INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print) 2222-5234 (Online)
http://www.innspub.net
Vol. 17, No. 1, p. 223-231, 2020

RESEARCH PAPER OPEN ACCESS

Tanaisia bragai Santos, 1934 (Eucotylidae: Tremaroda): A new host from kidney of (*Turdoides striata*, 1823 Leiothrichidae) at Sindh, Pakistan

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Key words: Kidney, Naushahro Feroze, *Turdoides striata, Tanaisia bragai,* Trematodes

http://dx.doi.org/10.12692/ijb/17.1.223-231 Article published on July 30, 2020

Abstract

The current research work was conducted during the November to March, 2018-19 (winter/cold season) in response to takeout the internal visceral examination of the host bird *T. striata,* from different localities of District: Naushahro Feroze, Sindh, Pakistan. This species of social birds mostly found in association of 2-10 in groups. They are dirty in colour, strong yellow bill, less active but beneficial to agro-ecosystem to eat the insect pests but harbour diversity of parasites. A total of (n=10) host birds of Jungle babbler (Family: Leiothrichidae) thoroughly internal examination was done for the presence of the Trematode. A total of (n=48) specimens were recovered and all the hosts were found positive with digenean Trematode parasites belonging to family Eucotylidae: Trematodes were found from kidney of the host birds. The present findings of the internal examination revealed to report Jungle babbler kidney fluke *T. bragai* is a new host record. The present specimens are accredited first time from present host in Sindh- Pakistan.

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Introduction

Jungle babblers live in groups and after hatching of eggs older males and females provide parental care for new young chicks at least one and half year (Andrews and Naik, 1970). The passeriformes birds, Jungle babbler in the Indian sub-continent popularly are known as seven sisters or Saath bhai (Henry, 1903). They feed together by forming family flock, joint defence, sub-social organization and co-operative breeding in behaviour (Wilson, 1975; Srivastava, 2013).

They often form small groups frequently seen in gregarious manner, forests, cities, gardens and non-migratory in behaviour (Gaston, 1977), male bird is larger compared female with yellow bills, short wings with feathers drably in color, yellowish eyes (Mohan, 2015). *T. striata* feed nectars, fruit, seeds, barriers but commonly insect matters and their larvae (Khan *et al.*, 2010; Narang and Lamba, 1986).

Babblers first turning over leaves by hooping but commonly feed on the surface of the ground (Grimmett *et al.,* 1998). Young chicks get semi-digested food from their older parents, male birds are helper and dominant (Bharucha and Padate, 2010; Gaston, 1977), they are weak in flight, farmer-friendly and valuable for local livelihood (Bharucha and Padate, 2010) but urbanization and abundance applications of certain toxic pesticides creates a critical effect of their population growth and survival due to this reason they are not increasing their progeny much more (Laurance, 2010). Visiting birds every year migrate from Siberia through a route called Birds Migratory Route no 4/Indus Flyway Zone/ Green Route (The, Dawn, 2016).

Trematode in avian hosts especially in *T. striata* are not properly documented in Pakistan. There is strictly needed to perform a comprehensive and considerable study on it. Many scholars have used their stamina to study avian for prevalence of trematodes but none of them reported trematode of Jungle babbler in Pakistan. The main motto of this paper is to report first record of species; *Tanaisia bragai* from the host; *T. striata* in District: Naushahro Feroze, Sindh.

Material and methods

Study area

Alive host wild birds were captured by the application of different strategies and collection was made from five talukas of District: Naushahro Sindh- Pakistan. Two hosts were captured from the fertile lands of each talukas of this region. The collection was brought by the source of iron made cages to the Parasitology laboratory of Zoology, Shah Abdul Latif University Khairpur.

Dissection procedure

During the present research study, the host birds, Jungle babbler; *T. striata* a total of (n=10) host birds were disected and (n=48) specimens were recovered from the kidney of the hosts. Under laboratory conditions ethically hosts were anesthetized and necropsies by the help of few drops of chloroform placed on cotton swab. After this the hosts were placed inside dissecting try and puffy feathers were removed ventrally from anal opening to neck region. A longitudinal cut was given through fasten scissors. Each internal visceral organs were recovered with the source of scissors and forceps, kept separate in sterilized petri dishes containing a 40% NaCl solution. Specimens were examined very intensively by a source of binocular stereomicroscope and from the kidney of the all hosts trematode helminths were recovered.

