



*Zootaxa* 3639 (1): 001–076  
www.mapress.com/zootaxa/

Copyright © 2013 Magnolia Press

# Monograph

ISSN 1175-5326 (print edition)

**ZOOTAXA**

ISSN 1175-5334 (online edition)

<http://dx.doi.org/10.11646/zootaxa.3639.1.1>

<http://zoobank.org/urn:lsid:zoobank.org:pub:32584FBD-212B-4042-BCEF-04C698D71117>

# ZOOTAXA

3639

## Review of Rhabdiasidae (Nematoda) from the Holarctic

YURIY KUZMIN

*Department of Parasitology, Schmalhausen Institute of Zoology, NAS of Ukraine; Vul. B. Khmelnytskogo, 15, Kyiv, 01601, Ukraine.  
E-mail: rhabdias@izan.kiev.ua; rhabdias@gmail.com*



Magnolia Press  
Auckland, New Zealand

*Accepted by A. Choudhury: 18 Feb. 2013; published: 16 Apr. 2013*

Yuriy Kuzmin  
**Review of Rhabdiasidae (Nematoda) from the Holarctic**  
(*Zootaxa* 3639)

76 pp.; 30 cm.

16 Apr. 2013

ISBN 978-1-77557-140-7 (paperback)

ISBN 978-1-77557-141-4 (Online edition)

FIRST PUBLISHED IN 2013 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: [zootaxa@mapress.com](mailto:zootaxa@mapress.com)

<http://www.mapress.com/zootaxa/>

© 2013 Magnolia Press

All rights reserved.

No part of this publication may be reproduced, stored, transmitted or disseminated, in any form, or by any means, without prior written permission from the publisher, to whom all requests to reproduce copyright material should be directed in writing.

This authorization does not extend to any other kind of copying, by any means, in any form, and for any purpose other than private research use.

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

## Table of contents

Abstract	4
Introduction	4
Material and methods	5
Results	5
1. General information	5
1.1. Life cycles and development	5
1.2. Morphology	8
1.2.1. Free-living stages	8
1.2.2. Parasitic stages	18
1.3. Taxonomy	24
2. Systematics	26
2.1. Key to the genera of Rhabdiasidae Railliet, 1915	26
2.2. Genus <i>Rhabdias</i> Stiles et Hassall, 1905	27
2.2.1. Diagnosis	27
2.2.2. Keys to Nearctic species	27
2.2.3. Keys to Palearctic species	28
2.2.4. Descriptions of species	28
<i>Rhabdias agkistrodonis</i> Sharpilo, 1976	29
<i>Rhabdias ambystomae</i> Kuzmin, Tkach and Snyder, 2001	30
<i>Rhabdias americanus</i> Baker, 1978	30
<i>Rhabdias bakeri</i> Tkach, Kuzmin et Pulis, 2006	33
<i>Rhabdias bermani</i> Rausch, Rausch et Atrashkevich, 1984	33
<i>Rhabdias bufonis</i> (Schrank, 1788) Stiles et Hassall, 1905	35
<i>Rhabdias elaphe</i> Sharpilo, 1976	37
<i>Rhabdias esculentorum</i> Cipriani, Mattiucci, Paoletti et al., 2012	38
<i>Rhabdias eustreptos</i> (McCallum, 1921) Chitwood et Chitwood, 1934	39
<i>Rhabdias fuscovenosa</i> (Railliet, 1899) Goodey, 1924 sensu lato	39
<i>Rhabdias horigutii</i> Yamaguti, 1943	41
<i>Rhabdias incerta</i> Wilkie, 1930	41
<i>Rhabdias joaquinensis</i> Ingles, 1935	44
<i>Rhabdias kurilensis</i> Sharpilo, 1976	47
<i>Rhabdias nipponica</i> Yamaguti, 1935	47
<i>Rhabdias ranae</i> Walton, 1929	48
<i>Rhabdias rubrovenosa</i> (Schneider, 1866) Semenov, 1929	49
<i>Rhabdias sphaerocephala</i> Goodey, 1924	51
<i>Rhabdias tarichae</i> Kuzmin, Tkach et Snyder, 2003	52
<i>Rhabdias tokyoensis</i> Wilkie, 1930	54
<i>Rhabdias vibakari</i> Kuzmin, 1996	55
<i>Rhabdias dossei</i> Hartwich, 1972	55
<i>Rhabdias lacertae</i> Moravec, 2010	55
<i>Rhabdias martinoi</i> Kurochkin et Gus'kov, 1963	56
<i>Rhabdias rhacophori</i> Yamaguti, 1941	56
<i>Rhabdias rotundata</i> (Linstow, 1906) Semenov, 1929	57
<i>Rhabdias</i> sp.	57
2.3. Genus <i>Entomelas</i> Travassos, 1930	58
2.3.1. Diagnosis	58
2.3.2. Key to Palearctic species	58
2.3.3. Descriptions of species	58
<i>Entomelas dujardini</i> (Maupas, 1916) Travassos, 1930	58
<i>Entomelas entomelas</i> (Dujardin, 1845) Travassos, 1930	60
<i>Entomelas kazachstanica</i> Sharpilo et Vakker, 1972	61
<i>Entomelas ophisauri</i> (Kreis, 1940)	61
2.4. Genus <i>Kurilonema</i> Szczerbak et Sharpilo, 1969	64
<i>Kurilonema markovi</i> Szczerbak et Sharpilo, 1969	64
2.5. Species of Rhabdiasidae reported outside of the Holarctic but close to its southern borders	66
<i>Rhabdias bicornis</i> Lu, 1934	66
<i>Rhabdias globocephala</i> Kung et Wu, 1945	66
<i>Rhabdias japalurae</i> Kuzmin, 2003	66
Genus <i>Neoentomelas</i> Hasegawa, 1989	69
<i>Neoentomelas asatoi</i> Hasegawa, 1989	69
References	69
Appendix	74

