

MALLOPHAGA (ISCHNOCERA) INFESTING BIRDS IN THE PUNJAB (INDIA).

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INTRODUCTION.

The group Mallophaga has been much neglected by workers in India. There are in India about twenty-five hundred species and subspecies of birds. Of these, up to the present, only about one hundred bird hosts have been examined and a few species of Mallophaga recorded from them.

The first Mallophagan to be described from India was *Esthiopterum* (= *Pediculus*) *tantali* (Fab.), from the Painted Stork (*Ibis l. leucocephalus*, Pennant), (1798, *Ent. Syst. Suppl.*, p. 571). Thereafter, *Lipeurus himalayensis* Rudow, from the Western Horned Pheasant (*Tragopan melanocephalus*, Gray), (1870, *Zeit. f. g. Nat.*, 36, p. 123) and *Menopon acutovulvatum* Piaget from the Indian Large Pied Hornbill (*Hydrocissa malabarica malabarica*, Gmel.), (1881, *Tijd. v. Ent.*, 24, p. 5, pl. 1, fig. 4) were described, probably from the material collected from the Indian birds.

There is no further mention of the Indian Mallophaga for more than thirty years, when Kellogg and Paine (1914) published 'Mallophaga from birds (mostly of Corvidae and Phasianidae) of India and neighbouring countries', which contained the description of about nine new species and forty records of old species found within the Indian limits. A year later Kellogg and Nakayama (1915) published 'Additional Mallophaga from the Indian Museum (Calcutta)', from 32 bird hosts.

Waterston (1928) published a very valuable paper on the Mallophaga of the Sand-grouse and described six species of *Syrhoptoecus* collected from skins of the Indian Sand-grouse (*Pteroclididae*) in the British Museum. Recently, Qadri (1935) started work on this group and has so far described eleven species. Clay and Meinertzhagen (1935-1943) have added 27 species to the Indian fauna, and Sen (1942) has added 2 more species to the list.

During an investigation of the food-habits of birds undertaken at the Punjab Agricultural College and Research Institute, Lyallpur, a collection of the Mallophaga was made at the suggestion of Prof. M. Afzal Husain. The lice were collected from about one hundred species of birds belonging to 83 genera, 38 families and

10 different orders. Of these, the Mallophaga from only 22 species of birds had been previously recorded from India. Those of the remaining 78 hosts are recorded here for the first time. Collection was made from the freshly killed birds and bird skins by Mr. H. R. Bhalla and myself. The birds were identified by the Bombay Natural History Society and the Indian Museum, Calcutta. The help received is gratefully acknowledged. I acknowledge with gratitude the share of Mr. Bhalla in the extensive collection, so laboriously made and excellently preserved.

Specimens soaked in 5% caustic potash for about 24 hours and ultimately mounted in canada balsam were used for all the measurements recorded here. The specimens were not artificially pressed but were mounted under light, No. 6A $\frac{3}{4}$ "-circular microscope cover-glasses. Apart from the errors inherent in the method owing to distortion or fixation, measurement made of some species mounted in glycerine showed that an accuracy of well within $\pm 4\%$ was usually attained. All linear measurements were taken along the medium line, while the breadth recorded is the maximum for each body part. Measurements were made under a microscope, by means of an eyepiece micrometer. The drawings were made by the author with the aid of camera lucida. The types have been deposited in the collection of the Entomological Laboratory of the Punjab Agricultural College and Research Institute, Lyallpur.

ACKNOWLEDGMENTS.

The present work would not have been possible but for the guidance and valuable help of Prof. M. Afzal Husain (formerly Entomologist to the Punjab Government and Vice-Chancellor, Punjab University). I am greatly indebted to him for his unflinching interest in this work and for the advice which he gave me, throughout these studies. My thanks are also due to Dr. Khan A. Rahman (Entomologist, Punjab Agricultural College and Research Institute, Lyallpur) for placing the entire collection of Mallophaga at the Institute at my disposal and for his constant help in several other ways.

My respectful gratitude is due to Dr. Hem Singh Pruthi, O.B.E., Imperial Entomologist, for facilities for work in his laboratory and for his keen interest in the progress of this work. My sincere thanks are also due to Dr. M. L. Roonwal and Mr. M. S. Mani for going through the manuscript, giving me the benefit of their valuable criticism and for help in its preparation for the press.

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SYSTEMATIC ACCOUNT.

ISCHNOCERA.

1896. *Ischnocera*, Kellogg, *Proc. Calif. Acad. Sci.*, VI(2), p. 63.

Harrison (1916) divided the bird-infesting Ischnocera into six sub-families, but Ewing (1929) discarded this classification on the ground that a logical sub-grouping was doubtful. In the present paper, however, I propose, for the sake of convenience, to treat the Ischnocera under five main groups, viz., Esthiopteridae, Philopteridae, Degeeriellidae, Lipeuridae and Gonioididae. The table given below will be found useful in recognising the genera dealt with in this paper.

I. KEY TO GENERA.

1. Forehead usually rectangular or almost trapezoidal in shape; clypeo-lateral margin slightly concave, or straight, never convex; trabeculae often present and usually pronounced; temporal lobes rounded 2
- Forehead not rectangular or trapezoidal in shape; clypeo-lateral margin convex; trabeculae almost absent or only as very small protuberances 28

2. Ptero-thorax rectangular, sides almost sub-parallel, posterior margin almost straight: ESTHIOPTERIDAE 3
 Ptero-thorax (fused meso- and meta-thorax) broader than long, sides strongly divergent and with posterior margin angulate or outwardly rounded..... 8
3. Clypeal signature (pigmented blotch) bearing numerous crescentic papillae on the upper side..... *Ardeicola* Clay.
 Clypeal signature without such character..... 4
4. Clypeal signature large, bearing a longitudinal slit; gular plate large; IX abdominal segment in female bifid, partly flanked on each side by pointed prolongation of segment VIII *Fulicoffula* Clay & Mein.
 Without such characters..... 5
5. Forehead with 4-6 circular incassations on the lateral margins..... *Falcolipeurus* Bedford.
 Forehead without circular incassations on the lateral margins..... 6
6. Clypeal suture deeply emarginate, the cavity so formed margined with hyaline produced preantennal region and furnished with a strong spine and 3-4 fine hairs... *Anaticola* Clay.
 Clypeal suture without such characters..... 7
7. Forehead narrow, sides sub-parallel; trabeculae almost absent; I antennal segment longest; eyes flatly rounded..... *Columbicola* Ewing.
 Forehead wider, sides strongly diverging, preantennal area broad; trabeculae conspicuous, small lobes; II antennal segment longest; eyes protruding..... *Turturicola* Clay & Mein.
8. Stout species with large head and comparatively short, broad abdomen..... 9
 Slender species..... PHILOPTERIDAE..... 9
 DEGEERIELLIDAE..... 19
9. Trabeculae short, ventral; female abdomen with three irregularly shaped dark chitinised plates in the centre of segment VII; dorsal and ventral abdominal hairs lanceolate..... *Aegypoecus* Clay & Mein.
 Trabeculae large, movable; abdomen without such characters..... 10
10. Forehead with hyaline flaps..... 11
 Forehead without hyaline flaps..... 17
11. Preantennal region very narrow; clypeal front deeply notched or forcipated and flanked with hyaline flap..... 12
 Preantennal region truncate, short; clypeal region with hyaline margin..... 14
12. Abdomen bearing many short stout spines on ventral aspect of segment I and II and sometimes on III and IV also..... *Echinophilopterus* Ewing.
 Abdomen not bearing spines on the abdominal sternum..... 13
13. Tergal plates I-VIII entire; pleurites with straight narrow re-entrant heads; I abdominal segment rectangular..... *Picophilopterus* gen. nov.
 Tergal plate VIII entire; pleurites with curved re-entrant heads..... *Alcedoffula* Clay & Mein.
14. Hyaline anterior portion of head originates each side of the level of clypeal suture..... 15
 Clypeal region expanded with hyaline free margin, evenly rounded throughout..... 16
15. Clypeal margin broadly emarginate in front, and notch flanked with hyaline flaps which touch each other at tips..... *Incidifrons* Ewing.
 Clypeal margin concave, flanked with hyaline flap..... *Falcoecus* Clay & Mein.
16. Clypeal suture passing inwards and forming median suture, anterior hyaline margin projecting beyond the contour of the preantennal margin..... *Alcedoecus* Clay & Mein.
 Clypeal region expanded with hyaline margin throughout, hyaline flap not projecting beyond the contour of the preantennal margin; two small peg-like dorsal spines, one on each side of the posterior apex of the signatural plate..... *Anatoecus* Cummings.
17. Male genitalia with parameres curved and protruding beyond the mesosome, the latter consisting of flattened plate with central penis..... *Penenirmus* Clay & Mein.
 Male genitalia with very small parameres which do not protrude beyond the mesosome, the mesosome a flattened plate with central penis, which is usually projecting..... *Philopterus* Nitzsch.
18. Head circumfasciate, parabolic to subogival..... 19
 Head quadrangulate or interrupto-fasciate..... 26
19. Antennae showing sexual dimorphism..... *Psittaconirmus* Harrison.
 Antennae similar in the two sexes..... 20
20. Forehead with clypeal signature..... 21
 Clypeal signature absent..... 23
21. Clypeal suture present; hyaline margin arising anterior to clypeal suture; median vertical preantennal suture present..... *Quadriceps* Clay & Mein.
 Hyaline margin arising at clypeal suture, without median vertical suture..... 22
22. With transverse preantennal suture; hyaline margin narrow..... *Luniceps* Clay & Mein.
 With vertical preantennal suture; hyaline margin broad..... *Carduiceps* Clay & Mein.
23. Tergal plates interrupted in the middle..... 24
 Tergal plates not interrupted in the middle..... 25

24. Forehead completely rounded; curved transverse suture across preantennal region present *Cuculicola* Clay & Mein.
 Forehead parabolic or subogival; transverse suture absent *Syrhaptocerus* Waterston.
25. Forehead parabolic; pleural plates with straight wedge-shaped intermittent heads, highly pigmented, reaching as far as 2/3rds of the preceding segment, tails not highly pigmented *Upupicola* Clay & Mein.
 Forehead completely or flatly rounded; pleural plates bent towards the median line, with blunt intermittent heads, uniformly pigmented throughout *Kelerinirmus* Eichler.
26. Head quadrangular 27
 Head interrupto-fasciate *Painjunirmus* gen. nov.
27. Male genitalia highly pigmented, with broad endomeral plate; with strongly built, pointed and incurved parameres *Bruelia* Keler (= *Degeeriella* Nitzsch).
 Male genitalia feebly sclerotic, with poorly developed endomeral plate; and almost straight parameres *Traihoriella* gen. nov.
28. Head longer than broad, with projecting forehead and rounded temples LIPEURIDAE ... 29
 Head usually as broad as or even broader than long, forehead equal to at least one-third of the post-antennal region of head GONIODIDAE ... 30
29. Male genitalia characteristic, with broad basal plate; parameres short, inwardly curved; endomeral plate longer than parameres *Oculotogaster* Carriker (= *Gallipeurus* Clay).
 Basal plate long, narrow; parameres long, usually narrowly pointed; endomeral plate short, not extending beyond the middle of parameres *Lipeurus* Nitzsch.
30. Third segment of male and sometimes first also with an appendage *Goniodes* Nitzsch.
 Third segment of male never appendiculate 31
31. Two large recurved frontal processes on each side of head present; male genital armature nirmoid type, highly built *Paragoniocotes* Cummings.
 Without frontal processes; male genital armature simple, rod-like and narrow *Goniocotes* Burmeister.

