

**MALLOPHAGA (AMBLYCERA) INFESTING BIRDS IN THE PANJAB
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(Communicated by Dr. Hem Singh Pruthi, F.N.I.)

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With best compliments,
for criticism and favour of exchange.
From
M. Atiq-ur-Rahman Ansari

I. INTRODUCTION.

Kellogg and Paine (1914) obtained a collection of the Mallophaga from the Indian Museum, Calcutta, and published an account of these insects, a year later, Kellogg *et al.* (1915) supplemented this. Waterston (1928), Qadri (1935-39), Miss Clay and Meinertzhagen 1935-45, Sen (1942) and Atiquir-Rahman-Ansari (1943-47) have made further contributions to the study of the Indian Mallophaga.

A study of the feeding habits of the birds of the Panjab was taken in hand at the Panjab Agricultural College and Research Institute, Lyallpur, in 1926, and at the suggestion of Professor M. Afzal Husain, the then Entomologist to the Government of the Panjab, a collection of Aviculous Mallophaga was made from about one hundred different species of birds. The collection, although small, furnished fresh information on the distribution of several forms and it contained several species which were undescribed.

The types of all the new forms described here are provisionally deposited in the author's collection, until sufficient material is available for distribution to museums of standing and repute.

ACKNOWLEDGMENTS.

This work was undertaken at the suggestion of Professor M. Afzal Husain (formerly Vice-Chancellor, Panjab University). I express my gratitude to him for his instruction, help and encouragement. I owe a deep debt of gratitude to Dr. Hem Singh Pruthi, for his keen interest and valuable advice in this work. I tender my thanks to Dr. Khan Abdul Rahman (Entomologist, Agricultural College, Lyallpur) for placing the entire collection of the Mallophaga at my disposal. I am deeply indebted to Miss Theresa Clay (Department of Entomology, British Museum—Natural History—London), Dr. K. B. Lal (Entomologist, Agricultural College, Cawnpur) and Dr. M. S. Mani (St. John's College, Agra) for kindly going through several parts of the typescript and making useful suggestions. I desire to express my thanks to Miss Clay, Mr. Hopkins (Formerly Senior Entomologist (Medical) Kampala, Uganda), Dr. Cesari Conci (Istituto di Zoologia dell'Universitat, Geneva), Dr. Büttiker (Institut der ETH Universitätsstrasse, Zurich) for assistance in sending me some of the original papers on the group. My thanks are also due to my wife, Zohra, for her kind assistance in collecting Mallophaga from some birds. She also relieved me of much of the drudgery of the mechanical preparation of the paper. Without this co-operation the investigation recorded could never have been completed.

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II. SYSTEMATIC ACCOUNT.

AMBLYCERA¹

1896, *Amblycera*, Kellogg, *Proc. Calif. Acad. Sci.*, VI (2), p. 68.

Nitzsch (1818) named this group Liotheidae with two genera, viz., *Gyropus* (with one clawed-tarsi, exclusively found upon mammals) and *Liotheum* (with two-clawed tarsi, exclusively infesting birds). He further divided the latter genus into six sub-genera, viz., *Eureum*, *Læmobothrium*, *Phycostomum*, *Trinoton*, *Colpocephalum*, and *Menopon*.

¹ *Amblys*: blunt, *Ceras*: horn. Mallophaga in which the antennae are capitate or swollen towards the free end, and when in repose largely concealed in lateral longitudinal excavations or antennal capsules, which sometimes are bulbous.

Kellogg (1896) adopted the Nitzschian classification in all essentials, with the difference that his families were raised to sub-orders, genera to families and sub-genera to genera. He also added several new genera to the list.

He created the sub-order Amblycera, and divided it into two families: Gyropidae (tarsi with one claw, exclusively infesting mammals) and Liotheidae (tarsi with two claws, exclusively infesting birds, except *Boopia* spp.). The latter family was further sub-divided into nine genera, i.e., *Colpocephalum* Nitzsch, *Boopia* Piaget, *Trinoton* Nitzsch, *Laemobothrion* Nitzsch, *Physostomum* Nitzsch, *Eureum* Nitzsch, *Menopon* Nitzsch, *Nitzschus* Denny and *Ancistrona* Westwood.

Several of these genera include widely differing forms. For instance the species of the genera *Colpocephalum* Nitzsch and *Menopon* Nitzsch are very loosely held together. Splitting of unwieldy genera has started and the status of certain genera has been raised to families. Harrison (1916-17) recognized four families and six sub-families, while Ewing (1926) recognized five families and five sub-families.

Today the bird-infesting species are generally grouped into three families, viz., Ricinidae Neumann, Laemobothriidae Mjöberg and Menoponidae Mjöberg. The latter family has, however, been further split into three avicolous sub-families namely Menoponinae Harrison, Ancistroninae Harrison and Menacanthinae Eichler. The number of described genera has increased very rapidly in recent years.

The species belonging to families Laemobothriidae and Menoponidae are presented in this paper. The table given below is based on the works of various investigators and will be found useful in recognizing genera dealt with in this paper.

TENTATIVE KEY TO FAMILIES, SUB-FAMILIES AND GENERA OF BIRD-INFESTING AMBLYCERA.

1. Antennae lying in grooves at the sides of head; abdomen always with lateral notches at the junction of different segments..... Family: MENOPONIDAE.... 2
- Antennae situated in bulbous capsules which open ventrally and constitute conspicuous lateral swellings on the head; abdomen without any lateral notches at the junction of different segments..... Family: LAEMOBOTHRIDAE.... 20
2. Forehead provided with a ventral spinous or uncinatè process, arising from a position behind each palpus..... Sub-family: MENACANTHINAE.... 3
- Forehead without such characters..... 6
3. Head squat, extremely broad, being more or less twice as wide across the temples as long, ocular slit present (on Columbæ). *Columbimenopon* gen. nov.
- Head less than twice as long as broad, temporal region of head much broader than forehead and prothorax..... 4
4. Oesophageal sclerite well developed, tergites with one or two rows of setae (on Galliformes)..... *Uchida* Ewing (1930)..... 5
- Oesophageal sclerite vestigial and modified..... 5
5. Forehead narrow in front, greatly reduced; mandibles situated almost near the anterior margin; tergites with two transverse rows of setae (on Galliformes)..... *Eomenacanthus* Uchida (1926)..... 6
- Forehead broadly rounded in front; mandibles situated a short distance behind the anterior margin; tergites with a transverse row of setae (on Passeriformes)..... *Menacanthus* Neumann (1912)..... 6
6. Posterior femora and certain abdominal sternites with combs of short and stiff spines.... Sub-family: COLPOCEPHALINAE.... 7
- Posterior femora and abdominal sternite without combs of spines..... Sub-family: MENOPONINAE.... 14
7. 2-3 fringes of stout setae curving upwards around the sides of the VIII abdominal sternite..... 8
- Fringes of stout recurved setae wanting..... 9
8. Forehead flatly rounded, truncate; ocular emargination acute; ventral surface of posterior femora and III abdominal sternite with 4-5 combs of short and stiff hairs (on Galliformes)..... *Galliferrisia* gen. nov.
- Forehead convex; ocular emargination squarish; posterior femora with three combs of short stiff spines on the ventral surface; two such combs on each side of the III abdominal sternite..... *Colpocephalum* Nitzsch (1818)

9. Ocular emargination present, not very deep; ocular slit present..... 10
 Ocular emargination deep; ocular slit wanting..... 12
10. Three combs of stiff and short setae on each side of third abdominal sternite..... 11
 Two combs of stiff and short setae on each side of third abdominal sternite; posterior femora with three combs of stiff and short setae on ventral surface (on Herodiones).....
Pseudocolpocephalum Qadri (1936)
11. Three combs on each side of fourth abdominal sternite; posterior femora with four or five combs and a group of irregularly scattered hairs on the ventral surface (on Cuculiformes).....
Cuculiphilus Uchida (1926)
 Fourth abdominal sternite without combs of setae; posterior femora with three combs of setae (on Strigiformes).....
Uluoecus subgen. nov.
12. Two combs of stiff and short setae on each side of third and fourth abdominal sternites; posterior femora with four combs and a group of irregularly scattered hairs on the ventral surface (on Herodiones).....
Ardeiphilus Bedford (1939)
 Two combs of stiff and short setae on each side of III abdominal sternite; IV sternite without such combs of setae; posterior femora with three ventral combs of setae..... 13
13. Genitalia of male with a chitinous structure near the apex of the basal plate, usually complex.....
Allocolpocephalum Qadri (1939)
 Genitalia of male without a chitinous structure near the apex of the basal plate (on Picidae).....
Picusphilus subgen. nov.
14. Meso- and meta-thorax fused..... 15
 Meso- and meta-thorax distinctly separated..... 16
15. Forehead with distinct slit in front of eyes; gular region without gular plate.....
Menopon Nitzsch (1818)
 Forehead truncate, with shallow or deep notch in front of the eyes; posterior margin of forehead straight, meeting the temples at right angles; gular region with well chitinized quadrate plate; dark species, (on Pterocletes).....
Neomenopon Bedford (1920)
16. Thorax very large and heavily chitinized, meso- and meta-thorax divided by a distinct suture none of them similar in shape to the abdominal segments; legs short, stout and heavy (on Anatidae).....
Trinoton Nitzsch (1918)
 Thorax normal; meso- and meta-thorax separated by indistinct suture, both somewhat similar to abdominal segments..... 17
17. Forehead with a distinct notch in the lateral margin, just before the eyes; femoral and sternal patches small, composed of spines which are as large as those constituting the general chaetotaxy and sometimes merging with it (on Charadriiformes).....
Actornithophilus Ferris (1916)
 Lateral margins of forehead continuous with the eyes..... 18
18. Head less than twice as broad as long; second abdominal sternite usually beset on each side with a group of heavy, belonoid spines on well-formed callosity; certain abdominal sternites and ventral face of posterior femora with indistinct patches of spines; male genitalia with moderately long basal plate, continuous distally with a broad rounded lamina at the base of which the stout apically recurved parameres are set..... 19
 Head twice as broad as long, sometimes more; II abdominal sternite without a group of heavy spines; sternites IV-VI with setae, more numerous on lateral margins; posterior femora with fine setae on venter, usually not sufficient to form a brush; male genitalia with basal plate short, narrow in front, gradually broadening towards apex, where it expands; parameres present (on Charadriiformes).....
Austromenopon Bedford (1939)
19. Genital armature with complex chitinous structure near the apex of the basal plate (on Passeriformes).....
Myrsidea Waterston (1950)
 Genital armature without chitinous structure near the apex of the basal plate (on Coraciiformes).....
Alcediniphilus gen. nov.
20. Clypeus not excavated or concave (on Accipiteres).....
Laemobothrion Nitzsch (1918)

Sub-family: MENACANTHINAE

COLUMBIMENOPON gen. nov.

Small, wide-bodied form with the following diagnostic characters:—

Head almost twice as broad as long; forehead flatly rounded in front with a minute median notch; lateral margins without ocular emargination, but with narrow slit in front of well developed eyes; ocular fleck well marked; temples slightly expanded, rounded marginally; ventrum with well built skeleton to support mandibles, continuous to the anterior clypeal margin; mandibles situated a short distance behind the anterior margin; antennal fossae backed by chitinized area; antennae 4-segmented; a backwardly directed rectate, recumbant, moderately long, peg-like, spinous process arising near the base of each palpus; oesophageal

sclerite and glands present; gular plate not well chitinized, quadrate, furnished with lateral hairs. Pro-thorax well built, winged; meso-thorax narrow, indistinctly separated; meta-thorax short; sternal plates well developed. Legs normal, third femora with distinct patches of setae. Abdomen short, orbicular, last segment entire, flatly rounded; ventral surface with patch of fine setae on III, IV, and V sternites.

Exhibit sexual dimorphism, last segment in male being devoid of fringe of hairs. Genitalia simple, basal plate short, furnishing short slender paramere and a quadrate, flatly rounded lamina. The paramere with the distal end slightly curved outward.

This genus is closely allied to *Menacanthus* Neumann (1912) and *Uchida* Ewing (1930), from both of which it can be distinguished by the shape of the head, ventral patches of hairs on III femora and III-V abdominal sternites.

This genus is apparently confined to pigeons and doves (Columbae).

Type of the genus: *Columbimonopen modestus* sp. nov. (*vide infra*) ex the Indian Ring Dove, *Streptopelia d. decaoctis* (Frisal.).

1. *Columbimonopen modestus* sp. nov.

Female (Text-fig. 1a): pale yellow with broad body, almost spherical abdomen.

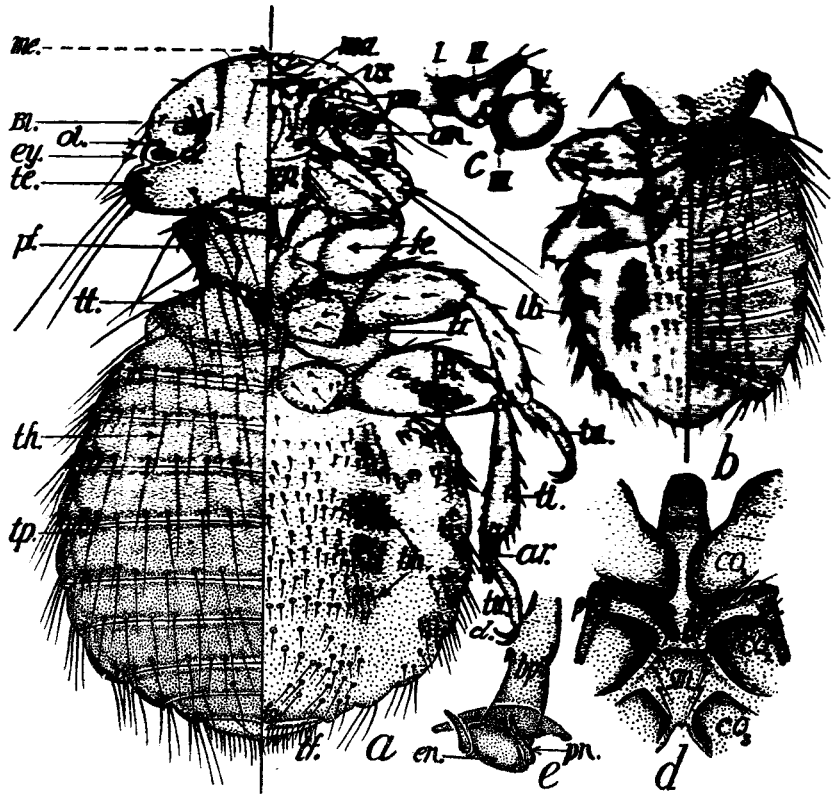
Head very broad, almost twice as broad as long; pre-antennal region narrow; front broadly rounded, with a minute median notch, furnished with dorsal and ventral hairs as shown in text-figure; ocular slit narrow; eyes well developed, ocular fleck trilobed; ocular fringe obsolete, inferior, not projecting laterally; temples narrow, slightly expanded, margins rounded, bearing two short and three long hairs; occipital margin sinuous, edged with narrow band, bearing two long hairs on each half; vertex with one long hair; two long, one short and two minute hairs on each side of the dorsum of head. Ventrums with well developed skeleton to support mandibles, reaching as far as on each side of clypeal region; peg-like process arising near the base of palpi; clypeus narrow; mandible weak; gular plate squarish not well chitinized, bearing four hairs on each side. Antennae exhibit very outstanding characters (Text-fig. 1c), segment I short, squat, on which fits exactly the pedicel which is more or less of the shape of an antique Egyptian lampion, one side produced into lobe or arm (antennule), extending latero-apically far forwards, antennule being larger than the body of the joint; segment III calyciform, with shallow cup and short peduncle, which is immediately inserted in the well marked depression of lampad segment II; segment IV irregularly spherical, resting obliquely in shallow cavity of the calyx; apical depression well defined.

Pro-thorax large, expanded; lateral angles obtuse, with a spine and long hair; posterior lateral margin straight, practically confluent with the posterior margin, strongly convergent, each bearing two long and two minute setae; posterior margin convex and bears three long hairs on each side of a median protuberance; transverse bar and lateral bands well developed, a short spine on the bar-end. Meso-thorax narrow, suture indistinct. Meta-thorax short, trapezoidal; lateral margin diverging posteriorly with two minute spines; lateral angles produced with a long and several short spines; posterior margin convexo-concave, with four long hairs and two spines on each half, disposed of as shown in figure. Legs well built, third femora with definite patch of short hairs. Sternal plates (Text-fig. 1d) well formed.

Abdomen short, broad, orbicular, almost round; segments projecting, dorsum with a transverse row of long hairs to each segment, of which lateral 2-3 becoming spinous; last segment fringed with fine hairs. Ventrums medially hairy; third to fifth sternites with group of hairs on each end, merging more or less with general chaetotaxy; pleural plates with spinous hairs.

Male (Text-fig. 1b): similar to female, but smaller and chaetotaxy more scarce; last segment parabolic with four small marginal hairs. Genitalia (Text-fig. 1e)

simple; basal plate short, faintly chitinized, continuous distally with a squarish flatly rounded lamina; at each side of which is a slender, short paramere with slightly curved outward distal end.



TEXT-FIG. 1. *Columbimenopon modestus*, sp. nov.: (a) dorsal and ventral aspects of female, (b) ventral and dorsal aspects of thorax and abdomen of male, (c) antenna of female (enlarged), (d) ventral aspect of thorax (enlarged), and (e) male genital armature (enlarged). (For lettering and explanation of figures see page 201.)

Measurements (mm.) of Columbimenopon modestus sp. nov.

	Female (Holotype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.426	.....	1.025	.....
Head	0.293	0.560	0.266	0.426
Pro-thorax	0.160	0.360	0.133	0.293
Ptero-thorax	0.160	0.440	0.106	0.346
Abdomen	0.813	0.729	0.520	0.453
Head-index ¹ (breadth : length)	1.91		1.601	

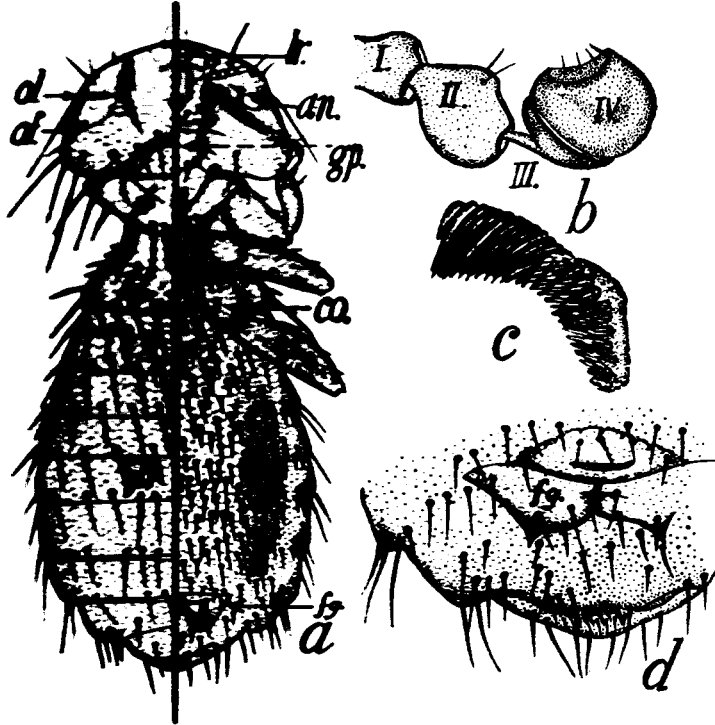
¹ Head-index is the proportion of the breadth to the length of the head (Clay, 1938 and 1940).

Holotype: A female, *Allotype*: A male; both from Lyallpur, 12. viii. 1929, ex the Indian Ring-Dove, *Streptopelia d. decaocta* (Frial.); on slide No. MA. 049. *Paratypes*: 3 females in spirit (same data as above).

This species does not resemble any species so far described from doves and pigeons.

2. *Columbimenopon chanabensis* sp. nov.

Female (Text-fig. 2a): body yellowish-pale, with pale-brownish markings on head.



TEXT-FIG. 2. *Columbimenopon chanabensis*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) gastric teeth (enlarged), and (d) genital plate on VIII abdominal sternite (enlarged).

Head extremely broad, being slightly more than twice as wide across the temples as long; forehead flatly rounded in front, a minute hair on each side of the middle; then two minute hairs, one short hair and a long hair on the lateral margin, which is continuous to the eyes, with a narrow ocular slit; a long and a short hair on each side of the dorsum of head. Eyes large, fleck oblong with a minute spine. Temples rounded with one long, one short and two minute marginal hairs and a long submarginal hair. Occipital margin concave, bearing three long hairs on each half. Ventrum with yellowish-brown skeleton to support mandibles, continuous to the anterior clypeal region. Antennal fossae covered above by a transversely slitted expansion of head; ventral expansion reduced, narrow, backed up by a highly chitinized area. Antennae four-jointed (Text-fig. 2b); scape small, II joint irregularly pyriform, with narrow base inserted apically in segment I, outer margin slightly produced; third joint calyciform with very shallow cup and short and narrow peduncle which is immediately inserted in the well marked depression of segment II; segment IV spherical, resting in the shallow cavity of the calyx, latero-apical depression well defined, deep; visible chaetotaxy disposed of as in

figure. Spinous process arising from the base of each palpus, 0.055-0.060 mm. long. Gular region lightly chitinized, squarish, with four short lateral hairs, continuous anteriorly with chitinous framework giving articulation to mandibles. Oesophageal sclerite and glands well developed.

Pro-thorax large and winged; lateral angles acute, produced, each with a spine and a long hair; posterior lateral margin nearly straight, diverging posteriorly, practically continuous with the posterior margin, each with one short, one long and one fine hair; posterior margin convex with three long hairs on each side of a median cylindrical ridge; transverse band narrow, pale-yellow, distinct; lateral chitin bar pronounced, reaching as far as the scapular area. Meso-thorax narrow, lateral bands distinct, posterior suture indistinct. Meta-thorax trapezoidal, lateral margin slightly convex, with several spinous hairs; lateral angles produced with a long hair; posterior margin nearly straight with fine long hairs. Legs paler than thorax, marginal markings on femora and tibia narrow, spiny. Pro-sternum reduced, completely covered by the plate-like coxae of fore-legs; meso- and metasternites with several hairs.

Abdomen broadly elliptical, widest at the fifth segment; length of segment I shortest, that of II-VIII subequal, lateral margins of each with 2-3 spines; posterior lateral angles I-VII, each bearing two long hairs; posterior margins I-VII nearly straight, each bearing a submarginal row of 4-5 hairs on each half; segment VIII strongly concave posteriorly, bearing 4-5 hairs in the posterior angle and a hair on posterior margin; segment IX broadly rounded with six hairs on each posterior half. Ventral surface of each abdominal sternite bearing two or three transverse rows of short hairs. The most important feature is the occurrence of a complex chitinous structure on the VIII abdominal sternite, shown in figure (Text-fig. 2d). Gastric teeth present (Text-fig. 2c).

Male: not available.

Measurements (mm.) of Columbimenoapon chanabensis sp. nov.

	Female (Holotype).		Female (Paratype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.484	.....	1.532	.....
Head	0.252	0.534	0.252	0.563
Pro-thorax	0.204	0.388	0.242	0.408
Ptero-thorax	0.155	0.417	0.165	0.446
Abdomen	0.873	0.631	0.873	0.534
Head-index	2.119		2.234	

Holotype: A female from Lyallpur, 1-ix-1930, on slide No. MA. 044, ex (?) the Himalayan Griffon Vulture, *Gyps himalayensis* Hume. *Paratype*: one female on slide No. MA. 044P (same data as above).

This parasite is probably a straggler and appears to have transferred itself from a pigeon or dove on which the host might have preyed prior to shooting or it might have reached this host from the game bag in which the bird was carried.

This species almost resembles *Columbimenoapon modestus*, sp. nov. (*vide supra*), but from which it can be distinguished by differences in shape of antennae, chaetotaxy and in some characters of the posterior region of the abdomen.

3. *Columbimenoapon* sp.

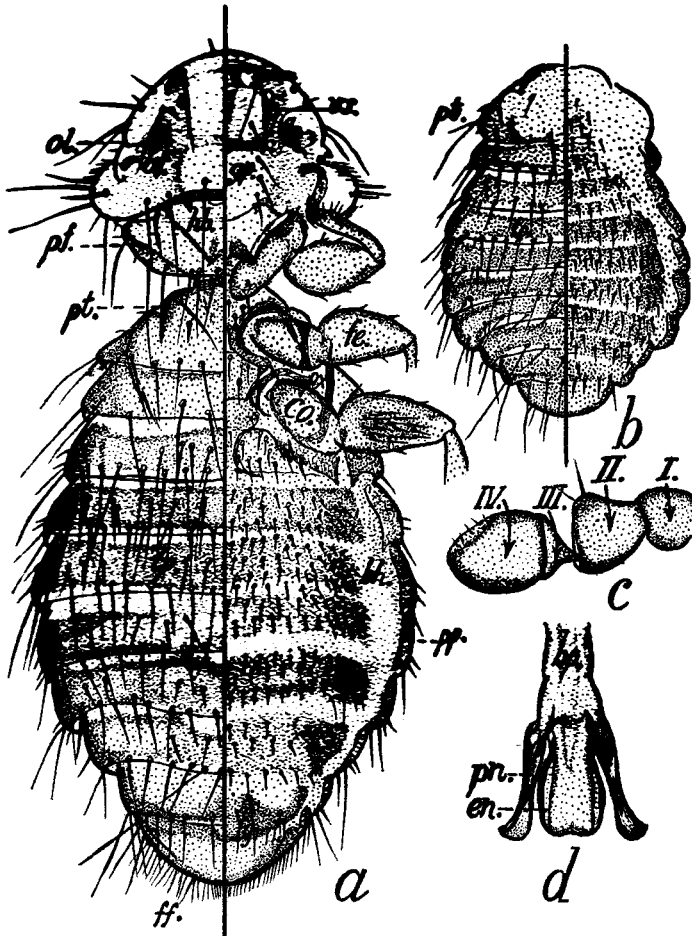
Two female specimens were collected from the Indian Blue Rock Pigeon, *Columba livia intermedia* Strick; shot in Lyallpur. The poor condition of these specimens

has made an exact determination impossible. However, it is apparent that the specimens are closely related, if not conspecific, with *Columbimenopon modestus*, sp. nov. (*vide supra*). It has been considered advisable to leave the exact identity until more material is available to me.

4. *Uchida abdominalis indicus* subsp. nov.

Piaget (1880) described *Menopon abdominalis* from the Grey Quail, *Coturnix c. coturnix* Linn. While the specimens before me agree fairly well with this species, differences, however, exist in the size of certain parts, general chaetotaxy of abdominal tergites, and the length of the hairs on the posterior margin of the last abdominal segment.

Female (Text-fig. 3a): body pale-brownish, with dark-brown markings on head, thorax and abdomen.



TEXT-FIG. 3. *Uchida abdominalis* var. *indicus* nov.: (a) dorsal and ventral aspects of female, (b) dorsal and ventral aspects of abdomen of male, (c) antenna of female (enlarged), and (d) male genital armature (enlarged).

Head broad, somewhat lunate in shape, front parabolic with a minute hair on each side of the middle; two short hairs and a long hair on each side, a long

and a fine hair in the lateral angle; a short and a long hair on the dorsum, and a long submarginal hair near the anterior frontal margin; ocular slit distinct; eyes large and flat, inconspicuously emarginated; ocular fleck irregularly oblong, bare; temples narrowly expanded, rounded, each with three long, two short and several minute submarginal hairs; occipital margin slightly concave, edget with dark-brown band, bearing three long hairs on each half. Ventral surface with highly chitinized framework, running forward to the anterior margin of the head, extending to the inner border of the antennal fossae, and continued downwards to the occipital margin; a central narrow bar in the gular region; gular plate quadrate, chitin thin, very lightly pigmented with four long lateral hairs; mandibles situated well towards the frontal margin; labrum almost touching the anterior clypeal margin. Antennal fossae deep; dorsal flap complete, with a narrow ocular slit; ventral flap half as broad as dorsal flap, with a comb of hairs on latero-posterior margin. Antennae 4-jointed (Text-fig. 3c), scape well developed; II joint pear-shaped; III joint calyciform; IV joint conical with excavated top which is furnished with sensory hairs. Spinous process moderately long, 0.075 mm. in length.

Pro-thorax large, expanded; lateral angles produced, rounded, each with a spine and a long hair; posterior lateral margin almost straight, each bearing a minute hair and a long posterior hair; posterior margin straight with four long hairs on each side; transverse band pale-yellow; longitudinal chitinous bar dark-brown. Meso-thorax rudimentary, lateral bands dark-brown, a long hair and a spine also present. Meta-thorax short, dorsally fused with the meso-thorax, broad; lateral margins very slightly concave, widely divergent posteriorly, each bearing two minute spines; posterior lateral angles with two long hairs; posterior margin almost straight, set with one spine and four long hairs. Legs short, pale, with narrow marginal markings and a few scattered hairs; ventral surface of hinder femora with a group of short, stiff hairs. Sternal plates well developed, pericoxal plates highly chitinized, chaetotaxy as shown in figure 3a.

Abdomen ovate, widest at the IV segment; length of the segments almost equal, but segment I slightly narrow; posterior angles projecting a little, each bearing two long hairs; posterior margin of segments I-V nearly straight, those of VI and VII concave laterally and convex in the middle; segments I and VIII with one row and segments II-VII with two transverse rows of hairs, last segment rounded, with a fringe of colourless hairs. Transverse bands distinct with clear intersegmental area, entire on segments I-VIII; segment IX with band along posterior margin; lateral bands slightly more pigmented, brown. Ventral surface of each abdominal sternite with three transverse rows of hairs; group of weak setae on each side of III-VII sternites, merging in transverse rows.

Male (Text-fig. 3b): similar to female, but size considerably small, last segment devoid of fringe of fine hairs. Genitalia (Text-fig. 3d) pale, but well chitinized, of the type common to the genus.

Measurements (mm.) of Uchida abdominalis indicus, subsp. nov.

	3 males.		3 females.	
	Length.	Breadth.	Length.	Breadth.
Total	1.163-1.290	.....	1.819-1.924	.....
Head	0.261-0.291	0.485-0.522	0.335-0.358	0.612-0.649
Pro-thorax	0.149-0.164	0.313-0.358	0.185-0.224	0.448-0.493
Ptero-thorax	0.119-0.171	0.371-0.425	0.201-0.238	0.559-0.642
Abdomen	0.619-0.701	0.485-0.559	1.119-1.157	0.859-0.970
Head-index	1.769-1.858		1.709-1.913	

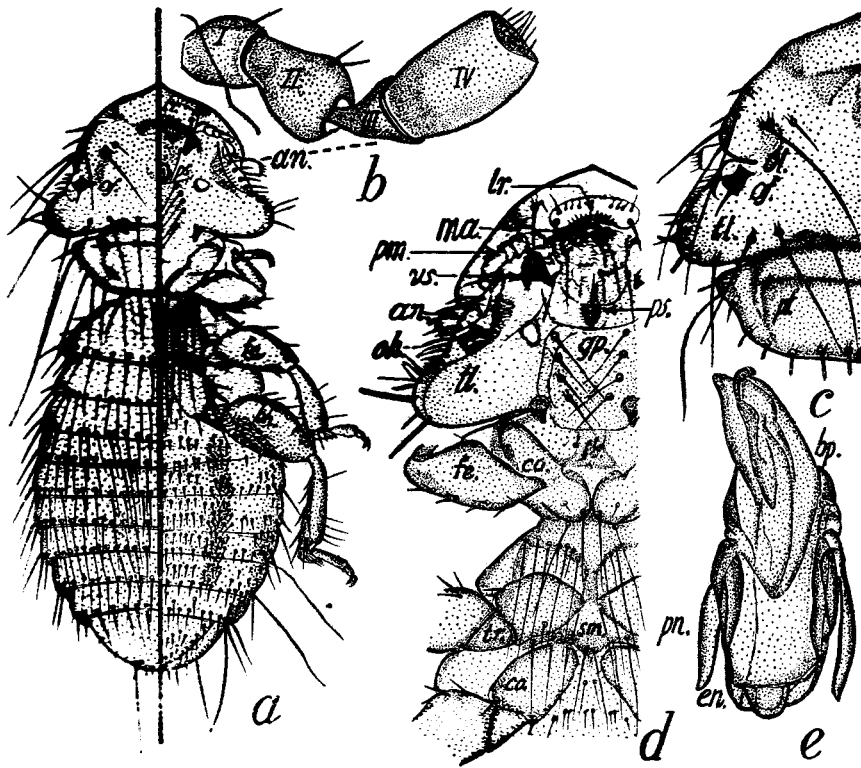
Piaget (1880) gave the measurements of *M. abdominalis* (female) as 2.05 mm. \times 0.97 mm. The head-index calculated = 1.735.

Holotype: A female on slide No. MA. 054 H, *Allotype*: A male on slide No. MA. 054 A; *Paratype*: two females and two males on slide No. MA. 054, all from Lyallpur, 11.ix.1931, ex the Common Grey Quail, *Coturnix c. coturnix* (Linn.).

5. *Uchida kalatitar*¹ sp. nov.

Male (Text-fig. 4a): body broad, pale-yellow; with deep-yellow markings on head; pleural plates present but not well developed.

Head short; front broadly parabolic, slight angulation on meson with one minute hair on each side, two short and three long hairs on lateral angles; two short and a long hair on dorsum, situated a short distance above the ocular slit; ocular slit narrow, backed with brownish blotch. Eyes with double cornea; ocular fleck black, irregularly quadrate with a short posterior seta; ocular fringe distinct. Temples expanded, each lobe bearing five long and several short hairs. Occipital margin concave, narrowly edged with yellowish-brown band, bearing four long hairs on each side of the median line. On the ventrum, mandibles situated a short distance behind the anterior margin; labrum well built, bearing numerous hairs. Oesophageal sclerite and glands well developed; jugular plate distinct, quadrate,



TEXT-FIG. 4. *Uchida kalatitar* sp. nov.: (a) dorsal and ventral aspects of male, (b) antenna of male (enlarged), (c) dorsal aspect of head and pro-thorax of male (enlarged), (d) ventral aspect of head and thorax of male (enlarged), and (e) male genital armature (enlarged).

¹ *Kalatitar* is the vernacular name of the Indian Black Partridge.

concolorous with the head, bearing four long hairs on each side. Antennae (Text-fig. 4b) prominent, 4-jointed, I segment squat; II segment pyriform; III segment ventricose at the apex and stalked, inserted apically in segment II; IV segment cylindrical, truncate and excavated at the apex with several long hairs. Spinous process short, claw-shaped, 0.031-0.034 mm. long.

Pro-thorax large, expanded with acute wings; lateral angles with a short spine; posterior-lateral margins slightly concave each bearing three or four long hairs and a short spine; posterior margin nearly straight with eight long hairs and a short median protuberance; transverse bar distinct, bearing a short prickle on each end; lateral bars curved, very distinct. Meso-thorax rudimentary, lateral band distinct, completely fused posteriorly with meta-thorax. Meta-thorax short, broad; with slightly convex widely diverging sides, bearing about six spines; posterior lateral angle with two long hairs; posterior margin almost straight or slightly convex, bearing about sixteen long and a short hair. Legs concolorous with the thorax, marginal markings on femora and tibia narrow, yellowish; hind femora with a ventral patch of short hairs. Pro-sternal plate present, pale, quadrate, expanded basally, with two fine short hairs; coxae of first pair of legs almost touching each other. Ptero-sternum with numerous long hairs, disposed of as shown in figure 4d.

Abdomen broadly elliptical, widest at the fourth segment, length of segments nearly subequal; posterior angles of segments slightly projecting; posterior margins nearly straight, bearing about twenty to twenty-eight hairs; posterior margin of the last segment broadly rounded, bearing one long and several short hairs on each side. Ventral surface of each abdominal sternite bearing two rows of short and weak hairs, and a patch of numerous short hairs on each side of IV-VI sternites, merging more or less with general chaetotaxy. Pleural plates distinct with several short, irregularly scattered setae. Last segment with a distinct genital plate bearing about eight short hairs on either side.

Genitalia (Text-fig. 4e) characteristic, basal plate short; parameres thinly chitinized and pointed towards their free ends; distal plate flat, with well chitinized slender rods on each side.

Female: not available.

Measurements (mm.) of Uchida kalatitar sp. nov.

3 Males.	(Holotype).		(Paratype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.299	..	1.193-1.269	....
Head	0.308	0.485	0.240-0.288	0.451-0.461
Pro.thorax	0.173	0.384	0.154-0.163	0.356
Ptero.thorax	0.145	0.432	0.145	0.384
Abdomen	0.673	0.548	0.654-0.673	0.461-0.481
Head-index	1.575		1.579-1.921	

Holotype: A male mounted on slide No. MA. 056H from Lyallpur, 12.xi.1933, ex the Indian Black Partridge, *Francolinus f. asiae* Bonap. *Paratypes*: two males on slide No. MA. 056P (same data as above).

This form resembles *Uchida perdicis* (Denny) from *Perdix cinerea*. It is not possible to sort out differences from Denny's brief description. However, it is apparent from the figure, that the new species is distinguished from it, amongst other characters, by the absence of the fuscous spot on each side of the clypeus and by considerably small size.

6. *Eomenacanthus stramineus* (Nitzsch).1874, *Menopon stramineum*, Nitzsch, in *Giebel's Ins. Epiz.*, p. 291.

This familiar species of louse has been recorded from practically all parts of the world *ex* the Domestic Fowl, *Gallus g. domesticus* Linn. Nitzsch (1874), Piaget (1880) and Sugimoto (1920) also recorded it from various other birds, viz., *Meleagris gallopavo*, *Euplocames cuviere*, *Pavo m. muticus* Linn., *Phasianus colchicus*, etc. It is a common parasite of domestic fowls in India, and the specimens referred to here were taken off the Domestic Fowl from Lyallpur, Lahore, Attari, Amritsar, Dhariwal, Pathankot and Bijnor (U.P.).

Measurements (mm.) of Eomenacanthus stramineum (Nitzsch).

	15 females.		20 males.	
	Length.	Breadth.	Length.	Breadth.
Total	2.30-2.94	....	2.46-2.90	....
Head	0.30-0.36	0.60-0.68	0.30-0.40	0.60-0.68
Pro-thorax	0.28-0.30	0.46-0.56	0.26-0.32	0.48-0.52
Ptero-thorax	0.20-0.24	0.50-0.60	0.20-0.30	0.50-0.56
Abdomen	1.50-2.00	0.76-0.90	1.60-1.98	0.76-0.90
Head-index	1.833-2.006		1.7-2.0	

Piaget (1880) gave the measurements of female and male as 2.75 mm. \times 1.00 mm. and 2.95 mm. \times 0.90 mm. respectively, while head-index (head length: breadth) calculated = 1.55 and 1.625.

