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BIOLOGY OF *PARASA LEPIDA* CRAM., a pest of coconut in Kerala *

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Parasa lepida Cram (Cochlidiidae: Lepidoptera) is a polyphagous pest doing great damage to a wide veriety of crops such as coconut, castor, palmyra.pepper,tea,coffee, banana, cauliflower and mango. (Lefroy 1909, Fletcher 1914 and 1919, Pillai 1919, Ayyar 1940 and 1944 and Nirula 3955) The information available on its biology is meagre and is derived from the observations recorded of the pest in Ceylon and Malaya by King (1950), Corbett (1951), Austin (1952) and Hutson (1932) on tea. *Parasa lepida* has in recent years become a serious pest of Coconut in Kerala, appearing sporadically and doing considerable damage, especially to young plants. No knowledge, however, exists on the biology of the post on coconut in India and hence the present studies were undertaken. These studies were made under laboratory conditions, coconut leaflets being given for feeding. (Plate III, Fig. 2)

Mating and Oviposition: Mating takes place on the second day of the emergence of the moths and lasts 3 to 4 hours. Oviposition starts on the next day. Eggs are laid in batches of 10 to 15 and rarely, even up to 50. The total number of eggs laid per female ranges from 112 to 212 Egg laying is completed in 3 days and the number of eggs laid per day progressively decreases from the first to the third day, the average number of eggs laid on these days being 69, 59 and 29 respectively (Table 1). Eggs are strongly glued to the substratum

The Egg : (Plate I, Fig. 1) Elliptical, flat and yellowish green in colour with a smooth shining surface; 2«2 mm in length and 1·5 mm in breadth, Viability of egg 87 per cent. Incubation period 6'4 days on an average (Table 2). The larva emerges by breaking the chorion in the centre.

The first instar larva : (Plate f, Fig. 2). Body dorsoventrally flattened and cream white in colour; measures 2·2 mm *x* 1·5 mm. Head, light yellowish measuring 0 68 mm x 0.64 mm. Mouth parts reddish brown; labrum and clypeus well developed; antennae two segmented, bearing a long hair and two minute processes distally; ocelli 3 in number and found at the lateral margin posterior to each antennal base. Head concealed under a transparent prothoracic flap. Pro, meso and meta thorax with indistinct segmentation, 8 pairs of spixa-

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eles, 7 pairs of lateral scoli, two pairs of sub-dorsal scoli and 8 median locomotory sucker discs on the ventral side. Natural mortality of the first instar caterpillar is 46 per cent on an average; it feeds little and lasts 2½ to 5 days (Table 2). Larva has gregarious tendency.

The second instar larva: (Plate I, Fig. 3) Cream coloured and 3·8 mm x 1·3 mm. Head yellowish green, 1 mm x 0·98 mm; labrum and clypeus large. Gregarious in habit. It feeds on the lower surface of the leaf by scraping off the surface tissues in longitudinal streaks. The second instar lasts 4 to 5 days (Table 2). Natural mortality of the instar is 42 per cent.

The third instar larva: (Plate I, Fig. 4). Body glassy white in colour and 7 mm x 2·5 mm. Head 1·4 mm x 1·2 mm; mouth parts reddish brown; labrum and clypeus black. Middorsal line green and broken in the abdominal region by a white ring. The larva feeds on the lower surface of the leaf. Duration of the third instar ranges from 8 to 12 days (Table 2). Upto 30 per cent natural mortality is observed in this instar.

The fourth instar larva: (Plate I. Fig. 5). Buds of five pairs of sub dorsal scoli appear on abdomen. Body almost cylindrical, 9 mm x 3 mm. Head, light green; 2·2 mm x 2·0 mm; mouth parts black; labrum and clypeus relatively small in size. Colour of body white excepting the green mid-dorsal line and lateral lines. The larva feeds on its exuvium first and then on leaf tissues. This instar lasts 6 to 8 days (Table 2).

The fifth instar larva: (Plate I; Fig. 6). 17 mm x 5 mm. Head 2.9 mm x 2·7 mm; labrum and clypeus much reduced, Three types of setae on scoli, hair like, needle like and bottle shaped; bottle shaped ones more irritant. Larva very active and feeds voraciously on leaves; also feeds on the exuviae. The duration of this instar ranged from 5 to 6 days (Table 2j.

