

A redescription of *Metaphorura denisi* SIMON BENITO, 1985  
(Collembola: Onychiuridae: Tullbergiinae)

ROMUALD J. POMORSKI, DARIUSZ SKARŻYŃSKI

Zoological Institute of Wrocław University, Sienkiewicza 21, 50-335 Wrocław, Poland  
e-mail: onychus@biol.uni.wroc.pl

ABSTRACT. *Metaphorura denisi* SIMON BENITO, 1985 is redescribed based on ELLIS's material from Crete and material from the authors' collection. Additionally I instar larva of *M. denisi* is described. The key to the species of the genus *Metaphorura* BAGNALL, 1936 is given.

Key words: entomology, taxonomy, *Collembola*, *Onychiuridae*, *Tullbergiinae*.

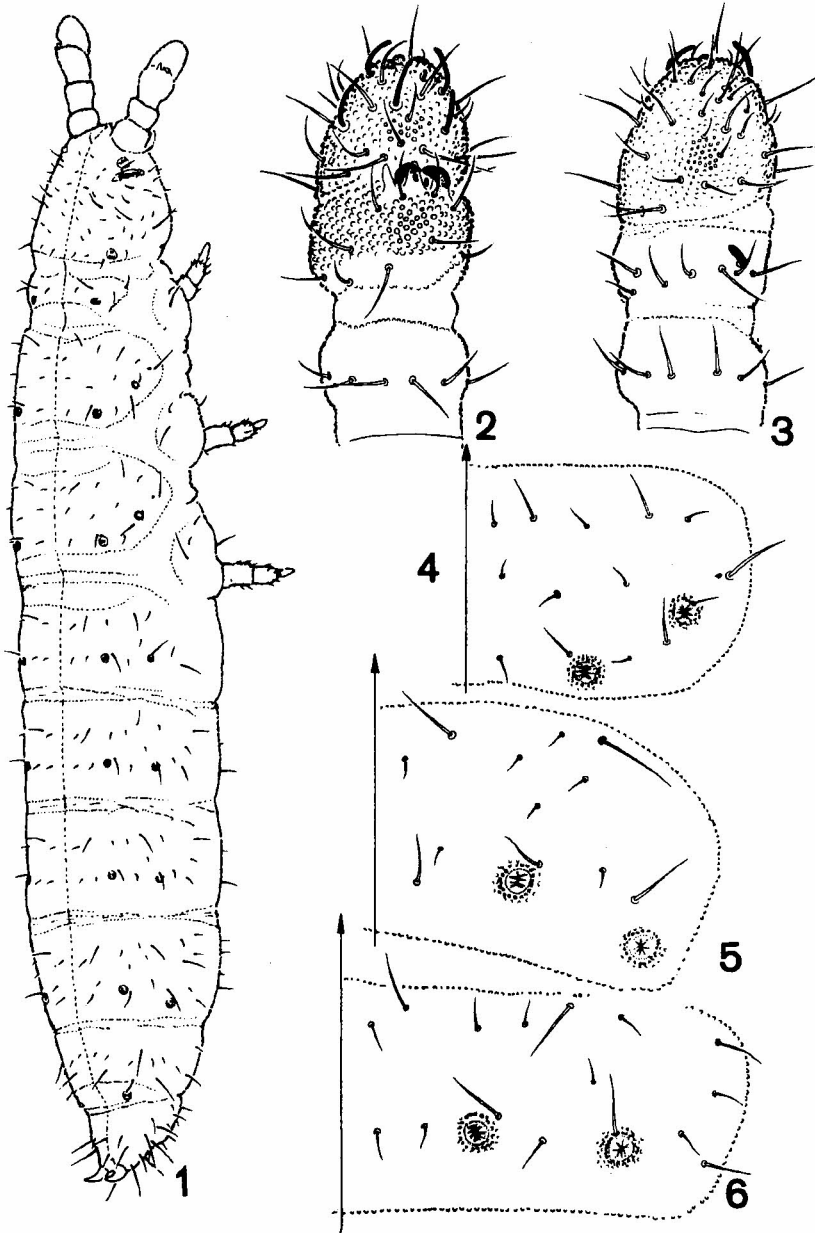
SIMON BENITO (1985) described two new species of *Metaphorura* BAGNALL, 1936 on the base of material of *M. affinis* (BÖRNER, 1902) from Crete, collected and studied by ELLIS (1976). Descriptions of *M. ellisi* SIMON BENITO, 1985 and *M. denisi* SIMON BENITO, 1985 are very short and incomplete. ZIMDARS & DUNGER (1994) omitted both new species in their Synopses on Palearctic *Collembola* Part I. *Tullbergiinae* BAGNALL, 1935. Lately GRUIA (1995) redescribed *M. ellisi* using material from Israel.