II. ESTHIOPTERIDAE.

1. *Ardeicola gaibagla*,¹ sp. nov.

Female (Text-fig. 1a) elongate, creamy white with yellowish brown pleural plates.

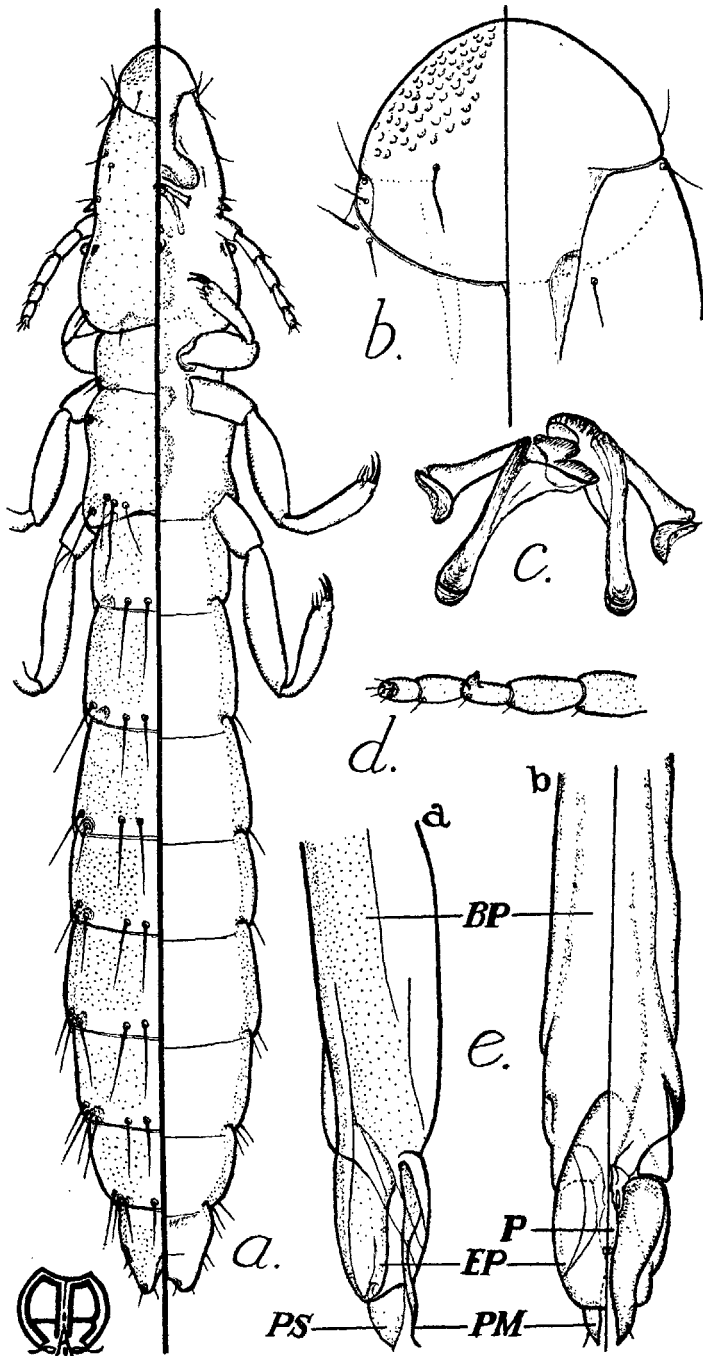
Head long and narrow, triangular; forehead trapezoidal, rounded in front, clypeal suture distinct, entire dorsally and confined marginally on the ventrum; clypeal signature bearing about fifty-seven crescentic papillae or ridges (Text-fig. 1b); chaetotaxy scarce, disposed as in figure. Trabeculae short, conical and immovable. Temples rounded with narrow, indistinct, yellowish marginal band and a short seta disposed as shown in figure. Occipital margin sinuous with a small seta, gular plate weak. Antennae 5-jointed, filiform, bearing cluster of fine setae at the tip. Eyes protruding, rounded, ocular blotch distinct, small. Pharyngeal glands and sclerite well developed.

Prothorax small, lateral margins straight with a small seta in posterior lateral angle. Meso- and meta-thorax fused into a pterothorax, slightly wider than prothorax and bearing 4 pustulated hairs on the posterior margin. Sternal plates indistinct, intercoxal plates not well developed. Legs as shown in figure, concolorous with the body.

Abdomen elongated, broadest in the V segment, gradually tapering towards the posterior end. Segments I-VII well marked, segments VIII-IX fused, last segment bilobed posteriorly. Pleural plates I-VII distinct, narrow. Tergal plates yellowish, indistinct. Chaetotaxy scarce as shown in figure. Sternal plates indistinct.

Male similar to female but smaller. Antennae 5-segmented, I joint enlarged and III joint has a small lateral protuberance. Male genitalia characteristic: basal plate long, evenly and feebly chitinised; almost double the size of parameres and mesosome, slightly narrowing towards the anterior; parameres long, well developed but not well chitinised, furnished with a sensory seta; endomeral plate of simple structure; penis short, rod-shaped reaching as far as the middle of parameres.

¹ 'Gaibagla' in vernacular means the Indian Cattle Egret.



TEXT-FIG. 1. *Ardeicola gaibagla*, sp. nov.

a. Dorsal and ventral aspects of female; b. Clypeal region, showing crescentic papillae;
 c. Mandibles; d. Antenna of male; e. Male genital armature
 (a) side view, (b) dorso-ventral aspect.

Measurements (mm.).

	Female (Holotype).	Male (3). ¹
Body	2.84 × 0.48	2.51-2.62 × 0.40
Head	0.65 × 0.34	0.61-0.62 × 0.32-0.34
Prothorax	0.18 × 0.28	0.15-0.17 × 0.24-0.28
Pterothorax	0.28 × 0.34	0.30 × 0.26-0.30
Abdomen	1.73 × 0.48	1.45-1.53 × 0.40

Holotype (female) and *Allotype* (male) both from Lyallpur, 29-iii-1930, from the Indian Cattle Egret (*Bubulcus ibis coromandus*, Bodd.), mounted together on slide No. MI. 139. *Paratypes*: 2 males mounted together on slide No. MI. 139 P (same data as above).

This louse closely resembles *Ardeicola ardea* (Linn.) from the Heron (*Ardea c. cinerea* Linn.) and *Ardeicola episcopi* (Qadri) from the Indian White-necked Stork (*Dissoura e. episcopa* Bodd.). It differs from the allied forms in size, chaetotaxy and tergal plates.

2. *Fulcoffula luridum* (Nitzsch).

1818. *Lipeurus luridus*, Nitzsch, *Germ. Mag.*, III, p. 292.

This species has been recorded on the Coot (*Fulica a. atra* Linn.), from England (Denny, 1842), and Germany (Nitzsch, 1818; Mjöberg, 1910); on *Fulica americana*, from the United States of America (Osborn, 1896); on *Gallinula chloropus*, from England (Denny, 1842).

One male and one female were obtained from the Coot (*Fulica a. atra* Linn.), shot in Lyallpur, 16-ii-1928.

Measurements (mm.).

	Female.	Male.
Body ..	2.56 × 0.43	1.87 × 0.32
Head ..	0.57 × 0.31	0.57 × 0.31
Thorax ..	0.47 × 0.32	0.44 × 0.27
Abdomen ..	1.52 × 0.43	0.86 × 0.32

Denny (1842) gave the length of female as 2.54 mm., while Piaget (1880) and Taschenberg (1882) gave it as 3.04 mm. and 3.2 mm. respectively.

3. *Falcolipeurus quadripustulatus* (Nitzsch).

1818. *Lipeurus quadripustulatus*, Nitzsch, *Germ. Mag.*, III, p. 293.

This species has been recorded from different vultures from Europe, Africa, Asia and the U.S.A. Most of the hosts recorded from outside India are also present within India, viz., the Cinereous Vulture (*Aegyptius monachus*, Linn.), the European Griffon (*Gyps fulvus fulvus*, Hab.), the Bearded Vulture (*Gypaëtus barbatus*, Linn.) the Golden Eagle (*Aquila chrysaëtus daphanea*, Hodgs.), the White-tailed Sea-Eagle (*Haliaeëtus albicillus*, Linn.), and the Upland Buzzard (*Buteo hemilasius* Temm.).

¹ Figures in parenthesis indicate the number of individuals measured in each case.

My specimens are from the Cinereous Vulture (*Aegypius monachus*, Linn.), 26-iii-1928; and the Himalayan Griffon (*Gyps himalayensis* Hume), 9-i-1930; both shot in Lyallpur.

Measurements (mm.).

	Female (3).	Male (2).
Body	3.450-4.069 × 0.563-0.774	3.886-3.985 × 0.60-0.676
Head	0.732-0.873 × 0.493-0.563	0.817 × 0.493-0.563
Thorax	0.563-0.591 × 0.563-0.714	0.534-0.591 × 0.590-0.614
Abdomen	2.155-2.605 × 0.563-0.774	2.535-2.577 × 0.600-0.676

Piaget (1880) and Mjöberg (1910) gave the measurements of female as 3.25 mm. × 0.7 mm. and 4.3375 mm. × 0.75 mm., while of male as 3.0 mm. × 0.6 mm. and 3.537 mm. × 0.612 mm. respectively.

4. *Anaticola crassicorne* (Scopoli).

1763. *Pediculus crassicorne*, Scopoli, *Ent. carn.*, p. 383.

This long known species is very widely distributed on various species of ducks. On account of slight variations, parasites from different hosts have been given varietal status, resulting in a long synonymy. The specimens referred to this species were obtained from the Ruddy Sheldrake (*Casarca f. ferruginea*, Vroeg) shot in Lyallpur, 21-ii-1933, and Kulu, 21-x-1939; the Common Teal (*Nettion c. crecca*, Linn.) shot in Lyallpur, 20-ii-1933, and Kulu, 21-x-1939; and the Dun Bird (*Nyroca f. ferina*, Linn.) shot in Lyallpur, 14-xi-1932. One female was also obtained from the Himalayan Whistling Thrush (*Myophonus coeruleus temminckii* Vigors) shot in Kulu, 15-ix-1928. This is undoubtedlyly straggler.

Measurements (mm.).

	Female (3).	Male (1).
Body	2.82-3.29 × 0.35-0.57	2.56 × 0.44
Head	0.56-0.61 × 0.34-0.43	0.55 × 0.42
Thorax	0.42-0.59 × 0.35-0.44	0.55 × 0.33
Abdomen	1.84-2.09 × 0.35-0.57	1.46 × 0.44

Piaget (1880) and Kellogg (1896) gave the measurements of female as 2.85 mm. × 0.5 mm. and 3.3 mm. × 0.62 mm. respectively, while Piaget's (1880) male was 2.5 mm. × 0.39 mm.

5. *Columbicola columbae* (Linn.).

1758. *Pediculus columbae*, Linnaeus, *Syst. Nat.*, p. 164.

This is one of the commonest species all over the world. There is a certain amount of variation coincident with geographical areas and hosts, but they are almost entirely those of size, which make it difficult to define the various sub-species.

