Neotrop. Helminthol., 4(1), 2010

ISSN: 2218-6425 impreso / ISSN: 1995-1043 on line

aphia
ASOCIACIÓN PERUANA DE HELMINTOLOGÍA E INVERTEBRADOS AFINES

REVIEW/ ARTÍCULO DE REVISIÓN

RHABDOCHONA (*R.*) *URUYENI* (NEMATODA, RHABDOCHONIDAE) IN BRAZIL: PRESENT STATUS OF SOUTH AMERICAN *RHABDOCHONA* RAILLIET WITH A WORLDWIDE BIBLIOGRAPHICAL SURVEY OF THE GENUS FROM 1845 TO 2010

RHABDOCHONA (*R.*) *URUYENI* (NEMATODA, RHABDOCHONIDAE) EN BRASIL: PRESENTE SITUACIÓN DE *RHABDOCHONA* RAILLIET EN SUD-AMÉRICA, CON UN LEVANTAMIENTO BIBLIOGRÁFICO A NIVEL MUNDIAL DEL GÉNERO DESDE 1845 HASTA 2010

Roberto Magalhães Pinto[1, 2*], Dely Noronha[1], Marcelo Knoff [1] & Delir Corrêa Gomes[1]

Suggested citation: Pinto, M.R., Noronha, D., Marcelo Knoff, M., Gomes, DC. 2010. *Rhabdochona* (*R.*) *uruyeni* (Nematoda, Rhabdochonidae) in Brazil: present status of South American *Rhabdochona* Railliet with a worldwide bibliographical survey of the genus from 1845 to 2010. Neotropical Helminthology, vol. 4, nº 1, pp. 49-69.

Abstract

During studies of fish helminths, deposited in the Helminthological Collection of the Oswaldo Cruz Institute (CHIOC), some samples of nematodes were studied and identified as *Rhabdochona uruyeni* Diaz-Ungria, 1968. The present status of the species occurring in South America is discussed and updated. To facilitate further accesses, a worldwide bibliographical survey related to systematic, taxonomic, morphological, biological, cladistical and ecological approaches to the genus, covering a period of 165 years is presented. To date, *Rhabdochona (Rhabdochona) acuminata* is referred in Argentina, Brazil, and Ecuador, together with *Rhabdochona* (*Filochona*) *fabianae* in Argentina and *Rhabdochona* (*Rhabdochona*) *uruyeni* in Venezuela and now in Brazil, for the first time and in a new host. Also, *Rhabdochona* spp. are cited in Argentina, Brazil and Peru. *Rhabdochona colossomi* Diaz-Ungria, 1968 is considered a *nomen nudum*.

Key words: Bibliographical survey - fishes - *Rhabdochona* spp. - South America.

Resumen

Durante investigaciones direccionadas a los nematodos de peces depositados en la Colección Helmintológica del Instituto Oswaldo Cruz (CHIOC), algunas muestras fueron estudiadas y identificadas como *Rhabdochona uruyeni* Diaz-Ungria, 1968. La presente situación de las especies que ocurren en Sud-América es discutida y actualizada. Además, se efectuó un amplio levantamiento bibliográfico relacionado a taxonomía, morfología, biología, cladística y ecología del género, a fin de proporcionar una pronta indicación de las citas sobre las especies de *Rhabdochona*, comprendiendo un período de 165 años. Hasta el presente, *Rhabdochona (Rhabdochona) acuminata* es referida en Argentina, Brasil, y Ecuador, junto con *Rhabdochona* (*Filochona*) *fabianae* en Argentina y *Rhabdochona* (*Rhabdochona*) *uruyeni* en Venezuela y ahora en Brasil por primera vez y en un nuevo huésped. También, *Rhabdochona* spp. están señaladas en Argentina, Brasil y Peru. *Rhabdochona colossomi* Diaz-Ungria, 1968 es considerado como *nomen nudum*.

Palabras clave: encuesta bibliográfica - peces - *Rhabdochona* spp. - Sud-América.

[1,2*]Laboratório de Helmintos Parasitos de Vertebrados, Helmintologia, Instituto Oswaldo Cruz, Avenida Brasil 4365, 21045-900 Rio de Janeiro, Rio de Janeiro, Brasil.
[2]Conselho Nacional de Dsenvolvimento Científico e Tecnológico (CNPq) research fellow.

INTRODUCTION

Species of *Rhabdochona* Railliet, 1916 mainly parasitize fishes but can also rarely occur in snakes (Moravec, 1983), bats (Barus & Tenora, 1970) freshwater crabs (Poinar & Kannangara, 1972) and birds (Kumar & Gupta, 1979). In despite of the small number of South American *Rhabdochona* species, all parasitizing freshwater fishes, there have been misunderstandings mainly related to the validity of the Brazilian representatives of this genus. This investigation deals with data to better inform about the present status of the species and hosts that occur in Brazil, Argentina, Ecuador, Peru and Venezuela, together with an updating of bibliographical references concerning *Rhabdochona* worldwide.

MATERIALS AND METHODS

The studied nematode samples are deposited in the Helminthological Collection of the Oswaldo Cruz Institute (CHIOC), preserved in AFA (ethanol 70º GL, 93 mL; formaldehyde, 5mL; glacial acetic acid, 2mL). Samples were obtained early in March and April, 1948, from three specimens of a freshwater fish host. Nematodes were clarified in lactophenol and provisionally mounted in glycerin gel. Generic classification of the nematodes is in accordance with Chabaud (1975). Common names of the hosts appear in English, Portuguese or Spanish, depending on their availability. Measurements are in millimeters (mm). NHR and NGD refer to New Host Record and New Geographical Distribution, respectively.

RESULTS

Rhabdochona (Rhabdochona) uruyeni Diaz-Ungria, 1968
Morphometrics based on five males and five females.

Brief redescription: general: relatively small and slender nematodes, tail conical, with rounded tip, devoid of cuticular spike. Deirids lateral, inconspicuous, very small, hardly observed. Number of prostomal teeth is 13-14.

Males: body 6.92-8.90 long, 0.12-0.15 wide. Funnel-like prostomal chamber 0.019-0.030 long. Distance of nerve ring and excretory pore, 0.16-0.18 and 0.12-0.15 from anterior end, respectively. Muscular esophagus 0.12-0.15 long, glandular esophagus 1.48-1.72 long. Large spicule slender, 0.32-0.45 long. The short spicule, with a barb at its posterior end is stout, 0.070-0.12 long. Length ratio of spicules is 1: 3.75 - 4.57. Caudal papillae are distributed in 8-10 pairs of pre-cloacal and 05 pairs of post-cloacal papillae, together with an unpaired papilla. Tail conical, 0.18-023 long, with slightly rounded tip.

Females: body 10.8-12.0 long, 0.12-0.17 wide. Funnel-like prostomal chamber 0.038-0.046 long. Distance of nerve ring, deirids and excretory pore is 0.15-017, 0.04-0.06 and 0.15-0.19 from anterior end, respectively. Muscular esophagus 0.20-0.25 long, glandular esophagus 2.10-2.30 long. Vulva located at 4.80-5.94 from posterior extremity. Eggs non filamented, 0.0035-0.039 long, 0.018-0.021 wide. Tail conical, with slightly rounded tip.

Taxonomic summary:
Host: *Pachyurus squamipennis* Agassiz, 1831, Sciaenidae; common names: Pescada-corvina do São Francisco, Corvina, Corvina de água doce, Corvina preta, Sofia (NHR).
Site of infection: intestine.
Locality: Lagoa Juparanã, Linhares, State of Espírito Santo (19º23'28"S, 40º 04'20"W), Brazil (NGD).
Deposited: CHIOC no. 16847, 16848, 16849 (wet material).

Remarks: This species has already been previously described, redescribed and figured (Diaz-Ungria, 1968; Moravec, 1972a). In accordance with the latter author, *Rhabdochona* (*R.*) *uruyeni* is very close to *Rhabdochona* (*R.*) *acuminata* (Molin, 1860) and that the only

morphological differences of specific value between both species are related to the size and shape of the deirids as well as the shape of the tail. This is the first report of *R.* (*R.*) *uruyeni* in Brazil and in a new host.

DISCUSSION

Saidov (1953), on the basis of the presence or absence of egg filaments, divided the genus *Rhabdochona* into two subgenera *Rhabdochona* (eggs devoid of filaments) and *Filochona* (filamented eggs). Moravec (1972a), based on the type of eggs, proposed three subgenera: *Rhabdochona*, *Filochona* and *Globochona* (eggs with special swellings or globules). Later, Moravec (1975) in a study related to the reconstruction of the genus *Rhabdochona*, re-arranged the subgenera and increased their number to four, namely *Rhabdochona*, *Globochona*, *Globochonoides* and *Sinonema* including more characteristics for their diagnosis other than egg filaments, such as number and arrangement of teeth in the prostome, presence of cervical alae, shape of female tail tip and shape of deirids. Nevertheless, Chabaud (1975) only recognized three subgenera: *Rhabdochona*, *Filochona* and *Globochona*. This classification is now widely accepted and was adopted in the present study.

To date, over a hundred species, allocated in *Rhabdochona*, with its type species *Rhabdochona denudata* (Dujardin, 1845) Railliet, 1916, have been reported worldwide. From 1845 to 1957 (Yamaguti 1961) thirty-eight valid species had already been referred, and further, a great amount of species was described, re-described, synonymized or referred in systematical, taxonomic, morphological, biological, cladistical or ecological approaches from 1961 to 2010, according to the present bibliographical survey that appear in chronological order: [Campana-Rouget, 1961; Agrawal, 1965; Furtado, 1965; Rasheed, 1965; Kloss, 1966; Sahay, 1966; Diaz-Ungria, 1968; Moravec, 1968, 1971, 1972a-c, 1974, 1975, 1976, 1977, 1983, 1994, 1995, 1998, 2006, 2007a,b, 2010; Holloway & Klewer, 1969; Khan & Yaseen, 1969; Rai, 1969; Sahay *et al*., 1969; Barus & Tenora, 1970; Kaletskaya, 1970; Moravec & Mikailov, 1970; Majumdar & De, 1971; Moravec & Arai, 1971; Sahay & Narayan, 1971; Chiriac & Mester, 1972; Kalyankar, 1972; Poinar & Kannangara, 1972; Sood, 1972; Verma, 1972; Pennel *et al*., 1973; Puylaert, 1973; Rehana & Bilqees, 1973; Collins & Dechtiar, 1974; El-Naffar & Saoud, 1974; Vassiltadès & Troncy, 1974; Voth *et al*., 1974; Chabaud & Krishnasamy, 1975; Lockard *et al*., 1975; Margolis *et al*., 1975; Seki, 1975; Zaid & Khan, 1975; Beacham & Haley, 1976; Buhrnheim, 1976; Cordero del Campillo & Pellitero, 1976; Fahmy *et al*., 1976; Lang & Edson, 1976; Moravec & Daniel, 1976; Wang, 1976; Arya & Johnson, 1977; Combs *et al*., 1977; Mudry & Anderson, 1977; Sood *et al*., 1977; Amin, 1978; Arya, 1978; Kakacheva-Avramova & Nedeva-Menkova, 1978a,b, 1979; Kazic, 1978; Moravec & Amin, 1978; Pluto & Rothenbacher, 1978; Rahemo, 1978; Alvarez-Pellitero, 1979; Bueno & Pellitero, 1979; Chiang *et al*., 1979; Grigoryan & Vartanyan, 1979; Kayton *et al*., 1979; Kumar & Gupta, 1979; Rahemo & Kasim, 1979; Leong, 1980; Robinson & Jahn, 1980; Seng, 1980; Soota & Dey-Sarkar, 1981; Moravec *et al*., 1981, 1985, 1991, 1995, 1997a,b, 1998, 1999, 2001, 2006, 2007, 2008, 2009; Wang *et al*., 1979; Wang, 1981; Bilqees 1979, 1982; Gupta & Srivastava, 1982; Kirka *et al*., 1982; Rautela & Malhotra, 1982; Arai & Mudry, 1983; Naidu, 1983; Siddiqi & Khatak, 1983, 1984; Soota, 1983; Wier *et al*., 1983; Carvalho-Varela *et al*., 1981, 1984; Malhotra & Chauhan, 1984; Muzzall, 1984, 1986, Vicente *et al*., 1985; Bilqees & Rehana, 1986; Muzzall & Sweet, 1986; Ali *et al*., 1987a-b; Dhar & Majdah, 1987; Duggal & Kaur, 1987; Heckman *et al*., 1987; Ito *et al*., 1987; Kohn & Fernandes, 1987; Moravec & Otero, 1987; Petter, 1987; Moravec & Huffman, 1988a, b, 2001; Moravec & Sey, 1988; Sood, 1988; Mashego, 1989, 1990; Moravec & Nagasawa, 1989, 1998; Imam & El-Askalany, 1990; Imam *et al*., 1991; Kaur & Khera, 1991; Katoch & Kalia, 1991, 1993a, b; Kritscher, 1991; Moravec & Scholz, 1991a, b, 1995; Anderson, 1992; Chishti & Bakshi, 1992; Byrne, 1992 a, b; Maggenti *et al*., 1992;

