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Heterorhabditis beicherriana n. sp. (Nematoda: Heterorhabditidae), a new entomopathogenic nematode from the Shunyi district of Beijing, China

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Abstract

A new heterorhabditid nematode was recovered in orchards in the Beijing area. Morphological and molecular data confirmed this nematode as a new species, which belongs to the *bacteriophora*-group with sister taxa *Heterorhabditis bacteriophora* and *H. georgiana*. The nematode was named *H. beicherriana* n. sp. and is characterized by males, hermaphrodites, females and infective juveniles. In males the peloderan bursa is characterized by the formula 1 2 3 3, spicule length 45 (41–51) μm. Male body length is substantially higher than that of *H. bacteriophora* and *H. georgiana* (1028 μm vs 820 and 838 μm, respectively). In hermaphrodites there are six labial and six cephalic papillae; the vulval pattern is smooth, rounded or slightly elliptical. Tail is conoid with a moderately prominent post-anal swelling slightly longer than anal body width. In females vulval lips are non-protruding, tail conical without or with a slightly developed post-anal swelling, about twice as long as anal body width. In infective juveniles, the body is elongate, slender and straight when heat-killed, on average 639 μm long, which is longer than in *H. bacteriophora* (558 μm) and *H. georgiana* (598 μm), respectively. *Heterorhabditis beicherriana* n. sp. is further characterized by internal transcribed spacer (ITS) and D2D3 rDNA sequences, the most similar species, *H. georgiana*, being separated by 21 bp across 994 bp of the ITS and 3 across 890 bp of the D2D3 region. ITS and D2D3 regions of *H. beicherriana* evolved five and one autapomorphies, respectively. Phylogenetic analyses placed *H. beicherriana* n. sp. as a member of the *bacteriophora*-group.

Key words: new species, description, morphology, taxonomy, systematics, phylogeny, SEM

Introduction

Entomopathogenic nematodes (EPN) of the family Heterorhabditidae have been found to be a successful biological control agent. These nematodes are mutualistically associated with bacteria of the genus *Photorhabdus* which cause the septicaemia of insect hosts. Several new species have recently been described and at present the family comprises 15 species. These species form three monophyletic groups (Nguyen *et al*. 2008). The *bacteriophora*-group (*H. bacteriophora* Poinar, 1976, *H. georgiana* Nguyen, Shapiro-Ilan & Mbata, 2008), the *megidis*-group (*H. atacamensis* Edgington, Buddie, Moore, France, Merino & Hunt, 2011, *H. downesi* Stock, Griffin & Burnell, 2002, *H. marelatus* Liu & Berry, 1996, *H. megidis* Poinar, Jackson & Klein, 1987, *H. safricana* Malan, Nguyen, de Waal & Tiedt, 2008, and *H. zealandica* Poinar, 1990), and the *indica*-group (*H. amazonensis* Andaló, Nguyen & Moino, 2007, *H. baujardi* Phan, Subbotin, Nguyen & Moens, 2003, *H. floridensis* Nguyen, Gozel, Koppenhofer & Adams, 2006, *H. gerradi* Plichta, Joyce, Clarke, Waterfield & Stock, 2009, *H. indica* Poinar, Karunakar & David, 1992, *H. mexicana* Nguyen, Shapiro-Ilan, Stuart, McCoy, James & Adams, 2004, *H. tayserae* Shamseldean, El-Sooud, Abd-Elgawad & Saleh, 1996).

Surveys for EPN in the territory of China located several steinernematid species, but only one heterorhabditid (*H. bacteriophora*) (Han 1994). *H. brevicaudis* Liu, 1994 isolated in the Fujian Province (Liu 1994) and partly re-described based on an isolate from Taiwan (Feng-Chia *et al*. 2009) has yet to be described satisfactorily and its taxonomic status clarified. In an EPN survey in orchards in the Beijing area, a heterorhabditid isolate was

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