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Notes on the first instar larvae of *Ctenophora* and *Nephrotoma* (Diptera, Tipulidae)

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Abstract

1830 egg-larvae of 7 species belonging to long palped crane flies (Tipulidae): *Ctenophora guttata* Meigen, *Nephrotoma pratensis* Linnaeus, *N. dorsalis* Fabricius, *N. scurra* Meigen, *N. flavescens* Linnaeus, *N. submaculosa* Edwards and *N. crocata* Linnaeus were obtained from 22 females captured in Lithuania in 2011–2012. It took from five days to more than three weeks for eggs to hatch. Crane flies have four instars of larvae. Second, third and the last instar larvae are very similar, when the first instar or egg-larvae differs radically. Descriptions and illustrations of external morphology, chaetotaxy of abdominal segments, characters of head capsules and last abdominal segments are given for the previously unknown first instar larvae of *Ct. guttata*, *N. crocata*, *N. dorsalis*, *N. flavescens*, *N. pratensis*, *N. scurra* and poorly known *N. submaculosa*. It was found out that difference of head capsule and last abdominal segment among the first instar larvae of above mentioned species of genus *Nephrotoma* are more obvious than in last instar. During this study it was found, that such characters as shape of apical teeth of mandible, shape of basal segment of antenna and number of sensillae, shape of hypostomium and arrangement of sensory structures on labrum, differ among egg-larvae of *Nephrotoma*. It was found, that pads on frontal part of prothorax and shape of lateral plates of egg-larvae labrum of *Nephrotoma* differ significantly from that of *Ctenophora* and could be used as genus separating characters.

Key words: Crane fly, head capsule, egg-larva, last abdominal segment

Introduction

Long palped crane flies (Tipulidae) is one of the largest Diptera families, which counts 4276 recognized species (Oosterbroek 2013) and what makes up almost 30 percent of the total number of all crane flies (Tipuloidea). All crane flies have four larval instars, pupae and adult (Henning 1950) in their development. Adults of crane flies are one of the most commonly encountered flies easily recognized because of typical general appearance and long legs. They are short living insects with almost aphagous adult stage. The greatest part of their life crane flies spent as larvae. Preimaginal stages of Tipulidae are not as well studied as adults. The best studied are the last instar larvae, but even then, last instar larvae of less than 0.5 percent of all Tipulidae species are known and described at the moment (Chiswell 1956, Gelhaus 1986, Theowald 1967, Savchenko 1983, Podeniene 2003). Knowledge of larval ecology is mostly based on European and North American species and still is poorly understood. It is known, that larvae of Tipulidae can develop in different aquatic and terrestrial habitats, most of them consume decaying plant material (Pritchard 1983). Larvae of several species are serious pests.

The first instar larvae are very poorly known. The first descriptions of egg-larvae were made in the early twentieth century. After that, the first instar larvae of a little more than 20 species were described (Gerbig 1913, Hemmingsen 1965, Savchenko 1983, Kim & Lee 2004, Lantsov 1982, 1984, 2009). It is known, that features of head capsules, general morphology and chaetotaxy of the second and third instar larvae are very similar to the last instar, when the first instar or egg-larvae differs drastically (Gerbig 1913, Hemmingsen 1965, Savchenko 1983). Spiracular field of egg-larva has just lateral and ventral spiracular lobes, when in other instars, dorsal lobes are present too. Egg-larvae have few pairs of tiny sclerites with very long bristles on dorsal part of spiracular field and

egg-larvae from female captured in Naujoji Vilnia environs, Vilnius district, N54.70365, E25.405980, 09 VIII 2011, eggs were laid on 13 VIII 2011, egg-larvae hatched on 21 VIII 2011; 118 egg-larvae from female captured in Vilnius, N54.68194, E25.27087, 31 VII 2012, eggs were laid on 01 VIII 2012, egg-larvae hatched on 06 VIII 2012.

Discussion

Differences between the last instar larvae of genus *Nephrotoma* were noticed just in sclerotisation of spiracular field and shape of anal papillae. Characters of head capsule of the last instar larvae have never been discussed or used in any key. Arrangement and length of dorsal, ventral and lateral setae have been discussed by Chiswell (1954), but have never been used in any key. During this study it was found that such characters as shape of apical teeth of mandible, shape of basal segment of antenna, number of sensillae, shape of hypostomium and arrangement of sensory structures on labrum differ among egg-larvae of genus *Nephrotoma*. The length of abdominal setae differs significantly among egg-larvae of different species. The longest ventral and dorsal setae could be half the length of the whole segment in *N. crocata*, *N. dorsalis* and *N. scurra*, or just as long as one-third of it in *N. flavescens*, *N. pratensis* and *N. submaculosa*. Arrangement of dorsal setae is very similar in all *Nephrotoma* species. In some species seta D2 is the longest dorsal seta (*N. crocata*, *N. pratensis*, *N. submaculosa*), when in other species, the longest is D3 (*N. dorsalis*, *N. flavescens*, *N. scurra*). Ventral setae are arranged in same way in all *Nephrotoma* species, but length of them is different in all species. Lateral setae could be arranged in two ways. In some species, they all are forming a line, in others, setae L1–L3 are far apart from each other. The most significant differences were observed in spiracular field. Number and length of lateral bristles, number of tufts, number of bristles in tufts, number and length of apical bristles on ventral lobes and sclerotisation of spiracular field makes spiracular field of each *Nephrotoma* species unique.

Egg-larvae, as well as other instar larvae of *Nephrotoma*, have pads on frontal part of prothorax. This character was known as the only character separating larvae of that genus from the other genera. In egg-larvae pad is solid and better expressed on dorsal and ventral parts of prothorax. In the last instar larvae there is a pair of pads on dorsal side of prothorax. We found, that lateral plates of labrum of genus *Nephrotoma* differ significantly from that of genus *Ctenophora*. This character could be used as genera separating feature as well.

During this study, we never noticed any protruding sclerotization on the dorsal side of head capsule, mentioned by Hemmingsen (1965), which can be used as “hatching spine”. It was noticed, that egg-larvae eat their egg skins and is quite possible, that they are using their huge mandible with sharp apical teeth for hatching.

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