Muzzall *et al*., 1992, 1995; Wang *et al*., 1992; Boomker & Petter, 1993; Khan & Rasheed, 1993; Oguz & Ozturk, 1993; Barger & Janovy, 1994; Boomker, 1994 a, b; Ghazi *et al*., 1994; Moreira, 1994; Ortubay *et al*., 1994; Gutierrez-Galindo *et a*l., 1995; Muzzal & Whelan, 1995; Pazooki *et al*., 1996; Shimazu, 1996; Appleby & Sterud, 1997; Bergeron *et al*., 1997; Rojas *et al*., 1997; Valles-Rios & Ruiz-Campos, 1997; Sanchez-Alvarez, 1998; Saraiva & Moravec, 1998; Sterud *et al*., 1998; Thoen *et al*., 1998; Lakshmi & Sudha, 1999a, b; Ghazi & Rahim, 1999; Rahemo & Al-Din, 1999; Wu, 1999; Caspeta-Mandujano & Moravec, 2000; Caspeta-Mandujano *et al*., 2000 a, b, c, 2002, 2005; Pérez-Ponce De León *et al*., 2000; Aguirre-Macedo *et al*., 2001; Akram & Khatoon, 2001; Aydogdu *et al*., 2001; Hanzelova *et al*., 2001; Jan & Khan, 2001; Lakshmi, 2001; Marcogliese *et al*., 2001; Moravec & Huffman, 2001; Cremonte *et al*., 2002; Dyer & Poly, 2002; Pérez-Ponce de León & Choudhury, 2002; Rafique *et al*., 2002; Saraiva *et al*., 2002 a, b; Young & Heckmann, 2002; Aguilar-Aguilar *et al*., 2003; Ghazi *et al*., 2003; Hirasawa & Urabe, 2003; Kirin, 2003; Mejia-Madrid & Pérez-Ponce de León, 2003, 2007; Öktener, 2003; Popiolek & Kotusz, 2003; Caspeta-Mandujano & Mejia-Mojica, 2004; Choudhury *et al*., 2004; Hirasawa *et al*., 2004; Khan *et al*., 2004; Martinez-Aquino *et al*., 2004; Salgado-Maldonado *et al*., 2004; Boonchot & Wongsawad, 2005; Brasil-Sato & Santos, 2005; Caspeta-Mandujano *et al*., 2005; Mejia-Madrid *et al*., 2005, 2007a, b; Paraguassú *et al*., 2005; Pérez-Ponce de León & Choudhury, 2005; Pracheil *et al*., 2005; Ramallo, 2005; Saraiva *et al*., 2005; Asmatullah *et al*., 2006; Barger, 2006; González-Solis & Jimenéz-Garcia, 2006; Kakar *et al*., 2006, 2008; Poulin, 2006; Salgado-Maldonado, 2006; Kakar & Bilqees, 2007a, 2007b; Moravec & Klimpel, 2007; Moravec & Muzzall, 2007; Moravec *et al*., 2007; Paraguassú & Luque, 2007; Lira-Guerrero *et al*., 2008; Moravec & Shimazu, 2008; Mortezaei, 2008; Reyda, 2008; Romero-Tejeda *et al*., 2008; Seifertova *et al*., 2008; Shukerova & Kirin, 2008; Albuquerque, 2009; Martinez-Aquino *et al*., 2009; Moravec *et al*., 2009; Nachev & Sures, 2009; Pérez-Ponce de León *et al*., 2009; Pullen *et al*., 2009; Santos *et al*., 2009; Sudhakar *et al*., 2009; Takemoto *et al*., 2009; Tavernari *et al*., 2009; Zrncic *et al*., 2009; Quilchini *et al*., 2010].

In despite of the large number of *Rhabdochona* species reported worldwide, the distribution of hosts was taken into account in the present investigation; thus, the fishes considered here are those that were captured in some rivers of Brazil, Argentina, Ecuador, Peru and Venezuela. The first Brazilian *Rhabdochona* species to be described was *Rhabdochona* (*R*.) *acuminata*, proposed as *Spiroptera acuminata* by Molin (1860) in *Brycon falcatus* (Müll. & Trosch, 1844) (Matrinxã-miúda, Nipon) from the State of Mato Grosso, Brazil. Travassos *et al*. (1928) [in accordance with Drasche (1884)] reproduced the description, figures and hosts of *R*. (*R*.) *acuminata*. Among the latter *Barbus* sp. (Gold barb) was included and authors commented about the reference of *Barbus* sp. as a host for a Brazilian species of *Rhabdochona*, considering that this genus is not represented in the Neotropical region. At the occasion, *Rhabdochona* (*R*.) *elegans* from specimens of the characid *Tetragonopterus* sp. (Tetra) from the rivers Tietê and Mogi-Guassú in the State of São Paulo was described.

Vaz & Pereira (1934) redescribed *Rhabdochona* (*R*.) *acuminata* from the small intestine and gall bladder of *Pimelodella lateristriga* (Lichtenstein, 1823) (Mandí-chorão, Fat catfish) and *Tatia neivai* (Ihering, 1930) [= *Glanidium neivai*] (Jundiá, a small freshwater catfish) captured in Rio Grande, municipality of Santo Amaro, Tietê river, State of São Paulo.

Kloss (1966) proposed two new species, namely *Rhabdochona* (*R*.) *fasciata* from the small intestine of *Astianax fasciatus* (Cuv., 1819) (Lambari do rabo vermelho, Matupiri, Mojarra, Banded astianax, Mexican tetra), and *A. schubarti* Britsk, 1964 (Lambari, Tetra) and *Rhabdochona* (*R*.) *australis* from the small intestine of *Astianax bimaculatus* (L., 1758) (Lambari do rabo amarelo, Twospot astyanax); specimens of the above characid hosts were captured in the Mogi-Guassú River. Also, a new

name was designed, *Rhabdochona* (*R.*) *siluriformis* (Vaz & Pereira, 1934) Kloss, 1966, for the nematodes previously identified as *R.* (*R.*) *acuminata* by Vaz & Pereira (1934).

After, Moravec (1972a) in a revision of the South American *Rhabdochona*, stated that species of the genus previously referred in Brazil so far, should be referred to only as *Rhabdochona* (*Rhabdochona*) *acuminata*, taking into account the stiletto-shaped well developed deirids, and the presence of a tail tip provided with a sharp cuticular spike. Nevertheless, Vicente *et al*. (1985) unaware of this proposition considered *Rhabodochona* (*R.*) *australis* Kloss, 1966, *R.* (*R.*) *elegans* Travassos, Artigas & Pereira, 1928, *R.* (*R.*) *fasciata* Kloss, 1966, *R.* (*R.*) *siluriformis*, as valid species, in a catalogue of Brazilian fish nematodes. Later, Kohn & Fernandes (1987) referred to *R.* (*R.*) *acuminata* in *Leporellus vittatus* (Val., 1849) (= *Leporellus pictus*) [Ferreirinha, Piava japonesa, Solteira, Black banded leporinus] from the river Mogi-Guassú, Pirassunuga, State of São Paulo. More recently, Luque *et al*. (2005), also overlooking the proposition of Moravec (1972a), reported to *R.* (*R.*) *fasciata* (= *R.* (*R.*) *acuminata*) parasitizing specimens of *Geophagus brasiliensis* (Quoy & Gaimard, 1824) [Acará, Pearl cichlid] from Lajes Reservoir, State of Rio de Janeiro. Also, *R.* (*R.*) *acuminata* was further reported in *Astyanax bimaculatus* (L., 1758) and *A. fasciatus* from the same locality by Luque & Paraguassú (2007), as well as in the siluriform *Auchenipterus osteomystax* (Miranda-Ribeiro, 1918) [no English common name available. Palmitinho (Brazil), Buzo, Hocicón, Pirá-bicicleta (Argentina)] from Rosana's Reservoir and the upper Paraná river, and from the upper Paraná river flood plain, State of Paraná (Takemoto *et al*., 2009; Tavernari *et al*., 2009).

Buhrnheim (1976) reported to a *Rhabdochona* sp. in the intestine of *Leporinus octofasciatus* Steind., 1915 (Ferreirinha, Piau, Piava, Eight-banded leporinus) from Emas, Pirassununga, State of São Paulo and Moreira (1994) referred to a *Rhabdochona* sp. recovered from specimens of *Cichla kelberi* Kullander & Ferreira, 2006 (Tucunaré amarelo, Cichla peacock bass [general common name for the group], captured in the São Francisco river basin, State of Minas Gerais. Brasil-Sato & Santos (2005) also listed another *Rhabdochona* sp. occurring in the pimelodid *Conorhynchos conirostris* (Valenciennes, 1840) (=*Pimelodus conirostris*) [Pirá, Pirá-tamanduá (Brazil). No other common names] from the São Francisco river basin, State of Minas Gerais. More recently, Albuquerque (2009) referred to *Rhabdochona* sp., parasitizing *Triporteus guentheri* (Garman, 1890) [Hatchetfish, Piaba-facão, Seca chuva] and *Tetragonopterus chalceus* Spix & Agassiz, 1829 (Piaba-rapadura, Sabaleta) from the Reservoir of Três Marias, upper São Francisco river, State of Minas Gerais.

In Venezuela, Diaz-Ungria (1968), proposed *Rhabdochona* (*R.*) *uruyeni* from the intestine of *Piabucina* sp. (Lebiasinidae) [Saltona], from Uruyen, Auyantepui, Bolívar State. Interestingly, in the summary of the paper (pag. 545, third paragraph, 1st line), perhaps due to a misprint, there is a reference to a "*Rhabdochona colossomi* n.sp." instead of "*Cucullanus colossomi* n.sp.", also described together with *Rhabdochona* (*R.*) *uruyeni* in this occasion. Thus, *R. colossomi* is to be considered a *nomen nudum*.

In Ecuador, Petter (1987), redescribed *Rhabdochona* (*R.*) *acuminata* parasitizing specimens of *Tetragonopterus argenteus* Cuvier, 1816 (Sauá, Pacú reloj, Relojito) and *Leporinus pearsoni* Fowler, 1940 (Fowler's leporellus, Piau, Sardina, Septimo), from San Pablo Kantesya, Aguarico River, Province of Napo, *Pimelodella* sp. and Ciclidae sp. from Hacienda Primavera, Napo River.

