

**DESCRIPTION OF THE LARVA OF *LESTES VIRGATUS*
(BURMEISTER) AND COMPARISONS WITH SOME OTHER
SOUTH AFRICAN LESTIDAE
(ZYGOPTERA)**

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The larva is described here for the first time. More comprehensive descriptions of the partially described *L. plagiatus* and *L. tridens* are also given. All 3 spp. are abundant at varying localities in the eastern parts of Natal, South Africa. Comparisons are also made with larvae of other African Lestidae.

INTRODUCTION

There are seven species of Lestidae recorded to date in South Africa (SAMWAYS, 1992): *L. dissimulans* Fraser, 1955; *L. ictericus* Gerstaecker, 1869; *L. pallidus* Rambur, 1842; *L. plagiatus* (Burmeister, 1839); *L. tridens* McLachlan, 1895; *L. uncifer* Karsch, 1899; *L. virgatus* (Burmeister, 1839). Few of the larval stages have been described. *L. ictericus* was described as "*L. pallidus* form *ictericus* Gerstaecker 1869" by PINHEY (1961). *L. tridens* was also described by PINHEY (1959) and *L. plagiatus* was described by CAMMAERTS (1966). Another African species, *L. simulans* Martin, 1910, was recently described by LEGRAND (1976) but has not been recorded from South Africa. The larva of the Malawian, Zambian and Zimbabwean species, *L. ochraceus* Selys, 1862 was described as "*L. pallidus* form *ochraceus*" by PINHEY (1959). In due course this species may well be recorded in South Africa, after more intensive searching.

The aim here is to describe the larva of another Lestidae species until now unknown: *Lestes virgatus*. As the descriptions of *L. tridens* and *L. plagiatus* are incomplete, we present further data on the larval morphology of these two species

permitting improved comparisons with the other species.

MATERIAL AND METHODS

CORBET's (1953) terminology for the labium was adopted here, although it does not strictly apply to the Lestidae. In particular, the morphology of the branches of the palpus are not described by Corbet, so additional terms were required here, such as inner and outer lobes of the labial palpus, as proposed by LEGRAND (1976). The descriptions were from larval exuviae of specimens collected in the field and reared in the laboratory through to emergence. Species determinations were from general imagos. Exuviae were stored in 70% ethyl alcohol and drawn with microscope/camera lucida <200 x magnification. All measurements were to the nearest 0.1 mm, with a micrometric eyepiece.

The following dimensions were measured. Dorsal view: head width, antennae length, distance between antennae insertion axes, anterior wing-sheath lengths (from the mutual junction point between left and right ones). Ventral view: prementum width (after being cut at the postmentum level and laid out, but not flattened), and length (from the tip of the anterior medial lobe to the articulation line with the postmentum). Lateral view: caudal gill length and metatibial length. The variable telescoping of the body during preservation precluded measurement either of abdomen or total body length. Distortion during preservation also affected the relative position of the wing cases and the abdominal segments, as well as the prementum-postmentum articulation and the coxae pairs.

DESCRIPTIONS OF THE LARVAE

LESTES VIRGATUS (BURMEISTER)

Figures 1-2

Material. — 4 ♂, Queen Elizabeth Park, Pietermaritzburg, Natal, 16-I-1989, 21-I-1989, 13-XII-1991; — 1 ♂, Himeville, Natal, 30-I-1930; — 2 ♀, Queen Elizabeth Park, Pietermaritzburg, Natal, 13-XII-1991.

The larva has not been described previously.

Body long and slender, as is typical of the Lestidae. Head wider than the thorax, with large globular eyes. Head width 4.0-4.2 mm. Antennae 7-segmented, and 3rd segment longest, and the 4th only less so. Antennae length 3.2-3.3 mm; distance between insertions 1.3 mm.

Mask clavate, but relatively short and massive, premental articulation at the level of the mesocoxae. Prementum length 3.3-3.4 mm, width 2.1-2.3 mm, premental setae 6+6, or 5+5, median cleft fairly long, with several spiniform setae on both sides, a line of spiniform setae on the lateral margin of the prementum. Distal margin of the prementum crenulate, with one claviform seta on each crenulation.