The sixth instar larva: (Plate I. Fig. 7), 24 mm x 8 mm. Head light green, 3·5 mm x 3·2 mm. Sub dorsal scoli very prominent and green in colour. Ventral sucker discs well developed. Sixth iastar stage lasts 5 to 7 days. (Table 2).

The seventh instar larva: (Plate II, Fig V. 30 ram x 10 mm. Head green, 4·7 mm x 4·2 mm. mouth parts deeply coloured; mandibles conspicuous and black; labrum and clypeus much reduced. Body apple green, mid-dorsal line and lateral lines deep blue, sub-dorsal side and scoli dark green and lateral scoli light green, Scoli short with greater number of setae; setae strong and stiff with the tips sharply pointed and easily detachable. Seventh instar ranges from 6 to 8 days, (Table 2).

The pupa: (Plate II. Figs. (2 & 3 , Prior to pupation the body of the larva shrinks considerably and the colour changes to yellowish green. The prepupal period lasts 2 days. On the second day the larva ejects a thick reddish brown viscous fluid which spreads under the larva on the substrate surface and hardens to form a firm base. The cocoon is spun over it with silken threads. The cocoon is made compact and hard by spreading on its inner side a viscous fluid ejected out of the mouth. The minute hairs on the black tubercles at the posterior end of the body are spread over the cocoon giving it a dark

brown colour. The cocoon is elongate and hemispherical and strongly glued to the substratum at its base. Pupation takes place on the ventral side of the leaflet in the field. The pupal period varies from 27 to 37 days. (Table 2).

The adult : The moth comes out of the cocoon by pushing off an operculum to one side which remains hinged to the main part. Soon after the meconium is discharged, the moth becomes active, flutters its wings and starts flying. Moths are nocturnal in habit and positively phototropic.

Sex ratio of male to female is 1:1.5. The longevity of unmated males is 7 to 10 days and unmated females 7 to 8 days, whereas the longevity of mated males is 4 to 6 days and of females 6 to 8 days (Table 2).

The nature and extent of damage: The pest generally infests 2 to 8 years old coconut plants. The caterpillars in the initial stages are highly gregarious and a leaflet may contain 20 to 30 of them. Subsequently they disperse and distribute themselves on adjacent leaflets. In the early stages they scrape off only the lower epidermis of the leaves and therefore the injury is not significant. The fourth and the subsequent instar larvae cause severe damage by defoliation. They feed on the leaflet blades leaving only the mid-ribs.

Natural enemies : *Apanteles parasae* R« parasitises the larva. *Aspergillus sp.* infects the larva during the monsoon months. The infected larva turns brown and putrefies. No external growth of the fungus is observed before or after the death of the mature caterpillars; in early instar caterpillars, however, thick external growth of the fungus is evident. Conidiophores bearing globular conidia arise from aft over the body of the larva. Plate III, Fig. 1)

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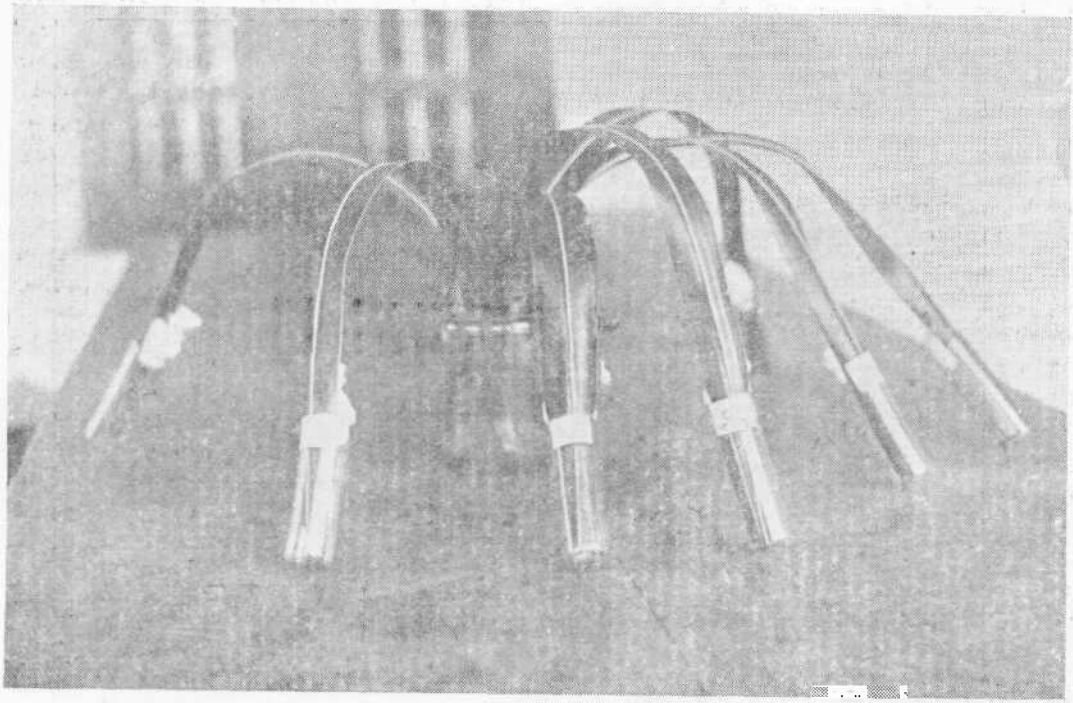
Table 1

