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A NEW SPECIES OF NALEPELLA KEIFER
(ACARINA: ERIOPHYOIDEA: PHYTOPTIDAE)
FROM ABIES IN DENMARK

by J. BOCZEK ¹, S. HARDING ², A. SHI¹ & J. BRESCIANI²

(Accepté Novembre 2000)

SUMMARY: Nalepella danica n. sp. found on Abies nordmanniana in Denmark is described. The species is a serious pest of Christmas trees, and notes on its occurrence, biology and damage of the needles are given.

RéSUMÉ: Cet article décrit et illustre une nouvelle espèce d‘Eriophyoides, Nalepella danica n. sp., trouvée sur Abies nordmanniana au Danemark. L‘espèce est un ravageur des sapins de Nordmann et des observations sur sa fréquence, sa biologie et les dégâts sur les aiguilles sont apportés.

INTRODUCTION

Eriophyoid mites of the genus Nalepella Keifer are commonly found as needle vagrants on conifers. The mites feed on the cell sap of the needles and some species have been reported to cause severe needle damages especially in nurseries and plantations (BOCZEK, 1962; EIDT, 1966; LÖYTTYNIEMI, 1969; MARSHALL & LINDQUIST, 1972; POSTNER, 1972; Hu & KRANTZ, 1991).

Abies nordmanniana (Steven) Spach is widely used as a Christmas tree in Europe. Since 1992, discolouration and loss of needles due to attack by eriophyoid mites have been of economic importance in Danish Christmas tree plantations (HARDING & JACOBSEN, 1995). So far, Nalepella shevtchenkoi Boczek has been identified from the plantations and the species has been considered the major cause of the injury (HARDING & BRESCIANI, 1997). During biological investigations of N. shevtchenkoi in Denmark a new species of Nalepella was discovered in large numbers on the needles of A. nordmanniana and severe discolouration was recorded. A description of this new species is given below along with notes on its biology and occurrence.

MATERIAL AND METHODS

The morphology of the new species was investigated using phase contrast microscope and with scanning electron microscopy (JEOL-JSM 840) including cryo scanning attachment (Hexland CT 1000). Prior to light microscopy the mites were mounted in Heinzle’s medium. The measurements are based on study of 10 females, 10 males and few larvae and nymphs. All measurements are given in micrometers, the range of measurements in parentheses.
DESCRIPTION

*Nalepella danica* Boczek, Harding & Shi n. sp. (Figs. 1, 2 and 3).

Female: 294 (247-303) long; 97 wide, 92 thick. (Fig. 1, Fig. 2A, Fig. 3A) Body fusiform, reddish-yellow in colour in life; immature stages white-whitish. Gnathosoma 43 long with antapical rostral seta 13 long. Chelicerae 47 long, slightly bent. Prodorsal shield 66 (65-70) long, 90 wide with lobe rounded anteriorly, with design of bell shape (Fig. 2B, Fig. 3C). Anterior shield seta 40 long, directed ahead, posterior scapular tubercles 10 long, thick, 50 apart, setae situated close to rear shield margin directed to the front. Dorsal setae 108 long directed up and ahead. Leg I 57 long; tibia 17 long with seta 9 long and solenidion 8 long; tarsus 8 long with solenidion 11 long, slightly knobbed; empodium 8 long, 7-rayed. Leg II 42 long; tibia 15 long; tarsus 9 long with solenidion 10 long, slightly knobbed; empodium 7 long (Fig. 2C, E, Fig. 3F). Coxae not touched, not forming sternum, smooth (Fig. 3B). First forecoxal tubercles 18 apart, setae 13 long; second tubercles 17 apart, setae 30 long; hindcoxal tubercles 40 apart, setae 48 long.

Opisthosoma evenly arched, of 15 (15-22) broad and wavy, smooth and at the rear 4 (4-8) narrow microtuberculate dorsal annuli and about 115 microtuberculate ventral annuli (Fig. 2A, Fig. 3A). Lateral setae 56 long, on 15th ventral annulus; first ventral setae 95 long on 40th; second ventral setae 70 long, on 62nd ventral annulus; third ventral setae 57 long, on 8th annulus from the rear. Accessory setae 5 long. Female genitalia between 15th and 16th ventral annulus, 24 long 30 wide; coverflap smooth; genital setae 30 long, tubercles 24 apart (Fig. 3B).

**MALE:** 230 long; prodorsal shield 62 long; opisthosoma of 17-19 wavy, broad, smooth and 4 narrow, microtuberculate dorsal and 92 ventral annuli; genitalia 26 wide; genital setae 10 long; tubercles 25 apart (Fig. 3E).

**NYMPH:** 172 long; prodorsal shield 40 long; opisthosoma of 57 microtuberculate dorsal annuli; genital setae 10 long; tubercles 10 apart.

**LARVA:** 70-80 long; prodorsal shield 23-27 long; opisthosoma of 55-58 microtuberculate rings; dorsal setae 9 (anterior) and 27 (posterior) long; chelicerae 25 long.

**EGG:** 44 × 53, oval.

**HOST PLANT:** *Abies nordmanniana* Steven (Spach) (Pinaceae). The mites were found as vagrants on the surfaces and undersides of the needles. The infested needles were discoloured by tiny rusty-bronze spots.

