

## INFESTATION OF CHEWING LICE (PHTHIRAPTERA: INSECTA) ON TURKEY FOWL (AVES: GALLIFORMES) FROM DISTRICT HYDERABAD, SINDH, PAKISTAN

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### Abstract

The chewing lice (Phthiraptera: Insecta) dorsoventrally flattened wingless parasitic insects of avian fauna. The lice have strong mandibles for biting tissue debris and body feathers of their hosts, causes parasitism and have high capability to develop host specificity. They have acute to chronic effects on their host's fitness responsively. Their purpose is numerous illnesses and play significant role as vector of various types of helminths and bacteria. Presently, only one type of galliform bird, Turkey fowl *Meleagris gallopavo* was selected for examining the abundance, intensity, Population density and rate of infestation of chewing lice of various localities of district Hyderabad Sindh, Pakistan. 08 Turkey fowls *Meleagris gallopavo* were selected for collection of chewing lice species. The study was directed from November 2015 to September 2016. Turkey fowls were kept on white paper sheet for about 30 minutes and were gently sprayed with coopec powder (Permethrin powder) on their wings. Birds infected were tagged with identity rings to check their lice infestation after interval of 2 to 3 weeks. The chewing lice species were collected and preserved in 70% ethyl alcohol. Permanent microscopic slides were prepared with the help of Canada balsam following standard method of mounting. In the present study total 132 chewing lice were obtained from infested host which belonging to 04 genera of 02 families. These five species and their prevalence are 15.90% for *Chelopistes meleagridis* (Linn., 1758); 23.88% for *Goniodes dissimilis* Denny, 1842, and 29.54% for *Lipeurus tropicalis* Peters, 1931 belonging to family Philopteridae 9.70% *Menacanthus pallidulus* (Neumann, 1912) and 20.45% for *Menacanthus stramineus* (Nitzsch, 1818) belonging to family Menoponidae. All these five species are being reported for the first time from Turkey of district Hyderabad, Sindh. All chewing lice species were studied and described systematically.

