

Redescription of *Pygmephorus islandicus* SELLNICK, 1940 (Acari: Heterostigmata)

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(With 3 figures)

A b s t r a c t

The phoretic mite associated with small mammals, ***Pygmephorus islandicus*** Sellnick, 1940 (Acari: Heterostigmata), is redescribed based on type-material. The taxonomic status of the species is discussed and similar taxon, ***P. nidicolus*** Mahunka, 1969 is proposed as its junior synonym.

I n t r o d u c t i o n

The phoretic genus ***Pygmephorus*** Kramer, 1877 (Acari: Heterostigmata, Pygmephoridae) represents mites associated with small mammals and currently includes 48 nominal taxa (Dastyh et al. in press). ***Pygmephorus islandicus*** Sellnick, 1940 was the second species described within the genus and it has been recorded from Iceland (Sellnick, 1940, Lindroth et al. 1973, Hallas 1981, Hallas & Gravensen 1987), Poland (the Sudeten: Willmann 1952, 1953) and Canada (Smiley & Whitaker 1984).

Morphological information on ***P. islandicus***, other than that from the original description, was provided by Willmann (1953) and Krczal (1959). The former author dealt with tarsal structures of the species, the latter redescribed this taxon. The redescription, however, was based on mis-identified specimen (see Mahunka 1969, Smiley & Whitaker 1984).

Recently we have had an opportunity to examine type-specimens of ***P. islandicus***. Due to some discrepancies between the original description and the type-material as well as taxonomic ambiguities concerning the species, we found it important to correct and supplement these data. The paper is devoted to that question.

M a t e r i a l s a n d M e t h o d s

The type-material of ***Pygmephorus islandicus*** is a part of Island's arthropod collection of the late Dr. Lindroth. The mites from this collection were studied by Sellnick (1940) who described several new taxa. The type-series of the species is deposited in Göteborg and represents 9 females preserved in 70 % ethanol. A label which accompanies the mites has pencilled Sellnick's handwriting: "202. ***Pygmeph. island***". The numeral "202" indicates a locality where the mites were collected (op. cit., p. 21) and it is also

included in a list of surveyed taxa [**"Pygmephorus islandicus** sp. n.", "SW. Isl. 202: Reykjavik (14)": op. cit., p. 30)]. The original description of the species was based on 14 females and a supposed male (op. cit., p. 30). However, the whereabouts of the five lacking females and a male from the type-series are unknown. One can not exclude that Sellnick deposited them separately in his working collection in Königsberg, completely destroyed after World War II. Sellnick has not designated a holotype, thus all these specimens had a status of syntypes. The lectotype and paralectotypes are designated in this paper.

The mites were transferred with a micropipette from ethanol into lactic acid and temporarily mounted in this medium on microslides. The observations were carried out using phase- and interference contrast microscopy. Subsequently, three specimens were rinsed in distilled water for 6 hours and mounted separately as permanent slide preparations in chloral gum (Swan's medium). After examination the remaining specimens were also rinsed in water and returned to ethanol. If not mentioned otherwise, all measurements are for $n = 9$. In parentheses, arithmetic mean and measurements of the lectotype are given, respectively. Setal notation and terminology of structures follow Lindquist (1977, 1986) and has been explained elsewhere (Dastych & Rack 1991). All measurements are in micrometers (μm).