Numerous specimens were obtained from the Bengal Green Pigeon (*Crocopus p. phoenicopterus*, Lath.) shot in Ambala, the Indian Blue Rock Pigeon (*Columba*

livia intermedia Strick.) shot in Lyallpur, 27-viii-1928; the Indian Spotted Dove (*Streptopelia chinensis suratensis*, Gmel.), 8-iii-1928; the Little Indian Brown Dove (*Streptopelia senegalensis cambayensis*, Gmel.), 21-viii-1929; the Indian Ring Dove (*Streptopelia d. decaocta*, Frival.), 27-iii-1928; and the Red Turtle Dove (*Oenopopelia t. tranquebarica*, Herm.), 6-iv-1932; all shot in Lyallpur.

Measurements (mm.).

	Female (3).	Male (5).
Body	2.239-2.453 × 0.29-0.40	1.786-2.012 × 0.200-0.266
Head	0.553-0.560 × 0.20-0.33	0.480-0.546 × 0.116-0.213
Thorax	0.373-0.400 × 0.20-0.29	0.306-0.400 × 0.186-0.213
Abdomen	1.333-1.493 × 0.29-0.40	1.000-1.066 × 0.200-0.266

Piaget (1880) and Taschenberg (1882) gave the size of female as 2.1 mm. × 0.37 mm. and 2.44 mm. × 0.39 mm., while of male as 1.8-1.9 mm. × 0.3 mm. and 2.28 mm. × 0.36 mm. respectively. Kellogg's (1896) female was 2.5 mm. × 0.37 mm.

6. *Turturicola salimalii* Clay & Mein.

1937. *Turturicola salimalii*, Clay & Meinertzhagen, *Entomologist*, LXX, p. 278, f. 1.

Clay and Meinertzhagen (1937) found it on *Streptopelia d. decaocta*, Frival. and *Oenopopelia t. tranquebarica*, Herm., both from Rajputana. The present specimens were obtained from the Indian Blue Rock Pigeon (*Columba livia intermedia* Strick.), 27-viii-1928; the Indian Ring Dove (*Streptopelia d. decaocta*, Frival.), 27-iii-1928; the Indian Spotted Dove (*Streptopelia chinensis suratensis*, Gmel.), 8-iii-1928; and the Little Indian Brown Dove (*Streptopelia senegalensis cambayensis*, Gmel.), 21-viii-1928.

I also found it on the Bengal Jungle Babbler (*Turdoides t. terricolor*¹ Hodgs), 16-iii-1932; the Burmese White-browed Fantail Fly-catcher (*Leucocirca aureola burmanica* Hume), 21-ii-1928; the Common Indian Myna (*Acridotheres t. tristis*, Linn.), 16-xii-1931; the Common Indian House Sparrow (*Passer domesticus indicus* Jard. & Selby.) and the Rose-ringed Paroquet (*Psittacula krameri manillensis*, Bechst.), 7-iii-1931. All the hosts were shot in Lyallpur. It is difficult to explain the presence of this louse on such widely separated hosts. Some are possibly stragglers and might have reached the hosts while they were feeding in close association, breeding in closer proximity, huddling together on perches; or they might have used deserted nests of pigeons and doves.

Measurements (mm.).

	Female (7).	Male (5).
Body	2.180-2.370 × 0.306-0.426	1.786-1.893 × 0.226-0.306
Head	0.520-0.546 × 0.299-0.333	0.466-0.493 × 0.280-0.293
Thorax	0.333-0.450 × 0.240-0.305	0.360-0.400 × 0.213-0.253
Abdomen	1.266-1.440 × 0.306-0.426	0.946-1.000 × 0.226-0.306

¹ It has been pointed out that the Punjab form appears to be *Turdoides terricolor sindianus* Ticehurst.

III. PHILOPTERIDAE.

7. *Aegypocercus brevicollis* (Nitzsch).

1838. *Docophorus brevicollis*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 424.

This species was first described from the Cinereous Vulture (*Aegypius monachus*, Linn.) and has since been recorded on the type-host from many parts of the world. The specimens referred to here were obtained from the type-host shot in Lyallpur, 26-iii-1928.

Measurements (mm.).

	Female (1).	Male (1).
Body ..	2.198 × 1.266	1.959 × 1.130
Head ..	0.666 × 0.933	0.666 × 0.880
Thorax ..	0.466 × 0.733	0.360 × 0.666
Abdomen ..	1.066 × 1.266	0.933 × 1.130

Piaget (1880) gave its length as 1/2'''.

8. *Aegypocercus griffoneae*, sp. nov.

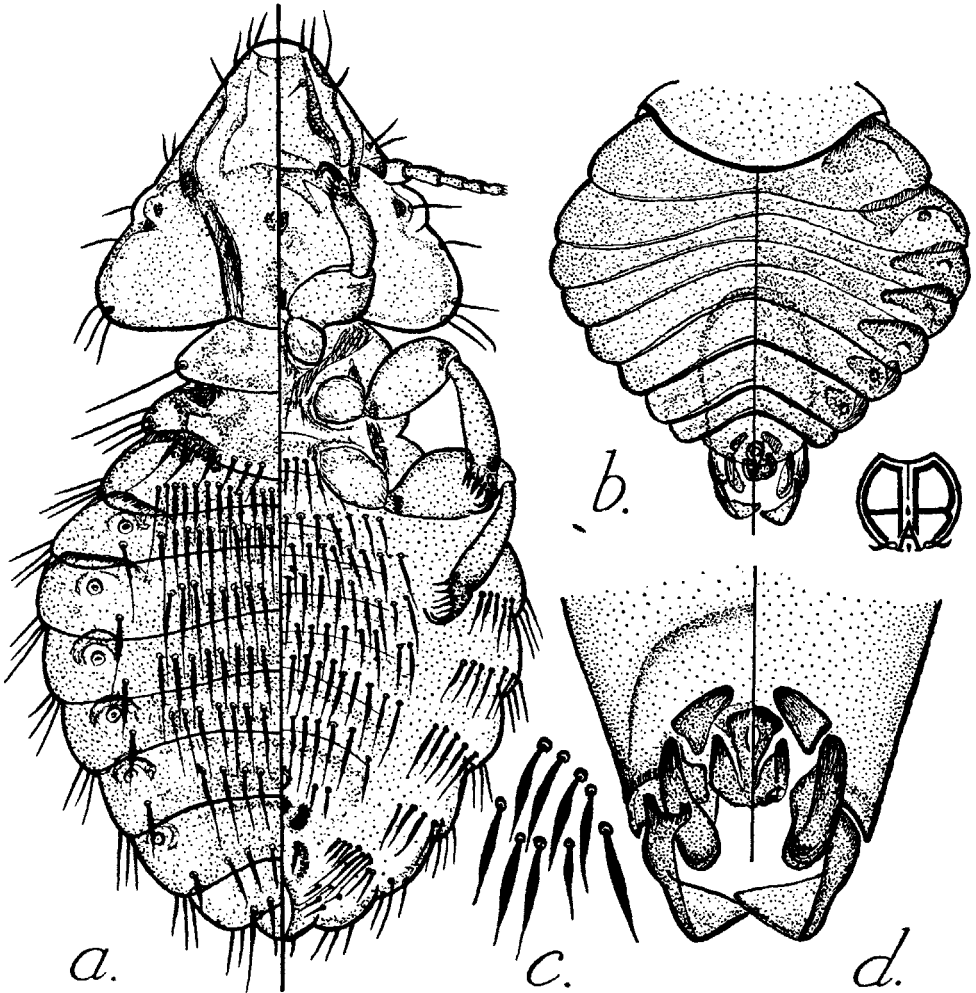
Female (Text-fig. 2a) golden yellow with brown markings on head, thorax and abdomen; abdomen almost circular.

Head slightly wider than long, triangular; clypeal front uncoloured, very slightly dilated, narrow, straight to slightly concave; two short hairs at the anterior angle; two hairs near the distinct clypeal suture, two dorsal hairs just before the clear uncoloured clypeal region; clypeal band deep yellow; clypeal signature indistinct, reaching as far as the mandibles; internal band conspicuous; antennal band dark brown, distinct, running along the margin, posteriorly straight, fusing with occipital band; a black blotch at the base of trabeculae; trabeculae ventral, short and not projecting beyond the contour of head; antennae short and slender; temporal margins projecting outwardly, posterior angle rounded with two short hairs; temporal band narrow, slightly conspicuous at the base of eye; eyes protruding, each with a short sub-basal hair; occipital margin almost straight furnished with two central hairs, occipital band indistinct, occipital signature shield-shaped and yellowish brown.

Prothorax narrow, with acutely rounded lateral angles, each bearing a short hair; posterior margin slightly convex, bare; marginal band indistinct, brown intercoxal plates showing through. Meso- and meta-thorax completely fused into a pterothorax; slightly projecting laterally; acutely rounded lateral angles, each bearing three hairs; posterior margin markedly convex with three median and three submarginal lanceolate hairs on each half; marginal bands indistinct, with a black, distinct, anterior blotch at the inter-thoracic suture; intercoxal and pericoxal plates highly chitinised and showing through. Legs with claws unequal in size and bearing a number of pedunculate spines at the distal end of tibia, dark rings at the distal end of femoral and tibial segments distinct.

Abdomen almost circular or broadly elliptical, with dark brown transverse marginal intersegmental lines, tergal plates not distinctly marked; posterior margin of segments I-VIII concave in the middle and convex submarginally; segment IX uncoloured, narrow and emarginate; segments I-VII with numerous dorsal median rows of lanceolate hairs; segments II-VII with 1-3 lateral hairs. Ventrums with similar lanceolate hairs on I-V segments, and segments III-VI with lateral 5-6 lanceolate hairs. Anal orifice distinct; segment VII with three brown plates; one central, trapezoidal; two lateral, one on each side, bean-shaped; genital plate distinct with few marginal hairs.

Male (Text-fig. 2*b*) similar to female, the tergal plates very well marked, confined to the submarginal region. Last segment rounded and thickened. Genital



TEXT-FIG. 2. *Aegypocercus griffoneae*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of abdomen of male; c. Lanceolate hairs clothing body; d. Male genital armature.

armature (Text-fig. 2*d*) well developed, general characters as for the genus but the parameres are strongly developed, twisted inwards from the middle and shear-shaped.

Holotype (female) on slide No. MI. 043 H, *Allotype* (male) on slide No. MI. 043A, obtained from Himalayan Griffon Vulture (*Gyps himalayensis* Hume), both shot in Lyallpur, 9-i-1930. *Paratypes*: 3 females and one male on slide No. MI. 043 P (same data as above).

This species is similar to *Aegypocercus* (= *Helluo*) *neophron* (Clay and Mein.), but differs in the narrow, uncoloured fronto-clypeus and indistinct, weakly pigmented

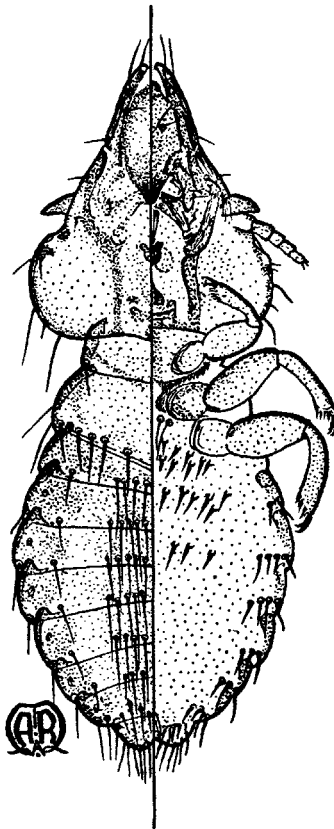
Measurements (mm.).