**Keywords:** Birds, Menoponidae, Philopteridae, Turkey fowl, Ectoparasites, Hyderabad.

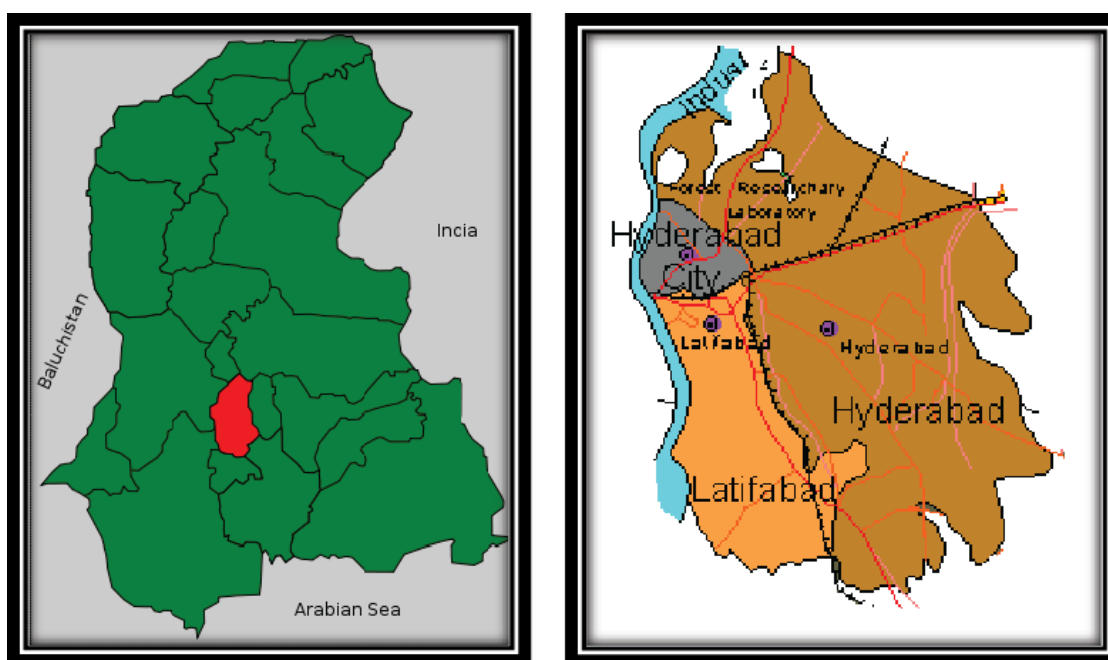
### INTRODUCTION

Phthiraptera Hackel, 1896 an Insect order of chewing Lice. Chewing Lice are tiny wingless, parasitic insects. Ectoparasites of mammals and birds. Mostly host specific, dorso-ventrally flattened body. They feed on feathers, skin debris or dry skin, dermal epithelium or may feed on blood of the host. Causing itching, skin irritation and dermal inflammation to host. Chewing Lice have 03 suborders: Amblycera Kellogg, 1896, Ischnocera Kellogg, 1896 and Rhynchophthirina Ferris, 1931. Family Phasianidae (Aves: Galliformes) is a large family, of the avian fauna, order Galliformes includes domestic fowls, pheasants, partridges quails (Batairs), turkey fowls, red jungle fowls, common peafowls and guinea fowls (Roberts, 1991; Rust, 1974; Grimmett *et al.*, 2012). These birds are also known as game birds or game fowls; and with three pairs of clasping types of legs terminating to one or two tarsal claws (Kimball *et al.*, 1999; Cherry and Morris, 2008). These birds have heavy body, moderate to large size are common in our region and are mostly kept in captivity by humans and provide them natural environment. Birds are one and only heavily populated life forms and also splendid indicators of health of many ecosystems. Chewing lice almost 150 species have been recorded and reported from Punjab (only Faisalabad) (Ansari, 1946; 1947; 1955; 1956) whereas in Sindh region no significant work has been conducted or other parts of Pakistan, except one of few chewing lice species (Naz *et al.*, 2011; 2016). Populations of chewing lice are largely effected by variations on humidity and temperature near the host skin. Chewing lice are so harmonized to conditions on the body of the host that few species can survive for more than a few days off the host (Marshall, 1981; Price and Graham, 1997). Turkey fowls *Meleagris gallopavo* large sized possess scattering, buff shaped tails and characteristic thickset wattles, called a snood that swing from the topmost of the beak and are castoff when in courtship behavior. Their feathers used for robes, blankets and ceremonial purposes (Pond and Bell, 2010). The fowls or Poultry birds have great economic importance by covering the nutritional needs of man. Millions of fertilized eggs of Phasianid fowls are using every year to produce vaccine of annual flu requirements (Jacob *et al.*, 2014). Phasianidae family is largest family of galliform birds include, other than fowls, it also includes *Tetraogallu himalayensis* (Ram chukar), *Lerwa lerwa* (Snow partridges), *Alectoris chukar* (Rock partridge or Chukar), *Francolinus francolinus* (Black partridges or Black francolin), *Francolinus pondicerianus* (Grey francolin)

or Indian grey partridges), *Ammoperdix griseogularis* (See-see partridges), *Coturnix coturnix* (Common quail or Grey quail), *Coturnix coromandelica* (Rain quail or Black-breasted quail), *Tragopan melanocephalus* (Western tragopan) (Johnsgard, 1988; Mc Gowan, 1994). There are about seven (07) species of chewing lice which parasitize different breeds of Turkey fowl *Meleagris gallopavo* (Linnaeus, 1758) and cause infestation throughout the world (Price *et al.*, 2003). The family Menoponidae (suborder: Amblycera) and family Philopteridae (suborder Ischnocera) species are, found in a reduced amount of to adequate rate of infestation on galliform birds worldwide. The world reported species of *Meleagris gallopavo* are *Chelopistes meleagridis* (Linnaeus, 1758), *Colpocephalum tausi* (Ansari, 1951), *Lipeurus caponis* (Linnaeus, 1758), *Goniocotes gallinae* (De Geer, 1778), *Menopon gallinae* (Linnaeus, 1758), *Oxylipurus polytrapezius* (Burmeister, 1838) and *Menacanthus stramineus* (Nitzsch, 1818) are found all over the world.

