



## RESEARCH PAPER

## OPEN ACCESS

Prevalence of *Lyperosomum longicauda* Rudolphi, 1809  
(Dicrocoeliidae: Trematoda) from the gallbladder of  
*Turdoides stirata* (Aves: Leiothrichidae) at Sindh, Pakistan

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### Abstract

The present findings are related to report the helminth parasitic infection in Jungle babbler, at District: Naushahro Feroze. Host species were investigated from the month of June to August, 2018. These birds are non-migratory, former friendly, earth colored sibling in habitat but internal visceral organs consisting intensity of parasites. Total (n=16) of *T. striata* were captured and dissected on a weekly basis under laboratory conditions at Department of Zoology, SALU-Khairpur. All found with helminth population of digenean trematode but high prevalence was found in the month of June followed by other months. During surgical examination (n=44) specimens were recovered in the gall bladder of the host, morphologically having tapered ends at terminal body point, forebody is shorter than hind body, protrusible rounded oral suckers but ventral suckers are rounded, maximum width at post-acetabular region, oval-shaped pharynx, short esophagus, diverticular caeca, median-shaped ovary and oblique testes, un-equal bands of lateral vitellaria and dark brown coloured eggs. These features of the worms resemble already identified as; *L. longicauda* hence; identified as such. This species of fluke was first time recovered from present host and result of present study revealed that it is a new host record from upper Sindh.

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## Introduction

The birds are great valuable gift of almighty Allah, their colourful plumage attract the people, they are charming as sweet voices produce during early morning time, they having high economic value and serve as plant pollinators (Elon and Fred, 1924), found close association with humans. Avifauna having the potential power to fly thousands of the miles within few days and all species having own unique appearance, ecology, habitat, distributaries and habits (Whelan *et al.*, 2008).

Avifauna is valuable in respect of mankind as they feed over variety of pest insects, use seed weeds, agricultural pests but abundance population of helminth parasites greatly harm their body and create clinical signs (Soulsby, 1968). The high density of birds population, wet litter, contaminated food particles, rough ventilation, mismanagement etc., are the causative reasons by which helminth parasites increase in their number and enhance their progeny (Nadeem *et al.*, 2007). The birds are reducing day by day due to urbanization, loss of habitat, climatic changes and vast application of pesticides also birds harbor a diversity of both endoparasites and ectoparasites cause deadly disease to their hosts and propagate to neighbouring livelihood (Akcakaya, 1990).

Jungle babbler found in Indian Sub-continent tropical and sub-tropical regions (Ripley, 1969), commonly search their food in a group manner being an insectivorous search mostly; *Helicoverpa armigra* on croplands and are also known as voracious feeder of insect pests (Gaston, 1977) but these species of hosts are weaker in their flight. Their body is dirty and eyes in yellow-colored, beneficial for agro-ecosystem due to feeding of variety of insect matters (Andrew and Naik, 1965) and wings are shortly rounded (Ali and Ripley, 1996).

Being scavengers they having positive role to control the population of insect pests (Chittampalli and Bhatkhande, 1993). Aves are a carrier of a certain zoonotic lethal disease (Hubalek, 2004), but majority of flukes hit kidney and gallbladder of the Aves (Kanev *et al.*, 2002).

Trematodes parasites especially threat to Passeriformes caused significant living losses (Chung *et al.*, 1995). The trematode belongs to family Dicrocoeliidae, Eucotylidae and Rencicolidae cause great harm to the kidney and gall bladder, bile duct of the wild and domestic aves (Kanev *et al.*, 2002). Jungle babbler is being omnivorous to their feeding behaviour bare parasitic worms and infestation depends availability of food source (Kyi and Poon, 1987). *T. striata* severely infected by numerous fluctuations of internal visceral helminths. In Pakistan there is no research documentary on the systematic studies of helminth parasites on *T. striata* and the main aim and motivation of present research work to findout the helminthological burden, parasitic identification and formulate systematic studies due to this reason *T. striata* agro-friendly species of bird selected as model for research and authors became strongly wilful on carryout experimental research to find out the prevalence of parasites from the internal visceral organs of host species.

## Material and methods

### Site description and samle location

Mostly the lands of district: Naushahro feroze is highly fertile, greenish and enrich in agro-ecosystem where these former friendly birds surviving on different living and nonlivings matters. The host species were captured from different locations of this region and brought parsitology laboratory, department of Zoology, Shah Abdul Latif University, Khairpur, Sindh-Pakistan for dissection purpose. The birds which were captured from the different croplands, A total of (n=16) in consequent months from May to August during, 2018. The handmade nets, standard traps, gullel, air gun were used and collection were kept in cages if supposed to dead immediately kept in refrigerator and on priority basis dissected them under laboratory conditions as soon as possible.