7. *Menacanthus gonophoeus* (Nitzsch).

This species was first described from specimens obtained *ex* the Raven, *Corvus corax* Linn.; in Europe and since then it has been recorded from the Pied Crow, *Corvus albus* Mull.; the Black Crow, *Heterocorax capensis* Lcht.; the Rook, *Corvus frugilegus* Linn.; etc., from different parts of the world.

The present material was collected from the Punjab Raven, *Corvus corax laurencei* Hume; and the Eastern Rook, *Corvus frugilegus tschusii* Hartert; from various parts in the Punjab.

8. *Menacanthus masudi* Qadri.1935. *Menacanthus masudi*, Qadri, *Z. Parasit.*, VIII, p. 227, fig. 2.

Qadri (1935) described it from specimens taken off the Common Indian House Crow, *Corvus s. splendens* Vieill.; in Aligarh. The specimens referred to here were collected from the type-host in Lyallpur, 19.ii.1936.

Measurements (mm.): Length \times Breadth.

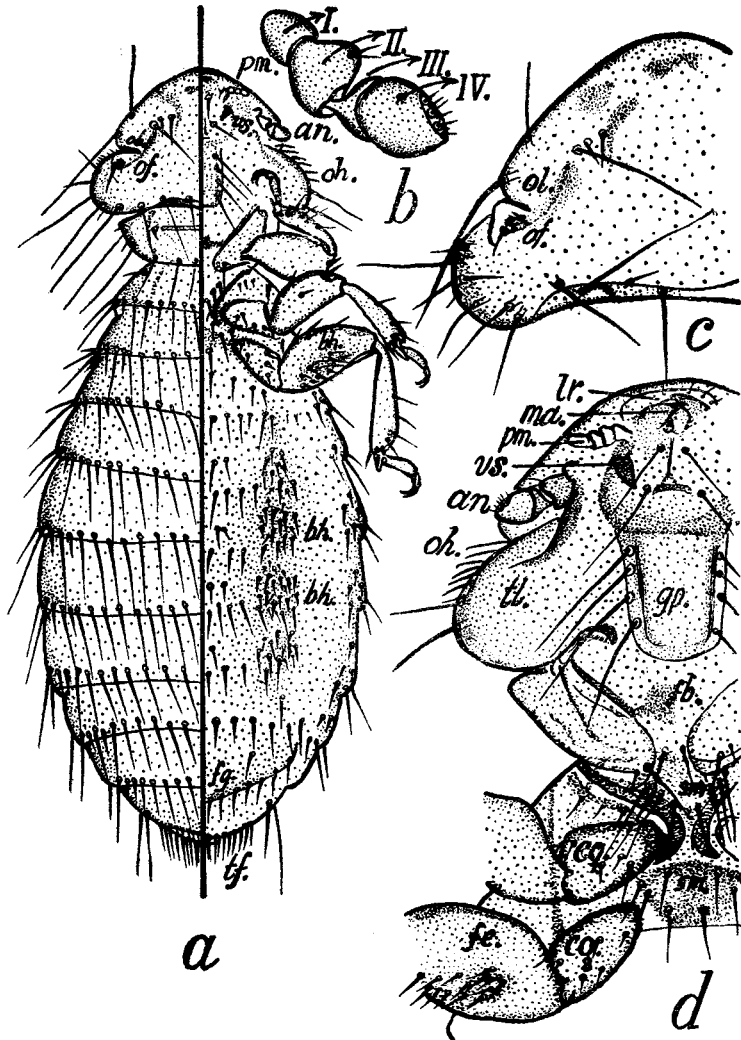
Female: Total 2.30 \times 0.96, head 0.30 \times 0.70, pro-thorax 0.22 \times 0.56, ptero-thorax 0.18 \times 0.60, abdomen 1.06 \times 0.96, head-index 2.33.

Qadri (1935) gave the measurements of female and male as 2.5 mm. \times 0.91 mm. and 1.945 mm. \times 0.74 mm., while head-index calculated = 2.109 and 1.937 respectively.

9. *Menacanthus guldum*¹ sp. nov.

Female (Text-fig. 5a): Ground colour of the body pale, with yellowish-brown markings on head and thorax, and faint abdominal bands.

Head short, broad, front parabolic; two long hairs on the lateral margin, two short hairs and a long hair on the dorsal surface of head; ocular slit narrow and deep. Eyes large, flat, with a slight latero-medial concavity; ocular fleck black, kidney-shaped, with a short posterior hair. Temples expanded, rounded; bearing a fringe of short, stiff hairs on the anterior margin, just below the eyes; each lobe posteriorly furnished with two short, three long and several fine hairs. Occipital



TEXT-FIG. 5. *Menacanthus guldum*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) dorsal aspect of a portion of head showing ocular slit and eye (enlarged), and (d) ventral aspect of head and thorax (enlarged).

¹ *Guldum* is the vernacular name for the Punjab Red-Vented Bulbul.

margin slightly concave, edged with very narrow, pale-brown marginal band and dark-brown blotch, bearing six hairs. On the ventral aspect of the head, mandibles situated fairly close to the anterior margin; clypeal region and labrum reduced; oesophageal sclerite vestigial, oesophageal glands wanting; chitinous framework for articulation of mandibles well developed; antennal fossae not deep, dorsal flap entire, ventral flap partial, posterior inner border chitinized, pale-brown. Antennae (Text-fig. 5b) 4-jointed, scape simple and short, segment II pear-shaped with bluntly produced outer margin, segment III calyx-like, with obliquely straight basal stalk driven subapically into segment II, segment IV cone-shaped with several sensory fine hairs confined to outer latero-apical margin. Quadrate ventral sclerite weak with four long lateral hairs. Spinous processes hyaline, blunt, peg-like, small, about 0.035 mm. long.

Pro-thorax short, protruded, lateral angles obtusely expanded, each with a short spine; posterior lateral margin almost straight, each with a spine and two long hairs; posterior margin straight, furnished with six long hairs. Transverse bar distinct; longitudinal bar yellowish-brown, well developed towards the scapular margin, a short hair at the meeting place of transverse and longitudinal bars. Mesothorax reduced, lateral band distinct, yellowish-brown. Meta-thorax short, almost of the size of pro-thorax; lateral margins straight, divergent posteriorly, each with a spine on the anterior margin, each posterior angle with two long hairs and a spine, posterior margin almost straight with two spines and twelve long hairs. Legs concolorous with the body, hinder femora with thin patches of short hairs. Pro-sternum present, with a central quadrate plate and lateral chitinized arm, running along the procoxal plates; meso- and meta-sternum well separated with several long hairs, meso- and meta-legs with well chitinized pericoxal plates.

Abdomen broadly elliptical, widest at IV-V segments, length of segments subequal, posterior angles produced, each bearing two long hairs; posterior margin almost straight each furnished with sixteen to twenty-four hairs of which outer 2-3 are spinous; posterior margin of the last segment broadly rounded with two long hairs on each side and a fringe of fine hairs between them; tergal plates faintly coloured, distinct, entire. Ventrum with two transverse rows of hairs, anterior one being small and the posterior one entire; group of several hairs on each side of IV-VI sternal plates, merging more or less with transverse rows of hairs. Pleural plates with several irregularly scattered spinous hairs. Genital plate distinct, lying on VIII-IX sternites, posterior margin with several short hairs.

Male: not available.

Measurements (mm.): Length × Breadth.

Holotype (Female): Total 1.639 × 0.713, head 0.277 × 0.509, pro-thorax 0.139 × 0.370, pterothorax 0.140 × 0.389, abdomen, 1.083 × 0.713, head-index 1.845.

Holotype: A female from Lyallpur, 14.i.1928, on slide No. MA. 018, ex the Punjab Red-Vented Bulbul, *Molpastes cafer intermedius* (Jerdon).

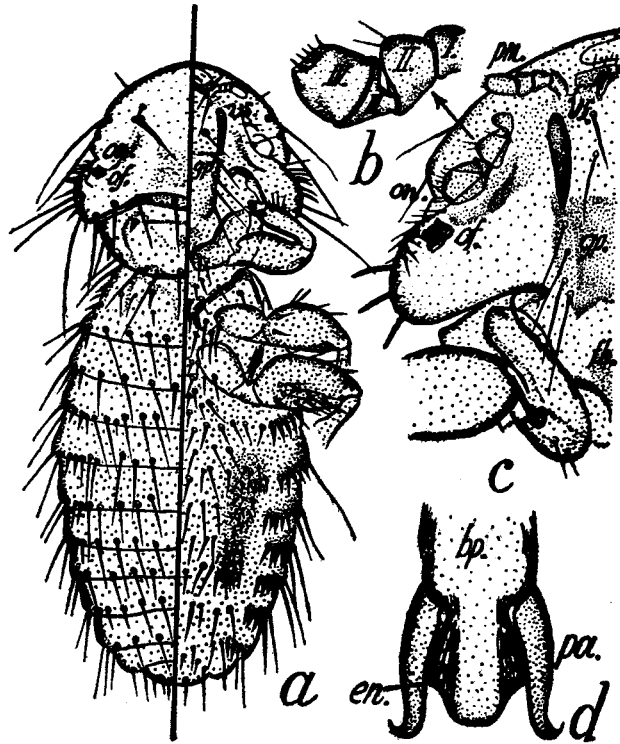
This species is close to *M. microsceli* Uchida from the Brown-eared Bulbul, *Microscelis amaurotis*; but differs from it, amongst other characters, in the general chaetotaxy and shape of the last abdominal sclerite.

10. *Menacanthus safedgal*¹ sp. nov.

Male (Text-fig. 6a): very small, wide bodied form; ground colour brownish-yellow with dark-brown markings on head.

¹ *Safedgal* is the vernacular name for the White-cheeked Bulbul.

Head comparatively large, pre-antennal region almost twice as long as the post-antennal region, front broadly parabolic; one short and two long hairs on the



TEXT-FIG. 6. *Menacanthus safedgal*, sp. nov.: (a) dorsal and ventral aspects of male, (b) antenna of male (enlarged), (c) ventral aspect of a portion of head and pro-thorax of male (enlarged), (d) male genital armature (enlarged).

lateral margin; two short and a long hair on each side of the dorsum of head; ocular slit narrow, indistinct. Eyes large, double cornea, with nearly quadrate fleck, bare. Temples slightly expanded; margin flatly rounded, each bearing three long and several subequal hairs, fringe of stiff hairs along the margin, just below the eyes. Occipital margin concave, edged with dark-brown band on the lateral margin, bearing eight long hairs. On the ventrum, mandibles situated a short distance behind the anterior margin; labrum distinct with numerous short hairs irregularly scattered on the posterior margin, oesophageal sclerite and glands wanting, gular plate faintly chitinized, quadrate with posterior concavity, bearing four long hairs on each side. Antennal cavity completely covered above, lower flap almost one-third of upper flap in breadth; inner chitin of the fossa dark-brown. Antennae (Text-fig. 6b) 4-segmented, scape quadrate, placed over it is the irregularly pyriform segment II, segment III calyciform, with shallow cup and short peduncle inserted apically on one side of segment II; segment IV irregularly cone-shaped with a grooved subapical margin. Spinous process (Text-fig. 6c) large, reaching as far as the imaginary line joining the eyes, 0.073–0.078 mm. long.

Pro-thorax large, protruded, lateral angles rectangular, rounded, each with a spine; posterior lateral margin almost straight, with two long hairs and a spine in between; posterior margin slightly convex, with four long hairs on each side of

median conical protuberance; transverse bar distinct, with short median longitudinal bar running posteriorly and a spine on each lateral end; lateral bars distinct, reaching as far as scapular region, dark-brown. Meso-thorax fused with the posterior segment; lateral bar distinct, reaching as far as pro-thorax, running inwards for some distance and then backwards and inwards; bearing a spine and 2-3 fine dorsal hairs on each half. Meta-thorax short, broader than pro-thorax, lateral margins straight, each with four spines; lateral bar distinct; posterior lateral angle with a spine and a long hair; posterior margin slightly convex, bearing two short spines and eight long hairs. Legs concolorous with the body, with brownish marginal markings and short marginal hairs; hind femora with brief ventral patch of stiff, short hairs. Pro-sternum distinct; central piece lightly pigmented, squarish blotch; lateral bars strongly built, running along the coxal plates as far as the scapular margin. Meso-sternum confined between the two meso-coxal bars, which almost touch each other in the middle, about four hairs on each posterior margin and several short ones scattered above. Meta-sternum four-sided, two hairs on each frontal margin and two such hairs on each posterior margin.

Abdomen elliptical, widest at the III segment, length of segments almost equal, posterior angles produced, each bearing one short and a long hair; posterior margins of segments I-III slightly convex, of segments IV-VI almost straight, and of VII-VIII concave; each segment bearing a transverse row of long hairs of which lateral 2-3 becoming spinous; segment IX with two hairs on the posterior projecting angle, last segment short, flatly rounded with about 8-10 marginal hairs. Abdominal sternites, each bearing a row of short weak hairs and several spinous hairs on each side; sternites III-VII with patch of fine hairs on each end, merging more or less with transverse row of hairs. Pleural plates well developed, with several spinous hairs on the posterior margins. Genitalia (Text-fig. 6d) pale, short, parameres faintly chitinized with strongly, outwardly recurved ends; endomeral plate well developed with well chitinized lateral ends.

Female: not available.

Measurements (mm.) Length × Breadth.

Holotype (Male): Total 1.128 × 0.455, head 0.250 × 0.431, pro-thorax 0.130 × 0.325, ptero-thorax 0.122 × 0.374, abdomen 0.626 × 0.455, head-index 1.728.

Holotype: One male from Kulu, 2.x.1939, on slide No. MA. 019, ex the White-cheeked Bulbul, *Molpastes l. leucogenys* (Gray).

The present species is distinguished from other species of the genus, by the shape of the head, body size, general chaetotaxy, by the male genitalia, and other details.

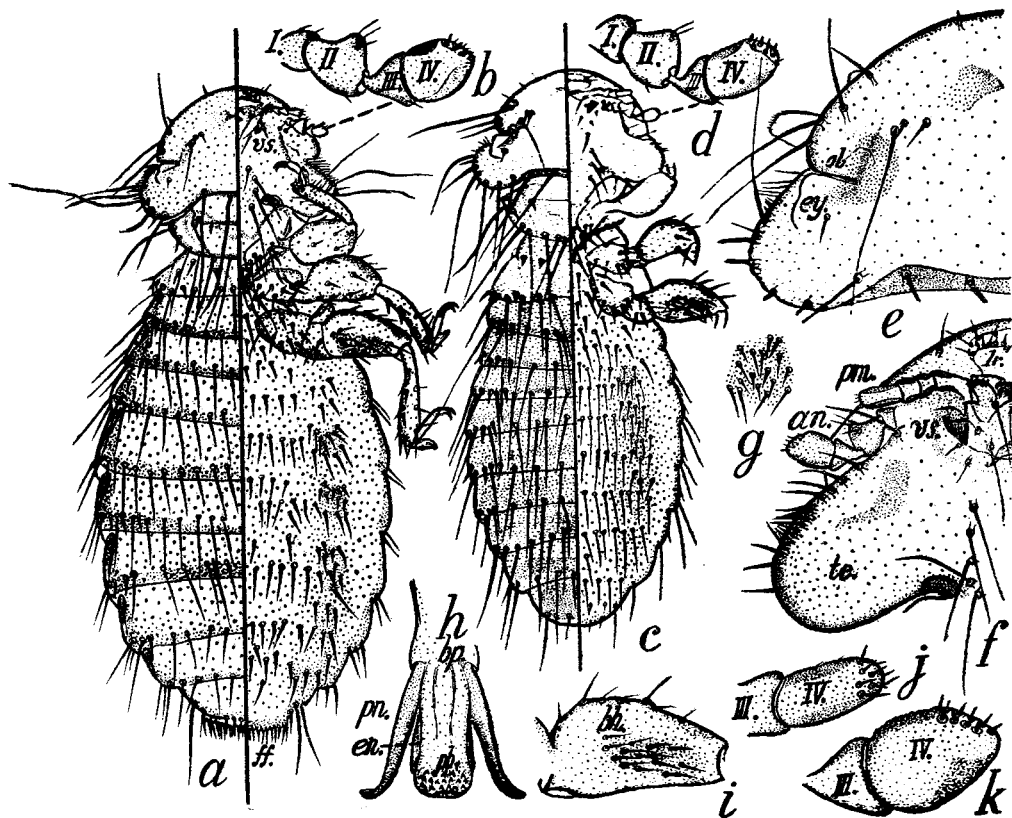
11. *Menacanthus dudiyalatora*¹ sp. nov.

Female (Text-fig. 7a): broadly elliptical, brownish-yellow, with yellowish-brown markings on head and thorax.

Head broad, slightly little less than twice as broad as long; front rounded, two short hairs on each side of meson; lateral margins with a small and three long hairs; lateral angles rounded; two short and one long hair on dorsum; ocular slit distinct. Eyes large, concave in the middle, ocular fleck oblong with a minute spine; temples swollen, slightly expanded, rounded with five long and several short hairs; a comb of stiff hairs on the ventrally produced margin, occipital margin slightly concave, edged with narrow, brown chitinous band, bearing three long hairs on each half. On the ventral side of head, mandibles situated a short distance

¹ *Dudiya-latora* is the vernacular name for the Indian Great Grey Shrike.

behind the frontal margin, labrum almost touching the forehead; frontal chitin yellowish-brown, continues backwards and downwards to the mandibular articulation. Antennal fossae deep; with well chitinized inner margin, dark-brown. Antennae (Text-fig. 7*b* and 7*k*) 4-jointed, projecting; scape simple and short; segment II irregularly pear-shaped, with subapical margin produced to one side; segment III ventricose at the apex and stalked, inserted apically in the middle of segment II; segment IV ovate, with numerous sensory apical hairs. Gular plate quadrate, faintly chitinized, each side with four long hairs of which the posterior one is longest. Spinous pegs, short and delicate, 0.033 mm. long.



TEXT-FIG. 7. *Menacanthus dudiyalatora* sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) dorsal and ventral aspects of male, (d) antenna of male (enlarged), (e) dorsal aspect of a portion of head showing the ocular slit and eye (enlarged), (f) ventral aspect of head (enlarged), (g) a patch of several irregularly scattered short hairs on the sides of III abdominal sclerite (enlarged), (h) genital armature of male (enlarged), (i) posterior femora, showing group of ventral hairs (enlarged), (j) terminal segment of maxillary palp (enlarged), and (k) terminal segment of antenna (enlarged).

Pro-thorax large, lateral angles each with a spine and a long hair; lateral margin slightly convex, each bearing a spine and a long hair, posterior margin nearly straight, bearing three long hairs on each half; transverse band distinct, a short spine on lateral ends; lateral longitudinal bars well chitinized, dark-brown. Meso-thorax reduced, distinct; meta-thorax short, broader than pro-thorax, lateral margin almost straight, diverging posteriorly; posterior angle with two spines;

posterior margin almost straight, bearing five long hairs and a spine on each half, legs somewhat paler than the body with distinct marginal markings and roughly scattered short hairs, posterior femora (Text-fig. 7i) with a group of hairs on the ventral surface. Pro-sternum reduced, the coxae of the foot-jaws almost touching each other; meso- and meta-sternum and peri-coxal plates well developed, bearing several long hairs as shown in figure.

Abdomen broadly elliptical, widest at IV-V segment, posterior angles of the segments projecting; each with two long hairs; posterior margins of the segments almost straight, each bearing a transverse row of 14-20 hairs of which lateral 2-3 becoming very small; posterior margin of the last segment truncate, bearing one long and a short hair on each side of a fringe of fine hairs and six short hairs dorsal to the fringe. On the ventral surface, each abdominal sternite with a transverse row of hairs and a smaller row of irregularly arranged short hairs; several irregularly scattered short hairs on each side also present, merging more or less with general chaetotaxy.

Male (Text-fig. 7c): similar to female, but size considerably small, abdomen smaller and narrower; ventrum with one row of hairs and a group of short hairs on each side of it. Genitalia (Text-fig. 7h) pale, well chitinized, basal plate long, distally flat, articulating with a flatly rounded lamina; on each side of which is a slender outwardly recurved paramere; preputial sac beset with curved spines.

Measurements (mm.) of Menacanthus dudiyalatora sp. nov.

	Female (Holotype).		2 males.	
	Length.	Breadth.	Length.	Breadth.
Total	1.826	..	1.513-1.591	.....
Head	0.281	0.534	0.242-0.292	0.505-0.553
Pro-thorax	0.165	0.398	0.155-0.194	0.359-0.378
Ptero-thorax	0.147	0.534	0.126-0.136	0.408-0.485
Abdomen	1.233	0.835	0.971-0.990	0.650-0.679
Head-index	1.9		1.906-2.086	

Holotype: A female from Lyallpur, 19-xi-1930, on slide No. MA. 023H. *Allotype*: A male from Lyallpur, 4.iv.1928, on slide No. MA. 023A *ex* the Indian Great Grey Shrike, *Lanius excubitor lahtora* (Sykes). *Paratype*: A male from Lyallpur, 27.ii.1936 (same data as above).

This species resembles *Menopon coarctatum* (Scopoli) from the Red-backed Shrike, *Lanius collurio* but is distinguished from it by the differences in size, the general chaetotaxy, and by the male genitalia.

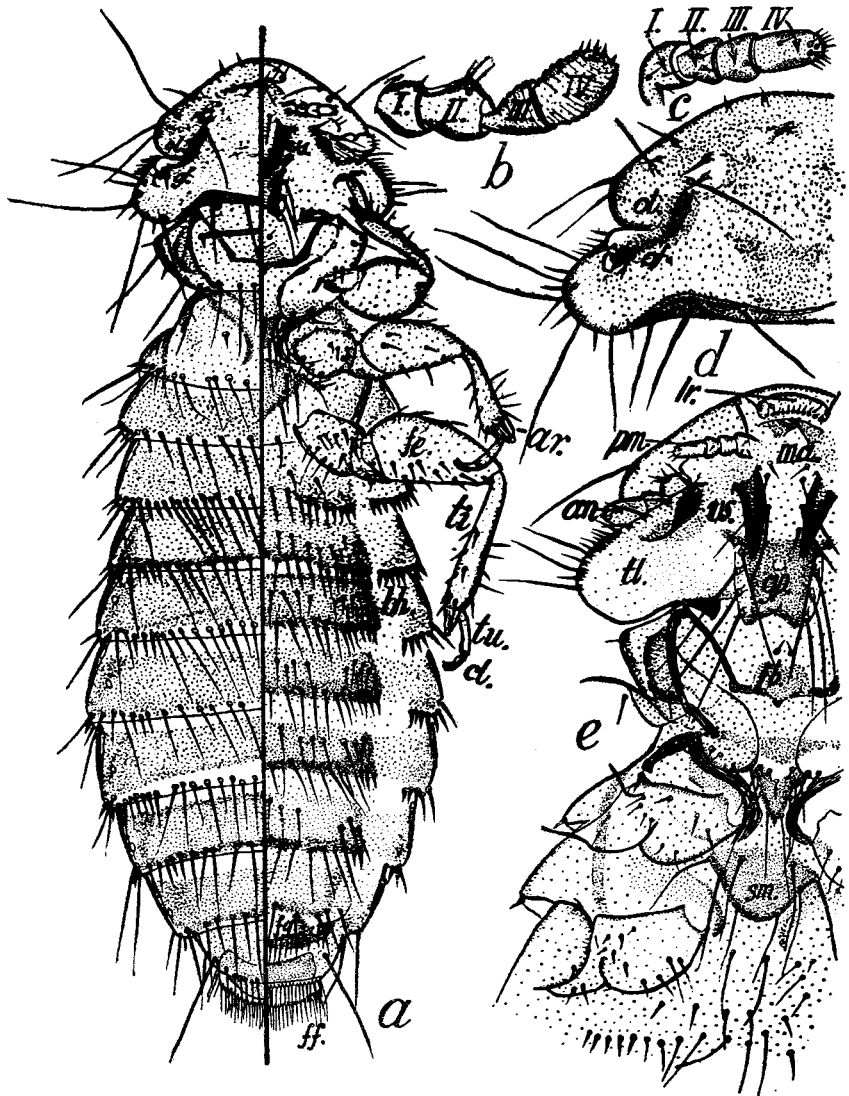
12. *Menacanthus gulabimaina*¹ sp. nov.

Female (Text-fig. 8a): body large and oval, pale-brown with brownish markings on head and thorax.

Head comparatively short; front broadly parabolic, two minute hairs on each side of meson; lateral margins slightly concave, each bearing one small and a long hair, two long hairs in the lateral angles; one long and two short setae on the dorsal surface of the head; ocular emargination shallow, continued into a slit; eyes large, emarginated, double cornea; ocular fleck irregularly rectangular, black, a short seta in the notch and another situated posteriorly; temples moderately

¹ *Gulabimaina* is the vernacular name for the Rose-coloured Starling.

expanded, rounded laterally, bearing about seven stiff, short, posteriorly bent setae, then five long and six short setae; occipital margin slightly concave, edged



TEXT-FIG. 8. *Menacanthus gulabimaina*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) maxillary palp of female (enlarged), (d) dorsal aspect of a portion of head showing ocular notch, slit and eye (enlarged), and (e) ventral aspect of a portion of head and thorax (enlarged).

with dark brown chitin, bearing three long hairs on each side. On the ventral aspect of the head; mandibles situated a short distance behind the anterior margin; labrum narrow with numerous minute and two short hairs; oesophageal sclerite and glands indistinct; plate on the gular region well developed, extending beyond the occipital margin, quadrate, with deeply concave posterior margin, bearing

four long hairs on each side. Inner border of antennal fossae highly chitinized, dark-brown; antennae (Text-fig. 8b) projecting, 4-jointed, scape transverse, small and squat; II joint pear-shaped, with minutely produced apical margin, and slightly bulging to one side; III joint bell-shaped, pedunculate basally and regularly diverging towards the apex, basal stalk tucked in submedially on the apex of segment II; segment IV elongate, irregularly cylindrical, with sub-apical groove furnished with minute hairs, visible hairs disposed of as in figure. Ventral spinous spatula (Text-fig. 8e) running backwards as far as or even beyond gular plate, straight, 0.112-0.130 mm. long.

Pro-thorax large, protruding, lateral angles obtuse, each with a spine; posterior lateral margin slightly convex, each with two long hairs and a spine; posterior margin straight, with four long hairs on each side of a short median keel; transverse bar distinct with a minute spine on the lateral tip, curved long bars at its end, well chitinized, dark-brown. Meso-thorax narrow; lateral bands narrow, well chitinized, dark-brown, bare; posterior margin with two minute spines on each side. Meta-thorax short and broad, lateral margins slightly convex, bearing three minute spines, diverging posteriorly; each posterior angle bearing a spine and two long hairs; posterior margin nearly straight with one spine and six long hairs on each side. Legs slightly paler than the thorax; with very narrow, brownish yellow marginal markings and roughly scattered short hairs; hind femora with several stiff hairs but no distinct patch.

Abdomen elliptical, widest at V segment, posterior angles of the segments projecting, each with a long hair and two short spines; posterior margins of segments I-V straight, and those of segments VI-VIII concave, each bearing a transverse row of long hairs, of which lateral three or four becoming spinous; posterior margin of the last segment broadly rounded, with one exceptionally long hair and a long hair on each side of several short hairs. A fringe of fine hairs on hyaline margin also present. Transverse bands brownish-yellow, entire; lateral bands narrow, clear brown. Ventral surface of each abdominal segment with two transverse, rows of hairs, several outer ones of the posterior row smaller, out of these 2-3 spinous; sternite III-VII, each with a patch of roughly arranged hairs. Pleural plates well developed, each with several heavy spines. Genital plate well developed, lying as far as the middle of segment IX, furnished with posterior row of 19-20 short hairs.

Male: similar to female, but size considerably small. Genital armature calls for no description.

Measurements (mm.) of Menacanthus gulabimaina sp. nov.

	Female (Holotype).		Female (Paratype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total	2.125	..	2.047	..	1.491	..
Head	0.298	0.615	0.327	0.577	0.259	0.509
Pro-thorax ..	0.201	0.481	0.211	0.461	0.173	0.404
Ptero-thorax ..	0.222	0.625	0.182	0.548	0.154	0.481
Abdomen	1.404	0.961	1.327	0.798	0.905	0.596
Head-index ..	2.068		2.764		1.965	

Holotype: one female, on slide No. MA. 026H; *Allotype*: one male, on slide No. MA. 026A; *Paratype*: one female; all from Lyallpur, 2.iii.1936, ex the Rosy Starling, *Pastor roseus* (Linn.).

**MALLOPHAGA (AMBLYCERA) INFESTING BIRDS IN THE PANJAB
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(Communicated by Dr. Hem Singh Pruthi, F.N.I.)

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¹ 'Mallophaga (Ischnocera) infesting birds in the Panjab (India)' has been published in the Proceedings of the National Institute of Sciences of India, Vol. XIII, No. 6, pp. 253-303 (1947).² This work was carried out during 1934-1936 and 1940-1942 in the Entomological Laboratory, Panjab Agricultural College, Lyallpur, and was finally prepared during 1936-37 and 1942-43 in the laboratory of the Imperial Entomologist, Imperial Agricultural Research Institute, New Delhi; but due to certain unavoidable circumstances it could not be presented for publication earlier.³ Now the Government Entomologist, Public Health Department, Panjab, Provincial Vaccine Institute, 6 Birdwood Road, Lahore.

With best compliments,
for criticism and favour of exchange.
From
M. Atiq-ur-Rahman Ansari

I. INTRODUCTION.

Kellogg and Paine (1914) obtained a collection of the Mallophaga from the Indian Museum, Calcutta, and published an account of these insects, a year later, Kellogg *et al.* (1915) supplemented this. Waterston (1928), Qadri (1935-39), Miss Clay and Meinertzhagen 1935-45, Sen (1942) and Atiqur-Rahman-Ansari (1943-47) have made further contributions to the study of the Indian Mallophaga.

A study of the feeding habits of the birds of the Panjab was taken in hand at the Panjab Agricultural College and Research Institute, Lyallpur, in 1926, and at the suggestion of Professor M. Afzal Husain, the then Entomologist to the Government of the Panjab, a collection of Aviculous Mallophaga was made from about one hundred different species of birds. The collection, although small, furnished fresh information on the distribution of several forms and it contained several species which were undescribed.

The types of all the new forms described here are provisionally deposited in the author's collection, until sufficient material is available for distribution to museums of standing and repute.

ACKNOWLEDGMENTS.

This work was undertaken at the suggestion of Professor M. Afzal Husain (formerly Vice-Chancellor, Panjab University). I express my gratitude to him for his instruction, help and encouragement. I owe a deep debt of gratitude to Dr. Hem Singh Pruthi, for his keen interest and valuable advice in this work. I tender my thanks to Dr. Khan Abdul Rahman (Entomologist, Agricultural College, Lyallpur) for placing the entire collection of the Mallophaga at my disposal. I am deeply indebted to Miss Theresa Clay (Department of Entomology, British Museum—Natural History—London), Dr. K. B. Lal (Entomologist, Agricultural College, Cawnpur) and Dr. M. S. Mani (St. John's College, Agra) for kindly going through several parts of the typescript and making useful suggestions. I desire to express my thanks to Miss Clay, Mr. Hopkins (Formerly Senior Entomologist (Medical) Kampala, Uganda), Dr. Cesari Conci (Istituto di Zoologia dell'Universitat, Geneva), Dr. Büttiker (Institut der ETH Universitätsstrasse, Zurich) for assistance in sending me some of the original papers on the group. My thanks are also due to my wife, Zohra, for her kind assistance in collecting Mallophaga from some birds. She also relieved me of much of the drudgery of the mechanical preparation of the paper. Without this co-operation the investigation recorded could never have been completed.

The generosity of the Panjab University, Lahore, for the grant of a research, fellowship to carry out this work at the Imperial Agricultural Research Institute, New Delhi, is gratefully acknowledged.

II. SYSTEMATIC ACCOUNT.

AMBLYCERA¹

1896, *Amblycera*, Kellogg, *Proc. Calif. Acad. Sci.*, VI (2), p. 68.

Nitzsch (1818) named this group Liotheidae with two genera, viz., *Gyropus* (with one clawed-tarsi, exclusively found upon mammals) and *Liotheum* (with two-clawed tarsi, exclusively infesting birds). He further divided the latter genus into six sub-genera, viz., *Eureum*, *Læmobothrium*, *Phycostomum*, *Trinoton*, *Colpocephalum*, and *Menopon*.

¹ *Amblys*: blunt, *Ceras*: horn. Mallophaga in which the antennae are capitate or swollen towards the free end, and when in repose largely concealed in lateral longitudinal excavations or antennal capsules, which sometimes are bulbous.

Kellogg (1896) adopted the Nitzschian classification in all essentials, with the difference that his families were raised to sub-orders, genera to families and sub-genera to genera. He also added several new genera to the list.

He created the sub-order Amblycera, and divided it into two families: Gyropidae (tarsi with one claw, exclusively infesting mammals) and Liotheidae (tarsi with two claws, exclusively infesting birds, except *Boopia* spp.). The latter family was further sub-divided into nine genera, i.e., *Colpocephalum* Nitzsch, *Boopia* Piaget, *Trinoton* Nitzsch, *Laemobothrion* Nitzsch, *Physostomum* Nitzsch, *Eureum* Nitzsch, *Menopon* Nitzsch, *Nitzschus* Denny and *Ancistrona* Westwood.

Several of these genera include widely differing forms. For instance the species of the genera *Colpocephalum* Nitzsch and *Menopon* Nitzsch are very loosely held together. Splitting of unwieldy genera has started and the status of certain genera has been raised to families. Harrison (1916-17) recognized four families and six sub-families, while Ewing (1926) recognized five families and five sub-families.

Today the bird-infesting species are generally grouped into three families, viz., Ricinidae Neumann, Laemobothriidae Mjöberg and Menoponidae Mjöberg. The latter family has, however, been further split into three avicolous sub-families namely Menoponinae Harrison, Ancistroninae Harrison and Menacanthinae Eichler. The number of described genera has increased very rapidly in recent years.

The species belonging to families Laemobothriidae and Menoponidae are presented in this paper. The table given below is based on the works of various investigators and will be found useful in recognizing genera dealt with in this paper.

TENTATIVE KEY TO FAMILIES, SUB-FAMILIES AND GENERA OF BIRD-INFESTING AMBLYCERA.

1. Antennae lying in grooves at the sides of head; abdomen always with lateral notches at the junction of different segments..... Family: MENOPONIDAE.... 2
- Antennae situated in bulbous capsules which open ventrally and constitute conspicuous lateral swellings on the head; abdomen without any lateral notches at the junction of different segments..... Family: LAEMOBOTHRIDAE.... 20
2. Forehead provided with a ventral spinous or uncinatè process, arising from a position behind each palpus..... Sub-family: MENACANTHINAE.... 3
- Forehead without such characters..... 6
3. Head squat, extremely broad, being more or less twice as wide across the temples as long, ocular slit present (on Columbæ)..... *Columbimenopon* gen. nov.
- Head less than twice as long as broad, temporal region of head much broader than forehead and prothorax..... 4
4. Oesophageal sclerite well developed, tergites with one or two rows of setae (on Galliformes)..... *Uchida* Ewing (1930)..... 5
- Oesophageal sclerite vestigial and modified..... 5
5. Forehead narrow in front, greatly reduced; mandibles situated almost near the anterior margin; tergites with two transverse rows of setae (on Galliformes)..... *Eomenacanthus* Uchida (1926)..... 6
- Forehead broadly rounded in front; mandibles situated a short distance behind the anterior margin; tergites with a transverse row of setae (on Passeriformes)..... *Menacanthus* Neumann (1912)..... 6
6. Posterior femora and certain abdominal sternites with combs of short and stiff spines.... Sub-family: COLPOCEPHALINAE.... 7
- Posterior femora and abdominal sternite without combs of spines..... Sub-family: MENOPONINAE.... 14
7. 2-3 fringes of stout setae curving upwards around the sides of the VIII abdominal sternite..... 8
- Fringes of stout recurved setae wanting..... 9
8. Forehead flatly rounded, truncate; ocular emargination acute; ventral surface of posterior femora and III abdominal sternite with 4-5 combs of short and stiff hairs (on Galliformes)..... *Galliferrisia* gen. nov.
- Forehead convex; ocular emargination squarish; posterior femora with three combs of short stiff spines on the ventral surface; two such combs on each side of the III abdominal sternite..... *Colpocephalum* Nitzsch (1818)

9. Ocular emargination present, not very deep; ocular slit present..... 10
 Ocular emargination deep; ocular slit wanting..... 12
10. Three combs of stiff and short setae on each side of third abdominal sternite..... 11
 Two combs of stiff and short setae on each side of third abdominal sternite; posterior femora with three combs of stiff and short setae on ventral surface (on Herodiones).....
Pseudocolpocephalum Qadri (1936)
11. Three combs on each side of fourth abdominal sternite; posterior femora with four or five combs and a group of irregularly scattered hairs on the ventral surface (on Cuculiformes).....
Cuculiphilus Uchida (1926)
 Fourth abdominal sternite without combs of setae; posterior femora with three combs of setae (on Strigiformes).....
Uluoecus subgen. nov.
12. Two combs of stiff and short setae on each side of third and fourth abdominal sternites; posterior femora with four combs and a group of irregularly scattered hairs on the ventral surface (on Herodiones).....
Ardeiphilus Bedford (1939)
 Two combs of stiff and short setae on each side of III abdominal sternite; IV sternite without such combs of setae; posterior femora with three ventral combs of setae..... 13
13. Genitalia of male with a chitinous structure near the apex of the basal plate, usually complex.....
Allocolpocephalum Qadri (1939)
 Genitalia of male without a chitinous structure near the apex of the basal plate (on Picidae).....
Picusphilus subgen. nov.
14. Meso- and meta-thorax fused..... 15
 Meso- and meta-thorax distinctly separated..... 16
15. Forehead with distinct slit in front of eyes; gular region without gular plate.....
Menopon Nitzsch (1818)
 Forehead truncate, with shallow or deep notch in front of the eyes; posterior margin of forehead straight, meeting the temples at right angles; gular region with well chitinized quadrate plate; dark species, (on Pterocletes).....
Neomenopon Bedford (1920)
16. Thorax very large and heavily chitinized, meso- and meta-thorax divided by a distinct suture none of them similar in shape to the abdominal segments; legs short, stout and heavy (on Anatidae).....
Trinoton Nitzsch (1918)
 Thorax normal; meso- and meta-thorax separated by indistinct suture, both somewhat similar to abdominal segments..... 17
17. Forehead with a distinct notch in the lateral margin, just before the eyes; femoral and sternal patches small, composed of spines which are as large as those constituting the general chaetotaxy and sometimes merging with it (on Charadriiformes).....
Actornithophilus Ferris (1916)
 Lateral margins of forehead continuous with the eyes..... 18
18. Head less than twice as broad as long; second abdominal sternite usually beset on each side with a group of heavy, belonoid spines on well-formed callosity; certain abdominal sternites and ventral face of posterior femora with indistinct patches of spines; male genitalia with moderately long basal plate, continuous distally with a broad rounded lamina at the base of which the stout apically recurved parameres are set..... 19
 Head twice as broad as long, sometimes more; II abdominal sternite without a group of heavy spines; sternites IV-VI with setae, more numerous on lateral margins; posterior femora with fine setae on venter, usually not sufficient to form a brush; male genitalia with basal plate short, narrow in front, gradually broadening towards apex, where it expands; parameres present (on Charadriiformes).....
Austromenopon Bedford (1939)
19. Genital armature with complex chitinous structure near the apex of the basal plate (on Passeriformes).....
Myrsidea Waterston (1950)
 Genital armature without chitinous structure near the apex of the basal plate (on Coraciiformes).....
Alcediniphilus gen. nov.
20. Clypeus not excavated or concave (on Accipiteres).....
Laemobothrion Nitzsch (1918)

Sub-family: MENACANTHINAE

COLUMBIMENOPON gen. nov.