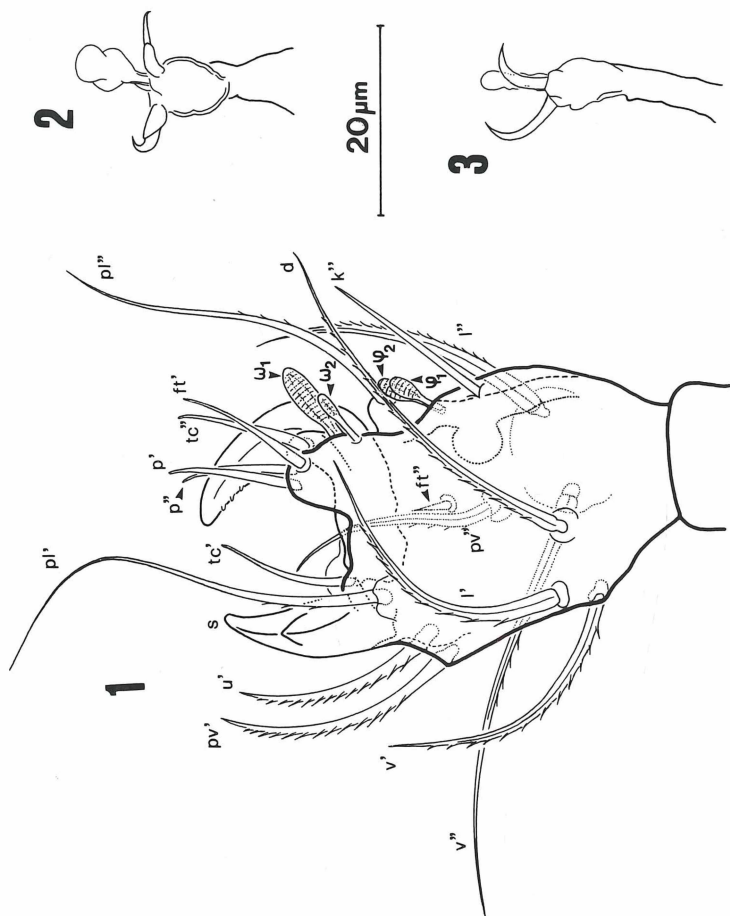
The type-series is slightly worn-out and some specimens are mutilated. Moreover, the material is softened and more transparent than the mites of **Pygmephorus** usually are, as a result of influence of lactic acid used by Sellnick (and us) for temporary slide preparation. All these specimens are also characterized by weak formation of setal barbs. The lectotype and one paralectotype (two slides) and six paralectotypes (in ethanol) are housed in the Naturhistoriska Museet in Göteborg (Sweden). One paralectotype (slide) is deposited in the Zoologisches Museum, Universität Hamburg (Reg. No. A 100/91).

R e d e s c r i p t i o n

Pygmephorus islandicus Sellnick, 1940 (Figs 1-3)

- 1940 **Pygmephorus islandicus** Sellnick (in: K. Vet. O. Vitterh. Samh. Handl., 6: 1-129, Stockholm, pp. 120-123, Figs 122, 124, 126, 128, 130, 131)
 1952, 1953 **P. islandicus**: Willmann (misidentified **P. stammeri** Krczal, 1959)
 1959 **P. islandicus**: Krczal (misidentified **P. stammeri**)
 1969 **P. islandicus**: Mahunka
 1969 **P. nidicolus**: Mahunka (new synonym)
 1973 **P. islandicus**: Lindroth et al.
 1975 **P. nidicolus**: Rack (misidentified **P. ideii** Smiley & Whitaker, 1979)
 1981 **P. islandicus**: Hallas
 1982 **P. nidicolus**: Whitaker et al.
 1984 **P. islandicus**: Smiley & Whitaker
 1987 **P. islandicus**: Hallas & Gravesen

MATERIAL EXAMINED. 9 females from old hay, Reykjavik, 5. August 1929, coll. C. Lindroth (type-series). Other material: holotype of **P. nidicolus** Mahunka, 1969.



Figs 1-3: *Pygmephorus islandicus* Sellnick, 1940: 1 = tibiotarsus, dorsal view; 2 = terminal unit of tarsus III with claws and empodium, ventral view; 3 = terminal unit of tarsus IV, dorsolateral view (paralectotypes).

DIAGNOSIS. Median-sized **Pygmephorus** with setiform and barbed setae e, h2, TrIV v'. Claws II and III small, smooth and with thickened bases.