### Dissection procedure

For the surgical examination cotton swab contained chloroform was used for host anaesthetization

purpose when host became unconsciousness laid it on white page just 5 to 10 minute to examine the ectoparasite because during alive period actoparasites actively attach to their host but just after death the ectoparasites detach from their host body. Then puffy feathers removed from sternum region, a longitudinal cut was given from cloacal opening up to neck region and by the source of forceps body cavity were opened digestive tract, liver, heart, kidney, gallbladder, mesenteries, bile duct, aerial sacks, pancreas, gizzard, intestine, lungs were removed and kept in separate petri dishes containing saline solution. According to convenient techniques kidneys and intestine were opened by fasten scissors also all internal organs by the help of needles were opened and thoroughly examined through dissecting microscope. After intensive examination of all internal organs of the host recorded trematode, *Lyperosomum longicauda* Rudolphi, 1809 (Dicrocoeliidae: Trematoda), from the gallbladder of *Turdoides striata* (Aves: Leiothrichidae) under laboratory conditions.

#### Permanent slide pattern

Specimens were washed by passing them in ethyl alcohol graded series up to 70% and then by the source of camel hair brush worms were placed on the sterilized glass slide by giving them cover slip, wrapped by threads for overnight and slides were kept in coplin jar containing 75% alcohol. After twelve hours threads were re-opened and again specimens were washed in alcoholic series. Then borax carmine palced in separate petri dishes and very gradually specimens were poured for staining, depends on the integument of the specimen, again placed in 70% ethanol for each five to ten minutes followed by 80%, 90%, and 100%, respectively. Mounted with Canada balsam and permanent slides comprise trematodes were labelled with host name, locality, collection date and parasite and slides were arranged parallel in wooden slide box for further motivation.

#### Formation of diagram and body measurements

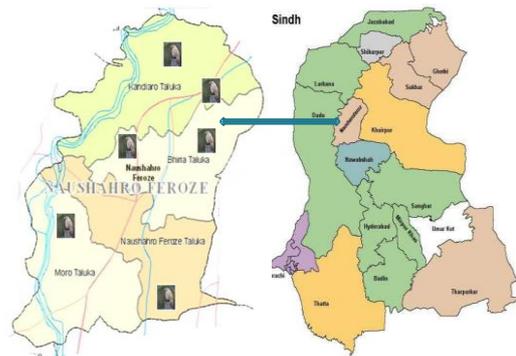
Diagram of the trematodes were formed by the help of Camera Lucida and in millimetres (mm) measurements of body organs were taken but in

micrometers ( $\mu\text{m}$ ) eggs were measured. Meiji infinity 1-DK 3000 camera was uses for photography purpose. However; the species identified by using of stereo-microscope, reports, literature, and keys introduced by (Yamaguti, 1961; 63; 71; Gibson and Jones, 2008).

#### Data analysis

For statistical analysis data were placed in MS, excel sheet and variance of analysis shows a significant difference at ( $P < 0.05$ ) among the trematode species and for ANOVA help was taken student packege software SXW, 8.1 versions USA. The worms intensity found in to insectivorous bird, Jungle babbler on the monthly basis at district Naushahro Feroze northern region of Sindh-Pakistan.

#### Map of Sindh (Study area)



#### Results

During research study, sixteen hosts from different localities were captured, and those were anesthetized after surgical investigation results were taken that all the birds were observed parasitized with digenean trematodes; *L. longicauda* has given in (Fig. 1). Further forty-four specimens were recovered from gallbladder of the host birds. In this regard, the present species previously reported form other localized but for the first time in the given above locality was observed and the present host is the new host record described in (Table 1).

