V. LIFE HISTORY

Introduction.— _Lentocerisa varicornis_ Fabrilius is an important representative of sub-family Alydinae. It was Fabrilius (1794) who for the first time distinguished the genus _Lentocerisa_ as _Ceris_. Giraudet (1805) named it as _Lentocerisa_, a term which is in current use. Subsequently others like Burmeister (1835) and Kolenat (1840) termed it as _Myodacmus_ and _Rhopoceros_ respectively. Burmeister (1835) influenced by his new decision called it _Stenocerisa_. Regarding the species, Fabrilius (1803) was the first to classify it as _Ceris varicornis_ and was followed by Wolff (1811) who retained this term. Guerin-Meneville (1836) changed the name of the species as _Lentocerisa falcata_, while Burmeister named it as _Myodacmus varicornis_. In 1855 Dallus gave another synonym, _Lentocerisa chinensis_.

Lefroy (1902) worked out the life history of _Lentocerisa varicornis_ which can be claimed as a standard work of his time. He was followed by Dutt (1900), Ayer (1901) and Lal (1946). The present writer has attempted to enter into details which were overlooked by Lefroy. 

Distribution.— _Lentocerisa varicornis_ is one of the major insect pests of cotton plants in India. It is found in fields along with its sister species viz. _L. acuta_ and _L. costalis_. Lefroy (1902) has given a long list of the distribution of _L. varicornis_ which covers...
almost all the rice growing areas of Uttar Pradesh, Bihar, Orissa, Bengal, Madhya Pradesh, Kerala west coast, Karnataka and Burma.

Fletcher (1910) has also reported it practically from every rice growing region of India. Sheroff (1910) recorded it at Bumco while Bec (1923) reported it from Madras. Suscinother (1923) observed it in company with L. acuta in Madras. The present writer has recorded its occurrence at Allahabad, Kanpur, Aligarh, Delhi, Varanasi, Bhindore, Bacoa and neighbouring districts. At Aligarh it was found in abundance along with Lentocoris acuta.

Food plants.— Leffroy (1908) has shown that besides paddy the other plants subjected to its attack are: *Sorgum vulgare* (Parr.)*, Sorgum* *vulgare* var. *Pers.,* *Pennisetum typhoides*, sugar-cane, sesame (*Ricinus communis* Linn.), *Manic* (*Glansine coracana* Linn.) and banana (*Musa* *italica* Linn.). The present writer could record this pest on the first four plants including paddy.

Damage.— Lentocoris varicornis is most destructive to paddy plants especially when the ear formation has commenced. The reports of the previous workers invariably show that in Northern India the pest is most injurious during grain forming stage of paddy in September—October, while in southern part it is very active during November—December. The bugs, young and old alike, suck the milky juice of developing seeds and render the seeds underdeveloped and dry. Prior to seed formation it feeds on seedlings by sucking the sap from leaves and tender shoots. Heavy damage
is caused to naddy plants in these cases where there is abundant
growth of wild grasses. The present writer could collect just
thrice the number of bugs from such fields. It is thus presumed
that such wild-grass areas afford best opportunity for eating
and increased breeding. The damage done to food plants other than
naddy is hardly severe.

Habits of the adult.— After the rains have set in and the
growth of wild grasses has commenced, the activities of the pest
become apparent. The pest breeds freely due to the presence of
abundance of wild-grasses during the period (June—July). In the
meantime (July—August) seedling become long enough to become a
source of food for the pest. The attack becomes more severe in
September and October when the ear formation sets in. When the
early season variety of naddy is harvested the bugs shift their
destructive activity on late season varieties and continue causing
damage to plants till November. During winter (December to March)
they become inert as a response to unfavourable ecological factors.
This inactive phase continues during summer (April to June) and
may be attributed to high scarcity of food material i.e. naddy
corn.

The males and females are almost of the same size and
colour, the only difference lies in the structure of the abdomen.
The posterior tip of the males is slightly swollen while those
of the females is pointed. In females due to developing eggs the
abdomen becomes swollen. The slender body and dull reddish green
colour of the bug give it an opportunity to avoid the notice of
the enemies. Besides, some pungent and repelling odour emitted from the odoriferous glands seems to help the bugs in defending themselves against the enemies.