DESCRIPTION. The length of the body ranges from 216 to 406 μm (\bar{x} = 322.5; 375). Gnathosomal dorsum with two pairs of smooth cheliceral setae (ch1 and ch2) and a pair of supracoxal setae pp. Their length formula is $\text{ch1} > \text{ch2} > \text{pp}$. Prodorsal shield with drop-shaped, slightly elongated stigmata.

Idiosomal setae are barbed, but sometimes the barbs are difficult to discern. Setae v1 are 37-78 long (\bar{x} = 55.0; 42), the length of setae v2 is 28-50 (\bar{x} = 41.1; 32). Setae sc2 are 50-90 long (\bar{x} = 70.7; 64, n = 8). Distance between setae 1b und 1c is longer than that between setae 1a and 1b or, rarely, they are of equal length. Setae e are 22-59 long (\bar{x} = 46.0; 40), setae h2 are 22-53 (\bar{x} = 40.0; 38) in length. The length of setae h2 is 76-100 % of the length of setae e (\bar{x} = 87.0 %; 95 %). Distance between setae e and f is relatively large (10-20, \bar{x} = 15.1; 12), the insertion of the setae bases varies slightly. Seta 1c is flattened, with thickened edges and between them occurs thin, transparent membrane, giving an impression of the seta bifurcation. Setae 2c are 50-70 long (\bar{x} = 63.5; 46, n = 7), the length of setae 2b is 31-50 (\bar{x} = 43.3; 37, n = 5). Formation of caudal setae and distance between them are as those illustrated by Sellnick (op. cit., Fig. 122). Apodemes 5 and poststernal apodeme are shaped as an inverted "Y", with a wide angle between the former structures (see op. cit., Fig. 124).

Tibiotarsus I is short (Fig. 1). Modified subunguinal seta s is relatively long and with distinct dorsal tooth in a half of its length. Setae TiTa v'' and l'' are located on a small plate. Internal tibiotarsal thickening is roundish, but not separated from the limb wall. Eupathidium ft'' is strikingly small, in a shape of a short, sharp spine and placed antieriad of seta pv' (Fig. 1). The remaining tarsal eupathidia and tibial eupathidium k'' are also smooth, other setae on tibiotarsus are more or less barbed. In the largest specimens the eupathidium k'' is provided with several tiny, hardly discernible granules (phase contrast), probably vestigials of barbs. Seta FeI d is short, smooth and terminates as a membranous, sharp and slightly asymmetrical spine. Setae FeI l' are short and smooth. The remaining setae on leg I are barbed.

Seta FeII v'' is located antieriad or antieriolaterad of seta FeII d. The following setae on legs II to IV are blade-like and smooth: TaIII pl'', FeIV v' and TaIV pl''. Seta TrIV v' is moderately long, setiform and barbed. Other setae on legs are also more or less barbed.

Claws II and III are similar in size, small, smooth and with thickened bases (Fig. 2). Claws II are also similar in size, but simple (Fig. 3). Empodia on legs II and III are small, trilobate and their anterior edges are usually smooth (Fig. 2). However, hardly discernible traces of vertical striation on the empodial edges have been observed in two specimens. Empodial stalks are short. Empodium on leg IV is elongated, rod-like and with rounded apex (Fig. 3).

D i s c u s s i o n

The chaetotaxy and other characters of *P. islandicus* illustrated originally by Sellnick (1940) agree well those in re-examined, slightly mutilated type-specimens. However, setae v1 are longer than v2 and setae 2c are about 1/3-1/4 longer and 1/3 thicker than 2b in the type-material, compared to those in the Sellnick's illustration (op. cit., Figs 122, 124). Moreover, in the type-series, seta 1c is flattened, has distinctly sclerotized lateral edges with a thin transparent cuticular membrane between them. These setae are figured by Sellnick as simple, setiform structures.