#### Description

The body of worms were observed much extended both terminal parts of body tapering measured 5.58-5.72 x 0.68-0.81mm and at the post-acetabular region

contain maximum width. The hindbody recorded larger 4.7 than forebody 0.28 and protrusible, rounded oral sucker measuring 0.03-0.06 x 0.04-0.07 in diameter. Pharynx oval shaped smaller containing 0.09-0.03 x 0.08-0.04 in diameter and short sized oesophagus containing 0.05 x 0.03 in length. Caeca situated in front of acetabulum, diverticula runs in lateral sides but cannot reach at terminal region. Large size ventral sucker and rounded in shape oral sucker comprising 0.3-0.7 x 0.4-0.11 in size. Posterior to acetabular region rounded and sub-median ovary found in 0.17-0.18 x 0.20-0.24 in size. Testes in oblique and rounded form. At the region of posterior to ventral suckers anterior testes are found consisted on 0.08-0.14 x 0.09-0.14mm and posterior testes large-sized sub-median having 0.17-0.24 x 0.3-0.8 size. Vitellarian consisted unequal two bands runs from the anterior testes but cannot reach up to terminal point of the body and post-testicular region consisted 0.05-0.15 x 0.16-0.4 in size. Dark brown colored small-sized eggs comprising 18-28 x 13-16 micrometer (Table- 1).

*Systematic summary of Lyperosomum longicauda Rudolphi, 1809.*

Family: Dicrocoeliidae Odher, 1910.

Fig: 1 A-C, Table- 1.

Genus: Lyperosomum Looss, 1899.

Site of infection: Gallbladder.

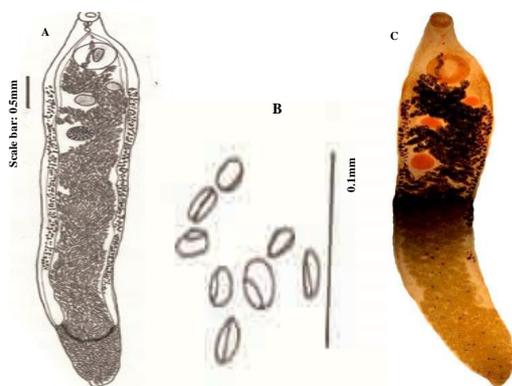
Host: *T. Striata*.

Locality: Naushahro Feroze.

No. of host: 16.

No. of specimens: 44.

Record: New host.



**Fig. 1.** *Lyperosomum longicauda*; A. Specimen entirely; B: Eggs shape; C. Specimen photography.

*Remarks*

Dicrocoeliidae is a larger family, comprises more than four hundred trematode species, consisting certain variations in size and shape of the body. Usually these species found in gallbladder and ducts of their hosts. *L. longicauda* Rudolphi, 1809 is the type species of this genus reported from *Aquila pennata*, *Trypanocorax frugdegus*, *Geronticus eremita*, *Garrulus glandarius*, *Lanius collurio*, *Luscutia luscini*, *Anthus arboreus*, *Sternus vulgaris*, *Cyprelus apus*, *Corvus cornix*, *Pica pica*, *Turdus merula*, *T. philoneas* from India, Europe and Turkestan.

Other species of this genus; *L. longicauda* (Rudolphi, 1809) recovered from gallbladder of *G. eremita* in Turkey; *L. byrdi* (Denton and Wayne, 1975) reported gallbladder and liver *P. erythrophthalmus* in Florida; *L. malaysiae* (Gmelin, 1960) recovered intestinal parts *P. zeylanicus* in Malaysia and Turan. *L. mindorensis* (Eduardo and Gaddi, 2003) recovered intestinal parts *R. eurizonoides* from Philippines and *L. velasquezae* (Eduardo and Gaddi, 2003) reported from liver of *G. gallus philippensis* in Philippine; *L. duculae*, *L. palawanense* (Fischthal and Kuntz, 1973) intestinal region of *D. aenae palawanensis* and *D. javanense everetti* in Palawan Island; *L. alagesi* (Skrjabin and Shtrom, 1930) host *P. pica* at Uzbekistan and Kirgizia; *L. alaudae* (Shtrom and Sondak, 1935) from host *Z. corvus*. *A. cantarella* in Azerbaidzhan and Czechoslovakia; *L. anatis* (Belogourov and Leonov, 1963) host *A. acuta* and *A. falcate* at Kamtchatka. *L. charadrii* (Belopolskaia, 1963) at Amur basin in *N. madagascariensis*; *L. clathratum* (Deslongchamps, 1824) at Europe from *A. apus*; *L. coracii* (Sultanov, 1927) from *C. garrulus* at Tashkent; *L. collurionis* (Skrjabin and Isaichikov, 1927) in *C. indicus* and *L. collurio* at Siberia, Czechoslovakian and Russia; *L. formosaense* (Yamaguti and Mitunage, 1943) at Formosa from *P. altricapillusrestrictus*; *L. direptum* (Nicoll, 1914). At America host *C. nigra*; *L. halacichlae* (Faust, 1964) in gallbladder of *H. musteline* in Louisiana; *L. kavini* (Fotedar and Raina, 1965) host; *C. monedula soemmeringii* in Kashmir; *L. indosinense* (Odening, 1964) host; *Garrulax* at Vietnam; *L. oswaldoi*

