

***Nesciothemis farinosa*:
description of the final stadium larva
(Odonata: Libellulidae)**

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ABSTRACT

A written description and illustrations of the final stadium larva of *Nesciothemis farinosa* are presented, based on larvae and exuviae collected in Namibia. The larvae were reared in the laboratory until emergence. Additionally, information on larval microhabitat, behaviour and development is provided.

INTRODUCTION

The genus *Nesciothemis* Longfield, 1955 is composed of five species, *N. farinosa* (Förster, 1898), *N. fitzgeraldi* Longfield, 1955, *N. minor* Gambles, 1966, *N. nigriensis* Gambles, 1966 and *N. pujoli* Pinhey, 1971 (Gambles 1966; Pinhey 1971; Dijkstra 2003) occurring in subsaharan continental Africa, Egypt and the southern Arabian Peninsula, with *N. farinosa* being the most widespread species, ranging from southern Africa to Egypt and Arabia (Dumont 1991; Schneider & Krupp 1993; Carfi & D'Andrea 1994; Samways 1999; Clausnitzer 2001). *N. farinosa* reported from western Africa (e.g. Ivory Coast, Tsuda 1991) are questionable, because they differ constantly from typical *N. farinosa* and might belong to *N. pujoli* (K.-D.B. Dijkstra in litt.). The larvae of all *Nesciothemis* species are hitherto not described. Here we describe the final stadium larva and exuvia of *N. farinosa* from material collected in Namibia. Additionally, information on the larval microhabitat, behaviour in the laboratory and development is provided.

The larva of *Nesciothemis farinosa*

Specimens studied

We collected one ultimate and one penultimate stadium larva and three exuviae at the Uniab River near Palmwag Lodge, Namibia (19°53'14"S, 13°56'11"E), on 19 March 2003. Additionally, we found some younger stadia larvae. The description is mainly based on the larvae, of which one emerged afterwards and one moulted to the final stadium. Both are deposited in the collection of the National Museum of Namibia.

Description

General: The general appearance of the larva (Fig. 1) is close to that of the genus *Orthetrum*. Mainly the head looks like that of *Orthetrum* spp., i.e. having parallel lateral margins and small eyes, with occipital area behind eyes extensive. In contrast, the shape of the abdomen and the length of the legs differ. Whereas the abdomen of *Orthetrum* has nearly parallel outer margins when viewed dorsally, the abdomen of *N. farinosa* larvae is shaped more like that of *Sympetrum*, i.e. more oval. Whole body densely covered with three different types of setae (Fig. 2) that are irregularly distributed: (a) long thin setae, (b) solid sable-shaped setae, and (c) short setae that may be thin or thick. Total length of the female larva 14.5 mm, total length of one male exuvia 18.8 mm. The other exuviae could not be exactly measured. Body colour of the larva is pale brown in life without any distinct markings. Younger stadium larvae of *N. farinosa* caught by us showed almost the same characters. However, they were conspicuous in the coloration of the body: thorax and the anterior parts of the abdomen were dark, whereas the posterior part of the abdomen was pale brown.

Head: Wider than long, maximum width ranging 4.3–4.5 mm. Lateral margins of the head parallel (Fig. 3). Eyes small, being one quarter of the length of the lateral margins. Antennae seven-jointed, all segments with more or less the same length. First segment (scapus) distally covered with a row of setae. All other segments irregularly covered with setae of types (a) and (c), some being 1.25 times longer than the length of the respective segments. Head covered with all three types of setae; bare areas: one area posterior to the central ocellus, four areas left and right, respectively (Fig. 3).

Mouthparts: Labium is spoon-shaped, with palpi covering the face. Articulation of postmentum and prementum reaches the anterior margin of the mesocoxae; prementum about 1.25 times as long (4.4 mm) as wide, slightly trapeziform; the base (1.75 mm) is 0.5 of its distal part (3.5 mm). Prementum and palpi covered with a few setae of type (a). Anterior margin of the prementum pointed, the margin with 12 weak crenations at each side, each with one small spiniform seta in the centre. Dorsally the prementum with three to five stout setae on each side of the centre. Palpi with single end-hooks; palpal lobes with 10 very fine crenations (Fig. 4). Dorsal margins of each palpus with three long setae (Fig. 4). Outer surfaces of the palpi covered with long setae (Fig. 4).

Thorax: Pro- and synthorax covered with all types of setae. Dorsally the thorax has bare areas separated by two bands of setae, type (c). Wing cases slightly extended over the posterior margin of S7; setae on the wing cases are arranged only along the position of the tracheae in the wing cases. Legs long, with the hind-legs clearly extending beyond the length of the abdomen (Fig. 1); the joint between femur and tibia reaches the posterior margin of S8. A single spine at the anterior margin of each tibia (see arrow Fig. 1). Legs covered with all three types of setae. Tarsal formula: 2-2-3.

