

**DESCRIPTION OF THE LAST INSTAR LARVA OF
NOTIOTHEMIS JONESI RIS, 1919
(ANISOPTERA: LIBELLULIDAE)**

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Ultimate instar larva of both sexes, from KwaZulu-Natal, South Africa, is described and illustrated for the first time, and compared with Australian Tetrathemistinae spp.

INTRODUCTION

Notiothemis is an endemic African genus, with only two known species, *N. robertsi* Fraser and *N. jonesi*. The subspecies *N. j. jonesi* is widespread from the Eastern Cape to Zaire and Kenia, (DAVIES & TOBIN, 1985) but *N. j. auricolor* is known only from Uganda (FRASER, 1944). The adult female *N. j. jonesi* was described relatively recently (PINHEY, 1968). *N. jonesi* occurs in bush or forest streams and pools, and the adults are very shy like many other Tetrathemistinae (PINHEY, 1985).

The larval habitat was previously unknown, and is described here.

METHODS AND TERMINOLOGY

The larvae described here were collected in the field and reared through to adult emergence in the laboratory. Species determination was from the teneral imago. Exuviae were stored in 75% ethyl alcohol and drawn using a stereomicroscope and a camera lucida (50X magnification). All measurements were to the nearest 0.02 mm using a micrometric eyepiece. The following measurements were made: total body length, abdomen width, distance between tips of postero-lateral angles at S8 and S9, epiproct width, anal pyramid width, antennae length, distance between antennae insertions in dorsal view; abdomen length, prementum length, mask length and width (after being cut at the postmentum level and laid out, but not flattened) in ventral view; epiproct and cerci length in lateral view. CORBET's (1953) terminology for the labium was adopted. Abdominal segments are indicated as S1 ... S10.

MORPHOLOGICAL DESCRIPTION

Material. – 7 ♂ and 4 ♀, Krantzklouf Nature Reserve, Kloof, KwaZulu-Natal, 26-I, 11-II, 11-III and 16-III-1994; – 1 ♀, Charters Creek Nature Reserve, Mtubatuba, KwaZulu-Natal, 16-X-1994, G. Whiteley & R. Gopane leg.

Habitus like *Sympetrinae* (Fig. 1). Body uniformly pale brown. No dark spots or stripes. Head larger than thorax, covered with sparse small spiniform setae behind the eyes. Antennae 7-segmented, the sixth segment the longest (Fig. 3a).

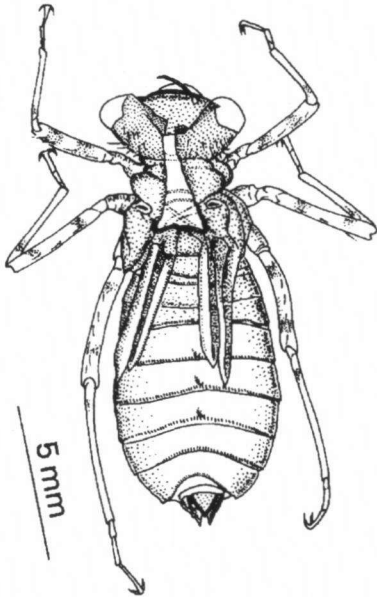


Fig. 1. *Notiothemis jonesi*, last instar exuvia, habitus.

Mask wide and short, very concave and cup-shaped, (Fig. 2a, b). Premental setae from 12+13 to 15+15. Palpus with 7-9 deep crenations on distal margin, and strong spines on each crenation (Fig. 3a). Movable hook sharp, as long as, or a little shorter than palpal setae (Fig. 2a). Palpal setae from 9&9 to 11&11. Articulation between prementum and postmentum reaching mesocoxae (Figs. 2b, c).

Wing sheaths long, reaching, in living specimens, the distal margin of S5. Ventral surface of mesothorax provided with two series of spiniform setae between insertions of mesocoxae (Fig. 2c).

Legs long and slender, with scarce, stout spiniform setae. Articulation between femur and tibia of metathoracic legs exceeding the end of S6 (this character is not easy to detect on the exuvia).

