more of untreated bags were kept as control (with the exception of wheat) not very far off from the treated bags. The bags were arranged so as to conserve the mercury vapour as far as possible. The bags in the centre of the stack were treated with 1 gm. of mercury and the outer ones were treated with 5 gms. of it. At the end of five months the bags were examined and the samples from different bags were collected and studied.

Following is the summary of the mean of the various counts of the damaged grains:—

Name of the grain	Original condition	Condition after treatment of 5 months	Condition of the untreated grain after 5 months
Gram	Some eggs seen on the grain	Not a single grain bored	Cent per cent. grain holed, some with 2 or 3 holes
Jowar	Slightly infested	3 % grain affected	34 % grains holed with some powder formed
Wheat	Not infected	Not a single grain affected	——
Tur dal	,, ,,	,, ,,	Slight damage seen, some powder formed

The gram was infested with eggs of *Bruchus Chinesis* and jowar was infested by *Calandra oryzæ*, *Rhizopertha dominica* and *Triboleum casteneum*.

The experiment speaks for itself. If it is taken into consideration that the experimental grain was stored along with a large quantity of infested grain in the godown the results are excellent. The grain was stored in the months of July to November, a season which is most favourable for the activities and the breeding of many of the insects affecting the stored grains. The infested grain existing in the godown was seen to be containing the *Calandra oryzæ*, *Triboleum castaneum*, *Rhizopertha dominica*, *Sitotroga cereallela* and *Bruchus Chinesis*.

It should be noted that mercry is effective mainly towards sterilization of eggs and killing of small larvæ and is not so effective against adult insects, say *e.g.*, the *Sitophylus oryzæ*. So the method will prove more useful with uninfested grain or grain infested with insects which, in adult stage, do not cause much damage. If the grain is slightly infested the breeding of the insects is stopped, but if it is badly infested especially with a pest whose adults cause much damage then it is desirable to supplement the mercury by some method for elimination of these insects; either by killing, repelling or by removal by sieving. In a recent work in this laboratory the mercury method is supplemented by a substance with insect-repelling properties. The account of this insect-repellant will be published in due course.

I must thank Messrs. Kirloskar Brothers, Ltd., for placing at my disposal grain worth more than Rs. 10,000 and giving me facilities to carry out this large-scale experiment at their own cost.

Fergusson College,
Poona,
December 12, 1944.

K. K. Dole.

1. Dole, *J. University of Bombay*, **1943**, **11**, Part **5**, **118**. 2. Dole, K. K., *Proc. Ind. Sci. Cong. Agric. Sec.*, Jan. **1944**.

LIFE-HISTORY OF AN ECTOPARASITIC BRACONID ON A PSYLLID, *PAUROPSYLLA DEPRESSA* (CRAW)

While I was working on *Pauropsylla depressa* (Craw), a gall-forming Psyllid, I found the larva of a Braconid parasite leading an ectoparasitic life. The life-history of the ectoparasitic Hymenoptera is very interesting and worth recording.

Pauropsylla depressa (Craw) attacks the leaves of *Ficus glomerata* Roxb., and gives rise to large, globose galls. Galls are simple and unilocular, sometimes several simple galls fuse incompletely and form into a compound mass. The Psyllid spends all the developmental stages within the gall. After reaching adult stage it comes out of the gall through the lacerated opening which is formed on the lower side of the leaf.

The eggs are laid by the Braconid parasite in batches of six to nine near the gall on the upper surface of the leaf. The eggs are white in colour and cylindrical in form. Each egg measures about a millimetre in length and 0·4 millimetre in breadth.

The larvæ of the parasite hatch out of the eggs after some days and enter the gall cavity by boring the tissue of the gall which is thick and soft. The larva is almost white in colour, cylindrical in shape and both anterior and posterior regions are somewhat pointed. There are thirteen segments of approximately equal length. The mandibles are almost invisible. Fine setæ are present on the dorsal region.

It is remarkable to note that only a single larva enters a single gall. The Braconid parasite attacks the host, *Pauropsylla depressa* (Craw), usually in the second instar. The Braconid larva after entering the gall cavity migrates towards the host and reaches its dorsal region. Then the parasitic larva proceeds to one of the sides of the host and attaches itself by the mouth on the ventral side to the intersegmental region of the last thoracic and first abdominal segments, as shown in Fig. 1. From this time onwards the parasite leads an ectoparasitic life on the Psyllid. After a few days a tube-like organ appears as shown in Fig. 2 which may be called a tube of attachment. This tube is very thin and measures about 0·7 mm. in length. The origin and function of this tube is not fully known. After the development of the tube of attachment the host becomes inactive and after a few days the host is killed. After the death of the host the parasite detaches itself from the host and enters into the pupal stage. The fully grown parasitic larva measures 1·8 mm. in length and 0·7 mm. in breadth.

The parasitic larva slowly migrates to a corner in the gall cavity and covers itself by a white parchment and remains within it for the rest of the pupal stage. As the growth takes place in the parasite the parchment-like covering enlarges in size and occupies nearly the whole cavity of the gall made by the Psyllid. After the completion of the pupal stage the adult Braconid emerges out of the gall through a lacerated opening which is formed as the gall gets dry.

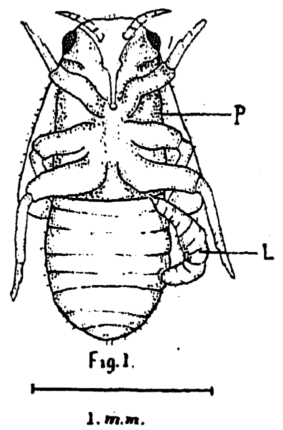

Fig. 1. Ventral view of the Psyllid showing the attachment of the Braconid larva.
L—Braconid larva.
P—Psyllid.

The adult Braconid measures 2·1 mm. in length. The colour of the body is brownish-red. The percentage of attack is about 85. It