

NEW LOCALITY AND HOST RECORD OF *RHABDOCHONA BILQEESAE*, NAQVI ET AL., 2014 (NEMATODE: RHABDOCHONIDAE SKRJABIN, 1946) FROM THE FRESHWATER FISH *RITA RITA* IN NAUSHAHRO FEROZE, SINDH, PAKISTAN

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ABSTRACT

During the survey of helminth parasites of freshwater fish *Rita rita* of Naushahro feroze, Sindh, Pakistan. Thirty specimens (8 male and 22 female) were recovered from the small intestine of nine freshwater fish host *Rita rita*. Present specimens resemble to *Rhabdochona bilqeesae* Naqvi et al., 2014 in general body parts, i.e, similar shape of prostom, similar number of prostomal teeth, shape of two unequal spicules, and same number of caudal papillae.

Key-words: *Rhabdochona bilqeesae*, *Rita rita*, Naushahro feroze, Sindh, Pakistan.

INTRODUCTION

Rhabdochona Railliet and Henry, 1916 is a group of parasitic nematodes belongs to order Spirurida and the family Rhabdochonidae Skrjabin, 1946. Species of the genus *Rhabdochona* Railliet and Henry, 1916 are mainly found in freshwater fish, but there are some species that can also infect reptiles and amphibians.

Twenty four species of the genus *Rhabdochona* Railliet and Henry, 1916 have been reported from freshwater fishes host in Pakistan are, *Rhabdochona cavasius* Rehana and Bilqees., 1973 recovered from *Mystus cavasius*; *R. chanawensis* Zaidi and Khan, 1975 reported from *Eutropiichthys vacha*, *R. magna* Khan and Yaseen, 1969 recovered from the intestine of *Rita rita*, *R. megasaculata* Ghazi and Attur-Rahim, 1999 found from the stomach of *Brilurus vegra*, *R. kharani* Kakar et al., 2006 recovered from *Labeo gedrosicus*; *Rhabdochona annai* Kakar et al., 2012 from *Tor putitora*., *R. bolani* and *R. cephalodiverticula* Kakar et al., 2008; *R. meavesicula* Kakar and Bilqees, 2007 recorded from *Schizocyprus brucei*; *R. hingoli* Kakar and Bilqees., 2007 recovered from fish *Cyprinion milesi*; *R. milesi* Kakar and Bilqees, 2007 recovered from *Cyprinion milesi*, *R. magnavesicula* Kakar and Bilqees, 2008 reported from fish *Schizocyprus brucei*, *R. megasaculata* Ghazi and Rahim, 1999 recorded from fresh water fish *Birliis vagra*, *R. milesi* Kakar et al., 2008 recorded from *Cyprinion milesi*, *R. pakistanica* Kakar et al., 2012 recovered from fish *Cyprinion watsoni*, *R. uvaginus* Kakar and Bilqees, 2007 recovered from fish *Tor putitora*, *R. nushkiai* Kakar and Bilqees, 2007 recorded from the fish *Cyprinion milesi*, *R. watsoniai* Kakar and Bilqees, 2007 recovered from the fish *C. watsoni*, *R. indusi* Soofi et al., 2017 recorded from intestine of *Rita rita*, *R. bifidum* Kakar and Bilqees, 2007 recorded from fish *Tor putitora*, *R. mujibi* Kakar and Bilqees, 2009 was reported from *Tor putitora*, *R. bilqeesae* Naqvi et al., 2014 recovered from the small intestine of *Labeo rohita*, *R. haspani* Kakar et al., 2014 recovered from the intestine of a fish *Cyprinion watsoni*, *R. spatulatum* Kakar and Bilqees, 2016 recovered from the intestine of cyprinid fish, *R. sindhicus* Soofi et al., 2020 recovered from *Rita rita*, *R. spinicauda* Kakar et al., 2012 reported from the *Tor putitora*. The present specimens were recovered from the freshwater fish host *Rita rita* from Naushahro feroze, Sindh, Pakistan. The locality and host record of this species is new.

MATERIAL AND METHOD

Sixteen freshwater fish *Rita rita* were examined for helminth parasites. Hosts were dissected and internal organs were examined. Out of sixteen examined hosts nine were found to be infected with thirty specimens (8 male and 22 female) of *Rhabdochona bilqeesae* Naqvi et al., 2014 recovered from small intestine.

The recovered specimens were fixed in alcohol and stored in the mixture of 70% ethanol and glycerin (9: 1 parts). Nematodes specimens were cleared in lactophenol and temporary mounted in glycerine. All the diagrams were prepared with camera Lucida. The specimens are deposited at Parasitology research laboratory, University of Sindh, Jamshoro, Pakistan.