Palpus of the usual *Lestes* type, with one long seta and two similar setae on the movable hook. Distal margin of the palpus deeply divided into two branches. Inner branch of the palpus bearing one strong terminal hook and with minute regular serrations on inner margin, and also with a line of small spiniform setae. Outer branch bearing two large unequal-sized hooks, and an intermediate line

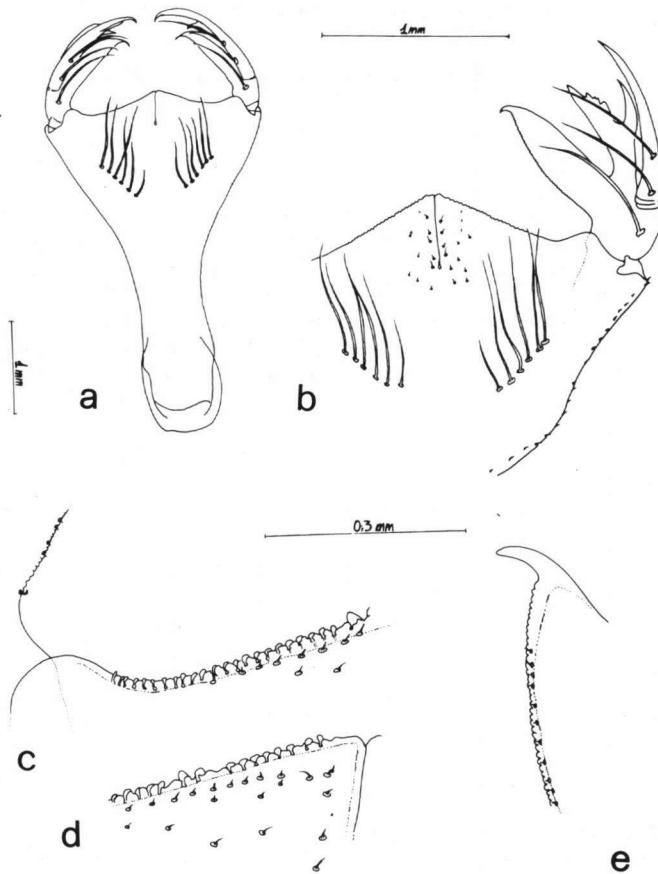


Fig. 1. Morphology of the larva of *Lestes virgatus*: (a) whole view of the mask; — (b) prementum and palpus; — (c) distal margin of the prementum near the palpus articulation; — (d) distal margin of the prementum near the median cleft; — (e) inner branch of the palpus, end hook and inner margin of the palpus.

with irregular teeth, bent towards the innermost hook.

Wing sheaths covering all of the 3rd or half of the 4th abdominal segment; anterior wing sheaths length 5.6-5.7 mm. Legs very slender, as typical in Lestidae. Hind femur length 4.7 mm.

Abdomen slender, all segment surfaces covered by fairly long and slender setae. Terminal segments with latero-inferior carinae, covered by setae little different in shape and in length to those covering the remaining surface. Last two segments with a dorsal line of long hair-like setae aligned on the medial plane. Last segment with a deep dorsal incision.

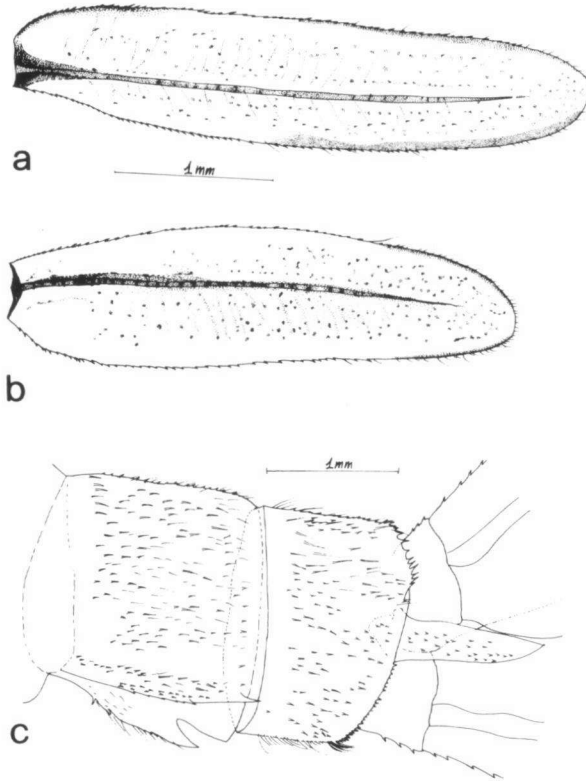


Fig. 2. Morphology of the larva of *Lestes virgatus*: (a) lateral lamella; – (b) central lamella; – (c) last two abdominal segments.