(Travassos, 1920) recovered from the hosts, *Cyanocitta*, *R. brasilaus*, *O. capueria*, *T. coronatus*, *Toxostoma*, *Trogon*, *M. bonariensis*, *M. humeralis*, *Crax* and *C. haemorrhous* at USA and Europe; *L. metatestis* (Belogurov and Tseva, 1967) in Russia host *C. alpine*. *L. petrovi* (Skrjabin and Evranova, 1953) recovered host *F. francolinus* in Azerbaidzhan; *L. pawlowskii* (Shtrom, 1928; Travassos, 1944) host; *D. leuconotus*, *C. crex*, *Porzanaporzana* and *Gallinula chloropus* in Russia. *L. sarothrurae* (Bear, 1959) at Congo host *S. pulchra*; *L. rossicum* (Skrjabin and Isaichikov, 1992) in Russia from *C. coturnix* and *C. communis* birds; *L. schikhobalovi* (Skrjabin and Evranova, 1953) at Armenia, Russia, Uzbekistan and recovered *A.*

*graeca*; *L. scitulum* (Nicoll, 1914) in Moluccas collected *L. domicella*; *L. skrjabini* (Solovev, 1911) recovered from *T. frugilegus*, *P. pica* and *C. corone* at Turekistan, France and Kazakhstan; *L. sinuosum* (Travassos, 1917) at Panama and Brazil collected from host; *N. Violaeca*, *L. squamatum* (Lintstow, 1996) in Palatupana from *D. episcopus*; *L. dujardini* (Shtrom and Sondak, 1935) in Transcaucasia host; *P. modularia obscura*; *L. stunkardi* (Agrwal, 1964) reported *A. tristis* in Varanasi; *L. corvi* (Yamaguti, 1939, Travassos, 1944) in *S. vulgaris* and *C. corone* at Kirgizia and Japan; *L. turdi* (Ku, 1938) from *T. merula mandarinus* in China and Japan *L. urocissae* (Yamaguti, 1929) reported from *U. caerulea* at Formosa.

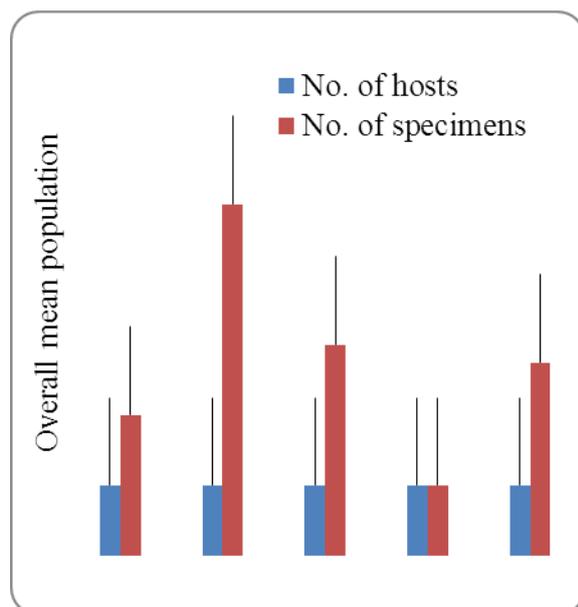
**Table 1.** Body measurements comparative morphological features and of *Lyperosomum* species under laboratory conditions during, 2018.