RESULTS***Rhabdochona bilqeesae* Naqvi et al., 2014
(Figure 1-13)**

Host: *Rita rita* (Ham)
 Locality: Naushahro Feroze, Sindh, Pakistan.
 Site of infection: Small intestine
 Number of hosts examined/ infected: 16/09
 Number of specimens recovered: 8 male and 22 female

Description:

Elongated medium sized delicate and thin nematodes. Body covered with transversely striated cuticle. Rounded anterior end in male and tapering anterior end in female. Oral aperture provided with 2 labial papillae. In cephalic region and cervical region a conspicuous cephalic and cervical alae is present. Two large lateral amphids are evident. Funnel shaped prostom with 10 teeth, small and forwardly directed. The prostom leads to mesostom or vestibula which is long. Deirids not observed, nerve ring and excretory pore are not visible. Long esophagus contain two portions, muscular and glandular esophagus. Longer glandular esophagus than muscular esophagus and occupies entire body width. Intestine is simple. The eggs are embryonated and have smooth walls.

Male:

The body of male is thin and measure 11.5-16.3 by 0.15-0.16. Cup shaped prostom measures 0.031-0.037 by 0.039-0.042. Long and thin mesostom measures 0.165-0.187 by 0.016-0.018mm. Long muscular esophagus measures 0.32-0.38 by 0.027-0.09. Glandular esophagus measures 0.84-0.9x0.1-0.011. Well-developed cephalic and cervical alae measures 2.3-2.5 by 0.28-0.39. The lips of mouth opening contain a pair of papillae, 10 teeth are present at the prostom. Deirids, nerve ring, excretory pore are not visible. Two unequal spicules left is larger while small is boat like in shape. Left spicule measures 1.27-1.29 mm and right spicule measures 0.462-0.472 mm. There are 18 pair of caudal papillae includes 13 pair of pre anal papillae and 5 pair of post anal papillae, the last pair of post anal papillae is situated slightly on the lateral side, conical tail is present.

Female:

Female body is thin and delicate, cuticle of the body is straited, anterior tapering end and posterior pointed end. The female body measures 17.5-22.7 mm. Oral aperture with a pair of labial papillae, funnel shaped prostom with 10 teeth measures 0.132-0.176 by 0.088-0.165. Long vestibuli measures 0.341-0.66. Muscular esophagus measures 0.92-0.96x0.09-0.1 glandular esophagus measures 1.49-1.56x0.15-0.18. Deirids, nerve ring, excretory pore is absent. Vulva is post equatorial. The flap of vulva is directed with vaginal tube which is long. Eggs are embryonated and oval measures 0.078-0.08 by 0.066-0.067.

DISCUSSION

In Pakistan almost 24 species of the genus *Rhabdochona* Railliet and Henry, 1916 have been reported, which includes *Rhabdochona annai* Bilqees and Khan, 2012 from *Tor putitora*., *R. bolani* and *R. cephalodiverticula* Kakar et al., 2008, *R. cavasius* Rehana and Bilqees., 1973 recovered from *Mystus cavasius* *R. hingoli* Kakar and Bilqees., 2007 recovered from fish *Cyprinion milesi*, *R. kharani* Kakar et al., 2006 recovered from *Labeo gedrosicus*, *R. meavesicula* Kakar and Bilqees, 2007 recorded from *Schizocyprus brucei*, *R. milesi* Kakar and Bilqees, 2007 recovered from *Cyprinion milesi*, *R. magnavesicula* Kakar and Bilqees, 2008 reported from fish *Schizocyprus brucei*, *R. megasacculata* Ghazi and Rahim, 1999 recorded from fresh water fish *Birlius vagra*, *R. milesi* Kakar et al., 2008 recorded from *Cyprinion milesi*, *R. pakistanica* Kakar et al., 2012 recovered from fish *Cyprinion watsoni*, *R. uvaginus* Kakar and Bilqees, 2007 recovered from fish *Tor putitora*, *R. nushkiai* Kakar and Bilqees, 2007 recorded from the fish *Cyprinion milesi*, *R. watsoniai* Kakar and Bilqees, 2007 recovered from the fish *C. watsoni*, *R. indusi* Soofi et al., 2017 recorded from intestine of *Rita rita*, *R. bifidum* Kakar and Bilqees, 2007 recorded from fish *Tor putitora*, *R. mujibi* Kakar and Bilqees, 2009 was reported from *Tor putitora*, *R. bilqeesae* Naqvi et al., 2014 recovered from the small intestine of *Labeo rohita*, *R. haspani* Kakar et al., 2014 recovered from the intestine of a fish *Cyprinion watsoni*, *R. spatulatum* Kakar and Bilqees, 2016 recovered from the intestine of *cyprinid fish*, *R. chanawensis* Zaidi and Khan, 1975 from *Eutropiichthys vacha*, *R. magna* Khan and Yaseen, 1969 recovered from the intestine of *Rita rita*, *R. megasacculata* Ghazi, et al., 1999 recovered from the stomach of *Brilurus vegra*, *R. sindhicus* Soofi et al., 2020 recovered from *Rita rita*, *R. spinicauda* Kakar et al., 2012 reported from the *Tor putitora*.