In Argentina, Cremonte *et al*. (2002), by means of scanning electron microscopy (SEM) presented the most accurate redescription of *Rhabdochoma* (*R.*) *acuminata* on the basis of specimens recovered from the intestine of the siluriform *Diplomystes mesembrinus* Ringuelet, 1982 (Bagre aterciopelado [Patagonia]) and *Percichthys trucha*

(Valenciennes, 1833) (Perca criolla, Perca trucha, Trucha criolla, Creole perch), captured in Chubut River, province of Chubut, Patagonia. Also, the presence of *Rhabdochona* sp. was reported in other Argentinean hosts in Patagonia by Ortubay *et al*. (1994), namely *Galaxias platei* Steindachner, 1898 (Tollo [Spanish common name]), *Odontesthes hatcheri* Eigenmann, 1909 (Pejerrey patagónico), the salmonid *Oncorhynchus mykiss* (Walbaum, 1792) (Truta arco-íris, Rainbow trout), and *P. trucha*. Curiously, the reference listed by Cremonte *et al*. (2002) as well as by Ramallo (2005) corresponding to Petter (1987) and that is related to fish nematodes from Ecuador is misspelled, since the correct volume is 94 (not 91) and the pages are 61-76, instead of 935-952. Ramallo (2005) described *Rhabdochona (Filochona) fabianae* recovered from *Bryconamericus iheringi* Boulanger, 1887 (Lambari, Tetra, Mojarra) and redecribed *R.* (*R.*) *acuminata* in *Jenynsia multidentata* (Jenyns, 1842) [Barrigudinho, Overito, Oversided livebearer, Rio de La Plata oversided livebearer Overito]. Specimens of both host species were collected from Medina River, Province of Tucumán.

In Peru, Reyda (2008) cited the presence of *Rhabdochona* sp. occurring in the spiral intestine of the freshwater stingrays *Paratrygon aireba* (Müller & Henle, 1841) [Arraia cururu, Arraia disco, Arraia rajadinha, Ceja stingray] and *Potamotrygon* cf *castexi* Castello & Yagolkowski, 1969 [Vermiculate river stingray, Otongo ray, Jaguar ray] captured in Madre de Dios Department, Alto Madre de Dios River (Boca Manu).

The present results complement and confirm data after Moravec (1972a), when redescriptions and original figures of *Rhabdochona* (*R.*) *acuminata* and *R.* (*R.*) *uruyeni* were provided on the basis of the examined type-specimens of both species, as well as enlarge the list of hosts for *Rhabdochona* spp. in South America, as indicated in this updated briefing: BRAZIL - *Rhabdochona* (*R.*) *acuminata* occurs in *A. bimaculatus*, *A. fasciatus*, *A. schubarti*, *Auchenipterus osteomystax*, *Brycon falcatus*, *Geophagus brasiliensis*, *Leporellus vittatus*, *Pimelodella lateristriga*, *Tatia neivai*. *Rhabdochona* (*R.*) *uruyeni* is now referred in *Pachyurus squamipennis*; *Rhabdochona* sp. was reported in *Cichla kelberi*, *Conorhynchos conirostris*, *Leporinus octofasciatus*, *Tetragonopterus chalceus*, *Triportheus guenteri*; ARGENTINA - *Rhabdochona* (*R.*) *acuminata* occurs in *Diplomystes mesembrinus*, *Jenynsia multidentata*, *Percichthys trucha*; *Rhabdochona* (*F.*) *fabianae* is reported in *Bryconamericus iheringi*, whereas *Rhabdochona* sp. was cited in *Galaxias platei*, *Odonthestes hatcheri*, *Oncorhynchus mykiss*; ECUADOR - *Rhabdochona* (*R.*) *acuminata* was recovered from specimens of Cichlidae sp., *Leporinus pearsoni*, *Pimelodella* sp.; PERU - *Rhabdochona* sp. is reported from *Paratrygon aireba*, *Pomatotrygon casteli*; VENEZUELA - *Rhabdochona* (*R.*) *uruyeni* was described on the basis of nematodes parasitizing specimens of *Piabucina* sp.

Based on the present data, it is early to affirm that *Rhabdochona (R.) acuminata, R.* (*F.*) *fabianae* and *R.* (*R.*) *uruyeni* are the only species that occur in South America, until the nominated generic *Rhabdochona* spp. have been properly identified to its specific diagnosis.

ACKNOWLEDGEMENTS

To Conselho Nacional de Desenvolvimento Tecnológico e Científico (CNPq), Brazil, for the financial support to the fellowship R. M. Pinto.

BIBLIOGRAPHIC REFERENCES

Agrawal, V. 1965. *Some new nematode parasites from freshwater fishes of Lucknow*. Indian Journal of Helminthology, vol. 17, pp. 1-17.

Aguilar-Aguilar, R. Contreras-Medina, R. & Salgado-Maldonado, G. 2003. *Parsimony analysis of endemicity (PAE) of Mexican hydrological basins based on helminth parasites of freshwater fishes*. Journal of Biogeography, vol. 30, pp. 1861-1872.

Aguirre-Macedo, ML, Sholz, T, Gonzalez-Solis, D, Vidal-Martinez, VM, Posel, P, Arjona-Torres, G, Dumailo, S & Siu-Estrada, E. 2001. *Some adult endohelminths parasitizing freshwater fishes from the Atlantic drainages of Nicaragua*. Comparative Parasitology, vol 68, pp. 190-195.

Akram, M & Khatoon, N. 2001. Schizothorax plagiostomus*, a new host of nematode infection of* Rhabdochona *species from Gilgit, Pakistan.* Pakistan Journal of Zoology, vol. 33, pp. 77-79.

Albuquerque, MC. 2009. *Taxonomia e aspectos ecológicos da fauna parasitária de* Triportheus guentheri *(Garman, 1890) e* Tetragonopterus chalceus *Spix & Agassiz, 1829 no Reservatório de Três Marias, Alto Rio São Francisco, MG*. Master thesis, Universidade Federal Rural do Rio de Janeiro, 106 p.

Ali, NM, Salih, NE & Abdul-Ameer, KN. 1987a. *Parasitic fauna of some freshwater fishes from Tigris river, Baghdad, Iraq. IV. Nematoda*. Iraqi Journal of Biological Sciences Research, vol. 18, pp. 35-45.

Ali, NM, Al-Jafery, AR & Abdul-Ameer, KN. 1987b. *Parasitic fauna of freshwater fishes in Diyala River, Iraq*. Iraqi Journal of Biological Sciences Research, vol. 18, pp. 163-181.

Alvarez-Pellitero, MP. 1979. *Helmintocenosis del tracto digestivo de la trucha en los ríos de Léon*. Institución Fray Bernardino de Sahagun, Diputación Provincial, Léon, 269 p.

Amin, OM. 1978. *Intestinal helminths of some Nile fishes near Cairo, Egypt with descriptions of* Camallanus kirandensis *Baylis, 1928 (Nematoda) and* Bothriocephalus aegyptiacus *Rysavy and Moravec, 1975 (Cestoda)*. Journal of Parasitology, vol. 64, pp. 93-101.

Anderson, RC. 1992. *Nematode parasites of vertebrates. Their development and transmission*. 2nd Ed. CABI Publishing, London, 650 p.

Appleby, C & Sterud, E. 1997. *Parasites of bleak (*Alburnus alburnus*) from the river Glomma water-system, South-Eastern Norway*. Bulletin of the Scandinavian Society for Parasitology, vo. 7, pp. 15-18.

Arai, HP & Mudry, DR. 1983. *Protozoan and metazoan parasites of fishes from the headwaters of the Parsnip and McGregor Rivers, British Columbia: a study of possible parasite transfaunations*. Canadian Journal of Fisheries and Aquatic Sciences, vol. 40, pp. 1676-1684.

Arya, SN. 1978. *A new species of the genus* Rhabdochona *Railliet, 1916 from a fish, with a key to the species of* Rhabdochona *(Nematoda: Rhabdochonidae) from Indian waters*. Indian Journal of Helminthology, vol. 30, pp. 137-142. (Publ. 1980).

Arya SN & Johnson, S. 1977. *A new species of the genus* Rhabdochona *(Nematoda: Rhabdochonidae) from the fish* Cybium guttatum. Journal of Zoological Research Aligharti, vol. 1, pp. 22-25.

Asmatullah, K, Bilqees, FM & Kakar, JK. 2006. Rhabdochona kharani *sp. n. (Nematoda: Rhabdochonidae) from the fish* Labeo gedrosicus *Zugmayer, 1912 from Garruk, District Kharan, Balochistan, Pakistan*. Acta Parasitologica Turcica, vol. 30, pp. 62-67.

Aydogdu, A, Altunel, FN & Yildrimhan, HS. 2001. *Occurrence of helminths in chub,* Leuciscus cephalus*, on the Doganci (Bursa) dam lake, Turkey*. Bulletin of the European Association of Fish Pathologists, vol. 21, pp. 246-251.

Barger, MA. 2006. *Spatial heterogeneity in the parasite communities of creek chub (*Semotilus atromaculatus*) in southern Nebraska*. Journal of Parasitology, vol. 92, pp. 230-235.

Barger, MA & Janovy, J. 1994. *Host specificity of* Rhabdochona canadensis *(Nematoda: Rhabdochonidae) in Nebraska*. Journal of Parasitology, vol. 80, pp. 1032-1035.

Barus, V & Tenora, F. 1970. *Further discoveries of nematodes in the bats of Afghanistan*. Acta Universitats Agriculturae, vol. 18,

pp. 133-141.

Beacham, BE & Haley, AJ. 1976. *Some parasites of the white perch,* Marone americana *(Gmelin), in Chesapeake Bay*. Proceedings of the Helminthological Society of Washington, vol. 43, pp. 232-233.

Bergeron, M, Marcogliese, DJ & Magnan, P. 1997. *The parasite fauna of brook trout,* Salvelinus fontinalis *(Mitchill), in relation to lake morphometrics and the introduction of creek chub,* Semotilus atromaculatus *(Mitchill)*. Ecoscience, vol. 4, pp. 427-436.

Bilqees, FM. 1979. Rhabdochona parastromatei *sp. n. (Nematoda, Rhabdochonidae) from the fish* Parastromateus niger *(Bleeker) of the Karachi coast*. Zoologica Scripta, vol. 8, pp. 107-110.

Bilqees, FM 1982. *New host records for* Philometra lateolabracis *(Yamaguti, 1935) Rasheed, 1963 and* Rhabdochona parastromatei *Bilqees, 1979*. Pakistan Journal of Zoology, vol. 14, p. 107.

Bilqees, FM & Rehna, H. 1986. *Larval nematodes from the fishes of Karachi coast*. Proceedings of Parasitology, vol. 2, pp. 6-17.

Boomker, J. 1994a. *Parasites of South African freshwater fish. VI. Nematode parasites of some fish species in the Kruger National Park*. Onderstepoort Journal of Veterinary Research, vol. 61, pp. 35-43.

Boomker, J. 1994b. *Parasites of South Africa freshwater fish. VII. Nematodes of some scaled fishes from the Hartbeespoort Dam, Transvaal*. Onderstepoort Journal of Veterinary Research, vol. 6, pp. 197-199.

Boomker, J & Petter, AJ. 1993. *Parasites of South African freshwater fish. III.* Rhabdochona *(*Rhabdochona*)* versterae *n. sp. (Nematode: Rhabdochonidae) from the spot-tailed robber* Alestes imberi *Petter, 1852*. Onderstepoort Journal of Veterinary Research, vol. 60, pp. 23-27.

Boonchot, K & Wongsawad, C. 2005. *A survey of helminths in fish from the Mae Ngad Somboonchon Reservoir, Chiang Mai Province, Thailand.* Southeast Asian Journal of Tropical Medicine & Public Health, vol. 36, pp. 103–107.

Brasil-Sato, MC & Santos, MD. 2005. *Metazoan parasites of* Conorhynchus conirostris *(Valenciennes, 1840) an endemic siluriform fish of the São Francisco basin, Brazil*. Revista Brasileira de Parasitologia Veterinária, vol. 14, pp. 160-166.