Permanent slide procedure

Specimens were washed with normal saline solution and passed alcoholic series from 20% to 100% and fixed slides with thread containing specimens and poured in coplin jars for overnight after passing of one night thread was reopened again specimens was washed. For fruitful results stained with borax carmine and confirmed staining, specimens re-washed. Further comprehensive examination parasite were laid on glass slide and mounted permanently by the application of two to four drops of Canada balsam slides containing parasite covered with a cover slip.

Then slides were placed in oven box by fixing of temperature for overnight. Permanent slides were tagged left side with date of collection, locality, name of host bird and helminth. By the source of Camera Lucida diagram of the Trematode were formulated.

Formation of diagram and body measurements

The Meiji infinity 1-DK3000 camera used for photography and measurements of the all specimens were taken in millimetres (mm). The permanent slides of trematode specimens were deliberately detailed studied by the source of microscope, also help was taken from explanatory reports, available literature and key tools which were introduced by (Yamaguti, 1971; Gibson and Jones, 2008).

Statistical analysis

The data were placed in MS, excel sheet for statistical analysis, latter on imported to the analysis software to check its significant difference at ($P<0.05$) among the helminths parasites *T. bragai* appearance in the host birds through the help of analytical software SXW, 8.1 versions USA.

Results

During the research study (n=10) hosts were captured by keeping them in cages in alive conditions brought for surgical examination. Hosts were anesthetized and necropsies for prevalence of parasitism and (n=48) specimens of digenean, trematode, *T. bragai* Santos, 1934 (Fig. 1) recovered from kidney of the hosts and their brief description is given below (Table 1).

Description

The worm consist elongated body measured 2.26 x 3.39- 0.24 x 0.59 in size. The length of hindbody measured 1.59 x 2.19 forebody 0.39 x 0.89 in mm. In lateral body side caeca is situated but blind to posterior region. Oral sucker nearly rounded measuring 0.12x0.16-0.11x0.17 in diameters. Lateral posterior to the ovary posterior testes are present measure 0.8x0.1-0.5x0.6 mm whereas; posterior to ovary oval-shaped anterior testes consist 0.08x0.15-0.5x0.14 in size and 1.60 forebody 2.20 was post-testicular space.

Round shaped pharynx having 0.5x0.4-0.6x0.2 mm in diameter and from the posterior of the ovary vitellaria runs parallel but not reaches at terminal extremity. Ovary greater in size then testes which is irregular sub-median shaped consist 0.14x0.19-0.8x0.17 in size and 0.25 x 0.41 mm post caecal in shape. From the posterior point vitellaria situated at the distance of 1.58 x 0.84 in size, whereas; eggs in small-sized comprising 19 x 27-14 x17 micrometers.

Systematic status of Tanaisia bragai Santos, 1934

Family: Eucotylidae Skrjabin, 1924

Fig.: 1A-C, Table. 1

Genus: *Tanaisia* Skrjabin, 1924

Infection site: Kidney

Host: *Turdoides striata*

Locality: Naushahro Feroze

No. of host found positive: 10

No. of specimen: 48

Record: New host record

Remarks

Eucotylidae family was introduced by (Cohn, 1904) and reported trematode from the kidney and urinary bladders of the avian; *T. bragai* (Santos, 1934) was recovered from urinary tract of *L. swainsoni, Q. quiscula aeneus* and *S. aurocapillus* at Virginia, Texas, and Georgia, having closely similarity with present specimens on the basis of muscular pharynx, body composition, shape of oral suckers, caecal position, uterus, shape of ovary and testes and shape of eggs. *T. fedischenkoi* Skrjabin, 1924 is the type species. It is commonly reported from Passeriformes especially, *C. vociferus, E. carolinus, T. fedischenkoi* also collected from numerous birds including, *S. tringa, F. atra, Oxtenchus, E. scarolinus, Larus, C. ossifragus, Corvus, G. chloropus, Chettusia, Charadrius, Chroicocephallus, R. rocifers, Hydrochelidon, C. mesamexicanus, G. Phalaropus, Numenius, Himantopus, Pedoceps, Childonias, Capella delicate, Phalacrocorax, Planurus, Rallus, Ardea* and *G. delicat* at USA (Byrd and Denton, 1950), respectively described in (Table 1).