Table 1. Comparative Morphometric characteristics of present species with other species of genus *Rhabdochona* Railliet, 1916.

Species	Present Specimen		<i>R. sindhicus</i> Soofi <i>et al.</i> , 2020		<i>R. Spatulatum</i> Kakar and Bilquees, 2016	
Host	<i>Rita rita</i>		<i>Rita rita</i>		<i>Tor putitora</i>	
Locality	Pakistan		Pakistan		Pakistan	
	Male	Female	Male	Female	Male	Female
Body length	11.5-16.3	17.5-22.9	9.121-10.167	38.081-43.020	4.2-4.6	5.3-6.1
Teeth	10	10	8	8	--	--
Prostom	0.031-0.037x 0.039-0.042	0.132-0.176x 0.088-0.165	0.01-0.04x 0.006-0.008	0.064-0.069 x0.04-0.06	0.002-0.004x 0.004- 0.006	0.002-0.003x 0.007- 0.009
Muscular esophagus	0.32-0.38x 0.027-0.09	0.92-0.96x 0.09-0.1	0.06-0.09x 0.006-0.007	0.288-0.380x 0.024-0.030	0.081-0.086x 0.004-0.005	0.079-0.085x 0.005-0.009
Glandular esophagus	0.84-0.9x 0.1- 0.011	1.49-1.56x 0.15-0.18	0.288-0.380x 0.024-0.030	0.06-0.09x 0.006-0.007	0.198-0.227x 0.021-0.024	0.194-0.212x 0.02-0.03
Large spicule	1.27-1.29	--	0.03-0.06 x 0.004-0.008	--	0.345-0.383x 0.014-0.017	--
Small spicule	0.462-0.472	--	0.022-0.040x 0.016-0.020	--	0.078-0.083 x 0.018-0.025	--
Vulva	--	9.0-12.08	--	0.012-0.015x 0.028-0.030	--	0.041-0.045x 0.02-0.03
Eggs	--	0.078-0.081x 0.066--0.067	--	0.04-0.07x 0.088-0.090	--	0.016-0.037x 0.011-0.021

Table 2. Morphometric Comparison of present species with closely related species of genus *Rhabdochona* Railliet, 1916.

Species	Present specimen		<i>Rhbdochona bilqeesa</i> Naqvi <i>et al.</i> , 2014	
Host	<i>Rita rita</i>		<i>Labeo rohita</i>	
Locality	District Naushahro Feroze , Sindh		District Thatta, Sindh	
	Male	Female	Male	Female
Body length	11.5-16.3x0.15-0.16	17.5-22.9	10.4-15.6 x 0.1-0.12	16.24 – 22.64
Teeth	10	10	10	10
Nerve ring, Deirids. Excretory pore	Not observed	Not observed	Not conspicuous	Not conspicuous
Prostom	0.031-0.037x 0.039- 0.042	0.132-0.176x 0.088- 0.165	0.0290.034x 0.036-0.039	0.12 – 0.16 x 0.08 – 0.15
Mesostom	0.165-0.187 x 0.016-0.018	0.341-0.66	0.15 –0.17 x 0.014 – 0.016	0.31 – 0.60
Muscular esophagus	0.32-0.38x0.027- 0.09	0.92-0.96x0.09-0.1	0.22-0.25x0.025- 0.08	0.79 – 0.82 x 0.08 – 0.09
Glandular esophagus	0.84-0.9x0.1-0.011	1.49-1.56x 0.15- 0.18	0.34-0.4x0.09 - 0.095	1.45 – 1.50 x 0.12 – 0.14
Large spicule	1.27-1.29	--	1.20 – 1.22	
Small spicule	0.462-0.472		0.42 – 0.43	
Vulva		9.0-12.09		8.19 -12.06
Eggs	--	0.078-0.081 x0.066- -0.067		0.071 – 0.074