	Female (Holotype).	Female (3).	Male (2).
Body ..	2.083 × 1.000	2.027-2.199 × 1.000-1.093	1.732-1.946 × 0.760-1.113
Head ..	0.791 × 1.010	0.718-0.853 × 0.986-1.010	0.731-0.760 × 0.906-0.933
Prothorax ..	0.120 × 0.506	0.120-0.169 × 0.506-0.591	0.133-0.169 × 0.480-0.521
Pterothorax ..	0.226 × 0.666	0.221-0.253 × 0.666-0.704	0.173-0.211 × 0.634-0.693
Abdomen ..	0.951 × 1.000	0.887-1.000 × 1.000-1.093	0.774-0.826 × 0.760-1.113

clypeal signature; prothorax with slightly angulate lateral margin and so is the pterothorax; male genitalia with very well-developed parameres which are twisted inwards in the middle and are flat and shear-shaped.

9. *Echinophilopterus tota*,¹ sp. nov.

Female (Text-fig. 3) golden yellow with brown markings on head, thorax and abdomen; abdomen oval with angularly emarginate terminal segment.



TEXT-FIG. 3. *Echinophilopterus tota*, sp. nov.
Dorsal and ventral aspects of female.

¹ 'Tota' in vernacular means the Indian Rose-ringed Paroquet.

Head resembling Piaget's (1880) interesting group *forficulati*, triangular with narrow anteriorly tapering clypeus; clypeal front deeply notched and flanked with anteriorly produced lateral flaps which meet in the middle; anterior angle with two ventrally situated hairs showing through the dorsum; clypeal band prominent; clypeal suture distinct, extending far beyond clypeal signature, deeply concave; clypeal signature distinct, reaching as far as the mandibles; internal band conspicuous; antennal band dark brown, distinct, turned inwards and reaching as far as the sub-median region; trabeculae large, long, projecting and blunt at the tips; antennae short; temporal margins projecting outward, rounded, with two ocular setae, and two long hairs and a seta at the posterior angle; temporal bands not conspicuous, pale yellow with slightly distinct ocular blotch; eyes not protruding; occipital margin a little concave marginally and convex medially, bare; occipital band distinct reaching as far as the middle of the head and fused with the antennal band. Occipital signature is triangular on a rectangular base.

Prothorax large, rectangular with acute latero-posterior angles, a small seta in the posterior angle; posterior margin straight, bare; marginal band distinct, continuous in the head; intercoxal plates highly developed, reaching as far as the middle line; sternum well developed, oblong, bare. Meso- and metathorax completely fused into pterothorax; pterothorax slightly projecting laterally, latero-posterior angle blunt bearing two long hairs; posterior margin angulate on abdomen with 5 hairs distributed as shown in figure; lateral bands distinct; sternum weak with two hairs, pericoxal plates well developed. Legs normal with slightly developed marginal bands.

Abdomen ovate, with dark yellow latero-transverse plates and dark brown marginal bands on segments I-VII; segment VIII with entire blotch; segments I-VII with 4-5 hairs on each side of the median line, confined in the middle, one hair on sublateral margin at the base of the lateral plates, and 1-2 hairs in the lateral angles; segment VIII deeply emarginate posteriorly and with about 6 hairs on each lobe. Ventrums with short setae on segments I, II and III as shown in figure; hairs on posterior margin, genital plate well developed with a series of short hairs.

Measurements (mm.)

Female.	(Holotype).	(Paratype).
Body ..	1.892 × 0.720	1.665 × 0.680
Head ..	0.760 × 0.613	0.653 × 0.546
Prothorax ..	0.133 × 0.374	0.106 × 0.333
Pterothorax ..	0.266 × 0.533	0.240 × 0.480
Abdomen ..	0.733 × 0.720	0.666 × 0.680

Holotype and *Paratype*: 2 females from Lyallpur ex the Indian Rose-ringed Paroquet (*Psittacula krameri manillensis*, Bechst.) mounted together on slide No. MI. 034, shot in Lyallpur, 17-iv-1931.

10. *Echinophlopterus*, sp.

Several nymphs were collected from the Indian Large Paroquet (*Psittacula eupatria nepalensis* Hodgs.) shot in Lyallpur, 21-ii-1931.

11. *Alcedoffula alcedinis* (Denny).

1842. *Docophorus alcedinis*, Denny, *Anop. Brit.*, p. 111, pl. 6, f. 1.

This species was first described from the European King-fisher (*Alcedo atthis ispida*). Only one immature specimen was obtained by me from the Egyptian White-breasted King-fisher (*Halcyon s. smyrnensis*, Linn.) shot in Lyallpur, 17-ii-1928.

Picophilopterus, gen. nov.

This genus is erected for the reception of a new species collected from the Himalayan Scaly-bellied Green Woodpecker (*Picus s. squamatus* Vigors) shot in Kulu, 15-ix-1928 and 6-x-1939.

Description of the genus.—Elongate nirmoid Philopteridae with very moderately sclerotised body. Head large; clypeus narrow, separated from preantennal region by a distinct suture; clypeal front forcipated because of the lateral clypeal bands extending beyond the signature, area between flanked with hyaline flap which is entire; clypeal signature not distinctly chitinised, concave anteriorly, bluntly pointed posteriorly, reaching as far as the anterior margin of labrum. Trabeculae large, not extending beyond the I antennal segment. Antennae filiform, showing no sexual dimorphism. Occipital signature small, triangular; pharyngeal sclerite and glands well developed. Prothorax small, far reaching in the occipital margin, pterothorax with projected sides, small, broadly convex posteriorly; sternum and precoxal plates present. Legs short. Abdomen ovate, with rectangular I segment; pleural plates II-VI straight, narrow, re-entrant heads straight; tergal plates well marked, entire on segments II-VIII. Female with deeply emarginate IX segment, with slightly coloured blotch; male with rounded IX segment, with distinct marginal band.

Genital plate in female conspicuous, notched and fringed with hairs. Male genital armature with narrow basal plate. Parameres are short, pointed, curved; endomeral plate broad with narrow chitinised margins, in the centre of the endomeral plate lies a compound structure with curved triangular ears near the tip and a hollow tube beyond.

This genus can be separated from *Alcedoffula* by the distinctly different form of genital armature and from *Echinophilopterus* by the absence of strong spines on ventral aspect of abdomen.

This genus is apparently confined to the Woodpeckers (Picidae) and should contain the species belonging to Piaget's (1880) group *angustifrontes* and *Philopterus evagans* (Kellogg), *P. jungens* (Kellogg) and *P. californiensis* (Kellogg).

Genotype.—*Picophilopterus tuktola* sp. nov. (*vide infra*) ex the Himalayan Scaly-bellied Green Woodpecker (*Picus s. squamatus* Vigors).

12. *Picophilopterus tuktola*,¹ sp. nov.

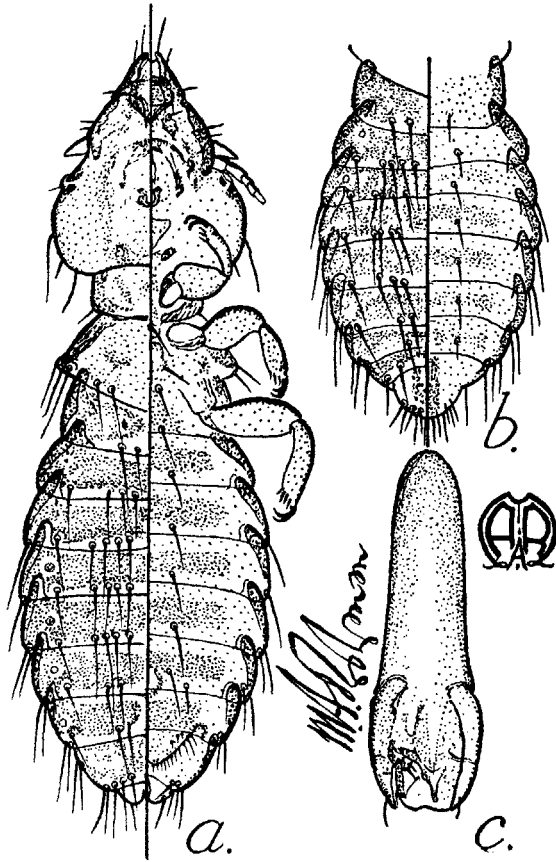
Female (Text-fig. 4a) elongate, nirmoid body, narrow clypeal front, pale with dark marginal markings.

Head a little longer than broad; triangular, with narrow, anteriorly tapering front; clypeus incised in front because of the lateral clypeal bands which extend beyond the signatural plate; anterior angle with two long hairs; one hair in front of suture; one dorsal, submarginal hair between the suture and the front; one such hair on the tail of internal band, two hairs just in front of trabeculae; antennal bands distinct, broken at the clypeal suture; trabeculae large, acute, hardly reaching the I antennal segment; antennae normal, similar in the two sexes, eyes prominent, flatly rounded, with central seta; ocular blotch blackish, ocular band distinct; temples broadly rounded with narrow marginal band, two long hairs and a prickle; occipital margin sinuous, bare; occipital band distinct but not highly pigmented; occipital signature short, triangular; pharyngeal sclerite and glands distinct.

Prothorax short, projecting considerably beneath head, posterior angle rounded with one hair, posterior margin flatly convex; true pterothorax, short, projecting laterally, latero-posterior angle with one short and two long hairs, posterior margin obtusely angulate on the abdomen with two sub-median hairs on each side; marginal

¹ 'Tuktola' in vernacular means the Himalayan Scaly-bellied Woodpecker.

bands distinct; sternum distinct; intercoxal plates well developed. Legs normal, concolorous with the body.



TEXT-FIG. 4. *Picophilopterus tuktolae*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of thorax and abdomen of male; c. Male genital armature.

Abdomen elongate, oval, with dark marginal bands on segments I-VIII, transverse bands entire on segments I-VIII, but on I-II emarginate medially on anterior margin; segments III-VIII with long hairs on slightly projecting posterior angles, segments II-VII with one submarginal hair, segments I-VII with median row of hairs, segment VIII with 3 hairs on the posterior margin; segment IX deeply emarginate almost colourless and bearing no hairs. Sternal plates confined in the middle; chaetotaxy scarce; genital plate on segment VIII as shown in figure.

Male (Text-fig. 4b) similar to female; last segment projecting, rounded, with long hairs on posterior margin and a distinct band. Genital armature (Text-fig. 4c) distinct, showing through segments VI-IX.

Holotype (female) and *Allotype* (male) mounted together on slide No. MI. 080. From Kulu ex the Himalayan Scaly-bellied Woodpecker (*Picus s. squamatus* Vigors), 15-ix-1928. *Paratypes*: Numerous males and females from the type-host shot in Kulu, 15-ix-1928 and 6-x-1939.

Measurements (mm.).

	Female (Holotype).	Female (3).	Male (2).
Body ..	2.266 × 0.740	2.173-2.266 × 0.560-0.746	1.719-1.839 × 0.600-0.610
Head ..	0.666 × 0.533	0.613-0.666 × 0.533-0.560	0.573-0.586 × 0.480-0.490
Prothorax ..	0.160 × 0.320	0.146-0.160 × 0.280-0.320	0.133 × 0.280
Pterothorax ..	0.240 × 0.573	0.240-0.254 × 0.533-0.573	0.200 × 0.406-0.466
Abdomen ..	1.200 × 0.740	1.133-1.200 × 0.560-0.746	0.800-0.933 × 0.600-0.610

13. *Incidifrons pertusus* (Nitzsch).