Bueno, JMP & Pellitero, MPA. 1979. Rhabdochona *spp. en ciprinidos de los rios de Leon*. Anales de la Faculdad de Veterinaria de Leon, vol. 25, pp. 155-198.

Buhrnheim, U. 1976. *Levantamento ecológico dos helmintos parasitos de peixes do rio Mogi-Guassú, na Cachoeira de Emas, Estado de São Paulo*. Master thesis. Universidade de São Paulo, 260 p.

Byrne, PJ. 1992a. Rhabdochona rotundicaudatum *n. sp. and a redescription of* R. cascadilla *Wigdor, 1918 (Nematoda: Thelazioidea) from minnows in southern Ontario, Canad*a. Canadian Journal of Zoology, vol. 70, pp. 476-484.

Byrne, PJ. 1992b. *On the biology of* Rhabdochona rotundicaudatum *and* R. cascadilla *(Nematoda: Thelazioidea) in stream fishes from southern Ontario, Canada*. Canadian Journal of Zoology, vol. 70, pp. 485-493.

Campana-Rouget, Y. 1961. *Nématodes de poisons. Expl. Hydr. Lacs Kivu, Edouard et Albert (1952-1954). Resultats scientifiques*. Bulletin de L'Institute Royal des Sciences Naturelles de Belgique, vol. 3, pp. 1-61.

Carvalho-Varela, M, Cunha-Ferreira, V, Cruz e Silva, MP, Monteiro, MT & Grazina-Freitas, MS. 1981. *Parasites and parasitosis in fish culture in Portuga*l. Journal of the World Mariculture Society, vol. 12, pp. 9-14.

Carvalho-Varela, M, Cunha-Ferreira, V, Cruz e Silva, MP & Grazina-Freitas, MS. 1984. *Sobre a parasitofauna de enguia-europeia (*Anguilla anguilla *(L). em Portugal*. Repositório de Trabalhos do Laboratório Nacional de Investigação Veterinária, vol. 16, pp. 143-150.

Caspeta-Mandujano, JM & Mejia-Mojica, H. 2004. *Seasonal dynamics and maturation of* Rhabdochona canadensis *in its*

definitive host, Notropis boucardi *of the Chalma River, State of Morelos, Mexico*. Helminthogia, vol. 41, pp. 21-123.

Caspeta-Mandujano, JM & Moravec, F. 2000. *Two new intestinal nematodes of* Profundulus labialis *(Pisces, Cyprinodontidae) from fresh waters in Mexico*. Acta Parasitologica, vol. 45, pp. 332-339.

Caspeta-Mandujano, JM, Aguilar-Aguilar, R & Salgado-Maldonado, G. 2002. Rhabdochona guerreroensis *sp. n. (Nematoda: Rhabdochonidae) from the intestine of the Gobiid* Sicydium multipunctatum *from freshwater waters in Mexico*. Journal of Parasitology, vol. 88, pp. 746–749.

Caspeta-Mandujano, JM, Cabañas-Caranza, G, Salgado-Maldonado, G & Gosztony, AE. 2005. *Nematode parasites of the characid freshwater fish* Brycon guatemalensis *in the Usumasinta River, Chiapas, Mexico*. Helminthologia, vol. 42, pp. 41-44.

Caspeta-Mandujano, JM, Moravec, F & Salgado-Maldonado, G. 2000a. *Two new species of Rhabdochonids (Nematoda: Rhabdochonidae) from freshwater fishes in Mexico, with a description of a new genus*. Journal of Parasitology, vol. 87, pp. 139-143.

Caspeta-Mandujano, JM, Moravec, F & Salgado-Maldonado, G. 2000b. Rhabdochona mexicana *sp. n. (Nematoda: Rhabdochonidae) from the intestine of characid fishes in Mexico*. Folia Parasitologica, vol. 47, pp. 211–215.

Caspeta-Mandujano, JM, Moravec, F, Delgado-Yoshino, MA & Salgado-Maldonado, G. 2000c. *Seasonal variations in the occurrence and maturation of the nematode* Rhabdochona kidderi *in* Cichlasoma nigrofasciatum *of the Amacuzac river, Mexico*. Helminthologia, vol. 37, pp. 29-33.

Chabaud, AG. 1975. *Keys to the genera of the Order Spirurida; Part I. Camallanoidea, Dracunculoidea, Gnathostomatoidea, Physalopteroidea, Rictularioidea and Thelazioidea. CHI Keys to the Nematode Parasites of Vertebrates.* London, 27 p.

Chabaud, AG & Krishnasamy, M. 1975. *Noveaux nematodes du genre* Trichospirura *Smith et Chitwood, 1967 en Malaysia. Remarques sur l'evolution de la famille des Rhabdochonidae*. Annales de Parasitologie Humaine et Comparée, vol. 50, pp. 813-820.

Chiang, GL, Seng, LT & Lian, CC. 1979. *Parasites of fishes from Sungai Pinang and Sungai Teluk Bahang, Pulau Pinang, Malaysia*. Malayan Nature Journal, vol. 32, pp. 247-251.

Chiriac, E & Mester, L. 1972. *Citeva aspecte ale infestarii Cobitidelor cu diversi parasiti*. Studii si Cercetari de Biologie, Seria Zoologi, vol. 24, pp. 459-465.

Chishti, MZ & Bakshi, S. 1992. *On* Rhabdochona guptii *n. sp. from the intestines of* Cyprinus carpio spicularis*, a fresh water fish from Hokarsar (wetland) in Kashmir*. Indian Journal of Parasitology, vol. 16, pp. 161-163.

Choudhury, C, Hoffnagle, TL & Cole, RA. 2004. *Parasites of native and non-native fishes of the Little Colorado River, Ground Canyon, Arizona*. Journal of Parasitology, vol. 9, pp. 1042-1053.

Collins, JJ & Dechtiar, O. 1974. *Parasite fauna of kokanee salmon (*Oncorhynchus nerka*) introduced into Lake Huron*. Journal of the Fisheries Research Board of Canada, vol. 31, pp. 1818-1821.

Combs, DL, Harley, JP & Williams, JC. 1977. *Helminth parasites of the spotted sucker and golden headhorse from the Kentucky river*. Transactions of the Kentucky Academy of Science, vol. 38, pp. 128-131.

Cordero Del Campillo, M & Pellitero, MPA. 1976. *Los parasitos de las truchas en Espana*. Anales de la Faculdad de Veterinaria de Leon, vol. 22, pp.77-93.

Cremonte, F, Navone, GT, Gosztony, AE & Kuba, L. 2002. *Redescription of* Rhabdochona *(*Rhabdochona*)* acuminata *(Nematoda: Rhabdochonidae) from freshwater fishes from Patagonia (Argentina), the geographical implications*. Journal of Parasitology, vol. 88, pp. 934-941.

Diaz-Ungria, C. 1968. *Helmintos de peces de Venezuela, con descripción de un género y tres especies nuevas*. Boletin de la Sociedad Venezolana de Ciencias Naturales, vol. 27, pp. 537-549.

Dhar, RL & Majdah, M. 1987. *Fish parasitisation by helminths in Wular lake, Kashmir*. Indian Journal of Helminthology, vol. 39, pp. 143-152. (Publ. 1988)

Drasche, R. 1884. *Revision der in der Nematoden-Sammlung des k.k. Zoologischen Hofcabinets befindlichen Original-Exemplare Diesing's und Molin*. Verhandlugen K.-K. Zoologisch –Botanische Gesellschaft Wien, vol. 33, pp. 193-218.

Duggal, CL & Kaur, H. 1987. Rhabdochona moraveci *sp. nov. (Nematoda: Rhabdochonidae) from a freshwater fish,* Barbus thor *in Punjab, India*. Research Bulletin of the Punjab University - Science, vol. 38: 137-139.

Dyer, WG & Poly, WG. 2002. *First record of* Rhabdochona cascadilla *Wigdor, 1918 (Nematoda, Thelazioidea) in the blue sucker,* Cycleptus elongatus *(Lesueur, 1817) from Illinois*. Transactions of the Illinois State Academy of Science, vol. 95, pp. 107-109.

El-Naffar, MK & Saoud, MFA. 1974. Rhabdochona aegyptiacus *n. sp. (Nematoda: Rhabdochonidae) from some freshwater fishes of the River Nile at Assiut, Egypt*. Bulletin of the Zoological Society of Egypt, vol. 26, pp. 45-49.

Fahmy, MAM, Mandour, AM & El-Naffar, MK. 1976. *On some nematode parasites from the freshwater fishes in Assiut Province, Egypt*. Veterinary Medical Journal, vol. 24, pp. 263-276. (Publ. 1978).

Furtado, JL. 1965. Rhabdochona penangensis *sp. nov. (Nematoda: Rhabdochonidae) from a Malayan cyprinid fish*. Zoologischer Anzeiger, vol. 147, pp. 231-236.

Ghazi, RR & Atta-Ur-Rahim. 1999. *Proposal of a new species* Rhabdochona megasacculata *(Nematoda: Rhabdochonidae) from a freshwater fish* Barilius vagra *(Ham.1889) caught from the Chatter stream, Islamabad*. Proceedings of Parasitology, vol. 28, pp. 61-65.

Ghazi, RR, Noor-U-Nissa & Bilqees, FM. 2003. F*irst report of the genus* Rhabdochona *(*Globochona*)* rahimi *sp. n. from a freshwater fish* Barilius [Barilius] pakistanicus *in Pakistan*. Acta Parasitologica Turcica, vol. 27, pp. 217-221.

Ghazi, RR, Noor-U-Nissa & Ata-Ur-Rahim.1994. *Surface ultrastructure and a new host record of* Rhabdochona *(*Filochona*)* charsaddiensis *(*Siddiqui and Kattak, 1984*) (Nematoda: Rhabdochonidae)*. Proceedings of Parasitology, vol. 18, pp. 1-10.

González-Solis, D. & Jiménez-Garcia, MI. 2006. *Parasitic nematodes of freshwater fishes from two Nicaraguan crater lakes.* Comparative Parasitology, vol. 73, pp. 188-192.

Grigoryan, DA & Vartanyan, LK. 1979. *Two species of parasitic nematodes new for the Armenian fauna.* Biologicheskii Zhurnal Armenii, vol. 32, pp. 929-930.

Gupta, SP & Srivastava, AB. 1982. *Nematodes parasites of fishes. On four new species of genus* Rhabdochona *Railliet, 1916 from freshwater fishes of India*. Rivista di Parassitologia, vol. 43, pp. 265-274.

Gutierrez-Galindo, JF, Lacasa-Milan, MI, Castela-Espuny, J & Muñoz-Lopez, E. 1995. *Helminths of* Barbus meridionalis meridionalis *Risso, 1826 in northeastern Spain*. Acta Parasitologica, vol 40, pp. 140-141.

Hanzelova, V, Spakulova, M & Turcekova, L. 2001. *Diversity of endoparasitic helminths of fish from the lake Morske oko, Eastern Slovakia.* Helminthologia, vol. 38, pp. 139-143.

Heckmann, RA, Kimball, AK & Short, JA. 1987. *Parasites of the mottled sculpin,* Cottus bairdi *Girard, from five localities in Utah and Wasatch counties, Utah*. Great Basin Naturalist, vol. 47, pp. 13-21.

Hirasawa, R & Urabe, M. 2003. Ephemera strigata *(Insecta: Ephemeroptera:*

Ephemeride) is the intermediate host of the nematodes Rhabdochona denudata honshuensis *and* Rhabdochona coronacauda *in Japan*. Journal of Parasitology, vol. 89, pp. 617-620.

Hirasawa, R, Urabe, M & Yuma, M. 2004. *Relationship between intermediate host taxon and infection by nematodes of the genus* Rhabdochona. Parasitology International, vol. 53, pp. 89-97.

