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RESEARCH ARTICLE

FIRST RECORD OF *DACTYLOGYRUS RACOTORABUS* (MONOGENEA) ON *GARA GOTYLA* (PISCES, CYPRINIDAE) TO INDIA FROM POONCH RIVER AND ITS TRIBUTARIES, DISTRICT POONCH, JAMMU AND KASHMIR

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ABSTRACT

The ectoparasitic fauna of fishes of District Poonch, Jammu and Kashmir, India were studied on monthly basis for a period of two years from June 2011 to May 2013. During the period under study the specimens of monogenean *Dactylogyrus ractotorabus* Gussev *et al*., 1993 were collected from the gills of 76 infected fishes *Gara gotyla*, recorded a prevalence of 16.59. This parasite has been recorded for the first time in India from *G. gotyla*. The present communication deals with the *Dactylogyrus racotorabus* recorded for the first time in India.

INTRODUCTION

The aquatic system of Poonch district of Jammu and Kashmir state is rich in fish resources with forty fish species reported by Dutta, (2003). Fish as a group from biodiversity view point, has the highest species diversity among all vertebrate taxa. Froese and Paul (2012) have recognized 32,500 fish species in the world. Fishes are of great significance in the life of mankind as a source of food, income and employment. They are known for nutritionally rich source of protein, minerals and less saturated fat.

In India, the fish consumption demand is recording an annual growth of 3.5% and it is estimated that by 2020 the annual fish consumption demand will reach 12.70 million tons (Singh 2013). Parasites and diseases however are known to effect the palatability and availability of fish supplies (Hadfield, 2007), ultimately affecting the national economy (Chiary *et al.*, 2014) and nutritional food source. Among the fish parasites monogeneans are the most numerous ectoparasites of fish constituting the largest class of phylum Platyhelminthes. Monogeneans mainly infect the gills of fishes (Bychowsky, 1957), feeds on mucus, epithelial, cells, tissues and blood, causing different signs and symptoms (Duijn, 1973). Mechanical interference by huge number of parasites disturb the respiratory system (Eriasmas and Chapmann, 1972) resulting increased breathing frequency in fish, their gills become expended and very pale (Abul-Ameer, 2010). Many species of monogenetic flukes are found on the gills of fishes. Majority of the gill flukes belong to the family *Dactylogyridae* represented by the largest genus *Dactylogyrus*, including more than 900 species (Diorine Crafford, 2013).

The genus *Dactylogyrus* was first of all recorded from Lucknow, India by Price (1938) on *Puntius dorsalis* and described *D. moorthyi* as its type species. Subsequently, various surveys were done (Pandey & Agrawal, 2008), as on date in India the genus is represented by fifty one species viz., *D. boli* Tripathi, 1957; *D. chagunionis* Tripathi, 1957; *D. gobii* Tripathi, 1957; *D. kontii* Tripathi, 1957; *D. sarani* Tripathi, 1957; *D. cauveryi* Tripathi, 1959; *D. gussevi* Jain, 1959; *D. orientalis* Jain, 1959; *D. cirrhini* Jain, 1960; *D. glossogobii* Jain, 1960; *D. anchoracanthus* Kulkarni, 1970; *D. pedunculatus* Kulkarni, 1970; *D. pharyngocephalus* Kulkarni, 1970; *D. angularis* Gusev, 1976; *D. barbi* Gusev, 1976; *D. brevicardus* Gusev, 1976; *D. brevitignus* Gusev, 1976; *D. brevitubus* Gusev, 1976; *D. bucinus* Gusev, 1976; *D. chitravanshii* Gusev, 1976; *D. crucitrabus* Gusev, 1976; *D. dubii* Gusev, 1976; *D. lohanii* Gussev, 1976; *D. longiacus*