Fecundity of *Parasa lepida*

Replication (Moth)	No. of eggs laid on 1st day	2nd day	3rd day	Total eggs
1	80	54	42	176
2	68	70	50	188
3	50	40	22	112
4	70	50	28	149
5	97	80	35	212
Average	69	59	29	167



Fig, 2

Fig. 2. Rearing of caterpillars of P. *lepida* on coconut leaves.

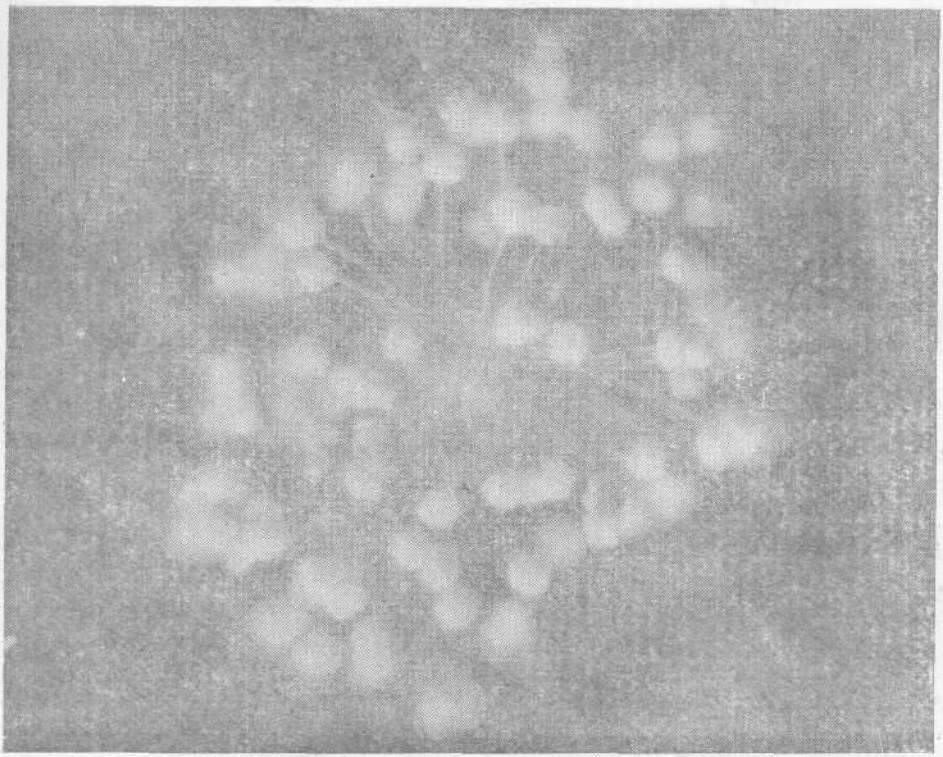


Fig. 1

Fig. *1*, *Aspergillus* sp, on caterpillar of P. *lepida*

Table 2

Duration of different stages of *P. lepida* in days.