Leptocorisa varicornis is a slow flier and when approached takes a short flight. The females are, no doubt, more active than the males and take a longer flight. The bugs are diurnal and their activities accelerate at moderate temperatures. From July to October, when the mornings and evenings are pleasant, they are invariably found on the upper parts of the plants especially the ears, while between 10 A.M. to 4 P.M. when the temperature is high, they hide in the lower parts of the plants. From November to middle of December the pest becomes active late in the forenoon at about 8.30 P.M. When the winter becomes severe the pest is rarely seen. L. varicornis is positively phototrophic and is seen to fall on electric light. Besides, marked increase in activities can be noticed in this medium.

Method of rearing.— The adults collected by means of hand-nets from paddy fields were then kept in medium-sized lantern glass chimneys which were covered on the top with a thin muslin cloth. The chimneys were then placed on glass troughs of 1 1/2" long and 3 1/3" diameter. The glass troughs were filled to three-fourth length with sand soaked in water. Thin shoots, leaves and young ears of paddy were fixed in sand so that they get regular supply of water and may not turn dry. These shoots, leaves etc. serving as source of food were changed daily in the early part of the
paddy season, while in the later part change was given on alternate days. When the paddy season was over and no leaves etc. were available, the wild grasses were used as source of food in a similar way. The chimneys containing these insects were then placed in a breeding cage measuring 3½' x 2½' with a maximum minimum thermometer placed in it. When the temperature was low (November-February) an electric bulb varying from 25W to 60W (according to the temperature required) was lighted inside the cage. The leaves on which the eggs were laid, were removed and kept in glass troughs covered with small lantern chimneys.

High mortality was recorded in the first instar and the young nymphs could not survive longer. It had become a problem to get the moults. The present writer therefore tried different methods, the most successful is the following:

Glass tubes (of the shape of test-tubes) measuring about 12" long and 1½" diameter were taken and filled for about one-third of their length with sand which was soaked with water to its maximum. Few ripening ears and tender leaves were fixed in the tube so that they may not get dry. The ears and the leaves were changed daily so as to provide a regular supply of fresh food and also to avoid any fungus growth. Only one newly emerged nymph was released in one tube, the top of which was covered with a thin muslin cloth.

Copulation. It has been observed both in the fields and under captivity. In the field it has been invariably recorded in the
day especially in the morning between 8 A.M. and 9 A.M. In
insectary it has also been observed in the night in absence of
electric light which impresses upon the present writer that
light is not an essential factor for copulation.

One pair of the newly emerged adults were released
in large lantern glass chimneys which were placed in a manner
described above. It was done so as to allow a greater space for
their movements. It has been observed that the males become
active sooner than the females. The latter does not offer herself
for mating soon after emergence. Copulation usually takes place
in about 12-14 days after emergence and lasts for about 2-4 hours.
In the field the courtship could not be recorded but under captivi-
ity it has been observed. First the male approaches the female
from front and moves gently its antennae over that of the female.
If she is unwilling, she flies away while the male follows her
immediately and repeats the same process again and again. This
act is done probably to arouse the sexual urge in the female.
When the female offers herself for mating the male extends his
abdomen below that of the female and the copulation starts in
opposition, that is, their anterior ends point in opposite direc-
tions. The usual process of riding of male over female does not
happen. For about 2-2½ hours there is absolutely no movement,
both remaining inactive, but after that slight movements on the
body are observed. It is only the male who initiates such activi-
ties. It moves the hind-legs one after the other over its as
well as over that of females abdomen. The hemelytra are then
raised and the hind legs are moved in a similar fashion. Afterwards both the fore legs are moved forward, the labium, the antennae and finally the legs themselves are cleaned. The middle legs are then passed over the abdomen in a similar way as described in the case of hind legs. The male repeats the same process again and again at intervals of 15-20 minutes till the copulation is over and both the male and female separate.

Oviposition.—The female starts laying the eggs 3-4 days after copulation. In captivity the oviposition mostly takes place in the night but the process has also been observed in day time. In the fields the eggs are mostly deposited regularly in a row on the underside of the leaves while in insectary no hard and fast rule is followed and besides leaves the eggs are also deposited on glass chimneys. The eggs are attached firmly to the substratum by means of a sticky substance which on becoming dry hardens thereby forming a protective covering for them. It enables eggs to resist the adverse conditions such as rains, temperature, wind etc. The eggs are invariably laid in clusters which consists of 1-3 rows. They are mostly deposited symmetrically in one row only. In insectary the maximum number of eggs in one row was twelve while the cluster of eggs brought from the fields contained 15-20 eggs in one row. The time taken for depositing one egg varies from 2-10 minutes. The number of eggs laid per day by a single female is 12-19 while the total number of eggs laid by it ranges between 14-30. The female finishes egg-laying in about 2-3 days.
When the female is about to deposit the eggs, it sits in such a manner as the legs are stretched properly far apart from each other and the antennae direct anteriorly. When one egg is laid, the female moves forward and goes on depositing the eggs one after the other till the desired number is reached. The freshly laid egg is creamy white in colour which deepens in about 3-4 hours. In about twelve hours it becomes dark brown and as the time of hatching approaches it becomes darker and darker in colour.