Abdomen: Enlarged at middle, length 9.6 mm, maximum width 5.8 mm (at S6); with long and short setae (types a and c) at its lateral margins and at the posterior margin of each segment (Fig. 1); posterior margins of S4-10 in dorsal view with a

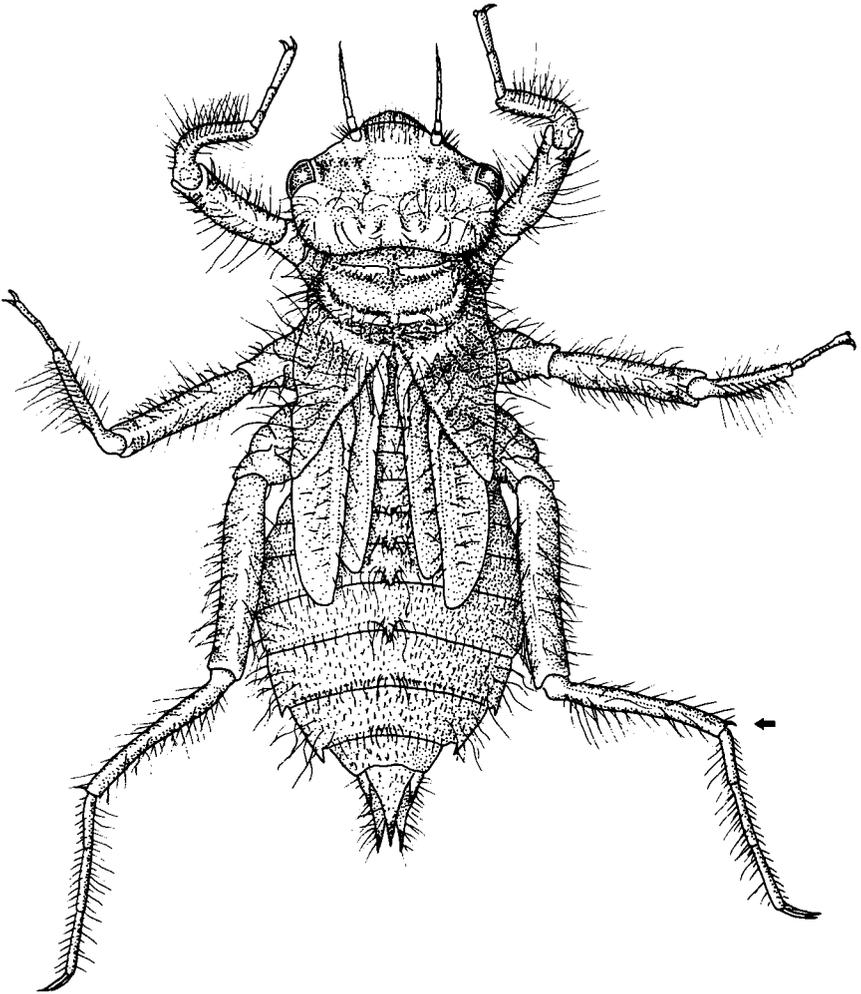


Figure 1: *Nesciothemis farinosa* — general appearance of the final larval stadium, dorsal view. The arrow indicates the position of the spine at the tibia.

row of very short spines. The whole surface of the tergites covered with short setae of type (c). S8+9 with short lateral spines. Tergites 4-7 with strong dorsal hooks that gradually increase in size rearwards (Fig. 5); hooks with rounded bases and densely covered with setae of type (c). The hook on S7 is sharply pointed; the following hooks were gradually becoming blunt. Hooks on S6+7 overlap the respective next tergite, the others overlapping at least the intersegmental skins. Caudal appendages equal, more than twice as long as S10; with apical part acutely pointed. Cerci less than half as long as the paraprocts.