On the basis of ELLIS's material from Crete, which we have obtained thanks to the kindness of Dr W. HOGENES from the Zoological Museum of University of Amsterdam, material from Turkey collected by J. KANIA and our material, collected during faunistic investigations in south-eastern Bulgaria we redescribe *M. denisi* and give the key to the species of the genus *Metaphorura*. Besides we describe I instar larva of *M. denisi*.

***Metaphorura denisi* SIMON BENITO, 1985**

MATERIAL

Female identified as *Metaphorura affinis* (BÖRNER) type C, Ellas Kriti, Aghia Varvara, 972.228, 21.10.1972, leg. A. C. & W. N. ELLIS; male and 3 females



1-6. *M. denisi* (adult specimen): 1 - dorsal chaetotaxy and arrangement of pseudocelli, 2 - right antenna, dorsal view, 3 - right antenna, ventral view, 4 - chaetotaxy and arrangement of pseudocelli on thoracic tergum III, 5 - chaetotaxy and arrangement of pseudocelli on abdominal tergum IV, 6 - chaetotaxy and arrangement of pseudocelli on abdominal tergum III

identified as *Metaphorura affinis* (BÖRNER) type C, Ellas Kriti, Malia, 972.222, 29. 10. 1972, leg. A. C. & W. N. ELLIS; female and juvenile, moss and litter on the rocks, Torul, Pontus Mountains, Turkey, 7.06.1996, leg. J. KANIA; many specimens of both sexes and juveniles, roots of plants on sand dune between ernomorec and Sozopol, Bulgaria, 4. 09. 1996, leg. R. J. POMORSKI, D. SKARZYŃSKI; many specimens of both sexes and juveniles, lichens on sand dune near border of Ropotamo National Park, Arkutino, Bulgaria, 6. 09. 1996, leg. D. SKARZYŃSKI, R. J. POMORSKI.

## REDESCRIPTION

Body length 0.9-1.2 mm. Colour of the body white, anal spines yellowish. Granulation coarse and uniform, only abdominal tergum VI with areas of stronger granulation (figs 1, 9). Between setae  $p_2$  on abdominal tergum V 15-17 granules (fig. 9).

Pseudocellar formula: 11/122/22221. The arrangement of pseudocelli as in figs 1, 4-6. Pseudocelli are of two types, submedial composed of two parallel rows, of 3-4 narrow vesicles and lateral usually smaller and composed of a rosette with 8-9 narrow vesicles (figs 4-6).

Setae well differentiated into micro- and macrochaetae (macrochaetae 2-3 times longer than microchaetae). Dorsal chaetotaxy is the following formula:

	I	II	III	I	II	III	IV	V
a	-	5	5	5	6	6	5	6
m	4	5	5	1	1	1	2	-
p	-	4	4	5	5	5	5	3
subc/pl	2	3	3	2	4	4	6	3

Lateral sensillae s on meso- and metanotum thin, setaceous (figs 1, 4). Thoracic terga II and III with microsensilla laterally. Seta  $p_3$  near pseudocellus on the abdominal tergum V is mesochaeta slightly thickened at most (figs 1, 9),  $p_5/p_3$  length ratio is (1,3-2) : 1 and  $p_5/p_2$  length ratio is (1-1,2) : 1. Anal lobes with setae  $l_2$ ,  $l_3$  and without setae  $l_{2''}$ ,  $l_3$ .