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Gusev, 1976; *D. magnicordus* Gusev, 1976; *D. mrigali* Gusev, 1976; *D. parvianchoris* Gusev, 1976; *D. speciosus* Gusev, 1976; *D. sphyrnoides* Gusev, 1976; *D. spinitubus* Gusev, 1976; *D. subtilis* Gusev, 1976; *D. tori* Gusev, 1976; *D. vicinus* Gusev, 1976; *D. varicorhinoides* Gusev, 1976; *D. indicus* (Jain, 1957) Gusev, 1976; *D. hyderabadensis* (Kulkarni, 1972) Gusev, 1976; *D. chauhanus* Gusev and Musselius, 1976; *D. kalyanensis* Musselius and Gusev, 1976; *D. labei* Musselius and Gusev, 1976; *D. calbasi* (Jain, 1957) Gusev, 1978; *D. cotius* (Jain, 1957) Gusev, 1978; *D. lali* (Jain, 1960) Gusev, 1978; *D. tetraradiatus* (Kulkarni, 1970) Gusev, 1978; *D. fotedari* (Jain, 1960) Gusev, 1978.; *D. circumphallus* Venkatanarasaiah, 1981; *D. macrogaster* Venkatanarasaiah, 1981; *D. manairensis* Venkatanarasaiah, 1981; *D. molnari* (Ergens et Dulma, 1969) Kumar and Kumar, 2013; *D. vastator* (Nybelin, 1924) Kumar and Kumar, 2013 and *D. daniconi* (Raziabeevi and Radhakrishnan, 2010) Shini *et al.*, 2015. The Indian aquatic system is very rich in fish diversity so, many more surveys of ectoparasitic fauna of fishes are needed to recognize more and more species and information regarding them. The present communication deals with the recorded *Dactylogyrus racotorabus* for the first time in India.

MATERIAL AND METHODS

District Poonch of Jammu and Kashmir state falls between 32°17′ – 37°05′ north latitude and 72°31′-80°20′ east longitude, Poonch River and its tributaries constitutes the major part of the District wetland. Poonch River, Mendhar Nallah, Suran Nallah and Bettar Nallah were scanned from June 2011 to May 2013 for the ectoparasitic fish fauna. Live fishes were collected and transported to the temporary laboratory set at Poonch. In the laboratory the fishes were pithed, smear from gills and skin was made, gills were cut out through the edges and examined for ectoparasites. The parasites were collected under stereo-microscope, then placed on slide, and preserved under the cover slip in glycerine. All measurements were recorded in µm according to Gussev (1985), Kritsky and Boeger (2002), by using micrometer. Drawings were made by using camera lucida. Microphotography of parasites was done by using DP_{25} digital camera. Parasites were identified microscopically according to Gussev (1985).

RESULTS AND DISCUSSION

Dactylogyrus racotorabus Gussev *et al.*, 1993

A study for the ectoparasitic fauna of the fishes of Poonch district was conducted from June 2011 to May 2012 and the fish hosts *Gara gotyla* were found harbouring a monogenean species belonging to the genus *Dactylogyrus*. On subsequent studies, the worms were identified as *Dactylogyrus racotorabus* Gussev *et al.*, 1993. The specimens of *D. racotorabus* were collected from 76 cyprinid fish hosts recording an overall prevalence of 16.59, with highest infestation 50% in July and lowest 10% in the month of October, January and February.

D. racotorabus was first of all reported by Gussev *et al.*, 1993 from the gills of *Gara rufa* Heckel, 1843 from River Dez, Tigris-Euphrates Basin, Iran. *D. racotorabus* is re-described herein and the re-description is based on morphological and micrometric observations.

Description

The worms have an elongated body with well developed and distinct haptor. The cephalic lobes are distinct and prohaptor bears four eye spots. Body measure 174-410.76 in length, 29.3-79.2 in width. The pharynx is spherical measuring 11.2x9.2. The haptor measures 39.1-63.5 in length and 46.9-63.5 in width. The armature of haptor consists of a pair of anchors, a dorsal bar and seven pairs of marginal hooks (Fig. 1). Anchors are thin 22.7-34.5 length, with a long straight inner root measuring 9.4-4.2 long. The outer root measures 1.5-1.9 long. The shaft is wider at the base and narrower towards the curved point, it is 15.7-23.7 long. The recurved tip is short measuring 4.8-9.5. Dorsal transverse bar is almost straight single rod with rounded enlarged ends, measuring 12.6-17.8 in transverse length and 1.8-3.0 in longitudinal width. A single oval shaped egg found in the middle portion of the body of some specimens. The male copulatory complex is sclerotised, the copulatory tube (44.4-5.3 long) has a buble like expanded base 4.9-7.8 in diameter from which a narrow tube reflexes abruptly and runs as an attenuated tube with a terminal fork like truncated end. The accessory piece (22.9-31.2 long) is also sclerotized straight rod running from the basal expanded region upto the truncated end of copulatory tube.