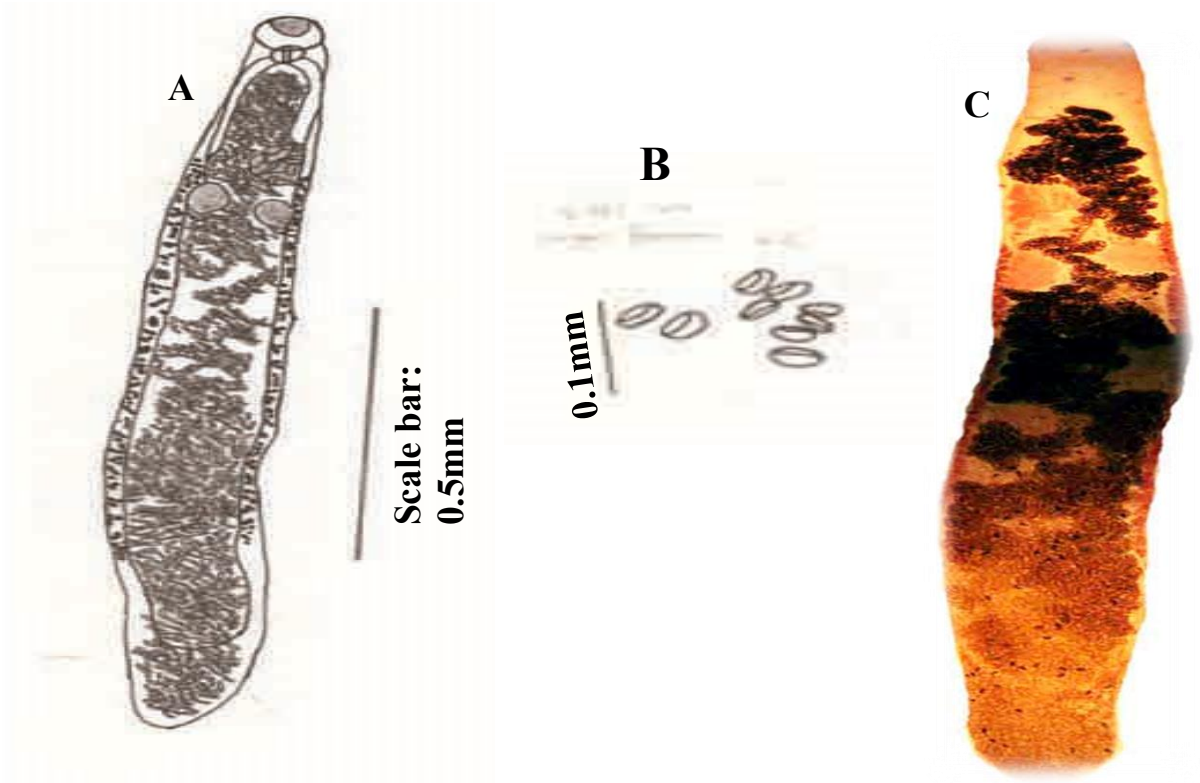

Fig. 1. *T. bragai;* **A.** Worm entirely; **B.** Eggs; **C.** Entire specimen photograph. Scale bar: **A.** 0.5mm and **B.** 0.1mm.