Holloway, HL, & Klewer, HI. 1969. Rhabdochona beatriceinsleyae *n. sp. (Nematoda: Spiruroidea, Rhabdochoninae) from the Antarctic zoarcid,* Rhigophila dearborni. Transactions of the American Microscopical Society, vol. 88, pp. 460-471.

Imam, EAE & El-Askalany, MA. 1990. *An approach to helminth parasites of catfish (*Clarias lazera*) in Beni-Suef Governorate*. Assiut Veterinary Medical Journal, vol. 24, pp. 96-107.

Imam, EAE, El-Askalany, MA & Rashad, SM. 1991. *Studies on helminth parasites of* Synodontis schall *and* Bagrus bayad *from Beni-Suef water resources*. Assiut Veterinary Medical Journal, vol. 24, pp. 137-152.

Ito, MK, Nagasawa, K, Kamiya, H & Ohbayashi, M. 1987. *Morphological variation in teeth of* Rhabdochona oncorhynchi *(Fujita, 1921) from Japanese freshwater salmonids*. Folia Parasitologica, vol. 34, pp. 287-288.

Jan, AH & Khan, RU. 2001. *Prevalence of parasites in fresh water cyprinid fish,* Cyprion watsoni *from Rami stream, Islamabad, Pakistan*. Proceedings of Pakistan Congress of Zoology, vol. 21, pp. 323-330.

Kakacheva-Avramova, D & Nedeva-Menkova, I. 1978a. *Helminthological investigation of fish in the rivers of the Rodophi region*. Khelmintologiya, vol. 6, pp. 44-53.

Kakacheva-Avramova, D & Nedeva-Menkova, I. 1978b. *Study of the helminths of fish from the Iskyr reservoir. II. Helminths of fish living in the estuary of river Palakiriya*. Khelmintologiya, vol. 5, pp. 39-46.

Kakacheva-Avramova, D & Nedeva-Menkova, I. 1979. *Helminths of Salmonidae*. Veterinarna Skirba, vol. 77, pp. 15-17.

Kakar, A & Bilqees, FM. 2007a. Rhabdochona uvaginus *new species (Nematoda: Rhabdochonidae) from the fish Tor putitora of River Bolan, Balochistan*. Pakistan Journal of Zoology, vol. 39, pp. 51-55.

Kakar, AU & Bilqees, FM. 2007b. *Two new species of the genus* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) from the fishes* Cyprinion milesi *Day, 1880 and* C. watsoni *Day, 1872 of Nushki, Balochistan*. Pakistanese Journal of Nematodology, vol. 25, pp. 147-155.

Kakar, AU, Bilqees, FM & Ahmad, S. 2008. *Two new species of the genus* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae from the fish* Tor putitora *(Cyprinidae) from Bolan, Baloschistan, Pakistan*. Pakistanese Journal of Nematodology, vol. 26, pp. 21-28.

Kakar, A, Bilqees, FM & Kakar, JK. 2006. Rhabdochona kharani *sp.n. (Nematoda: Rhabdochonidae) from the fish* Labeo gedrosicus *Zugmayer, 1912 from Garruk, District Kharan, Balochistan*. Acta Parasitologica Turcica, vol. 30, pp. 63-68.

Kaletskaya, SL. 1970. *Cestodes, nematodes, acanthocephalans, and parasitic crustaceans of fish in Zapadnaya Dvina*. Uchenye-Zapiski-Vitebskogo-Veterinarnogo-Instituta-Voprosy-Teorii-i-Praktiki-Veterinarii-i-Zootekhnii, vol. 22, pp. 33-36.

Kalyankar, SD. 1972. *On some interesting nematodes of fishes from India*. Review of Parasitology, vol. 33, pp. 281-288.

Katoch, K & Kalia, DC. 1991. *Nematode parasites of vertebrates from Himachal Pradesh. I. On a new species* Rhabdochona *(*R.*)* moraveci *(Family: Rhabdochonidae Skrjabin, 1946) from fresh water fishes from Beas river*. Indian Journal of Helminthology, vol. 43, pp. 88-91. (Publ. 1992).

Katoch, K & Kalia, DC. 1993a. *A key to the species of* Rhabdochona *(Rhabdochona)*

Railliet, 1916. Bioved, vol. 4, pp. 89-94.

Katosh, K & Kalia, DC. 1993b. *Nematode parasites from Himachal Pradesh. II.* Rhabdochona *(*R.*)* fotedari *sp. n. (Nematoda, Thelazioidea) from a fresh water fish in India.* Indian Journal of Helminthology, vol. 45, pp. 92-95. (Publ. 1994).

Kaur, J & Khera, S. 1991. *On new and one already known species under the subgenus* Rhabdochona *Railliet, 1916 from freshwater fishes* Tor putitora *and* Tor tor *from Bilaspur and Ropar (India)*. Indian Journal of Parasitology, vol. 15, pp. 67-74.

Kayton, RJ, Kritsky, DC & Tobias, RC. 1979. Rhabdochona catostomi *sp. n. (Nematoda: Rhabdochonidae) from the intestine of* Catostomus *spp. (Catostomidae)*. Proceedings of the Helminthological Society of Washington, vol. 46, pp. 224-227.

Kazic, D. 1978. *Endohelminths of Salmonida from artificial lake Piva, Montenegro, Yugoslavia*. Verhandlungen Internationale vereinigung fur theoretische und Angewandte Limnologie, vol. 20, pp. 2154-2158.

Khan, AR & Rasheed, M. 1993. *Influence of season on the intensity of helminth infection in* Schizothorax esocinus *Heckel from the Wular Lake*. Indian Journal of Helminthology, vol. 45, pp. 64-73. (Publ. 1994).

Khan, D & Yaseen, T. 1969. *Helminth parasites of fishes from East Pakistan 1. Nematodes*. Bulletin of Department of Zoology University of the Punjab. Article 4, pp. 1-33 pp.

Khan, AR, Chishti MZ, Fayaz, A, Rashid, M. & Bakshi, S. 2004. *Seasonal occurrence of helminth parasites in* Schizothorax *in Dal Lake Kashmir*. Journal of Parasitic Diseases vol. 28, pp. 45-56.

Kirin, D. 2003. *Biodiversity and ecological evaluation of the helminth communities of* Barbus cyclolepis *and* Alburnus alburnus *from Arda river, Bulgaria*. Experimental Pathology and Parasitology, vol. 6, pp. 44-50.

Kirka, A, Meszaros, J & Nagy, S. 1982. *Ichtyofauna a jej sucasne podmienky v rieke Ondave*. Polnohospodarstvo, vol. 28, pp. 534-540.

Kloss, GR. 1966. *Helmintos parasitos de espécies simpátricas de* Astianax *(Pisces, Characidae)*. Papéis Avulsos do Departamento de Zoologia da Secretaria de Agricultura de São Paulo, vol. 18, pp. 189-219.

Kohn, A & Fernandes, BMM. 1987. *Estudo comparativo dos helmintos parasitos de peixes do rio Mogi Guassu, coletados nas excursões realizadas entre 1927 e 1985*. Memórias do Instituto Oswaldo Cruz, vol. 82, pp. 483-500.

Kritscher, E. 1991. *Beitrag zur Kenntnis der Parasiten des Seesaiblings* Salvelinus alpinus salvelinus *L. (Pisces: Salmonidae) aus dem Attersee (Oberosterreich)*. Annalen des Naturhistorischen Museums in Wien. Serie B fur Botanik und Zoologie, vol. 92, pp. 257-265.

Kumar, P & Gupta, SP. 1979. *On two new spirurid nematodes of birds*. Rivista di Parassitologia, vol. 40, pp. 43-48.

Lakshmi, BB. 2001. Rhabdochona indiana *n. sp. (Nematoda: Rhabdochonidae) from the intestine of* Pempheris vanicolensis. Boletin Chileno de Parasitologia, vol. 57, pp. 107-110.

Lakshmi, BB & Sudha, M. 1999a. *On a new species* Rhabdochona marina *(Nematoda: Rhabdochonidae) from the intestine of* Pempheris vanicolensis *(Cuvier) of Visakhapatnam*. Uttar Pradesh Journal of Zoology, vol. 19, pp. 165-170

Lakshmi, BB & Sudha, M. 1999b. *On* Rhabdochona holocentra *sp. nov. (Nematoda: Spiruroidea) from* Holocentrus ittodai *(Jordan and Fowler) of Visakhapatnam*. Journal of Parasitology and Applied Animal Biology, vol. 8, pp. 92-96.

Lang, BZ & Edson, SA. 1976. *Parasites of the speckled dace from eastern Washington*. Journal of Parasitology, vol. 62, p. 93.

Leong, TS. 1980. *Additional information of helminths in* Puntius binotatus *from Punau Pinang, Malaysia*. Malayan

Nature Journal, vol. 34, pp. 113-114.

Leong, TS. 1986. *Seasonal occurrence of metazoan parasites of* Puntius binotatus *in an irrigation canal, Pulau Pinang, Malaysia*. Journal of Fish Biology, vol. 28, pp. 9-16.

Lira-Guerrero, G, Prieto, LG & Pérez-Ponce de Léon, G. 2008. *Helminth parasites of atherinopsid freshwater fishes (Osteichthyes: Atheriniformes) from central Mexico*. Revista Mexicana de Biodiversidad, vol. 79, pp. 325-331.

Lockard, LL, Parsons, RR & Schaplow, BM. 1975. *Some relations between internal parasites and brown trout from Montana streams*. Great Basin Naturalist, vol. 35, pp. 42-448.

Maggenti, AR, Abdel-Rehman, FR & Cid Del Prado-Vera, I. 1992. *New species of* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) from rainbow trout in California streams*. Journal of Nematodology, vol. 24, pp. 379-390.

Majumdar, G & De, NC. 1971. Rhabdochona barusi *sp. new. from the fish* Barilius *sp. with the key to the Indian species of this genus*. Folia Parasitologica, vol. 18, pp. 381-184.

Malhotra, SK & Chauhan, RS. 1984. *Helminth infection in hillstream fishes*. Indian Journal of Parasitology, vol. 8, pp. 303-305.

Marcogliese, DJ, Ball, M & Lankester, MW. 2001. *Potential impacts of clearcutting on parasites of minnows in small boreal lakes*. Folia Parasitologica, vol. 48, pp. 269-274.

Margolis, L, Moravec, F. & McDonald, TE. 1975. Rhabdochona kisutchi *sp. nov. (Nematoda: Spiruroidea) from coho salmon,* Onchorynchus kisutch *(Walbaum) of western Canada*. Canadian Journal of Zoology, vol. 53, pp. 960-966.

Martinez-Aquino, A, Salgado-Maldonado, G, Aguilar-Aguilar, R, Cabañas-Carranza, G & Ortega-Olivares, MP. 2004. *Helminth parasites of* Chapalichthys encaustus *(Pisces: Goodeidae), an endemic freshwater fish from Lake Chapala, Jalisco, Mexico*. Journal of Parasitology, vol. 90, pp. 889-890.

Martinez-Aquino, A, Aguilar-Aguilar, R, Perez-Rodriguez, R & Pérez-Ponce de Léon, G. 2009. *Helminth parasites of* Xenoaenia resolanae *(Osteichthyes, Cyprinodontiformes, Goodeidae) from the Cuzalapa Hydrological System, Jalisco, Mexico.* Journal of Parasitology, vol. 95, pp. 1221-1223

Mashego, SN. 1989. *Nematode parasites of* Barbus *species in Lebowa and Venda, South Africa*. South African Journal of Wildlife Research, vol 19, pp. 35-37.

Mashego, SN. 1990. *A new species of* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) from* Barbus *species in South Africa*. Annale van die Transvaal Museum, vol. 35, pp. 147-149.