Small, wide-bodied form with the following diagnostic characters:—

Head almost twice as broad as long; forehead flatly rounded in front with a minute median notch; lateral margins without ocular emargination, but with narrow slit in front of well developed eyes; ocular fleck well marked; temples slightly expanded, rounded marginally; ventrum with well built skeleton to support mandibles, continuous to the anterior clypeal margin; mandibles situated a short distance behind the anterior margin; antennal fossae backed by chitinized area; antennae 4-segmented; a backwardly directed rectate, recumbant, moderately long, peg-like, spinous process arising near the base of each palpus; oesophageal

sclerite and glands present; gular plate not well chitinized, quadrate, furnished with lateral hairs. Pro-thorax well built, winged; meso-thorax narrow, indistinctly separated; meta-thorax short; sternal plates well developed. Legs normal, third femora with distinct patches of setae. Abdomen short, orbicular, last segment entire, flatly rounded; ventral surface with patch of fine setae on III, IV, and V sternites.

Exhibit sexual dimorphism, last segment in male being devoid of fringe of hairs. Genitalia simple, basal plate short, furnishing short slender paramere and a quadrate, flatly rounded lamina. The paramere with the distal end slightly curved outward.

This genus is closely allied to *Menacanthus* Neumann (1912) and *Uchida* Ewing (1930), from both of which it can be distinguished by the shape of the head, ventral patches of hairs on III femora and III-V abdominal sternites.

This genus is apparently confined to pigeons and doves (Columbae).

Type of the genus: *Columbimonopen modestus* sp. nov. (*vide infra*) ex the Indian Ring Dove, *Streptopelia d. decaoctis* (Frisal.).

1. *Columbimonopen modestus* sp. nov.

Female (Text-fig. 1a): pale yellow with broad body, almost spherical abdomen.

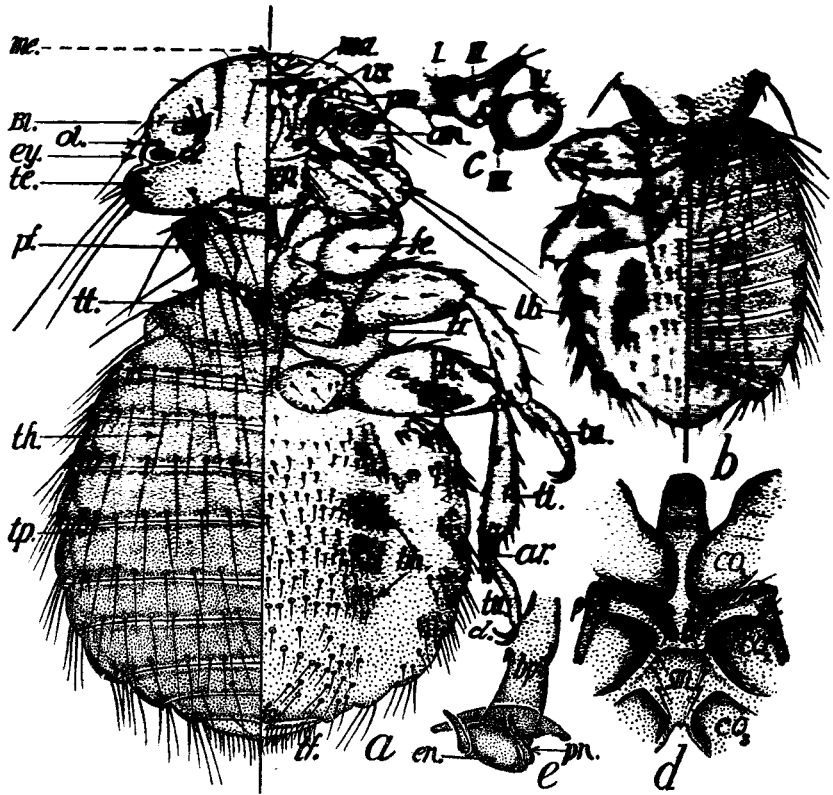
Head very broad, almost twice as broad as long; pre-antennal region narrow; front broadly rounded, with a minute median notch, furnished with dorsal and ventral hairs as shown in text-figure; ocular slit narrow; eyes well developed, ocular fleck trilobed; ocular fringe obsolete, inferior, not projecting laterally; temples narrow, slightly expanded, margins rounded, bearing two short and three long hairs; occipital margin sinuous, edged with narrow band, bearing two long hairs on each half; vertex with one long hair; two long, one short and two minute hairs on each side of the dorsum of head. Ventrums with well developed skeleton to support mandibles, reaching as far as on each side of clypeal region; peg-like process arising near the base of palpi; clypeus narrow; mandible weak; gular plate squarish not well chitinized, bearing four hairs on each side. Antennae exhibit very outstanding characters (Text-fig. 1c), segment I short, squat, on which fits exactly the pedicel which is more or less of the shape of an antique Egyptian lampion, one side produced into lobe or arm (antennule), extending latero-apically far forwards, antennule being larger than the body of the joint; segment III calyciform, with shallow cup and short peduncle, which is immediately inserted in the well marked depression of lampad segment II; segment IV irregularly spherical, resting obliquely in shallow cavity of the calyx; apical depression well defined.

Pro-thorax large, expanded; lateral angles obtuse, with a spine and long hair; posterior lateral margin straight, practically confluent with the posterior margin, strongly convergent, each bearing two long and two minute setae; posterior margin convex and bears three long hairs on each side of a median protuberance; transverse bar and lateral bands well developed, a short spine on the bar-end. Meso-thorax narrow, suture indistinct. Meta-thorax short, trapezoidal; lateral margin diverging posteriorly with two minute spines; lateral angles produced with a long and several short spines; posterior margin convexo-concave, with four long hairs and two spines on each half, disposed of as shown in figure. Legs well built, third femora with definite patch of short hairs. Sternal plates (Text-fig. 1d) well formed.

Abdomen short, broad, orbicular, almost round; segments projecting, dorsum with a transverse row of long hairs to each segment, of which lateral 2-3 becoming spinous; last segment fringed with fine hairs. Ventrums medially hairy; third to fifth sternites with group of hairs on each end, merging more or less with general chaetotaxy; pleural plates with spinous hairs.

Male (Text-fig. 1b): similar to female, but smaller and chaetotaxy more scarce; last segment parabolic with four small marginal hairs. Genitalia (Text-fig. 1e)

simple; basal plate short, faintly chitinized, continuous distally with a squarish flatly rounded lamina; at each side of which is a slender, short paramere with slightly curved outward distal end.



TEXT-FIG. 1. *Columbimenopon modestus*, sp. nov.: (a) dorsal and ventral aspects of female, (b) ventral and dorsal aspects of thorax and abdomen of male, (c) antenna of female (enlarged), (d) ventral aspect of thorax (enlarged), and (e) male genital armature (enlarged). (For lettering and explanation of figures see page 201.)

Measurements (mm.) of Columbimenopon modestus sp. nov.

	Female (Holotype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.426	.....	1.025	.....
Head	0.293	0.560	0.266	0.426
Pro-thorax	0.160	0.360	0.133	0.293
Ptero-thorax	0.160	0.440	0.106	0.346
Abdomen	0.813	0.729	0.520	0.453
Head-index ¹ (breadth : length)	1.91		1.601	

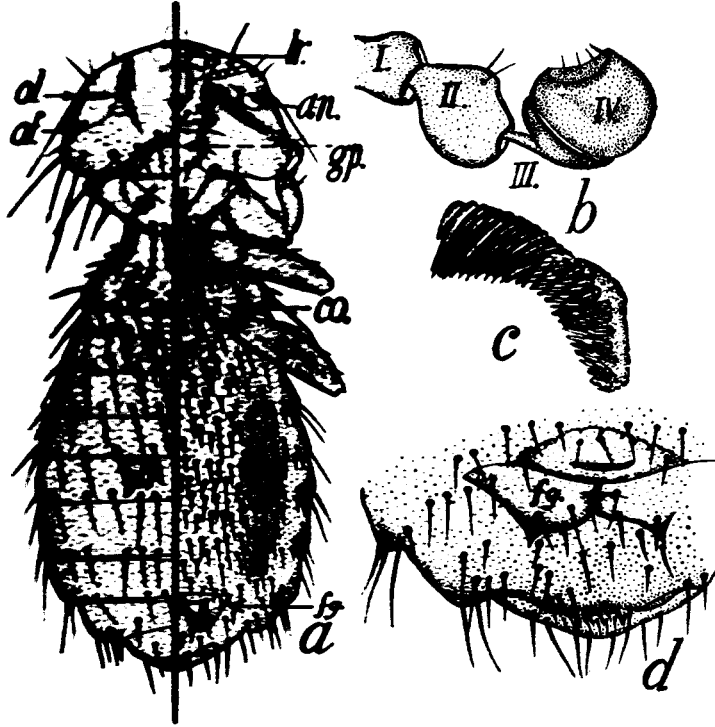
¹ Head-index is the proportion of the breadth to the length of the head (Clay, 1938 and 1940).

Holotype: A female, *Allotype*: A male; both from Lyallpur, 12. viii. 1929, ex the Indian Ring-Dove, *Streptopelia d. decaocta* (Frisal.); on slide No. MA. 049. *Paratypes*: 3 females in spirit (same data as above).

This species does not resemble any species so far described from doves and pigeons.

2. *Columbimenopon chanabensis* sp. nov.

Female (Text-fig. 2a): body yellowish-pale, with pale-brownish markings on head.



TEXT-FIG. 2. *Columbimenopon chanabensis*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) gastric teeth (enlarged), and (d) genital plate on VIII abdominal sternite (enlarged).

Head extremely broad, being slightly more than twice as wide across the temples as long; forehead flatly rounded in front, a minute hair on each side of the middle; then two minute hairs, one short hair and a long hair on the lateral margin, which is continuous to the eyes, with a narrow ocular slit; a long and a short hair on each side of the dorsum of head. Eyes large, fleck oblong with a minute spine. Temples rounded with one long, one short and two minute marginal hairs and a long submarginal hair. Occipital margin concave, bearing three long hairs on each half. Ventrum with yellowish-brown skeleton to support mandibles, continuous to the anterior clypeal region. Antennal fossae covered above by a transversely slitted expansion of head; ventral expansion reduced, narrow, backed up by a highly chitinized area. Antennae four-jointed (Text-fig. 2b); scape small, II joint irregularly pyriform, with narrow base inserted apically in segment I, outer margin slightly produced; third joint calyciform with very shallow cup and short and narrow peduncle which is immediately inserted in the well marked depression of segment II; segment IV spherical, resting in the shallow cavity of the calyx, latero-apical depression well defined, deep; visible chaetotaxy disposed of as in

figure. Spinous process arising from the base of each palpus, 0.055-0.060 mm. long. Gular region lightly chitinized, squarish, with four short lateral hairs, continuous anteriorly with chitinous framework giving articulation to mandibles. Oesophageal sclerite and glands well developed.

Pro-thorax large and winged; lateral angles acute, produced, each with a spine and a long hair; posterior lateral margin nearly straight, diverging posteriorly, practically continuous with the posterior margin, each with one short, one long and one fine hair; posterior margin convex with three long hairs on each side of a median cylindrical ridge; transverse band narrow, pale-yellow, distinct; lateral chitin bar pronounced, reaching as far as the scapular area. Meso-thorax narrow, lateral bands distinct, posterior suture indistinct. Meta-thorax trapezoidal, lateral margin slightly convex, with several spinous hairs; lateral angles produced with a long hair; posterior margin nearly straight with fine long hairs. Legs paler than thorax, marginal markings on femora and tibia narrow, spiny. Pro-sternum reduced, completely covered by the plate-like coxae of fore-legs; meso- and metasternites with several hairs.

Abdomen broadly elliptical, widest at the fifth segment; length of segment I shortest, that of II-VIII subequal, lateral margins of each with 2-3 spines; posterior lateral angles I-VII, each bearing two long hairs; posterior margins I-VII nearly straight, each bearing a submarginal row of 4-5 hairs on each half; segment VIII strongly concave posteriorly, bearing 4-5 hairs in the posterior angle and a hair on posterior margin; segment IX broadly rounded with six hairs on each posterior half. Ventral surface of each abdominal sternite bearing two or three transverse rows of short hairs. The most important feature is the occurrence of a complex chitinous structure on the VIII abdominal sternite, shown in figure (Text-fig. 2d). Gastric teeth present (Text-fig. 2c).

Male: not available.

Measurements (mm.) of Columbimenoapon chanabensis sp. nov.

	Female (Holotype).		Female (Paratype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.484	.....	1.532	.....
Head	0.252	0.534	0.252	0.563
Pro-thorax	0.204	0.388	0.242	0.408
Ptero-thorax	0.155	0.417	0.165	0.446
Abdomen	0.873	0.631	0.873	0.534
Head-index	2.119		2.234	

Holotype: A female from Lyallpur, 1-ix-1930, on slide No. MA. 044, ex (?) the Himalayan Griffon Vulture, *Gyps himalayensis* Hume. *Paratype*: one female on slide No. MA. 044P (same data as above).

This parasite is probably a straggler and appears to have transferred itself from a pigeon or dove on which the host might have preyed prior to shooting or it might have reached this host from the game bag in which the bird was carried.

This species almost resembles *Columbimenoapon modestus*, sp. nov. (*vide supra*), but from which it can be distinguished by differences in shape of antennae, chaetotaxy and in some characters of the posterior region of the abdomen.

3. *Columbimenoapon* sp.

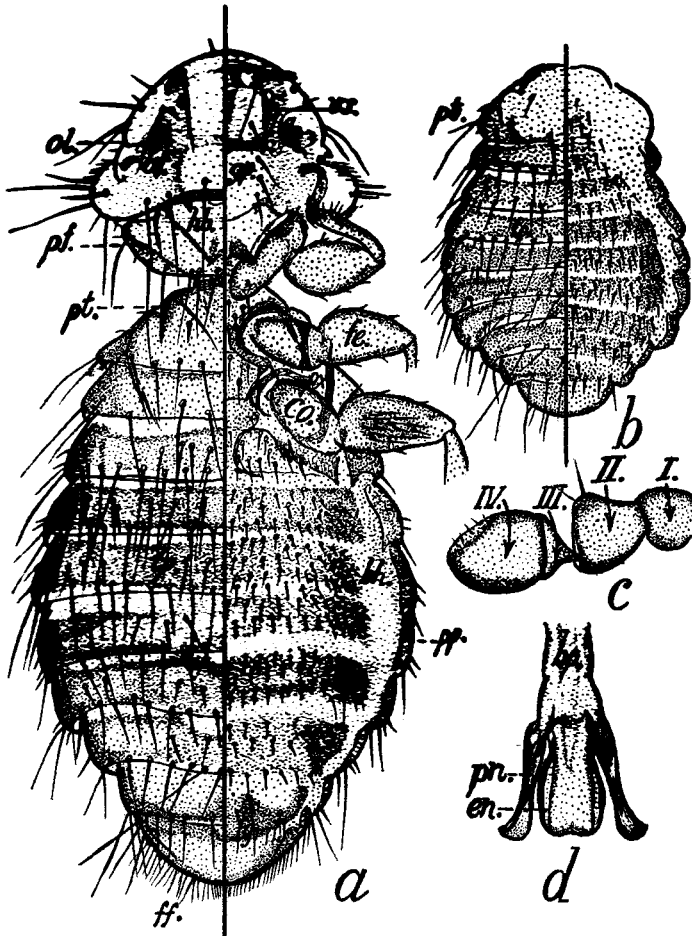
Two female specimens were collected from the Indian Blue Rock Pigeon, *Columba livia intermedia* Strick; shot in Lyallpur. The poor condition of these specimens

has made an exact determination impossible. However, it is apparent that the specimens are closely related, if not conspecific, with *Columbimenopon modestus*, sp. nov. (*vide supra*). It has been considered advisable to leave the exact identity until more material is available to me.

4. *Uchida abdominalis indicus* subsp. nov.

Piaget (1880) described *Menopon abdominalis* from the Grey Quail, *Coturnix c. coturnix* Linn. While the specimens before me agree fairly well with this species, differences, however, exist in the size of certain parts, general chaetotaxy of abdominal tergites, and the length of the hairs on the posterior margin of the last abdominal segment.

Female (Text-fig. 3a): body pale-brownish, with dark-brown markings on head, thorax and abdomen.



TEXT-FIG. 3. *Uchida abdominalis* var. *indicus* nov.: (a) dorsal and ventral aspects of female, (b) dorsal and ventral aspects of abdomen of male, (c) antenna of female (enlarged), and (d) male genital armature (enlarged).

Head broad, somewhat lunate in shape, front parabolic with a minute hair on each side of the middle; two short hairs and a long hair on each side, a long

and a fine hair in the lateral angle; a short and a long hair on the dorsum, and a long submarginal hair near the anterior frontal margin; ocular slit distinct; eyes large and flat, inconspicuously emarginated; ocular fleck irregularly oblong, bare; temples narrowly expanded, rounded, each with three long, two short and several minute submarginal hairs; occipital margin slightly concave, edget with dark-brown band, bearing three long hairs on each half. Ventral surface with highly chitinized framework, running forward to the anterior margin of the head, extending to the inner border of the antennal fossae, and continued downwards to the occipital margin; a central narrow bar in the gular region; gular plate quadrate, chitin thin, very lightly pigmented with four long lateral hairs; mandibles situated well towards the frontal margin; labrum almost touching the anterior clypeal margin. Antennal fossae deep; dorsal flap complete, with a narrow ocular slit; ventral flap half as broad as dorsal flap, with a comb of hairs on latero-posterior margin. Antennae 4-jointed (Text-fig. 3c), scape well developed; II joint pear-shaped; III joint calyciform; IV joint conical with excavated top which is furnished with sensory hairs. Spinous process moderately long, 0.075 mm. in length.

Pro-thorax large, expanded; lateral angles produced, rounded, each with a spine and a long hair; posterior lateral margin almost straight, each bearing a minute hair and a long posterior hair; posterior margin straight with four long hairs on each side; transverse band pale-yellow; longitudinal chitinous bar dark-brown. Meso-thorax rudimentary, lateral bands dark-brown, a long hair and a spine also present. Meta-thorax short, dorsally fused with the meso-thorax, broad; lateral margins very slightly concave, widely divergent posteriorly, each bearing two minute spines; posterior lateral angles with two long hairs; posterior margin almost straight, set with one spine and four long hairs. Legs short, pale, with narrow marginal markings and a few scattered hairs; ventral surface of hinder femora with a group of short, stiff hairs. Sternal plates well developed, pericoxal plates highly chitinized, chaetotaxy as shown in figure 3a.

Abdomen ovate, widest at the IV segment; length of the segments almost equal, but segment I slightly narrow; posterior angles projecting a little, each bearing two long hairs; posterior margin of segments I-V nearly straight, those of VI and VII concave laterally and convex in the middle; segments I and VIII with one row and segments II-VII with two transverse rows of hairs, last segment rounded, with a fringe of colourless hairs. Transverse bands distinct with clear intersegmental area, entire on segments I-VIII; segment IX with band along posterior margin; lateral bands slightly more pigmented, brown. Ventral surface of each abdominal sternite with three transverse rows of hairs; group of weak setae on each side of III-VII sternites, merging in transverse rows.

Male (Text-fig. 3b): similar to female, but size considerably small, last segment devoid of fringe of fine hairs. Genitalia (Text-fig. 3d) pale, but well chitinized, of the type common to the genus.

Measurements (mm.) of Uchida abdominalis indicus, subsp. nov.

	3 males.		3 females.	
	Length.	Breadth.	Length.	Breadth.
Total	1.163-1.290	.....	1.819-1.924	.....
Head	0.261-0.291	0.485-0.522	0.335-0.358	0.612-0.649
Pro-thorax	0.149-0.164	0.313-0.358	0.185-0.224	0.448-0.493
Ptero-thorax	0.119-0.171	0.371-0.425	0.201-0.238	0.559-0.642
Abdomen	0.619-0.701	0.485-0.559	1.119-1.157	0.859-0.970
Head-index	1.769-1.858		1.709-1.913	

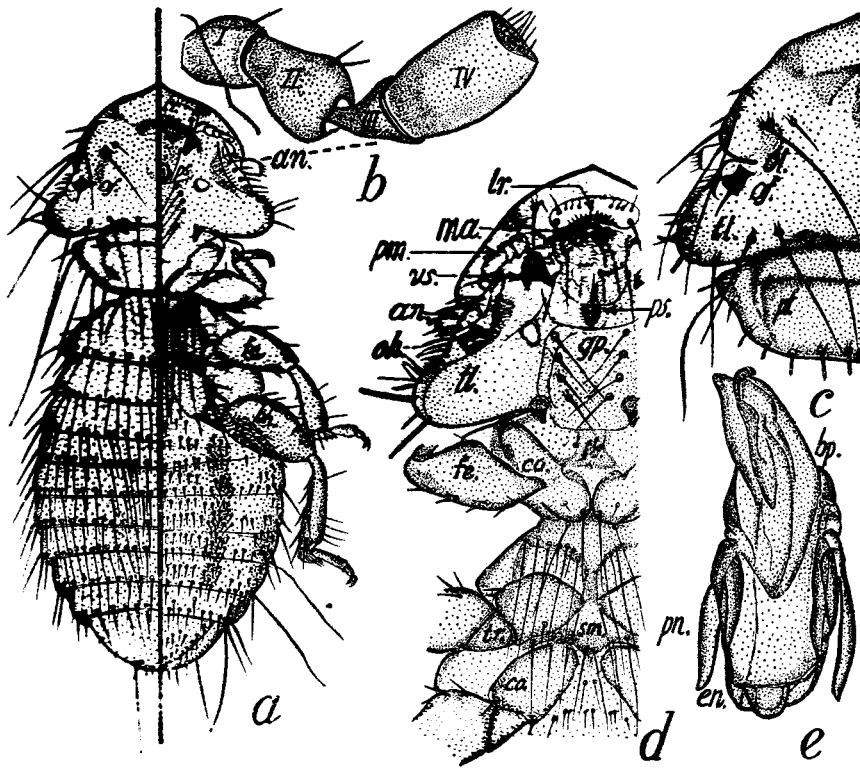
Piaget (1880) gave the measurements of *M. abdominalis* (female) as 2.05 mm. \times 0.97 mm. The head-index calculated = 1.735.

Holotype: A female on slide No. MA. 054 H, *Allotype*: A male on slide No. MA. 054 A; *Paratype*: two females and two males on slide No. MA. 054, all from Lyallpur, 11.ix.1931, ex the Common Grey Quail, *Coturnix c. coturnix* (Linn.).

5. *Uchida kalatitar*¹ sp. nov.

Male (Text-fig. 4a): body broad, pale-yellow; with deep-yellow markings on head; pleural plates present but not well developed.

Head short; front broadly parabolic, slight angulation on meson with one minute hair on each side, two short and three long hairs on lateral angles; two short and a long hair on dorsum, situated a short distance above the ocular slit; ocular slit narrow, backed with brownish blotch. Eyes with double cornea; ocular fleck black, irregularly quadrate with a short posterior seta; ocular fringe distinct. Temples expanded, each lobe bearing five long and several short hairs. Occipital margin concave, narrowly edged with yellowish-brown band, bearing four long hairs on each side of the median line. On the ventrum, mandibles situated a short distance behind the anterior margin; labrum well built, bearing numerous hairs. Oesophageal sclerite and glands well developed; jugular plate distinct, quadrate,



TEXT-FIG. 4. *Uchida kalatitar* sp. nov.: (a) dorsal and ventral aspects of male, (b) antenna of male (enlarged), (c) dorsal aspect of head and pro-thorax of male (enlarged), (d) ventral aspect of head and thorax of male (enlarged), and (e) male genital armature (enlarged).

¹ *Kalatitar* is the vernacular name of the Indian Black Partridge.

concolorous with the head, bearing four long hairs on each side. Antennae (Text-fig. 4b) prominent, 4-jointed, I segment squat; II segment pyriform; III segment ventricose at the apex and stalked, inserted apically in segment II; IV segment cylindrical, truncate and excavated at the apex with several long hairs. Spinous process short, claw-shaped, 0.031-0.034 mm. long.

Pro-thorax large, expanded with acute wings; lateral angles with a short spine; posterior-lateral margins slightly concave each bearing three or four long hairs and a short spine; posterior margin nearly straight with eight long hairs and a short median protuberance; transverse bar distinct, bearing a short prickle on each end; lateral bars curved, very distinct. Meso-thorax rudimentary, lateral band distinct, completely fused posteriorly with meta-thorax. Meta-thorax short, broad; with slightly convex widely diverging sides, bearing about six spines; posterior lateral angle with two long hairs; posterior margin almost straight or slightly convex, bearing about sixteen long and a short hair. Legs concolorous with the thorax, marginal markings on femora and tibia narrow, yellowish; hind femora with a ventral patch of short hairs. Pro-sternal plate present, pale, quadrate, expanded basally, with two fine short hairs; coxae of first pair of legs almost touching each other. Ptero-sternum with numerous long hairs, disposed of as shown in figure 4d.

Abdomen broadly elliptical, widest at the fourth segment, length of segments nearly subequal; posterior angles of segments slightly projecting; posterior margins nearly straight, bearing about twenty to twenty-eight hairs; posterior margin of the last segment broadly rounded, bearing one long and several short hairs on each side. Ventral surface of each abdominal sternite bearing two rows of short and weak hairs, and a patch of numerous short hairs on each side of IV-VI sternites, merging more or less with general chaetotaxy. Pleural plates distinct with several short, irregularly scattered setae. Last segment with a distinct genital plate bearing about eight short hairs on either side.

Genitalia (Text-fig. 4e) characteristic, basal plate short; parameres thinly chitinized and pointed towards their free ends; distal plate flat, with well chitinized slender rods on each side.

Female: not available.

Measurements (mm.) of Uchida kalatitar sp. nov.

3 Males.	(Holotype).		(Paratype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.299	..	1.193-1.269	....
Head	0.308	0.485	0.240-0.288	0.451-0.461
Pro.thorax	0.173	0.384	0.154-0.163	0.356
Ptero.thorax	0.145	0.432	0.145	0.384
Abdomen	0.673	0.548	0.654-0.673	0.461-0.481
Head-index	1.575		1.579-1.921	

Holotype: A male mounted on slide No. MA. 056H from Lyallpur, 12.xi.1933, ex the Indian Black Partridge, *Francolinus f. asiae* Bonap. *Paratypes*: two males on slide No. MA. 056P (same data as above).

This form resembles *Uchida perdicis* (Denny) from *Perdix cinerea*. It is not possible to sort out differences from Denny's brief description. However, it is apparent from the figure, that the new species is distinguished from it, amongst other characters, by the absence of the fuscous spot on each side of the clypeus and by considerably small size.

6. *Eomenacanthus stramineus* (Nitzsch).1874. *Menopon stramineum*, Nitzsch, in *Giebel's Ins. Epiz.*, p. 291.

This familiar species of louse has been recorded from practically all parts of the world *ex* the Domestic Fowl, *Gallus g. domesticus* Linn. Nitzsch (1874), Piaget (1880) and Sugimoto (1920) also recorded it from various other birds, viz., *Meleagris gallopavo*, *Euplocames cuviere*, *Pavo m. muticus* Linn., *Phasianus colchicus*, etc. It is a common parasite of domestic fowls in India, and the specimens referred to here were taken off the Domestic Fowl from Lyallpur, Lahore, Attari, Amritsar, Dhariwal, Pathankot and Bijnor (U.P.).

Measurements (mm.) of Eomenacanthus stramineum (Nitzsch).

	15 females.		20 males.	
	Length.	Breadth.	Length.	Breadth.
Total	2.30-2.94	....	2.46-2.90	....
Head	0.30-0.36	0.60-0.68	0.30-0.40	0.60-0.68
Pro-thorax	0.28-0.30	0.46-0.56	0.26-0.32	0.48-0.52
Ptero-thorax	0.20-0.24	0.50-0.60	0.20-0.30	0.50-0.56
Abdomen	1.50-2.00	0.76-0.90	1.60-1.98	0.76-0.90
Head-index	1.833-2.006		1.7-2.0	

Piaget (1880) gave the measurements of female and male as 2.75 mm. \times 1.00 mm. and 2.95 mm. \times 0.90 mm. respectively, while head-index (head length: breadth) calculated = 1.55 and 1.625.

7. *Menacanthus gonophoeus* (Nitzsch).

This species was first described from specimens obtained *ex* the Raven, *Corvus corax* Linn.; in Europe and since then it has been recorded from the Pied Crow, *Corvus albus* Mull.; the Black Crow, *Heterocorax capensis* Lcht.; the Rook, *Corvus frugilegus* Linn.; etc., from different parts of the world.

The present material was collected from the Punjab Raven, *Corvus corax laurencei* Hume; and the Eastern Rook, *Corvus frugilegus tschusii* Hartert; from various parts in the Punjab.

8. *Menacanthus masudi* Qadri.1935. *Menacanthus masudi*, Qadri, *Z. Parasit.*, VIII, p. 227, fig. 2.

Qadri (1935) described it from specimens taken off the Common Indian House Crow, *Corvus s. splendens* Vieill.; in Aligarh. The specimens referred to here were collected from the type-host in Lyallpur, 19.ii.1936.

Measurements (mm.): Length \times Breadth.

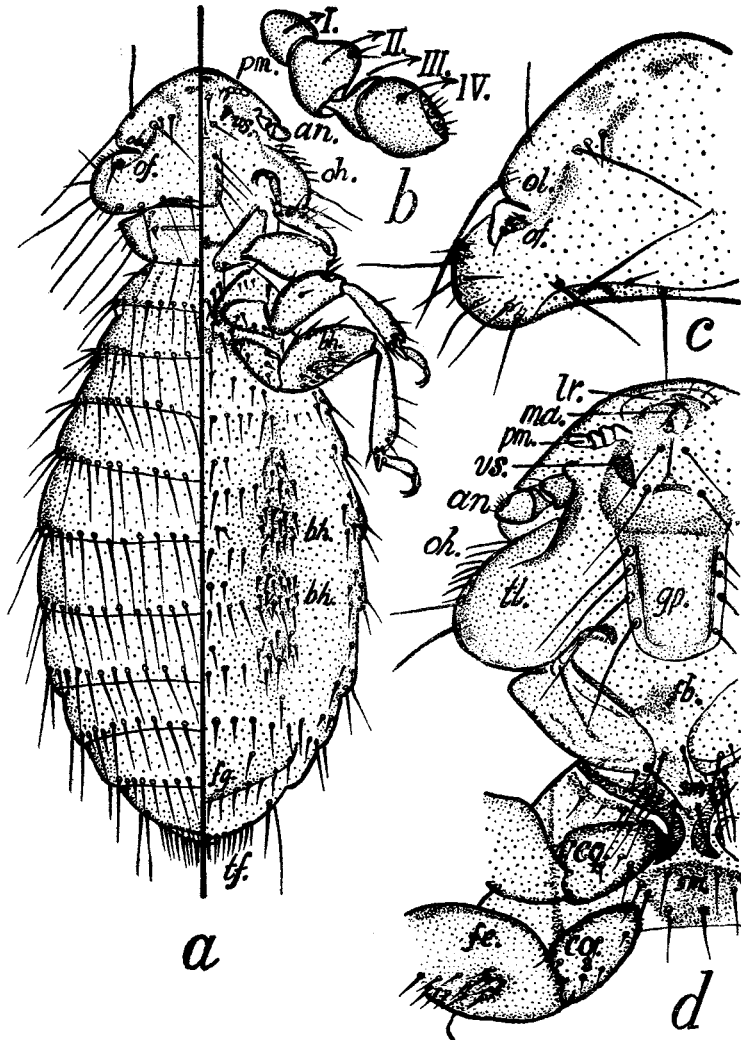
Female: Total 2.30 \times 0.96, head 0.30 \times 0.70, pro-thorax 0.22 \times 0.56, ptero-thorax 0.18 \times 0.60, abdomen 1.06 \times 0.96, head-index 2.33.

Qadri (1935) gave the measurements of female and male as 2.5 mm. \times 0.91 mm. and 1.945 mm. \times 0.74 mm., while head-index calculated = 2.109 and 1.937 respectively.

9. *Menacanthus guldum*¹ sp. nov.

Female (Text-fig. 5a): Ground colour of the body pale, with yellowish-brown markings on head and thorax, and faint abdominal bands.

Head short, broad, front parabolic; two long hairs on the lateral margin, two short hairs and a long hair on the dorsal surface of head; ocular slit narrow and deep. Eyes large, flat, with a slight latero-medial concavity; ocular fleck black, kidney-shaped, with a short posterior hair. Temples expanded, rounded; bearing a fringe of short, stiff hairs on the anterior margin, just below the eyes; each lobe posteriorly furnished with two short, three long and several fine hairs. Occipital



TEXT-FIG. 5. *Menacanthus guldum*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) dorsal aspect of a portion of head showing ocular slit and eye (enlarged), and (d) ventral aspect of head and thorax (enlarged).

¹ *Guldum* is the vernacular name for the Punjab Red-Vented Bulbul.

margin slightly concave, edged with very narrow, pale-brown marginal band and dark-brown blotch, bearing six hairs. On the ventral aspect of the head, mandibles situated fairly close to the anterior margin; clypeal region and labrum reduced; oesophageal sclerite vestigial, oesophageal glands wanting; chitinous framework for articulation of mandibles well developed; antennal fossae not deep, dorsal flap entire, ventral flap partial, posterior inner border chitinized, pale-brown. Antennae (Text-fig. 5b) 4-jointed, scape simple and short, segment II pear-shaped with bluntly produced outer margin, segment III calyx-like, with obliquely straight basal stalk driven subapically into segment II, segment IV cone-shaped with several sensory fine hairs confined to outer latero-apical margin. Quadrate ventral sclerite weak with four long lateral hairs. Spinous processes hyaline, blunt, peg-like, small, about 0.035 mm. long.

Pro-thorax short, protruded, lateral angles obtusely expanded, each with a short spine; posterior lateral margin almost straight, each with a spine and two long hairs; posterior margin straight, furnished with six long hairs. Transverse bar distinct; longitudinal bar yellowish-brown, well developed towards the scapular margin, a short hair at the meeting place of transverse and longitudinal bars. Mesothorax reduced, lateral band distinct, yellowish-brown. Meta-thorax short, almost of the size of pro-thorax; lateral margins straight, divergent posteriorly, each with a spine on the anterior margin, each posterior angle with two long hairs and a spine, posterior margin almost straight with two spines and twelve long hairs. Legs concolorous with the body, hinder femora with thin patches of short hairs. Pro-sternum present, with a central quadrate plate and lateral chitinized arm, running along the procoxal plates; meso- and meta-sternum well separated with several long hairs, meso- and meta-legs with well chitinized pericoxal plates.

Abdomen broadly elliptical, widest at IV-V segments, length of segments subequal, posterior angles produced, each bearing two long hairs; posterior margin almost straight each furnished with sixteen to twenty-four hairs of which outer 2-3 are spinous; posterior margin of the last segment broadly rounded with two long hairs on each side and a fringe of fine hairs between them; tergal plates faintly coloured, distinct, entire. Ventrum with two transverse rows of hairs, anterior one being small and the posterior one entire; group of several hairs on each side of IV-VI sternal plates, merging more or less with transverse rows of hairs. Pleural plates with several irregularly scattered spinous hairs. Genital plate distinct, lying on VIII-IX sternites, posterior margin with several short hairs.

Male: not available.

Measurements (mm.): Length × Breadth.

Holotype (Female): Total 1.639 × 0.713, head 0.277 × 0.509, pro-thorax 0.139 × 0.370, pterothorax 0.140 × 0.389, abdomen, 1.083 × 0.713, head-index 1.845.

Holotype: A female from Lyallpur, 14.i.1928, on slide No. MA. 018, ex the Punjab Red-Vented Bulbul, *Molpastes cafer intermedius* (Jerdon).

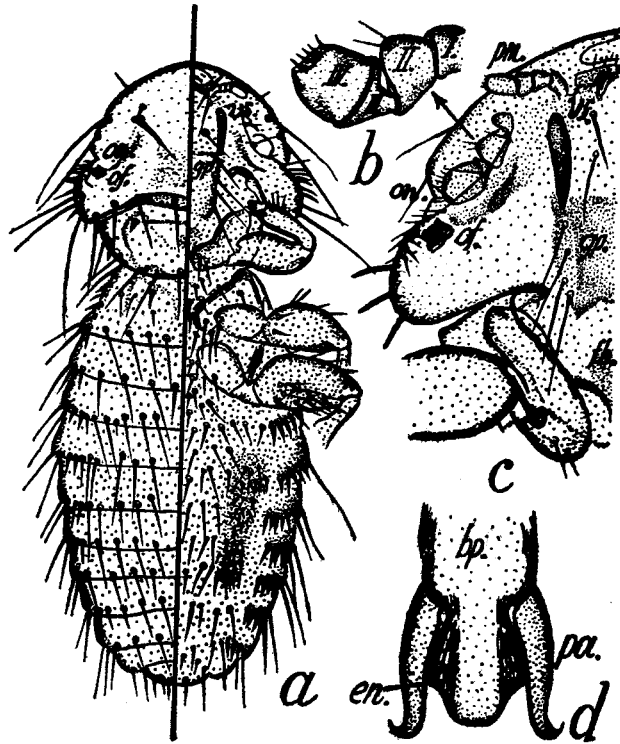
This species is close to *M. microsceli* Uchida from the Brown-eared Bulbul, *Microscelis amaurotis*; but differs from it, amongst other characters, in the general chaetotaxy and shape of the last abdominal sclerite.