Species	Present species	<i>L. longicauda</i> Rudolphi, 1809	<i>L. malaysiae</i> Helminthological Society of Washington, 2011	<i>L. byrdi</i> <i>Denton and</i> <i>Krissinger,</i> 1975	<i>L. mindorense</i> SL Eudardo and CB Gaddi, 2003	<i>L. velasquezae</i> Eudardo and CB Gaddi, 2003
Body	5.58- 5.72 x 0.68-0.81	10.54-11.26 x 1.32 x 1.44	4.26-5.065 x 0.41- 0.45	2.098-3.745 x 0.3-0.41	7.675-8.275 x 0.550-0.675	6.750-7.750 x 0.850-1.100
Oral sucker	0.03-0.06 x 0.04-0.07	0.47-0.53 x 0.54-0.59	0.165-0.198 x 0.121-0.126	0.18 x 0.23	0.275-0.335 x 0.255-0.290	0.270-0.300 x 0.250-0.310
Pharynx	0.09-0.03 x 0.08-0.04	0.19-0.25 x 0.35-0.40	0.073-0.078 x 0.087-0.085	0.063-0.078 x 0.076-0.096	0.085-0.90 x 0.080-0.095	0.125-0.135 x 0.150-0.160
Esophagus	Smaller	Shorter	Elongated	Slighter	Stretched	Larger
Ventral sucker	0.3-0.7 x 0.4- 0.11	0.87-0.95 x 0.91-0.98	Nearest to end	Found near posterior end Dorsally to accetbulum up	0.455-1.005 x 0.445-1.020	1.115-1.16 x 1.150-1.285
Caeca	Runs laterally up to end of the worm	Found lateral up to terminal	Thin, eggs form covering	to caudal vitellarian	Appear laterally ends at terminal point	Presnet straight laterall up to end point
Testes	Oval	Round	Glossy	Silky	Circular	Round,
Anterior testes	0.08-0.14 x 0.09-0.14	0.34-0.39 x 0.39-0.44	0.11-0.145 x 0.105-0.165	Located right side	0.220-0.295 x 0.180-0.230	0.155-0.235 x 0.145-0.280
Posterior testes	0.17-0.24 x 0.3- 0.8	0.37-0.43 x 0.41-0.46	0.098-0.115 x 0.33-0.34	Located left side	0.205-0.275 x 0.195-0.205	0.175-0.280 x 0.170-0.275
Post testicular space	0.05-0.15 x 0.16-0.4	Unseen	Unnoticed	Absent	Lacking	Not present
Ovary	0.17-0.18 x 0.20-0.24	0.42-0.49 x 0.48-0.56	0.11-0.19 x 0.14- 0.24	oval 0.5-0.12 x 0.06-0.14	0.175-0.240 x 0.165-0.255	0.225-0.265 x 0.190-0.280
Vitellaria	Form un-equal strands run anterior testes up to nearest terminal	Diagonal laterally from anterior testes up to closet to terminal	Over lapping caeca at laterally form follicles	Posterior to ovary and testes runs close to terminal	Laterally vitellaria up to terminal extremity	At laterall sides vitellaria appear up to nearest to end
Eggs	18-28 x 13-16	24-26 x 39-43	28-33 x 17-22	30-35 x 18-21	35.00-46.25 x 22.50-28.75	36.25-41.25 x 22.50-25.00
Host	Jungle babbler	Northern bald ibis	Straw-headed bulbul	Eastern towhee	Eurasian tree sparrow	Red jungle fowl
Locality	N. Feroze, Sindh	Turkey	Malaysia	Florida	Philippine	Philippine

The specimens which were recovered from the gallbladder of present host birds having close morphological similarity with, *L. longicauda* Rudolphi, 1809 at district: Naushahro Feroze, Sindh and were identified as such and this species is first host record at given area.

*Prevalence digenean trematode lyperosomum Longicauda Rudolphi, 1809 in T. striata*

Present research based investigation was carried out in the months from May to June during, 2018. Birds were dissected and internal examination was taken to check out the burden of helminth parasites. Every week one host was remained under observation and on weekly basis data was taken. The results of the present research work shows that there was no any host bird free from infection and all the host birds found positive with parasites but high parasite prevalence found in the month of June followed by July, May, and August. In the August month from (n=4) host (n=4) specimens, in the May month from (n=4) hosts (n=8) specimens, during the July month from (n=4) birds (n=12) specimens and during the month of June from (n=4) hosts (n=20) specimens were recovered, respectively. *L. longicauda* with an overall mean population was observed up to (11) during this research study as describe in (Fig. 2).