Pre-imaginal stages—

(A) Egg.— Each egg is oval in structure. Its dorsal surface is flat while latero-ventrally it is regularly curved. It is highly convex on the ventral side, the lower most part of which touches the surface on which it is deposited. Its dorsal flat surface measures externally 1.2 mm long and 0.8 mm broad. The dorso-lateral rim of the shell is more sclerotized than the rest and probably assists in the rupture of the shell. Four small black dots, which are placed in a curve, are visible on one end of the dorsal flat size. A white spot, which in dissection reveals to be a circular depression in the membrane surrounding the enclosed embryo, is placed laterally in the middle of the area enclosed by the black dots. This, as will be seen later, is the anterior end of the egg. Lefroy (1908) reported the dorsal surface to be slightly concave but the present writer could observe such concavity only in deformed eggs which did not hatch at all.
(B) Incubation period.— The hatching period of the eggs varies very slightly in pre-winter days when the pest is active. During July - September the eggs generally hatch out in about 4-5 days while in October to December the hatching usually takes place in 5-6 days.

(C) Eclosion from the egg.— The eclosion of the nymph from the egg in insectary mostly takes place in the later part of the night. In more advanced stages of the embryo, it has been observed that the thorax and abdomen lie within the egg on the ventral curved side. The abdomen occupies a major portion while the thorax lies on the antero-ventral region. The head curves upwards so that its occiput lies in the antero-lateral part of the shell. The frons, clypeus and the mandibular plates become dorsal in position. The legs, antennae and labium lie in a curved (more or less coiled and entangled) state on the mid-dorsal region of the shell. Practically in all the cases the upper flat surface breaks off at dorso-lateral rim of the shell, which suggests that the pressure exerted by the young one is confined only to the antero-dorsal region. Moreover an examination of the embryonic covering which is always left behind within the shell confirms it. In the opinion of the present writer the black dots, the chitinized dorso-lateral rim of the shell and the white spots of the head are corelated with each other and have some bearing for the rupture of the shell. The break at the sides of the dorsal flat surface is uniform almost in all the cases, but its posterior
limit is not definite. In few it is about three-fourth while in some two-third and still more in others about half of the upper disc is peeled off. The membrane enclosing the embryo breaks off at the head region and extends up to the thorax. The head followed by thorax protrudes out of the shell. At this stage a greater force can be applied by the emerging nymph to jerk out the body. Later on, the abdomen, legs, antennae and beak wriggles out and the embryonic membranous covering is left behind within the shell.

(D) Nymphal stages.— The newly emerged nymphs pass through five stages to attain the adult hood. Before undergoing a change the nymph becomes sluggish. It occupies a solitary place and prepares for ecdysis. It sits in such a fashion that the legs are stretched far apart and the antennae direct posteriorly. One by one the legs are moved to and fro, the antennae are also subjected to the same process. This is done probably to loosen the skin which is to be given off. The skin breaks off in the mid-dorsal region of the thorax and extends up to the head. The nymph then pushes forward its body and the head followed by thorax comes out. Its advance in forward direction brings out the antennae and the legs. The posterior tip of the abdomen is the last part to come out. The whole process lasts for about fifteen minutes. Some important remarkable changes are met with in the final moult and the early adult stage. The nymphal periods of different instars vary in different stages. The nymphs attain maturity in about 16-19 days.
(i) **First instar.**— Just after emergence the nymph is about 1.75 mm. long. The growth being rapid it becomes about 2 mm. in 4-5 hours and by the expiry of first stadium it increases to its maximum of 2.5 mm. The first instar's duration is 3-4 days. The general colour of the body is green with small hairs throughout the body. The division of the body into three regions viz. the head, thorax and abdomen is quite distinct.