Many other species of *Tanasia* genus are also documented from several host birds; *T. zarudnyi* (Skrjabin, 1924) reported from *P. erythrophthalmus erythrophthalmus, H. guttata, C. americana americana, C. cristata florincola, P. erythrophthalmus canaster* and *Z. albicollis* at Virginia, Florida, North Carolina and Texas; *T. karachiensis* (Begum *et al.,* 1997) from *C. splendes* hosts; *T. inopina* (Freitas, 1951) reported from kidneys of *P. domestica* and *C. jopinaca,* in Brazil, *T. manchhari* (Birmani, 2011) at Sindh from kidney of *F. atra; T. fedtschenkoi* (Skrjabin, 1924) urinary tract of many host, *F. atra, O. vociferus vociferus, Ardea, C. delicate, Phalacrocorax, E. carolinus, Pedoceps, C. ossifragus, Phalaropus, C. mesamexicanus, Planurus, G. chloropus cachinans, Hydrochelidon, Oxyenchus, Chroicocephallus, R. rociferus, Charadrius, C. delicate, Chettusia, Euphaguscarolinus, Corvus, Numenius, Rallus, Tringa, Himantopus, Gelochelidon, Sterna, Childonias* and *Larus at* Georgia, Florida and Texas; *T. longivittellata* Shtrom (Skrjabin, 1947) recovered from kidney of *S. hirundo*is, *P. bailloni, F. atra and P. porzana,* of Poland, Russia, Slovakia and Siberia; *T. angusta* (Franco, 1965) of Brazil recovered from *M. maculates* and *Pardirallus*; *T. integerriorcha* (Saidov, 1954) at Primorskii Krai, Dagestan of Russia from host birds *C. hiaticula, S. hirundo, C. hybris* and *C. nigra*; *T. dubia* (Feritas, 1951) from Brazilian host *T. melanolecua*; *T. serrata* (Szidat,1961) at Buencs Aries reported from host *F. leucoptera*; *T. macrorchis* (Yamaguti, 1942) from *C. gallinago* at Manchuria; *T. validas* (Freitas, 1951) at Columbia form the host *C. wilsonia*; *T. atra* (Nezlobinsky, 1926) of Georgia, Louisiana, USA recovered hosts form *P. gallinules, F. americana americana, C. mesamexicanus gallinules, A. Phoenicus,* and *R. elegans;T. Pelidnae* (Cheatum, 1938) At North America form the host *P. alpine sakhalina* and *T. elliptica* (Nezlobinski, 1962) of Yugoslavia, Bulgaria and Mecedonia from the body cavity of the host birds *P. pica* and *H. nigra*. All above reported species of worms certain morphological differentiation of present species.

Table 1. *Tanasia* species comparatively measurements and morphological appearance under laboratory conditions during, 2018-19.

Name of parasite	*T. atra*	*T. karachiensis*	*T. inopina*	*T. bragai*	*T. fedtschenkoi*	*Tanasia bragai*
Host	American coot	House crow	Japanese quail	Common grackle	Rusty blackbird	Jungle babbler
Locality	U.S.A	Karachi	Brazil	U.S.A	U.S.A	Nuashahro Feroze
Body	0.92 x 1.25 -0.15 x 0.27	3.2 x 3.7 - 0.07 x 0.09	1.3 x 1.9 - 0.23 x 0.45	1.62 x 2.55 - 0.32 x 0.53	1.62 x 3.46 - 0.41 x 0.71	2.26 x 3.39- 0.24 x 0.59
Oral Suckers	0.08 x 0.10 - 0.10 x 0.15	0.22 x 0.24 - 0.34 x 0.36	0.1 x 0.2 - 0.18 x 0.21	lo.13 x 0.20 - 0.14 x 0.20	0.13-0.22 x 0.17-0.29	0.12 x 0.16 - 0.11 x 0.17
Pharynx	0.02 x 0.04 - 0.03 x 0.05	0.1 x 0.11 - 0.13 x 0.15	0.03 x 0.05 - 0.06 x 0.08	0.04 x 0.08 - 0.06 x 0.09	0.05 x 0.09 - 0.08 x 0.14	0.5 x 0.4-0.6 x 0.2
Anterior tests	0.04 x 0.06 - 0.03 x 0.05	0.24 x 0.26 - 0.23 x 0.26	0.09 x 0.15 - 0.10 x 0.12	0.09 x 0.15 -0.07 x 0.15	0.15 x 0.29 - 0.10 x 0.21	0.8 x 0.15-0.5 x 0.14
Posterior tests	0.04 x 0.06 - 0.03 x 0.05	0.19 x 0.22 - 0.18 x 0.21	0.13 x 0.15 - 0.09 x 0.12	0.09 x 0.18 - 0.08 x 0.15	0.13 x 0.30 - 0.10-0 x 22	0.8 x 0.1-0.5 x 0.6
Eggs	22 x 34- 15 x 19	38 x 39 -25 x 27	31 x 35 x 34 x 37	30 x 34-16 x 22	33 x 38 - 10 x 19	19 x 27-14 x 17
Vitellaria	Present but shorter	Present larger	Present short	Present acrch like	Present but larger	Present but lobed like
Ovary	Sub-median 0.10 x 0.13	Lobed	Lobed	Sub-median 0.20 x 0.19	Deeply lobed 0.28 x 0.27	sub-median 0.14 x 0.17
Testes	Oblique	Sloping	Transverse	Oblique	Asymmetrical	Oblique, oval
Caeca	Simpler	Tapered	Narrow posteriorly	A little dilate	Undulate	Slightly simple
Ventral suckers	Not present	Missing	Lacking	Not found	No appeared	Un observed
Post testicular space	Small	Short	Smaller	Uneven	Shorter	Shorter