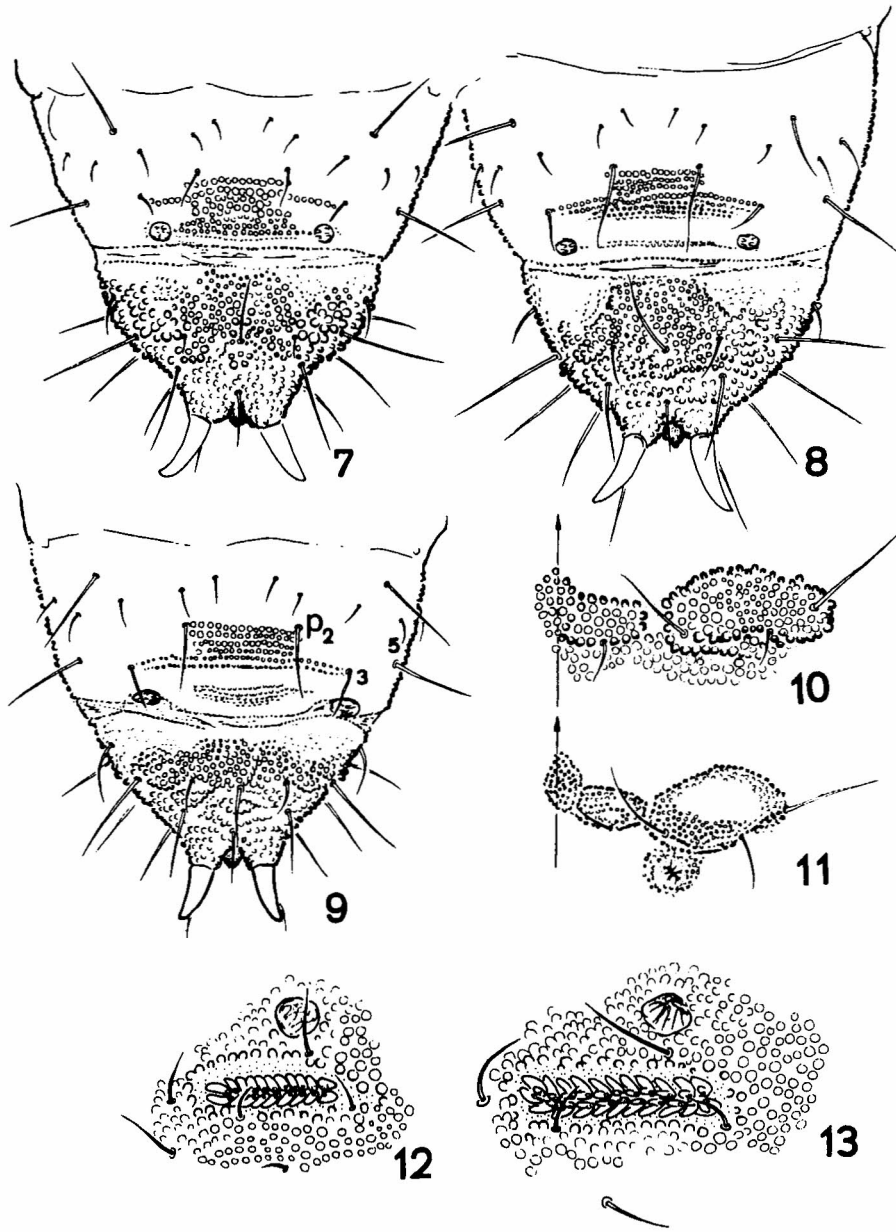
Antennae slightly shorter than head. Antennal segment I and II with respectively 7 and 11 setae. Antennal segment IV with apical papilla, two subapical sensory pegs and 5 thickened sensillae a-e (figs 2, 3). Antennal organ III consists of 2 large sensory clubs, 2 small sensory pegs and 3 protecting papillae (fig. 2). Ventral side of antennal segment III with one large sensory club (fig. 3).

Postantennal organ with 18-24 simple, curved vesicles covering one another, sometimes vesicles are deeply divided into two arms basally joined together (fig. 13).