1818. *Docophorus pertusus*, Nitzsch, *Germ. Mag.*, III, p. 290.

This species was described from the Coot (*Fulica atra* Linn.) by Schrank (1803) and since then has been recorded from the type-host from many parts of the world. Kellogg (1896) recorded it from the American Coot (*Fulica americana*) and the Ruddy Duck (*Erismatura rubida*) which are constant associates in nature.

My specimens were recorded from the Coot (*Fulica a. atra* Linn.) shot in Lyallpur, 16-ii-1928.

Measurements (mm.).

	Female (1).	Male (1).
Body ..	1.666 × 0.586	1.126 × 0.493
Head ..	0.560 × 0.466	0.380 × 0.400
Thorax ..	0.306 × 0.400	0.266 × 0.306
Abdomen ..	0.800 × 0.586	0.480 × 0.493

Piaget (1880) gave its length to be 1/2"', i.e. 1.27 mm. and 2/3"', i.e. 1.693 mm. for male and female respectively, while Kellogg's (1896) female specimens were slightly bigger and measured 2.0 mm. × 0.92 mm.

14. *Falcoecus ?milvi* (Mjöberg).

1910. *Docophorus milvi*, Mjöberg., *Ark. Zool.*, VI, p. 109, pl. 3, f. 1, tf. 63.

I provisionally refer to this species a number of specimens obtained from the Common Pariah Kite (*Milvus migrans govinda* Sykes) shot in Lyallpur, 5-iv-1933. The type-host of this species is *Milvus aegyptius*.

Measurements (mm.).

	Female (2).	Male (1).
Body	2.093-2.213 × 0.893-0.933	1.799 × 0.800
Head	0.800 × 0.800-0.84	0.733 × 0.733
Thorax	0.453-0.480 × 0.60	0.333 × 0.546
Abdomen	0.840-0.933 × 0.893-0.933	0.733 × 0.800

Mjöberg's (1910) female and male specimens measured 2.3125 mm. × 1.0875 mm. and 1.925 mm. × 0.9625 mm. respectively.

15. *Alcedoecus capistratus* (Neumann).1912. *Philopterus capistratus*, Neumann, *Arch. Parasit.*, XV, p. 375, f. 20.

Numerous specimens from the Egyptian White-breasted King-fisher (*Halcyon s. smyrnensis*, Linn.) shot in Kulu, 9-x-1939, and Lyallpur, 21-i-1929. This species was described from specimens taken off *Halcyon leucocephala*. Bedford (1919) recorded it from the Brown-hooded Kingfisher (*Halcyon albeventris*) from Transvaal and Natal.

Measurements (mm.).

	Female (2).	Male (3).
Body	1.679-1.746 × 0.453-0.600	1.439-1.492 × 0.533-0.560
Head	0.546-0.560 × 0.506-0.533	0.453-0.493 × 0.480-0.493
Thorax	0.306-0.320 × 0.453-0.466	0.280-0.306 × 0.400-0.426
Abdomen	0.813-0.880 × 0.453-0.600	0.666-0.706 × 0.533-0.560

16. *Anatoecus dentatus* (Scopoli).1763. *Pediculus dentatus*, Scopoli, *Ent. Carn.*, p. 383.

This is the commonest parasite of ducks, recorded under different names from various parts of the world. A large number of its recorded hosts occur within Indian limits, viz., the White-fronted Goose (*Anser a. albifrons*, Scop.), the Mallard (*Anas platyrhyncha*, Linn.), the Wigeon (*Mareca penelop*, Linn.), the Common Teal (*Nettion c. crecca*, Linn.), the Shoveller (*Spatula clypeata*, Linn.), the Red Crested Pochard (*Netta rufina*, Pallas), the Pochard (*Nyroca f. ferina*, Linn.), the Scaup (*Nyroca m. marila*, Linn.), the Tufted Pochard (*Nyroca f. fuligula*, Linn.), the Smew (*Mergellus albellus*, Linn.) and the Goosander (*Mergus merganser merganser* Linn.).

My specimens were obtained from the Brahminy Duck (*Casarca ferruginea*, Vroeg), 5-iv-1933, and the Dun Bird (*Nyroca f. ferina*, Linn.), 14-xi-1932, both shot in Lyallpur.

Measurements (mm.).

	Female (2).	Male (3).
Body	1.479 × 0.533	1.118 × 0.466
Head	0.506 × 0.426	0.426 × 0.400
Thorax	0.280 × 0.360	0.226 × 0.333
Abdomen	0.693 × 0.533	0.466 × 0.466

Kellogg (1896) gave the measurements of female as 1.4 mm. × 0.52 mm.

17. *Penenirmus subflavescens* (Geoffroy).1762. *Pediculus subflavescens*, Geoffroy, *Hist. Ab. Ins.*, II, p. 599.

This species has been recorded from a number of passerine birds. Giebel (1874) listed 29 passerine birds representing 15 genera; Picaglia (1885) gave an exhaustive list of synonymy and listed 43 species of European birds from which this species was collected up to that time. Kellogg *et al.* (1896-1899) recorded it from about 45 American Passeriformes. Harrison (1916) has referred to 21 synonyms. Provisionally I refer numerous specimens to this group of closely allied species

from the following birds shot in Lyallpur. Variation among these specimens was marked and certainly of specific value, but the uncertain condition of this species kept me from attempting further diagnosis. The Bengal Jungle Babbler (*Turdoides terricolor terricolor* Hodgs.), the Common Babbler (*Argya c. caudata*, Dumont), the Punjab Red-vented Bulbul (*Molpastes cafer intermedius*, Jerdon), the Himalayan White-cheeked Bulbul (*Molpastes l. leucogenys*, Gray), the Western Red Spotted Blue-throat (*Cyanosylvia s. suecica*, Linn.), the Brown-backed Indian Robin (*Saxicoloides fulicata cambaiensis*, Lath.), the Indian Great Grey Shrike (*Lanius excubitor lahtora*, Sykes), the Rufous-backed Shrike (*Lanius schach erythronotus*, Vigors), the Brown Willow Warbler (*Phylloscopus collybitus tristis* Blyth.), the Red headed Bunting (*Emberiza bruniceps* Brandt.), the Indian White Wagtail (*Motacilla alba dukhunensis*, Sykes) and the Indian Crested Lark (*Galerida cristata chendoola* Frankl.).

Measurements (mm.).

	Female (8).	Male (3)
Body	1.289-1.462 × 0.53-0.613	1.126-1.329 × 0.426-0.546
Head	0.453-0.560 × 0.426-0.530	0.463 × 0.400
Thorax	0.263-0.266 × 0.360-0.493	0.200-0.266 × 0.333-0.386
Abdomen	0.530-0.733 × 0.530-0.613	0.463-0.600 × 0.426-0.546

18. *Penenirmus ornatus* (Nitzsch).

1866. *Docophorus ornatus*, Nitzsch, in Giebel, *Zeit., f. ges, Nat.*, XXVII, p. 116.

This species was described by Nitzsch (in Giebel 1866) from specimens taken off the European Golden Oriole (*Oriolus o. oriolus*, Linn.). The specimens referred to here were immature and obtained from the Indian Golden Oriole (*Oriolus o. kundoo* Sykes), shot in Lyallpur, 5-vii-1928.

19. *Penenirmus raji*,¹ sp. nov.

Female (Text-fig. 5a) well built, yellowish with brownish body markings, with conspicuous tergal plates and ventral transversal blotches.

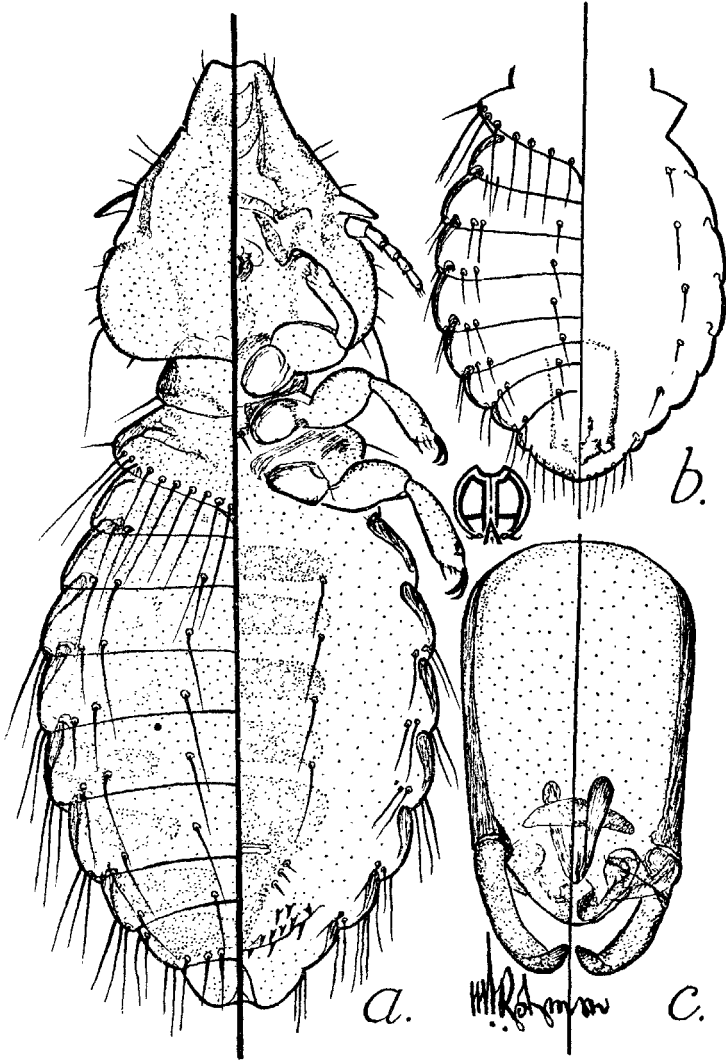
Head slightly longer than broad, forehead narrow, concave; clypeal suture distinct, anterior angle with two hairs, 3 hairs beyond it on the preantennal region; antennal band and internal bands well formed, narrow; trabeculae large, acute, reaching as far as two-third of the II antennal segment; antennae normal, similar in the two sexes; eyes prominent with a basal hair; ocular bands distinct; temples rounded with one long hair and a few setae as shown in figure; occipital signature small; pharyngeal glands and sclerite well developed.

Prothorax well developed, projecting considerably beneath the head; posterior angle with a hair; marginal band well pigmented; intercoxal plates showing through. True pterothorax, projecting laterally, latero-posterior angle with two hairs; posterior margin characteristically angulate on the abdomen with a series of long hairs; marginal bands distinct; sternum distinct; intercoxal plates well developed. Legs normal, concolorous with body.

Abdomen ovate, with slightly projecting segments, marginal bands I-VII distinct, with turned inwards heads; tergal plates I-VII submarginal, tergal plate VIII entire; segment IX emarginate, colourless. Chaetotaxy scarce. Sternal

¹ 'Raji' in vernacular means the Indian Yellow-throated Sparrow.

plates distinctly marked, genital plate on segment VIII with pustulated setae on the margins.



TEXT-FIG. 5. *Penenirmus raji*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of thorax and abdomen of male; c. Male genital armature.

Male (Text-fig. 5b) similar to female; last segment rounded behind with narrow posterior border and numerous hairs. Genitalia (Text-fig. 5c) showing through segments VI-IX.