10. *Menacanthus safedgal*¹ sp. nov.

Male (Text-fig. 6a): very small, wide bodied form; ground colour brownish-yellow with dark-brown markings on head.

¹ *Safedgal* is the vernacular name for the White-cheeked Bulbul.

Head comparatively large, pre-antennal region almost twice as long as the post-antennal region, front broadly parabolic; one short and two long hairs on the



TEXT-FIG. 6. *Menacanthus safedgal*, sp. nov.: (a) dorsal and ventral aspects of male, (b) antenna of male (enlarged), (c) ventral aspect of a portion of head and pro-thorax of male (enlarged), (d) male genital armature (enlarged).

lateral margin; two short and a long hair on each side of the dorsum of head; ocular slit narrow, indistinct. Eyes large, double cornea, with nearly quadrate fleck, bare. Temples slightly expanded; margin flatly rounded, each bearing three long and several subequal hairs, fringe of stiff hairs along the margin, just below the eyes. Occipital margin concave, edged with dark-brown band on the lateral margin, bearing eight long hairs. On the ventrum, mandibles situated a short distance behind the anterior margin; labrum distinct with numerous short hairs irregularly scattered on the posterior margin, oesophageal sclerite and glands wanting, gular plate faintly chitinized, quadrate with posterior concavity, bearing four long hairs on each side. Antennal cavity completely covered above, lower flap almost one-third of upper flap in breadth; inner chitin of the fossa dark-brown. Antennae (Text-fig. 6b) 4-segmented, scape quadrate, placed over it is the irregularly pyriform segment II, segment III calyciform, with shallow cup and short peduncle inserted apically on one side of segment II; segment IV irregularly cone-shaped with a grooved subapical margin. Spinous process (Text-fig. 6c) large, reaching as far as the imaginary line joining the eyes, 0.073–0.078 mm. long.

Pro-thorax large, protruded, lateral angles rectangular, rounded, each with a spine; posterior lateral margin almost straight, with two long hairs and a spine in between; posterior margin slightly convex, with four long hairs on each side of

median conical protuberance; transverse bar distinct, with short median longitudinal bar running posteriorly and a spine on each lateral end; lateral bars distinct, reaching as far as scapular region, dark-brown. Meso-thorax fused with the posterior segment; lateral bar distinct, reaching as far as pro-thorax, running inwards for some distance and then backwards and inwards; bearing a spine and 2-3 fine dorsal hairs on each half. Meta-thorax short, broader than pro-thorax, lateral margins straight, each with four spines; lateral bar distinct; posterior lateral angle with a spine and a long hair; posterior margin slightly convex, bearing two short spines and eight long hairs. Legs concolorous with the body, with brownish marginal markings and short marginal hairs; hind femora with brief ventral patch of stiff, short hairs. Pro-sternum distinct; central piece lightly pigmented, squarish blotch; lateral bars strongly built, running along the coxal plates as far as the scapular margin. Meso-sternum confined between the two meso-coxal bars, which almost touch each other in the middle, about four hairs on each posterior margin and several short ones scattered above. Meta-sternum four-sided, two hairs on each frontal margin and two such hairs on each posterior margin.

Abdomen elliptical, widest at the III segment, length of segments almost equal, posterior angles produced, each bearing one short and a long hair; posterior margins of segments I-III slightly convex, of segments IV-VI almost straight, and of VII-VIII concave; each segment bearing a transverse row of long hairs of which lateral 2-3 becoming spinous; segment IX with two hairs on the posterior projecting angle, last segment short, flatly rounded with about 8-10 marginal hairs. Abdominal sternites, each bearing a row of short weak hairs and several spinous hairs on each side; sternites III-VII with patch of fine hairs on each end, merging more or less with transverse row of hairs. Pleural plates well developed, with several spinous hairs on the posterior margins. Genitalia (Text-fig. 6d) pale, short, parameres faintly chitinized with strongly, outwardly recurved ends; endomeral plate well developed with well chitinized lateral ends.

Female: not available.

Measurements (mm.) Length × Breadth.

Holotype (Male): Total 1.128 × 0.455, head 0.250 × 0.431, pro-thorax 0.130 × 0.325, ptero-thorax 0.122 × 0.374, abdomen 0.626 × 0.455, head-index 1.728.

Holotype: One male from Kulu, 2.x.1939, on slide No. MA. 019, ex the White-cheeked Bulbul, *Molpastes l. leucogenys* (Gray).

The present species is distinguished from other species of the genus, by the shape of the head, body size, general chaetotaxy, by the male genitalia, and other details.

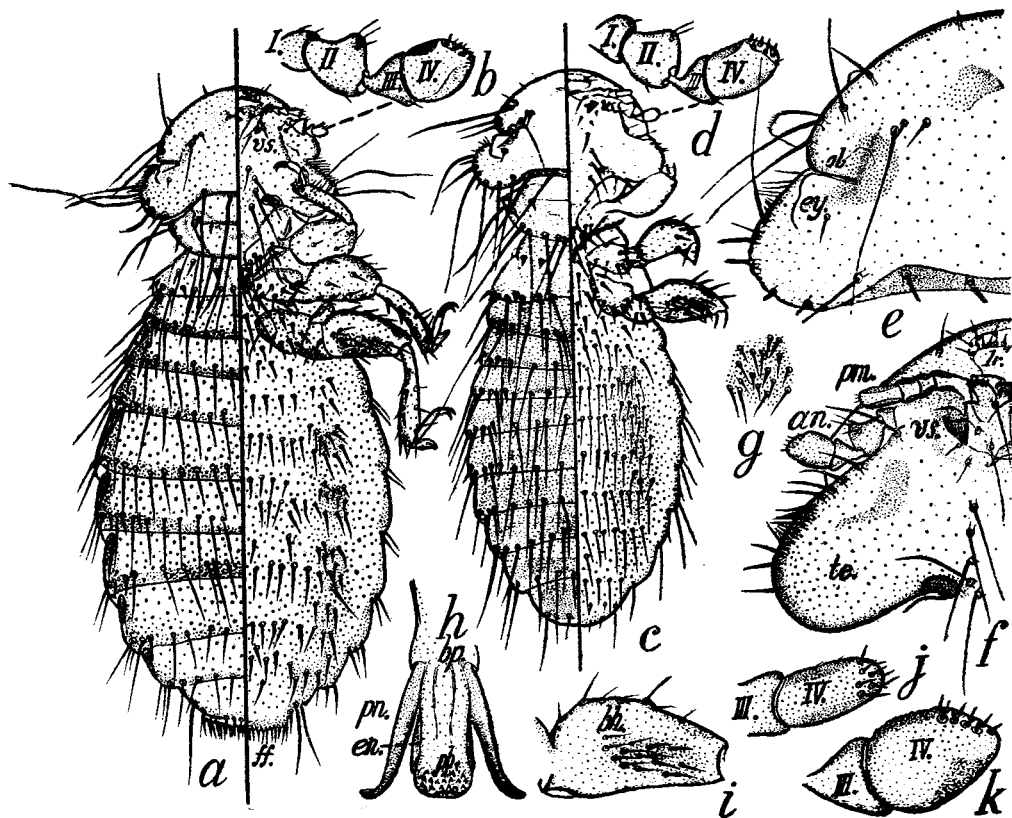
11. *Menacanthus dudiyalatora*¹ sp. nov.

Female (Text-fig. 7a): broadly elliptical, brownish-yellow, with yellowish-brown markings on head and thorax.

Head broad, slightly little less than twice as broad as long; front rounded, two short hairs on each side of meson; lateral margins with a small and three long hairs; lateral angles rounded; two short and one long hair on dorsum; ocular slit distinct. Eyes large, concave in the middle, ocular fleck oblong with a minute spine; temples swollen, slightly expanded, rounded with five long and several short hairs; a comb of stiff hairs on the ventrally produced margin, occipital margin slightly concave, edged with narrow, brown chitinous band, bearing three long hairs on each half. On the ventral side of head, mandibles situated a short distance

¹ *Dudiya-latora* is the vernacular name for the Indian Great Grey Shrike.

behind the frontal margin, labrum almost touching the forehead; frontal chitin yellowish-brown, continues backwards and downwards to the mandibular articulation. Antennal fossae deep; with well chitinized inner margin, dark-brown. Antennae (Text-fig. 7*b* and 7*k*) 4-jointed, projecting; scape simple and short; segment II irregularly pear-shaped, with subapical margin produced to one side; segment III ventricose at the apex and stalked, inserted apically in the middle of segment II; segment IV ovate, with numerous sensory apical hairs. Gular plate quadrate, faintly chitinized, each side with four long hairs of which the posterior one is longest. Spinous pegs, short and delicate, 0.033 mm. long.



TEXT-FIG. 7. *Menacanthus dudiyalatora* sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) dorsal and ventral aspects of male, (d) antenna of male (enlarged), (e) dorsal aspect of a portion of head showing the ocular slit and eye (enlarged), (f) ventral aspect of head (enlarged), (g) a patch of several irregularly scattered short hairs on the sides of III abdominal sclerite (enlarged), (h) genital armature of male (enlarged), (i) posterior femora, showing group of ventral hairs (enlarged), (j) terminal segment of maxillary palp (enlarged), and (k) terminal segment of antenna (enlarged).

Pro-thorax large, lateral angles each with a spine and a long hair; lateral margin slightly convex, each bearing a spine and a long hair, posterior margin nearly straight, bearing three long hairs on each half; transverse band distinct, a short spine on lateral ends; lateral longitudinal bars well chitinized, dark-brown. Meso-thorax reduced, distinct; meta-thorax short, broader than pro-thorax, lateral margin almost straight, diverging posteriorly; posterior angle with two spines;

posterior margin almost straight, bearing five long hairs and a spine on each half, legs somewhat paler than the body with distinct marginal markings and roughly scattered short hairs, posterior femora (Text-fig. 7i) with a group of hairs on the ventral surface. Pro-sternum reduced, the coxae of the foot-jaws almost touching each other; meso- and meta-sternum and peri-coxal plates well developed, bearing several long hairs as shown in figure.

Abdomen broadly elliptical, widest at IV-V segment, posterior angles of the segments projecting; each with two long hairs; posterior margins of the segments almost straight, each bearing a transverse row of 14-20 hairs of which lateral 2-3 becoming very small; posterior margin of the last segment truncate, bearing one long and a short hair on each side of a fringe of fine hairs and six short hairs dorsal to the fringe. On the ventral surface, each abdominal sternite with a transverse row of hairs and a smaller row of irregularly arranged short hairs; several irregularly scattered short hairs on each side also present, merging more or less with general chaetotaxy.

Male (Text-fig. 7c): similar to female, but size considerably small, abdomen smaller and narrower; ventrum with one row of hairs and a group of short hairs on each side of it. Genitalia (Text-fig. 7h) pale, well chitinized, basal plate long, distally flat, articulating with a flatly rounded lamina; on each side of which is a slender outwardly recurved paramere; preputial sac beset with curved spines.

Measurements (mm.) of Menacanthus dudiyalatora sp. nov.

	Female (Holotype).		2 males.	
	Length.	Breadth.	Length.	Breadth.
Total	1.826	..	1.513-1.591	.....
Head	0.281	0.534	0.242-0.292	0.505-0.553
Pro-thorax	0.165	0.398	0.155-0.194	0.359-0.378
Ptero-thorax	0.147	0.534	0.126-0.136	0.408-0.485
Abdomen	1.233	0.835	0.971-0.990	0.650-0.679
Head-index	1.9		1.906-2.086	

Holotype: A female from Lyallpur, 19-xi-1930, on slide No. MA. 023H. *Allotype*: A male from Lyallpur, 4.iv.1928, on slide No. MA. 023A *ex* the Indian Great Grey Shrike, *Lanius excubitor lahtora* (Sykes). *Paratype*: A male from Lyallpur, 27.ii.1936 (same data as above).

This species resembles *Menopon coarctatum* (Scopoli) from the Red-backed Shrike, *Lanius collurio* but is distinguished from it by the differences in size, the general chaetotaxy, and by the male genitalia.

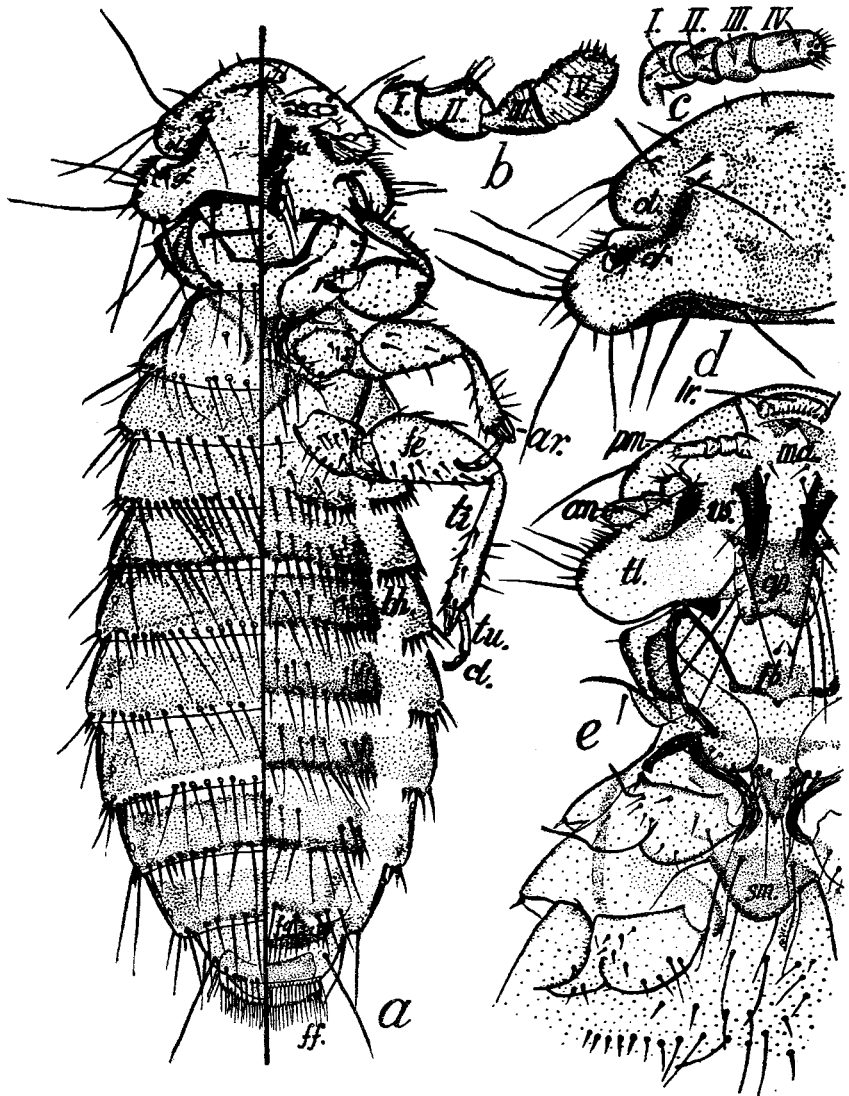
12. *Menacanthus gulabimaina*¹ sp. nov.

Female (Text-fig. 8a): body large and oval, pale-brown with brownish markings on head and thorax.

Head comparatively short; front broadly parabolic, two minute hairs on each side of meson; lateral margins slightly concave, each bearing one small and a long hair, two long hairs in the lateral angles; one long and two short setae on the dorsal surface of the head; ocular emargination shallow, continued into a slit; eyes large, emarginated, double cornea; ocular fleck irregularly rectangular, black, a short seta in the notch and another situated posteriorly; temples moderately

¹ *Gulabimaina* is the vernacular name for the Rose-coloured Starling.

expanded, rounded laterally, bearing about seven stiff, short, posteriorly bent setae, then five long and six short setae; occipital margin slightly concave, edged



TEXT-FIG. 8. *Menacanthus gulabimaina*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) maxillary palp of female (enlarged), (d) dorsal aspect of a portion of head showing ocular notch, slit and eye (enlarged), and (e) ventral aspect of a portion of head and thorax (enlarged).

with dark brown chitin, bearing three long hairs on each side. On the ventral aspect of the head; mandibles situated a short distance behind the anterior margin; labrum narrow with numerous minute and two short hairs; oesophageal sclerite and glands indistinct; plate on the gular region well developed, extending beyond the occipital margin, quadrate, with deeply concave posterior margin, bearing

four long hairs on each side. Inner border of antennal fossae highly chitinized, dark-brown; antennae (Text-fig. 8b) projecting, 4-jointed, scape transverse, small and squat; II joint pear-shaped, with minutely produced apical margin, and slightly bulging to one side; III joint bell-shaped, pedunculate basally and regularly diverging towards the apex, basal stalk tucked in submedially on the apex of segment II; segment IV elongate, irregularly cylindrical, with sub-apical groove furnished with minute hairs, visible hairs disposed of as in figure. Ventral spinous spatula (Text-fig. 8e) running backwards as far as or even beyond gular plate, straight, 0.112-0.130 mm. long.

Pro-thorax large, protruding, lateral angles obtuse, each with a spine; posterior lateral margin slightly convex, each with two long hairs and a spine; posterior margin straight, with four long hairs on each side of a short median keel; transverse bar distinct with a minute spine on the lateral tip, curved long bars at its end, well chitinized, dark-brown. Meso-thorax narrow; lateral bands narrow, well chitinized, dark-brown, bare; posterior margin with two minute spines on each side. Meta-thorax short and broad, lateral margins slightly convex, bearing three minute spines, diverging posteriorly; each posterior angle bearing a spine and two long hairs; posterior margin nearly straight with one spine and six long hairs on each side. Legs slightly paler than the thorax; with very narrow, brownish yellow marginal markings and roughly scattered short hairs; hind femora with several stiff hairs but no distinct patch.

Abdomen elliptical, widest at V segment, posterior angles of the segments projecting, each with a long hair and two short spines; posterior margins of segments I-V straight, and those of segments VI-VIII concave, each bearing a transverse row of long hairs, of which lateral three or four becoming spinous; posterior margin of the last segment broadly rounded, with one exceptionally long hair and a long hair on each side of several short hairs. A fringe of fine hairs on hyaline margin also present. Transverse bands brownish-yellow, entire; lateral bands narrow, clear brown. Ventral surface of each abdominal segment with two transverse, rows of hairs, several outer ones of the posterior row smaller, out of these 2-3 spinous; sternite III-VII, each with a patch of roughly arranged hairs. Pleural plates well developed, each with several heavy spines. Genital plate well developed, lying as far as the middle of segment IX, furnished with posterior row of 19-20 short hairs.

Male: similar to female, but size considerably small. Genital armature calls for no description.

Measurements (mm.) of Menacanthus gulabimaina sp. nov.

	Female (Holotype).		Female (Paratype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total	2.125	..	2.047	..	1.491	..
Head	0.298	0.615	0.327	0.577	0.259	0.509
Pro-thorax ..	0.201	0.481	0.211	0.461	0.173	0.404
Ptero-thorax ..	0.222	0.625	0.182	0.548	0.154	0.481
Abdomen	1.404	0.961	1.327	0.798	0.905	0.596
Head-index ..	2.068		2.764		1.965	

Holotype: one female, on slide No. MA. 026H; *Allotype*: one male, on slide No. MA. 026A; *Paratype*: one female; all from Lyallpur, 2.iii.1936, ex the Rosy Starling, *Pastor roseus* (Linn.).

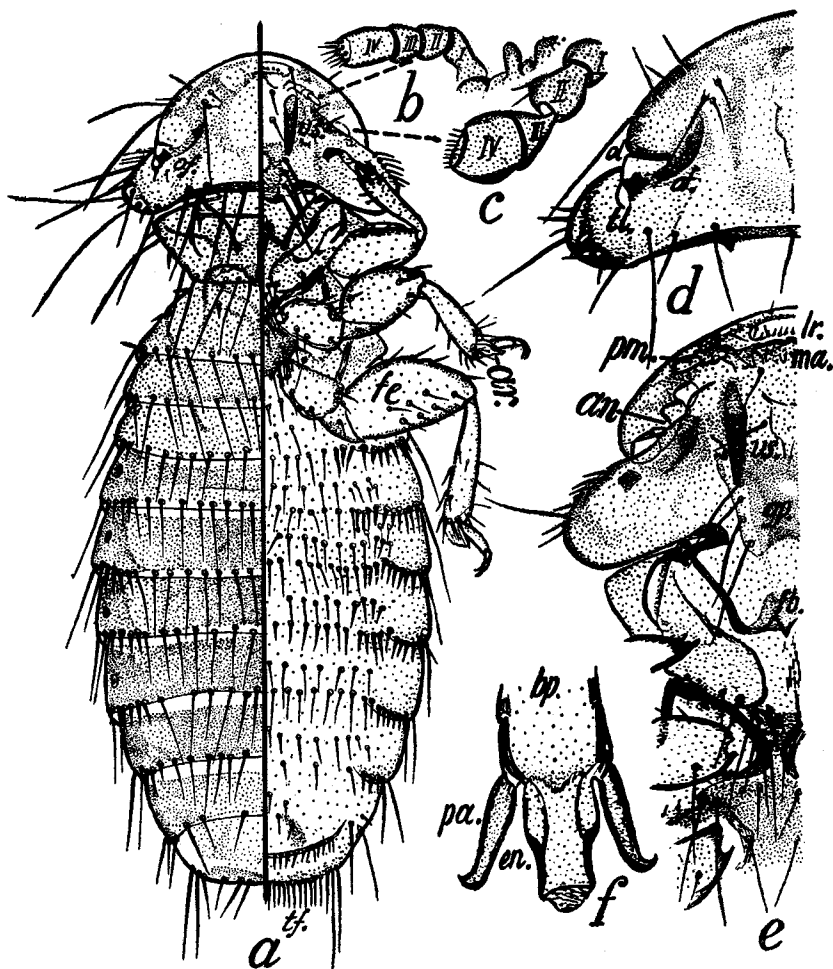
This species resembles *Menacanthus tristis* Qadri but differs from it in the following characters: plate-like coxae of the foot-jaws touch each other in the middle; antennae short, not projecting; spinous process longer.

Piaget (1880) recorded *Myrsidea breviventris* from this host.

13. *Menacanthus himalayicus* sp. nov.

Female (Text-fig. 9a): body broadly elliptical, pale-brown, with brown and dark-brown markings on head and thorax and brownish bands on abdomen.

Head short and broad; front broadly rounded, a minute angulation on meson bare; lateral margin with two short and two long hairs; one long and two short hairs, on the dorsal surface; lateral margin continuous with the eyes, ocular slit distinct; eyes well developed, cornea flat, medially emarginated; ocular fleck irregularly squarish, bearing a short seta behind; temples narrow and produced, each lobe



TEXT-FIG. 9. *Menacanthus himalayicus*, sp. nov.: (a) dorsal and ventral aspects of female, (b) maxillary palp of female enlarged, (c) antenna of female (enlarged), (d) dorsal aspect of a portion of head showing ocular slit and eye (enlarged), (e) ventral aspect of a portion of head and thorax (enlarged), and (f) male genital armature (enlarged).

with five very long and several short hairs, a comb of stiff hairs on the margin, lying below the eyes; occipital margin concave, edged with narrow, brown chitinous bands, bearing four hairs on each half. On the ventral side of the head, mandibles situated a short distance behind the frontal margin; labrum narrow with anteriorly pointed clypeal suture; oesophageal sclerite and glands reduced; gular plate quadrate, extending beyond the occipital margin; posterior margin deeply concave, bearing four long hairs on each side. Inner border of antennal fossae highly chitinized, dark brown; antennae (Text-fig. 9c) not projecting, 4-jointed; scape squat; II joint pear-shaped, slightly produced apically to one side; III joint calyciform, IV joint cone-shaped with truncate sub-apical margin. Ventral spinous process running backwards as far as beyond gular plate, straight (Text-fig. 9e), 0.121 mm. long.

Pro-thorax large, protruded; lateral angles nearly at right angles, each with one short spine; posterior lateral margin almost straight, each with two long hairs and a spine in between; posterior margin straight, with four long hairs on each side of a central ridge, outermost of which is at a distance and longest, transverse band and lateral bars distinct, a small spine on band's end. Meso-thorax reduced, lateral bands dark-brown; meta-thorax trapezoidal, lateral margins straight, diverging posteriorly, each with three spines; posterior angle with two long hairs and a spine; posterior margin straight furnished with one spine and five long hairs on each half; legs paler than the body, with brownish margins and roughly scattered spinous hairs; hind femora with several ventral, stiff hairs. Sternal plates (Text-fig. 9e) and pericoxal bars well developed.

Abdomen elliptical, widest at the IV segment; length of segments subequal; posterior angles projecting, each bearing two long hairs and several spines; posterior margin with a transverse row of several hairs, of which outer 3-4 becoming spinous; posterior margin of the last segment truncate, bearing two long and four short hairs on each half, hyaline flap bearing fringe of fine hairs below; transverse bands yellowish-brown, entire, present across each segment; lateral bands narrow, brown. Ventral surface of each abdominal segment bearing two rows of short and weak hairs, the outer ones of the row becoming spinous. Pleural plates well developed, each with spinous posterior hairs. Genital plate across segment IX with posterior row of several fine setae.

Male: similar to female, but smaller. Genital armature (Text-fig. 9f) distinct; parameres pale, transparent with outwardly curved tips; endomeral plate, oblong with well chitinized outer rod-like structures.

Measurements (mm.) of Menacanthus himalayicus sp. nov.

	Female (Holotype).		5 Females (Paratype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total ..	1.682	..	1.672-1.710	....	1.125	..
Head ..	0.259	0.548	0.259-0.279	0.548-0.558	0.240	0.432
Pro-thorax ..	0.192	0.452	0.192	0.432-0.442	0.144	0.356
Ptero-thorax	0.154	0.548	0.182-0.192	0.529-0.548	0.107	0.384
Abdomen ..	1.077	0.721	1.019-1.067	0.673-0.731	0.634	0.452
Head-index ..	2.116		1.964-2.154		1.8	

Holotype: A female from Lyallpur, 10.ii.1928, on slide No. MA. 027H. *Allotype*: A male from Lyallpur, 28.iii.1929, on slide No. MA. 027A, ex the Himalayan Starling, *Sturnus vulgaris humii* Brooks. *Paratypes*: A female, 6.xi.1933, on slide and several males and females preserved in alcohol (same data as above).

This species closely resembles *Menacanthus gulabimaina* sp. nov. (*vide supra*), but differs in the shape of the head and ventral chaetotaxy.

14. *Menacanthus spiniferum* (Piaget).

1885, *Menopon spiniferum*, Piaget, *Les Pediculines (Suppl.)*, p. 99, pl. 10, fig. 9.

This species has frequently been recorded from the Indian Minor, *Acridothores t. tristis* (Linn.). The specimens referred to below were collected from the Common Indian Myna shot in Lyallpur, 16.vi.1933.

Measurements (mm.): Length × Breadth.

5 Females: Total 1.88–2.30 × 0.68, head 0.36 × 0.52, thorax 0.41 × 0.52, abdomen 1.20–1.51 × 0.68, head-index 2.0.

Piaget (1885) gave the measurements of female as 2.2–2.3 mm.–0.75 mm., while the head-index calculated = 1.714.

15. *Menacanthus quadrifasciatum* (Piaget).

1880, *Menopon quadrifasciatum*, Piaget, *Les Pediculines*, p. 440, pl. 35, fig. 6.

This species was first described from Domestic Sparrow, *Passer domesticus* Linn. Uchida (1926) recorded it from the Russet Sparrow, *Passer r. rutilans*. The specimens referred to below were collected from the Indian House Sparrow, *Passer domesticus indicus* Jard, & Selby.; shot in Lyallpur, 3.x.1930.

Measurements (mm.): Length × Breadth.

Female: Total 1.26 × 0.53, head 0.26 × 0.46, thorax 0.28 × 0.39, abdomen 0.72 × 0.52, head-index 1.769.

Piaget (1880) and Uchida (1926) gave the measurements of female as 1.3 mm. × 0.51 mm. and 1.5–1.55 mm. × 0.63–0.65 mm. respectively, while head-index calculated = 1.384 and 2.0 respectively.

16. *Menacanthus* sp.

Several immature specimens were obtained from the Indian Yellow-throated Sparrow, *Gymnoris x. xanthocollis* (Burt.); shot in Lyallpur, 4.v.1933.

Sub-family: COLPOCEPHALINAE

GALLIFERRISIA gen. nov.

The following is the preliminary description of a new genus and species of Mallophaga taken from the Common Indian Peacock, *Pavo cristatus* Linn.

The characters of *Colpocephalum* Nitzsch, to which it resembles in form and superficial appearance; include mainly 2-3 fringes of stout setae curving upwards on the posterior lateral margin of the VIII abdominal segment, combs of hind femora and III abdominal sternite as well as genitalia. The genus discussed below is similar to it as far as the presence of fringes of recurved setae on the posterior lateral margin of the VIII abdominal segment is concerned but differs considerably in many features, viz. shape of head, thoraces, combs of hind femora and abdominal sternite. There are certain other unusual anatomical structures and further studies are contemplated. The following table of comparison includes additional characters, none of these enables a sharp separation to be made but in combination they are effective.

Table showing schematical comparison of *Colpocephalum* and *Galliferrisia*.

<i>Colpocephalum</i> Nitzsch.	<i>Galliferrisia</i> gen. nov.
1. Head (seen from above) with a distinct squarish ocular notch.	1. Head (seen from above) with a deep, acutely notched, peculiar ocular emargination.
2. Head less firmly fastened to the thorax.	2. Head more firmly fastened to the thorax, overlapping pro-thorax.
3. Antenna 4-segmented with swollen, obliquely pear-shaped II joint.	3. Antenna 4-segmented, II joint pear-shaped.
4. Eyes lateral, double cornea.	4. Eyes greatly reduced, slightly ventral or absent.
5. Pro-thorax short and protruded lateral angles nearly at right angles.	5. Pro-thorax with acute wings, anterior portion deeply inserted under occipital margin, postero-lateral margin strongly confluent.
6. Meso- and meta-thorax separated with an obliterated suture.	6. Meso- and meta-thorax distinctly separated laterally with a notch.
7. Venter of the posterior femora with 2-3 combs.	7. Venter of posterior femora with 4-5 combs of hairs.
8. III abdominal sternite with a pair of diagonally set combs of spines.	8. III abdominal sternite with 4-5 pairs of diagonally set combs of spines.
9. Male genitalia with complex chitinous structure near the apex of the basal plate.	9. Male genitalia with complex chitinous structure as in <i>Colpocephalum</i> , but modified in essential characters.
10. Female genital plate simple.	10. Female genital plate rugose.

Description of the genus.—Head about one and half times wider than long; forehead broadly rounded; lateral margins, in front of the eyes, with a notch; eyes wanting or vestigial, ventral, situated far away from the margin; ocular fleck situated immediately near the occipital band. Antennae 4-jointed as shown in text-figure, extending outwards beyond the border of the head. Mandibles situated a short distance behind the anterior margin. Oesophageal sclerite well developed. Gular plate well marked, but feebly sclerotic. Pro-thorax well formed, wings acute, Ptero-thorax with distinct marginal suture, meso-notum short, intercoxal plates and sternum as shown in text-figure. Legs normal, posterior femora with four-five combs of spines on the ventrum. Abdomen elongate, tapering posteriorly; tergal and sternal plates well formed. Chaetotaxy as shown in text-figure; VIII abdominal pleurite in the female with about ten stout hairs, curving upwards around the sides of the segment; III sternite with four-five combs of spines. Sexes dimorphic. Male genitalia more or less as in *Colpocephalum* Nitzsch.

This genus is apparently confined to Pea-fowls (Phasianidae).

Type of the genus: *Galliferrisia tausi* sp. nov. (vide *infra*) ex the Common Pea-fowl, *Pavo cristatus* Linn. There is some probability that *Colpocephalum echinatum* Ewing, and *Colpocephalum thoracium* Kellogg and Paine described from *Pavo muticus*, belonging to this genus, but it is impossible to draw a more exact conclusion from the descriptions available to me.

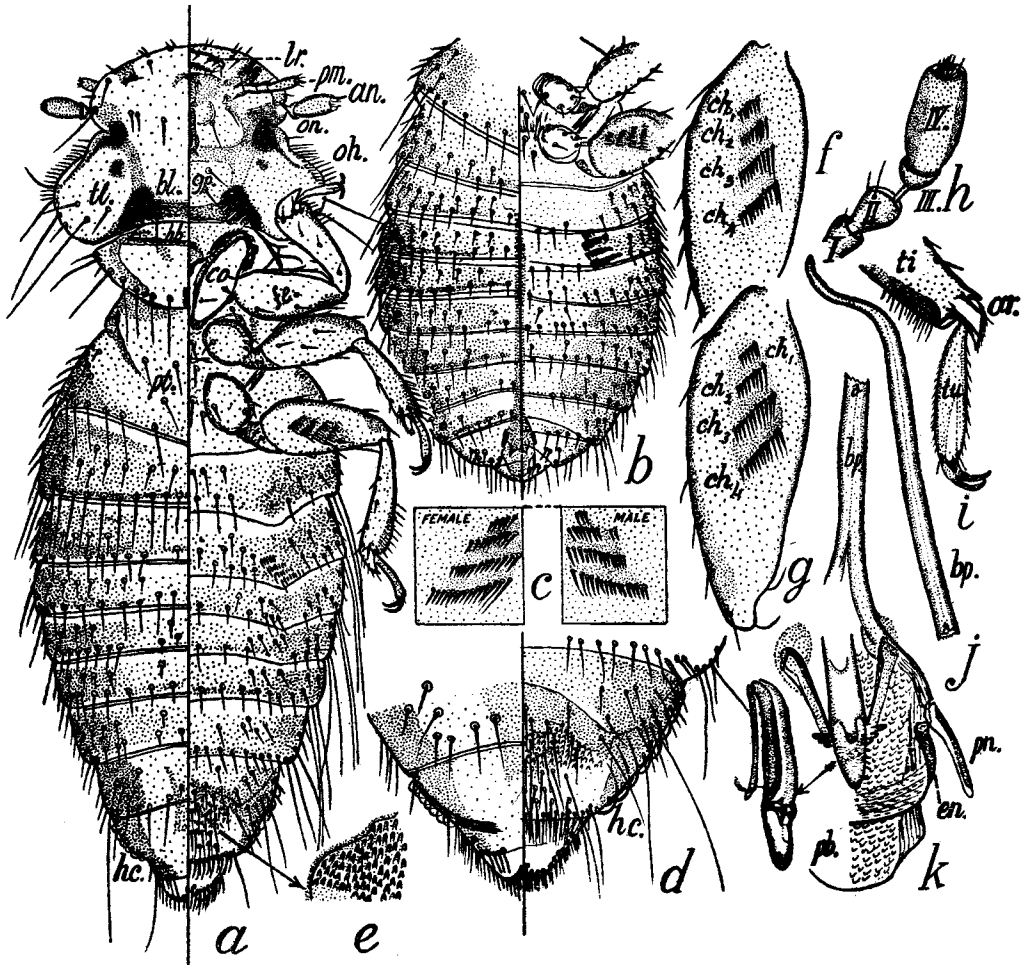
17. *Galliferrisia tausi*¹ sp. nov.

Female (Text-fig. 10a): pale brownish-yellow, with dark-brown markings on head and distinct abdominal bands.

Head broader than long, front broadly rounded with dorsal and ventral hairs arranged as in text-figure, ocular notch moderately deep, acutely angled, with

¹ 'Taus' is the Persian name of the Common Indian Pea-fowl.

dark-brown blotch immediately behind. Eyes far behind the margin, hence not visible; ocular fleck situated about the middle line of temples; temples broad, rounded, moderately spread, bearing dorsal and ventral hairs; a row of small, stiff hairs below the eyes; occipital margin concave with deep-brown marginal band and pitchy-brown blotch, continued to the occipital band, gular plate quadrate, well developed, feebly sclerotic; oesophageal sclerite and glands well formed; palpi projecting; antennae (Text-fig. 10*h*) 4-jointed, projecting; I joint of usual shape, II joint swollen submedially, obliquely reduced apically; III joint calyciform, cup shallow, oblique, stalk inserted apically on segment II; IV joint cylindrical, well developed; apical depression well marked, studded with sensory hairs.



TEXT-FIG. 10. *Galliferrisia tarsi*, sp. nov.: (a) dorsal and ventral aspects of female, (b) dorsal and ventral aspects of thorax and abdomen of male, (c) combs of hairs on the III abdominal sternite (enlarged), (d) dorsal and ventral aspects of the tip of the abdomen of female (enlarged), (e) rough genital blotch (enlarged), (f-g) ventral aspect of posterior femora showing combs of hairs (enlarged: f-male, g-female), (h) antenna of female (enlarged), (i) posterior tibio-tarsus joint (enlarged), and (j, k) male genital armature (enlarged).

Pro-thorax large, expanded with produced lateral angles, well towards the frontal margin; posterior margin convex, furnished with a series of hairs as shown in text-figure; transverse bar and longitudinal bands distinct. Meso-thorax narrow, lateral notch distinct; posterior suture obliterated, bearing two short hairs. Meta-thorax trapezoidal; lateral margins strongly divergent, furnished with numerous short hairs; posterior lateral angles produced, bearing short hairs, pigmented; posterior margin flatly convex on the I abdominal segment, transverse row of hairs disposed of as in text-figure. Legs well developed concolorous with the body, with narrow marginal markings and annular bands on femora and tibia; hind femora (Text-fig. 10g) with four combs of short, stiff hairs on the ventrum, proximal row being shortest, and III-IV rows subequal. Sternal plates, intercoxal bands and bars as in text-figure.

Abdomen elongate, widening posteriorly to the III segment, broadest in II-III segments, then tapering gradually to posterior end; tergites well sclerotized, entire; about two transverse rows of hairs on I-VII segments; segment VIII with ten stout hairs, curving upwards around the sides of the segment; last segment short, posterior margin notched in the middle. On the ventral surface each segment with rows of hairs as in text-figure; sternal plate III (Text-fig. 10c) provided with four combs of setae, anterior row with 5 setae and remaining three have 9, 13 and 15 setae respectively. Genital plate well formed, studded with hairs, surface rough (Text-fig. 10e). General chaetotaxy as in figure.

Male (Text-fig. 10b): similar to female, small; with ovate abdomen; last segment flatly rounded; upwardly curved hairs on the VIII pleural plate, wanting. Male genitalia (Text-fig. 10j, k) well developed; elongate, reaching from the posterior margin of the first segment to the end of the last segment; strongly expanded at the apex; paramere rod-like, straight; endomere short, preputial sac covered over with numerous recurved hooklets; complex chitinous structure in the preputial sac also present.

Measurements (mm.) of Galliferrisia tausi sp. nov.