Mejia-Madrid, HH, Choudhury, A & Pérez-Ponce de León, G. 2007a. *Phylogeny and biogeography of* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) species from the Americas*. Systematic Parasitology, vol. 67, pp.1-18.

Mejia-Madrid, HH, Dominguez-Dominguez, O. & Pérez-Ponce de León, G. 2005. *Adult endohelminth parasites of* Goodeinae *(Cyprinodontiformes: Goodeidae) from Mexico with bibliographical considerations*. Comparative Parasitology, vol. 72, pp. 200-211

Mejia-Madrid, HH & Pérez-Ponce de Léon, G. 2003. Rhabdochona ahuehuellensis *n. sp. (Nematoda: Rhabdochonidae) from the balsas goodeid,* Ilyodon whitei *(Osteichthyes: Goodeidae) in Mexico.* Journal of Parasitology, vol 89, pp. 356-361.

Mejia-Madrid, HH & Pérez-Ponce de Léon, G. 2007a. *A new rhabdochonid from the blue striped chub* Sectator ocyurus *(Osteichthyes Kyphosidae) in Chamela Bay, Mexico.* Journal of Parasitology, vol. 93, pp. 166-170.

Mejia-Madrid, HH, Vásquez-Dominguez, E & Pérez-Ponce de Léon, G. 2007b. *Phylogeography and freshwater basins in central Mexico: recent history as revealed by the fish parasite* Rhabdochona lichtenfelsi *(Nematoda)*. Journal of

Biogeography, vol. 34, pp. 787801.

Molin, R. 1860. *Una monografia del genere Spiroptera*. Anzeigen der Akademie der Wissenschften, Wien Mathematisch-naturwissenschaftliche, vol. 38, pp. 911-1005.

Moravec, F. 1968. *Species of the genus* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) from fishes of Czechoslovakia*. Folia Parasitologica, vol. 15, pp. 29-40.

Moravec, F. 1971. *Nematodes of fishes in Czechoslovakia*. Acta Scientarium Naturalium Brno, vol. 5, pp. 1-49.

Moravec, F. 1972a. *General characterization of the nematode genus* Rhabdochona *with a revision of the South American species*. Vestnik Ceskoslovenke Spolecnosti Zoologicke, vol. 36, pp. 29-46.

Moravec, F. 1972b. *A revision of African species of the nematode genus* Rhabdochona *Railliet, 1916*. Vestnik Ceskoslovenske Spolecnosti Zoologicke, vol 36, pp. 196-208.

Moravec, F. 1972c. *Studies on the development of the nematode* Rhabdochona (Filochona) ergensi *Moravec, 1968*. Folia Parasitologica, vol. 19, pp. 321 333.

Moravec, F. 1974. *On some nematodes from Egyptian freshwater fishes*. Vestinik Ceskolovenske Spolecnosti Zoologicke, vol. 38, pp. 32-51.

Moravec, F. 1975. *Reconstruction of the nematode genus* Rhabdochona *Railliet, 1916, with a review of the species parasitic in fishes of Europe and Asia.* Studie CSVAV, Praha, Academia, 104 p.

Moravec, F. 1976. *Observations on the development pf* Rhabdochona phoxini *Moravec, 1968 (Nematoda: Rhabdochonidae)*. Folia Parasitologica, vol. 23, pp. 309-320.

Moravec, F. 1977. *Life history of the nematode* Rhabdochona phoxini *Moravec, 1968 in the Rokytka Brook, Czechoslovakia.* Folia Parasitologica, vol. 24, pp. 97-105.

Moravec, F. 1983. Rhabdochona puylaerti *sp. n. (Nematoda: Rhabdochonidae) recorded from the African viper* Causus rhombeatus *(Lichtenstein)*. Folia Parasitologica, vol. 30, pp. 313-317.

Moravec, F. 1994. *Parasitic nematodes of freshwater fishes of Europe*. Boston, London, Praha, Dordrecht, Academia and Kluwer, 473 p.

Moravec, F. 1995. *Trichopteran larvae (Insecta) as the intermediate hosts of* Rhabdochona hellichi *(Nematoda: Rhabdochonidae), a parasite of* Barbus barbus *(Pisces)*. Parasitology Research, vol. 81, pp. 268-270.

Moravec, F. 1998. *Parasitic nematodes of freshwater fishes of the Neotropical region*. Praha, Academia, 464 p.

Moravec, F. 2006. *Systematic status of* Rhabdochona leucaspii *Kritscher, 1979 (Nematoda: Rhabdochonidae),* Folia Parasitologica, vol. 53, p. 240.

Moravec, F. 2007a. *First experimental observations on the development of* Rhabdochona denudata *(Nematoda: Rhabdochonidae) in the intermediate host.* Folia Parasitologica, vol. 54, pp. 236-238.

Moravec, F. 2007b. *Some aspects of the taxonomy and biology of adult spirurine nematodes parasitic in fishes: a review*. Folia Parasitologica, vol. 54, pp. 239-257.

Moravec, F. 2010. *Some aspects of the taxonomy, biology, possible evolution and biogeography of nematodes of the spirurine genus* Rhabdochona *Railliet, 1916 (Rhabdochonidae, Thelazioidea).* Acta Parasitologica, vol. 55, pp. 144-160.

Moravec, F & Amin, A. 1978. *Some helminth parasites, excluding Monogenea, from fishes of Afghanistan*. Acta Scientiarum Naturalium Academie Scientiarium Bohemoslovacae, vol. 12, pp. 1-45.

Moravec, F & Arai HP. 1971. *The North and Central American species of* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) of fishes including* Rhabdochona canadensis *sp. nov.* Journal of the Fisheries Research Board of Canada, vol. 28, pp. 1645-1662.

Moravec, F & Daniel, M. 1976. Rhabdochona minima *sp. n. (Nematoda: Spiruriodea) from the loach,* Noemacheilus inglisi *(Hora), of Nepal*. Folia Parasitologica, vol. 23, pp. 175-178.

Moravec, F & Huffman, DG. 1988a. Rhabdochona longleyi *sp. n. (Nematoda: Rhabdochonidae) from blind catfishes,* Trogloglansis pattersoni *and* Satan eurystomus *(Ictaluridae) from the subterranean waters of Texas*. Folia Parasitologica, vol. 35, pp. 235-243.

Moravec, F & Huffman, DG. 1988b. *Observations on the genus* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) from fishes of Central Texas, with descriptions of two new subspecies.* Folia Parasitologica, vol. 35, pp. 341-351.

Moravec, F & Huffman, DG. 2001. *Observations on the biology of* Rhabdochona kidderi texensis*, a parasite of North American cichlids*. Journal of Helminthology, vol. 75, pp. 197-203.

Moravec, F & Klimpel, S. 2007. *A new species of* Comephoronema *(Nematoda: Cystidicolidae) from the stomach of the abyssal halosaur* Halosauropsis macrochir *(Teleostei) from the Mid-Atlantic Ridge*. Journal of Parasitology, vol. 93, pp. 901-906.

Moravec, F & Mikailov, TK. 1970. *Species of the genus* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) from fishes of Azerbaidzhan.* Folia Parasitologica, vol. pp. 17: 13-23.

Moravec, F & Muzzall, PM. 2007. *Redescription of* Rhabdochona cotti *(Nematoda, Rhabdochonidae) from* Cottus caeruleomentum *(Teleostei, Cottidae) in Maryland, USA, with remarks on the taxonomy of North American* Rhabdochona *spp.* Acta Parasitologica, vol. 52, pp. 51-57.

Moravec, F & Nagasawa, K. 1989. *Observations on some nematode parasitic in Japanese freshwater fishes*. Folia Parasitologica, vol. 36, pp. 127-141.

Moravec, F & Nagasawa, K. 1998. *Helminth parasites of the rare endemic catfish,* Liobagrus reini*, in Japan*. Folia Parasitologica, vol. 45, pp. 283-294.

Moravec, F & Otero, SC. 1987. Rhabdochona cubensis *sp. n. (Nematoda: abdochonidae) from freshwater fish* Ganbasis punctata *from Cuba*. Helminthologia, vol. 24, pp. 103-110.

Moravec, F & Scholz, T. 1991a. *Observations on some nematode parasites in freshwater fishes in Laos*. Folia Parasitologica, vol. 38, pp. 163-178.

Moravec, F & Scholz, T. 1991b. *Ocurrence of endohelminths in chub,* Leuciscus cephalus*, of the Rokytna river, Czechoslovakia*. Acta Societatis Zoologicae Bohemoslovacae, vol. 55, pp. 12-28.

Moravec, F & Scholz, T. 1995. *Life history of the nematode* Rhabdochona hellichi*, a parasite of barbell in the Jihlava River, Czech Republic*. Journal of Helminthology, vol. 69, pp. 59-64.

Moravec, F & Sey, O. 1988. *Nematodes of freshwater fishes from North Vietnam. Part 2. Thelazioidea, Physalopteroidea and Gnathostomatoidea*. Vestnik Ceskoslovenske Spolecnosti Zoologicke, vol. 52, pp. 176-191.

Moravec, F & Shimazu, T. 2008. *Redescription of the female of* Mexiconema liobagri *(Nematoda: Daniconematidae) a little known parasite of the rare endemic catifish* Liobagrus reinii *(Amblyciptidae), in Japan*. Helminthologia, vol. 45, pp. 106-108.

Moravec, F, Ali, NM & Abul-Eis, ES. 1991. *Observations on two* Rhabdochona *species (Nematoda: Rhabdochonidae) from freshwater fishes in Iraq, including description of* R. similis *sp. n*. Folia Parasitologica, vol. 38, pp. 235-243.

Moravec, F, Lorber, J & Konecný, 2007. *Two new species of parasitic nematodes from the dogtooth tuna* Gymnosarda unicolor *(Pisces) off the Maldive Islands*. Journal of Parasitology, vol. 93, pp. 171-178.

Moravec, F, Margolis, L & Boyce, NP. 1981. *Some nematodes of the genus* Rhabdochona *Railliet, 1916 (Spiruroidea) from fishes of Japan*. Vestnik Ceskoslovenke Spolecnosti Zoologicke, vol. 45, pp. 277-290.

Moravec, F, Nagasawa, K & Urawa, S. 1985. *Some fish nematodes from fresh waters in Hokkaido, Japan*. Folia Parasitologica, vol. 32, pp. 305-316.

Moravec, F, Nagasawa, K & Urushibara. 1998. *Observations on the seasonal maturation of the nematode* Rhabdochona zacconis *in Japanese dace,* Tribolodon hakonensis*, of the Okitsu River, Japan*. Acta Societatis Zoologicae Bohemicae, vol. 62, pp. 45-50.

Moravec, F, Riha, M & Kuchta, R. 2008. *Two new nematode species,* Paragendria papuanensis *sp. n. (Seuratoidea) and* Rhabdochona papuanensis *sp. n. from freshwaterfishes in Papua New Guinea*. Folia Parasitologica, vol. 55, pp. 127-135.

Moravec, F, Gelnar, FM, Ergens & R. Scholz, T. 1997a. *Metazoan parasites of fishes from the section of the Vltava River supposed to be affected by the operation of the Temelin nuclear electric power-station, Czech Republic*. Acta Societatis Zoologicae Bohemicae, vol. 61, pp. 65-76.

Moravec, F, Konecny, R, Baska, F, Rydlo, M, Scholz, T, Molnar, K & Schiemer, F. 1997b. *Endohelminth fauna of barbel,* Barbus barbus *(L.), under ecological conditions of the Danube basin in central Europe*. Academia, Publishing House of the Czechoslovak Academy of Sciences, Prague, Czech Republic.

Moravec, F, Saraiva, A, Addullah, SM, Bilal, SJ & Rahemo, ZIF. 2009. *Two species of* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) parasitizing cyprinid fishes in Iraq, with a redescription of* R. tigridis *Rahemo, 1978 (emend.)* Systematic Parasitology, vol. 74 (2), pp. 125-135.

