The larva of *Laurhervasia setacea* (Klug), (Neuroptera: Nemopteridae: Crocinae) from southern Africa

by

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The larva of *Laurhervasia setacea*, which possesses a strikingly elongated prothorax, is described from southern Africa. This is the first record of crocin larvae from the region and a brief account is given of their biology.

INTRODUCTION

The first crocin larvae to be recorded from southern Africa, were found in a small cave in the Aurus mountains of South West Africa during October, 1974; the larvae were reared and the adults identified as *Laurhervasia setacea* (Klug). Additional larval material has subsequently been collected from several localities in South, and South West, Africa. Like the larvae of *Pterocroce storeyi* With. and *Klugina aristata* (Klug) from Egypt, *Pterocroce troglophilus* Pierre from Algeria and *Dielcroce jojpana* (With.) from Israel, the larvae of *L. setacea* have an elongated prothorax, long, slender legs and a cave dwelling habit. Subsequent to the initial discovery, at least four other species of larval Crocinae have been collected in southern Africa, ranging from a species resembling *Croce filipennis* (Westw.) with a short prothorax, through to a species with a prothorax longer than that of *P. storeyi*.

These remarkable insects have been known since 1833, when Roux (cited by Tjeder 1967) published an illustration of a larva which he found living in a rock tomb near Giseh in Egypt. He named the insect *Necrophilus arenarius*, but did not associate it with the Nemopteridae, placing it instead in the ‘Aptères hexapodes’ (Tjeder 1967). Westwood (1840) (cited by Tjeder 1967) first suggested that the larva belonged to the Nemopteridae, and subsequent authors, whose work is reviewed by Tjeder (1967), have confirmed this and have added considerably to the information on crocin larvae from the middle eastern countries and India.

Although adult Crocinae are known from southern Africa, Australia, South America and Socotra Island, nothing was known of their larvae and in his monograph on the southern African Nemopteridae, Tjeder (1967) described six species belonging to the Crocinae, but based this only on adult specimens.

The following account of the morphology and aspects of the biology of larval *L. setacea* is derived from observations on 117 specimens from eight localities and deals mainly with third instar larvae, although reference is also made to the earlier instars.
THE LARVA OF LAURHERVASIA SETACEA

The three larval instars are morphologically similar, differing only in size (Table 1) and coloration.

Table 1. Mean measurements (mm) for L. setacea larvae. The range is given in brackets.

<table>
<thead>
<tr>
<th>Instar</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of larvae</td>
<td>5</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>Head width</td>
<td>0.36 (0.36)</td>
<td>0.59 (0.56-0.60)</td>
<td>0.97 (0.88-1.08)</td>
</tr>
<tr>
<td>Head length</td>
<td>0.35 (0.32-0.36)</td>
<td>0.56 (0.52-0.60)</td>
<td>0.93 (0.84-0.96)</td>
</tr>
<tr>
<td>Mandible length</td>
<td>0.49 (0.48-0.52)</td>
<td>0.75 (0.68-0.80)</td>
<td>1.31 (1.16-1.40)</td>
</tr>
<tr>
<td>Prothoracic length</td>
<td>0.62 (0.60-0.64)</td>
<td>1.26 (1.20-1.36)</td>
<td>2.50 (2.28-2.84)</td>
</tr>
<tr>
<td>Body width*</td>
<td>0.96 (0.86-1.06)</td>
<td>1.43 (1.20-1.60)</td>
<td>2.90 (2.16-3.48)</td>
</tr>
<tr>
<td>Body length*</td>
<td>2.86 (2.52-3.0)</td>
<td>4.53 (4.16-5.28)</td>
<td>8.60 (7.20-10.72)</td>
</tr>
</tbody>
</table>

* Variable, dependent on feeding and state of maturity within the instar.