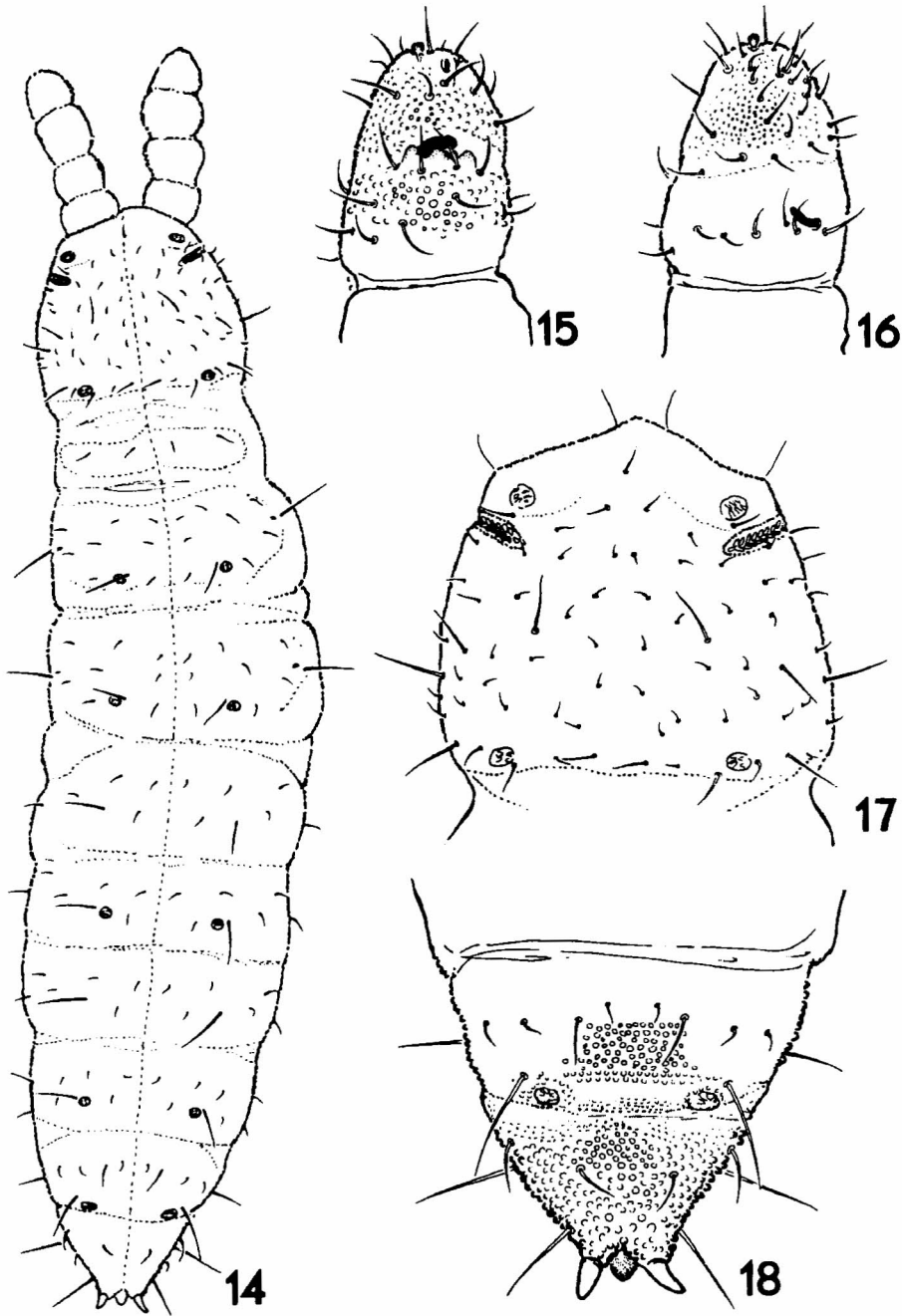
Claws without teeth, with rudimentary empodial appendage. Tibiotarsi I-III with respectively 11, 11, 10 setae.

Ventral tube with 6+6 setae.

Two anal spines on strong papillae, AD/GIII: 1,5 : 1. Between anal spines unpaired wart-like ventro-median process (fig. 9).



7-13. 7 - *M. ellisi*, chaetotaxy and granulation of abdominal terga V and VI, 8 - *M. affinis*, chaetotaxy and granulation of abdominal terga V and VI, 9 - *M. denisi*, chaetotaxy and granulation of abdominal terga V and VI, 10 - *M. ellisi*, thoracic tergum I, 11 - *M. denisi*, thoracic tergum I, 12 - *M. denisi*, postantennal organ of I instar larva, 13 - *M. denisi*, postantennal organ of adult specimen



14-18. *M. denisi* (1 instar larva): 14 - dorsal chaetotaxy and arrangement of pseudocelli, 15 - right antenna, dorsal view, 16 - right antenna, ventral view, 17 - dorsal chaetotaxy of head, 18 - chaetotaxy and granulation of abdominal terga V and VI

## DESCRIPTION OF I INSTAR LARVA

Body length 0,6 mm. Colour of the body white, anal spines white. Granulation coarse and uniform. Pseudocellar formula: 11/011/01011. Pseudocelli are composed of two parallel rows of 3-4 narrow vesicles, and arranged as in figs 14, 17, 18. In some specimens, pseudocellus-like spots of different granulation on thoracic tergum I and abdomen tergum III are visible.

Setae well differentiated into micro- and macrochaetae (macrochaetae 3-5 times longer than microchaetae). Dorsal chaetotaxy is the following:

	I	II	III	I	II	III	IV	V
a	-	3	3	3	3	3	3	5
m	2	4	4	-	-	-	-	-
p	-	3	3	3	3	3	3	1
subc/pl	1	2	2	1	1	1	4	1

Lateral sensillae s on meso- and metanotum thin, setaceous 4 times longer than microchaetae (fig. 14). Seta near pseudocellus on the thoracic tergum V is macrochaeta 5-6 times longer than microchaetae (figs 14, 18). Thoracic terga II and III with microsensilla laterally. Anal lobes with setae  $l_2$ ,  $l_3$  and without setae  $l_2$ ,  $l_3$ .