(a) **The head.**— The head is well developed and shows a remarkable resemblance with that of the adult. It is about 0.75 mm. long and 0.47 mm. broad. A dark brown broad patch extends posteriorly from the antennal sclerite to the metathorax. The clypeus is swollen anteriorly and thus the anterior tips of the mandibular plates lie far apart from each other. The deep clefts between clypeus and mandibular plates are distinct. A pair of dark brown four-segmented antennae are placed dorso-laterally in the anterior part of the head. They are lodged in distinct antennal sockets. The antennal sclerite is also clearly visible. The first segment of the antenna is of uniform dark brown colour, the proximal and distal ends of the second segment are dark brown while it is creamy white in the middle. The third segment like the first is dark brown in colour throughout its length. The ring joint is very small. The proximal part of the flagellum is dark brown and is followed by a creamy white patch while the distal half is again of dark brown colour. The antennae are covered with small hairs throughout their length. The two large black compound eyes are situated posterior to the antennae. The ecdysial suture is clearly visible, the frontal arms extending
upto the middle of the compound eyes. The frons is large. The
enistomal suture is faintly marked off. The occipital region is
broad and the ocelli are absent. The four-jointed long and
slender beak arises anteriorly and is kept curved back beneath
the body. It extends posteriorly beyond the tip of the abdomen
in newly emerged nymph, while in advanced first instar it
reaches upto middle of the abdomen. The labium is dark brown
in colour having the tip of the apical segment black. The labrum
is small and overlaps the first labial segment. The bucculae,
maxillary plates, gula and the sense are distinct but the sutures
limiting their areas are not visible.

Internally the paired dorso-lateral, paired ventral
and the single mid-dorsal process of the hypopharynx are quite
distinct. The salivary syringe with piston and handle lies
ventral to the mid-dorsal process of the hypopharynx. The maxi-
llary and mandibular stylets with their respective levers are
well developed and occupy a position similar to that of the adult.

(b) The thorax.— It is fairly long and is divided
into three well marked regions viz. the pro-, meso-, and meta-
thorax. The transverse grooves limit the areas of each, the
posterior most groove separating the metathorax from the abdomen.
The posterior extensions of the protergum of adult is lacking.
The prothoracic tergum is broader than that of meso- and meta-
thorax. The thoracic spiracles are uncovered. The phragmatal
lobes are yet undeveloped. One clear line appears in the
mid-dorsal region of the thorax and marks off the line of ecdysial cleavage. It is in continuation with the coronal suture and extends posteriorly as far as the middle of the metathorax. The pleural folds (episternal and enimeral folds of adult) are undeveloped. The trochantin is present and the coxa has both the pleural and trochantinal articulations. The basicostal suture is distinct and demarcates the coxa into two parts, the anterior being the basicoxite. Each division of the thorax bears a pair of moveable appendages, the legs. The fore-legs are the smallest while the metathoracic legs are largest. The trochanter, femur and tibia have the resemblance of the adult. The tarsi are two segmented and the pretarsus bears a pair of claws. The legs are dark brown in colour with numerous dark hairs of varying sizes.

(c) The abdomen.— It is broad anteriorly but in the newly emerged nymph it abruptly tapers out posteriorly. In the first instar of advance stage, the posterior tapering of the abdomen is gradual. The abdomen is divided into eleven segments, the eleventh being the smallest in the form of a ring and carries the anal opening. The grooves separating one segment from the other are feebly marked off. There are eleven tergal plates, there being no paratergites. Mesally on the fifth and sixth tergum are situated the openings of the odoriferous glands. The first abdominal sternum has become fused with the metasternum. Thus there are only ten sternites, the first actually being the second. The parasternites are faintly marked off from the sternum. There are seven pairs of abdominal spiracles which occur laterally on
second to eighth sternite. There are no abdominal appendages.
The genital armature has not yet made its appearance.

(ii) Second instar. — The nymph after casting off its
skin becomes active. It is about 2.8 mm. long and grows upto a
maximum size of 4.5 mm. in the second instar. There are no marked
change in the colour of the body, antennae, beak and legs. The
head is about 1.08 mm. long and 0.7 mm. broad. The rostrum now
reaches only upto third abdominal sternum. The postcoxal bridge
of the prothorax is rudimentary. The anterior extension of the
protergum which surrounds the postoccipital region of the head
is distinct. The lateral extension between the tergal and sternal
region become developed. These flaps in the prothoracic region
are longer than those of the meso- and metathorax. The sternal
furca become quite distinct while the neural apophyses are absent.
The abdomen becomes larger in size. Besides the above there are
no other marked changes in the second instar. The nymph remains
in this stage for an average period of 2-3 days and then under-
goes another moult.

