A new genus and species in the Crocinae (Neuroptera: Nemopteridae) from southern Africa

by

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A new genus and species, *Tjederia namaquensis*, is established for an undescribed crocin reared from larvae collected in the Cedarberg mountains, from Namaqualand and from South West Africa. This new taxon is compared with other Crocinae from southern Africa, and an account is given of the egg and larval stages.

**INTRODUCTION**

In his monograph on the Nemopteridae of southern Africa, Tjeder (1967) described six species in two genera, *Laurhervasia* Navas and *Concroce* Tjeder, within the sub-family Crocinae. These descriptions were based on adult specimens only, as the larvae of the southern African species were unknown. Larval Crocinae have subsequently been found in the sub-region (Mansell 1976) and several undescribed species have now been reared from field-collected larvae. The adults of *Tjederia namaquensis* gen. et spec. nov., differ from those of the two established genera in several respects and the larvae also differ from those of *Laurhervasia* and *Concroce*. Although larval characters have not been widely used in the definition of genera, they are probably of considerable importance. In addition to descriptions of the adults and larvae of *T. namaquensis*, this account deals with the morphology and hatching of the egg.

The name *Tjederia* is proposed in recognition of the invaluable contribution made to our knowledge of southern African Neuroptera, in particular the Nemopteridae, by the great Swedish neuropterist, Bo Tjeder.

**TJEDERIA** gen. nov.

Type-species: *Tjederia namaquensis* spec. nov.

Rostrum long; antennae about one third the length of the forewing. Males lacking bullae in the wings. Both sexes usually have two cross-veins between R and M before Rs in the forewings, and 9 or 10 radial cross-veins. Veins 1A and Cu2 unite and do not fuse with Cu1a before reaching the hind margin of the wing; pterostigma distinct; hindwings about 3 times longer than the forewings. Pleuritocavae absent. Males with tergite 9 entire, not divided dorsally. Females with lateral plates of sternite 8 fused with gonapophyses laterales. Larva with an extremely elongated prothorax (about 3,5 times the length of the head) and strongly tapered head.

Ar – arcessus; Epr – ectoproct; Gl – Gonapophyses laterales; Gs – gonarcus; Gsa – gonosaccus; Lpl – lateral plate of sternite 8; Pa – paramere; IX – sternite; 8, 9 – tergites.
**Tjederia namaquensis** spec. nov. figs 1–13

**Adults.** (figs 1–8). Sexes alike, males usually with narrower forewings than females. Size (mean measurements in mm from 21 specimens – range in brackets): length of body 7.9 (6.7–9.0); forewing 12.8 (11.5–14.0); hindwing 35.3 (31.0–43.0); antennae 3.6 (3.0–4.4); rostrum 1.6 (1.4–1.9). Holotype ♂ 7.7; 12.2; 36.0; 3.2; 1.4 respectively. Allotype ♀ 8.3; 13.4; 37.0; 4.2; 1.8 respectively.

Head (fig. 7). Creamy white with a shiny black macule (but pale in holotype) covering the raised portion of the frons above the antennae, diverging posteriorly to form a lighter V-shaped marking. Mouthparts pale yellow, clypeus pale proximally, light brown distally, genae and labrum dark brown. Antennae uniformly brown, darker towards apex with scape and pedicel diffusely light brown. Flagellar setae black.

Thorax. Uniformly brown, paler ventrally. Prothorax with long black setae along margins and shorter setae on dorsum. Meso- and metathorax with sparsely arranged short black setae on dorsum. Legs yellowish with brown annulations proximally on tibiae. Tarsi five-segmented with proximal tarsomere longer than the combined length of the other four. Paired claws pale brown. Legs densely covered with short black setae. Forewings (fig. 8) with distinct pterostigma formed by incrassate veins, brown proximally, creamy distally. Veins pale brown with black setae. Two cross-veins usually present between R and M before Rs and 9 (rarely 8–13) radial crossveins between R and Rs before the clear area below the pterostigma. Vein 1A fused with Cu2 for almost its entire length. Hindwings narrow, without dilations, pale brown proximally, becoming paler towards extremities. Bullae absent from wings of males.