Antennae slightly shorter than head. Antennal segment I and II with respectively 7 and 11 setae. Antennal segment IV with apical papilla and two subapical sensory pegs, thickened sensillae absent (figs 15, 16). Antennal organ III consists of 1 large sensory club, 2 small sensory pegs and 3 low protecting papillae (fig. 15). Ventral side of antennal segment III with one large sensory club (fig. 16).

Postantennal organ with 18-20 simple vesicles (figs 12, 17).

Claws without teeth, with rudimentary empodial appendage. Tibiotarsi I-III with respectively 11, 11, 10 setae.

Ventral tube with 6+6 setae.

Two anal spines on strong papillae, AD/GIII: 1,5 : 1. Between anal spines unpaired, rounded wart-like ventro-median process (figs 14, 18). It is relatively bigger than in adult specimen.

## REMARKS

The comparison of I instar larva and adult specimen shows differences, described earlier by RUSEK (1980) and LUCIANEZ & SIMON (1988, 1992):

- sensillar chaetotaxy of antennal segment IV of I instar larva without thickened sensillae,
- antennal III sense organ composed of only one sensory club and two sensory pegs,
- simpler chaetotaxy of the body,
- smaller number of vesicles in postantennal organ.

Exceptional character of *M. denisi*, among other *Tullbergiinae*, is increasing of number of pseudocelli, during postembryonic development. Pseudocellular formula is changes from 11/011/01011 to 11/122/22221. First appear submedial pseudocelli on thoracic tergum I and abdominal terga I and III (probably in the second instar). Lateral pseudocelli appear in later instars - in subadults they are always visible. The structure of submedial pseudocelli is the same in I instar larva and adult specimen.

## DISCUSSION

ELLIS (1976) distinguished three "types" (A, B, C) of *M. affinis* on the basis of rich material collected by him on Crete. The differences between these "types" involved body granulation - especially on abdominal terga V and VI, length of anal spines and length of sensillum on abdominal tergum V (fig. 7-11). SIMON BENITO (1985), using ELLIS's material, recognized them on the base of differences in pseudocellular formula as distinct species. According to him *M. affinis* type B is *M. affinis* s. str., *M. affinis* type A is *M. ellisi* and *M. affinis* type C is *M. denisi*.

We have summarized differences between these three closely related species using material from Crete, Turkey, Bulgaria and Poland. *M. ellisi*, was redescribed by GRUIA (1995) on the basis of material from Israel. We have seen ELLIS's specimen from Crete, identified as *M. affinis* type A and we have noticed some differences between GRUIA's redescription and the mentioned material. These data are given in the table.

	<i>M. affinis</i> (BÖRNER)	<i>M. ellisi</i> SIMON BENITO	<i>M. denisi</i> SIMON BENITO	
Material examined	Crete (ELLIS coll., identified as <i>M. affinis</i> type B), Poland	Crete (ELLIS coll., Israel, GRUIA (1995) identified as <i>M. affinis</i> type A)	Crete (ELLIS coll. identified as <i>M. affinis</i> type C), Turkey, Bulgaria	
<b>Pseudocellar formula</b>	11/111/11111	11/011/01111	11/011/01111	11/122/22221
<b>Number of granules between setae <math>p_2</math> on abd. V</b>	12-17	10-12	10 (?)	15-17
<b><math>p_5/p_2</math> length ratio on abd. V</b>	(1-1,2) : 1	(1,7-2,5) : 1	1,7 : 1 (?)	(1-1,2) : 1
<b><math>p_5/p_3</math> length ratio on abd. V</b>	(1,3-2) : 1	2,5 : 1	2 : 1 (?)	(1,3-2) : 1
<b>Number of vesicles in PAO</b>	20-24	20-23	25-27	18-24
<b>Number of setae on tibiotarsi I-III</b>	11,11,10	11,11,10	11,11,11	11,11,10
<b>AD/GIII length ratio</b>	(1,3-1,6) : 1	1,5 : 1	1,3 : 1	1,5 : 1
<b>Number of setae on abd. pl. I-III</b>	2,4,4	2,4,4	3,4,5	2,4,4

We give also the key to the species of the genus *Metaphorura* as a supplement to ZIMDARS & DUNGER paper (1994):

- 1. Body without pigment ..... 2.
- Body with dark blue pigment ..... *triacantha* (BÖRNER, 1901)
- 2. Pseudocellar formula: 11/111/11111 .....
- 11/011/11111 (North America) ..... *knowltoni* (WRAY, 1950)
- 11/011/01111 ..... *ellisi* (SIMON BENITO, 1985)
- 11/122/22221 ..... *denisi* (SIMON BENITO, 1985)

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