(iii) Third instar. — In this stage the nymph grows upto
a maximum length of 6.8 mm. There is no change in the colour of
the body. The lateral dark brown strap extending posteriorly from
the antenna to the metathorax becomes dull in colour. The head is
now about 1.78 mm. long and 1.1 mm. broad. The beak reaches unto
the hind coxae. The protergum extends posteriorly over the ante-
rior part of mesotergum. The basisternum of prothorax is distinct.
The prephragma is still undeveloped and the postphragma makes
its first appearance. The wing buds of both pairs also appear. The first pair belongs to mesothorax and is dorsal in position while the second pair originates from the metathorax and lies beneath the first pair. The wing buds of the first pair extend up to the middle of the metathorax while those of the second pair reach up to the posterior margin of the metathorax. The two thoracic spiracles are still uncovered and lie laterally in the inter-segmental space between the pro- and mesothorax and the meso- and metathorax. The pleural anephiyes of the pro- and metathorax become distinct while that of the mesothorax is rudimentary. The colour of the legs up to tibia become dull and the two jointed tarsus retains its original dark brown colour. There is no remarkable change in the structure of the abdomen except that it has become increased in size and in females a streak appears ventrally in the eighth sternum. The third stage lasts for 2-3 days.

(iv) Fourth instar.—The maximum length attained by the nymph in this instar is about 10.5 mm. The body and its appendages retain their original colour. The head increases in size and is about 2.32 mm. long and 1.4 mm. broad. The gular and hypostomal sutures become quite distinct and the gula and maxillary plate from senae. The gula occupies a major portion of the ventral plate and there is no definite line of separation between the former and the maxillary plate. The labium extends posteriorly up to the middle of metasternum. The nasal parts of the sternum become feebly sclerotized. The basisternum with its nasal ridges become fairly distinct. The development of the postphragma becomes
more pronounced. The growth of the first pair of wing buds is
rapid than those of the second pair. The first pair of wing lobes
extend up to the first abdominal tergum and completely overlaps
the second pair. The abdomen has become elongated and the ventral
streak in females extends throughout the eight sternum. The
duration of this stadium is of four days.

(v) Fifth instar.— In this last instar it has been
invariably seen that the growth of the nymph is very rapid. It
increases to a maximum length of about 15.2 mm. There is no change
in the colour of the body. The head is about 3.94 mm. long and
1.8 mm. broad. There is no remarkable change in the structure of
the head. The protergum extends posteriorly and overlaps about
half of the mesotergum. The pronotagma is faintly marked off
while the postnotagma has developed immensely. The mesotergum
becomes divided into scutum and scutellum, the later extending
unto the middle of the metatergum. The wing buds of both pairs
have increased in size. The first pair extends unto third abdomi-
nal tergum while the second pair ends near the posterior margin
of the second abdominal tergum. The sclerotization of the thoracic
sternum becomes more pronounced. The paratergitae and paraster-
tites of the abdomen have become more distinct. The first valvifer
becomes partially developed. The ninth sternum in males shows in
its postero-lateral region two large spots which indicate the
developing claspers. This nymphal stage lasts for five days and
as such becomes the longest stadium.
Newly emerged adult. — The fifth moult brings forth the well developed adult. The mechanism of eclosion of the adult from the last nymphal skin is similar to that of the preceding ones. In the newly emerged adult there are three things which can be claimed with any certainty as the special features of metamorphosis. Firstly, that the paired ocelli make their first appearance. Secondly, that the openings of the odoriferous glands, which so far in the nymph were placed on the fifth and sixth abdominal terga, close down and become functionless. The functional odoriferous glands of the adult develop and open into the metasternum. Finally, that the third tarsal joint is added. Lefroy (1908) considers this to have become separated from the distal tarsal joint of the nymph. The extension of the protergum over whole of the mesoscutum, the formation of the pleural folds (episternal and epimeral folds), the well developed wings and the external genitalia are few more notable features.

The newly emerged adult is about 16 mm. long and is devoid of any pigmentation. The general colour of the body and wings etc. is creamy white and the wings lie in a folded condition. In about twenty minutes the pigmentation starts and the body becomes green in colour. Gradually the colour deepens first becoming reddish and finally reddish brown. The antennae retain their usual colour (those of nymphs) while the legs at their joints have a slight tinge of black colour. In due course the wings occupy their normal position and lie flat over the abdomen. In
about three to three and a half hours the pigmentation of the body and the tracheation of the wings become complete.