Holotype (female) mounted on slide No. MI. 025H; from Lyallpur, 13-v-1933, ex the Yellow-throated Sparrow (*Gymnoris x. xanthocollis*, Burt.). *Allotype* (male) on slide No. MI. 025A from Lyallpur, 5-v-1931, ex the Indian House Sparrow (*Passer domesticus indicus* Jard. and Selby.). *Paratypes* (2 females) mounted together

Measurements (mm.).

	Female (Holotype).	Female (8).	Male (1).
Body ..	1.357 × 0.581	1.325-1.346 × 0.506-0.600	1.052 × 0.413
Head ..	0.413 × 0.411	0.413-0.440 × 0.413	0.400 × 0.360
Prothorax ..	0.072 × 0.221	0.066-0.080 × 0.213-0.240	0.066 × 0.200
Pterothorax ..	0.157 × 0.335	0.160 × 0.280-0.346	0.080 × 0.28
Abdomen ..	0.715 × 0.581	0.666-0.746 × 0.506-0.600	0.506 × 0.413

on slide No. MI. 025P. from Lyallpur, 5-v-1931, *ex* Yellow-throated Sparrow (*Gymnoris x. xanthocollis*, Burt.), and numerous males and females from Lyallpur, 13-v-1931, *ex* the Indian House Sparrow (*Passer domesticus indicus* Jard. and Selby.).

20. *Phlopterus crassipes* (Nitzsch).

1838. *Docophorus crassipes*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 425, f. 7.

The type-host of this species is the Nutteracker (*Nucifraga caryocatactes*). Kellogg and Paine (1914) recorded it from the Kashmir Magpie (*Pica pica bactriana* Bonap.) from the Punjab. The present specimens were obtained from the Himalayan Nutteracker (*Nucifraga caryocatactes hemispila* Vigors) shot in Lyallpur, 12-ii-1928, and Kulu, 14-x-1939.

Measurements (mm.).

	Female (2).	Male (1).
Body ..	2.160-2.199 × 1.000	1.825 × 0.890
Head ..	0.560-0.666 × 0.680-0.693	0.626 × 0.666
Thorax ..	0.400 × 0.586-0.603	0.400 × 0.533
Abdomen ..	1.133-1.200 × 1.000	0.800 × 0.890

Piaget (1880) gave the measurements of female and male as 2.0-2.1 mm. × 0.85 mm. and 1.7 mm. × 0.75 mm. respectively.

21. *Phlopterus rotundatus* (Piaget).

1880. *Docophorus rotundatus*, Piaget, *Les Pediculines*, p. 47, pl. 3, f. 5.

The type-host is the Carrion Crow (*Corvus corone*). Kellogg and Paine (1914) recorded it from the House Crow (*Corvus s. splendens*) from Nepal. The present specimens were obtained from the Common Indian House Crow (*Corvus s. splendens* Vieill) shot in Lyallpur, 11-ii-1930.

Measurements (mm.).

	Female (10).	Male (5).
Body	1.933-2.246 × 0.826-0.828	1.586-1.780 × 0.613-0.773
Head	0.640-0.660 × 0.532	0.586-0.653 × 0.559-0.573
Thorax	0.427-0.453 × 0.532-0.559	0.307-0.354 × 0.427-0.493
Abdomen	0.866-1.130 × 0.826-0.828	0.693-0.773 × 0.613-0.773

Piaget (1880) gave the measurements of female and male as 1.7-1.8 mm. \times 0.73 mm. and 1.6 mm. \times 0.7 mm. respectively.

22. *Philopterus garruli* (Boisd. & Lacord.).

1835. *Docophorus garruli*, Boisduval & Lacordaire, *Faun. Ent., Paris*, p. 120.

This species is found quite commonly upon the Jay (*Garrulus glandarius*). Kellogg and Paine (1914) recorded it from the Yellow-billed Magpie (*Urocissa f. flavirostris*, Blyth), the Indian Treepie (*Dendrocitta rufa rufa*, Lath.), the Himalayan Treepie (*Dendrocitta sinensis himalayensis* Blyth), the Black-throated Jay (*Garrulus lanceolatus* Vigors) and the Large Spotted Nutcracker (*Nucifraga multipunctata* Gould), all from India.

The present specimens are from the Indian Red-billed Blue Magpie (*Urocissa erythrorhyncha occipitalis*, Blyth) and the Bengal Treepie (*Dendrocitta r. rufa*, Lath.) both shot in Lyallpur, 16-viii-1928 and 25-viii-1928 respectively.

Measurements (mm.).

		Female (1).
Body	..	2.106 \times 0.80
Head	..	0.600 \times 0.573
Thorax	..	0.466 \times 0.546
Abdomen	..	1.04 \times 0.80

Piaget (1880) gave the measurements of male and female as 1.5 mm. \times 0.67 mm. and 1.9 mm. \times 0.8 mm. respectively.

23. *Philopterus corvi* (Linn.).

1758. *Pediculus corvi*, Linnaeus, *Sys. Nat.*, II, p. 612.

This species was recorded by Denny (1842) from the Common Rook (*Corvus frugilegus*) and the Hooded Crow (*Corvus cornix*). It has also been recorded by Kellogg and Paine (1914) from crows in India.

The present specimens were obtained from the Punjab Raven (*Corvus corax laurencei*, Hume), the Eastern Rook (*Corvus frugilegus tschusii*, Hartert), the Common Indian House Crow (*Corvus splendens splendens* Vieill.); all shot in Lyallpur 21-vi-1938, 21-ii-1929 and 11-ii-1930 respectively.

Measurements (mm.).

		Female (8).	Male (1).
Body	..	1.746-2.220 \times 0.820-0.880	1.913 \times 0.76
Head	..	0.610-0.680 \times 0.660-0.773	0.660 \times 0.66
Thorax	..	0.333-0.414 \times 0.560-0.613	0.307 \times 0.56
Abdomen	..	0.800-1.200 \times 0.828-0.880	0.946 \times 0.76

Piaget (1880) gave the measurements of female and male as 2.2 mm. \times 0.94 mm. and 1.8-1.9 mm. \times 0.94 mm. respectively.

24. *Philopterus sturni* (Schränk).1776. *Pediculus sturni*, Schränk, *Beit. zur. Nat.*, p. 118, f. 11-14.

This species was described from specimens obtained from the Starling (*Sturnus vulgaris* Linn.). The specimens referred to were obtained from the Rose-coloured Starling (*Pastor roseus*, Linn.), the Himalayan Starling (*Sturnus vulgaris humii* Brooks), the Black-headed Mayna (*Temenuchus pagodarum*, Gmel.), the Common Mayna (*Acridotheres t. tristis*, Linn.), and the Bank Mayna (*Acridotheres ginginianus*, Lath.); all shot in Lyallpur.

Measurements (mm.).

	Female (5).	Male (2).
Body ..	1.306-1.613 × 0.613-0.733	1.189 × 0.653
Head ..	0.530-0.600 × 0.533-0.560	0.506 × 0.533
Thorax ..	0.240-0.280 × 0.440-0.493	0.240 × 0.400
Abdomen ..	0.613-0.813 × 0.613-0.733	0.440 × 0.463

Piaget (1880) gave the measurements of the female and male as 1.5 mm. × 0.72 mm. and 1.2-1.3 mm. × 0.54 mm. respectively.

IV. DEGEERIELLIDAE.

25. *Psittaconirmus chandabani*,¹ sp. nov.

Female (Text-fig. 6a) yellowish white with distinct, brownish yellow pleural plates and indistinct tergal markings.

Head longer than broad; clypeal front rounded, small hairs distributed as shown in figure; clypeal band narrow; antennal band broad, highly pigmented; clypeus with two small papillae as shown in figure; clypeal signature absent; internal bands travelling half way towards the clypeal signature; trabeculae distinct, small, triangular; antennae filiform; temporal lobes rounded, as broad as the base of preantennal region; eyes distinct, ocular fleck black with a seta; temporal margin narrowly banded. Occipital margin concave, occipital signature distinct, large; pharyngeal sclerite and glands present.

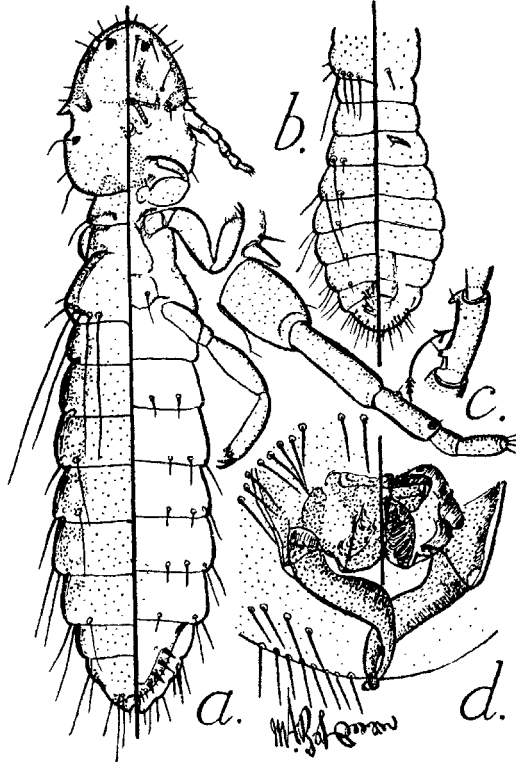
Prothorax rectangular, large, a long hair in the posterior margin and a small seta towards the anterior; posterior margin straight or slightly convex, bare; sternal plate narrow, precoxal margin pigmented showing through on the dorsum. Meso- and metathorax with a distinct marginal suture, otherwise fused; pterothorax trapezoidal, projecting laterally a little; posterior angle outwardly rounded with two small hairs, posterior margin angulate on the abdomen with a distinct median denticle with four long hairs on the margin; marginal bands distinct, brown; intercoxal plates showing through on the dorsum. Sternal plates distinct, broad, with a small seta. Legs long, lipeurid.

Abdomen elongate; marginal bands brown, conspicuous on segments I-VII; chaetotaxy very scarce, confined submarginally only, median areas almost bare; ventrum with a well built genital plate arising from the base of segment VII with four thick setae and numerous delicate hairs; terminal segment notched.

Male (Text-fig. 6b) similar to female, but shorter, antennae appendiculate (Text-fig. 6c), abdomen widening posteriorly to segment VI; segment VII a little narrower than VI, and segments VIII and IX narrowing more rapidly, segment VIII with 18-20 dorsal hairs arranged in a semicircle, segment IX broadly rounded

¹ 'Chandabani' in vernacular means the Indian Large Paroquet.

posteriorly with a median notch and profusely setaceous; ventrum with a delicate spur on segment III. Genitalia (Text-fig. 6d) characteristic with interlocking and well built parameres.



TEXT-FIG. 6. *Psittaconirmus chandabani*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of thorax and abdomen of male; c. Male antenna; d. Male genital armature.

Measurements (mm.).