	Female (Holotype).		5 females (Paratype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total ..	1.545	..	1.546-1.771	....	1.292	..
Head ..	0.320	0.533	0.320-0.386	0.533-0.577	0.293	0.493
Pro-thorax ..	0.186	0.386	0.173-0.196	0.360-0.400	0.146	0.280
Ptero-thorax	0.226	0.506	0.200-0.226	0.466-0.546	0.160	0.400
Abdomen ..	0.813	0.546	0.840-0.986	0.640-0.666	0.693	0.533
Head-index ..	1.665		1.484-1.665		1.683	

Holotype: A female from Hoshiarpur, 14.viii.1928, ex the Common Pea-fowl, *Pavo cristatus* Linn.; on slide No. MA. 053H, *Allotype*: one male. *Paratypes*: two females and one male on slide No. MA. 053P (same data as above), females and males from Atari (near Lahore) ex the Common Pea-fowl, 19.v.1934.

Colpocephalum appendiculatum Nitzsch, *C. longicorne* Rudow, *C. longicaudum* Piaget and *C. spinosum* Piaget are described from various Alectoropodes. The species under discussion does not resemble any one of them.

This new species somewhat resembles *Colpocephalum echinatum* Ewing, but is easily distinguished from it by smaller size and general chaetotaxy. In *C. thoracicum* Kell. and Paine, the abdomen of the female is not drawn out.

each bearing a marginal row of hairs; tergites strongly chitinized, I-V with some short hairs scattered here and there, forming no regular row; segment IX longer, bearing two hairs on the lateral margin, one long hair on the latero-posterior angle; posterior margin convex with one hair; tergal plate interrupted in the middle, a fringe of fine hairs along the antero-posterior margin. Ventral surface of each abdominal sternite with transverse row of hairs, becoming numerous on the sides of several sternites and assuming the form of a patch, sternites I-VII with three rows, while VIII-IX with two rows of hairs. Sternite III with two combs of spines (Text-fig. 11e), set slightly diagonally on the posterior lateral angle; segment IX beset with a row of marginal setae; pleural plates well developed, each with several short hairs, mostly scattered on the posterior half. Gastric teeth present (Text-fig. 11f).

Male: not available.

Measurements (mm.): Length \times Breadth.

Holotype (female): Total 1.606 \times 0.686, head 0.284 \times 0.549, pro-thorax 0.166 \times 0.362, ptero-thorax 0.185 \times 0.461, abdomen 0.971 \times 0.686, head-index 1.933.

Holotype: A female from Lyallpur, 7.ix.1929, on slide No. MA. 063, ex the Indian Cattle Egret, *Bubulcus ibis coromandus* (Bodd.).

This species is similar to *Pseudocolpocephalum uchidi* Qadri. It is distinguished from it, amongst other characters, by (i) the shape of the head, (ii) shape of the ptero-thorax, (iii) last abdominal segment, and (iv) dorsal and ventral chaetotaxy.

22. *Cuculiphilus upak*¹ sp. nov.

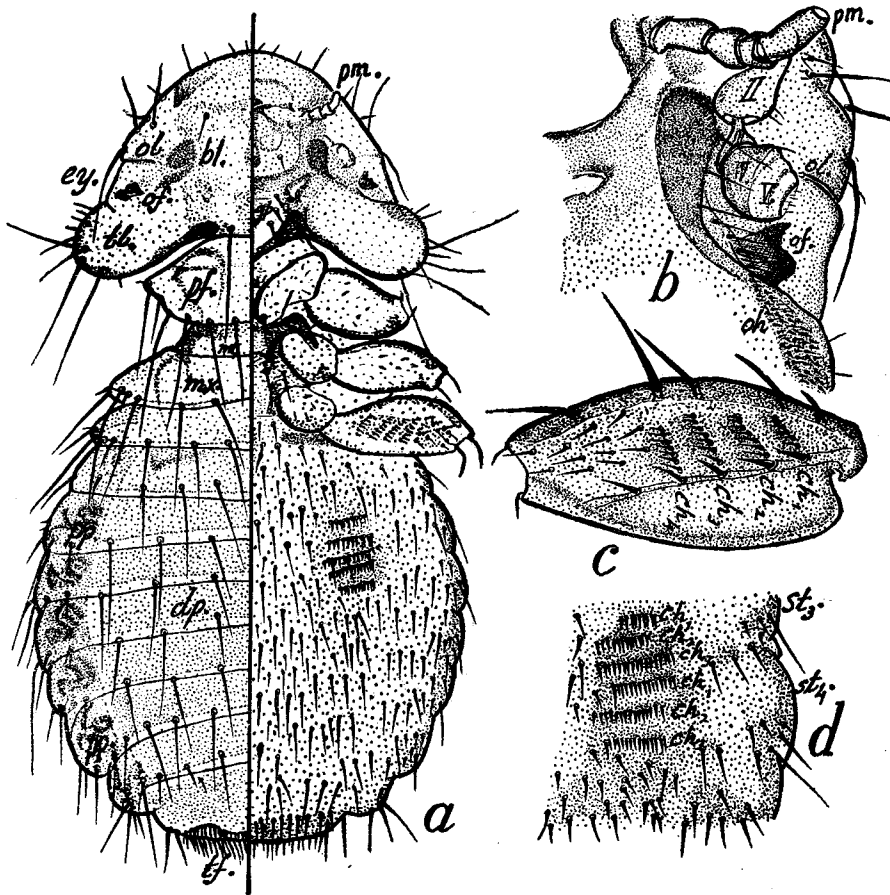
Female (Text-fig. 12a): body robust, abdomen rotundate, yellowish-brown with dark-brown markings.

Head yellowish-brown, with highly chitinized and strongly pigmented framework; front broadly parabolic, several short and long marginal hairs, one on the lateral angle being longest; one short hair on the dorsum. Ocular slit narrow, deep, backed by a dark-brown blotch. Eyes prominent, almost straight; ocular fleck black, roughly kidney-shaped. Temples broad, expanded, rounded, with four-five moderately long and several short hairs. Occipital margin strongly concave; edged with yellowish-brown band and dark-brown blotch; a long hair arising from near the blotch. On the ventral aspect, chitinous framework for support of mandibles continued forward to the anterior margin of the head, running downwards along inner border of the antennal fossae and then to the gular region enclosing faintly coloured plate with three moderately long fine hairs on each side; oesophageal glands and sclerite well developed. Antennae 5-jointed; I joint short, squat and quadrate; II joint obliquely companulate, with a stout basal stalk, fitting into joint I, apical half goblet-shaped; III joint calyciform with short, narrow peduncle placed apically on one side of the middle line of joint II; IV joint obliquely trough-shaped, narrow basally to fit uniformly in joint III and broad apically to accommodate obliquely hemispherical joint V, which is narrowly excavated at the apex, furnished with numerous tactile hairs; distribution of visible hairs is shown in figure.

Pro-thorax short, anterior portion deeply inserted under the occipital margin; anterior lateral margin concave; lateral angles acute, each with a short and a long hair; posterior-lateral margins slightly concave, bearing one short and a long hair; posterior margin fairly convex with about six long hairs, transverse bar distinct with a small, indistinctly visible hair on its ends; longitudinal bars well built.

¹ *Upak* is the vernacular name of the Common Hawk Cuckoo.

Meso-thorax distinct, lateral plate narrow. Meta-thorax diverging posteriorly, lateral margins straight, each with 1-2 spines; posterior lateral angles bearing one



TEXT-FIG. 12. *Cuculiphilus upak*, sp. nov.: (a) dorsal and ventral aspects of female (b) ventral aspect of a portion of head (enlarged), (c) ventral aspect of posterior femora (enlarged), and (d) portion of III-IV sternites showing combs of hairs (enlarged).

long and a short hair; posterior margin convexo-concave, with four long and a short hair. Legs colorous with the body, rather short, with well pigmented outer and inner margins; hind femora (Text-fig. 12c) with several short hairs on outer and inner chitin; ventrum furnished with four combs of minute stiff hairs and several hairs, not sufficient to form a brush, scattered towards the tibial joint. Pro-sternum with a circular, central perforation; coxal plates almost touching each other. Meso- and meta-sternites well separated; meso-sternum well chitinized anteriorly and merging into pericoxal plates; meta-sternum faintly chitinized with two fine hairs.

Abdomen ovate, widest in the middle; segments almost equal in length, lateral margins convex; posterior angles with one long and several, ventrally arising short hairs; posterior margin of segments I-IV truncate, those of V-VIII slightly concave, each bearing a row of 8-10 fine long hairs; last segment posteriorly truncate, with two long hairs on each side and several short hairs between them. Ventral surface of each segment with three irregular rows of fine hairs, sternites III-IV (Text-fig. 12d)

each with three broad combs of spines on each side. Pleural plates darker, artistically pigmented on II-VIII and simple on I, each with several short hairs, scattered irregularly. Genital plate distinct, furnished with about 24 marginal hairs; a fringe of fine hairs beyond it which merges into the general chaetotaxy.

Male: not available.

Measurements (mm.) of Cuculiphilus upak sp. nov.

Female	(Holotype).		(Paratype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.298	.....	1.420	.....
Head	0.310	0.604	0.290	0.550
Pro-thorax	0.129	0.320	0.120	0.340
Ptero-thorax	0.137	0.450	0.140	0.400
Abdomen	0.740	0.670	0.870	0.650
Head-index	2.006		1.896	

Holotype: A female from Lyallpur, 24.iv.1930, on slide No. MA. 038 ex the Common Hawk Cuckoo, *Hierococcyx varius* Vahl.; *Paratype*: A female (same data as above).

This species agrees with *Cuculiphilus fasciatus* (Scopoli), differences, however, exist in the size of the body, shape of the head and the thorax, and general chaetotaxy particularly ventral combs of hairs.

23. *Cuculiphilus pupiya*¹ sp. nov.

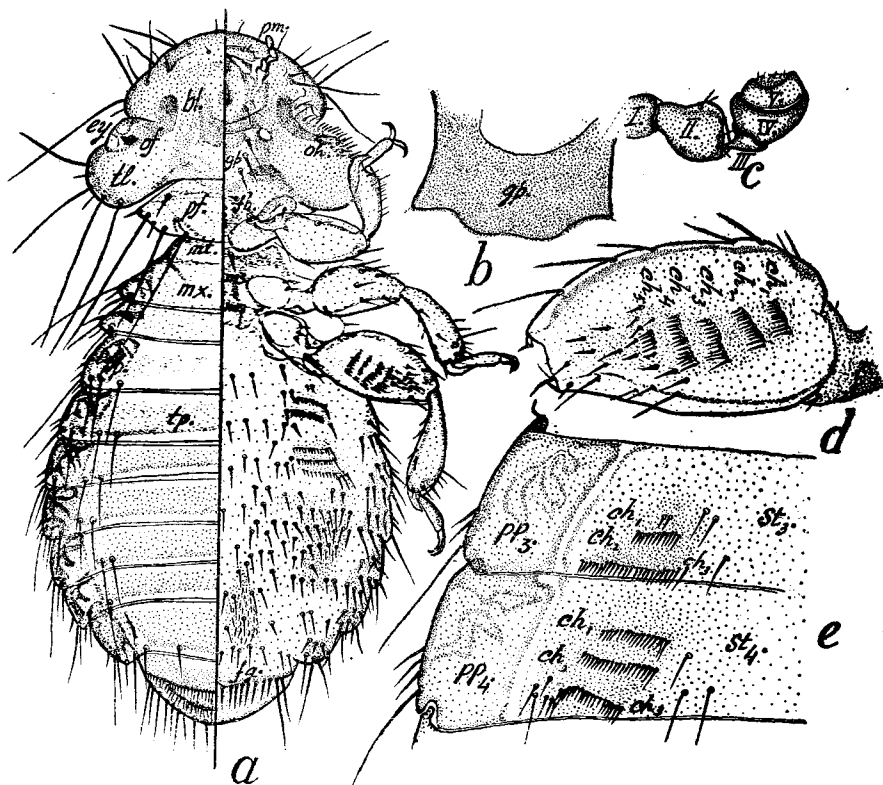
Female (Text-fig. 13a): body short and broad, yellowish-brown, with dark-brown markings on head, thorax and abdomen.

Head yellowish-brown, somewhat lunate; front broadly rounded, with several fine hairs and five long hairs, one on the lateral angle being exceptionally long; ocular slit narrow, deep, backed up by brown blotch; eyes prominent, almost flat; ocular fleck prominent, black, nearly quadrate, medially interrupted; temples flatly broad, marginally rounded, each bearing four long and several short hairs, occipital margin strongly concave, edged with brown band and deep-brown blotch, bare. Ventral framework of the head strongly built; antennal fossae backed up by a highly chitinized area. Gular region with a pigmented shield (Text-fig. 13b), bearing three long lateral hairs; oesophageal sclerite and glands well developed. Antennae (Text-fig. 13c) 5-segmented, similar to *Cuculiphilus upak* sp. nov. (*vide supra*).

Pro-thorax short, anterior margin deeply inserted under the occipital margin; lateral angles produced, each with a short and a long hair; posterior-lateral margins slightly concave, with a short and a long hair; posterior margin slightly convex with a long hair on each side, arising from a highly chitinized bar which runs to the front and meets transverse bar, a small seta at the point of junction. Meso-thorax short, distinct, lateral plates strongly built, running a short distance anteriorly. Meta-thorax about as long as the abdominal segments; lateral margin slightly concave, diverging posteriorly, each with a short and a long hair; posterior margin almost straight with one hair towards the lateral angles. Legs concolorous with the body, rather short, with well pigmented outer and inner femoral and tibial chitin; hind femora (Text-fig. 13d) with five subequal combs of short hairs and

¹ *Pupiya* is the vernacular name for the Indian Pied Crested Cuckoo.

several hairs irregularly scattered towards the tibial joint. Pro-sternal plate trapezoidal, with a central, oblong pit and a short hair on the anterior margin; coxal



TEXT-FIG. 13. *Cuculiphilus pupiyya*, sp. nov.: (a) dorsal and ventral aspects of female, (b) gular sclerite (enlarged), (c) antenna of female (enlarged), (d) ventral aspect of posterior femora showing chaetotaxy (enlarged), and (e) portion of III-IV abdominal sternites showing combs of hairs (enlarged).

plates well apart from each other. Meso- and meta-thoracic sternites distinctly separated, meso-sternite highly chitinized, pericoxal plates with two short anterior hairs; meta-sternite quadrangular, faintly pigmented, bearing fine hairs.

Abdomen broadly ovate, widest at IV-V segment and then gradually narrowing to the posterior; segment I narrow, segment II longest, others subequal; posterior angles with 1-2 long hairs; segments I-VII with almost straight posterior margins, segment VIII with convex posterior margin; tergites yellowish-brown, darker towards the lateral ends, entire; segment I bearing one, while others with three sub-marginal long hairs, median bare; segment IX rounded posteriorly, furnished with about twenty long hairs. Ventral surface of each segment with transverse plates, each bearing two rows of hairs, III sternite with two and IV sternite with three broad combs of spines on each side (Text-fig. 13e) indistinct patches of short hairs, almost merging with general chaetotaxy on each side of V-VII sternites. Pleural plates, dark in colour; well developed on I-VIII segments, characteristically designed on II-VIII; each with several short setae. Genital plate distinct, lying across IX sternite, furnished with about two dozen marginal hairs. A fringe of fine hairs on the posterior tip.

Male: not available.

Measurements (mm.) of Cuculiphilus pupiyya sp. nov.

Female.	(Holotype).		(Paratype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.544	..	1.48	..
Head	0.321	0.55	0.29	0.57
Pro-thorax	0.156	0.35	0.16	0.36
Ptero-thorax	0.131	0.46	0.15	0.44
Abdomen	0.936	0.69	0.89	0.66
Head-index	1.713		1.956	

Holotype: A female from Lyallpur, 22.vi.1929, on slide No. MA. 039 ex the Indian Pied Crested Cuckoo, *Clamator j. jacobinus* (Bodd.); *Paratype*: A female (same data as above).

This species closely resembles *Cuculiphilus upak* sp. nov. (*vide supra*), but differs in the shape of the head, general chaetotaxy and ventral combs of hairs.

ULULOEUCUS subgen. nov.

Small sized species; head comparatively short, somewhat lunate in shape; front parabolic, sides swollen; lateral margins with a slight notch and distinct slit before the eyes; chitinous framework for support of mandibles continued forwards to the anterior margin of the head and then curving downwards and backwards along the antennal fossae to the gular plate; antennae 4-jointed, short, not projecting, of the shape shown in text-figure, oesophageal sclerite and glands well built; gular plate squarish. Thorax normal, ptero-thorax very short, meso-notum separated from meta-notum, thoracic sternites well formed; legs normal, posterior femora with three combs of minute spines on the ventral surface. Abdomen elliptical, apically truncate; transverse bands pale-yellow, extending to pleurites; segments I-VIII with two rows of short hairs; sternal plates hairy, I-VII with three transverse rows, VIII-IX with two such rows of short hairs; two broad combs of spines upon each side of III sternite, sternites IV-VII each with a patch of minute hairs, merging more or less with the general chaetotaxy.

Species occurring, as far as known, only upon owls (Strigiformes).

Type of the subgenus: *Ululoecus panjabensis*, sp. nov. (*vide infra*) ex the Northern Spotted Owlet, *Athene brama indica* (Frankl.).

Ululoecus resembles *Cuculiphilus* Uchida in apparent body structures, but is widely different from it in certain characters of sub-generic importance, detailed below.

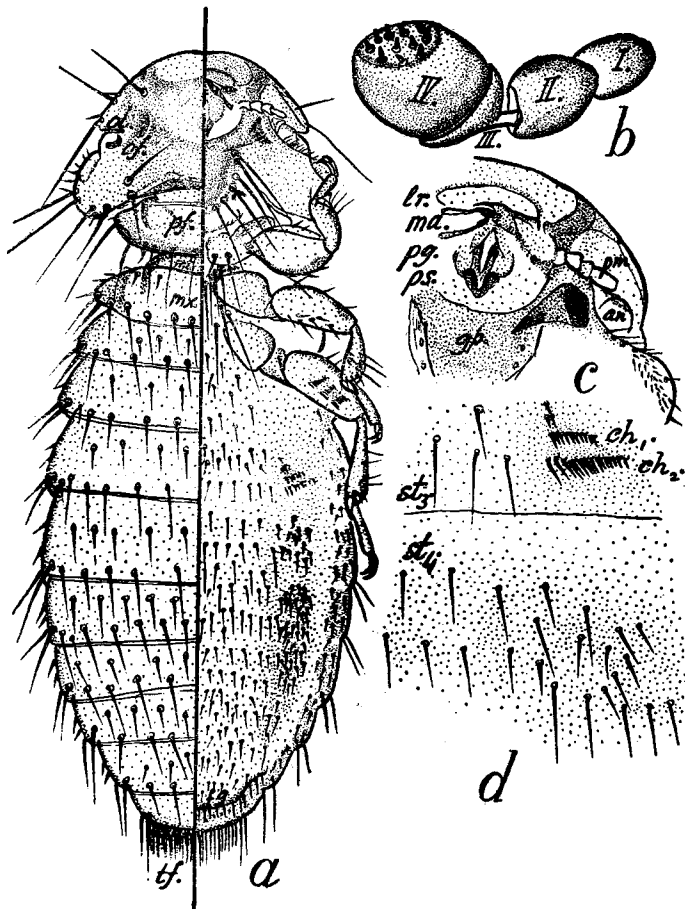
Colpocephalum painei McGregor from the Screech Owl, *Otus asio maccallicephalum*, which was described as a curious *Colpocephalum* by the author, and included in *Cuculiphilus* by Uchida (1926), seems to be a member of this new subgenus.

24. Cuculiphilus (Ululoecus) panjabensis sp. nov.

Female (Text-fig. 14a): body short and broad, pale-yellow with yellowish-brown markings on head.

Head almost twice as broad as long; front rounded, anterior margin somewhat squat, with a slight concavity on the meson, lateral margins slightly swollen, with yellowish-brown blotch immediately behind, bearing two long and a short marginal hair; one long dorsal hair, submarginal in position; ocular slit fairly deep, backed up with brown blotch; eyes prominent, flat, with a single cornea; ocular fleck

kidney shaped; temples expanded, margins rounded, each bearing four long and several short hairs, numerous short marginal hairs irregularly scattered on the ventrum; occipital margin concave, edged with yellowish-brown band and fuscous-brown lateral blotches, chaetotaxy scarce, only one marginal and one submarginal hair, near the occipital blotch. On the ventrum, chitinous framework for support of mandibles well developed, continued as far as on each side of labrum and anterior margin of the head, then running backwards along the lateral margins of the forehead; oesophageal sclerite and glands well developed; gular plate characteristic, broadly conical, tapering gradually to posterior end, well chitinized and continued as far as the pro-thoracic sternum, furnished with 4-6 long hairs on the lateral margin. Antennae (Text-fig. 14b) prominent, I joint bead-shaped; II joint similar to I but robust; III joint calyciform, with short stalk, immediately inserted to one side of segment II; IV joint dorso-ventrally flattened orbit, tilted to one side, subapical depression well marked, furnished with tactile setae. Antennal fossae well developed, deep, backed up by a strongly pigmented chitin, which continues as far as the gular plate, lateral margin of ventral plate with several short hairs.



TEXT-FIG. 14. *Caculiphilus (Ululoecus) panjabensis*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) ventral aspect of a portion of head (enlarged), and (d) III-IV abdominal sternites showing chaetotaxy (enlarged).

Pro-thorax short, broad; anterior margins concave, lateral angles obtuse, each with a short spine and a long hair; posterior-lateral margins slightly concave with a short and a long hair; posterior margin slightly convex, with a short and three long hairs on each half; a longitudinal median papilla present; a transverse yellowish bar between the marginal longitudinal bands. Meso-thorax short and narrow distinctly separated from meta-thorax. Meta-thorax trapezoidal in shape, lateral margins straight or slightly convex, diverging posteriorly, each with several marginal and submarginal spines; posterior lateral angles bearing one long and a short hair; posterior margin with about ten long hairs. Pro-sternum with large central portion, lateral bars running along the anterior coxal margin; frontal coxae enlarged, almost touching each other in the middle; meso- and meta-sternites short, bearing numerous long hairs. Legs concolorous with the body, outer margins well chitinized; posterior femora with three ventral combs of minute hairs.

Abdomen elliptical, widest at the IV segment, segments subequal, latero-posterior angles projecting, each bearing two long hairs, posterior margins I-IV straight, those of V-VIII concave, each bearing 10-12 long hairs, dorsal surface of I-VIII segments bearing another row of weak hairs; last segment narrow, almost truncate, bearing two long hairs on each side and fringe of fine hairs between them. Abdominal sternites I-VII with three transverse rows of short hairs, sternites VIII-IX with two such rows of weak hairs; two broad combs of spines on each side of third sternite (Text-fig. 14d). Sternites IV-VII with a patch of numerous short hairs, merging more or less with the general chaetotaxy. Pleural plates distinct, each with several hairs. Genital plate lying across IX sternite, furnished with marginal row of hairs.

Male: not available.

Measurements (mm.): Length × Breadth.

Holotype (female): Total 1.561 × 0.641, head 0.271 × 0.534, pro-thorax 0.145 × 0.359, ptero-thorax 0.126 × 0.427, abdomen 1.019 × 0.641, head index 1.97.

Holotype: A female from Lyallpur, 23.xi.1931, on slide No. MA. 043 ex the Northern Spotted Owllet, *Athene brama indica* (Frankl.). *Paratype*: two females (same data as above).

This species, apparently, not very closely related to any form which has so far been described or figured from specimens taken off the owls (Strigiformes).

25. Cuculiphilus (Ululoecus) sp.

One immature specimen was obtained, ex the Indian Barn Owl, *Tyto alba strepens* (Hart.), shot in Lyallpur, 11.ix.1931.

26. Culculiphilus (Ululoecus) sp.

One globular, mutilated female, ex the Indian Great Horned Owl, *Bubo bubo bengalensis* (Frankl.), shot in Gurdaspur, 8.ii.1928.

27. Ardeiphilus trochioxus (Nitzsch).

1838, *Colpocephalum trochioxum*, Nitzsch, in *Burmeisters' Handbuch der Ento.*, II, p. 438.

This species was first described from the Bittern, *Botaurus s. stellaris* (Linn.), and since then has been recorded from various other herons from different parts of the world. The following of its hosts also occur within our Faunistic limits: The Purple Heron, *Ardea purpurea* Linn.; the Common Indian Pond Heron, *Ardeola grayii* (Sykes); and the Bittern, *Botaurus s. stellaris* (Linn.).

The specimens referred to here, were collected from the Indian Pond Heron, *Ardeola grayii* (Sykes), at Lyallpur I.ix.1933.

Measurements (mm.): Length × Breadth.

3 females: Total 2.280–2.336 × 1.116–1.126, head 0.398–0.408 × 0.823–0.835, thorax 0.472–0.582 × 0.728–0.747, abdomen 1.300–1.456 × 1.116–1.126, head-index 2.017–2.097.

Piaget (1880) gave the measurements of female and male as 2.6–2.7 mm. × 1.13 mm. and 2.1–2.2 mm. × 0.95 mm. respectively, while Qadri (1935) gave the measurements of female of *Cuculiphilus mirzai* Qadri (Synonym) as 2.5 mm. × 1.025 mm. According to these measurements the head-index calculated = 1.717, 1.875 and 1.631 respectively.

28. *Allocolpocephalum subaequale* (Nitzsch).

1838, *Colpocephalum subaequale*, Nitzsch, *Burmeisters' Handbuch der Ent.*, II, p. 438.

This is a long known species of Mallophaga infesting crows and is cosmopolitan in its distribution. This species was first described from the European Raven, *Corvus corax* Linn. and the Rook, *Corvus frugilegus* Linn. Kellogg and Paine (1914) recorded it *ex Corvus insolens* from Burma and *ex Corvus s. splendens* from Calcutta.

The specimens referred to below were collected from the Punjab Raven, *Corvus corax laurencei* Hume; and the Common House Crow, *Corvus s. splendens* Vieill; from various parts in the Punjab.

Measurements (mm.): Length × Breadth.

10 females: Total 1.42–1.51 × 0.59–0.62, head 0.28 × 0.47–0.52, thorax 0.30–0.32 × 0.45–0.48, abdomen 0.84–0.95 × 0.59–0.62, head-index 1.671–1.857.

Piaget (1880) gave the measurements of female and male as 1.5–1.6 mm. × 0.58 mm. and 1.2 mm. × 0.45 mm. respectively while Kellogg's female measured 1.53 mm. × 0.63 mm. According to these measurements the head-index calculated = 1.911, 1.387 and 1.613 respectively.

Cesare Conci, April 1942, erected a new Genus *Corvocolpocephalum* for this species. This is apparently a synonym of *Allocolpocephalum* Qadri (1939).

PICUSPHILUS subgen. nov.

The old unwieldy and complex group of Colpocephalids (*Colpocephalum* Nitzsch) has been greatly simplified, by taking out a number of accurately defined, distinct forms and grouping them into small and compact genera. Uchida (1926) was, probably, the pioneer worker in this direction. He separated the genus *Cuculiphilus* for species mostly occurring upon Cuculiformes, Coraceiformes and Strigiformes. The characters of this subgenus include mainly 3–4 combs of spines upon ventral surface of the posterior femora and 1–3 combs upon each side of certain abdominal sternites; lateral margin of the head with slit before the eyes; and genitalia of male characteristic, very much different from *Ciconiphilus* Bedford.

The specimens before me, from the Scally-bellied Green Wood-pecker, resemble the species included in *Cuculiphilus* Uchida (1926), but are readily distinguished by certain important characters necessitating their separation from this genus. The author deems it necessary to suggest a new sub-genus for species infesting Piciformes.

Description of the sub-genus.—Body short, elongate; with the tergites, sternites and pleural plates well formed. Head less than twice as broad as long; forehead considerably narrower than hindhead, parabolic; lateral margins with a distinct

notch in front of the eyes; temples expanded, rounded; ocular blotch **distinct**, gular plate well developed; antennae 4-jointed, projecting; oesophageal glands and sclerite vestigial.

Pro-thorax short, with acute wings; meso-notum short, completely fused with meta-notum. Legs normal; posterior femora with three combs of short spines on the venter.

Abdomen elongated; tergal, sternal and para-tergal plates distinct; tergites with two transverse rows of hairs; sternites very hairy, usually with 2-3 rows of hairs; III sternite with two combs of stiff hairs on either side, set diagonally to the posterior margin.

Male genitalia distinctly different from *Cuculiphilus* Uchida (1926). Basal plate long and slender, reaching the posterior margin of II abdominal segment, expanded towards the apex and articulating with a flat rounded lamina; parameres short, incurved and pointed; preputial sac beset with recurved hooks.

Type of the subgenus: Picusphilus tirkhan sp. nov. (*vide infra*) ex the Himalayan Scally-bellied Green Wood-pecker, *Picus s. squamatus* Vigors.

29. *Cuculiphilus (Picusphilus) tirkhan*¹ sp. nov.

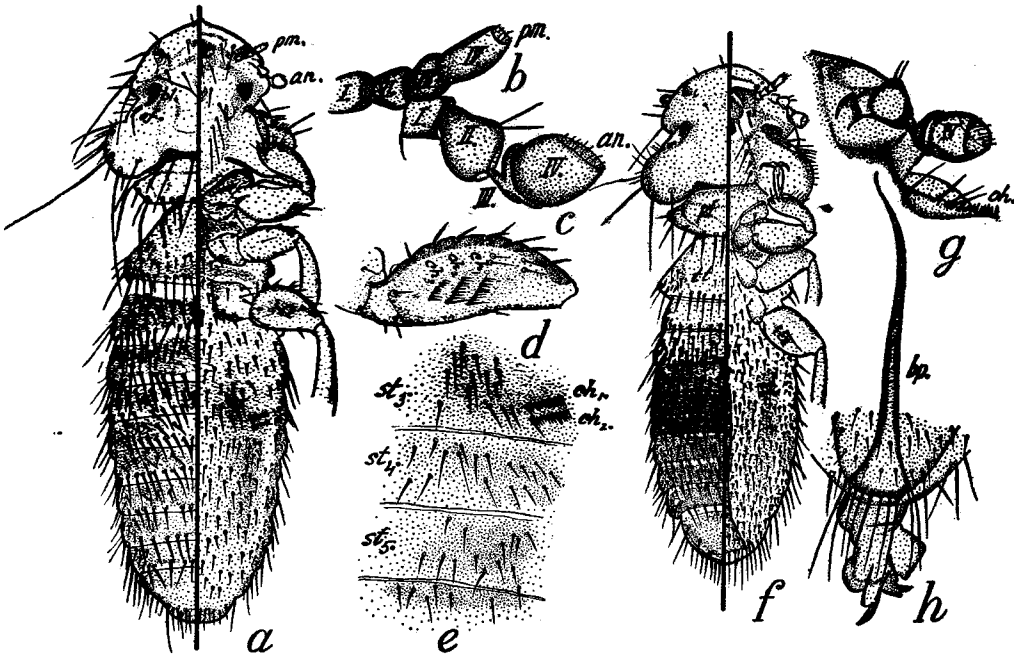
Female (Text-fig. 15a): body small, elongate; pale-brownish, with dark-brown body markings.

Head slightly wider than long; front rounded with a median angulation; a short hair on each side of the angulation, three subequal hairs on the lateral margin, and two long and a short hair on the lateral angle, three short and a long hair on the dorsal surface disposed of as shown in figure; ocular emargination a shallow notch, backed with a yellowish-brown blotch. Eyes almost flat, large, with a quadrangular fleck and a short hair arising posteriorly; temples expanded, margins rounded, each bearing several long pustulated hairs and several short hairs, a long pustulated hair submarginal in origin. Occipital margin concave, edged with yellowish-brown band and dark-brown occipital blotch, bearing two long hairs on each half. Ventral aspect of head with well chitinized, yellowish-brown, framework for support of mandibles; oesophageal sclerite and glands well developed; gular region with distinct plate, bearing four long hairs; antennal fossae extensive, backed up with a chitinized blotch about the base of ocular notch, and another near the palpus, which continues to the front. Antennae (Text-fig. 15c) projecting, 4-jointed; scape quadrate; II joint pyriform, outer margin dilated to one side; III joint oblique calyciform, stalk inserted apically on one side of segment II; IV joint cylindrical, squat, resting obliquely in shallow cavity of the calyx, subapically truncate; visible chaetotaxy disposed of as in figure. Ventral temporal plate with numerous short stiff marginal hairs.

Pro-thorax short with protruded wings, lateral angles acute, each with a long hair; posterior lateral margins slightly concave or straight, bearing two short and a long hair; posterior margin almost straight with four hairs on each side of a medial protuberance; transverse bar yellowish, distinct; longitudinal band well built, yellowish-brown; a short hair at the junction of the two, a median furrow running from the transverse bar to the posterior papilla. Meso-thorax narrow, not well separated; meta-thorax short, broad, with slightly convex, widely diverging sides bearing several setae; posterior lateral angles acute; posterior margin almost straight with numerous long hairs, dorsal surface with numerous short hairs; lateral posterior region dark-brown, extending to the narrow lateral band and dorsally to the broad tergal plates. Pro-sternum largely occupied by the well developed coxal plates which touch each other in the middle. Ptero-sternum with several long hairs. Legs concolorous with the body; outer margins highly

¹ *Tirkhan* is the Punjabi name for the Himalayan Scally-bellied Green Wood-pecker.

chitinized, dark-brown; posterior femora (Text-fig. 15*d*) with three ventral combs of hairs, each composed of about 10, 14 and 16 hairs respectively.



TEXT-FIG. 15. *Cuculiphilus (Picusphilus) tirkhan*, sp. nov.: (a) dorsal and ventral aspects of female, (b) maxillary palp of female (enlarged), (c) antenna of female (enlarged), (d) posterior femora showing ventral combs of hairs (enlarged), (e) III-IV abdominal sternites showing chaetotaxy (enlarged), (f) dorsal and ventral aspects of male, (g) ventral aspect of a portion of head (enlarged), and (h) male genital armature (enlarged).

Abdomen elongate, broadest at the IV segment; length of segments subequal; lateral margins with small setae; posterior lateral angles bearing two long hairs; tergites well chitinized, with two transverse rows of hairs, confined to the highly pigmented lateral portion, and one row on the faintly coloured medial portion of I-VI tergites; VII-VIII tergites with weak second row of hairs; IX segment bearing several short and a long hair on each side of a fringe of colourless fine hairs. Abdominal sternites with 2-3 irregular rows of short hairs; III sternite (Text-fig. 15*e*) with two combs of stiff hairs on either side, set diagonally to the posterior margin. Pleural plates distinct, each with numerous irregularly arranged short hairs.

Male (Text-fig. 15*f*): similar to female, but smaller; abdomen somewhat short, rounded posteriorly, fringe of fine hairs wanting. Genitalia (Text-fig. 15*h*) slender, long, reaching the posterior margin of II abdominal segment; distally set with a flat plate, lateral margins well chitinized; parameres slender. An exerted penis is shown in the figure.

Holotype: A female from Kulu (Kangra Valley), 6.x.1939, on slide No. MA. 037, ex the Himalayan Scally-bellied Green Wood-pecker, *Picus s. squamatus* Vigors; **Allotype**: A male; **Paratypes**: Two females (same data as above).

It is allied to *Colpocephalum inaequale* Nitzsch, but differs in size, shape of the body, tergal markings and general chaetotaxy. This species seems to be a member of this group.

Measurements (mm.) of Cuculiphilus (Picusphilus) tirkha sp. nov.

	Female (Holotype).		2 females (Paratype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total ..	1.487	..	1.428-1.508	....	1.268	..
Head ..	0.333	0.463	0.306-0.315	0.444-0.463	0.296	0.416
Pro-thorax ..	0.139	0.324	0.129-0.157	0.315-0.324	0.139	0.296
Ptero-thorax ..	0.154	0.416	0.155-0.188	0.398-0.416	0.185	0.287
Abdomen ..	0.866	0.555	0.805-0.898	0.491-0.555	0.648	0.450
Head-index ..	1.39		1.451-1.469		1.405	

Sub-family: MENOPONINAE

30. *Menopon phaeostomum* (Nitzsch).1866, *Menopon phaeostomum*, Nitzsch, *Zeit f. ges. Nat.*, XXVIII, p. 391.

This is one of the best known *Menopon* and has been recorded from *Pavo cristatus* Linn., from various parts of the world.

Several specimens were obtained by me from the type-host, *Pavo cristatus* Linn.; from Attari (near Lahore), 9.vi.1935.

Measurements (mm.) of Menopon phaeostomum Nitzsch.

	Female.		Male.	
	Length.	Breadth.	Length.	Breadth.
Total ..	2.691	..	1.738	..
Head ..	0.468	0.844	0.365	0.708
Pro-thorax ..	0.327	0.698	0.261	0.573
Ptero-thorax ..	0.271	0.729	0.156	0.615
Abdomen ..	1.625	0.958	0.956	0.739
Head-index ..	1.803		1.939	

31. *Menopon gallinae* (Linn.).1758, *Pediculus gallinae*, Linnaeus, *Syst. Nat.*, p. 613.

This familiar species has been recorded from practically all over the world on the Domestic Fowl, *Gallus g. domesticus* Linn. It is an active species and is frequently recorded wandering about on roosts and elsewhere in chicken houses. It is also known to pass readily to other barn-yard fowls, viz. pigeons, ducks, guinea-fowls, turkeys, etc., cattles, horses and dogs. It is commonly found in India and it is the most abundant of all the species infesting House hen in the Punjab.

Denny (1842) gave the length of female and male as $\frac{3}{4}$ " and $\frac{1}{2}$ ", i.e., 1.905 mm. and 1.27 mm. respectively.

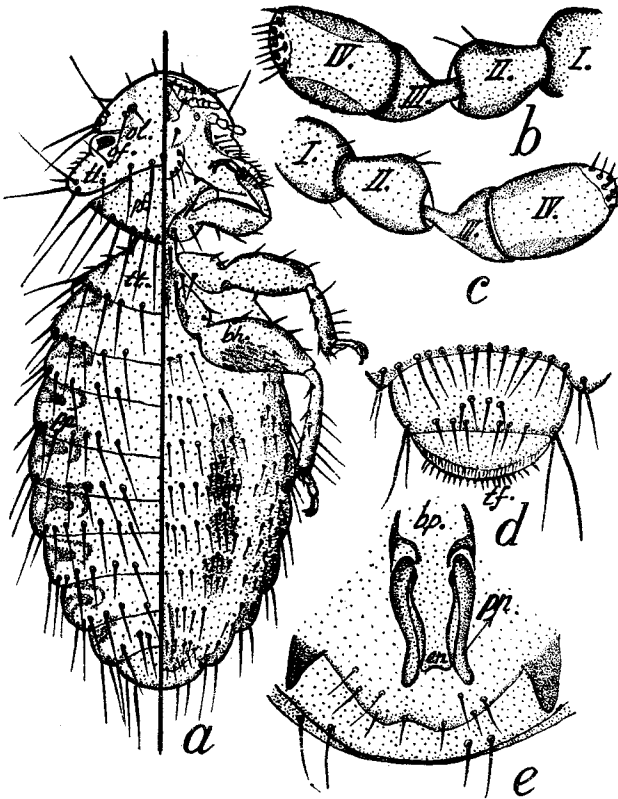
Measurements (mm.) of Menopon gallinae (Linn.).