In the females, the gonapophyses are well developed, which is unusual for the larval stage. The apices of the medial valves extended beyond the epiproct and paraprocts, while those of the external valves extended beyond the distal end of S10.

Caudal lamellae typical of the Lestidae, with secondary tracheae slightly visible, but the main tracheae with some apparent bamboo-like sections with clearly-marked taenidia (Fig. 2a,b), mainly in the central lamella. Pigmented band represented only near the margins; numerous small pigmented spots irregularly spaced on the surface, but not in proximity of the margins. Lateral lamellae length 7.0–7.5 mm, central lamellae length 6.8–7.3 mm. Lateral lamellae slightly longer than the central one, but in one example the reverse appears to be the case. Spiniform setae on the whole margins of the lamellae and hair-like setae on the distal half, with similar distributions on the dorsal and ventral margins. Cerci long and slender.

LESTES TRIDENS McLACHLAN

Figures 3-4

Material. — 4 ♂, 1 ♀, pools at St Lucia, Natal, 11-II-1990; — 1 ♂, Kratzkop Kloof, 2-II-1988; — 1 ♂, Stainbank Nature Reserve, Durban, X-1988; — 1 ♂, 1 ♀, same locality, 13-I-1992.

The larva was described by PINHEY (1959), but without figures of the lamellae and details of the palpus.

General features of the body, head, legs and lamellae typical for the Lestidae. Head width 3.8-4.0 mm, antennae 7-segmented, but in one example, one antenna was 6-segmented; 3rd segment the longest. Antennae length 2.9-3.3 mm, distance between insertions 0.9-1.0 mm.

Mask clavate, very slender with the medial part of the prementum thin, and nearly triangular in transverse section. Articulation between the prementum and the postmentum at the level of the metacoxae, but in one specimen slightly behind. Prementum length 3.7-4.2 mm, width 1.3-1.4 mm, premental setae variable in number and in length from 5_1+1_5 to 5_2+2_4 and to 6_1+2_5 . Distal margin of the prementum straight with crenulations, each with one truncate seta on each crenulation. Some spiniform setae along the lateral margins of the prementum near the articulation with the palpus.

Palpus as usual in Lestidae, with one long seta and two similar setae on the movable hook. Distal margin of the palpus deeply divided into two branches. Inner branch bearing one strong and long end-hook, and with regular serrations on the inner margin, coupled with some small spiniform setae not so numerous as the serrations. Outer branch of the palpus with two strong unequal length hooks, and an intermediate line of small irregular teeth, separated from the large hooks by two concavities on the palpal distal margin.

Wing sheaths covering half of the second or half of the third abdominal segment, anterior wing-sheaths length 4.7-4.8 mm. Hind femur length 4.8-5.4 mm.

Abdominal segments covered by spiniform setae. Terminal segments with latero-inferior carinae, covered by setae similar to those covering the other segment surfaces. Last two segments with a dorsal line of long hair-like setae in the medial plane. Last segment with a deep dorsal incision.

In the female, the ovipositor did not extend beyond the distal end of S10.

Caudal lamellae principal tracheae with apparent bamboo-like sections. Pigmented areas as in Figure 4; no spots on the surface. Lateral lamellae length 8.9-9.5 mm, central lamellae length 8.7-8.8 mm, about 0.5 mm of difference between the central and the lateral ones in each specimen. Spiniform setae along the whole margin of the lamellae, with the exception of the very distal parts; hair-like setae very scarce, more numerous in the very distal parts of the lamellae. Cerci long and slender.