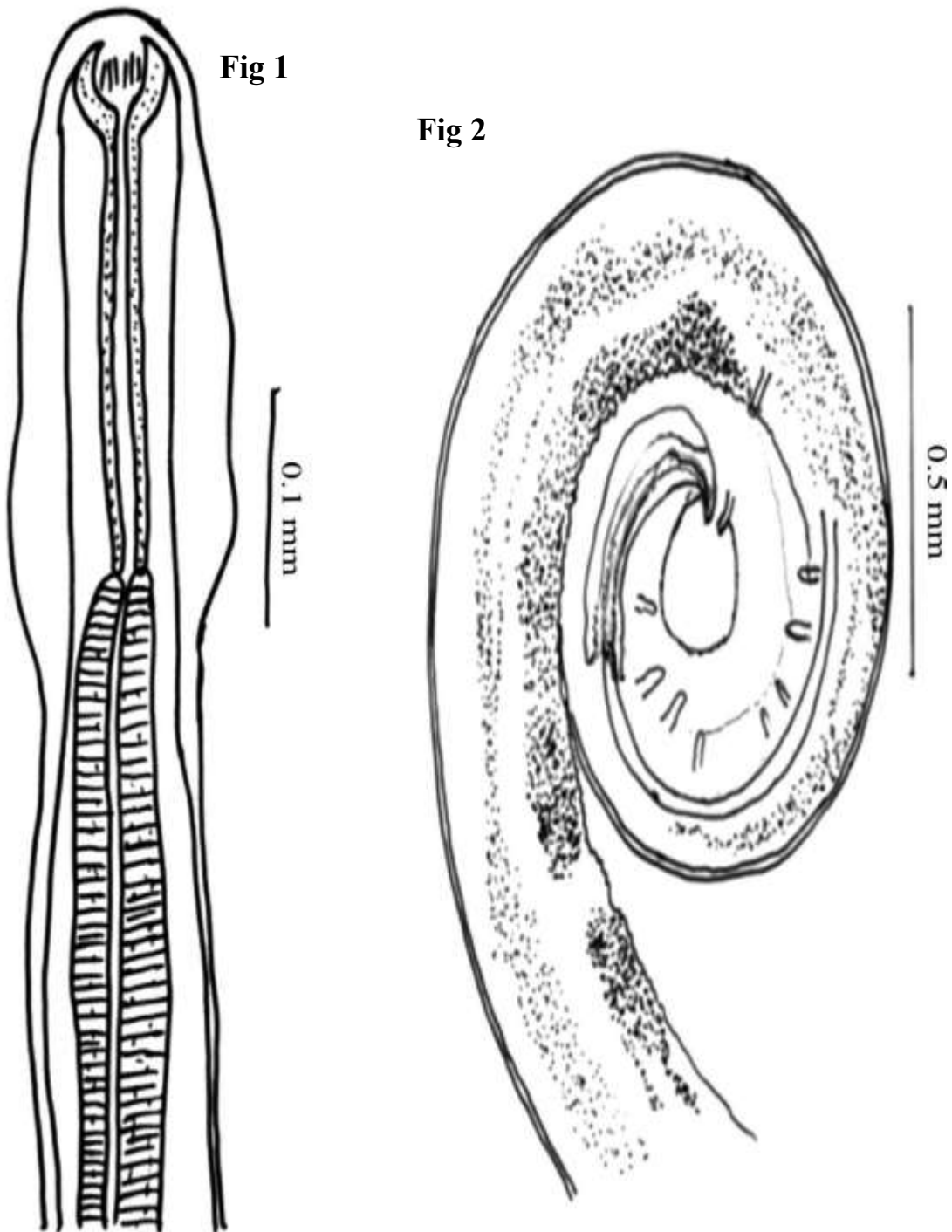


Fig. 1. *Rhabdochona bilqeesae* Naqvi et al., 2014 Line drawing of lateral view of male anterior region.
Scale bar: 0.1mm

Fig. 2. *Rhabdochona bilqeesae* Naqvi et al., 2014 Line drawing of lateral view of caudal region of male.
Scale bar: 0.5mm