## MATERIALS AND METHODS

The district Hyderabad is located in the Province of Sindh, Pakistan placed 138 km east of Karachi. It is the second largest city in Sindh Province by residents and 8<sup>th</sup> largest city in Pakistan. District Hyderabad is located on the east bank of the River Indus and (92 mil) away from Karachi, the regional center. It has warm desert temperature with hot conditions around the year (Biographical Encyclopedia of Pakistan, 1963). The city is famous for its windy weather which moderates the temperature if not hot weather. Its humidity and temperature remains high and it has not very cold winter (Fig. 1). The weather condition is very much favorable for the growth and development of tiny insects like chewing lice. During present research work which was carried out between November 2015 to September 2016. A total of 08 specimens of Turkey fowl *Meleagris gallopavo* have been examined for collection of chewing lice species from different localities of district Hyderabad, including Qasimabad, Latifabad, Tando Yusuf, Tando Hyder, and Hosri (Table 2) Sindh, Pakistan. In the progression of present study urban and rural areas selected for examining their population density. Fowls were taken from their natural environment which were available in captivity. Each bird was kept in white paper sheet sprinkled through Permethrin powder for about of 30 minutes and carefully investigated for chewing lice species on collar, belly, abdominal and tail feathers of hosts. All lice specimens are collected preserved in 70% ethylic alcohol and finally mounted in Canada balsam with the help of cover slips (Palma, 1978). Moreover observing the month wise except in April and October so that eggs may hatch and grow the population of lice. In both summer and winter seasons, the experiment was conducted. The winter collection was carried out during November 2015 to March 2016 and the summer collection was carried out during May 2016 to September 2016 in order to check climatic effect of chewing lice growth with host population.



**Fig. 1:** Map showing Hyderabad, Sindh, Pakistan.

## RESULTS AND DISCUSSION

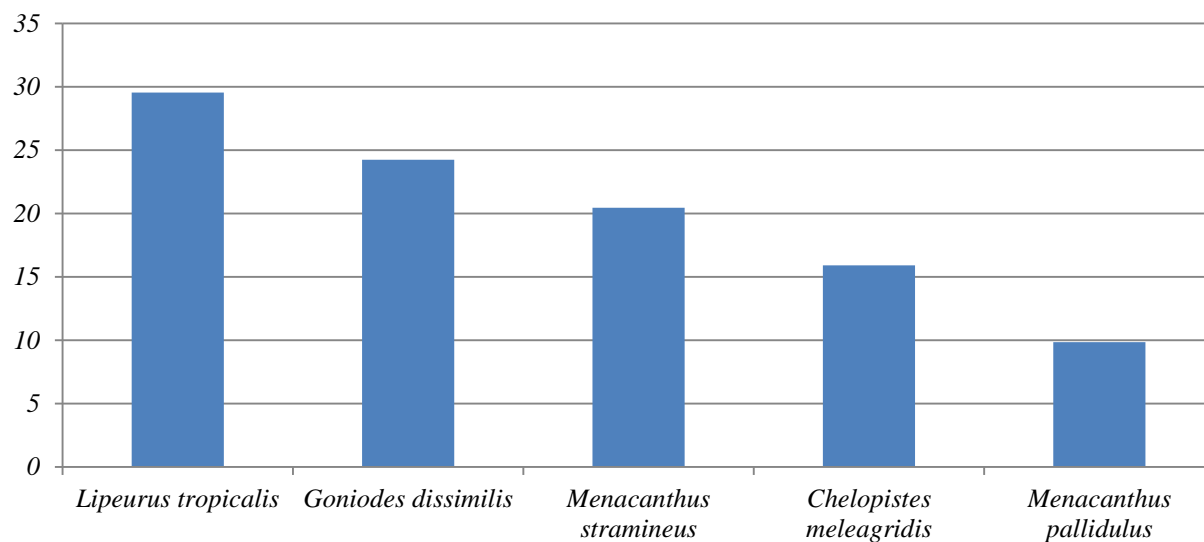
Total 08 Turkey fowls were examined, 08 went positive with 100% prevalent to their chewing lice species, which is a high abundance of their infestation. Chewing lice species that have been collected during present study belong to 04 genera of 02 families Menoponidae and Philopteridae. The variety of host distribution for the Genus *Chelopistes*, *Goniodes*, *Lipeurus* and *Menacanthus* have proven to be the most interesting result. The study was conducted in different localities of district, Hyderabad, includes Qasimabad, Latifabad, Tando Yousuf, Tando Hyder and Hosri from Sindh, Pakistan. First the calculation was made (Table 2 and Fig. 1) on the Prevalence of 05 species of chewing lice on Turkey fowl *Meleagris gallopavo* and then their main taxonomic characters were described along with their measuring body parts (Table 3) from the study area.