	Female.		Male.	
	Length.	Breadth.	Length.	Breadth.
Total	1.75	..	1.8-1.90	..
Head	0.31	0.47	0.32	0.46
Thorax	0.35	0.49	0.32	0.49
Abdomen	1.10	0.72	1.26	0.68
Head-index	1.516		1.439	

32. *Menopon interpositus* sp. nov.

Male (Text-fig. 16a): body small, almost twice as long as broad, pale-yellow, with slightly deeply coloured body markings.

Head short, broad; lateral angles acute, front parabolic with three short marginal hairs and three long hairs on the angles in front of shallow ocular emargination, a long and a short hair on each side of dorsum; ocular emargination distinct, but shallow, continued into a slit just before the eyes; eyes large and flat, with a



TEXT-FIG. 16. *Menopon interpositus*, sp. nov.: (a) dorsal and ventral aspects of male, (b) antenna of male (enlarged), (c) antenna of female (enlarged), (d) tip of abdomen of female (enlarged), and (e) male genital armature (enlarged).

pitchy, almost quadrate ocular fleck; ocular fringe distinct, composed of several short, curved hairs, continuous on the ventral lateral expansion of head. Temples narrow, expanded, reclined towards occiput, rounded marginally, each with three long and several short marginal hairs; occipital margin fairly concave, bearing three submarginal hairs on each half, occipital blotch distinct. On the ventrum mandibles situated a short distance behind the anterior margin; labrum narrow with several short hairs; oesophageal sclerite and glands distinctly visible, modified; chitinous framework for support of mandibles well developed, continued as far as the anterior margin of the head. Gular plate quadrate, bearing four long hairs on each side. Antennae (Text-fig. 16b) prominent, projecting beyond the antennal sinuses, 4-jointed; scape squat, II joint subpyriform; III joint narrow and pedunculate basally and flattened anteriorly to accommodate last segment, which is cylindrical and bearing several short hairs on the tip.

Pro-thorax large, protruded; lateral angles acute, each with a long hair; posterior margin convex with six long hairs on each half; transverse longitudinal bar pale and distinct; intercoxal plates showing through. Meso-thorax very narrow, completely fused with meta-thorax. Ptero-thorax short, broad, with strongly divergent, straight lateral margins, each bearing three short hairs; lateral angles acute, bearing two long hairs; posterior margin convex, bearing four long hairs on each side. Legs concolorous with the body, outer margin chitinized; hind femora with a group of short ventral hairs. Pro-sternum completely reduced, largely covered by the plate-like coxae of fore-legs. Ptero-sternum short, beset with several hairs as shown in text-figure.

Abdomen elliptical, widest at the IV segment; length of the segments nearly subequal; posterior angles produced; posterior margins I-IV slightly convex, V-VI nearly straight, VII-VIII nearly concave each bearing a submarginal row of long hairs, last segment flatly rounded with two long hairs on each side. Ventral surface of each abdominal sternite with transverse row of short hairs, a distinct patch of numerous short hairs on each side of IV sternite; V-VI sternites with indistinct patches of spines merging with general chaetotaxy. Pleural plates distinct, with several irregularly scattered short setae. Last segment (Text-fig. 16e) with distinct genital plate, bearing five short hairs on either side. Genitalia (Text-fig. 16e) simple more or less of general type, closely resembling that of *Menopon gallinae* (Linn.); basal plate short, slightly chitinized; parameres long, club-shaped with broad outwardly curved distal ends; endomeridial plate oblong with well chitinized, slender lateral margins, posterior margin concave.

Female: similar to male, larger in size and hairy; last segment (Text-fig. 16d) with numerous short hairs along the margin.

Measurements (mm.) of Menopon interpositus sp. nov.

	Male (Holotype).		5 Males (Paratype).		8 Females (Paratype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total ..	1.225	..	1.187-1.284	....	1.717-2.048	....
Head ..	0.264	0.491	0.283-0.301	0.500-0.519	0.302-0.377	0.622-0.645
Pro-thorax	0.169	0.349	0.161-0.169	0.330-0.339	0.208-0.236	0.434-0.491
Ptero-thorax	0.151	0.377	0.122-0.161	0.349-0.424	0.169-0.255	0.538-0.613
Abdomen ..	0.641	0.566	0.613-0.661	0.481-0.528	1.038-1.255	0.811-0.962
Head-index	1.858		1.724-1.767		1.676-2.06	

Holotype: A male mounted on slide No. MA. 057H from Lyallpur, 4.vii.1928, ex the Northern Grey Partridge, *Francolinus pondicerianus interpositus* Hart.

Allotype: A female on slide No. MA. 057A; *Paratypes*: several females and males (same data as above).

This species closely resembles *Menopon gallinae* (Linn.), important differences, however, exist in the shape of the head, last abdominal segment and in dorsal chaetotaxy.

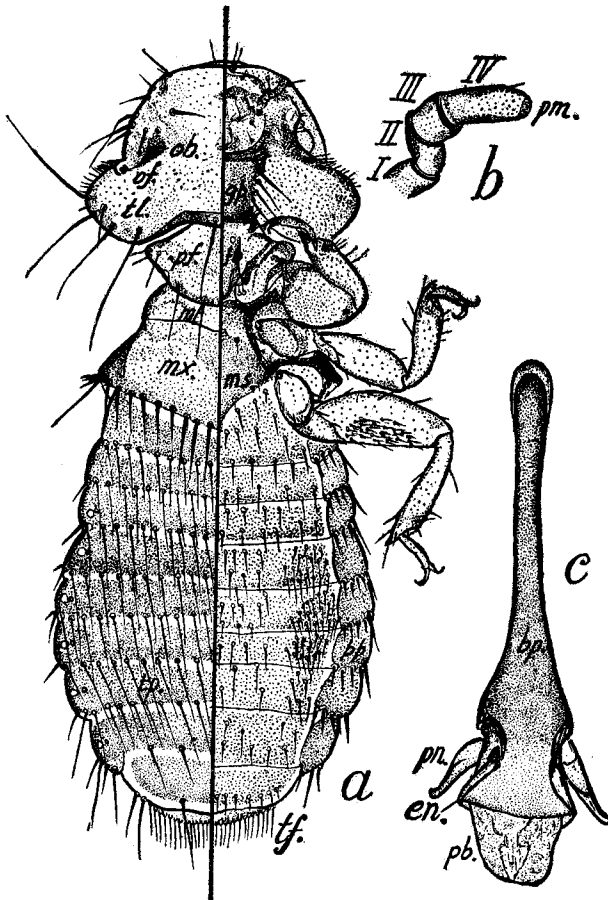
33. *Menopon* sp.

One immature specimen was taken off the Common Northern Chukor, *Alectoris graeca pallescens* (Hume.), shot in Kulu (Kangra Valley), 9.x.1939.

34. *Neomenopon baktitar*¹ sp. nov.

Female (Text-fig. 17a): body moderately robust, fuscous-brown with pitchy-brown markings on head, thorax and abdomen.

Head moderately broad, being slightly less than twice as wide across the temples as long; front broadly rounded, nearly truncate; one marginal and one submarginal short hair on each side of the middle line, six hairs of various lengths on the lateral margins, which are swollen; two hairs on each side of the dorsum;



TEXT-FIG. 17. *Neomenopon baktitar*, sp. nov.: (a) dorsal and ventral aspects of female, (b) maxillary palp (enlarged), and (c) male genital armature (enlarged).

¹ *Bakt-titar* is the vernacular name for the Indian Common Sand-Grouse.

lateral dorsal margins of head continuous with the eyes; eyes rounded, single cornea; ocular fleck black, almost square, backed by a pitchy-brown area near the anterior end of the ventral continuation of temporal margin; clypeal blotch present on each side of the head. Temples expanded, bluntly angular posteriorly; anterior margins with ocular fringe of stiff hairs, lateral margins flatly rounded with four long pustulated hairs, a smaller submarginal hair and several short hairs; temporal band pitchy-brown; occipital margin concave, occipital band fused with temporal band; occipital blotch distinct; one long hair on each side of the middle. Ventrums with highly chitinated framework for support of mandibles, continued to the anterior margin of clypeus, thence running to the inner border of the antennary fossae; a band connecting the two across the well developed, quadrate, gular-plate, which is laterally beset with five long hairs; oesophageal sclerite and glands well developed, antennae 4-jointed, concealed; scape short; II joint subpyriform with expanded inner margin, expansion furnished with two short hairs; III joint squat, flattened anteriorly, pedunculate basally; IV joint truncate, squat, well placed in the saucer behind. Palpi (Text-fig. 17b) with longest apical segment, II joint shortest, III and IV subequal.

Pro-thorax winged; anterior margin well inserted beneath the head; lateral angles acute, with two short spines; lateral margins almost confluent with the posterior margin, strongly convex, two long hairs on the margin; transverse bar faint, longitudinal bars highly developed, a short hair at the junction of the two. Meso-thorax distinct, narrow, lateral band pitchy-brown, continued to the anterior margin. Meta-thorax with nearly straight; lateral margins, widely diverging posteriorly; posterior lateral angles acute with two spines; posterior margin angulate on the abdomen, angle projecting backwards as far as the imaginary line connecting posterior angles of I abdominal segment, beset with about 10 hairs on each side of the angle; posterior lateral plate dark-brown. Legs faintly pigmented than the body, marginal bands dark-brown; posterior femora with a thick ventral patch of stiff hairs. Pro-sternal plate well developed, quadrate anteriorly with a triangular piece added to the base, lateral arms arising from the junction and running forwards along the margin of the plate-like coxae of the foot-jaws. Meso- and Meta-sternum separated; mesal plate rather small, almost quadrate; meta-sternal plate four-sided, beset with several short hairs; pericoxal plates well chitinated.

Abdomen ovate, being rather orbicular beyond segment III; widest at the VI segment; length of segments I-VIII nearly subequal, segment IX rather long; posterior angles of II-III segments with one short hair, IV-VI segments with two short hairs, VII segment with one short and one long hair, VIII segment with three long hairs; posterior margin of I-III segments convex, those of IV-VII almost straight; I-VII segments bearing a transverse row of numerous hairs, segment VIII with four hairs, segment IX truncate with two long hairs on each side of a fringe of fine hairs and a long hair a short distance towards the middle; tergal-plates distinct, transverse bands, entire, deep-brown, slightly darker laterally and with yellowish-brown intersegmental areas. Abdominal sternites with two irregular, transverse rows of short hairs; each side of the sternites IV-VI with distinct patches of short hairs, sternite VII with indistinct patch of setae merging in the general chaetotaxy. Pleural plates distinct, posterior margins beset with stiff spines.

Male: similar to female, narrow and ovate; last segment broadly rounded, with a long hair on each side and several short hairs between. Genitalia (Text-fig. 17c) with basal plate long and slender, reaching from the posterior margin of IV segment to the end of the last segment, apex expanded; paramere short, outwardly recurved; at the apex of the basal plate a well chitinated quadrate plate with well built outer endomeres.

Holotype: A female from Lyallpur, 7.ix.1933, on slide No. MA. 050 *ex* the Indian Common Sand-Grouse, *Pterocles exustus erlangeri* Neum.; *Allotype*: A male (same data as in table following).

Measurements (mm.) of Neomenopon baktitar sp. nov.

	Female (Holotype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.766	..	1.503	..
Head	0.388	0.612	0.339	0.566
Pro-thorax	0.194	0.388	0.194	0.359
Ptero-thorax	0.311	0.534	0.291	0.446
Abdomen	0.875	0.679	0.679	0.526
Head-index	1.577		1.669	

The genus *Neomenopon* Bedford hitherto included only the species *Neomenopon pteroclorus* Bedf. from *Pteroclorus namaqua*. The one described here is distinguished from *N. pteroclorus* by (i) shape of the head, pro-thorax, ptero-thorax and abdomen and (ii) general chaetotaxy.

35. *Trinoton querquadulae* (Linn.).

1758, *Pediculus querquadulae*, Linnaeus, *Syst. Nat.*, p. 613.

This is one of the long known parasites, most commonly infesting various species of ducks and has been recorded from practically all parts of the world. The following of its recorded hosts are also found within Indian limits: the Mallard, *Anas platyrhynchos* Linn.; the White-fronted Goose, *Ansar albifrons* (Scop.); the Mandarin Duck, *Aix galericulata* Linn.; the red-breasted Goose, *Branta sufficollis* Pallas; the Gadwall, *Chaulelasmus strepera* Linn.; the Bewicks Swan, *Cygnus bewickii* Yarrel; the Whooper, *Cygnus cygnus* Linn.; the Mute Swan, *Cygnus olor* (Gmel.); the Pintail, *Dafila a. acuta* (Linn.); the Pond Heron, *Egretta a. alba* (Linn.); the Crested Teal, *Eunetta falcata* (Georgi); the Golden Eye, *Glaucionetta c. clangula* Linn.; the Wigeon, *Mareca penelope* (Linn.); the Smew, *Mergellus albellus* Linn.; the Goosander, *Mergus merganser merganser* Linn.; the red-breasted Merganser, *Mergus serrater* Linn.; the red-crested Pochard, *Netta rufina* (Pallas); the Common Teal, *Nettion c. crecca* (Linn.); the Formosan Teal, *Nettion formosum* (Georgi); the Scaup, *Nyroca m. marila* (Linn.); the Garganey Teal, *Querquedula querquedula* Linn.; the Shoveller, *Spatula clypeata* Linn.; and the Eastern Grey Plover, *Squatarola s. hypomela* (Palas).

My specimens were collected from the Common Teal, *Nettion c. crecca* (Linn.); 20.ii.1933; and the Dun Bird, *Nyroca f. ferina* (Linn.), 14.xi.1932 both shot in Lyallpur.

Measurements (mm.) of Trinoton querquedulae (Linn.).

	Female.		Male.	
	Length.	Breadth.	Length.	Breadth.
Total	4.51	..	4.49	..
Head	0.74	1.99	0.75	1.17
Thorax	1.48	1.37	1.48	1.16
Abdomen	2.28	1.28	2.32	1.17
Head-index	1.608		1.56	

One specimen obtained from the Ruddy Sheldrake, *Casarca ferruginea* (Vroeg.), shot in Kulu, 21.x.1939, is placed temporarily in *T. querquedulae*, although it differs in some characters. However, it is apparent that it is closely related if not con-specific, but must await the examination of more material before it is identified with certainty.

Several immature specimens were also collected from the Himalayan Whistling Thrush, *Myophonus coeruleus temminckii* Vigors; shot in Kulu, 6.x.1939. It is certainly a straggler.

Piaget (1880) and Kellogg (1896) gave the measurements of female as 5.4 mm. \times 1.27 mm. and 5.0 mm. \times 1.56 mm., while of male as 4.7 mm. \times 1.0 mm. and 4.3 mm. \times 1.19 mm. respectively. According to the measurements given by them, the head-index of female and male calculated = 1.311, 1.6 and 1.222 and 1.428 respectively.

36. *Actornithophilus affine* (Nitzsch).

1818, *Colpocephalum affine*, Nitzsch, *Germ Mag.*, III, p. 299..

This species is one of the best known parasites recorded from various birds belonging to the sub-order LIMICOLA (CHARADRIIFORMES). Some of the hosts recorded from outside India are also found within our limits, viz. the Ringed Plover, *Charadrius hiaticula* (Linn.); the Oyster Catcher, *Haematopus ostralegus* Linn.; the Bar tailed Godwit, *Limosa lapponica lapponica* Linn.; the Lesser Tern, *Sterna minuta* Linn.; the Common Sandpiper, *Tringa hypoleucos* Linn.; the Green Sandpiper, *Tringa o. ochropus* Linn.; the Lapwing, *Vanellus vanellus* Linn.; etc.

My specimens, referred to below, were collected from the Black-winged Stilt, *H. h. himantopus* (Linn.); and the Green Sandpiper, *Tringa o. ochropus* Linn., 25.iv.1933 and 26.iv.1933 respectively, both shot in Lyallpur.

Measurements (mm.) of Actornithophilus affine (Nitzsch).

	Female.		Male.	
	Length.	Breadth.	Length.	Breadth.
Total	1.85	..	1.79	..
Head	0.35	0.51	0.34	0.43
Thorax	0.42	0.42	0.46	0.31
Abdomen	1.08	0.53	0.99	0.53
Head-index	1.457		1.264	

Piaget (1880) gave the measurements of female and male as 2.15 mm. \times 0.62 mm. and 1.8 mm. \times 0.47 mm. respectively, while the measurements of *C. ochraceum* (Piaget, 1880, a synonym of our species) are 2.15 mm. \times 0.62 mm., and 1.65 mm. \times 0.5 mm. respectively. According to the measurements given by this worker the head-index calculated = 1.333, 1.333, 1.351 and 1.393 respectively.

37. *Actornithophilus trilobatus* (Giebel).

1874, *Colpocephalum trilobatum*, Giebel, *Ins. Epiz.*, p. 278.

This species was first described from the Little Stint, *Erolia m. minuta* (Leis.). The specimens referred to below were collected from the type-host *Erolia m. minuta* (Leis.), 25.iv.1933, shot in Lyallpur.

Measurements (mm.) of Actornithophilus trilobatus (Giebel).

	Female.		Male.	
	Length.	Breadth.	Length.	Breadth.
Total	2.05	..	1.80	..
Head	0.35	0.53	0.32	0.41
Thorax	0.42	0.52	0.40	0.45
Abdomen	1.28	0.70	1.07	0.53
Head-index	1.514		1.281	

38. Austromenopon cursorius (Giebel).

1874, *Menopon cursorius*, Giebel, *Ins. Epiz.*, p. 296.

This species was first described from the specimens obtained from the Cream-coloured Courser, *Cursorius cursor cursor* (Lath.). The specimens referred to below were collected from the type-host shot in Lyallpur, 13.xii.1930.

Measurements (mm.): Length × Breadth.

Female: Total 1.75 × 0.83, head 0.21 × 0.68, thorax 0.41 × 0.50, abdomen 1.13 × 0.83, head-index 3.238.

Piaget's specimens measured $\frac{2}{3}$ " (1.69 mm.).

39. Austromenopon icterum (Nitzsch).

1838, *Menopon icterum*, Nitzsch, *Burmeisters' Handbuch der Ent.*, II, p. 44.

This species was originally described from the specimen taken off the Woodcock, *Scolopax r. rusticolor* Linn.; and since then has been recorded from various Limalicolae (Charadriiformes). My specimens were collected from the Black-winged Stilt, *Himantopus h. himantopus* (Linn.), 25.vi.1933; and the Green Sandpiper, *Tringa o. ochrophus* Linn., 26.iv.1933; both shot in Lyallpur. My specimens are very small and resemble those described and figured by Denny (1842).

Measurements (mm.) of Austromenopon icterum (Nitzsch).

7 Females.	5 Black-winged Stilt specimens.		2 Green Sandpiper specimens.	
	Length.	Breadth.	Length.	Breadth.
Total	1.273-1.294	.....	1.403-1.471	.....
Head	0.201-0.211	0.451-0.413	0.231	0.481-0.500
Pro-thorax	0.164-0.192	0.336-0.413	0.201-0.212	0.384
Ptero-thorax	0.101-0.135	0.413-0.423	0.115-0.154	0.432-0.442
Abdomen	0.769-0.794	0.558-0.577	0.817-0.913	0.644-0.673
Head-index	2.279-2.243		2.082-2.164	

Denny's specimens from the Sanderling, *Tringa variabilis*; measured $\frac{1}{2}$ " (1.27 mm.), while according to Piaget's measurements the female = 2.0 mm. × 0.79 mm., the head-index = 1.676.

40. *Myrsidea mesoleuca* (Nitzsch).

1818, *Menopon mesoleucum*, Nitzsch, in *Germars' Mag. Ent.*, III, p. 300.

It is a long known species of louse infesting crows, and has been recorded from all over the world. It was first described from *Corvus cornix* and *C. corone*, in Europe and since then has been taken off from other geographical races of Ravens, Hooded crows and Carrion crows.

It has also been recorded from various diurnal and nocturnal birds of prey, viz. the Buzzard, *Buteo lagopus*; the Falcon, *Falco communis*; the Peregrine Falcon, *Falco peregrinus* and *Sciurus vulgaris* (Germany: Mjöberg, 1910) and the Ural Wood Owl, *Strix uralensis fuscescens* (Japan: Uchida, 1926). The cause of such wide distribution of hosts may be attributed to straggling, either transmitted from game bag in which host-birds were carried or transmitted from a crow on which they might have preyed prior to having been shot.

The specimens referred to below were collected from the Eastern Rook, *Corvus frugilegus tshusii* (Hart.); the Punjab Raven, *Corvus corax laurencei* (Hume); and the Indian House Crow, *Corvus s. splendens* Vieill.

Measurements (mm.): Length × Breadth.

Female: Total 2.00 × 0.79, head 0.36 × 0.66, thorax 0.56 × 0.65, abdomen 1.08 × 0.79, head-index 1.833.

Piaget (1880) gave the measurements of male and female as 1.4 mm. × 0.56 mm. and 1.65 mm. × 0.66–0.80 mm. and according to his measurements the head-index calculated = 1.677 and 1.714 respectively.

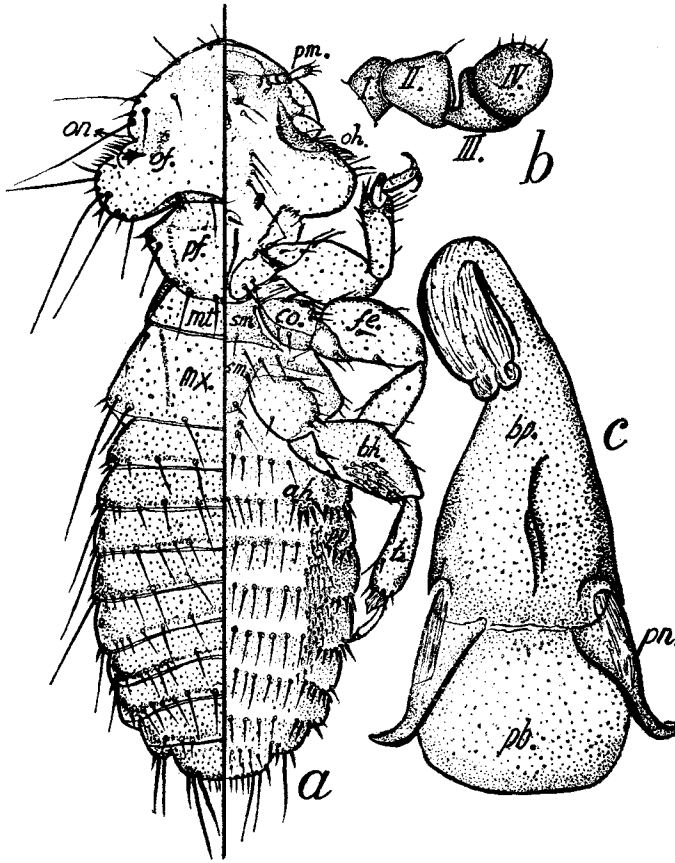
41. *Myrsidea flavirostratus* sp. nov.

Female (Text-fig. 18a): pale-brownish with dark-brown markings on head, and brown markings on thorax and abdomen.

Head concolorous with the body, occipital margin and curved line bounding antennal region pitchy-brown; slightly less broad than twice its length; front broadly parabolic, with a short hair and a minute spine on each side of the middle; two short hairs on the lateral margin, two long hairs in the lateral angles; two short hairs on the dorsum, one being near the lateral angle and the other in front of antennal blotch; eyes prominent with double cornea, ocular fleck black, cone-shaped, broader end three-lobed; temples expanded, broad; lateral margins rounded, each furnished with four long and 3-4 small marginal hairs and a short submarginal hair; anterior margin inferior to eyes, with a fringe of 9-11 backwardly curved stiff hairs; occipital margin slightly concave, edged with dark-brown chitin, bearing a minute spine and a fine hair on each half. Ventrum with quadrate gular plate, faintly chitinized, prominent, with three short and one long hair; oesophageal sclerite and glands present, small; antennal fossae with dark-brown anterior margin. Antennae (Text-fig. 18b) 4-jointed scape short; II joint dilated to one side, almost as broad as long; III joint oblique, calyciform, stalk short, immediately inserted on one side of segment II; IV joint squat sub-cylindrical, resting obliquely in shallow cavity behind, apical depression furnished with hairs.

Pro-thorax large, slightly less than twice as broad as long, much narrower than the head; lateral angles projecting, each with two spines and a spinous hair; posterior-lateral margins nearly straight, each with one long hair; posterior margin convex with two hairs on each half; transverse bar indistinct; lateral bars well developed, yellowish-brown. Meso-thorax distinct, short, lateral chitin clear pale, posterior margin nearly straight, bare. Meta-thorax large, produced posteriorly, lateral margins chitinized, diverging posteriorly, each bearing minute spines; posterior-lateral angles produced, furnished with three spines and a long hair; posterior

margin straight, one long hair and a small hair on each half. Legs paler than thorax, marginal markings on femora and tibia clear brown, narrow; posterior femora with about twenty-two minute ventral spinous hairs. Pro-sternal plate conical with two short hairs on the broad anterior margin; meso- and meta-sternum with well developed plates, bearing long hairs on the posterior margin; pericoxal plates well developed.



TEXT-FIG. 18. *Myrsidea flavirostratus*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), and (c) male genital armature (enlarged).

Abdomen elliptical, widest at the IV segment, latero-posterior angles projecting, each furnished with a long hair and 3-4 short spines; posterior margins concave, each furnished with a transverse row of hairs, of which outermost hairs become small and spinous; posterior margin of last segment truncate, beset with a short, marginal hair on each side of fine dorsal hairs and a fringe of weak hairs. Ventral surface of the abdominal segments with well developed sternal plates, each bearing a transverse row of spines; II sternite with 3-4 stiff, needle-like spines on latero-posterior angles, III-V sternites with a patch of closely set setae in each posterior angle; paratergites well developed, bearing several short posterior setae.

Male: similar to female, smaller, II sternal plate with 2-4 needle-like spines at the latero-posterior angles; III-V sternites with no definite patch of setae. Genital armature (Text-fig. 18c) fairly chitinized, enlarged, apically articulating with thin

quadrate plate on either side of which are well built parameres with pointed and outwardly directed distal ends.

Measurements (mm.) of Myrsidea flavirostratus sp. nov.

	Female (Holotype).		Female (Paratype).		2 males.	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total ..	1.756	..	1.681	..	1.23-1.38	.....
Head ..	0.311	0.612	0.339	0.582	0.28-0.29	0.49-0.51
Pro-thorax ..	0.213	0.372	0.213	0.372	0.14-0.18	0.31-0.35
Ptero-thorax ..	0.388	0.631	0.372	0.661	0.28-0.31	0.42
Abdomen ..	0.844	0.631	0.757	0.582	0.46-0.61	0.42-0.49
Head-index ..	1.967		1.717		1.717-1.834	

Holotype: A female from Kulu, 3.x.1939, on slide No. MA. 012H, ex the Yellow billed Magpie, *Urocissa f. flavirostris* (Blyth); *Allotype*: A male; *Paratype*: A female and two males (same data as above).

This species closely resembles *Myrsidea eurysternum* (Nitzsch) but is distinguished from it by considerably smaller size, shape of the body, parabolic front and general dorsal and ventral chaetotaxy. In *M. eurysternum* (Nitzsch) the abdomen of the female beyond segment III is drawn out into a long flat cone and the forehead is broadly rounded.

42. *Myrsidea brunnea* (Nitzsch).

1866 *Menopon brunneum*, Nitzsch, *Ziet. f. ges. Nat.*, XXVII, p. 120.

This species was first described from the Nutcracker, *Nucifraga caryocatactes* Linn. in Europe, and since then it has been recorded on the type-host from many parts of the world. The specimens referred to below were collected from the Himalayan Nutcracker, *Nucifraga carvocatectes hemispila* Vigors; shot in Lyallpur, 12.ii.1928, and Kulu (Kangra Valley), 14.x.1939.

Measurements (mm.) of Myrsidea brunnea (Nitzsch).

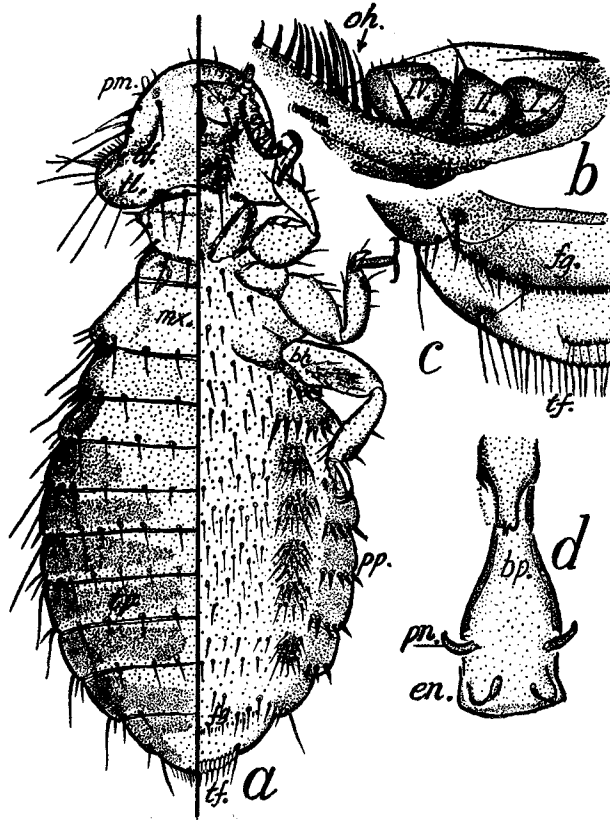
	Female.		Male.	
	Length.	Breadth.	Length.	Breadth.
Total ..	1.86	..	1.43	..
Head ..	0.36	0.59	0.28	0.40
Thorax ..	0.48	0.54	0.43	0.43
Abdomen ..	1.02	0.68	0.72	0.54
Head-index ..	1.639		1.42	

Piaget's (1880) male and female specimens measured 1.7 mm. x 0.56 mm. and 1.9-2.2 mm. x 0.6-0.75 mm. and accordingly the head-index calculated = 1.486 and 1.45 respectively.

43. *Myrsidea sehri*¹ sp. nov.

Female (Text-fig. 19a): body pale-brown, with dark-brown markings on head and thorax and brownish bands on abdomen.

Head broad, front rounded with a minute angulation on the meson, bearing a hair on each side of the angulation, a short hair on fronto-lateral margins; one long, two short and three to four minute hairs on a slight swelling of preocular area; a short hair on the dorsal surface; eyes large, flatly rounded; ocular fleck black, irregularly oblong with a short posterior seta; temples expanded, margins rounded, each with four very long, four short and a few minute hairs; ocular comb of short, stiff hairs present on the ventrally produced temporal margins; occipital margin slightly concave, edged with brown band, bearing four hairs; palpi projecting. Ventrums with well chitinized and highly pigmented sclerites; antennal fossae with dark-brown inner margin; antennae (Text-fig. 19b) 4-jointed, resemble that of *M. brunnea* (Nitzsch) in all essential characters and, therefore, call for no special description; oesophageal sclerite present, small and highly chitinized; posterior plate on the gular region distinct, quadrate, yellowish-brown, with four long and one exceptionally long hair; several short hairs scattered posterior to mandibles.



TEXT-FIG. 19. *Myrsidea sehri*, sp. nov.: (a) dorsal and ventral aspects of female, (b) ventral aspect of a portion of head showing antenna in repose (enlarged), (c) ventral aspect of the tip of abdomen showing genital plate (enlarged), and (d) male genital armature (enlarged).

¹ *Sehri* is the vernacular name for the Simla Laughing Thrush.

Pro-thorax short; anterior portion deeply inserted under the occipital margin; lateral angles rectangular, each with two small spines; posterior lateral margins concave, with a short hair; posterior margin convex, bearing three hairs on each half; transverse bar distinct; lateral bars well chitinized. Meso-thorax narrow, lateral bands well chitinized, posterior margin almost straight. Meta-thorax trapezoidal, lateral margins almost straight, well chitinized, bare; posterior lateral angles produced, each with three spines, posterior margin nearly straight with one long and three short hairs on each half. Legs concolorous with the body; marginal markings on femora and tibia narrow, clear brown, bearing several short and minute hairs; hind femora with a group of 21 short, stiff hairs on its ventral surface, the inner ones being slightly longer, sternal plates well developed, of usual *Myrsidea* type and call for no special description.

Abdomen elliptical, widest at the IV segment; latero-posterior angles, each with a long hair and 2-3 spines; posterior margins of segments almost straight, each bearing a transverse row of 6-10 weak, short hairs, the lateral ones being slightly longer; last segment (Text-fig. 19c) broadly rounded with one minute, one long and one small hair; a fringe of fine, colourless hairs also present; transverse bands entire, lightly coloured in the middle, inter-segmental areas clear. Ventral surface of each abdominal segment bearing two rows of weak hairs; II sternite with three heavy spines on each side, III-VII sternites with a patch of closely set short hairs in lateral area; pleural plates well developed, bearing several short, heavy spines on posterior margin. Genital plate on IX sternite as shown in Text-fig. 19c.

Male: similar to female, smaller and narrower, especially abdomen which is more elliptical. Genitalia typical (Text-fig. 19d), paramere exceptionally reduced, short, strongly recurved; endomerale plate broad. A simple chitinous plate just before the expanded apex of the basal plate also present.

Measurements (mm.) of Myrsidea sehri sp. nov.

	Female (Holotype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.640	..	1.163	..
Head	0.311	0.475	0.291	0.388
Pro-thorax	0.145	0.311	0.116	0.252
Ptero-thorax	0.213	0.485	0.174	0.359
Abdomen	0.971	0.699	0.582	0.446
Head index	1.527		1.333	

Holotype: A female from Kulu, 6.x.1939, on slide No. MA. 015, ex the Simla Streaked Laughing Thrush, *Trochalopteron lineatum grisescentior* (Hart.); *Allotype*: A male (same data as above).

As far as I am aware this is the first *Myrsidea*, described from *Trochalopteron* species and is quite distinct from other forms which have so far been described or figured from Timaliidae.

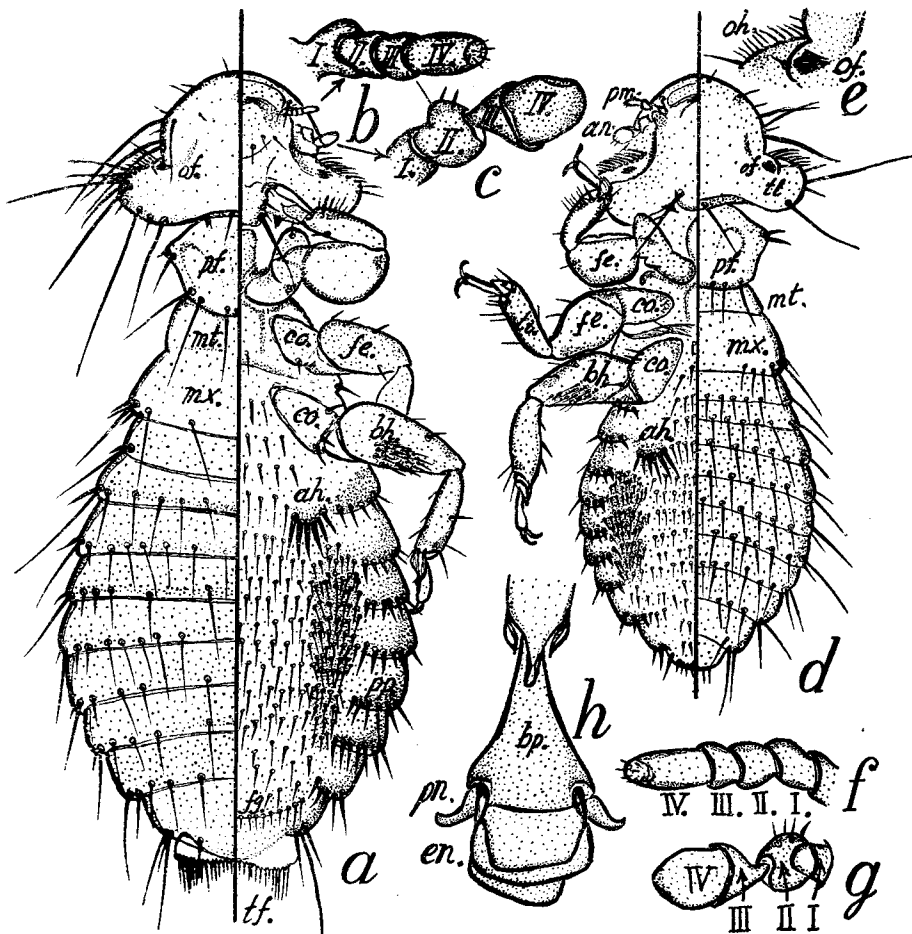
44. *Myrsidea satbhai*¹ sp. nov.

Female (Text-fig. 20a): body yellowish, with distinct brown markings on head and thorax, abdominal bands clear, pale-yellow.

Head broad, front broadly rounded; a minute hair on each side of the middle line, two short hairs near the anterior blotch, one such hair posterior to the blotch; two short and three long marginal and a long submarginal hair on the weak lateral

¹ *Sat-bhai* is the vernacular name for the 'Bengal Jungle Babbler'.

swellings; a minute hair on each side of the dorsum; lateral margins continuous with the eyes; eyes prominent, rounded; ocular fleck triangular, three-lobed; temples expanded, antero-laterally produced; ocular fringe composed of posteriorly curved stiff hairs, anterior ones being longest; four long, three short and several minute marginal hairs present; occipital margin flatly concave, ridged with narrow, weak, brown band, with one hair on each side of the middle line. On the ventral aspect of the head, chitinous framework for support of mandibles, pale-yellow, continued forwards to the anterior margin of the forehead; oesophageal sclerite present, small and simple; antennal fossae backed up by lightly chitinized area; antennae (Text-fig. 20c) projecting, 4-jointed; I joint simple and short; II joint irregularly pyriform, protruding on one side; III joint calyciform, driven in the preceding segment; IV joint cylindrical, subapical depression well marked; palpi (Text-fig. 20b) projecting, terminal joint longest, II-III joints small, subequal; gular plate small, with central perforation, chaetotaxy indistinct, four lateral hairs present, the posterior one being longest.