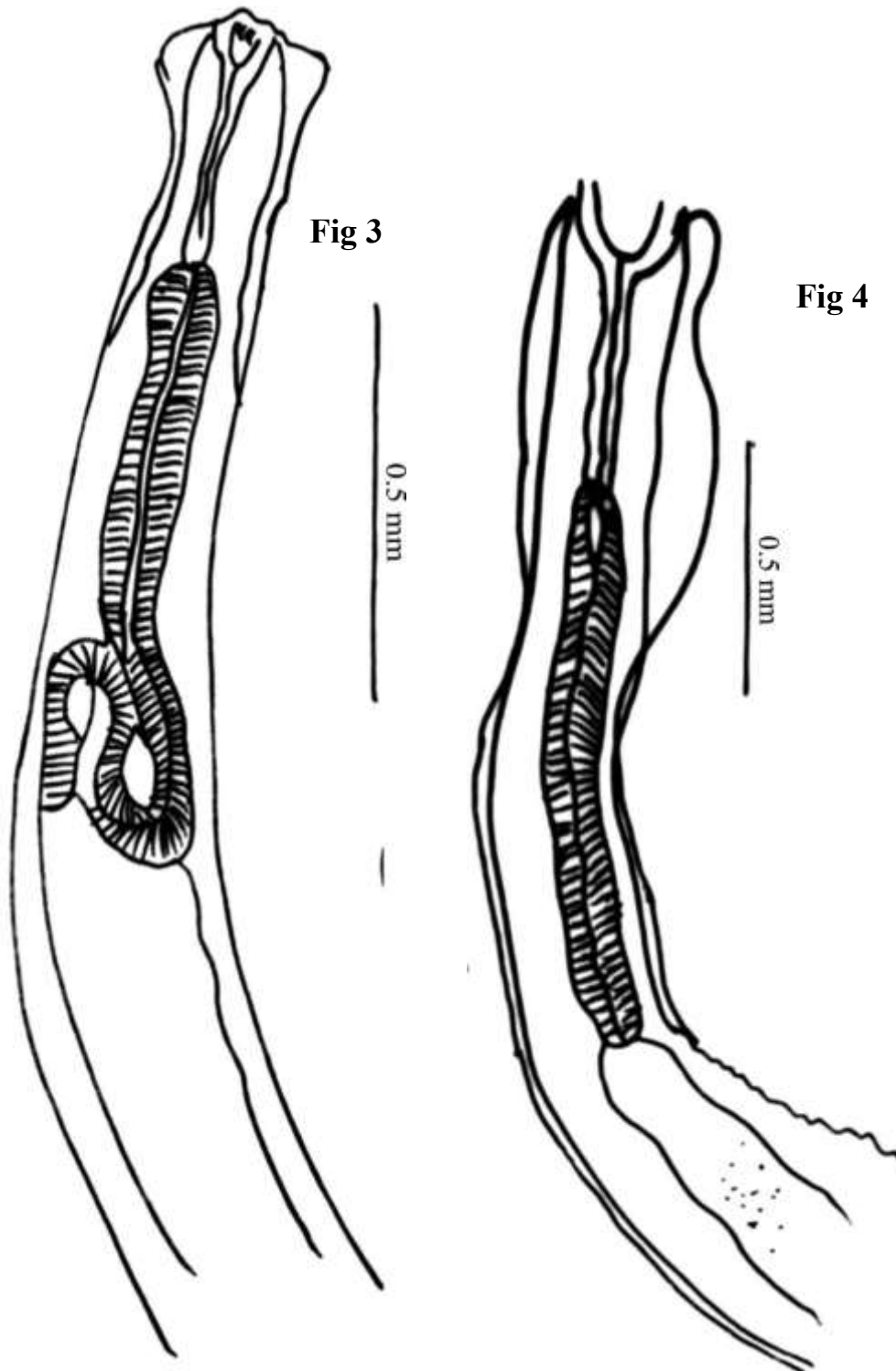


Fig. 3. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Line drawing of male anterior region shows cephalic alae
Scale bar: 0.5mm

Fig. 4. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Line drawing of female anterior region, lateral view shows large cephalic and cervical alae
Scale bar: 0.5mm