**Table 1. Chewing lice collected during present study from Turkey fowl *Meleagris gallopavo* of Hyderabad with their type host.**

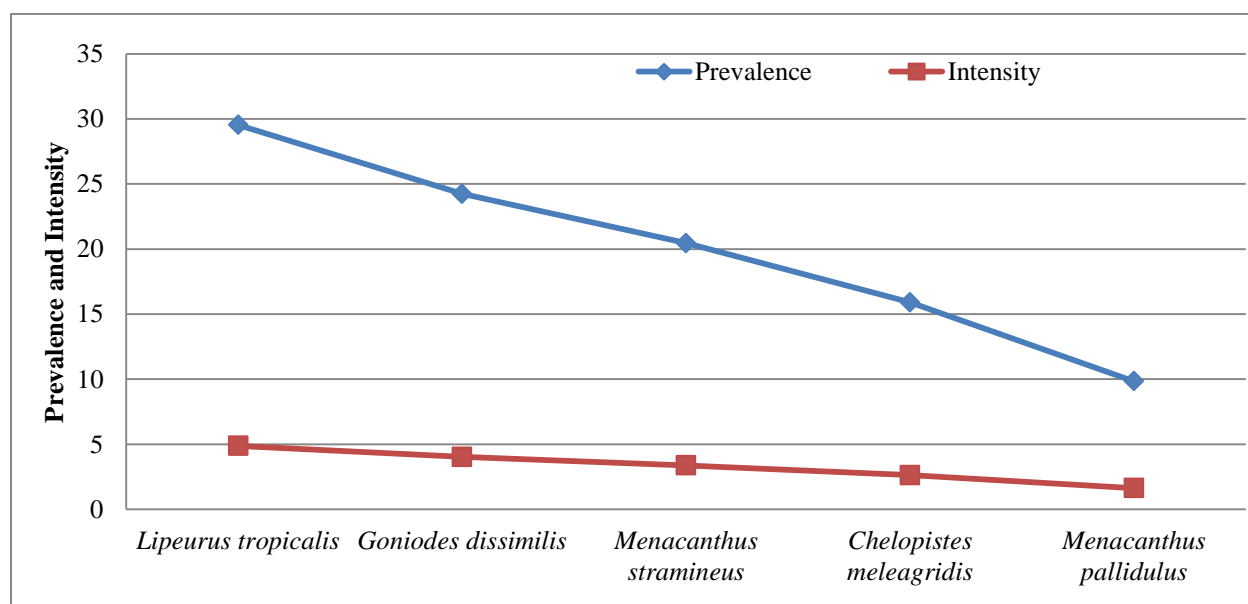
Suborder	Family	Genera	Species	Type Host
Amblycera	Menoponidae	<i>Menacanthus</i>	<i>M. Stramineus</i> (Nitzsch, 1818)	<i>Meleagris gallopavo</i>
			<i>M. pallidulus</i> (Neumann, 1912)	<i>Gallus gallus</i>
			<i>C. meleagridis</i> (Linnaeus, 1758)	<i>Meleagris gallopavo</i>
Ischnocera	Philopteridae	<i>Goniodes</i>	<i>G. dissimilis</i> Denny, 1842	<i>Gallus gallus</i>
			<i>L. tropicalis</i> Peters, 1931	<i>Gallus gallus</i>