Notes on biology and ecology

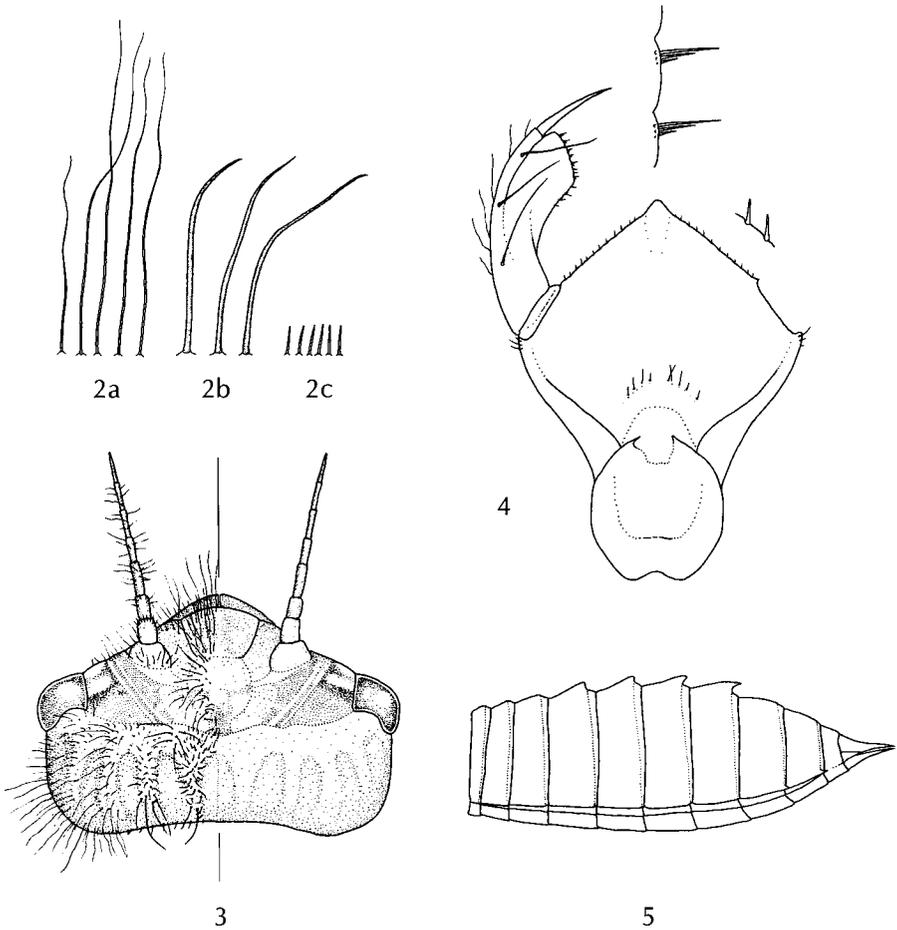
All larvae and exuviae of *N. farinosa* were collected at a perennial section of the ephemeral Uniab River (cf. Jacobson et al. 1995), which is one of only three localities where the species was recorded in Namibia (Martens et al. 2003). The site consisted of some springs, small running waters and pools. We found the larvae and exuviae in the running waters that had been widely overgrown with dense reeds of *Phragmites australis*, *Scirpus* sp. and *Carex* sp. All larvae were found at a site with detritus between dense reeds that were overhanging from the edge. The exuviae were attached to the reeds about 10-25 cm above the water level. Due to the dense vegetation and the shade they were difficult to spot. The larvae of *N. farinosa* co-occurred in the same microhabitat with larvae of *Pseudagrion massaicum* (Sjöstedt), *Anax imperator* Leach and *Trithemis arteriosa* (Burmeister). In containers in the laboratory the larvae perched on the ground being very inactive most of the time. They often feigned death after being touched with forceps.

An F-2 larva collected on 19 March 2003 and reared in the laboratory moulted twice within 1.5 month and finally emerged at 17 June 2003. Hence, it developed within three months from F-2 to emergence.

DISCUSSION

The larva of *Nesciothemis farinosa*, as well as the adult (cf. Longfield 1955), is very close in general appearance to that of the genus *Orthetrum* (as far as the larvae are known), particularly with respect to the shape of the head. However, the larva of *N. farinosa* can clearly be separated from these by its very long hind legs, which extend beyond the abdomen. *N. farinosa* has strong dorsal spines, which only insist on S4-7, while such spines in all *Orthetrum* known to us are also present on S2 and S3. Other characters may be the shape of the abdomen, different types of setae and the single spine at each tibia.

The long setae that cover the whole body of the larva as well as its inactive behaviour indicate tactile foraging (Pritchard 1965). Although the larva resembles the *Orthetrum* spp. larvae, which all, as far as we know, belong to the shallow burrowers (Corbet 1999: 155), the long hind-legs of *N. farinosa* indicate that the larva also clings in the vegetation or between detritus. This is supported by the fact that the larvae were collected from coarse detritus of *Carex* sp. and reeds. Nothing is known about the number of stadia or the duration of larval development. However, we collected eggs on 19 March 2003 also at Palmwag, which needed a minimum of 30 days until hatching in the laboratory (unpublished data). A larva from the same population needed three month from F-2 to emergence (s. above). We assume that larval development needs at least eight months, and it is likely that the population at Palmwag is univoltine. This is corroborated by a flight season from March to June.



Figures 2-5: *Nesciothemis farinosa* — (2) three different types of setae (see text); (3) dorsal view of the head (left: setae shown; right: setae omitted); (4) labium; (5) lateral view of the abdomen (setae omitted).

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