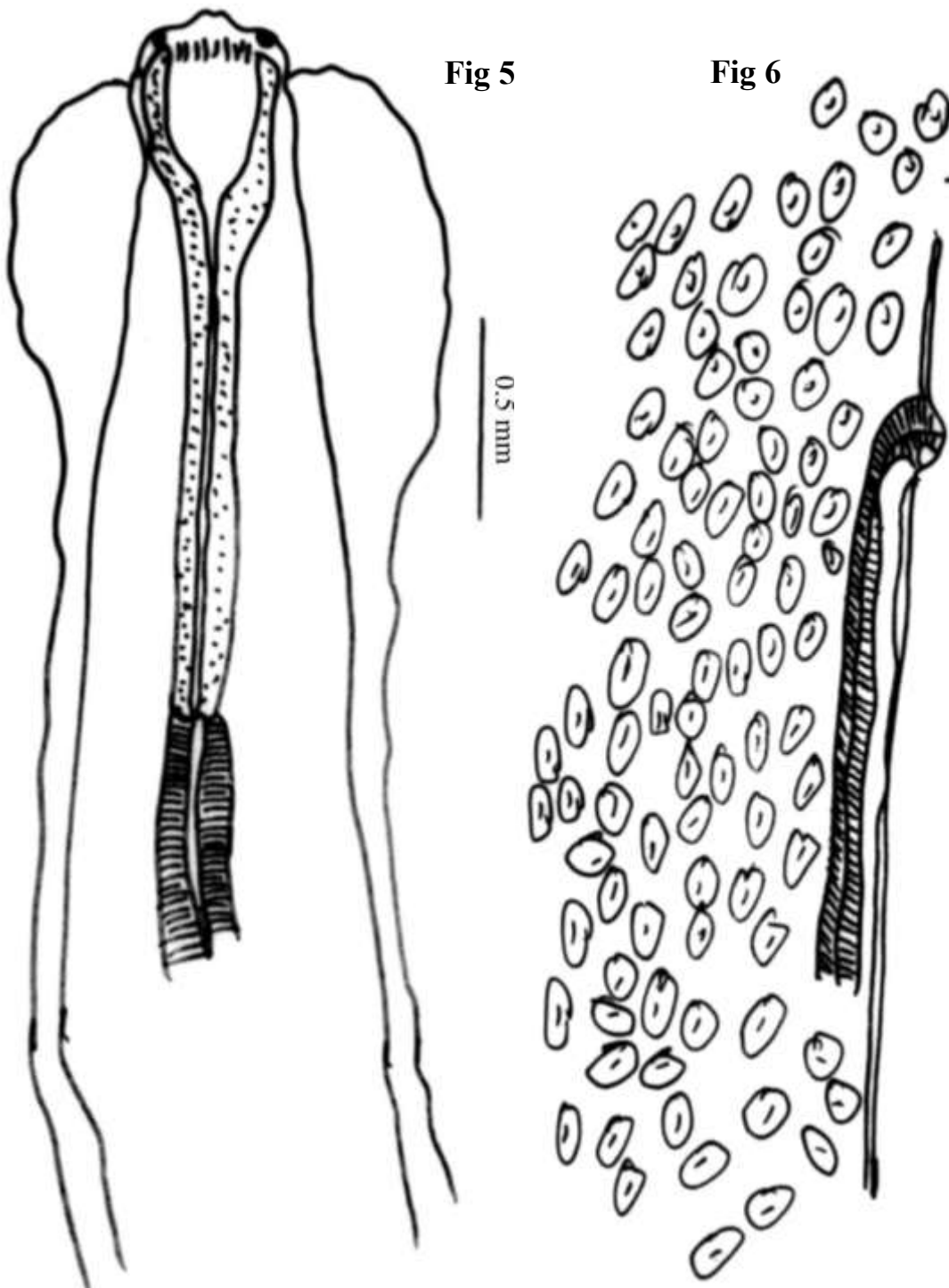


Fig. 5. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Line drawing of lateral view shows, prostom, mesostom and small cephalic alae
Scale bar: 0.5mm

Fig. 6. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Line drawing of vulva region, uterus with eggs.