Instar	Range	Average
Egg	6 — 7	6·4
IstLarva	2½ — 5	3·5
II "	4 — 5	4·5
III "	7 — 12	9·0
IV "	4 — 6	5·2
V "	5— 6	5·7
VI "	6 — 7	6·2
VII "	6 — 8	7·3
Pupa male	27 — 31	29·5
" female	30 — 37	32·0
Adult life (Male mated)	4 — 6	48
Adult life (female mated)	6 — 8	6·8
Male unmated	7 — 10	8 4
Female unmated	7 — 8	7·4

Note : The results are based on observations made on 10 insects reared separately.

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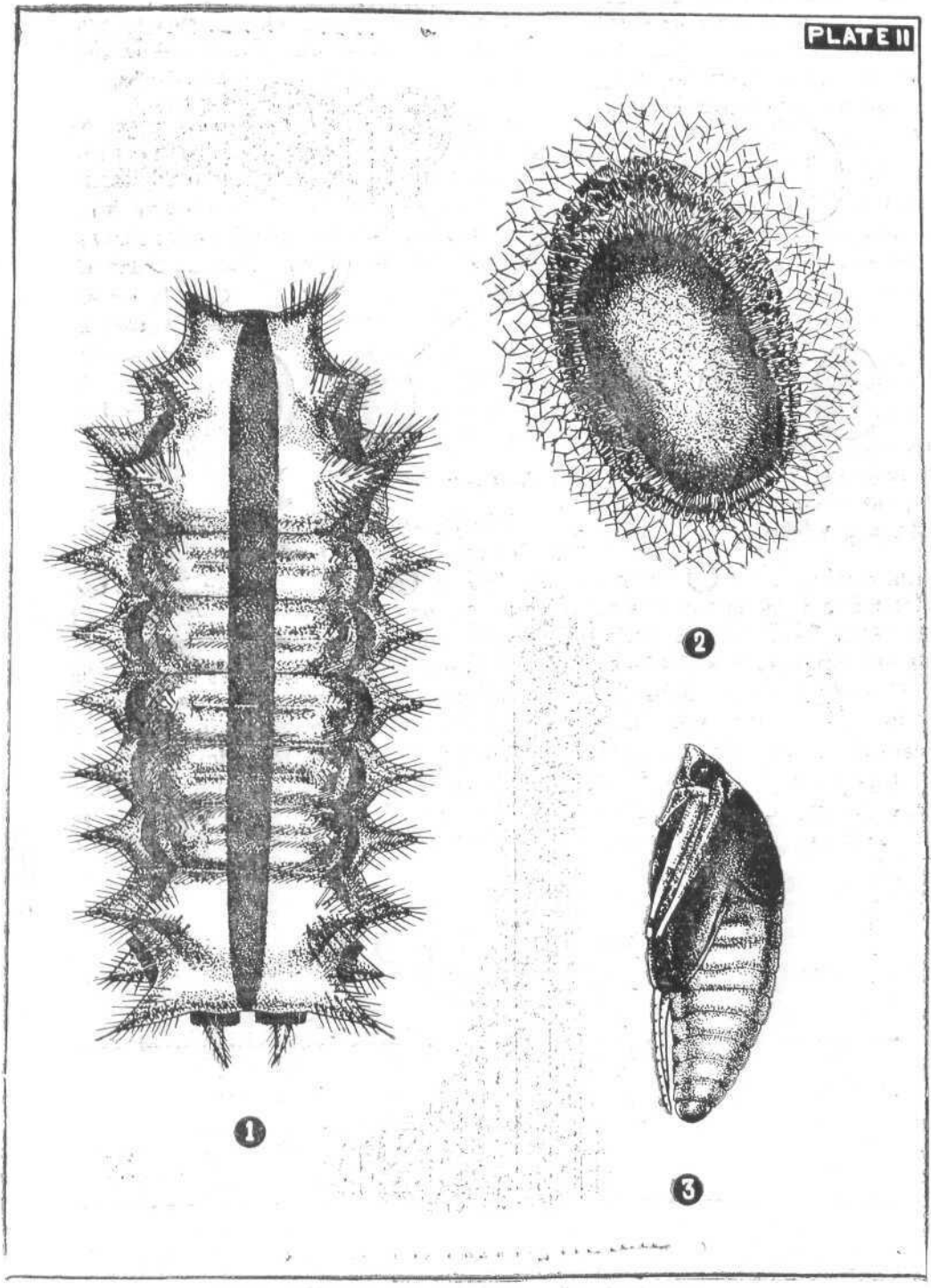

Plate II. Life stages of P. *lepida* (Contd.)