TEXT-FIG. 20. *Myrsidea sathhai*, sp. nov.: (a) dorsal and ventral aspects of female, (b) maxillary palp of female (enlarged), (c) antenna of female (enlarged), (d) dorsal and ventral aspects of male, (e) ocular notch and eye (enlarged), (f) maxillary palp of male (enlarged), (g) antenna of male (enlarged), and (h) male genital armature (enlarged).

Pro-thorax short, hexagonal in outline, wings acute; lateral angles produced, rectangular, each with a spine and a short spinous hair; posterior lateral margins slightly concave, each with a long posterior hair; posterior margin convex bearing two long hairs on each side of a central pimple; transverse band yellow, distinct, lateral longitudinal bars brownish-yellow. Meso-thorax distinct; lateral margins brownish-yellow, slightly convex, bare; posterior margin straight, bare; Meta-thorax trapezoidal. Lateral margins brownish-yellow, narrow, slightly concave, diverging posteriorly, bare; posterior-lateral angles with one long hair and three short spines; posterior margin flatly convex, with two hairs on each half. Legs concolorous with the body, femoral and tibial markings narrow, brownish-yellow; hind femora with a thick ventral patch of short stiff hairs. Pro-sternum well developed, central plate, shaped like an inverted bottle, lateral bars highly chitinized; pro-coxal plates not touching each other in the middle, meso- and meta-sternal plates quadrate, furnished with fine hairs, peri-coxal bands well developed, yellowish-brown.

Abdomen elongate, elliptical, widest at V segment, each segment almost equal in length, latero-posterior angles projecting, each with a long hair and two spinous hairs, posterior margin of the first segment slightly convex, those of II-VIII gradually concave, each with a transverse row of fine hairs; last segment with a broadly rounded posterior margin, furnished with a group of three long marginal hairs, and one a short distance away towards the middle line; hyaline flap bearing fringe of closely set fine hairs between the marginal long hairs; transverse bands pale, entire; lateral bands yellow. Ventral aspect of IV-VII abdominal segments with distinct transverse blotches; each abdominal sternite with rows of short hairs; sternites IV-VII with definite lateral brushes of hairs, segment II beset with a brood of six heavy, needle-like spines on a flattened elevation; genital plate with a row of short hairs along posterior margin; pleural plates I-VIII, well developed, each with a posterior row of spines.

Male (Text-fig. 20d): similar to female, size smaller and slender; dorsum slightly more hairy, last segment posteriorly rounded, with several short marginal hairs. Genitalia (Text-fig. 20h) slender, basal plate moderately long, expanded at its apex, paramere very short, almost one-half as long as the endomeral plate, a complex chitinous structure near the apex of the basal plate, consisting of a broad plate, posteriorly produced into a tube on each side of which is a leaf-like structure.

Measurements (mm.) of Myrsidea satbhai sp. nov.

	Female (Holotype).		Female (Paratype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Body ..	1.656	..	1.656	..	1.662	..
Head ..	0.294	0.490	0.294	0.519	0.294	0.490
Pro-thorax	0.176	0.313	0.156	0.362	0.186	0.343
Ptero-thorax	0.255	0.509	0.245	0.539	0.235	0.441
Abdomen ..	0.931	0.686	0.961	0.735	0.647	0.588
Head-index	1.666		1.765		5.666	

Holotype: A female from Lyallpur, 16.iii.1932, on slide No. MA. 016, ex the Bengal Jungle Babbler, *Turdoides terricolor terricolor* Hodgs; ¹ *Allotype*: A male; *Paratype*: A female (same data as above).

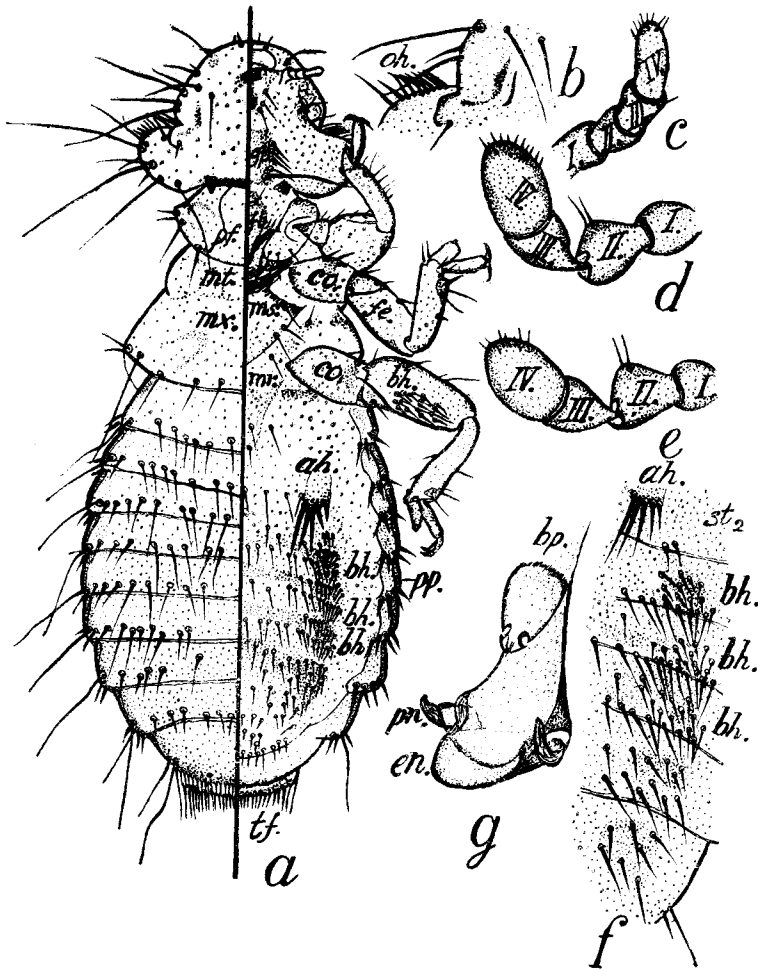
¹ It has been pointed out that Punjab form appears to be *Turdoides terricolor sirdianus* Ticehurst. I retain the name *Turdoides terricolor terricolor* Hodgs on the authority of Bombay Natural History Society, who identified this specimen (*J. Bomb. Nat. Hist. Soc.*, XXXIX, p. 2).

This new species is allied to *Myrsidea dissimilis* (Kellogg) from the Purple Martin, *Progne subis*; and *Myrsidea subdissimilis* Uchida from the Japanese Blue-flycatcher, *Cyanoptila cyanomelana*; but differs from the former in smaller body and broader abdomen and from the latter in antero-laterally produced temples, dorsal and ventral chaetotaxy.

45. *Myrsidea chilchil*¹ sp. nov.

Female (Text-fig. 21a): body pale-brownish with distinct brown markings on head and thorax and brownish lateral bands on abdomen.

Head broad, front flatly rounded, truncate, slightly depressed in the middle; a short hair on each side of the middle, one short and a minute hair on the lateral blotch; sides slightly concave a short distance, then swollen and turned in at posterior



TEXT-FIG. 21. *Myrsidea chilchil*, sp. nov.: (a) dorsal and ventral aspects of female, (b) ocular notch and eye (enlarged), (c) maxillary palp of female (enlarged), (d) antenna of female (enlarged), (e) antenna of male (enlarged), (f) abdominal sternite showing chaetotaxy (enlarged), and (g) male genital armature (enlarged).

¹ *Chilchil* is the vernacular name for the Common Babbler.

angles to meet the eyes, each with four hairs of different sizes and one longest hair in the middle; dorsal surface with two long hairs, one being directed towards the outer margin; eyes distinct, hemispherical, with a minute posterior hair; temples broad, somewhat produced, rounded, a fringe of about twelve stiff, curving hairs along anterior margin; four long, two short and several minute hairs along lateral margins; posteriorly angular, meeting the slightly concave occipital margin, edged with narrow band, lateral blotches dark-brown, a long hair on each side of the middle line; palpi (Text-fig. 21c) projecting; antennal fossae chitinized on the internal margin, dark-brown; antennae (Text-fig. 21d) 4-jointed; I joint transverse, small, squat; II joint pear-shaped with its outer margin bulging to one side; II joint bell-shaped, pedunculate basally and regularly diverging towards the apex, basal stalk tucked in the apex of II joint, IV joint elongate, irregularly cylindrical, sub-apical groove wanting, apically furnished with minute hairs; gular plate distinct, quadrate, slightly more pigmented than the ground colour, with four short and one exceptionally long lateral hair; oesophageal sclerite and glands well developed, small.

Pro-thorax hexagonal in outline; lateral angles produced, each with two spines and a hair; posterior lateral margins concurse with the posterior margin, bare; posterior margin convex with one hair on each side; transverse bar indistinct; lateral band small, confined to the scapular region. Meso-thorax distinct, lateral margins edged with narrow bands, bare; posterior margin straight and bare. Meta-thorax trapezoidal, lateral margins almost straight, lateral band narrow, distinct, bare; latero-posterior angles, each with two spines and a long hair; posterior margin straight, each half with three hairs; legs concolorous with the body, marginal markings clear brown; posterior femora with a ventral patch of setae. Sternum as in the previous species (*Myrsidea satbhai*, sp. nov.).

Abdomen broadly elliptical, widest at the IV segment; each segment almost equal in length; posterior angles projecting, each with a long hair and two spines; posterior margin of segments I-VIII slightly concave, those of segments IV-VII almost straight, segment VIII concave; each with a transverse row of short hairs; last segment broad, rounded, a long and a short hair on each side of a hyaline fringe of soft hairs; transverse bands indistinct, yellowish-brown; longitudinal sub-marginal bands present. Ventral aspect of each abdominal segment bearing a transverse row of short hairs on the posterior margin, IV-VIII segments with a median irregular transverse row; segments IV-VII with distinctly coloured transverse bands and a patch of roughly arranged short hairs, II sternite beset with five heavy, belonoid spines on a well formed callosity. Genital plate distinct, lying on the last segment, posterior margin dentate, bearing 16 short hairs. Pleural plates well formed, each with 3-4 posterior spines.

Male: agrees well with the female in all structures of the body and chaetotaxy. Genitalia (Text-fig. 21g) almost similar to *Myrsidea satbhai*, sp. nov. (*vide supra*),

Measurements (mm.) of Myrsidea chilchil sp. nov.

	Female (Holotype).		Female (Paratype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total ..	1.816	..	1.730	..	1.404	..
Head ..	0.356	0.509	0.346	0.500	0.298	0.461
Pro-thorax	0.182	0.336	0.192	0.346	0.192	0.317
Ptero-thorax	0.288	0.577	0.288	0.558	0.241	0.481
Abdomen ..	0.990	0.731	0.904	0.721	0.673	0.577
Head-index	1.429		1.446		1.547	

but the complex chitinous structure distinctly different; posterior tube reduced, with swollen tip, neatly placed in the anterior broad plate which is deeply emarginate with backwardly produced angles.

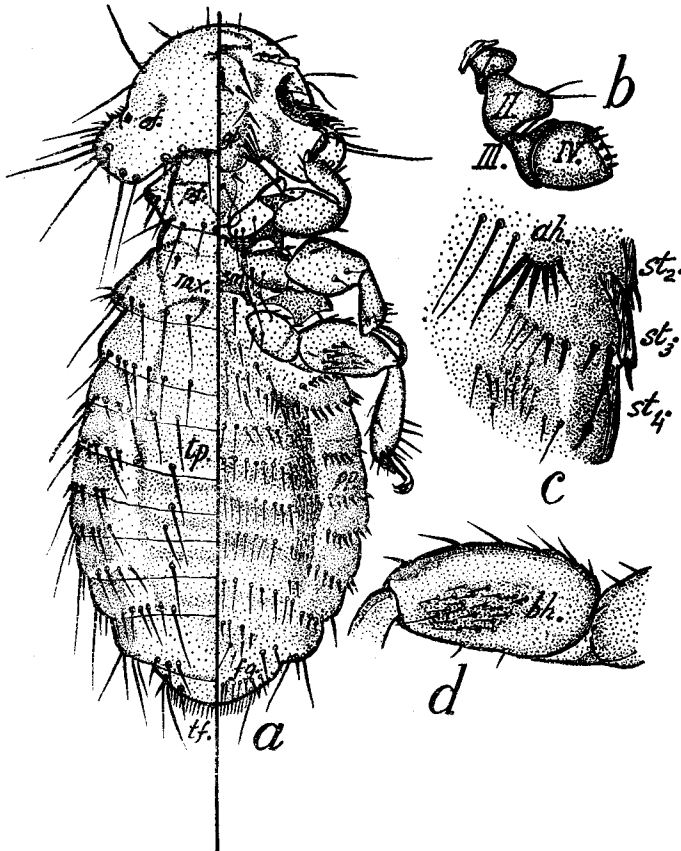
Holotype: A female from Lyallpur, 27.ii.1936, on slide No. MA. 017, ex the Common Babbler, *Argya c. caudata* (Dumont); *Allotype*: a male; *Paratype*: a female (same data as above).

This species closely resembles *Myrsidea satbhai*, sp. nov. (*vide supra*), but is distinguished from it by the shape of the head, ptero-thorax, asters of heavy spines, size of pleural plates, antennae and male genitalia.

46. *Myrsidea sultanpurensis* sp. nov.

Female (Text-fig. 22a): pale-brownish-yellow, with dark-brown markings on head and brown markings on thorax and abdomen.

Head broad, front rounded; sides swollen above the eyes, each with two long, two short and several minute hairs; eyes prominent, rounded with distinct irregularly rounded black fleck; palpus projecting; temples expanded, margins rounded, each bearing four very long, two slightly short and several very short marginal hairs; a short hair on the dorsal surface; occipital margin concave, edged with narrow, brown band, more pronounced on the lateral sides and fainter in the middle, bearing



TEXT-FIG. 22. *Myrsidea sultanpurensis*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) abdominal sternite showing chaetotaxy (enlarged), and (d) posterior femora showing ventral patch of hairs (enlarged).

one prickle, one long and one short hair on each half. Ventral aspect of the head with quadrate, posterior sclerite bearing five short and one long hair; three short hairs on the pharyngeal region; antennal fossa deep, dorsal flap complete, ventral flap reduced, bearing several curved hairs, crowded posteriorly and forming ocular fringe, inner margin chitinized, dark-brown. Antennae (Text-fig. 22b) 4-jointed, segments squat, shown in figure.

Pro-thorax hexagonal in outline, lateral angles produced, nearly rectangular, each bearing one spine, posterior-lateral margin slightly concave, diverging posteriorly, each bearing one minute and one short spinous hair; posterior margin convex with three hairs on each side of a minute median ridge, transverse bar indistinct; longitudinal bars yellowish-brown. Meso-thorax distinct, pale-brown, bare; posterior margin straight, a minute marginal spine on each side. Meta-thorax trapezoidal, lateral margins pale-brown, chitinous band narrow, slightly concave anteriorly, diverging posteriorly, each bearing two minute spines; posterior lateral angles produced, each with three spines, posterior margin convex, bearing one long, one spinous and three short hairs on each side. Legs concolorous with the body, femora and tibia with distinct, spiny marginal bands; hind femora (Text-fig. 22d) with a distinct ventral patch of 21 short hairs. Sternal plates well developed, broad, bearing several long and minute hairs as shown in figure.

Abdomen broadly elliptical, widest at the IV segment, I segment slightly longer, others almost equal in length; posterior angles with 1-2 short spines; posterior margin of I and VIII segments strongly convex, posterior margin of II-IV segments slightly convex and those of the V-VII almost straight; dorsal surface of each segment with a transverse row of hairs on each side of the posterior margin of which some lateral ones becoming spinous; posterior margin of the last segment broadly rounded with two long and two short hairs on each side of a fringe of fine hairs; transverse bands brownish-yellow, entire on segments I-VIII, lateral bands brown. Ventral surface of I-VII abdominal segments with a transverse row of short hairs; II with an aster of six spinous hairs (Text-fig. 22c), III-VI segments with a patch of roughly arranged short hairs, segment VIII with numerous hairs confined in the middle. Pleural plates I-VIII well developed; I-VII plates with 6-8 short spines on the posterior margin, VIII plate with two long hairs and two spinous hairs; last segment with about 24 short hairs on the genital plate.

Male: not available.

Measurements (mm.) of Myrsidea sultanpurensis sp. nov.

	3 females.		(Holotype).		(Paratype).	
			Length.	Breadth.	Length.	Breadth.
Total			1.669	..	1.572-1.619	....
Head			0.311	0.553	0.291-0.301	0.543-0.553
Pro-thorax			0.213	0.339	0.184-0.194	0.301-0.311
Ptero-thorax			0.223	0.543	0.165-0.223	0.495-0.524
Abdomen			0.922	0.776	0.922-0.932	0.699-0.776
Head-index			1.778		1.837-1.866	

Holotype: A female from Kulu, 6.x.1939, *ex* the Himalayan Whistling Thrush, *Myophonus coeruleus temminckii* Vigors; on slide No. MA. 022, *Paratype*: two females (same data as above).

This is the first record of any species of *Myrsidea* being collected and described from this bird. Though it has a somewhat superficial resemblance in general colour and outline to several *Colpocephalum* and *Menopon* species, collected from

various members of the sub-family Turdinae, yet it is readily recognized from all of them by the combination of different characters detailed above. *Myrsidea incertum* (Kellogg) is probably its nearest ally and differs from it in general chaetotaxy and in the size of the body.

47. *Myrsidea cucullaris* (Nitzsch).

1818, *Menopon cucullaris*, Nitzsch, *Germ. Mag.*, III, p. 300.

This species was first described from the Starling, *Sturnus vulgaris*, Linn.; in Europe, and since then has been recorded from various other Sturnidae from different parts of the world.

The specimens referred to below were collected from the Himalayan Starling, *Sturnus vulgaris humii* Brooks; from various parts of the Punjab.

Measurements (mm.): Length × Breadth.

Female: Total 1.50 × 0.58, head 0.28 × 0.46, thorax 0.43 × 0.48, abdomen 0.79 × 0.58, head-index 1.643.

Piaget (1880) gave the measurements of male and female as 1.2 mm. × 0.46 mm. and 1.5 mm. × 0.55 mm. respectively. According to his measurements the head-index of the two sexes is 1.466 and 1.393 respectively.

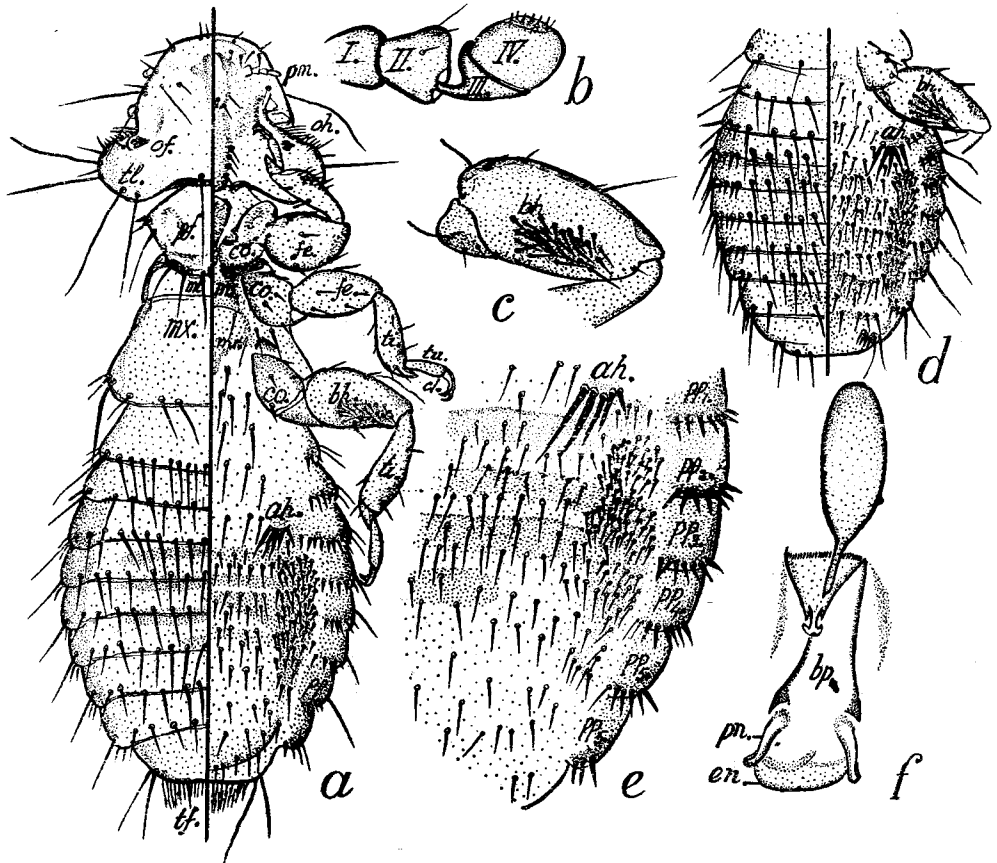
48. *Myrsidea lyallpurensis* sp. nov.

Female (Text-fig. 23a): body pale, brownish-yellow; with dark-brown markings on head, brown markings on thorax and brownish-pale on abdomen.

Head comparatively long, truncated front, sides almost straight, turned in at posterior angles to meet the eyes; frontal margin with two minute hairs on each side of the middle, two short hairs near the frontal blotch, two short and a long hair on the lateral margin and a long hair in the lateral angle, a short and a long hair on dorsal surface of the forehead, on each side of the dark-brown antennal blotch; eyes distinct, uniformly rounded; ocular fleck three-lobed, conical, transverse; temples moderately expanded, marginally rounded; bearing a fringe of 15 curved, stiff hairs along anterior margin, four long and several short marginal hairs; occipital margin shallow, edged with narrow band which is darker on tips and light in the middle, bearing two hairs. On the ventrum, mandibles are a short distance behind the frontal margin; labrum narrow with brownish lateral blotch; antennae and palpi slightly projecting beyond the margin; antennal fossae backed up with brown chitin; antennae (Text-fig. 23b) 4-jointed, resemble that of *Myrsidea brunnea*; quadrate, ventral sclerite pale, with four lateral hairs, posterior one being long; oesophageal sclerite and glands well developed, small.

Pro-thorax hexagonal in outline; lateral angles produced, rectangular each bearing two spinous hairs; posterior-lateral margins slightly concave, each with two long hairs; posterior margin rounded with two hairs on both sides of a central papilla, transverse bar indistinct; longitudinal bars distinct, yellowish. Meso-thorax distinctly separated; lateral margin edged with pale-yellow chitin, bare; posterior margin almost straight, bare. Meta-thorax trapezoidal, lateral margins slightly concave or almost straight, diverging posteriorly, edged with very narrow hyaline, yellow band, bare; posterior lateral angle blunt, produced, each with several spines and a long hair; posterior margin straight, bearings six or seven short hairs. Legs paler than the body, with clear marginal markings on femora and tibia; ventral surface of posterior femora with a group of thirty-two short stiff hairs (Text-fig. 23c) the inner row being of longer hairs while outer row of shorter hairs. Sternal plates

resemble that of *Myrsidea cucullaris* (Nitzsch) in all essential characters and call for no special description.



TEXT-FIG. 23. *Myrsidea lyallpurensis*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) posterior femora showing ventral patches of hairs, (enlarged), (d) dorsal and ventral aspects of abdomen of male, (e) abdominal sternite showing chaetotaxy (enlarged), and (f) male genital armature (enlarged).

Abdomen slightly longer than broad, broadly elliptical in outline, widest at the IV segment; length of I and IX segments longer, that of II-VIII almost equal; posterior angles very slightly projecting, each with a long hair and 2-3 short spines; posterior margins of the segments almost straight, each bearing a transverse row of several hairs; last segment truncate, with two long hairs on the lateral margin and two short hairs on the posterior margin; a fringe of fine, colourless hairs also present; lateral bands narrow, translucent brown, transverse bands fainter, entire across each segment. Ventral surface of each abdominal segment bearing two transverse rows of short, weak hairs; segments IV-VI with a patch of closely set setae on each posterior lateral angle, III sternite beset with a group of five heavy, needle-like spines on a flattened posteriorly produced callosity (Text-fig. 23e); genital plate well developed, lying across the IX segment; posterior margin with 7-8 short hairs; pleural plates well developed, each with a posterior row of short spines.

Male (Text-fig. 23d): similar to female, but smaller, last segment truncate, fringe of hairs wanting. Genital armature (Text-fig. 23f) as in *Myrsidea chilchil*, sp. nov. described above but there the parameres are narrow and long.

Measurements (mm.) of Myrsidea lyallpurensis sp. nov.

	Female (Holotype).		Female (Paratype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.	Length.	Breadth.
Total	1.532	..	1.421	..	1.251	..
Head	0.311	0.474	0.288	0.422	0.274	0.429
Pro-thorax ..	0.170	0.311	0.148	0.281	0.185	0.259
Ptero-thorax ..	0.296	0.466	0.237	0.444	0.200	0.348
Abdomen	0.755	0.644	0.748	0.600	0.592	0.451
Head-index ..	1.524		1.465		1.565	

Holotype: A female from Lyallpur, 16.vi.1931, on slide No. MA. 031, ex the Common Indian Myna, *Acridotheres t. tristis* (Linn.); *Allotype*: a male; *Paratype*: a female (same data as above).

It resembles *Myrsidea invadens* (Kell. & Chap), described from *Acridotheres t. tristis*; but differs from it in smaller body, shape of the head, in longer ptero-thorax, in ovate abdomen, and in general chaetotaxy. These specimens are decidedly more hairy.

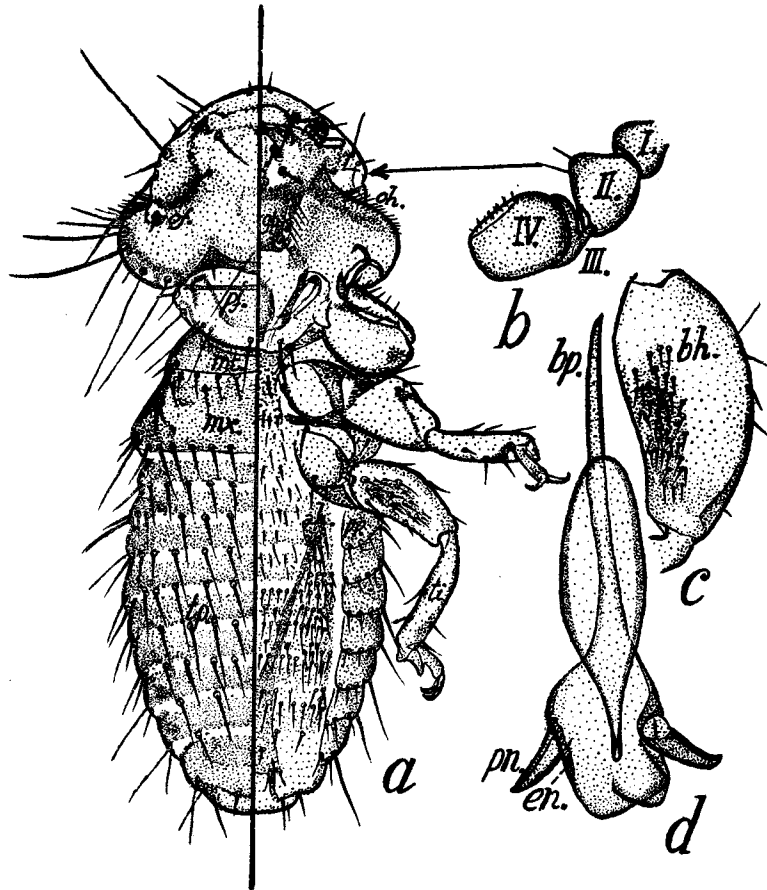
49. *Myrsidea dukhunensis sp. nov.*

Male (Text-fig. 24a): body pale-brownish with dark-brown markings and bands on head and thorax, and brown markings on abdomen.

Head broad, front rounded; a minute hair on each side of the middle line, one slightly longer and one minute hair in front of anterior blotch; lateral margins in front of eyes swollen, bearing two long, one short and a minute hair; two hairs on each side of the dorsum of forehead; eyes small, prominently emarginated in the middle; ocular fleck irregularly quadrangular with a posterior short hair, temples swollen, expanded, margins posteriorly rounded; temporal bands deep brown, furnished with four long, four short and an ocular comb of stiff, curved hairs continued on the ventral extension; occipital margin concave, edged with dark-brown chitinous band, which narrows outwardly, faintly pigmented in the middle, a long hair and a prickle on both sides of the middle line. Ventrums with strongly chitinized framework which continues as far as the outer margin of the forehead, thence running downwards and backwards along the antennal fossae, and a well chitinized broad band connecting the right and the left, continued posteriorly to the quadrate ventral sclerite on the gular region which bears five short and a long hair on each side; oesophageal sclerite and glands well developed; antennal fossae with dorsal flap, entire and ventral flap reduced to a ridge; antennae 4-jointed (Text-fig. 24b) resembling *Myrsidea brunnea* (Nitzsch) but slightly modified as shown in figure.

Pro-thorax large, inserted below the occipital margin; lateral angles obtuse each bearing two spines; lateral margins practically confluent with the posterior margin, strongly converging; postero-lateral margins convex, each bearing a small hair; posterior margin with a short, central spindle-shaped ridge, three small hairs on each side; transverse bar well developed, yellowish-brown; longitudinal bars deep-brown, broad anteriorly and tapering posteriorly; posterior chitinous band well developed. Meso-thorax distinct, narrow; lateral margins straight, chitinous lateral bands dark-brown; a short hair in the lateral-posterior angle; posterior

margin straight with a transverse row of short hairs. Meta-thorax trapezoidal; lateral margins chitinized, dark-brown, slightly concave, with two spines; posterio-lateral angles produced, each bearing two spines and a long hair; posterior margin almost straight with six hairs on each side; legs concolorous with the body; marginal bands on femora and tibia dark-brown, bearing numerous hairs; hind femora with a patch of numerous short hairs (Text-fig. 24c), sternal plates and pericoxal bars well developed.



TEXT-FIG. 24. *Myrsidea dukhunensis*, sp. nov.: (a) dorsal and ventral aspects of male, (b) antenna of male (enlarged), (c) ventral aspect of posterior femora (enlarged), and (d) male genital armature (enlarged).

Abdomen elongate, elliptical; widest at IV segment; posterior angles with two long hairs and 1-2 short spines; length of segments I-VIII almost equal, segment IX broader and segment X shortest; I-VI segments with a single transverse row of hairs on the posterior margin, VII segment with two hairs on each side, VIII segment with only one hair, IX segment with three long hairs in the posterior angles and a short hair on the posterior margin; last segment flatly rounded, bare; transverse tergal bands brownish-yellow with fainter inter-segmental spaces, entire on I-IX segments; last segment with a dark-brown band on the posterior margin; ventral aspect of each segment bearing two transverse rows of short hairs; II segment with asters of three heavy spines on each side of the sternite; III-VI

segments with a patch of short hairs; pleural plates I-VIII well developed; each with a posterior row of spines. Genitalia (Text-fig. 24d) composed of an exceedingly long basal plate, slender anteriorly, broad posteriorly; parameres short and broad with pointed distal ends; endomeres faintly chitinized; median ventral structure tubular, produced posteriorly and reaching as far as the middle of preputial sac.

Female: not available.

Measurements (mm.): Length × Breadth.

Holotype (male): Total 1.518 × 0.567, head 0.356 × 0.577, pro-thorax 0.182 × 0.365, pterothorax 0.211 × 0.500, abdomen 0.769 × 0.567, head-index 1.576.

Holotype: A male from Kulu, 3.x.1939, ex the Indian White Wag-tail, *Motacilla alba dukhunensis* (Sykes), on slide No. MA. 036.

The present species can be distinguished from other species of the genus by difference in size, general chaetotaxy, and head which is broader than the body, and aster on each side of the II abdominal sternite.

50. *Myrsidea* sp.

Two immature specimens were collected from the Red-billed Blue Magpie, *Urocissa erythrorhyncha occipitalis* (Blyth); shot in Lyallpur, 10.ix.1928.

51. *Myrsidea* sp.

One immature specimen was taken off the Eastern Indian Red Start, *Phoenicurus ochruros rufiventris* (Vieill.); shot in Kulu (Kangra district), 3.x.1939.

ALCEDINIPHILUS subgen. nov. *

Body medium sized, fairly chitinized; with well defined tergal, paratergal and sternal plates.

Head broad, front rounded with slightly swollen lateral margins, ocular emargination distinct; temples expanded, rounded marginally; framework for support of mandibles, weakly chitinized, antennae 4-jointed; oesophageal sclerites small, modified.

Pro-thorax short, broad; meso- and meta-thoraces distinctly separated; legs normal, hind femora with a distinct patch of stiff hairs on the ventrum.

Abdomen elongate; transverse incassations well formed, each with a transverse row of weak hairs on the lateral one third; sternal plates bearing transverse row of hairs, and indistinct patches of several short and weak hairs on each side merging with general chaetotaxy, II abdominal sternite with aster of stiff hairs. Last segment exhibiting sexual dimorphism, posterior margin with a mesal emargination and fringe of fine hairs in female, and rounded in male.

Genital armature entirely different from other *Myrsidea*, well built, basal plate long and slender, reaching the posterior margin of III abdominal segment, tapering anteriorly and distended posteriorly; parameres short and stout, apically recurved; endomerical plate broad, outer lateral margins faintly chitinized, posterior margin broadly rounded, complex structure near apex of the plate wanting.

This subgenus differs from *Myrsidea* Waterston, s. str. in that (i) ocular emargination distinct, (ii) meso- and meta-thoraces completely fused, short, trapezoidal, (iii) hind femora with distinct patches of stiff hairs, (iv) last segment in female bifid furnished with a fringe of fine hairs, and (v) genital armature without central complex structure. The possession of these characters probably does not warrant erection of new genus, in view of many similarities, therefore it is best if kept as subgenus of *Myrsidea* Waterston.

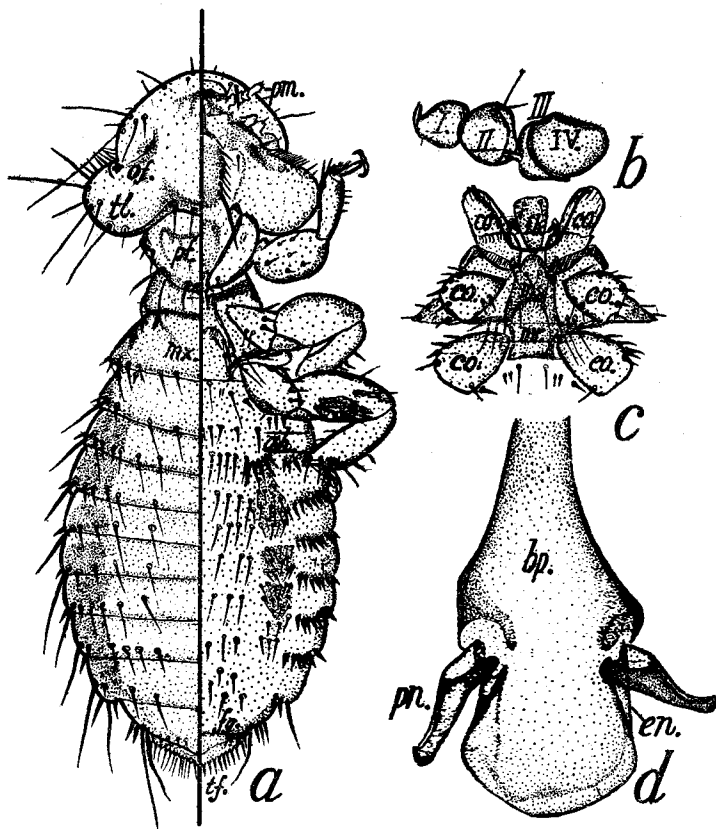
Occurring on Kingfishers (Alcedinidae).

Type of the subgenus: *Myrsidea* (*Alcediniphilus*) *kuluensis* sp. nov. (*vide infra*)
 ex the Himalayan Great Pied Kingfisher, *Ceryle lugubris guttulata* Stej.

52. *Myrsidea* (*Alcediniphilus*) *kuluensis* sp. nov.

Female (Text-fig. 25a): body pale-brownish with dark-brown markings on head and brownish markings on thorax and abdomen.

Head broad, front rounded with slight notch on the meson; a very minute hair on each side of the notch; one short hair and a minute hair on the lateral margin; two long and two minute hairs on sides, swollen above the base of shallow but distinct ocular emargination; two subequal hairs on the dorsal surface of the head; eyes present, rounded, single cornea, with pear-shaped fleck bearing a short posterior seta; temples expanded, margins rounded, each bearing three long, four short and seven minute hairs, fringe of several stiff curved hairs on the margin, just below the eyes and continued on to the ventral flap of antennal fossa; occipital margin strongly concave, edged with dark-brown band, bearing four hairs; occipital blotch present; ventrum with weakly chitinized framework; gular plate quadrate, bearing five lateral hairs, posterior one being longest; antennal cavity shallow, dorsal flap complete, ventral continuation of temporal lobes narrow, inner border



TEXT-FIG. 25. *Myrsidea* (*Alcediniphilus*) *kuluensis*, sp. nov.: (a) dorsal and ventral aspects of female, (b) antenna of female (enlarged), (c) thoracic ventral plates (enlarged), and (d) male genital armature (enlarged).

of the fossae highly chitinized, dark-brown; antennae 4-jointed (Text-fig. 25b), segments squat and reduced, similar to *Myrsidea dukhunensis* sp. nov. (*vide supra*), slightly modified, as shown in figure; oesophageal sclerite modified, not well chitinized.

Pro-thorax short and broad; lateral angles rectangular, each with very small spines; posterior lateral margins slightly concave, bearing a small anterior spine; posterior margin convex with three short hairs on both sides of a small central pimple; transverse bar distinct, lateral bands well chitinized. Meso-thorax distinct; lateral margins slightly projecting, almost straight; posterior margin nearly convex, bearing two minute hairs. Meta-thorax trapezoidal; lateral margins straight, diverging posteriorly, edged with chitinous bands, furnished with two spines; postero-lateral angles produced, each with two spines; posterior margin slightly convex, bearing one long, one spinous and three short hairs. Legs slightly paler than the body with narrow, clear brown marginal chitin on femora and tibia; posterior femora with 21 stiff hairs on the ventrum, out of which eighteen furnishing a patch, while three are solitary. Pro-sternal plate well built, as shown in figure, meso- and meta-sternum separated.