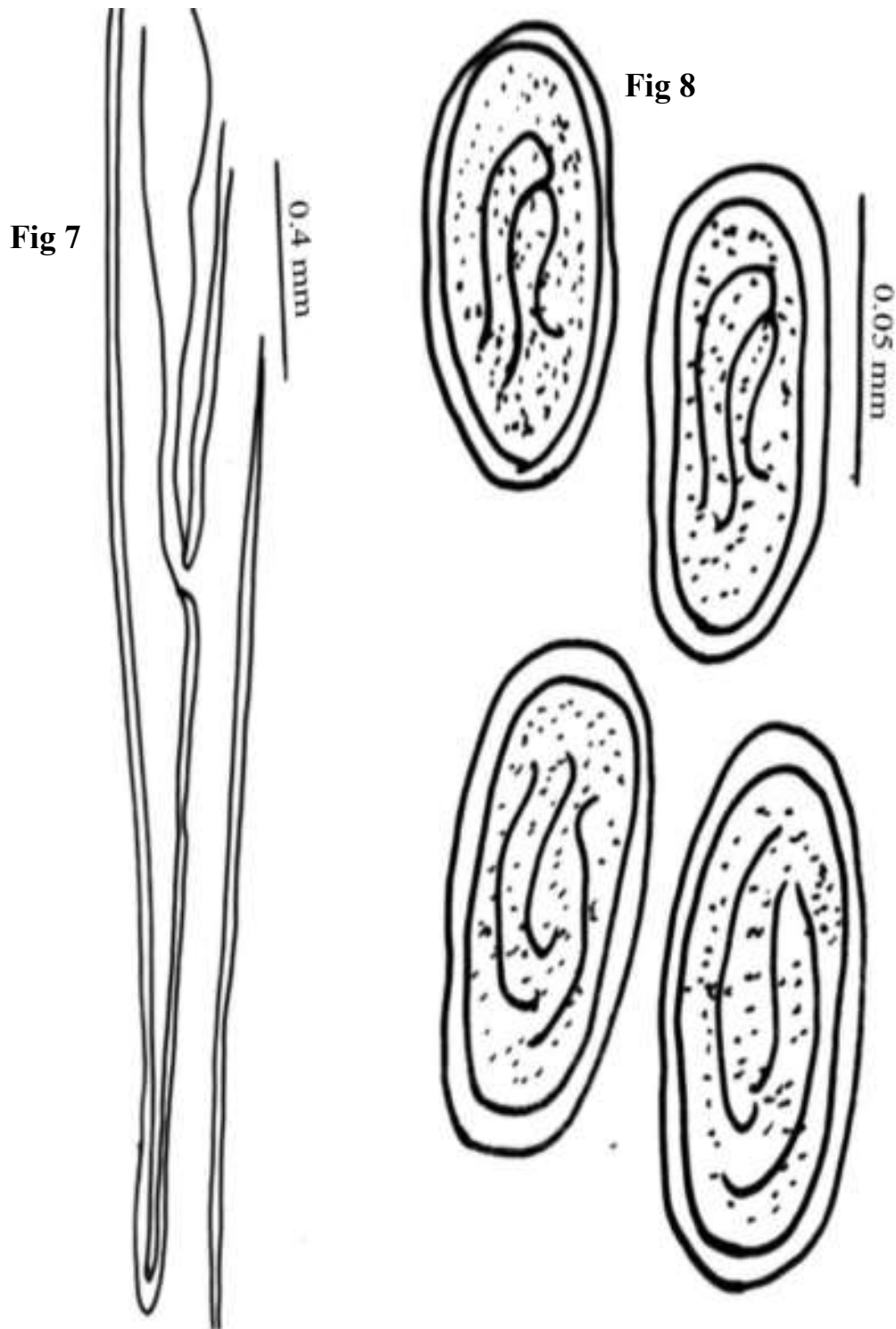


Fig.7. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Line drawing of female caudal region.
Scale bar: 0.4mm

Fig. 8. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Line drawing of embryonated eggs
Scale bar: 0.05mm

Fig 9**Fig 10**

Fig. 9. Photograph of *Rhabdochona bilquesae* Naqvi et al.,2014, Male anterior lateral view. (10X)

Fig. 10. *Rhabdochona bilquesae* Naqvi et al., 2014, Caudal region of male, Photograph 5x20

Fig 11



**Fig. 11. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Anterior region of female
Photograph 10x**



Fig 12

**Fig. 12. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Female vulva region and uterus with embryonated eggs.
Photograph**

Fig 13**Fig. 13. *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 Female caudal region with pointed tip.**

Present specimens are compared with some species reported from Pakistan. Present specimens are different from *Rhabdochona kharani* Kakar *et al.*, 2006 in entire body size. The body size of present specimens measures, male (11.5-16.3 by 0.15-0.16), female (17.5-22.7 by 0.19-2.0), larger than *R. kharani* Kakar *et al.*, 2006 male (3.5-4.3 by 0.2-0.4), female (8.5-9.2 by 0.025-0.027). The prostom is funnel shaped and measured by size, male (0.031-0.037 by 0.039-0.042), female (0.132-0.0176 by 0.088-0.165) where as prostom of *R. kharani* Kakar *et al.*, 2006 measures male (0.020-0.021), female (0.020-0.022). Present specimens possess 10 prostomal teeth while *R. kharani* Kakar *et al.*, 2006 possess 8 prostomal teeth, mesostom size of present specimens measures male (0.165-0.187), female (0.341-0.66), larger than *R. kharani* Kakar *et al.*, 2006 measures male (0.020-0.024) female (0.022-0.025). Size of muscular esophagus and glandular esophagus of present specimens are larger as compared to *R. kharani* Kakar *et al.*, 2006. Excretory pore is not conspicuous in present specimens while excretory pore in *R. kharani* Kakar *et al.*, 2006 is pre equatorial. Two unequal spicules of present specimens are larger in size than *R. kharani* Kakar *et al.*, 2006. Present specimens contains 18 pair of caudal papillae includes 13 pairs of pre anal

papillae and 5 pairs of post anal papillae, while *R. kharani* Kakar *et al.*, 2006 posses 17-18 pairs of caudal papillae includes 10-11 pairs of pre anal papillae and 6-7 pairs of post anal papillae. Eggs size measures 0.078-0.08 by 0.066-0.067, larger than *R. kharani* Kakar *et al.*, 2006 measures 0.040-0.059 by 0.019-0.021.