Head (figs 1-3). Triangular in shape, slightly wider than long, tapering posteriorly. Surface covered with raised papillae each bearing a dolichaster and interspersed with smaller papillae (fig. 3). Well-defined tentorial pits situated on the dorsal surface. Third instar larvae (fig. 1) characterized by conspicuous brown triangular marking on the dorsal surface, lateral and posterior regions usually light brown and ventral surface pale buff. Second instar with dorsal surface mainly brown, triangular marking not discernible, but with a well-defined epicranial suture. First instar with dorsal surface of head uniformly brown and with a well-defined epicranial suture. Eyes, each comprising seven facets, six lateral and one ventral. Antennae (fig. 2) consisting of a stout basal segment supporting a delicate, segmented flagellum of which the proximal and distal segments are long, the latter bearing three delicate apical bristles. The intermediate segments are short and vary in number from five to seven. Mandibles, longer than head, devoid of teeth, curved near the apices and bearing dolichasters along the basal third. Maxillae reduced to a single blade, fitting into the ventral surfaces of the mandibles to form the suckorial tubes. Maxillary palps absent but cardo and stipes distinguishable. Labium reduced to a single median plate, bearing three-segmented labial palps on each side; basal segment large and flattened (probably the palpiger), middle segment short, dilating apically, terminal segment fusiform, tapering to an acute tip bearing an oval pit sense-organ on the dorsal surface.
Figs 1-6. 

Laurhervasia setacea (Klug). 1. Third instar larva. 2. Basal segment of antenna. 3. Portion of dorsal surface of head showing dolichasters. 4. The cuticle of the mesothorax, showing the stellate conformation. 5. Spiracular opening on the first abdominal segment. 6. Lateral aspect of eighth abdominal segment. The positions of the structures depicted on the scanning electron micrographs are indicated by numbers 2 to 6 in fig. 1. Dolichasters omitted from drawing for clarity.
THORAX (figs 1 & 4). Prothorax markedly elongate, composed of three distinct regions. Anterior region elongated with two lateral fuscous streaks in the centre, and dilating apically with two fuscous markings on the dorsal surface of the dilated area. Mid region wider, divided into tergite and sternite (this division not being discernible in the anterior region); articulating with the anterior region and bearing the prothoracic legs; fuscous markings on the posterior surfaces. The posterior region short, unscerotized and incorporated with the rest of the body and bearing two spiracles laterally. Dolichasters and sensory hairs are present on the posterior region of the prothorax which has the cuticle thrown into stellate folds (fig. 4). Anterior and middle regions of the prothorax with rows of sparsely arranged dolichasters. Mesothorax quadrate in shape, metathorax similar but wider. Two large fuscous markings present on the meta-tergites with smaller irregular markings on either side of the midline. Ventral surface of thorax pale creamy white. Cuticle of stellate conformation, similar to the posterior region of the prothorax. A spiracle is present between the meso- and metathorax, but is difficult to discern. Legs, long and slender, light brown in colour with the proximal regions of the tibiae slightly darker. Sparse rows of dolichaster-bearing papillae present on the legs and sensory setae occur at the articulations. Tarsi one-segmented terminating in claws. Ventral surface of tarsi with two rows of four spines each.

ABDOMEN (figs 1, 5 & 6). Ten-segmented. Segments one to seven similar to each other, becoming progressively smaller with segment seven short and broad; each bearing lateral spiracles, similar to the prothoracic spiracles, with minute openings covered by a complex structure (fig. 5). Segment eight cone-shaped, bearing numerous fusiform dolichasters on the tergite and sternite (fig. 6). Segments nine and ten telescoped into segment eight, together forming the spinneret. Segments seven and eight almost completely fuscous dorsally and the abdominal sternites uniformly pale.

MATERIAL EXAMINED. 117 larvae, SOUTH WEST AFRICA, Aurus mountains, 27° 27′ S., 16° 05′ E., 19 larvae, 23.x.1974; Ai Ais, 27° 56′ S., 17° 31′ E., 21 larvae, 1.i.1975; near Fish River Canyon, 27° 52′ S., 17° 45′ E., 1 larva, 15.vii.1975, all M. W. Mansell. CAPE PROVINCE, 20 km south of Twee Rivieren, 26° 39′ S., 20° 37′ E., 10 larvae, 23.xii.1974; ’Kromrivier’ farm, Cedarberg, 32° 32′ S., 19° 18′ E., 11 larvae, 4/5/1.1975; Seven Weeks Poort, 32° 25′ S., 21° 24′ E., 5 larvae, 9.i.1975; 10 km north of Prieska, 29° 40′ S., 22° 30′ E., 8 larvae, 17.vii.1975, all M. W. Mansell; ’De Hoek’ farm, Oudtshoorn Dist., 33° 23′ S., 22° 11′ E., 42 larvae, 31.viii.1975, A. J. Urban & S. B. Malcolm.