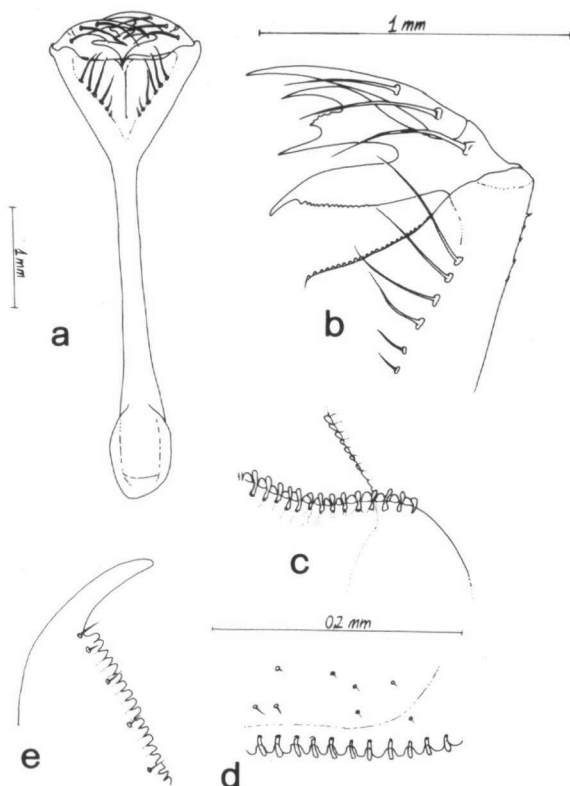


Fig. 3. Morphology of the larva of *Lestes tridens*: (a) whole view of the mask; – (b) prementum and palpus; – (c) distal margin of the prementum near the palpus articulation; – (d) distal margin of the prementum near the median cleft; – (e) inner branch of the palpus, end hook and inner margin of the palpus.

LESTES PLAGIATUS (BURMEISTER)

Material. – 1 ♂, 1 ♀, Hilton, Natal, IX/X-1988; – 1 ♂, Hlamboja R., Drakensberg, Natal, 25-I-1991.

The larva was described by CAMMAERTS (1966) from a single female (without antennae), collected in 1933, in Elisabethville, Belgian Congo (Zaire).

Our specimens are almost identical to that of Cammaerts. We report here on some additional relevant data:

Antennae 7-segmented, the third segment the longest, antennae length 3.9-4.5 mm, distance between insertions 1.2-1.3 mm.

Mask clavate, prementum length 3.9-4.1 mm, width 1.6-1.8 mm. No spiniform

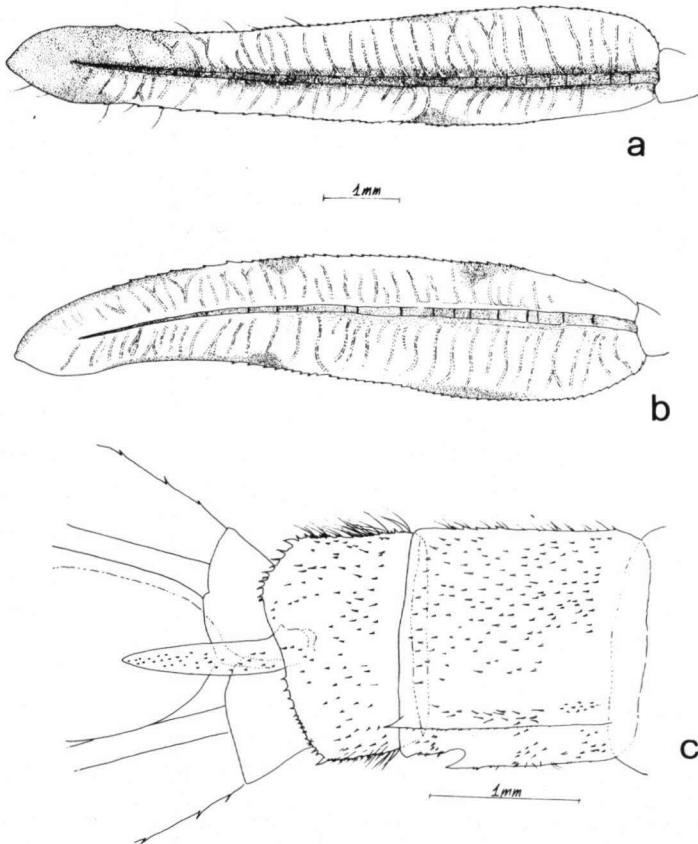


Fig. 4. Morphology of the larva of *Lestes tridens*: (a) lateral lamella; — (b) central lamella; — (c) last two abdominal segments.

seta on the palpus near the articulation of the movable hook.