Abdomen light brown with tergites darker along the posterior margins; sternites pale. Setae sparsely arranged, short and black. Pleuritocavae absent. Male (figs 1–5) with tergite 9 undivided but with median cleft in posterior margin, and narrowing to acute apices overlapping sternite 9 which has a short acute apex (fig. 4). Ectoprocts almost rectangular in shape with posterior ventral apex somewhat rounded. Gonarcus arch-shaped with well developed arcessus but with entoprocesses lacking. Parameres slender, slightly curved, about 0.8 mm in length, with a single sclerotized lobe in the distal region. Proximal region of parameres with a long, slender projection and a flattened quadrate area orientated at right angles to the length of the paramere. Gonosetae absent, spinellae present. Female (fig. 6) with tergite 9 divided dorsally, the two halves curving downwards and posteriorly, becoming closely adpressed to the dorsal margins of the gonapophyses laterales which are fused with the lateral plates of sternite 8. Ectoprocts almost quadrate, with posterior ventral margins projecting slightly.

**Material examined.** Adults, SOUTH AFRICA. ♂ holotype, 2 ♂ and 5 ♀ paratypes Stadsaal caves, Cedarberg (32° 31′ S 19° 19′ E), 6.i.1975. ♀ allotype, 2 ♂ and 2 ♀ paratypes, near Graafwater (32° 09′ S 18° 41′ E), 3.i.1975. 3 ♂ and 4 ♀ paratypes, Pakhuis Pass near Clanwilliam (32° 08′ S 19° 03′ E), 5.ix.1976. SOUTH WEST AFRICA, 1 ♂ paratype near Ai Ais (27° 57′ S 17° 31′ E), 1.i.1975. All reared from larvae collected by M. W. Mansell. Larval collection dates given above. Holotype and allotype deposited in National Collection of Insects, Plant Protection Research Institute, Pretoria. Paratypes: British Museum (Nat. Hist.), London, England; Entomological Museum, Zoological Institute, University Lund, Sweden; Musée Royale de L'Afrique Centrale, Tervuren, Belgium; Albany Museum, Grahamstown, South Africa.

PSp – prothoracic spiracle; MSp – metathoracic spiracle.
LARVA (fig. 9). Characterised by extremely long prothorax, markedly triangular head and medially-interrupted black band across the meta-tergites.

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

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<th>1st Instar</th>
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<tr>
<td>Number of larvae measured</td>
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<td>3</td>
<td>21</td>
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<tr>
<td>Head width</td>
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<td>0.60</td>
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<td>(0.88–1.08)</td>
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<tr>
<td>Head length</td>
<td>0.36</td>
<td>0.60</td>
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<td>(0.56–0.62)</td>
<td>(0.88–1.08)</td>
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<td>Mandible length</td>
<td>0.44</td>
<td>0.79</td>
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<td>(0.76–0.80)</td>
<td>(1.24–1.64)</td>
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<tr>
<td>Prothoracic length</td>
<td>0.64</td>
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<td>(2.80–3.60)</td>
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<td>Body width*</td>
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<td></td>
<td>(1.60–1.80)</td>
<td>(2.20–3.60)</td>
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<tr>
<td>Body length*</td>
<td>3.20</td>
<td>5.18</td>
<td>9.50</td>
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<td>(4.90–5.50)</td>
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*Variable, depending on feeding and state of maturity within the instar.