BIOLOGY

The larvae of L. setacea were all found in small, low (<1 m high), shallow caves or under rock overhangs, the feature of their habitats being that they offer complete protection from rain, direct sunlight and wind. Grocin larvae have not been found in habitats subjected to wind or draughts. In the field and the laboratory larvae will move away if an airstream is directed towards them, and only caves in which there is no through draught appear to be inhabited by these larvae. The larvae live among accumulated sand, dust and debris on the floors of the caves. The caves were usually inhabited by animals such as bats, hyraxes, porcupines, small carnivores, etc., and the debris which they provide harbours and attracts small invertebrates. Insects such as
Psocoptera, Thysanura, Coleoptera (Dermestidae), Hymenoptera (Formicidae), Isoptera and arthropods including Isopoda and Acari are abundant in caves occupied by crocin larvae and probably constitute their principal source of prey.

The larvae of *L. setacea*, like the larvae of other Croicinae, are able to move both backwards and forwards with great agility and are also capable of climbing vertical cave walls, often using this ability to escape when disturbed. Normally they lie concealed among the dust and debris in the cave with the abdomen buried in the substrate, leaving the head and thorax exposed. The whole insect is covered with a layer of fine dust, which enhances concealment, making the larvae very difficult to detect as long as they remain motionless. They only appear to move when disturbed or if in pursuit of prey. In the laboratory, they remain motionless for long periods of time, sometimes up to a week or more, similar to other species described by Tjeder (1967).

Unlike myrmeleontid larvae, which rely on a fast strike and rapid subdual of their prey, *L. setacea* larvae approach sluggish or immobile prey cautiously and then slowly insert the mandibles as described for *K. aristata* by Hafez & El-Moursy (1964). Sudden movement of the prey will usually elicit a rapid retreat by the crocin larva. In the laboratory, they have been fed on Isoptera (*Trinervitermes trinervoides* (Sjöst.)), Psocoptera, Diptera (*Drosophila*), larvae of Dermestidae, Formicidae and small Homoptera such as Aphididae. They will often feed upon prey much larger than themselves provided it has been immobilized, and this seems to indicate that they do not rely upon their own ability to subdue and kill prey, but could be regarded mainly as scavengers. They can, however, detect moving prey and will sometimes leave their places of concealment to pursue it. These larvae do not ‘overfeed’ if presented with excess food, as is often the case in myrmeleontids, and this supports the supposition that they are scavengers. The duration of the three larval instars is from two to three years depending upon availability of food.

Pupation takes place in a spherical, silken cocoon (diameter 5 mm) which is impregnated with sand grains on the exterior surface. During cocoon spinning, the long prothoracic region of the larva is gradually resorbed, thereby facilitating its accommodation within the cocoon. The extremely long hind wings are coiled and folded across the body of the pupa as described by Pierre (1952) for *P. troglrophilus*. In the field, cocoons were found lying freely on, or just below the substrate surface or sometimes attached to the walls of the caves. At eclosion the cocoon is breached by the pupa biting a hole through the silk and forcing the head and thorax through the opening. Once the head and thorax of the exarate pupa protrude from the cocoon, the pupa moults into the adult, leaving the pupal exuvium wedged in the eclosion aperture. The meconium is then voided and the adult seeks a vertical surface to cling to while the wings expand and harden.

There are close parallels between *L. setacea* from southern Africa and the northern species, *P. storeyi*, *P. troglrophilus*, *K. aristata* and *D. joppiana*. They are all cave dwellers, living in shallow caves or at the entrances of deeper caves and they subsist on comparable prey. The behaviour of *L. setacea* larvae is also similar to that described for *K. aristata* by Hafez & El-Moursy (1964) and for *P. storeyi* by Eltringham (1923).

Although Croicinae have not been recorded previously from central Africa (Tjeder 1967), it is possible that the northern and southern populations are linked through species occurring down the Rift Valley as evidenced by the recent discovery of crocin larvae at Nkudzi Bay (14° 24’ S., 35° 12’ E.) on Lake Malawi. This could account for the similarities between the two populations.
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REFERENCES


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