Abdomen elongate, elliptical, widest at V segment; posterior angles projecting, each with a long hair and a spine; length of the segments II-VIII almost equal, segments I and IX longest; posterior margins convex, each furnished with a transverse row of weak hairs, confined on the lateral one-third; posterior margin of last segment with a mesal angulation, bearing one long and several small and minute hairs, a fringe of fine hairs on the ventral hyaline flap; transverse bands yellowish-brown, entire across each segment, lateral bands clear brown. Ventral surface of each abdominal sternite bearing a transverse row of hairs and several short and weak hairs on each side merging more or less with general chaetotaxy; II sternite with five stiff spines, set on a callosity; pleural plates I-VIII well built, each bearing several spines on posterior margin; posterior lateral margin of segment IX with 2-3 spinous hairs and a long hair; posterior margin with four short hairs, a fringe of fine hairs between long hairs.

Male: similar to female, but smaller, abdomen narrow; last segment rounded without angulation. Genitalia (Text-fig. 25d) well built, reaching from the posterior margin of III abdominal segment to the posterior end of last segment; basal plate slender tapering anteriorly and broadly expanded posteriorly; parameres short and stout, apically recurved; endomerale plate broad, outer lateral margins faintly chitinized, posterior margin broadly rounded.

Measurements (mm.) of Myrsidea (Alcediniphilus) kuluensis sp. nov.

	Female (Holotype).		Male (Allotype).	
	Length.	Breadth.	Length.	Breadth.
Total	1.630	..	1.358	..
Head	0.339	0.592	0.291	0.534
Pro-thorax	0.194	0.339	0.194	0.324
Ptero-thorax	0.204	0.524	0.194	0.485
Abdomen	0.893	0.757	0.679	0.582
Head-index	1.746		1.834	

Holotype: A female from Kulu, 4.x.1939, ex the Himalayan Great Pied Kingfisher, *Ceryle lugubris guttulata* Stejneger, on slide No. MA. 040H; *Allotype*: a male (same data as above).

This species resembles *Colpocephalum pustulosum* Piaget from *Ceryle pugnax* and *C. subpustulatum* Carr. & Shull from *Ceryle alcyon*. From the former, it can be distinguished by the absence of conspicuous double row of clear pustules on the abdomen and head, shape of forehead, temples and pro-thorax, while from the latter it differs in the presence of the fringe of fine hairs on the posterior extremity of the abdomen and general chaetotaxy.

53. *Laemobothrion tinnunculi* (Linn.).

1758, *Pediculus tinnunculi*, Linnaeus, *Syst. Nat.*, p. 612.

This species has been recorded from various birds belonging to the family Falconiformes. The following of its avian-hosts, viz. the Marsh Harrier, *Circus aeruginosus* Linn.; the European Griffon, *Gyps f. fulvus* Hab., and the Hobby, *Falco subbuteo* Linn. are also common within Indian limits.

One immature specimen was taken off the Laggar Falcon, *Falco jugger* Gray; shot in Lyallpur, 5.i.1929.

54. *Laemobothrion titan* (Piaget).

1880, *Laemobothrium titan*, Piaget, *Les Pediculines*, p. 578, pl. 49, fig. 1.

This species was first described from the Black Kite, *Milvus migrans* (Bodd.) and since then has been recorded from various other diurnal birds of prey. Most of these Accipitrines occur within Indian limits, viz. the Sleppe or Desert Buzzard, *Buteo vulpinus* (Gloger); the European Kestrel, *Cerchneis t. tenuiculus* (Linn.); the Black-chested Harrier Eagle: *Circaetus pectoralis*; the Cape Vulture, *Gyps caprotheres*; the Black-eared Kite, *Milvus migrans lineatus* Gray; the Black Kite, *Milvus migrans migrans* (Bodd.); and the Osprey, *Pandion h. haliaetus*. Kellogg and Paine (1914) recorded it from the Blyth Baza, *Baza j. jerdoni* (Blyth) in Eastern Himalayas.

Several adult and immature specimens (Text-fig. 26a-d) referred to below were collected from the Common Pariah Kite, *Milvus migrans govinda* Sykes; shot in Lyallpur, 5.iv.1933.

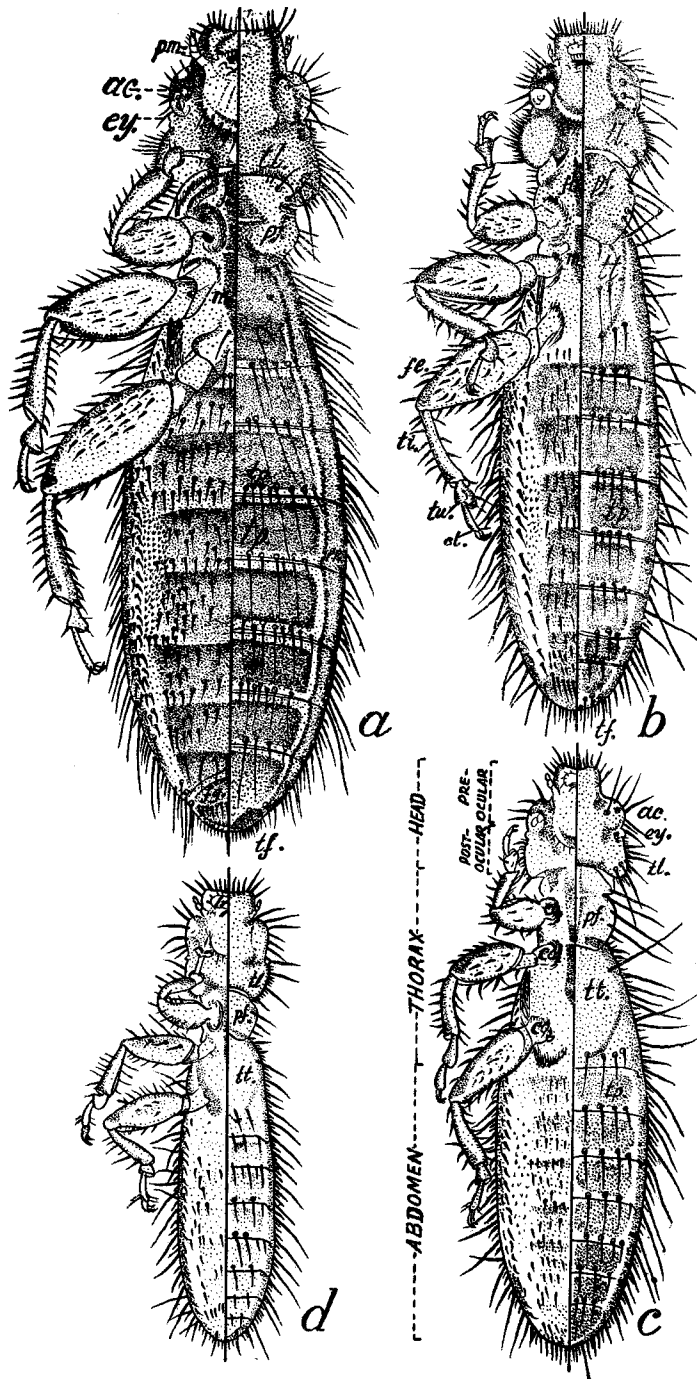
Measurements (mm.): Length × Breadth.

20 Females: Total 8.50-9.50 × 2.30-2.50, head 1.53-1.56 × 1.55-1.60, thorax 2.06-2.21 × 1.07-1.97, abdomen 4.60-5.49 × 2.30-2.50, head-index 1-1.045.

Piaget (1880) gave the measurements of his female specimens as 10.4 mm. × 2.5 mm. From the text measurements, the head-index is calculated at 0.967. *Laemobothrion gypsis* (Kellogg, 1906), one of its synonyms, measured 11.0 mm. in length. Sen (1942) recently described *Laemobothrion indica* from specimens taken off the Common Pariah Kite, *Milvus migrans govinda* Sykes. His female specimens, however, measured 8.5 mm. × 2.1 mm. It was not possible for me to examine his material, but the description and figure indicates that it is similar to *L. titan*. The head-index (calculated = 1.143) is also within the range of that calculated for specimens of *L. titan* Piaget (1880) collected by me from this host. I consider, therefore, that *L. indica* Sen is a synonym of *L. titan* Piaget.

55. *Laemobothrion* sp.

Several immature specimens were collected from the Himalayan Griffon Vulture, *Gyps himalayensis* Hume; shot in Lyallpur, 9.i.1930. I did not get an opportunity to examine specimens of *Laemobothrion* from the type-hosts of the species described from Aegypiidae, therefore it has been considered advisable to leave the exact determination until more material, especially adults, is available to me for study.



TEXT-FIG. 26. *Laemobothrion titan* Piaget: dorsal and ventral aspects of (a) adult female and (b, c and d) III, II and I stage nymphs.

III. SUMMARY.

An account of fifty-five species of Amblyceron Mallophaga, belonging to twenty genera, is given. This includes the description and figures of five new genera and subgenera, viz. *Columbimenopon*, *Galliferrisia*, *Uluoecus*, *Piciphilus* and *Alcediniphilus* and twenty-five new species, viz. *Columbimenopon modestus* ex the Indian Ring Dove—*Streptopelia d. decaocta* (Frisal.), *Columbimenopon chanabensis* ex (?) the Himalayan Griffon Vulture—*Gyps himalayensis* Hume, *Uchida abdominalis indicus* ex the Common Grey Quail—*Conturnix c. conturnix* (Linn.), *Uchida kalatitar* ex the Indian Black Partridge—*Francolinus f. asiae* Bonap., *Menacanthus guldum* ex the Punjab Red-vented Bulbul—*Molpastes cafer intermedius* (Jerdon), *Menacanthus safedgal* ex the White-cheeked Bulbul—*Molpastes l. leucogenys* (Gray), *Menacanthus dudiyalatora* ex the Indian Great Grey Shrike—*Lanius excubitor lahtora* (Sykes), *Menacanthus gulabimaina* ex the Rosy Starling—*Pastor roseus* (Linn.), *Menacanthus himalayicus* ex the Himalayan Starling—*Sturnus vulgaris humii* Brooks, *Galliferrisia tausi* ex the Common Indian Pea-fowl—*Pavo cristatus* Linn., *Pseudocolpocephalum doriabagla* ex the Indian Cattle Egret—*Bubulcus ibis coromandus* (Bodd.), *Cuculiphilus upak* ex the Common Hawk Cuckoo—*Hierocoecyx varius* Vahl., *Cuculiphilus pupiya* ex the Indian Pied Crested Cuckoo—*Clamator j. jacobinus* (Bodd.), *Cuculiphilus (Uluoecus) panjabensis* ex the Northern Spotted-Owlet—*Athene brama indica* (Frankl.), *Cuculiphilus (Picusphilus) tirkhan* ex the Himalayan Scaly-bellied Green Wood-pecker—*Picus s. squamatus* Vigors, *Menopon interpositus* ex the Northern Grey Partridge—*Francolinus pondicerianus interpositus* Hart., *Neomenopon baktitar* ex the Indian Common Sandgrouse—*Pterocles excustus erlangeri* Neum., *Myrsidea flavostratus* ex the Yellow-billed Magpie—*Urocissa f. flavirostris* (Blyth.), *Myrsidea sehri* ex the Simla Streaked Laughing Thrush—*Trochaloxypteron lineatum grisescentior* (Hart.), *Myrsidea sathhai* ex the Bengal Jungle Babbler—*Turdoides terricolor terricolor* Hodgs, *Myrsidea chilchil* ex the Indian Common Babbler—*Argya c. caudata* (Dumont), *Myrsidea sultanpurensis* ex the Himalayan Whistling Thrush—*Myophonon coeruleus temminckii* Vigors, *Myrsidea lyallpurensis* ex the Common Indian Myna—*Acridothores t. tristis* (Linn.), *Myrsidea dukhumensis* ex the Indian White Wag-tail—*Motacilla alba dukhumensis* (Sykes) and *Myrsidea (Alcediniphilus) kuluensis* ex the Himalayan Great Pied Kingfisher—*Ceryle lugubris guttulata* Stejneger. About forty-three species are recorded here for the first time from the Punjab.

A few of the recorded species differ from the description and figures of previous workers in certain morphological details and size and seem well differentiated to warrant their being treated as varieties, or even as subspecies or species, but as the type specimens were not available to me, no attempt has been made to alter their existing status.

IV. ADDENDUM.

After the type-script of this paper was sent to the press, Miss Theresa Clay of the British Museum (Natural History), London, directed my attention to a paper recently published by Eichler in *Arkiv for Zoologi* (1947 : 39A(2), p. 10) in which the author describes a new genus for *Colpocephalum appendiculatum* Nitzsch from *Argus argus* and calls it *Galligogus*. She further adds that there seems no doubt that it is congeneric with *Galliferrisia* (gen. nov.) from *Pavo cristatus* Linn. (*vide supra*), the description of which was sent, sometime back, to her for opinion. It was not possible for me to see this important publication and I am indebted to Miss Clay for calling my attention to it.

V. A LIST OF MALLOPHAGAN PARASITES WITH BIRD-HOSTS.

- Actornithophilus affina* (Nitzsch) from the Black-winged Stilt (*Himantopus h. himantopus* (Linn.): Charadriidae) and the Green Sand-piper (*Tringa o. ochrophus* Linn.: Scolopacidae).
A. trilobatus (Giebel) from the Little Stint (*Erolia m. minuta* (Linn.): Scolopacidae).
Allocolpocephalum subaequale (Nitzsch) from the Panjab Raven (*Corvus corax laurencei* Hume: Corvidae) and the Common Indian House Crow (*Corvus s. splendens* Vieill.: Corvidae).
Ardeiphilus trochiazus (Nitzsch) from the Indian Pond Heron (*Ardeola grayii* (Sykes): Ardeidae).
Austromenopon cursorius (Giebel) from the Cream-coloured Courser (*Cursorius cursor cursor* (Lath.): Glareolidae).
Austromenopon icterum (Nitzsch) from the Black-winged Stilt (*Himantopus h. himantopus* (Linn.): Charadriidae) and the Green Sandpiper (*Tringa o. ochrophus* Linn.: Scolopacidae).
Colpocephalum tricinctum Nitzsch from the Common Pariah Kite (*Milvus migrans govinda* Sykes: Falconidae).
Colpocephalum sp. from the Himalayan Griffon Vulture (*Gyps himalayensis* Hume: Aegypiidae) and the Lager Falcon (*Falco jugger* Gray: Falconidae).
Columbimenopon chanabensis sp. nov. from the Himalayan Griffon Vulture (*Gyps himalayensis* Hume: Aegypiidae)—? Straggler.
Columbimenopon modestus sp. nov. from the Indian Ring Dove (*Streptopelia d. decaocta* (Frisal.): Columbidae).

- Columbimenopon* sp. from the Indian Blue Rock Pigeon (*Columba livia intermedia* Strick: Columbidae).
- Cuculiphilus upak* sp. nov. from the Common Hawk Cuckoo (*Hierococcyx varius* Vahl.: Cuculidae).
- C. pupiya* sp. nov. from the Indian Pied Crested Cuckoo (*Clamator j. jacobinus* (Bodd.): Cuculidae).
- Cuculiphilus (Picusphilus) tirkan* sp. nov. from the Himalayan Scaly-bellied Green Wood-pecker (*Picus s. squamatus* Vigors: Picidae).
- Cuculiphilus (Ululoecus) panjabensis* sp. nov. from the Northern Spotted Owl (*Athene brama indica* (Frankl.): Asionidae).
- Cuculiphilus (Ululoecus)* sp. from the Indian Barn Owl (*Tyto alba stretens* Hart.: Tytonidae) and the Great Horned Owl (*Bubo bubo bengalensis* (Frankl.): Asionidae).
- Eomenacanthus stramineus* (Nitzsch) from the Common House Hen (*Gallus g. domesticus* Linn.: Phasianidae).
- Galliferrisia tausi* sp. nov. from the Common Pea-fowl (*Pavo c. cristatus* Linn.: Phasianidae).
- Laemobothrion tinnunculi* (Linn.) from the Lager Falcon (*Falco jugger* Grey: Falconidae).
- L. titan* (Piaget) from the Common Pariah Kite (*Milvus migrans govinda* Sykes: Falconidae).
- Laemobothrion* sp. from the Himalayan Griffon Vulture (*Gyps himalayensis* Hume: Falconidae).
- Menacanthus dudiyalatora*, sp. nov. from the Indian Great Grey Shrike (*Lanius excubitor lahtora* (Sykes): Laniidae).
- M. gonophoeus* (Burmeister) from the Panjab Raven (*Corvus corax laurencei* Hume: Corvidae) and the Eastern Rook (*Corvus frugilegus tschusii* Hartert: Corvidae).
- M. gulabimaina* sp. nov. from the Rosy Starling (*Pastor roseus* (Linn.): Sturnidae).
- M. guldum* sp. nov. from the Panjab Red-vented Bulbul (*Molpastes cafer intermedius* (Jerdon): Pycnonotidae).
- M. himalayicus* sp. nov. from the Himalayan Starling (*Sturnus vulgaris humii* Brooks: Sturnidae).
- M. masudi* Qadri from the Common Indian House Crow (*Corvus s. splendens* Vieill.: Corvidae).
- Menacanthus quadrifasciatum* (Piaget) from the Common Indian House Sparrow (*Passer domesticus indicus* Jard. and Selby: Fringillidae).
- M. safedgal* sp. nov. from the Himalayan White-cheeked Bulbul (*Molpastes l. leucogenys* (Gray): Pycnonotidae).
- M. spiniferum* (Piaget) from the Common Indian Minor (*Acridotheres t. tristis* (Linn.): Sturnidae).
- Menacanthus* sp. from the Indian Yellow-throated Sparrow (*Gymnoris x. xanthocollis* (Burt.): Fringillidae).
- Menopon gallinae* (Linn.) from the Common House Hen (*Gallus g. domesticus* Linn.: Phasianidae).
- M. interpositus* sp. nov. from the Northern Grey Partridge (*Francolinus pondicerianus interpositus* Hart.: Phasianidae).
- M. phaeostomum* (Nitzsch) from the Common Pea-fowl (*Pavo c. cristatus* Linn: Phasianidae).
- Menopon* sp. from the Common Northern Chukor (*Alectoris graeca pallescens* (Hume): Phasianidae).
- Myrsidea (Alcediniphilus) kuluensis* sp. nov. from the Himalayan Great Pied Kingfisher (*Ceryle lugubris guttulata* Stej.: Alcedinidae).
- Myrsidea brunnea* (Nitzsch) from the Himalayan Nut-cracker (*Nucifraga caryocatectes hemispila* Vigors: Corvidae).
- M. chilchil* sp. nov. from the Common Babbler (*Argya c. caudata* (Dumont): Timaliidae).
- M. cucullaris* (Nitzsch) from the Himalayan Starling (*Sturnus vulgaris humii* Brooks: Sturnidae).
- M. dukhunensis* sp. nov. from the Indian White Wag-tail (*Motacilla alba dukhunensis* Sykes: Motacillidae).
- M. flavirostratus* sp. nov. from the Yellow-billed Magpie (*Urocissa f. flavirostris* (Blyth): Corvidae).
- M. lyallpurensis* sp. nov. from the Common Indian Minor (*Acridotheres t. tristis* (Linn.): Sturnidae).
- M. mesoleuca* (Nitzsch) from the Eastern Rook (*Corvus frugilegus tschusii* (Hart.): the Punjab Raven (*Corvus corax laurencei* (Hume); and the Common Indian House Crow (*Corvus s. splendens* Vieill.); all Corvidae).
- M. satbhai* sp. nov. from the Bengal Jungle Babbler (*Turdoides terricolor sirdianus* Ticehurst: Timaliidae).
- M. sehri* sp. nov. from the Simla Streaked Laughing Thrush (*Trochaloxyron lineatum grisescentior* (Hart.): Timaliidae).
- M. sultanpurensis* sp. nov. from the Himalayan Whistling Thrush (*Myophonus coeruleus temminckii* Vigors: Turdidae).
- Myrsidea* sp. from the Indian Red-billed Blue Magpie (*Urocissa erythrorhyncha occipitalis* (Blyth.): Corvidae) and the Eastern Indian Red Start (*Phoenicurus ochruros rufiventris* (Vieill.): Turdidae).
- Neomenopon bakhtisar* sp. nov. from the Indian Common Sand Grouse (*Pterocles exustus erlangeri* Neum.: Pteroclididae).
- Pseudocolpocephalum doriabagla* sp. nov. from the Indian Cattle Egret (*Bubulcus ibis coromandus* (Bodd.): Ardeidae).
- Trinoton querquedulae* (Linn.) from the Common Teal (*Nettion c. crecca* (Linn.)); the Dun Bird (*Nyroca f. ferina* (Linn.)) and the Ruddy Sheldrake (*Casarca ferruginea* Vroeg): all Anatidae; and the Himalayan Whistling Thrush (*Myophonus coeruleus temminckii* Vigors: Turdidae)—? Straggler.

Uchida abdominalis var. *indicus* nov. from the Common Grey Quail (*Coturnix c. coturnix* Linn.: Phasianidae).

U. kalatitar sp. nov. from the Indian Black Partridge (*Francolinus f. asiae* Bonap.: Phasianidae).

VI. BIRD-HOSTS INDEX WITH MALLOPHAGAN PARASITES.

PASSERES

Corvidae:

1. *Corvus corax laurencei* Hume (Punjab Raven)
Menacanthus gonophoeus (Burm.),
Allocolpocephalum subaequale (Nitzsch),
Myrsidea mesoleuca (Nitzsch).
2. *Corvus frugilegus tchusii* Hartert (Eastern Rook)
Menacanthus gonophoeus (Burm.),
Myrsidea mesoleuca (Nitzsch).
3. *Corvus s. splendens* Vieill (Indian Common House Crow)
Menacanthus masudi Qadri,
Allocolpocephalum subaequale (Nitzsch),
Myrsidea mesoleuca (Nitzsch).
4. *Urocissa erythrorhyncha occipitalis* (Blyth) (Indian Red-billed Blue Magpie),
Myrsidea sp.
5. *Urocissa f. flavirostris* (Blyth) (Yellow-billed Magpie)
Myrsidea flavirostratus sp. nov.
6. *Nucifraga caryocactetes hemispila* Vigors (Himalayan Nut-cracker)
Myrsidea brunnea (Nitzsch).

Timaliidae:

7. *Trichalopteron lineatum grisescentior* (Hart.) (Simla Streaked Laughing Thrush)
Myrsidea sehri sp. nov.
8. *Turdoides terricolor sindianus* Ticehurst (Sindh Jungle Babbler)
Myrsidea satbhat sp. nov.
9. *Argya c. caudata* (Dumont) (Common Babbler)
Myrsidea chilchil sp. nov.

Pycnonotidae:

10. *Molpastes cafer intermedius* (Jerdon) (Punjab Red-vented Bulbul)
Menacanthus guldum sp. nov.
11. *Molpastes l. leucogenys* (Gray) (Himalayan White-cheeked Bulbul)
Menacanthus safedgal sp. nov.

Turdidae:

12. *Phoenicurus ochruros rufiventris* (Vieill.) (Eastern Indian Red-Start)
Myrsidea sp.
13. *Turdus atrogularis* Temm. (Black-throated Thrush)
Menoponidae.
14. *Myophonus coeruleus temminckii* Vigors (Himalayan Whistling Thrush)
Trinoton querquedulae (Linn.)—? Straggler.

Laniidae:

15. *Lanius excubitor lahtora* (Sykes) (Indian Great Grey Shrike)
Menacanthus dudiyalatora sp. nov.

Dicruridae:

16. *Dicrurus macrocercus peninsularis* Ticehurst (Indian Black Drongo)
Menoponidae.

Sturnidae:

17. *Pastor roseus* (Linn.) (Rose-coloured Starling)
Menacanthus gulabimaina sp. nov.
18. *Sturnus vulgaris humii* Brooks (Himalayan Starling)
Menacanthus himalayicus sp. nov.
Myrsidea cucullaris (Nitzsch).
19. *Acridothores t. tristis* Linn. (Common Indian Minor)
Menacanthus spiniferum (Piaget).
Myrsidea lyallpurensis sp. nov.

Fringillidae:

20. *Gymnoris x. xanthocolis* (Burt.) (Indian Yellow-throated Sparrow)
Menacanthus sp.
 21. *Passer domesticus indicus* Jard. & Selby (Indian House Sparrow)
Menacanthus quadrifasciatus (Piaget).

Motacillidae:

22. *Motacilla alba dukhunensis* (Sykes) (Indian White Wag-tail)
Myrsidea dukhunensis sp. nov.

CORACIIFORMES: PICO

Picidae:

23. *Picus s. squamatus* Vigors (Himalayan Scaly-bellied Green Wood-pecker)
Cuculiphilus (Picusphilus) tirkhan sp. nov.
 24. *Brachypternus benghalensis* Linn. (Northern Golden-backed Wood-pecker)
Menoponidae.

CUCULI

Cuculidae:

25. *Heirococcyx varius* Vahl. (Common Hawk Cuckoo)
Cuculiphilus upak sp. nov.
 26. *Clamator j. jacobinus* (Bodd.) (Indian Pied Crested Cuckoo)
Cuculiphilus pupiya sp. nov.
 27. *Eudynamis s. scolopaceus* (Linn.) (Indian Koil)
Menoponidae.

CORACII

Coraciidae:

28. *Coracias b. benghalensis* Linn. (Indian Roller)
Menoponidae.

Meropidae:

29. *Merops o. orientalis* Lath. (Indian Green Bee-eater)
Menoponidae.

Alcedinidae:

30. *Ceryle lugubris guttulata* Stej. (Himalayan Great Pied Kingfisher)
Myrsidea (Alcedinophilus) kuluensis sp. nov.

STRIGES

Tytonidae:

31. *Tyto albastretens* Hartert (Indian Barn Owl)
Cuculiphilus (Uluoecus) sp.

Asionidae:

32. *Bubo b. bengalensis* (Frankl.) (Great Horned Owl)
Cuculiphilus (Uluoecus) sp.
 33. *Athene brama indica* (Frankl.) (Northern Spotted Owlet)
Cuculiphilus (Uluoecus) panjabensis sp. nov.

ACCIPITRES

Aegypiidae:

34. *Gyps himalayensis* Hume (Himalayan Griffon Vulture)
Columbimenopon chanabensis sp. nov. (? Straggler),
Colpocephalum sp.,
Laemobothrion sp.

Falconidae:

35. *Falco jugger* Gray (Lagger Falcon)
Colpocephalum sp.,
Laemobothrion tinnunculi (Linn.)
 36. *Milvus migrans govinda* Sykes (Common Pariah Kite)
Colpocephalum tricinatum Nitzsch,
Laemobothrion titan (Piaget).

COLUMBAE

Columbidae:

37. *Columba livia intermedia* Strick. (Indian Blue Rock Pigeon)
Columbimenopon sp.
 38. *Streptopelia d. decaocta* (Frisal.) (Indian Ring Dove)
Columbimenopon modestus sp. nov.

PTEROCLETES

Pteroclididae:

39. *Pterocles exustus erlangeri* Neum. (Indian Common Sand Grouse)
Neomenopon baktitar sp. nov.

GALLINAE: ALECTOROPODES

Phasianidae:

40. *Pavo c. cristatus* Linn. (Common Pea-fowl)
Galliferrisia tausi sp. nov.,
Menopon phaeostomum Nitzsch.
 41. *Gallus g. domesticus* (Linn.) (Common House Hen)
Eomenacanthus stramineus (Nitzsch).,
Menopon gallinae (Linn.).
 42. *Coturnix c. coturnix* (Linn.) (Common Gray Quail)
Uchida abdominalis var. *indicus* nov.
 43. *Alectoris graeca pallescens* (Hume) (Northern Chukor)
Menopon sp.
 44. *Francolinus f. asiae* Bonap. (Indian Black Partridge)
Uchida kalatitar sp. nov.
 45. *Francolinus pondicerianus interpositus* Hart. (Northern Gray Partridge)
Menopon interpositus sp. nov.

CHARADRIIFORMES: LAROLIMICOLAE

Glareolidae:

46. *Cursorius cursor cursor* (Lath.) (Cream-coloured Courser)
Austromenopon cursorius (Giebel).

LIMICOLAE

Charadriidae:

47. *Himantopus h. himantopus* (Linn.) (Black-winged Stilt)
Actornithophilus affine (Nitzsch),
Austromenopon icterum (Nitzsch).

Scolopacidae:

48. *Tringa ochrophus* Linn. (Green Sand-piper)
Actornithophilus affine (Nitzsch),
Austromenopon icterum (Nitzsch).
 49. *Erolia m. minuta* (Leist.) (Little Stint)
Actornithophilus trilobatus (Giebel).

HERODIONES: ARDEAE

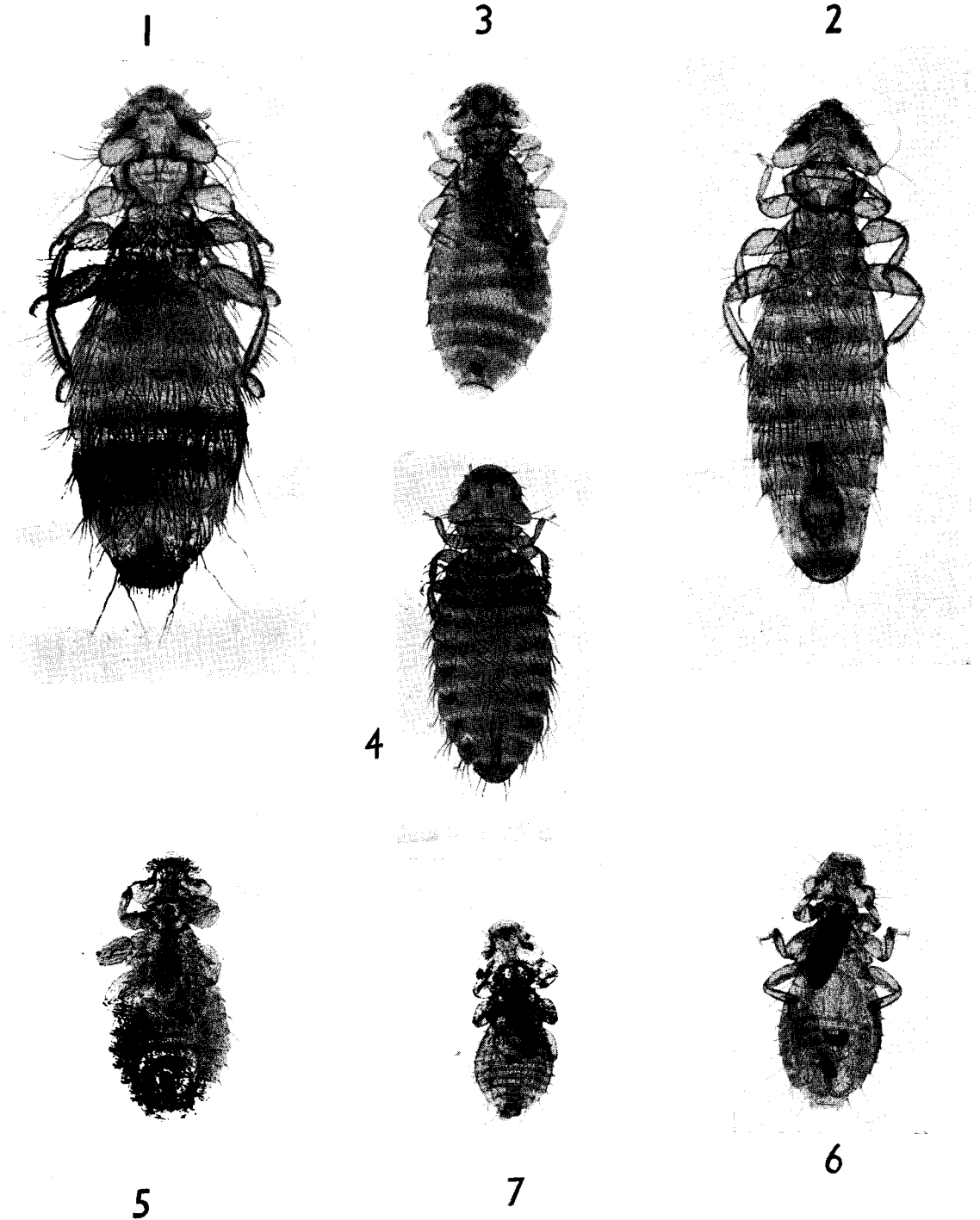
Ardeidae:

50. *Bubulcus ibis coromandus* (Bodd.) (Indian Cattle Egret)
Pseudocolpocephalum doriabagla sp. nov.
 51. *Ardeola grayii* (Sykes) (Indian Pond Heron)
Ardeiphilus trochioxus (Nitzsch).

ANSERES

Anatidae:

52. *Casarca ferruginea* (Vroeg) (Ruddy Sheldrake)
Trinoton querquedulae (Linn.).
 53. *Nettion c. crecca* (Linn.) (Common Teal)
Trinoton querquedulae (Linn.).
 54. *Nyroca f. ferina* (Linn.) (Pochard or Dun Bird)
Trinoton querquedulae (Linn.).



1. Female of *Eomenacanthus stramineus* (Nitzsch) $\times 34$;
2. Male of *Eomenacanthus stramineus* (Nitzsch) $\times 30$;
3. Female of *Menacanthus himalayicus*, sp. nov. $\times 23$;
4. Male of *Menopon gallinae* (Linn.) $\times 28$;
5. Female of *Myrsidea sathhai*, sp. nov. $\times 25$;
6. Female of *Myrsidea chũlchũl*, sp. nov. $\times 23$;
7. Male of *Myrsidea chũlchũl*, sp. nov. $\times 23$.

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LETTERING AND EXPLANATION OF FIGURES.

- ac. .. conspicuous lateral bulbous capsule in *Laemobothorion* or groove or furrow on the ventral surface of the head for reception of antenna in Amblyceron Mallophaga, bound on each side by the facial ridge.
- ah. .. aster of heavy, needle-like spines on a flattened callosity.
- an. .. antenna, 4-5 jointed.
- ar. .. arolium on the tarsi.
- bh. .. ventral patch of hairs on posterior femora and several abdominal sternites.
- bl. .. large, irregular spot, mark or blotch.
- bp. .. basal plate; the chitinized basal phallic sclerite in the wall of the genital chamber, highly variable in development, sometimes a large structure supporting the intromittent organ of the male, to the proximal part of which are attached the working parts of the genital armature of the male.
- ch. .. combs of hairs on each side of some abdominal sternites and on ventral aspect of posterior femora.
- cl. .. claw.
- co. .. coxa; first easily seen joint of the leg, actually attached to the thorax.
- dp. .. see tp.

- en.* .. endomeres, endomeral plate; the thickened sclerite and at the base of the parameres which support the penis and accessory parts.
- ey.* .. eye.
- ft.* .. prosternum; fore breast; ventral sclerite between the foot jaws.
- fe.* .. femur, femora; the first conspicuous long joint of the legs, nearly always the strongest of all, preceded by the coxa and the very small connecting joint between these two called the trochanter and followed by tibia; thigh.
- ff.* .. see *tf.*
- fg.* .. the chitinized sclerite derived from the sternum of certain (vii-viii) abdominal segments, lying under the genital organs of the female. Female genital plate.
- gp.* .. gular plate; ventrally situated sclerite between the ventral occipital bands which run from the occipital margin to the base of mandibles; throat sclerite forming the central part of the ventral hind-head.
- gt.* .. gastric teeth; a dense row of teeth and dentate flaps visible through the integument of the first or second abdominal segments in the position occupied by crop.
- hb.* .. the thickened and heavily pigmented, narrow, transverse sclerite.
- hc.* .. fringes of stout setae curving upwards around the sides of last abdominal segments.
- lb.* .. lateral bands; paratergal plates; lateral plates; pleural plates; heavily pigmented lateral sclerites of the abdominal segments.
- lr.* .. the upper lip covering the mandibles, labrum.
- ma.* .. mandibles.
- me.* .. median notch; emargination.
- mr.* .. the ventral sclerite or breast plate of the third or posterior thoracic ring; metasternum.
- ms.* .. the ventral surface of the middle thoracic ring; mesosternum.
- mt.* .. the second or middle, thoracic ring which bears the second pair of legs, usually united with posterior thoracic ring; mesothorax.
- mx.* .. the third or posterior thoracic ring which bears the hind pair of legs, usually fused with mesothorax and signifies the compound thoracic segment pterothorax; metathorax.
- ob.* .. ocular blotch; a round, cut off temporal band close to the anterior extremities of dorsal occipital band.
- of.* .. ocular fleck; a small, almost rounded spot of pigment near the eye.
- oh.* .. ocular fringe; closely set small hairs on posterior half of ocular emargination in Amblyceon Mallophaga, sometimes extending as far as temporal margins.
- ol.* .. ocular slit.
- on.* .. ocular notch.
- pa., pn.* .. parameres, the lateral, longer processes or plates, usually cultiform or falcate appendages of the genital armature which enclose the endomeral plates and serve to open the genital aperture of the female during copulation and facilitate the working of intromittent organ of male.
- pb.* .. preputial sac; the endophalus, the inner chamber of the phallus (intromittent organ of the male, penis) invaginated at the end of the aedagus, into which the ejaculatory duct opens; typically an aversible sac on tube but sometimes a permanently internal structure.
- pf.* .. prothorax; the first segment of the thorax, bearing the anterior pair of legs (foot jaws).
- pg., ps.* .. pharyngeal sclerite and glands; oesophageal sclerite a greatly developed thickening of the chitinous lining of the anterior part of the oesophagus, visible just behind the mandibles; the conspicuous sclerotic pharyngeal armature.
- pm.* .. sensitive organs of appreciation, articulating and attached to the maxillae; maxillary palp.
- pn.* .. see *pa.*
- pp.* .. paratergal plates; lateral plates; pleural plates; lateral bands.
- ps.* .. see *pg.*
- pt., tt.* .. pterothorax; meso- and meta-thorax fused together.
- px.* .. pericoxal plates; intercoxal line; intercoxal band; thickened, heavily pigmented sclerite of ventral surface of the thorax running transversely between the coxae of the same side.
- sm.* .. sternal markings; sternal blotches; the pigmented median, ventral plates.
- st.* .. the lower surface of abdominal segments; sternum.
- ta.* .. transverse abdominal bands.
- te., tl.* .. temples; lateral plates, each of which covers rather major portion of the surface and is limited internally by the dorsal occipital band; temporal lobes.
- tf., ff.* .. fringe of fine hairs on the last abdominal segment.
- th.* .. transverse row of hairs.
- ti.* .. tibia; the second of the long conspicuous division of the legs, generally longer and narrower than the femora.
- tl.* .. see *te.*

- tp., dp.* .. tergal plates; transverse blotches; transverse bands; the dorsal pigmented sclerites of the abdominal segments, lying between the lateral or pleural plates; these may be entire, median or confined on the lateral or submedian region of the abdominal segments.
- tr.* .. trochanter; very small connecting joint between coxa and femur.
- tt.* .. see *pt.*
- tu.* .. tarsus, the last joint of the legs.
- vs.* .. peg-like rectate, recumbent process arising ventrally from a position behind the palpi.