Head triangular in shape, longer than wide, tapering acutely towards the occipital region. Surface has raised dolichaster-bearing papillae interspersed with smaller papillae. Anterior tentorial pits present dorsally. Third instar larva with diffuse dark markings covering most of the head, a pattern comprising two triangular markings often discernible. Heads of first and second instar larvae uniformly brown with well defined epicranial suture present on the dorsal surface. Eyes each comprising one ventral and six dorsal facets. Antennae consisting of a stout, black pedicel, supporting a delicate segmented flagellum of eight segments. Proximal and distal segments of flagellum long; intermediate six segments short. Terminal flagellar segment bearing three delicate, apical bristles. Mandibles longer than head, uniformly brown, devoid of teeth, curved near the apices with dolichasters on the basal third. Maxillae each reduced to a single blade fitting into the ventral surfaces of the mandibles to form the typical planipennian suctorial tubes. Cardo and stipes distinguishable, but maxillary palps absent. Labium reduced to a single median plate, bearing three-segmented labial palps on either side; basal segment large and flattened, middle segment short, dilating apically, terminal segment fusiform, tapering to an acute tip bearing an oval pit-sense organ on the dorsal surface.

Prothorax greatly elongated, comprising three regions. Anterior region elongated, narrow and dilating apically; bearing sensory setae at articulation with head, two fuscous markings on dorsal surface of dilated area and a lighter fuscous band, divided by a pale narrow midline, behind these markings. Mid-region of prothorax shorter, wider, divided into tergite and sternite and bearing the prothoracic legs; a
fuscous marking covers most of the posterior two-thirds of this region, with only the apical third and narrow midline pale. The anterior and mid-regions of the prothorax uniformly brown in first and second instar larvae. Posterior region of prothorax short, unsclerotized, incorporated with the rest of the body and bearing two spiracles laterally (PSp fig. 9), sensory setae and dolichasters present, and two light brown stripes occur on either side of the dorsal midline. The cuticle is of stellate conformation (Mansell 1976, fig. 4). Mesothorax pale buff in colour, heavily overlain with irregular, rusty-brown markings and two fuscous markings on either side of the midline, diverging posteriorly. Metathorax similar to mesothorax but shorter and wider, bearing a characteristic, prominent black band across the posterior part of the meta-tergite. This band, interrupted in the midline, is also discernible in first and second instar larvae. Ventral surface pale creamy white with cuticle of stellate conformation. A fairly prominent spiracle (MSP fig. 9) is situated dorsally on the metathorax. Legs long, slender, brown in colour with coxae partly black; femora pale with black annulations distally; tibiae with dark markings proximally. Longitudinal rows of dolichaster-bearing papillae on legs, with sensory setae occurring at articulations. Tarsi one-segmented, terminating in paired claws.

Abdomen ten segmented, segments 1–7 all similar, but becoming progressively narrower, each bearing a pair of lateral spiracles. Segment 8 conical, bearing setae and fusiform dolichasters. Segments 9 and 10 telescoped into segment 8, together forming the spinneret. Coloration of abdomen similar to that of the thorax but with smaller fuscous markings on either side of the dorsal midline in segments 1–6. Segment 8 light brown in colour.

**Material examined.** Larvae. SOUTH AFRICA, Stadsaal Caves, Cedarberg (32° 31' S 19° 19' E), 10 larvae, 6.i.1975. Near Graafwater (32° 09' S 18° 41' E), 8 larvae, 3.i.1975. Pakhuis Pass, Clanwilliam (32° 08' S 19° 03' E), 10 larvae, 5.ix.1976. SOUTH WEST AFRICA, near Ai Ais (27° 57' S 17° 31' E), 1 larva, 1.i.1975. All collected by M. W. Mansell. In addition, 16 larvae were reared from eggs laid by females in the laboratory.

**Egg** (figs 10–13). Oval in shape, 0.72–0.74 mm in length. Surface of chorion (fig. 11) covered with aeropyles (Hinton 1970); a complex plastron-like structure (figs 10, 12, 13) situated over the micropyle at the cephalic end. Eggs translucent white when newly laid, with two black dots (the larval eyes) appearing through the cuticle at the cephalic end in the mature egg.

Prior to hatching the larva is orientated in the egg with the head folded ventrally under the body. On hatching, the chorion is ruptured at the cephalic end by the larva pushing against it with the thorax. Then the body of the larva straightens, the abdomen extruding through the ruptured chorion whilst the head remains temporarily within the eggshell. This manoeuvre results in the larva coming to rest on its dorsal surface enabling the soft legs to expand and harden before having to support the larva.