**Table 2. The Chewing lice of Turkeyfowl *Meleagris gallopavo* collected from various localities of Hyderabad during year November 2015-September 2016.**

Locality	Total no. of fowls examined	<i>L. tropicalis</i>	<i>G. dissimilis</i>	<i>M. stramineus</i>	<i>C. meleagridis</i>	<i>M. pallidulus</i>	Total lice in each locality	Population densiy
Qasimabad	01	06	05	04	03	02	20	20.01
Latifabad	02	07	06	05	04	03	25	12.5
Tando Yusuf	02	09	06	07	05	03	30	15.01
Tando Hyder	01	08	07	05	03	02	25	25.01
Hosri	02	09	08	06	06	03	32	16.01
Total birds and lice species	08	39	32	27	21	13	132	88.54
Overall incidence of chewing lice species		29.54	24.24	20.45	15.90	9.84	99.52	
Population abundance of all chewing lice species		4.87	4.01	3.37	2.62	1.62	16.5	



**Fig. 2:** Percentage representation of the Prevalence of host for chewing lice infestation during present study.



**Fig. 3:** Comparative numbers of chewing lice showing intensity and abundance of lice species on infested host.

### *Chelopistes meleagridis* (Linnaeus, 1758)

**Type Host:** *Meleagris gallopavo* (Linnaeus, 1758) (Table 1).

Less common chewing lice species of galliform birds of family Phasianidae. Large size dark yellow pigmented Philopterid, very much specific to Turkey fowl *Meleagris gallopavo*. Less active Ischnocera remain attached with body feathers. During present study 21 chewing lice specimens were recovered and prevalence of 33.33% on host body (Table 4). It is reported first time from Hyderabad as new locality record on Turkey fowl *Meleagris gallopavo*. Goniocephaloid, smooth, thick and broad anterior head margin, dorsal marginal setae present, antennae heteromorphic in both sexes, temporal marginal setae present, meso-metasternal plate present, abdomen ovoid, broad and tergites are complete bearing different number of setae in both sexes, male genitalia reaching up to the segment IX, parameres beg like with small size penis and endomeres are reduced (Fig. 4).

### Material Examined

08 ♂ and 13 ♀ on *Meleagris gallopavo* (Linnaeus, 1758) found from abdomen, head, tail feathers, legs, breast; Sindh, Pakistan, November 2015 to September 2016.

### *Goniodes dissimilis* Denny, 1842

**Type Host:** *Meleagris gallopavo* (Linnaeus 1758) (Table 1).

Common species in almost all types of Phasianid birds. Body is large size dark yellow pigmented. During present study 32 chewing lice specimens recovered and prevalence of 24.01% on host body (Table 4). It is recorded for the first time from Hyderabad, as new host and new locality record on Turkey fowl *Meleagris gallopavo*; previously it was reported from Karachi by Naz *et al.* (2011) on domestic fowls. The anterior margin of head broad, rounded and circumfasciate, antennae heteromorphic with deep antennal socket, absence of gular plate, temporal marginal setae five, well developed postocular nodus, absence of meso-metasternal plate, abdomen diamond shape with dark pigmented teropleurites, male genitalia complex with curved parameres, endomere attached with parameres, penis small size and joint with mesosomal plate (Fig. 7).