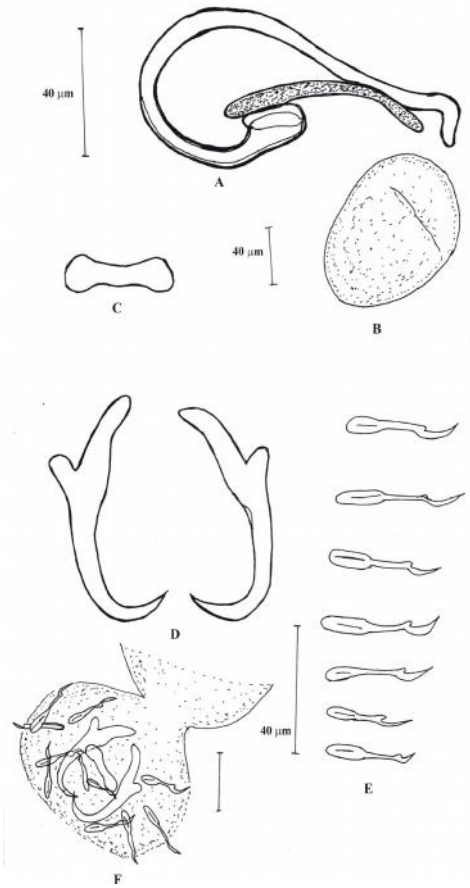

Fig. 1 *Dactylogyrus racotorabus* Gussev *et al.*, 1993. A. Copulatory organ; B. Egg; C. Dorsal bar; D. Anchors and E. Marginal hooks, F. Haptor with armature.

Table1 Comparative measurements of *Dactylogyrus racotorabus* Gussev *et al.*, 1993.
All measurement given in µm.

Body feature	Gussev *et al.*, 1993	Present specimen
Length	400	174 - 410.76
Width	85	29.3-79.2
Pharynx	-	11.2x9.2
Haptor	-	39.1-63.5 x 46.9-63.5
Anchor Total length	36	22.7-34.5
Inner root	15	9.4-14.2
Outer root	1	1.5-1.9
Shaft	24	15.7-23.7
Recurved point	10	4.8-9.5
Dorsal bar	2 x 18	1.8-3.0 x 12.6-17.8
Total length	15-22	9.7-21.3
Marginal hooks Ist	-	11.2-16.3
IInd	-	7.7-13.9
IIIrd	-	10.6-14.0
IVth	-	9.7-15.3
Vth	-	11.8-18.1
VIth	-	14.1-21.3
VIIth	-	12.8-19.4
Copulatory complex	60 x 2-2.5	44.4-58.3
Base of copulatory tube	8	4.9-7.8
Accessory piece	-	22.9-31.2

DISCUSSION

Workers like Jalali and Molnar, 1990a, Jalali and Molnar, 1990b; Jali, 1992; Molnar and Jali, 1992, Gussev *et al.*, 1993; Jali *et al.*, 1995 has made remarkable contribution in the studies of monogenea from Iranian fishes. They have described several new species of Dactylogyrids and divided the freshwaters fishes and their monogenean parasites of Iran in three different regions viz. Palaeartics; Mesopotamiam and Indian faunal region (Jalali *et al.*, 1995). The monogeneans recovered by Jalali and Molnar (1990a,b) from Northern Iran corresponds to those described by Gussev (1985) from Soviet territories of Ponto-Arab-Caspian the zoogeographic region of Palaeartics.
The *Dactylogyrus racotorabus* of Iran has been correlated to the Dactylogyrid fauna of Palaeartics region, the Wegeneri group (Gussev, 1985) but it differs in the shape of accessory piece of copulatory organ, structure of anchors with gradual transition from the shaft to the point.

The morphometric characteristics of *D. racotorabus* as given by Gussev *et al.*, (1993) fall well within the range of present specimens (Table 1). With the major similarities of parasite described from Iran with the present specimens under discussion from Indian sub-continents it is evident that the Iranian *D. racotorabus* is in close correlation with the Indian monogenoids but not to that of the Palaeartics region.

CONCLUSION

Gara gotyla is the new host record for *D. racotorabus* being recorded for the first time in Indian freshwater of District Poonch, Jammu and Kashmir, state. To the best of our knowledge regarding Indian freshwater fish parasites fauna, no record could be found regarding the *D. racotorabus.* In the sense of recognition of *D. racotorabus* as an Indian monogenoid, present research is of great important in the field of parasitology.

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