**Longevity.** — In presence of ample food the male and female lived for a maximum period of 50 and 104 days respectively. The average longevity of male and female is 33 and 55 days respectively. One female which survived for a maximum period of three and a half months was fed on wild grasses during winter days.

The phenomenon of parthenogenesis does not take place in *Leptocoris varicornis*.

**Delayed emergence.** — The present writer placed few clusters of eggs in order to record any case of delayed emergence i.e. passing over the winter season and summer season in egg-stage and hatching early during the rainy season, but not a single egg hatched. The non-occurrence of delayed emergence cases and the survival of one female for three and half months lead the present writer to uphold the view maintained by Lefroy (1908) that it hibernates as an image from December to February and that it aestivates from March to June.
### TABLE No. 1

Duration of life-history from July to November.

<table>
<thead>
<tr>
<th>Different stages of life-history</th>
<th>Duration Days</th>
<th>Temperature in °F</th>
<th>Humidity %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Maximum</td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>°F</td>
<td>°F</td>
</tr>
<tr>
<td>Pre-copulation period.</td>
<td>12-14</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Pre-oviposition period.</td>
<td>3- 4</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Oviposition period.</td>
<td>3- 3</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Incubation period.</td>
<td>4- 5</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>First instar.</td>
<td>3- 4</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Second instar.</td>
<td>2- 3</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Third instar.</td>
<td>2- 3</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Fourth instar.</td>
<td>4</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Fifth instar i.e. period between 4th instar and emergence of adult.</td>
<td>5</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Total period from newly emerged adult till emergence of off-spring.</td>
<td>37-45</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>Longevity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) male.</td>
<td>33</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
<tr>
<td>(b) female.</td>
<td>55</td>
<td>88 - 101</td>
<td>66 - 74</td>
</tr>
</tbody>
</table>
TABLE No. 2

Average length of body and head of ten nymphs.

<table>
<thead>
<tr>
<th>Parts of nymph</th>
<th>First instar mm.</th>
<th>Second instar mm.</th>
<th>Third instar mm.</th>
<th>Fourth instar mm.</th>
<th>Fifth instar mm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of body including the head.</td>
<td>2.5</td>
<td>4.5</td>
<td>6.8</td>
<td>10.5</td>
<td>15.2</td>
</tr>
<tr>
<td>Length of nymphal head.</td>
<td>0.75</td>
<td>1.08</td>
<td>1.78</td>
<td>2.32</td>
<td>3.24</td>
</tr>
</tbody>
</table>

Application of Dyer's law.— The ratio of increase in the width of the head is 1.4. It was obtained by dividing observed width of each instar by the one which precedes it.

TABLE No. 3

<table>
<thead>
<tr>
<th>Instars</th>
<th>Observed width of nymphal head</th>
<th>Calculated width of nymphal head</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st instar.</td>
<td>0.47 mm.</td>
<td>- - - - - - -</td>
<td>- - -</td>
</tr>
<tr>
<td>2nd instar.</td>
<td>0.7 mm.</td>
<td>0.47 x 1.4</td>
<td>0.65 mm.</td>
</tr>
<tr>
<td>3rd instar.</td>
<td>1.1 mm.</td>
<td>0.65 x 1.4</td>
<td>0.91 mm.</td>
</tr>
<tr>
<td>4th instar.</td>
<td>1.4 mm.</td>
<td>0.91 x 1.4</td>
<td>1.27 mm.</td>
</tr>
<tr>
<td>5th instar.</td>
<td>1.8 mm.</td>
<td>1.27 x 1.4</td>
<td>1.77 mm.</td>
</tr>
</tbody>
</table>
The observed width of the first instar was then multiplied by this ratio (1.4) to get the calculated width of the second instar. By multiplying the calculated width of the nymphal head by the ratio, the calculated width of the instar following it was obtained. The difference between the observed and calculated width shows that there is a gradual increase up to the third instar but in the later stages this geometrical progression is lost. The present writer is of the opinion that Dyer's law does not hold good in Lentocorisa varicornis. Quadri's (1946) similar findings in Periplaneta lead the present author to believe that Dyer's law is not applicable to Hemimetabolous (Exopterygota) insects where the metamorphosis is simple, gradual and direct.