In the taxonomy of the genus *Pygmephorus*, the shape and size of seta TrIV v' is considered as an important specific character. In all type-specimens of *P. islandicus* the seta is setiform and barbed and as such it has been described and illustrated by Sellnick (op. cit.). In the majority of other species of the genus the seta is blade-like or spine-like and smooth.

Surprisingly, such a spine-like, smooth seta TrIV v' was found by Krczal (1959) in a sole specimen on which he based the redescription of *P. islandicus*. The specimen originated from the Sudeten and was determined by Willmann (1952). This identification was confirmed by Sellnick (Krczal 1959: p. 478). However, that shape of the seta indicates some misidentification of the individual. This conclusion confirms another character described by Willmann (1953) in the same specimen, i.e. a round and sclerotized thickening inside tibiotarsus I distinctly separated from the limb wall. Willmann recognized the structure as a characteristic feature of *P. islandicus* (op. cit., Fig. 10). Sellnick mentioned nothing about its presence in the original description, but he figured it as adhering to the tibiotarsal wall (1940: Fig. 126). We have found the thickening in all type-specimens of *P. islandicus* formed similarly as that illustrated by Sellnick, i.e. coalesced with and not separated from the limb wall (Fig. 1). Among about thirty species of the genus *Pygmephorus* examined by us recently, we found separated thickening (as that illustrated by Willmann) only in one species, namely *P. stammeri* Krczal, 1959 (see Dastyk et al. 1991). *P. stammeri* has also spine-like and smooth setae TrIV v', its setae 2c are shorter than 2b and almost of the same thickness, compared to *P. islandicus*. All these characters we observed also in the specimen identified as *P. islandicus* by Willmann*, thus we have no doubt that it represents *P. stammeri*. Consequently, as a result of Willmann's misidentification, Krczal (1959) incorrectly based his redescription of *P. islandicus* on the individual of *P. stammeri*.

The above ambiguities have already been noted by Mahunka (1969). Then, however, the author recognized the misidentified specimen as a new species and named it *P. krczali*. From Mahunka's sketchy diagnosis, one can suppose that he has not seen the Willmann's specimen. For that indicates vague statement: "holotype and type-material in Dr. Krczal's collection" (op. cit.). What the author understood under this additional "type-material" is far from clear, since only one individual was examined

* The slide is labelled (in pencil): "*Pygmephorus islandicus* Sell", "Hofeberg, 28. 12. 43 auf Waldspitzmaus", but contains female of *P. stammeri* Krczal, 1959.

by Krczal (1959). Mahunka (op. cit.) recognized **P. krczali** as a closest relative of his other new species described in the same paper, i.e. **P. similis** Mahunka, 1969. The latter species is strikingly similar to **P. stammeri** and described from a sole specimen. The difficulties to separate both taxa have been already discussed by Rack (1975).

Recently **P. islandicus** has been reported from Canada by Smiley & Whitaker (1984). The authors also discussed its confused taxonomy and recognized then **P. krczali** as a nomen nudum (op. cit.). The latter taxon is, with no doubt, a junior synonym of **P. stammeri** (see Dastych et al. in press).

P. islandicus is strikingly similar to **P. nidicolus** Mahunka, 1969 described from Mongolia. Mahunka (1969) himself found, however, no differences between these taxa when he compared as many as ten important taxonomic characters (op. cit.: Table on p. 93). He presented only two differences separating both species in an identification key (op. cit., p. 92, couple 3 and 4). According to the key, setae e and h2 are of equal length in **P. islandicus**. Contrarily, in **P. nidicolus** setae e should be "by half their length longer than ..." setae h2. Moreover, setae 3a are "hardly further spaced from one another than ..." setae 3b in **P. islandicus**, but setae 3a are "spaced much further, almost twice as far, from one another than .." setae 3b in **P. nidicolus**.