Moravec, F, Salgado-Maldonado, G & Cabañas-Carranza, G. 2001. *New observations on* Vasorhabdochona cablei *(Nematoda: Rhabdochonidae) with remarks to the family Rhabdochonidae*. Helminthologia, vol. 38, pp. 231-235.

Moravec, F, Vargas-Vazquez & Gonzalez-Solis, D. 1999. *Nematode parasites from the blind fish* Ogilbia pearsei *from the Nohoc cave system with remarks on* Rhabdochona kidderi *(Nematoda) from fishes of Yucatan, Mexico*. Acta Societatis Zoologicae Bohemicae, vol. 63, pp. 295-300.

Moravec, F, Vivas-Rodriguez, C, Scholz, T, Vargas-Vasquez, J, Mendoza-Franco, E & Gonzalez-Solis, D. 1995. *Nematodes parasitic in fishes of cenotes (= sinkholes) of the Peninsula of Yucatan, Mexico*. Folia Parasitologica, vol. 42, pp. 115-129.

Moreira, NIM. 1994. *Alguns nematódeos parasitos de peixes da represa de Tres Marias, Bacia do Rio São Francisco, Minas Gerais*. Master thesis. Universidade Federal de Minas Gerais, 102 p.

Mortezaei, SRS. 2008. *Nematodes from freshwater fishes of Khouzestan province*. Pajouhesh - va - Sazandegi, vol. 7, pp. 2-10.

Mudry, DR & Anderson, RS. 1977. *Helminth and arthropod parasites of fishes in the mountain national parks of Canada*. Journal of Fish Biology, vol. 11, pp. 21-23.

Muzzal, PM. 1984. *Parasites of trout from four lotic localities in Michigan*. Proceedings of the Helminthological Society of Washington, vol. 51, pp. 261-266.

Muzzal, PM. 1986. *Parasites of trout from the Au Sable River, Michigan, with emphasis on the population biology of* Cystidiculoides tenuissima. Canadian Journal of Zoology, vol. 64, pp. 1549-1554.

Muzzal, PM & Sweet, RD. 1986. *Parasites of mottled sculpins,* Cottus bairdi*, from the Au Sable River, Crawford County, Michigan*. Proceedings of the Helminthological Society of Washington, vol. 53, pp. 142-143.

Muzzal, PM & Whelan, GE. 1995. *Rhabdochona cotti (Nematoda: Rhabdochonidae) in mottled sculpins,* Cottus bairdi*, from the Ford River, Michigan*. Journal of Parasitology, vol. 81, pp. 488-490.

Muzzall, PM, Peebles, CR & Thomas, MV. 1995. *Parasites of round goby,* Neogobius melastomus*, and tubenose goby,* Proterothinus marmoratus *(Perciformes, Gobiidae), from the St. Clair River and Lake St. Clair, Michigan*. Journal of the Helminthological Society of Washington, vol. 62, pp. 226-228.

Muzzall, PM, Whelan, GE & Taylor, WW. 1992. *Host-parasite relationships of longnose dace,* Rhinichthys cataractae*, from Ford River, Michigan*. Journal of Parasitology, vol. 78, pp. 837-844.

Nachev, M & Sures, B. 2009. *The endohelminth fauna of barbell (*Barbus barbus*) correlates with water quality of the Danube River in Bulgaria*. Parasitology, vol. 136, pp. 545-552.

Naidu, TSV. 1983. *Records of some nematode parasites of fishes of Vidarbha Region, Maharashtra State, India*. Rivista di Parassitologia, vol. 44, pp. 143-146.

Oguz, MC & Ozturk, MO. 1993. *Kizilkanat baliklarinin (*Scardinius erythopthalmus *L., 1758) endohelminthleri uzerine parazitolojik bir calisma*. Turkey Parasitology Dergisi, vol. 17, pp. 130-137.

Öktener, A. 2003. *A checklist of metazoan parasites recorded in freshwater fish from Turkey*. Zootaxa, vol. 394, pp. 1-28.

Ortuby, SG, Semenas, LG, Ubeda, CA, Quaggiotto, AE & Viozzi, GP. 1994. *Catálogo de peces dulceacuícolas de La Patagonia argentina y sus parásitos metazoos*. Dirección de Pesca, Subsecretaría de Recursos Naturales, Província de Rio Negro, Argentina, 107 p.

Paraguassú, AR & Luque, JL. 2007. *Metazoários parasitos de seis espécies de peixes do Reservatório de Lajes, Estado do Rio de Janeiro, Brasil.* Revista Brasileira de Parasitologia Veterinária, vol. 16, pp. 121-128.

Paraguassú, AR, Alves, DR & Luque, JL. 2005. *Metazoários parasitos do acará* Geophagus brasiliensis *(Quoy & Gaimard, 1824) (Osteichthyes: Cichlidae) do reservatório de Lajes, Estado do Rio de Janeiro, Brasil*. Revista Brasileira de Parasitologia Veterinária, vol. 14, pp. 35-39.

Pazooki, J, Ghasemi, R. & Masoumian, M. 1996. *Infections of three species of* Barbus *fishes by helminth parasites in Tadjan and Zaremrood Rivers, Mazandaran province, Iran*. Pajouhesh-va-Sazandegi, vol. 59, pp. 80-85.

Pennel, DA, Becker, CD & Scofield, NR. 1973. *Helminths of the sockeye salmon (*Oncorhynchus nerka*) from the Kvichak River system, Bristol Bay, Alaska*. Fishery Bulletin of the United States National Oceanic and Atmospheric Administration, vol. 71, pp. 267-277.

Pérez-Ponce de Léon, G & Choudhury, A. 2002. *Adult endohelminth parasites of ictalurid fishes (Osteichthyes: Ictaluridae in Mexico: empirical evidence for biogeographical patterns*. Comparative Parasitology, vol. 69, pp. 10-19.

Pérez-Ponce de Léon, G & Choudhury, A. 2005. *Biogeography of helminth parasites of freshwater fishes in Mexico: the search for patterns and processes*. Journal of Biogeography, vol. 32, pp. 645-659.

Pérez-Ponce de Léon, G, Garcia-Prieto, L, Léon-Regagnon, V & Choudhury, A. 2000. *Helminth communities of native and introduced fishes in Lake Patzcuaro, Michoacan, Mexico*. Journal of Fish Biology, vol. 57, pp. 303-325.

Pérez-Ponce de Léon, G, Rosas-Valdez, R, Mendoza-Garcias, B, Aguilar-Aguilar, R, Falcón-Ordaz, J, Garrido-Olivera, L & Pérez-Rodriguez, R. 2009. *Survey of the endohelminth parasites of freshwater fishes in the upper Mezquital River Basin, Durango State, Mexico*. Zootaxa, vol. 2164, pp. 1-20.

Petter, AJ. 1987. *Nématodes de poissons de l'Equateur*. Revue Suisse de Zoologie, vol. 94, pp. 61-76.

Pluto, TG & Rothenbacher, H. 1978. *An intestinal helminth survey of three species of Centrarchidae from Bald Eagle Creek, Centre County, Pennsylvania*. Proceedings of the Helminthological Society of Washington, vol. 45, pp. 268-270.

Poinar, GO, & Kannangara, DWW. 1972. Rhabdochona praecox *sp. n. and* Proleptus *sp. (Spiruroidea: Nematoda) from fresh water crabs in Ceylon*. Annales de Parasitologie Humaine et Comparée, vol. 47, pp. 121-129.

Popiolek, M & Kotusz, J. 2003. *Endoparasitic helminths of fishes of the genus* Cobitis

from Poland. Folia Biologica, vol. 51, pp. 173-178.

Poulin, R. 2006. *Variation in infection parameters among populations within parasite species: intrinsic properties versus local factors*. International Journal for Parasitology, vol. 36, pp. 877–885

Pracheil, BM, Mesti, GE, Muzzal, PM. 2005. *Metazoan parasites of young-of-the year paddlefish from Lewis and Clark Lake, Nebraska, U.S.A.* Comparative Parasitology, vol. 72, pp. 227-229.

Pullen, RR, Bouska, WW, Campbell, SW & Paukert, CP. 2009. Bothriocephalus acheilognathi *and other intestinal helminths of* Cyprinella lutrensis *in Deep Creek, Kansas*. Journal of Parasitology, vol. 95, pp. 1224-1226.

Puylaert, TFA. 1973. *Rhabdochonidae parasites de poissons africains d'eau douce et discussion sur la position systematique de ce groupe.* Revue de Zoologie et de Botanique Africains, vol. 84, pp. 647-665.

Quilchini, Y, Foata, J, Mouillot, D, Mattei, J & Marchand, B. 2010. *The influence of altitude, hydrographic network and season on brown trout parasites in Corsica using indicator species analysis*. Journal of Helminthology, vol. 84, pp. 13-19.

Rafique, RM, Mehboob, S, Gulzarin, M, Rubina, Y & Ahmad, M. 2002. *Helminths parasites of a freshwater fish* Mystus vitattus. International Journal of Agriculture and Biology, vol. 4, pp. 41-43.

Rahemo, ZIF. 1978. Rhabdochona tigrae *sp. n. (Nematoda, Rhabdochonidae) described from a freshwater fish,* Varicorhinus trutta *Heckel fom river Tigris, Iraq*. Acta Parasitologica Polonica, vol. 25, pp. 247-251.

Rahemo, ZIF & Al-Din, FNN. 1999. *A first report of two nematode larvae in Iraqi fishes*. Acta Parasitlogica Turcica, vol. 23, pp. 111-113.

Rahemo, ZIF & Kasim, MH. 1979. *Two new species of* Rhabdochona *Raillieti, 1916 (Rhabdochonidae) from a freshwater fish* Cyprinion macrostomus *Heckel, in Iraq*. Japanese Journal of Parasitology, vol. 28, pp. 371-376.

Rai, P. 1969. *On some of the hitherto known and unknown nematodes parasitic in some of the freshwater silurid fishes*. Indian Journal of Helminthology, vol. 21, pp. 94-101.

Ramallo, G. 2005. *Observations on two* Rhabdochona *species (Nematoda: Rhabdochonidae) from freshwater fishes in Argentina, including description of* Rhabdochona fabianae *n. sp.* Journal of Parasitology, vol. 91, pp. 415-419.

Rasheed, A. 1965. *A preliminary review of the genus* Rhabdochona *Ralliet, 1916 with description of a new and related genus*. Acta Parasitologica Polonica, vol. 13, pp. 407-424.

Rautela, AS & Malhotra, SK. 1982. *A contribution to the study of taxa differentiation in nematode taxonomy in the Himalayan ecosystem*. Himalayan Journal of Science, vol. 2, pp. 23-37.

Rehana, R. & Bilqees, FM. 1973. Rhabdochona cavasius *sp. n. (Nematoda: Rhabdochonidae) from a freshwater fish* Mystus vitattus *(Ham.) of Kalri Lake Sind.* Pakistan Journal of Science and Industrial Research, vol. 16, pp. 110-111.

Reyda, FB. 2008. *Intestinal helminths of freshwater stingrays in southern Peru, and a new genus and two new species of cestode*. Journal of Parasitology, vol. 94, pp. 684-699.

Robinson, GL & Jahn, LA. 1980. *Some observations of fish parasites in pool 20, Mississippi River*. Transactions of the American Microscopical Society, vol. 99, pp. 206-212.

Rojas, EP, Pérez-Ponce de León, G & Prieto, LG. 1997. *Helminth community structure of some freshwater fishes from Patzcuaro, Michoacan, Mexico*. Tropical Ecology, vol. 8, pp. 129-131.

Romero-Tejeda, ML, Garcia-Prieto, L, Garrido-Olvera, L & Pérez-Ponce de León, G. 2008. *Estimation of the endohelminth parasite species richness in freshwater fishes from La Mintzita Reservoir, Michoacán, Mexico*. Journal of

Parasitology, vol. 94, pp. 288-292.