**Table 3. Measurements of body parts of all type species in mm (n=3).**

Body Parts	<i>L.tropicalis</i>	<i>G. dissimilis</i>	<i>M. stramineus</i>	<i>C. meleagridis</i>	<i>M. pallidulus</i>
Total length (TL)	3.304 (3.28-3.31)	2.175 (2.149-202)	2.894 (2.879-2.909)	3.364 (3.229-3.49)	1.526 (1.484-1.569)
Head length (HL)	0.724 (0.70-0.739)	0.695 (0.684-0707)	0.366 (0.364-0.369)	0.819 (0.79-0.849)	0.311 (0.304-0.318)
Preocular width (POW)	0.503 (0.497-0.509)	0.825	0.534 (0.529-0.539)	0.854 (0.839-0.869)	0.379 (0.376-0.384)
Temporal width (TW)	0.504 (0.49-0.509)	0.780	0.671 (0.669-0.674)	1.474 (1.459-1.489)	0.506 (0.499-0.519)
Prothorax length (PL)	0.244 (0.214-0.274)	0.197 (0.174-0220)	0.276 (0.274-0.279)	0.29 (0.289-0.309)	0.199 (0.194-0.204)
Prothorax width (PW)	0.38 (0.37-0.39)	0.471	0.541 (0.539-0279)	0.759 (0.749-0.769)	0.376 (0.369-0.382)
Metathorax length (ML)	0.398 (0.388-0.40)	0.648	0.191(0.189-0.194)	0.69	0.146
Metathorax width (MW)	0.592 (0.575-0.609)	0.686	0.589 (0.57-0.59)	1.216	0.407
Abdominal length (AL)	2.02 (1.94-2.04)	0.961 (0.949-0.974)	1.914 (1.839-1.989)	1.782 (1.765-1.79)	0.905 (0.899-0.909)
Genital length (GL)	0.55 (0.54-0.56)	0.873 (0.864-0.883)	0.699 (0.689-0.709)	0.807	0.330 (0.326-0.334)
Genital width (GW)	0.091(0.08-0.093)	0.06 (0.08-0.119)	0.254 (0.249-0.259)	0.05	0.088 (0.079-0.096)
Head Index (HI)	0.696	1.122	1.833	1.799	1.627

**Table 4. During the present study the Chewing lice collected from Common Pea fowl of Hyderabad region with their rate of infestation and prevalence (%).**

S. No.	Name of lice species	No. of birds examined	No. of birds infested	No. of lice collected	Intensity of parasitism	Prevalence %
1	<i>Lipeurus tropicalis</i>	01	01	39	4.87	29.54
2	<i>Goniodes dissimilis</i>	02	02	32	4.01	24.24
3	<i>Menacanthus stamineus</i>	02	02	27	3.37	20.45
4	<i>Chelopistes meleagridis</i>	01	01	21	2.62	15.90
5	<i>Menacanthus pallidulus</i>	02	02	13	1.62	9.84
Total		08	08	132	16.49	99.52

### Material Examined

17 ♂ and 22 ♀ on *Meleagris gallopavo* (Linnaeus, 1758) found from belly, head, tail feathers, legs, breast; Sindh, Pakistan, November 2015 to September 2016.

#### *Lipeurus tropicalis* Peters, 1931

**Type Host:** *Gallus gallus* (Linnaeus, 1758) (Table 1).

Common head louse of poultry birds. Large size dark yellowish brown pigmented Philopterid. Less active chewing lice and remains attached with body feathers. During present study 39 chewing lice specimens were recovered and prevalence of 14.01% on host body (Table 4). It is reported Second time from Hyderabad, Sindh Pakistan as new locality record on Turkey fowl *Meleagris gallopavo*. It was first time reported from Karachi by Naz *et al.* (2011) on domestic fowls. The Anterior head margin of head circumfasciate, smooth, rounded, generally narrow at post antennal region, pterothorax wider, abdomen elongated, tergites complete and fused with pleurites, sternites are well developed, tergal plates are in hour-glass shaped, male and female terminalia supported by micro and macrosetae, male genitalia well developed reaching up to the segment IV, basal apodeme elongated and narrow, presence of genital sac and genital sclerites, parameres curved posteriorly (Fig. 8).