**Fig. 2.** Monthwise prevalence of *L. longicauda* in Jungle babbler birds under laboratory conditions.

### Discussion

Jungle babbler hunt insects, former friendly, beneficial for agro-ecosystem, belongs Leiothrichidae but severely infected by a diverse parasites. The present investigation was performed in hot months of the year, 2018 on host birds. *T. striata* (n=16) collected from green land of different taluka level such as; Naushahro Feroze, Kandiaro, Bhiria, Mehrabpur and Moro. All captured birds were thoroughly examined for purpose of helminth prevalence and observed positively with infection of digenean trematode; *L. longicauda* and all specimens (n=44) were recovered from gallbladder. The helminth prevalence in present host which was examined during present study is with the agreement of (Fotedar and Raina, 1965) both carried out internal examination on *C. monedula soemmeringii* birds in Srinagar, Kashmir and recovered *L. kavini* trematode consist oesophagus, cirrus sac, caeca, small-sized ovary and testes, near the testes pre-acetabular region, in front of pharynx genital pore, from testes vitellaria runs laterally towards posterior extremity and compared the morphological characteristics of *L. kalmikense*, *L. fringillae*. Present results are with the agreement of (Fischthal and Kuntz, 1974) who examined the Palawan birds in Philippine and Malaysian birds recovered *L. palawanense*, *L. ducidae*, *P. prashadi*, *P. dogi*, *A. heterolecithodes*, *B. attenuatum*, *L. malaysiae*, *L. bhattacharyai*, *B. vitellobum*, *B. pycnonoti*, *B. sabaense* and *B. api* reported eleven species of which one was brachylaimid and ten were belonged dicrocoellid. Present result is also with the agreement of (Denton and Krissinger, 1975) who thoroughly examined internal organs of *P. erythrophthalmus* host birds in Florida, Augusta and Georgia, during research work they recovered *L. byrdi* and compared other species of the genus *L. sinuosum* Travassos, 1917, *L. looss*, 1899. This type of research was performed (Shuvajit *et al.*, 2012) on host *T. striata* at India, recovered *Z. sanglaensis* n. sp., from gallbladder.

During research period month-wise significant difference was observed in the appearance of helminth infestation among all hosts.

Many researchers diagnosis many Aves and reported internal parasites of terrestrial passerines, from the spleen of birds (John, 1995) reported fluke worms by using of technique phylogenetic regression, Birds from Karachi cost were examined (Bilqees and Khan, 2005) dissected and documented *E. nickoli* trematode (Dharejo *et al.*, 2007) recovered *P. macrovesiculum* and *P. paramonostomum* from *F. atra* birds and from *A. grayii* trematode; *E. mohiuddini* reported, (Birmani *et al.*, 2008) from host bird; *F. atrae* recovered *E. atrae*, from *A. grayii* (Channa *et al.*, 2009) trematode *E. jamshorensi*, from *E. alba* at Karachi (Das and Ghazi, 2010) reported trematode; *P. mujibi* n. sp., (Drago and Lunachi, 2010) from Black-necked reported *A. candensis* trematode (Ghazi *et al.*, 2013) from *A. crecc* reported trematode; *P. bilqeesae* n. sp., and from host birds; *A. ginginiamus* recovered *E. mazharuddini* trematode.

However; there are massive records of avian helminth parasitic of many host species but no any parasitologist documented the internal parasites of Jungle babbler (Mangrio *et al.*, 2016) and *Hymenolepis spp.*, of cestodes from same host. Birds being insectivorous are beneficial for agro system because they are pest controlling agents. Similarly; majority of wild birds serves as pathogenic carriers which disturb the domestic flocks (Nice, 1994). Urbanization and intensive pest application relay negative effect on their lives and when infected birds move one area to play a role as disease carrying agent, in this way pathogens spread bird to bird, and bird to other vertebrates (Daniels, 1992). *T. striata* species of passerine are former-friend and beneficial being a feeding of insect pests context but in spite of increasing their generation they are decreasing. In this regard present research study indicates that more work should be performed for the appearance of internal visceral helminths and mode of transmission of parasites.

### Conclusion

Many species of digenean trematodes have been observed from variety of wild birds and result of present visceral examination shows that the specimens of the trematode which were recovered from the present host are morphologically compared

with the features of other Dicrocoeliidae species shows certain variations. The body length of present trematode is lager then *L. byrdi*, *L. malaysiae*, *L. palawanense*, *L. alaudae*, *L. anatis*, *L. clathratum*, *L. charadrii*, *L. collurionis*, *L. indosinense*, *L. turdia*, *L. formosaense*, *L. dujardini*, *L. metatestis*, *L. stunkardi*, *L. oswaldoi*, *L. sinuosum*, *L. rossicum* while as; smaller then, *L. mindorensis*, *L. duculae*, *L. velasquezae*, *L. corvi*, *L. scitulum*, *L. alagesi*, *L. direptum*, *L. urocissae*, *L. hylacichlae*, *L. skrjabini*, *L. kavini*, *L. schikhobalovi*, *L. pawlowskii*, *sarothrurae*, *L. petrovi* Kasimov but having close resemblance with *L. longicauda*, Rudolphi, 1809 hence; identified as such and this species reported first time from present locality. Jungle babbler is also first host record for present trematode species. This research will be helpful in the scientific documentary for the identification among diversity of trematodes.

### Acknowledgment

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