Sahay, U. 1966. *On* Rhabdochona bosei *sp. nov. from a fresh water fish,* Eutropiichthys vacha *(Hamilton)*. Indian Journal of Helminthology, vol. 18, pp. 57-61.

Sahay, U, Nath, S & Kumar, A. 1969. *A revised key to the species of the genus* Rhabdochona *Railliet (1916) parasitic in fishes in India*. Indian Journal of Science and Industry: A- Agricultural and Animal Sciences, vol. 3, pp. 117-123.

Sahay, U & Narayan, S. 1971. *A discussion on the validity of* Rhabdochona baylisi *Rai, 1969*. Indian Journal of Animal Research, vol. 5, pp. 51-54.

Saidov, Yu S. 1953. *Revision of the family Rhabdochonidae Skrjabin, 1946 and the subfamily Cyclozoninae Sobolev, 1949)*, Sb. Rabory po gelmintologii" k -75, Letiyu Akad. K. I. Skrajabina, Moscow, pp. 622-635 (in Russian).

Salgado-Maldonado, G. 2006. *Checklist of helminth parasites of freshwater fishes from Mexico*. Zootaxa, vol. 1324, pp. 1-357.

Salgado-Maldonado, G, Mercado-Silva, N, Cabañas-Carranza, G, Caspeta-Mandujano, JM, Aguilar-Aguilar, R & Iñiguez-Dávalo, LI. 2004. *Helminth parasites of freshwater fishes of the Ayuquila River, Sierra de Manantlán Biosphere Reserve, West Central Mexico*. Comparative Parasitology, vol. 71, pp. 67-72.

Sánchez-Alvarez, A, Garcia-Prieto, L, Pérez-Ponce de Léon, G. 1998. *A new species of* Rhabdochona *Railliet, 1916 (Nematoda: Rhabdochonidae) from endemic goodeids (Cyprinodontiformes) from two Mexican lakes*. Journal of Parasitology, vol. 84, pp. 840-845.

Santos, MD, Albuquerque, MC, Monteiro, CM, Martins, AN, Ederli. NB & Brasil-Sato, MC. 2009. *First report of larval* Spiroxys *sp. (Nematoda, Gnathostomatidae) in three species of carnivorous fish from Três Marias Reservoir, São Francisco River, Brazil*. Pan-American Journal of Aquatic Sciences, vol. 4, pp. 306-311.

Saraiva, A & Moravec, F. 1998. *Redescription of* Rhabdochona anguillae *(Nematoda: Rhabdochonidae), a parasite of eel* Anguilla anguilla*, in Europe*. Folia Parasitologica, vol. 45, pp. 233-238.

Saraiva, A, Antão, A & Cruz, C. 2005. *Comparative study of parasite communities in European eel* Anguilla anguilla *from Rivers of northern Portugal*. Helminthologia, vol. 42, pp. 99-106.

Saraiva, A, Pereira, A & Cruz, C. 2002a. *Observations on the occurrence and maturation of* Rhabdochona anguillae *(Nematoda: Rhabdochonidae) in the Sousa River, Portugal*. Journal of Helminthology, vol. 39, pp. 41-43.

Saraiva, A, Felisberto, P & Cruz, C. 2002b. *Occurrence and maturation of* Rhabdochona gnedini *(Nematoda: Rhabdochonidae) in the barbels of the Sousa River, Portugal.* Parasite, vol. 9, pp. 81-84.

Seiferjova, M, Vyskocilova, M, Moran, DS & Simkova, A. 2008. *Metazoan parasites of freshwater cyprinid fish (*Leuciscus cephalus*): testing biogeographical hypotheses of species diversity*. Parasitology, vol. 135, pp. 1417-1435.

Seki, N. 1975. *Studies on helminth parasites of salmonoid fishes in Hokkaido*. Japanese Journal of Veterinary Research, vol. 23, p. 113.

Seng, LT. 1980. *Additional information of helminths in* Puntius binotatus *from Pulau Pinang, Malaysia*. Malaysian Nature Journal 34: 113-114.

Shimatzu, T. 1996. *Mayfly larvae,* Ephemera japonica*, as natural intermediate hosts of salmonid nematodes,* Sterlidochona ephemeridarum *and* Rhabdochona oncorhynchi*, in Japan.* Japanese Journal of Parasitology, vol. 45, pp. 167-172.

Shukerova, SA & Kirin, D. 2008. *Helminth communities of the rudd* Scardinius erythrophthalmus *(Cypriniformes, Cyprinidae) from Srebarna Biosphere Reserve, Bulgaria*. Journal of Helminthology, vol. 82, pp. 319-323.

Siddiqi, MN & Khatak, AR. 1983. *Helminth parasites of fishes of N. W. F. P. Pakistan*. Pakistan Veterinary Journal, vol. 3, pp. 84-86.

Siddiqi, MN & A.R. Khatak AR. 1984. *Three new species of the family Rhabdochonidae Skrjabin, 1946 from fishes of N.W.F. P.* Pakistan Journal of Zoology, vol. 16, pp. 181-188.

Sood, ML. 1972. *Two nematode parasites (Rhabdochonidae Skrjabin, 1946) from freshwater fishes of India*. Zoologischer Anzeiger, vol 188, pp. 100-106.

Sood, ML. 1988. *Fish nematodes from South Asia*. Kalyani Publishers, New Delhi, India, 389 p.

Sood, ML, Mehta, M & Virk, S. 1977. *Records of some nematodes of freshwater fishes from the Punjab State*. Journal of Research of the Punjab Agricultural University, vol. 14, pp. 332-334.

Soota, TD. 1983. *Studies on nematode parasites of Indian vertebrates. 1. Fishes*. Records of the Zoological Survey of India, vol. 54, pp. 1-352. (Occasional paper).

Soota, TD & Dey-Sarkar, SR. 1981. *On some nematodes from Salan District. Himachal Pradesh, India*. Records of the Zoological Survey of India, vol. 79, pp. 169-177.

Sterud, E, Thoen, E & Haugland, O. 1998. *First record of* Rhabdochona *[*Rhabdochona*] oncorhynchi (Nematoda: Rhabdochonidae) from brown trout in Europe*. Bulletin of the European Association of Fish Pathologists, vol. 18, pp. 206-208.

Sudhakar, S., Anhalagan, T., Veerapan, N., Soundrapandian, P. & Arumugam, R. 2009. *Nematodes parasites from scianeids fishes of Parangipettai, Southern coast of India*. Current Research Journal of Biological Sciences vol 1, pp. 6-10.

Takemoto, RM, Pavanelli, GC, Lizama, MAP, Lacerda, ACF, Yamada, FH, Moreira, LHA, Ceschini, TL & Belay, S. 2009. *Diversity of parasites of fish from the upper Paraná River floodplain, Brazil*. Brazilian Journal of Biology, vol. 69 (Suppl.), pp. 691-705.

Tavernari, FC, Takemoto, RM, Guidelli, GM, Luzama, MAP, Lacerda, ACM & Pavanelli, GC. 2009. *Parasites of* Auchnipterus osteomystax *(Osteichthyes, Auchenipteridae) from two different environments, Rosana's reservoir and upper Paraná river flood plain, Brazil*. Acta Scientiarum, vol. 31, pp. 49-54.

Tohen, E, Haugland, O & Sterud, E. 1998. *Parasites of Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) from the River Akerselva, Oslo, Norway*. Bulletin of the Scandinavian Society for Parasitology, vol. 8, pp. 92-96.

Travassos, L, Artigas, P & Pereira, C. 1928. *Fauna helminthologica dos peixes de água doce do Brasil*. Archivos do Instituto Biológico, São Paulo, vol. 1, pp. 5-68.

Valle-Rios, ME & Ruiz-Campos, G. 1997. *Prevalencia e intensidad de helmintos parasitos del tracto digestivo de la trucha arcoiris* Oncorhynchus mykiss nelsoni *(Pisces: Salmonidae) de Baja California, Mexico***.** Revista de Biologia Tropical, vol. 44-45, pp. 579-584.

Vassiltadès, G & Troncy, PM. 1974. *Nématodes parasites des poissons du bassin tchadien*. Bulletin de l'Institut Fondamental d'Afrique Noire, vol. 36, pp. 670-681.

Vaz, Z & Pereira, C. 1934. *Contribuição ao conhecimento dos nematóides de peixes fluviais do Brasil*. Archivos do Instituto Biológico, São Paulo, vol. 5, pp. 87-103.

Verma, SL. 1972. *Helminth parasites of fresh water fishes VIII. On two species of the genus* Rhabdochona *Railliet, 1916 from Lucknow*. Japanese Journal of Parasitology, vol. 21, pp. 269-301.

Vicente, JJ, Rodrigues, HO & Gomes, DC. 1985. *Nematóides do Brasil 1ª parte: nematóides de peixes*. Atas da Sociedade de Biologia do Rio de Janeiro, vol. 25, pp. 1-70.

Voth, DR, Anderson, LF & Kleinschuster, SJ. 1974. *The influence of waterflow on brown trout parasites*. Progressive Fish Culturist, vol. 36, p. 212.

Wang, PQ. 1976. *Notes on some new nematodes of the suborder Spirurata from Fujian, Japan*. Acta Zoologica Sinica, vol. 22, pp. 393-402.

Wang, PQ. 1981. *Six new species of nematodes from vertebrates in Fugian Province (China)*. Acta Zootaxonomica Sinica, vol. 6, pp. 365-372.

Wang, PQ, Zhao, YR, Wang, XY, Zhang, JY & Chang, CY. 1979. *Report on some*

nematodes from vertebrates in Central and South China. Fujian Shida Xuebao, vol. 2, pp. 78-92.

Wang, PQ, Wang, YY, Zhao, YR, Yain, RL & Wang, SP. 1992. *The parasitic helminths of vertebrates from Meihua Mountain Nature Reserve and adjacent area*. Wuyi Science Journal, vol 9, pp. 31-48.

Wier, W, Mayberry, LF, Kinzer, HG & Turner, PR. 1983. *Parasites of fishes in the Gila River drainage in southwestern New Mexico*. Journal of Wildlife Diseases, vol 19, pp. 59-60.

Wu, XD. 1999. *A new species of* Pseudorhabdochona *(Spirurida: Rhabdochonidae), with discussion of the classification of the genus*. Acta Hydrobiologica Sinica, vol. 23, pp. 65-68.

Yamaguti, S. 1961. *Systema Helminthum. Vol. III. The nematodes of vertebrates*. New York, London, 1261 p.

Young, D & Heckman, RA. 2002. *Biological characteristics and range extension of* Rhabdochona paxamni *(Maggenti, Abdel-Rehman and Cid Del Prado) in two fish species from Little Cottonwood creek, Salt Lake County, Uttah, USA*. Proceedings of Parasitology, vol. 34: 25-43.

Zaid, DA & Khan, D. 1975. *Nematode parasites from fishes of Pakistan*. Pakistan Journal of Zoology, vol. 7, pp. 51-73.

Zrncic, S, Oraic, D, Sostaric, B, Caleta, M, Bulj, I, Zanella, D & Surmanovic, D. 2009. *Occurrence of parasites in Cobitidae from Croatian rivers draining into two different watersheds*. Journal of Applied Ichthyology, vol. 1, pp. 1-4.

Recibido el 14 de abril del 2010.
Aceptado el 17 de junio del 2010.

*Correspondence to author/Autor para correspondencia:
Roberto Magalhães Pinto

Laboratório de Helmintos Parasitos de Vertebrados,
Instituto Oswaldo Cruz.
Av. Brasil, 4365, 21040-900 Rio de Janeiro, Brasil

E-mail/correo electrónico:
rmpinto@ioc.fiocruz.br, rmpinto@globo.com