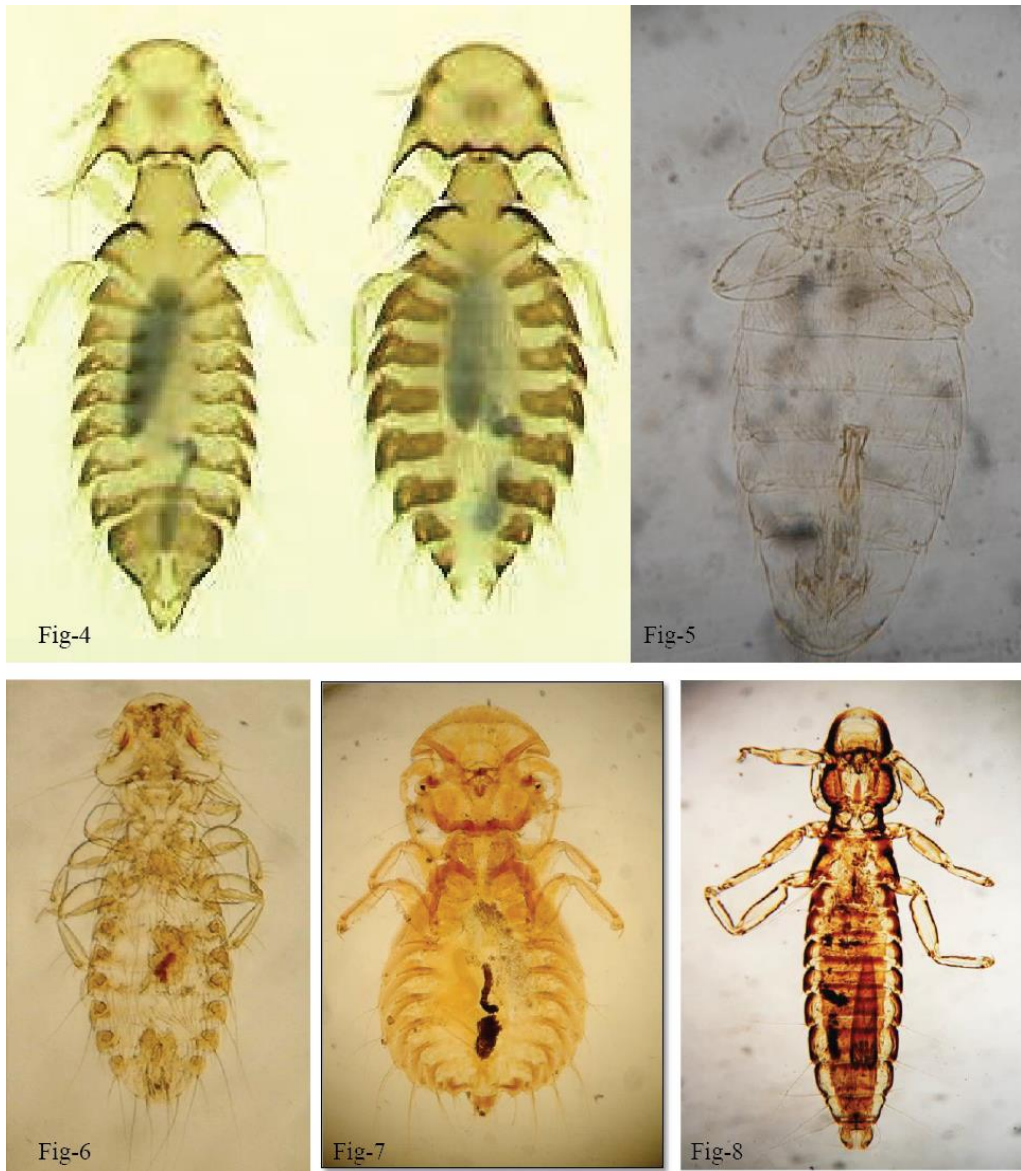
### Material Examined

17 ♂ and 22 ♀ on *Meleagris gallopavo* (Linnaeus, 1758) found from abdomen, head, tail feathers, legs, breast; Sindh, Pakistan, November 2015 to September 2016.