**Biology.** The biology of *Tjederia namaquensis* larvae is similar to that described for *L. setacea* by Mansell (1976). They occupy similar habitats and have been found living in the same shelter. In the laboratory, the two species have been reared on the same prey, mainly the worker caste of the termite *Trinervitermes trinervoides* Sjöst. There are three larval instars in *T. namaquensis* and cocoon spinning and pupation resembles that in *L. setacea*, although the cocoons are slightly larger (diameter 6 mm).
Adults reared from larvae in the laboratory, were placed in gauze cages and were provided with pollen (flowers) and a sugar solution as food. Although feeding and mating was not observed, three of the females laid eggs, the number of eggs varying between 26 and 30 per batch. The eggs were all fertile and the incubation period lasted about 21 days at room temperature during summer.


**DISCUSSION**

A new genus *Tjederia* has been created for *T. namaquensis* spec. nov., because although the genus resembles *Laurhervasia*, there are several differences. The most important of these is the lack of bullae in the wings of the males which is one of the main characters used to distinguish genera by Tjeder (1967) and Hölzel (1975 a & b). Also, in the forewings there are usually only two cross-veins between R and M before
Rs in *Tjederia*, whereas in *Laurhervasia* there are invariably three. In the males of *T. namaquensis* the structure of the distal portions of the parameres is simple (figs 3 and 5), in contrast to the enlarged and fairly complex structures occurring in *Laurhervasia* (Tjeder 1967, figs 1992, 2001, 2010). The females of the genera *Tjederia* and *Laurhervasia* are similar to each other but are distinguishable by the wing venation. Males of *Tjederia* resemble those of the other southern African genus, *Concroce*, in the lack of bullae, but differ in the larger number of radial cross-veins in the forewings and the longer rostrum. Also, in the males of *T. namaquensis*, tergite 9 is entire and not divided into two plates as is the case in the males of *Concroce* (Tjeder 1967, fig. 2017). The females of *Tjederia* have the lateral plates of sternite 8 fused with the gonapophyses laterales but in the genus *Concroce* they are separate (Tjeder 1967, fig. 2016).

*T. namaquensis* adults can be distinguished from the other southern African species of Crociinae described by Tjeder (1967) by the markings on the head and the structure of the male genitalia. The markings on the head of *T. namaquensis* could be confused with that of *L. rhodesiae* but differ in that the macule above the antennae is entire in *T. namaquensis* but divided in *L. rhodesiae* (Tjeder 1967, fig. 2006). The males of *T. namaquensis* resemble those of *L. damarae*, *C. capensis* and *C. walkeri* in the lack of entoprocesses on the gonarcus but differ in the presence of proximal projections on the parameres; the males of *L. setacea* and *L. rhodesiae* have proximal projections on the parameres and also have entoprocesses on the gonarcus (Tjeder 1967, figs 2001, 2019, 2021, 1992, 2010). Tergite 9, sternite 9 and the ectoprocts are characteristically shaped for each of the six known species in the southern African fauna.

The larvae of *T. namaquensis* differ from those of *Laurhervasia* and *Concroce* in three respects; (a) the prothorax of *T. namaquensis* is about three and a half times the length of the head; in *L. setacea* (and other undescribed *Laurhervasia* larvae) the prothorax is about two and a half times the head length, and in *Concroce* larvae (as yet undescribed) the prothoraxes are short — only slightly longer than the head: (b) *T. namaquensis* has an acutely tapered head; in *Laurhervasia* the heads do not taper markedly and *Concroce* larvae have heads which are almost quadrate in shape: (c) the legs of *Tjederia* and *Laurhervasia* are long and slender whereas in *Concroce* they are shorter and stouter.

The three genera are sympatric for part of their distribution in the south western Cape and Namaqualand and are sometimes found in the same habitat. At present, nothing is known of microhabitat preferences for the larvae of the different species.

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Mansell: New genus and species of Crocinae

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