The body size of present specimens are also larger than *Rhabdochona sindhicus* Soofi *et al.*, 2020 shown in Table 1. The prostom of present specimens are funnel shaped with 10 number of prostomal teeth, while *R. sindhicus* H. Soofi *et al.*, 2020 possess triangular shaped prostom with 8 prostomal teeth and smaller in size than the present specimens shown in table 3. The size of mesostom, muscular esophagus, glandular esophagus and size of spicules are also larger in present specimens than *R. sindhicus*. Soofi *et al.*, 2020, their size mentioned in the table. Present specimens shown similarity with *R. sindhicus* Soofi *et al.*, 2020 by having 18 pairs of caudal papillae composed of 13 pairs of pre anal papillae and 5 pairs of post anal papillae. Eggs size of present specimens are larger in size than the egg size of *R. sindhicus* Soofi *et al.*, 2020 shown in Table 1.

Present specimens also differs from *Rhabdochona mujibi* Kakar and Bilqees, 2009 in the number of prostomal teeth. Present specimens contain 10 prostomal teeth while *R. mujibi* Kakar and Bilqees, 2009 possess 8 prostomal teeth, variation also occurs in the pairs of caudal papillae, *R. mujibi* have 15 pairs of caudal papillae includes 9 pairs of pre anal papillae and 6 pairs of post anal papillae, while present specimens bears 18 pairs of caudal papillae includes 13 pairs of pre anal papillae and 5 pairs of post anal papillae.

Rhabdochona annai Kakar *et al.*, 2012 has smaller body size as compared to present specimens, number of prostomal teeth also varies, there are 10 prostomal teeth in present specimens while *R. annai* Kakar *et al.*, 2012 contains 8 teeth. Prostomal size also larger than *R. annai* Kakar *et al.*, 2012, size of mesostom, muscular pharynx, glandular pharynx and spicules are also larger in present specimens as compared to *R. annai* Bilqees and Khan, 2012. Present specimens also shows dissimilarity to *R. annai* Kakar *et al.*, 2012 in the pair of caudal papillae, 15 pair of caudal papillae are present in *R. annai* Kakar *et al.*, 2012 while recovered specimens possess 18 pairs of caudal papillae. The shape of eggs are similar in both *R. annai* Kakar *et al.*, 2012 and present specimens which is oval shaped but size of eggs varies in both species, Egg size in *R. annai* Kakar *et al.*, 2012 measures 0.009-0.21 by 0.005-0.012 while the egg size of present specimens measures 0.078-0.08 by 0.066-0.067. In *R. annai* Bilqees and Khan, 2012 deirids is present whereas in present specimens deirids is not present.

Present specimens are also compared with *Rhabdochona milesi* Kakar *et al.*, 2008. *R. milesi* Kakar *et al.*, 2008 is recovered from the host *Cyprinion milesi* while present specimens are recovered from the freshwater fish *Rita rita*. In present specimens deirids is absent while *R. milesi* possess deirids. There are 13 pair of caudal papillae in *R. milesi* Kakar *et al.*, 2008 which is differ from present specimens having 18 pair of caudal papillae.

Rhabdochona hingoli Kakar and Bilqees., 2007 differs from present specimens by having 6 prostomal teeth, presence of deirids and 15 sets of caudal papillae, whereas present specimens possess 10 prostomal teeth, deirids not observed and having 18 pair of caudal papillae.

The body size of present specimens are also larger than *Rhabdochona spatulatum* Kakar and Bilqees, 2016, the size of prostom, mesostom, esophagus, spicule are also larger than *R. spatulatum* shown in (Table 1). *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 shows similarity with present specimens, possess similar number of prostomal teeth, similar shape of two unequal spicules, same number of caudal papillae with slightly variation in size than present specimens shown in Table 2.

Present specimens resembles with *Rhabdochona bilqeesae* Naqvi *et al.*, 2014 in general body parts but slightly variations in body size shown in table-2. Due to the resemblance of general body parts and their position, this species is regarded as *Rhabdochona bilqeesae* Naqvi *et al.*, 2014, originally the species was recovered from *Labeo rohita* of District Thatta, Sindh, the present specimens recorded from the freshwater fish host *Rita rita* of District Naushahro feroze, Sindh Pakistan. The locality District Naushahro Feroze, Sindh, Pakistan is new and host *Rita rita* is the first record for the species.

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