Wing sheaths covering all of the 3rd abdominal segment, anterior wing sheaths length 5.3 mm. Hind femur length 5.3-6.1 mm, tibia 4.9-5.4 mm, tarsus 1.9-2.1 mm.

The ovipositor of the female reached just the end of S10. Lamellae length 10.0-10.7 mm, lateral and central lamellae almost equal in length.

DISCUSSION

At this stage in our knowledge, it is not possible to give a comprehensive key for all the South African Lestidae larvae, owing to the complete absence of data

for three species: *L. dissimulans*, *L. pallidus* and *L. uncifer*. However, some initial comparison is possible for the most common species occurring in the eastern part of the country.

L. virgatus is quite different from the other species in the shape of the prementum. Incidentally, however, in this character, it is similar to the Palaearctic *L. macrostigma*. Also the pigmentation in *virgatus*, with numerous small spots, is quite unique in the species covered here, but caution is necessary as this may be a variable feature across a wide distributional range. These two characters alone, nevertheless, distinguish this species from *tridens*, *plagiatus* and *simulans*, and in the females the length of the ovipositor was also highly diagnostic.

L. plagiatus in turn, has characteristic outer branch of the palpus, without the intermediate line of teeth between the terminal hooks. This character, together with the shape and the length of the caudal lamellae distinguishes this species from the other three species.

L. simulans is similar to *L. tridens* in the morphology of the mask, palpus and lamellae. However, the number of the premental setae is different. *L. simulans* has 10 setae, and *L. tridens* 12-14, making this character useful for distinguishing these two species, especially where their ranges overlap in East Africa.

PINHEY's (1959, 1961) descriptions of *L. pallidus* form *ictericus* and *L. pallidus* form *ochraceus* do not refer to the shape, or the length/width ratio of the prementum, but he mentions "mask reaching slightly beyond bases of middle legs" for *L. ictericus* and "labium reaching second pair of legs" for *L. ochraceus*. So, at this stage, we cannot exclude the possibility that *ictericus* and/or *ochraceus* also have a short mask as does *L. virgatus*. Moreover, the morphology of the lamellae was not reported for *L. ochraceus* and the morphology of the palpus is not clearly figured for *ictericus* (PINHEY, 1961). The lamellae apices of *ictericus* was reported by PINHEY (1961) to be similar to those of *tridens*, while the illustration of the palpus of *ochraceus* shows an outer branch similar to that of *plagiatus*. At the present time, therefore, it is not possible to discriminate the larvae of *L. ochraceus* and *L. ictericus* from the other known larvae.

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REFERENCES

- CAMMAERTS, R., 1966. La nymphe de *Lestes plagiatus* (Burm., 1839). *Revue Zool. Bot. afr.* 74: 317-323.

- CORBET, P.S., 1953. A terminology for the labium of larval Odonata. *Entomologist* 86: 191-196.
- LEGRAND, J., 1976. A propos de *Lestes simulans* Martin 1910: larvae et imago (Zygoptera: Lestidae). *Odonatologica* 5: 375-381.
- PINHEY, E., 1959. Notes on African Odonata nymphs (1). *J. ent. Soc. sth. Afr.* 22: 469-488.
- PINHEY, E., 1961. Notes on African Odonata nymphs (2). *J. ent. Soc. sth. Afr.* 24: 165-172.
- PINHEY, E., 1984. A survey of the dragonflies (Odonata) of South Africa. Part 1. *J. ent. Soc. sth. Afr.* 47: 147-188.
- SAMWAYS, M.J., 1992. Dragonfly conservation in South Africa: a biogeographical perspective. *Odonatologica* 21(2): 165-180.