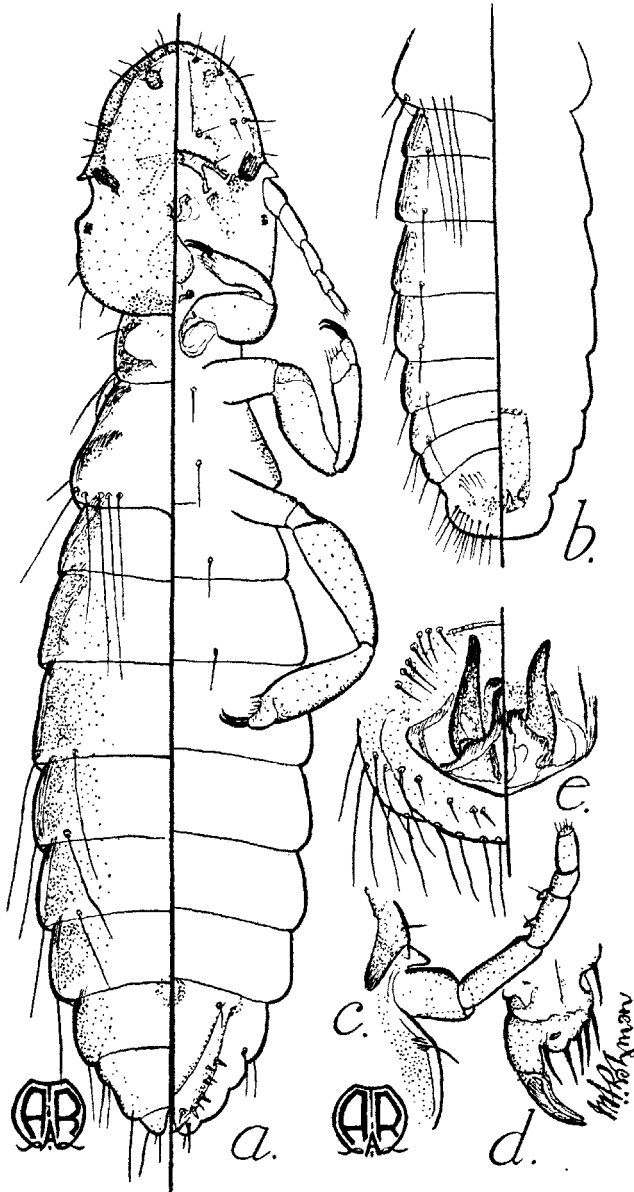
	Female (Holotype).	Female (3).	Male (2).
Body ..	1.918 × 0.466	1.705-1.825 × 0.386-0.426	1.412-1.425 × 0.346-0.373
Head ..	0.493 × 0.366	0.466-0.493 × 0.360-0.373	0.400-0.426 × 0.306-0.333
Prothorax ..	0.133 × 0.226	0.133 × 0.213-0.226	0.093-0.106 × 0.173-0.200
Pterothorax ..	0.226 × 0.350	0.200-0.216 × 0.333-0.360	0.226 × 0.293-0.306
Abdomen ..	1.066 × 0.466	0.893-1.026 × 0.386-0.426	0.680 × 0.346-0.373

Holotype (female) and *Allotype* (male) from Lyallpur, 18-iii-1931, ex the Indian Large Paroquet (*Psittacula eupatria nepalensis* Hodgs.) mounted on slide No. MI. 035; *Paratypes*: numerous males and females (same data as above) preserved in alcohol.

This species closely resembles *Lipeurus circumfasciatus* Piaget from *Platycercus melanurus*, but differs in numerous details given above.

26. *Psittaconirmus lybartota*,¹ sp. nov.

Female (Text-fig. 7a) yellowish white, with distinct brownish yellow pleural bands and indistinct tergal markings, very similar to *Psittaconirmus chandabani* sp. nov. (*vide supra*) but the following characters separate it.



TEXT-FIG. 7. *Psittaconirmus lybartota*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of thorax and abdomen of male; c. Male antenna; d. Hind tarsus; e. Male genital armature.

¹ 'Lybartota' in vernacular means the Indian Rose-ringed Paroquet.

(1) Male (Text-fig. 7b) with almost subparallel sides; (2) segment VIII with 6-7 hairs on each side of the circle; median area definitely bare; (3) male genitalia (Text-fig. 7e), as seen in extending condition, is different, with short parameres which are not interlocking, (4) ventrum without any spur on segment III.

Measurement (mm.).

	Female (Holotype).	Female (3).	Male (1).
Body ..	1.645 × 0.333	1.600-1.652 × 0.306-0.36	1.293 × 0.280
Head ..	0.440 × 0.293	0.413-0.440 × 0.280-0.32	0.400 × 0.280
Prothorax ..	0.093 × 0.213	0.080-0.120 × 0.173-0.20	0.093 × 0.173
Pterothorax ..	0.226 × 0.306	0.200-0.226 × 0.293-0.32	0.200 × 0.293
Abdomen ..	0.886 × 0.333	0.880-0.893 × 0.306-0.36	0.600 × 0.280

Holotype (female) and *Allotype* (male) from Lyallpur, 6-x-1931, mounted together on slide No. MI. 036 *ex* the Indian Rose-ringed Paroquet (*Psittacula krameri manillensis*, Bechst.). *Paratypes*: numerous males and females preserved in alcohol (same data as above).

27. *Quadriceps kekra*,¹ sp. nov.

Female (Text-fig. 8a) yellowish white with dark black marginal markings on head, thorax and abdomen, and chestnut-brown occipital signature and abdominal blotches.

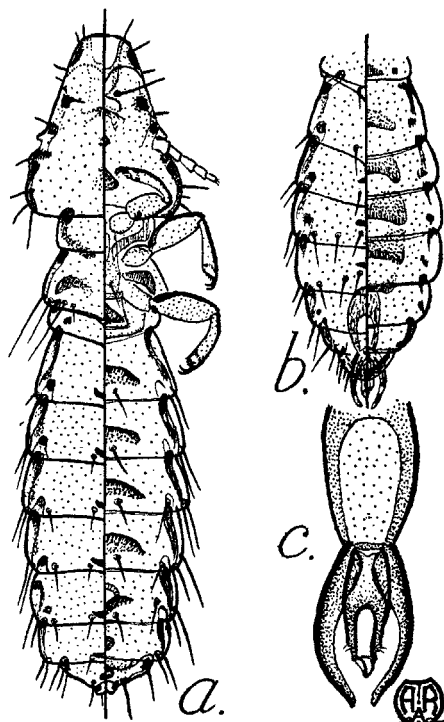
Head elongate, conical, clypeus truncate; front concave, feebly emarginate; a short hair at each anterior angle; two lateral ones, one in the middle and one at the clypeal suture; lateral band well defined, black; clypeal signature wanting; inner band absent; antennal band represented by two conspicuous black blotches, one just near the clypeal suture and another at the base of trabeculae, trabeculae short, conical and distinct; antennae short and slender, second segment longest, terminal segment pigmented; temporal margins weakly convex, with one long and two short hairs at the rounded posterior angle; temporal band black, continuous with the ocular blotch and bar. Eyes weakly developed, each with a spine; hyaline cornea distorted. Occipital margin concave, bare; occipital signature chestnut brown.

Prothorax quadrangular with short hair on the posterior angle; lateral margin black, the black area running anteriorly in the head as far as the occipital signature, and posteriorly along the posterior margin as far as the middle line. Meso- and metathorax completely fused into pterothorax. Pterothorax pentagonal, posterior angles projecting, anterior lateral margin chestnut brown; intercoxal, curved sternal blotches, showing through; posterior angles with 3-4 short hairs, two long marginal hairs on the posterior. Legs as in *Degeriella felix* (Gb.).

Abdomen nearly parallel sided for most of the length; segment I narrow, sides slightly concave, posterior margin angulate on segment II with a black spot at the large pleurite re-entrant head; sternum with a pointed half-moon shaped brownish blotch. Segments II-VII with marginal bands thickened on the anterior ends and with black spots at the large pleurite re-entrant heads; dorsum with small median blotches and ventrum with transverse blotches; segment VIII with a blotch and a bar at the lateral margin, and a median blotch just near the posterior margin; segment IX bilobed posteriorly with a black blotch on each lobe. Chaetotaxy scarce. Anal orifice in female very conspicuous.

¹ 'Kekra' in vernacular means the Egyptian Gull-billed Tern.

Male (Text-fig. 8b) agrees with the female except in size and abdominal sternal blotches which are wider; last abdominal segment broadly rounded with chestnut marginal band and with about 10–12 long marginal hairs and 4–4 submarginal hairs. Genitalia (Text-fig. 8c) well developed, short, parameres sword-shaped, turned inward, with a small seta at the tip, endomeral plate well developed, with well chitinised lateral margin, having two small setae at the postal end; penis well developed and enclosed in a sheath.



TEXT-FIG. 8. *Quadraceps kekra*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of abdomen of male; c. Male genital armature.

Measurements (mm.).

	Female (Holotype).	Male.
Body ..	1.816 × 0.394	1.440 × 0.366
Head ..	0.507 × 0.360	0.466 × 0.333
Prothorax ..	0.080 × 0.213	0.080 × 0.186
Pterothorax ..	0.173 × 0.280	0.133 × 0.226
Abdomen ..	1.056 × 0.394	0.761 × 0.366

Holotype (female) and *Allotype* (male) from Lyallpur, 11-viii-1931, ex the Egyptian Gull-billed Tern (*Gelochelidon n. nilotica*, Gmel.) mounted on slide Nos. MI. 102H and MI. 102A respectively. *Paratype*: one female mounted on slide (same data as above).

These examples closely resemble *Degeeriella praestans* (Kellogg) and *Degeeriella felix* (Gb.), but are distinctly of a smaller size, different type of marginal bands on the abdomen, transverse abdominal blotches and also a slight variation in chaetotaxy distinguish it from the two species.

28. *Quadriceps cursorius* (Mjöberg).

1910. *Nirmus cursorius*, Mjöberg, *Ark. Zool.*, VI, p. 141, pl. 1, f. 4.

Mjöberg (1910) obtained it from the Cream-coloured Courser (*Cursorius gallicus* Gmelin = *cursor cursor*, Lath.) in Europe. The specimens referred to here were obtained from the type-host (*Cursorius c. cursor*, Lath.), shot in Lyallpur, 13-xii-1930.

I transfer it to the genus *Quadriceps* because of the characters given by Clay and Meinertzhagen (1939).

Measurements (mm.).

		Female (3).
Body	..	2.013-2.226 × 0.401-0.533
Head	..	0.560-0.640 × 0.401-0.426
Thorax	..	0.293-0.333 × 0.400-0.401
Abdomen	..	1.160-1.293 × 0.401-0.533

Mjöberg (1910) gave the measurement of female as 2.3 mm. × 0.6125 mm.

29. *Quadriceps hiaticulae* (Müller).

1780. *Pediculus hiaticulae*, Müller, in Fabricius, *Faun. Groen.*, p. 220.

This species is recorded from various birds belonging to the family Charadriidae. The following of its bird-hosts are also common within Indian limits: The Ringed Plover (*Charadrius hiaticola* Linn.), the Little Plover (*Charadrius dubius* Scop.), the Avocet (*Recurvirostra avocetta avocetta* Linn.) and the Lapwing (*Vanellus vanellus* Linn.). My specimens were obtained from the Indian Red-wattled Lapwing (*Lobivanellus i. indicus*, Bodd.), shot in Lyallpur, 15-iii-1929.

Measurements (mm.).

		Female (1).	Male (1).
Body	..	1.772 × 0.360	1.319 × 0.346
Head	..	0.466 × 0.333	0.440 × 0.320
Thorax	..	0.306 × 0.280	0.293 × 0.240
Abdomen	..	1.000 × 0.360	0.586 × 0.346

Piaget (1880) gave the measurements of female and male as 1.5 mm. × 0.4 mm. and 1.3-1.4 mm. respectively.