Abdomen ovoid. S6 the widest segment. Dorsal keel on segments S4-S7, but only S4 with an evident and pointed spine, the others simply with a rounded relief (Figs. 1 and 2d). Lateral spines absent, fringes of short setae on lateral margins of S8 and S9 (Fig. 1, 3b). Distal margins of abdominal terga and sterna of segments S7-S9 fringed with unusual, pectinate setae (Fig. 3c) arranged in an uninterrupted row in S9, in small groups in S8 and in two reduced, lateral groups in S7. The rest of abdominal segments with occasional small spiniform setae and thin, hair-like setae. Anal pyramid short, paraprocts longer than epiproct. Cerci half as long as paraprocts (Fig. 2d).

HABITAT

In KwaZulu-Natal, *Notiothemis jonesi* is a low altitude species, occurring from sea level to about 800 m a.s.l. The larvae are only found in shaded, permanent pools, with considerable emergent and bank vegetation. The larvae are found amongst decomposing organic litter at the bottom of shallow (<0.5 m deep) and fairly stagnant pools.

DISCUSSION

The adult morphology of several Tetrathemistinae genera is well known: *Allorhyzua* (KIMMINS, 1942), *Hylaeothemis* (FRASER, 1927, 1946), *Monardithemis* (AGUESSE, 1968; LONGFIELD, 1947), *Nannophlebia* (TILLYARD, 1913), *Neodythemis* (AGUESSE, 1968), *Palaeothemis* (FRASER, 1923), *Tetrathemis* (FRASER, 1924, 1941, 1954; KIRBY, 1898) and others. The observations of

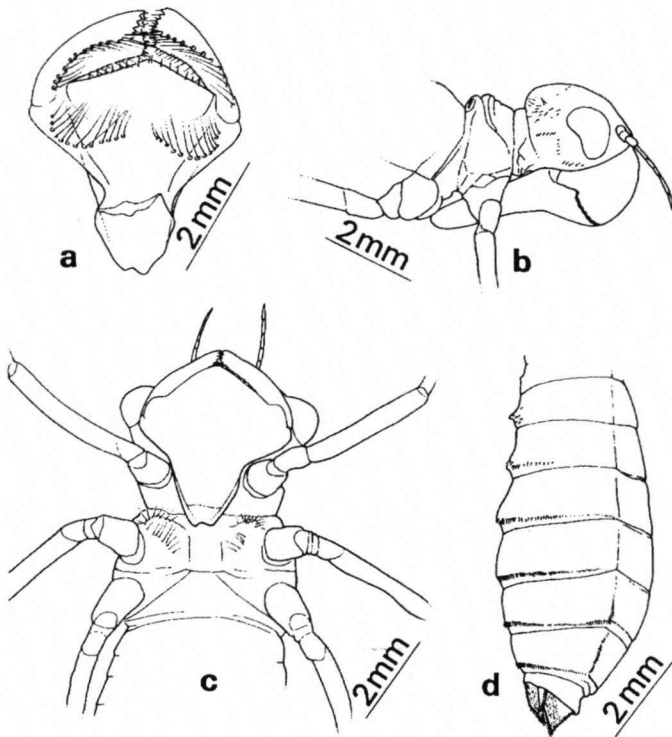


Fig. 2. *Notiothemis jonesi*: (a) mask; – (b) head and part of thorax, lateral view; – (c) head and thorax, ventral view; – (d) abdomen, lateral view.

LONGFIELD (1947) and AGUESSE (1968) on the morphology of the adults indicate *Eothemis*, *Micromacromia*, *Monardithemis* and *Neodythemis* as the most closely related genera to *Notiothemis*. Unfortunately, the larval morphology of these genera is unknown, and the knowledge on the whole of Tetrathemistinae is also insufficient, so that we have only been able to compare the larva of *N. jonesi* with those of two Australian species, *Nannophlebia risi*, Tillyard, 1913/*injibandi* Watson, 1969 (the status of *risi* and *injibandi* is obscure, as they intergrade [WATSON et al., 1991]) and *N. mudginberri* Watson & Theischinger, 1991. However, the larvae of *N. risi/injibandi* and *N. mudginberri* are indistinguishable (HAWKING, 1993). The palpal morphology of *N. jonesi* resembles very closely that of *Nannophlebia*. Both *N. jonesi* and *N. risi*, the latter described by HAWKING (1986), show a