Prevalence of digenea trematode; Tanaisia bragai Santos, 1934 in T. striata

Present research on helminth parasite of *T. striata* conducted during the month of November 2018 to March 2019. In the present research, study birds were captured and brought them in laboratory for dissection purpose and internal visceral examination to find out the parasitic burden in present host birds. After all internal visceral examination it was noted that all host birds harbor helminth parasites trematodes and show clinical signs but prevalence of worm record at variations in consequents months during study. It was observed that in hot season of the year parasite severely infect to their host and found at high intensity, every month (n=2) host birds were necropsied and examined but highest burden in the month of March (n=21) specimens from two hosts followed in November, (n=12), February, (n=7), December, (n=5) and January (n=3) respectively. *T. bragai* in present investigation overall 9.6 mean. For statistical analysis, data were placed in the MS, Excel, and analysis of variance shows (P> 0.05) difference and help was taken SXW, 8.1 version USA. The specimens morphologically show similarity in all characteristic features, hence identified as such and *T. striata* is first host record for present species at Naushahro Feroze, Sindh (Fig. 2).

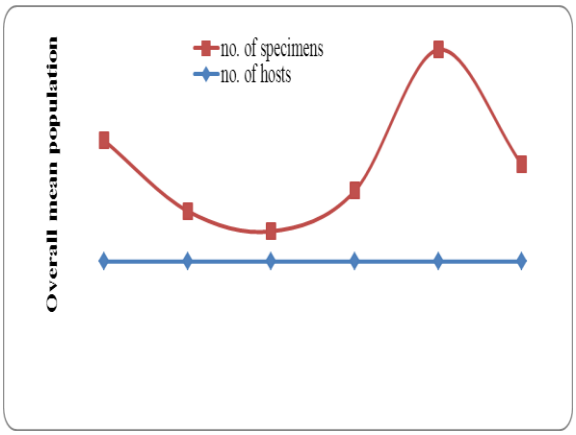

Fig. 2. Montly prevalence of *T. bragai* from *T. striata* under laboratory conditions.

Discussion

Jungle babbler are dull birds, weak in flight, dirty colored, only can fly at few distance and non-migratory (Sascnyanga, 1982) but being an insectivorous feeding behavior they are beneficial for crops and they can hunt variety of plant pests but in spite of that these birds severely harmed by many

species of helminth parasites. During present work a total of (n=10) birds were dissected and (n=48) specimens of trematode recovered from kidney and all of these identified as *Tanasia bragai* which is already reported from several species of passerine. Many species of the genus *Tanaisia* Skrjabin, 1924 is reported from various avian hosts from many localities belongs to Eucotylidae family and these worm widely attack kidney to their hosts (Kanev *et al.,* 2002; Olson *et al.,* 2003) and cause renal failure and nephritis in intestine to their hosts (Luppi *et al.,* 2007). Specimens which were collected from the present host on the basis of round shaped oral suckers and pharynx, irregular median shaped ovary, larger oval-shaped tests posterior to the ovary, posterior blindly caeca, vitellaria, post caecal space and shape of the eggs resembles totally with already identified species *Tanaisia bragai* Santos, 1934.