1. Seventh instar larva 2. Pupal cocoon 3. Pupa

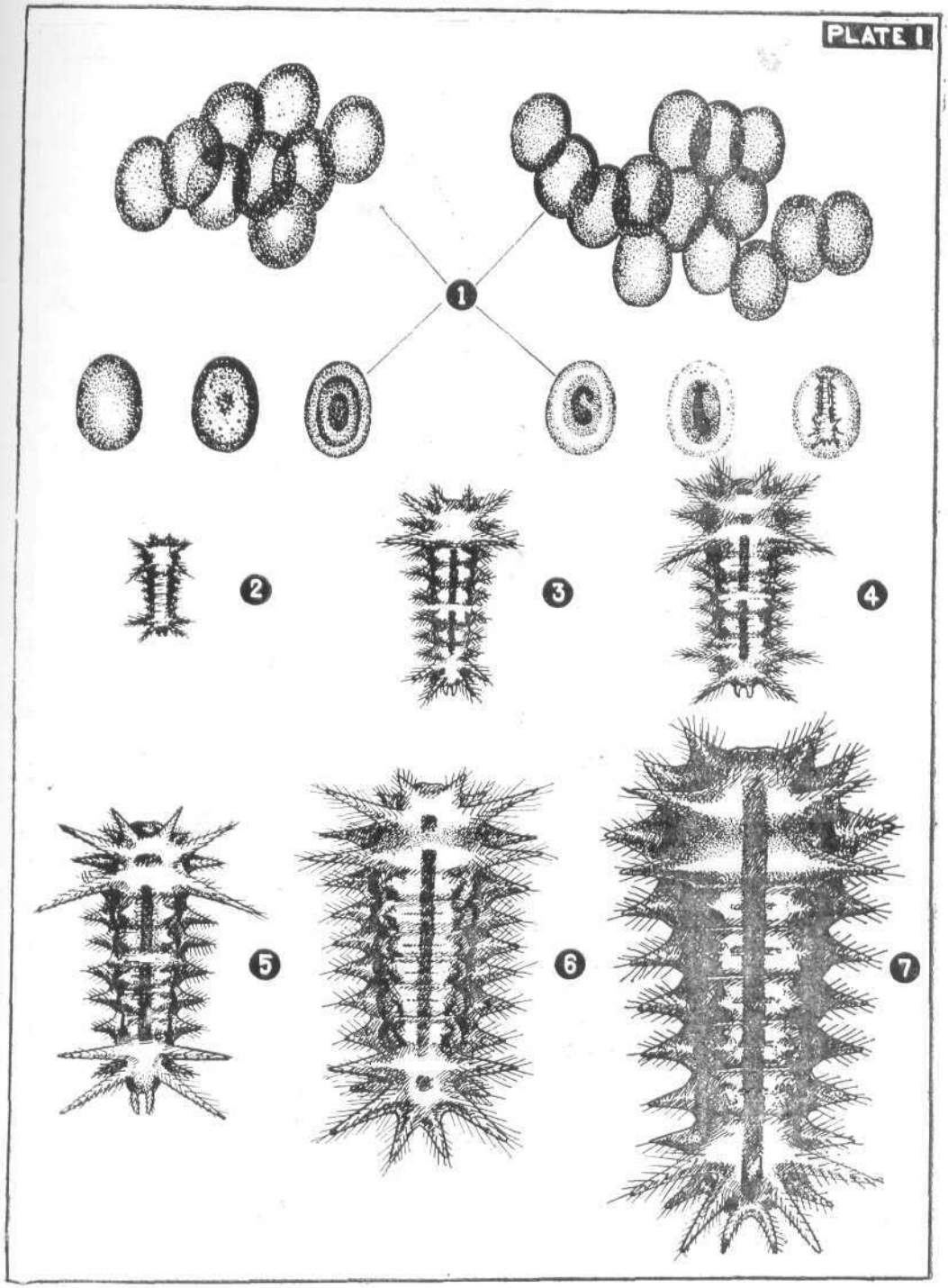

Plate. I Life Stages of *Parasa lepida*.
1. Egg 2. First instar larva 3. Second instar larva 4. Third instar larva
5. Fourth instar larva 6. Fifth instar larva 7. Sixth instar larva.