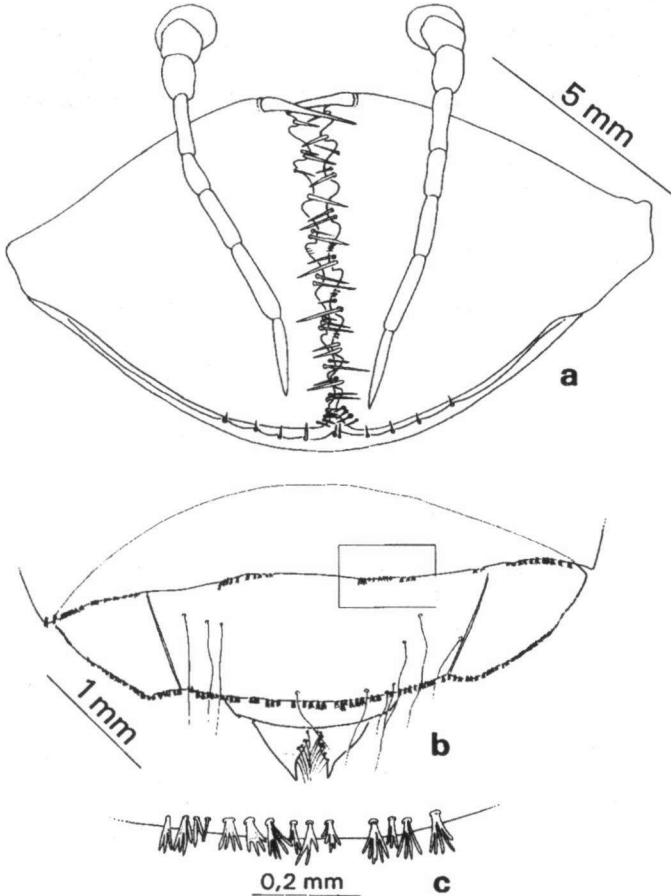


Fig. 3. *Notiothemis jonesi*: (a) palpi and antennae, frontal view; – (b) last abdominal segments, ventral view (see Fig. 3c for the details in the inset); – (c) details of the pectinate setae on the distal margin of S8, ventral view.

cordulid-like palpus, with regular, deep crenations on the distal margin, very different from the typical libellulid-like palpus. Abdominal features are different: *N. risi* has stout, sharp dorsal spines along the dorsal keel and clear lateral spines on the last abdominal segments.

The general shape of the larva of *N. jonesi* (Tetrathemistinae) resembles those of the Sympetrinae and the Trithemistinae, except that the eyes of *N. jonesi* are proportionately smaller and the legs longer than in the species in the other two sub-families of Libellulidae. These two characters (eyes and legs) as well as the morphology of the prementum, make *N. jonesi* similar to Corduliidae, and therefore intermediate between the Sympetrinae/Trithemistinae and the Corduliidae. It is also interesting to note that both Tetrathemistinae and Corduliidae larvae have similar habitat requirements, preferring shaded pools and streams, where the perception of the prey is mainly from tactile stimuli received by the legs and antennae.

Finally, the difference in size between males and females in *N. jonesi* is remarkable. The mean dimensions of most of the characters are greater in the males, and statistically significant for epiproct and cerci (see Tab. I).

Table I

Measurements (mm) from 12 last instar exuviae of *Notiothemis jonesi*. – [p = probability values of the "t" test between male and female measures; – ns: not significant]

	Males		Females		p
	mean	std dev	mean	std dev	
total body length	14.38	1.05	13.06	2.81	ns
distance between antennae insertions	1.10	0.07	1.05	0.08	ns
antennae length	2.07	0.11	1.96	0.17	ns
prementum length	3.47	0.13	3.43	0.34	ns
mask length	4.42	0.21	4.26	0.52	ns
mask width	3.27	0.09	3.16	0.35	ns
metatibia length	4.71	0.02	4.74	0.02	ns
abdomen length	8.72	0.70	7.27	1.54	ns
S6 width	5.02	0.26	5.09	0.53	ns
S8 minimum width	3.74	0.26	3.66	0.30	ns
S9 minimum width	2.25	0.07	2.15	0.20	ns
anal pyramid width	1.20	0.06	1.18	0.16	ns
epiproctum length	0.84	0.03	0.76	0.08	0.0306
epiproctum width	0.80	0.03	0.76	0.07	ns
cerci length	0.53	0.05	0.40	0.09	0.0083
cerci length/epiproctum length ratio	0.79	0.06	0.66	0.07	0.0145

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