**TYPE MATERIAL:** Holotype female and 10 female paratypes, 1 male and 3 nymphs collected at Strandegaard, SE Zealand, Denmark, November 1996.
FIG. 3. — *Nalepella danica* n. sp. A. — Lateral view, female. B. — Anteroventral view of female showing genital region and coxae. C. — Anterodorsal view of female showing prodorsal shield and shield setae. D. — Female genital apodeme. E. — Genital region, male. F. — Legs I and II.
Character | N. danica | N. triceras
--- | --- | ---
Prodorsal shield lobe | rounded | acuminate
Dorsal annuli | 15-22 | 16-21
Chelicerae | 47 long | 70 long
Empodium | 7-rayed | 5-6 rayed

Table 1: Comparison of morphological characters of Nalepella danica n. sp. and N. triceras (Börner). Measurements in μm.

(S. HARDING, coll.). The type material has been deposited at the Department of Applied Entomology, Warsaw Agricultural University, Poland and Department of Ecology, The Royal Veterinary and Agricultural University, Denmark.

Discussion

Until now 12 species of Nalepella have been described; of these only three — N. triceras Börner (Börner 1906) (Nalepa 1910), N. ednae Keifer and N. shevtchenkoi Boczek — have been found on Abies nordmanniana (BOCZEK, 1962, 1964, 1969; BOCZEK & CHYCZEWSKI, 1970; POSTNER, 1976; DENGLE, 1980). The new species is close to N. triceras, another needle vagrant documented to cause yellowing of needles of Abies sp. (POSTNER, 1972). The two species can, however, be distinguished by the appearance of the prodorsal shield which is rounded in N. danica but acuminate in N. triceras, by the number of dorsal annuli, the length of the chelicerae and the number of rays of the empodium (Table 1). In addition, N. danica is slightly longer than N. triceras.

It is also close to N. shevtchenkoi but it can be easily distinguished by opisthosoma structure, the appearance of tibiae and by prodorsal shield pattern (Table 2). N. shevtchenkoi (Figs. 4 and 5) has an opisthosoma of about 50 microtuberculate dorsal annuli (Fig. 4A, Fig. 5A), tibiae with rows of ventral spines (Fig. 4C, Fig. 5B) and shield with numerous broken longitudinal short lines (Fig. 4A, Fig. 5C). In N. danica, opisthosoma proximally has 15-22 broad smooth dorsal annuli and 4-5 microtuberculate rings distally; tibiae and tarsi smooth ventrally and prodorsal shield with a pattern of bell shape.

N. danica has been found in large numbers in Christmas tree plantations of A. nordmanniana at several localities in Denmark. The species has occurred alone or together with N. shevtchenkoi. Severe needle damages have been observed on both cases. The injury of the foliage is recognized as a rusty bronze discoloration due to dense spots of tiny chloroses, the symptoms developing some time after the feeding activity of the mites. Heavy attacks may result in defoliation. So far, adults and nymphs of this species appear to prevail during late summer and autumn. In both species eggs overwinter on needles. However, singular feeding and egg-laying mites were

<table>
<thead>
<tr>
<th>CHARACTERS</th>
<th>N. danica</th>
<th>N. shevtchenkoi</th>
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<tbody>
<tr>
<td>length of body</td>
<td>90-108</td>
<td>115-120</td>
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<tr>
<td>length of shield anterior setae</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>length of shield scapular setae</td>
<td>70</td>
<td>130</td>
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<tr>
<td>length of shield</td>
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<td>---</td>
</tr>
<tr>
<td>female</td>
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<td></td>
</tr>
<tr>
<td>length of body</td>
<td>145-240</td>
<td>180-305</td>
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<tr>
<td>no of dorsal annuli</td>
<td>15-22 broad, smooth and 4-5 microtuberculate</td>
<td>40-63 microtuberculate</td>
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<tr>
<td>tibiae</td>
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<tr>
<td>prodorsal shield pattern</td>
<td>bell-shaped with longitudinal lines</td>
<td>with numerous longitudinal broken lines</td>
</tr>
<tr>
<td>length of scapular shield setae</td>
<td>50-65</td>
<td>100-172</td>
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<tr>
<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>male</td>
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<tr>
<td>no. of dorsal annuli</td>
<td>16 broad, smooth and 4 narrow, microtuberculate</td>
<td>46-50 microtuberculate</td>
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<tr>
<td>prodorsal shield pattern</td>
<td>bell-shaped with longitudinal lines</td>
<td>with numerous longitudinal broken lines</td>
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</table>

Table 2: Comparison of differing characters of Nalepella danica n. sp. and N. shevtchenkoi Boczek. Measurements in μm.
Fig. 5. — *Nalepella shirchenkoii* Boczek. A. — Lateral view, female. B. — Legs I and II. C. — Prodorsal shield with broken longitudinal short lines and shield setae.
found as late as in January in Denmark. Eggs transferred to room temperatures hatch in 4-5 days. Eggs are found as aggregates on the needles, mainly close to their bases. Larvae, nymphs and adults feed both on upper and lower needle surfaces.

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