Dr. Mahunka kindly lent us the holotype of **P. nidicolus** and we compared it with type-material of **P. islandicus**. The length of setae e and h2 varies in **P. islandicus** and the setae h2 are 70-100 % of the length of the setae e. In the holotype of **P. nidicolus**, both setae e are 44 µm long and setae h2 are 33 and 37 µm long, respectively, so the length ratio is 75 % and 85 %. Thus, this character is similarly developed in both taxa. We found also no significant differences in the insertion of setae 3a and 3b in the type-material of both species. Distance between bases of the setae 3b is slightly shorter in the type-material of **P. islandicus**, compared to that illustrated by Sellnick (1940: Fig. 124). However, the character slightly varies and we found it similarly formed in the holotype of **P. nidicolus**. Hence, the key characters proposed by Mahunka for separation of these taxa are insufficient.

We observed non-significant differences between these species only in the following characters. In the holotype of **P. nidicolus** tibiotarsal eupathidium k'' is covered with distinct, though relatively small barbs. In the type-specimens of **P. islandicus** this seta is generally smooth. However, in the largest specimens the eupathidium is covered with a few irregularly shaped granules which may represent reduced vestigial barbs. Another difference comprises insertion of setae 1a to 1c. Distance between setae 1a and 1b is longer than that between 1b and 1c in **P. nidicolus**. This character, however, varies and on one side of the holotype the distances are 19 and 15 µm long, respectively. On another side of the body they are almost equal and have 19 and 18 µm in length each. Contrarily, in **P. islandicus** the distance between seta 1b and 1c is longer than that between 1a and 1b. However, we found here, too, slight variation. It should be noted that in the Sellnick's illustration (1940: Fig. 124) the distance are different on both sides of the body. In **P. islandicus** setae 1c are pseudo-bifurcated and in the holotype of **P. nidicolus** similarly formed seta is located on only one side of the body. The second seta 1c, however, seems to be "normal"

in shape. This impression may result from different positioning of the structure. In the holotype of **P. nidicolus** seta FeI v' is aberrantly bifurcated on one side of the body. The remaining taxonomically significant characters are formed similarly in both taxa. Consequently, we propose to recognize **P. nidicolus** as a junior synonym of **P. islandicus**.

P. islandicus resembles closely **P. ideii** Smiley & Whitaker, 1979 and **P. igleharta** Smiley & Whitaker, 1984. From these species it can be readily separated by the shape of setae GeIV v' and claws III. The setae are blade-like and smooth in the two latter taxa and setiform and barbed in **P. islandicus**. The claws III are simple in **P. ideii** and **P. igleharta** (i.e. without thickened bases, thus similar in shape to claws IV) and with thickened bases in **P. islandicus**. Interestingly, all these species have strongly reduced tibiotarsal eupathidium ft'', shaped as a sharp and short spine.

DISTRIBUTION. **P. islandicus** is known from Iceland (Sellnick 1940, Lindroth et al. 1973, Hallas 1981, Hallas & Gravesen 1987) and Canada (Smiley & Whitaker 1984). As **P. nidicolus** it has been reported from Mongolia (Mahunka 1969) and Canada (Whitaker et al. 1982). The mite has been found on two species of small mammals, in a nest of such a host and in stored hay (op. cit.). Its record in the Sudeten (Willmann 1952, 1953) refers to **P. stammeri**. However, records of **P. nidicolus** from the U.S.A. and Japan (Rack, 1975) refer to another similar species, namely **P. ideii** (see Dastych et al. in press).

A c k n o w l e d g e m e n t s

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Z u s a m m e n f a s s u n g

Eine phoretisch auf Kleinsäugetern vorkommende Milbenart, **Pygmephorus islandicus** Sellnick, 1940 (Acari: Heterostigmata) wird auf Grund des Typen-Materials nachbeschrieben. Der taxonomische Status der Milbe wird diskutiert, und eine ähnliche Art, **P. nidicolus** Mahunka, 1969 wird als ihr Synonym vorgeschlagen.

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