#### *Menacanthus pallidulus* (Neumann, 1912)

**Type Host:** *Gallus gallus* (Linnaeus, 1758) (Table 1).

Small size dark yellow pigmented Menoponid, common chewing lice species of galliform birds of family Phasianidae. It is more active Amblycera and move fast under the feathers of host. During present study 13 chewing lice specimens were recovered and prevalence of 18.01% on host body (Table 4). It is for the first time being reported from Hyderabad, Sindh Pakistan. It is a new host and locality record from Turkey fowl *Meleagris gallopavo*. Head circumfasciate type, round and thin preocular slit, temples rounded and small, evidence of maxillary palpi, gular plate present and weakly sclerotized, hypopharynx well developed, antennae capitate, metasternal plate present, abdomen oval, elongated, tergites complete with well develop sternal brushes and setae, male genitalia complex, basal apodeme well sclerotized, parameres developed, penis short, posterior margin of endomeres shorter than posterior end of parameres (Fig. 6).



### Material Examined

05 ♂ and 08 ♀ on *Meleagris gallopavo* (Linnaeus, 1758) found from abdomen, head, tail feathers, legs, breast; Sindh, Pakistan, November 2015 to September 2016.

### *Menacanthus stramineus* (Nitzsh, 1818)

**Type Host:** *Meleagris gallopavo* (Linnaeus, 1758) (Table 1).

Common body louse of chicken. Pale yellow pigmented large size menoponid. During present study 27 chewing lice specimens were recovered and prevalence of 10.67% on host body (Table 4). It is reported first time from Hyderabad, Sindh Pakistan as a new host and locality record from Turkey fowl (*Meleagris gallopavo*). Head circumfasciate, rounded and smooth, maxillary palpi developed, hypopharynx weakly developed, antennae long and generally concealed in ventral antennal groove, metasternal plate well developed and diamond shape, abdomen oval to oblong, tergites I-VIII complete, male and female terminalia comprises of IX and X segments, male genitalia is very typical or complex, reaching up to the IV abdominal segment, anterior end of basal apodeme broad and flat, parameres broad and curved outward, genital sac well sclerotized and well developed (Fig. 5).

## Material Examined

15 ♂ and 12 ♀ on *Meleagris gallopavo* Linnaeus found from abdomen, head, tail feathers, tail, breast; Sindh, Pakistan, November 2015 to September 2016.

The present study is pointed to encounter the chewing lice species which is of economically important bird, Fowls (Turkey fowl). Poultry birds are important game birds. The present investigation provide a basic knowledge to identify these parasites and raise awareness to poultry breeders which shall improve the production of poultry industry. During present research work five species of chewing lice *Chelopistes meleagridis* (Linnaeus, 1578), *Goniodes dissimilis* (Denny, 1842), *Lipeurus tropicalis* Peters, 1931 belonging to family Philopteridae, *Menacanthus pallidulus* (Neumann, 1912) and *Menacanthus stramineus* (Nitzsch, 1818) belonging to family Menoponodae were identified and described in details on Turkey fowl *Meleagris gallopavo* from five various localities of Hyderabad, Sindh, Pakistan. The most prevalent species was recorded *Lipeurus tropicalis* with 29.54% and 4.87 intensity whereas the least prevalent species was *Menacanthus pallidulus* with 9.84% and 1.62 intensity (Table 4 and Fig. 3). The temperature and humidity are very important elements in growing population of lice on the body of host. During the summer months the population of lice increases as compared to the winter season (Clay, 1970; Königsmann, 1960). It is determined by the experiments that the ectoparasites of humid and warm regions grow and multiply more rapidly than the parasites of arid regions (Layal, 1985).

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