## Abstract

The review deals with the species of Rhabdiasidae Railliet, 1915 occurring in the Holarctic. Descriptions of 26 species from the genera *Rhabdias* Stiles et Hassall, 1905 (21 species), *Entomelas* Travassos, 1930 (4 species), and *Kurolonema* Szczerbak et Sharpilo, 1969 (1 species) are presented. Additionally, 5 species of *Rhabdias* are listed as *species inquirenda*, and 4 species are included into the review, since they have been reported close to south-eastern border of Palaearctic (the exact distribution is unknown). Keys to the Holarctic species and diagnoses of the genera are provided. An overview of the information on the biology, morphology and taxonomy of Rhabdiasidae is also presented, as well as the host-parasite list of Holarctic Rhabdiasidae.

**Key words:** *Rhabdias*, *Entomelas*, *Kurolonema*, *Neoentomelas*, Holarctic, Nearctic, Palaearctic, life cycles, taxonomy, amphibians, reptiles

## Introduction

Nematodes of the family Rhabdiasidae Railliet, 1915 are mostly lung-dwelling parasites of amphibians and some reptiles. The group is distributed globally, excluding Antarctica. The family includes more than 90 nominal species belonging to 5–7 genera; most species are assigned to the genus *Rhabdias* Stiles et Hassall, 1905.

One of the distinguishing features of rhabdiasids is the alternation of two generations in their life cycles: hermaphroditic generation with adults inhabiting the host, and gonochoristic generation, soil- or faeces-dwelling. For most rhabdiasid species, however, only adult parasitic stage is described, and thus the species diagnoses are based on morphology of adult hermaphrodites.

Generally, Rhabdiasidae are considered to be morphologically monomorphic group. This makes difficult both the differentiation of species and studies on taxonomy, systematics and phylogeny of the family. However, recent studies involving traditional and novel approaches (electron microscopy, molecular methods) allowed description of new species based on the expanded differentiation. More than 40 species of the family have been described during the last decade, mostly in tropical regions of Central and South America, Africa and South–East Asia. On the other hand, a large part of rhabdiasid species is known from Palaearctic and Nearctic regions, apparently due to the better knowledge on helminths of amphibians and reptiles in Europe, North America and Japanese Islands.

Of about 90 of currently recognised rhabdiasid species, 2 have been already mentioned by Dujardin (1845): *Ascaris nigrovenosa* Rudolphi, 1802 (= *Rhabdias bufonis*, first reported by Schrank 1788 as *Ascaris bufonis*) and *Angiostoma entomelas* Dujardin, 1845 (= *Entomelas entomelas*). In the same century, Schneider (1866) described *Leptodera rubrovenosa* (= *R. rubrovenosa*) and Railliet (1899) reported *Angiostoma fuscovenosa* (= *R. fuscovenosa*) as a separate species. Meczников (1865) and Leuckart (1865) first discovered the alternation of generations in the life history of *R. bufonis*.

The information on rhabdiasid nematodes was first systematized in the beginning of the XX century. In 1905 the genus *Rhabdias* Stiles et Hassall, 1905 was erected (Stiles et Hassall 1905), and in 1915 the family Rhabdiasidae Railliet, 1915 was proposed (Railliet 1915). Further cataloguing of rhabdiasid nematodes in Europe, as well as description of new species, was presented in the works of Goodey (1924 b), Semenov (1929), Travassos (1930), Hartwich (1975), Sharpilo (1976). As a result, 10 rhabdiasid species from two genera were estimated for the fauna of Western Palaearctic. Almost each of them has become a subject of more or less extensive morphological and biological studies (Mecznikov 1865; Leuckart 1865; Railliet, 1899; Seurat, 1916; Goodey, 1924 a; Moravec, 1974; Spieler and Schierenberg 1995; Kuzmin 1997; Kuzmin and Miskov 1999; Kuzmin 2000 a; Langford and Janovy 2009).

In Eastern Palaearctic, rhabdiasid nematodes were investigated mainly due to the studies of Yamaguti and his scientific school (Yamaguti 1935, 1941, 1943, 1954), and the first rhabdiasid species from Japanese Islands, *R. tokyoensis* Wilkie, 1930, was described by Wilkie (1930). On the mainland part of Eastern Palaearctic the members of the family were described by Lu (1934), Kung and Wu (1945), Sharpilo (1976), Rausch *et al.* (1984). Works of Hasegawa (1984, 1989 a, b) added to the information on Rhabdiasidae from Japanese Isles. By now, little is known about the life cycles and biology of Rhabdiasidae from Eastern Palaearctic. The free-living stages were described only in *R. agkistrodonis* Sharpilo, 1976, one of 11 species known in this region (Kuzmin 1999).

In Nearctic, the first indigenous rhabdiasid species was described in the beginning of the XX century. That was