The appearance of parasite in present study with the agreement work of (Byrd and Denton, 1950) who examined more than one hundred different species of birds belonging different families and orders and documented four species of *Tanasia* trematode namely; *T. atata, T. fedtschenkoi, T. zaradnyi* and *T. bragai* and discussed morphological features of these species. (Fotedar and Raina, 1965) reported *P. dubois* from *M. migrans* of Kashmir, (Jaiswal *et al.,* 1971) documented *P. singhi* n. sp. form *D. javanica* and *D. autumnalis* birds of India (Carney, 1972) reported *B. stunkardi* from the gall bladder of *N. columhiana* at Montana (Jaiswal and Humayun, 1973) recorded *E. centropius* n. sp. from *C. sinensis* in India (Rind, 1974) disected various species of fresh water birds of New zealand and recovered *Strigeidae, Opisthorchiidae, Strigeidae, Psilostomatidae, Microphallidae, Cyclocoelidae, Schistosomatidae* and *Echinostomatidae* (Fischthal and Kuntz, (1974) in Malaysia internally examined many birds and reported *A. heterolecithodes, B. attenuatum, B.sabahense, P. dogieli, B. sabahense, P. prashadi, B, api, L. bhattaaharyai, B. vitellobum, B. pycnonoti* and *L. malaysiae* (Fischthal and Kuntz, (1973) documented trematodee of Palawan island birds, *L. philippinense, Lyperosomum*. spp., *L. palawanense, Brachylaimid* spp., *B. palawanense, Z. philippinensis, B. philippinense, L. ducidae* and *L. palawanense* (Forrester *et al.,* 1974) dissect host birds *G. Canadensis tabida* at Florida and recovered *O. jolliei* and *T. grusi* trematodes (Bilqees and Khan, 2005).

E. nickoli from intestine of *Corpodacus* sp. (Bilqees and Khan, 2006) disected *M. migrans* and recovered *O. jonesae* trematode (Dharejo *et al.,* 2006, 2007) recovered *P. macrovesiculm* n.sp and *Paramonostomum* worm from *F. atra,* and host *A. grayii* trematode *E. mohinochasmus* (Birmani *et al.,* 2008) *F. atrae* of Manchar lake disected and recovered *E. atrae* (Channa *et al.,* 2009) documented *E. jamshorensi* trematode from host *A. grayii* (Das and Ghazi, 2010) reported *P. mujibi* n.sp. host *E. alba* of Karachi (Akramova *et al.,* 2011) from birds of Uzbekistan reported *D. loossi* trematode (Shuvajit *et al.,* 2012) from *T. striata* host *Z. sanglaensis* n. sp. recovered (Ghazi *et al.,* 2013) documented trematode from *A. crecc* L. of Karachi and recovered *P. bilqeesae* n. sp. (Prastowo *et al.,* 2014) dissected *Columbidae* of Indonesia and reported *P. bragai*. The available documentary of helminth parasites indicates that *T. striata* have not been examined for the presence of parasite there is only one available report of (Shuvajit *et al.,* 2012) they documented *Z. sanglaensis* n.sp. from same host at Himachal Pradesh, India. Therefore; present species is identified as; *T. bragai* on the morphological similarity, comprehensive microscopic examination, available keys and survey of literature. Present recovery of this species is first documentary form the host *T. striata* at present locality. (Gaston, 1978) reported few species of digenetic trematodes belonging the genus; *Tanaisia* Skrjabin, 1924 from Leiothrichidae family but for the species; *T. bragai* from Jungle babbler this is the new host scientific documentary. Moreover; genus *T. bragai* contains wide variation among in their species and they surely cause certain diagnostic features in the family Leiothrichidae. Therefore; *T. bragai* trematode is the first report from Jungle babbler in Naushahro Feroze, Sindh-Pakistan.

Conclusion

It is concluded that many researchers since form the few decades working on the diversity of a variety of avifauna in Pakistan. Morphologically present specimens have a close resemblance in all essential features with *T. bragai* Santos, 1934 hence identified as such and this species is accredited first times from the host in district Naushahro Feroze, Sindh-Pakistan. Present research work will be a supportive tool to understand the diversity of trematode among avifauna in Pakistan.

Acknowledgment

The authors wish thanks to the formers of the given area for sanction to capture the *T. striata* from their croplands and given techniques and tricks. Authors are grateful for their research guide, for the identification of specimens at species level his loyal nature poured the sprit. Due to this gathered efforts scholars became successful in formulating the present manuscript.

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