30. *Quadriceps signata* (Piaget).

1880. *Nirmus signatus*, Piaget, *Les Pediculines*, p. 186, pl. 15, f. 8.

This species was first described from the Avocet (*Recurvirostra a. avocetta* Linn.). Waterston (1914) recorded it on the same host in South Africa. The present specimens were taken off the Black-winged Stilt (*Himantopus h. himantopus*, Linn.).

Measurements (mm.).

	Female (1).	Male (1).
Body ..	2.211 × 0.451	1.857 × 0.451
Head ..	0.478 × 0.309	0.478 × 0.338
Thorax ..	0.338 × 0.309	0.295 × 0.295
Abdomen ..	1.395 × 0.451	1.084 × 0.451

Piaget (1880) gave the measurements of female and male as 2.0–2.2 mm. × 0.52 mm. and 1.6–1.7 mm. × 0.46 mm. respectively.

31. *Quadriceps holophaea* (Nitzsch).

1838. *Nirmus holophaeus*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 427.

It has been recorded from most parts of the world on the type-host, the Ruff and Reeve (*Philomachus pugnax*, Linn.). My specimens were taken off the type-host, shot in Lyallpur, 13-viii-1929.

Measurements (mm.).

	Female (1).	Male (1).
Body ..	1.562 × 0.295	1.243 × 0.352
Head ..	0.394 × 0.225	0.380 × 0.267
Thorax ..	0.239 × 0.211	0.218 × 0.239
Abdomen ..	0.929 × 0.295	0.645 × 0.352

Piaget (1880) gave the measurements of female and male as 1.7–1.8 mm. × 0.34 mm. and 1.6–1.7 mm. × 0.33 mm. respectively.

32. *Quadriceps furva* (Nitzsch).

1838. *Nirmus furvus*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 427.

Recorded by Piaget (1880) from the Greenshank (*Glottis nebularia*, Gm.), the Spotted or Dusky Redshank (*Tringa erythropus*, Pallas), the Common Sand-piper (*Tringa hypoleucus* Linn.), the Green Plover or Lapwing (*Vanellus vanellus* Linn.) and the Chinese Little Ringed Plover (*Charadrius d. dubius* Scop.). It has also been recorded by European authors on the Turnstone (*Arenaria i. interpres*, Linn.), the Kentish Plover (*Leucopoliis a. alexandrinus*, Linn.), the Large Sand Plover (*Cirripidesmus leschenaultii*, Lesson), the Black-winged Stilt (*Himantopus h. himantopus*, Linn.), the Bar-tailed Godwit (*Limosa lapponica lapponica*, Linn.), the Green Sand-piper (*Tringa ochrophus* Linn.), the Curlew-Stint or Pigmy Sand-piper (*Erolia testacea*, Pallas), and the Dunlin (*Erolia a. alpina*, Linn.). All these hosts occur within Indian limits.

My specimens were obtained from the Green Sand-piper (*Tringa ochrophus* Linn.), 24-iv-1933, and the Black-winged Stilt (*H. h. himantopus*, Linn.) 25-iv-1933, both shot in Lyallpur.

Measurements (mm.).

	Female (1).	Male (1).
Body ..	1.689 × 0.295	1.210 × 0.253
Head ..	0.422 × 0.239	0.239 × 0.197
Thorax ..	0.239 × 0.218	0.197 × 0.182
Abdomen ..	1.028 × 0.295	0.774 × 0.253

Piaget (1880) gave the measurements of female and male as 1.5–1.6 mm. × 0.37 mm. and 1.2–1.3 mm. × 0.29 mm. respectively.

33. *Luniceps actophila* (Kell. & Chap.)

1899. *Nirmus actophilus*, Kellogg & Chapman, *Proc. Calif. Acad. Sci.* (2) VI, p. 78, pl. 6, f. 4.

This species was described from the Sanderling (*Calidris arenaria*) shot in California. Bedford (1920) recorded it from the Curlew Sand-piper (*Erolia testacea*, Pallas) and the Little Stint (*Erolia minuta minuta*, Leist.) from South Africa. Both these birds are also distributed within Indian limits. My specimens were obtained from the Little Stint (*Erolia m. minuta*, Leist.), shot in Lyallpur, 25-iv-1933.

Measurements (mm.).

	Female (1).	Male (1).
Body ..	1.464 × 0.239	1.295 × 0.211
Head ..	0.338 × 0.225	0.352 × 0.182
Thorax ..	0.253 × 0.169	0.225 × 0.169
Abdomen ..	0.873 × 0.239	0.718 × 0.211

Kellogg and Chapman (1899) gave the measurements of female as 1.59 mm. × 0.4 mm.

34. *Carduiceps cingulatus zonarius* (Nitzsch).

1838. *Nirmus cingulatus zonaria*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 438.

This species was described by Denny (1842) from specimens taken off the Black-tailed Godwit (*Limosa l. limosa*, Linn.). Piaget (1880) recorded it from the Sanderling (*Calidris arenaria*) and the Little Stint (*Erolia m. minuta*, Leist.). The Godwit and the Little Stint are migrants to North-West India. The specimens referred to below were obtained from the Little Stint (*Erolia m. minuta*, Leist.), shot in Lyallpur, 5-iv-1933.

Measurements (mm.).

	Female (1).
Body ..	1.280 × 0.338
Head ..	0.309 × 0.253
Thorax ..	0.197 × 0.182
Abdomen ..	0.774 × 0.338

Piaget (1880) gave the measurements of female and male as 1.3 mm. \times 0.3 mm. and 1.1-1.2 mm. respectively while *Nirmus cingulatus* Nitzsch is given as 1.5 mm. \times 0.42 mm. and 1.3-1.4 mm. \times 0.38 mm. respectively.

35. *Cuculicola latirostris* (Burmeister).

1838. *Nirmus latirostris*, Burmeister, *Handbuch der Ent.*, II, p. 429.

It was described from specimens taken off the European Cuckoo (*Cuculus canorus* Linn.), which migrates in winter to North-West India. My specimens were obtained from the Common Hawk-Cuckoo (*Hierococyx varius* Vahl.), 9-iv-1928, and the Indian Pied Crested Cuckoo (*Clamator j. jacobinuis*, Bodd.), 22-viii-1929, both shot in Lyallpur.

Measurements (mm.).

	Female (4).	Male (4).
Body	1.620-1.758 \times 0.360-0.440	1.599-1.613 \times 0.440-0.466
Head	0.477-0.506 \times 0.333-0.346	0.480-0.493 \times 0.346
Thorax	0.200-0.240 \times 0.305-0.320	0.186-0.200 \times 0.333
Abdomen	0.946-1.066 \times 0.360-0.440	0.920-0.933 \times 0.460-0.480

Piaget (1880) gave the measurements of female and male as 1.5-1.6 mm. \times 0.43 mm. and 1.4 mm. \times 0.39 mm. respectively.

36. *Syrrhaptoecus emahusaini*, sp. nov.

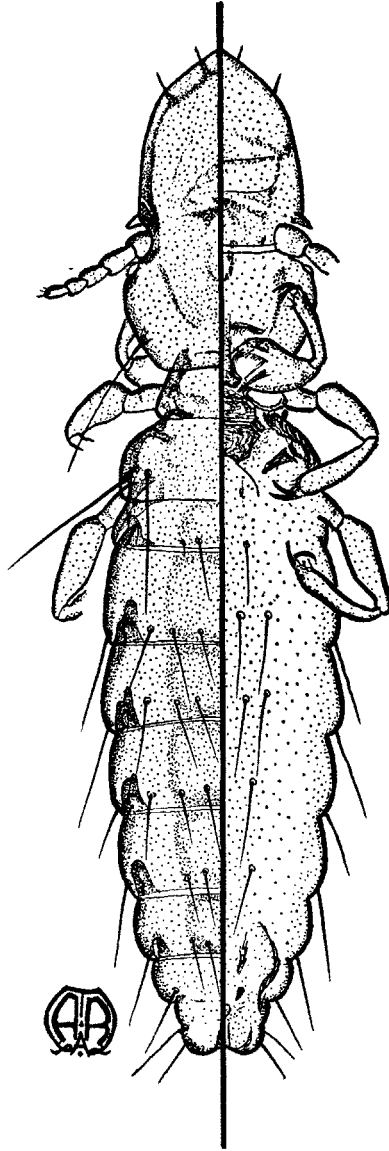
Female (Text-fig. 9) elongate, about five times as long as wide; smoky brown with fuscous black bands on the margin of head, thorax and abdomen and fuscous transverse abdominal blotches; chaetotaxy scarce.

Head stout, about two times as long as wide; forehead broader at posterior aspect, with an angulation on meson, lateral margins straight bearing two short hairs; antennal bands fuscous black, continuous with yellowish brown clypeal bands; trabeculae movable, short, triangular, slightly longer than broad; antennae simple; eyes hyaline, prominent, cornea rounded, ocular seta wanting, ocular band well formed; temples convergent, lateral margins almost straight or flatly rounded with a long median hair, marginal band narrow, not very distinct but near the eyes, posterior margin flatly concave, occipital band dark yellow to brown.

Thorax about half as long as head. Prothorax narrow, short, trapezoidal, anterior portion deeply inserted under the occipital margin; lateral margins projecting, straight, bare; lateral bands distinct; posterior margin straight. Mesothorax narrow, collar-like, with distinct lateral bands, completely fused posteriorly with metathorax. Pterothorax well developed, broad, parallel sided; lateral bands broad, latero-posterior angles rectangular with two postulated long hairs; posterior margin straight, bare. Legs colorous with the thorax, marginal markings on femora and tibia narrow. Sternal plates well developed, as shown in figure.

Abdomen elongated, broadest in the III segment, gradually tapering towards the last segment; segment I shortest; segment II longest and segments III-V long, nearly equal in length, segments VI-VII short, segments VIII and IX fused; latero-posterior angles of II-VIII segments with one hair; posterior margins straight, terminal segment with median notch; segments I-VI bearing transverse row of 2-3 long hairs; lateral bands well developed, each pleurite articulating with pleurite in front of it by means of an inner, capitate condyle; transverse bands confined to the

middle. Sternal plates I-V with 1-2 short hairs; sternite VI with distinct genital blotch and longitudinal bands.



TEXT-FIG. 9. *Syrrhoptoecus emahusaini*, sp. nov.

Dorsal and ventral aspects of female.

Holotype (female) on slide No. MI.129 from Lyallpur, ex the Indian Common Sandgrouse (*Pterocles exustus erlangeri* Neum.), shot on 28-viii-1931. *Paratypes*: 3 females (same data as above).

Measurements (mm.).

	Female (Holotype).	Female (3).
Head index (breadth: length)	0.594	0.650-0.658
Body	1.642 × 0.381	1.598-1.680 × 0.373-0.426
Head	0.516 × 0.301	0.506-0.533 × 0.333-0.346
Prothorax	0.079 × 0.198	0.201-0.226 × 0.293-0.333
Pterothorax	0.135 × 0.254	
Abdomen	0.912 × 0.381	0.866-0.946 × 0.373-0.426

This species closely resembles *Syrrhaptoecus digonus* Waterston, but sufficient difference, however, exists in the size of the body, general chaetotaxy and other important details.

37. *Syrrhaptoecus falcatus* Waterston.

1928. *Syrrhaptoecus falcatus*, Waterston, *Proc. Zool. Soc., London*, p. 345, t.f. 2a-10b.

Waterston recorded it from *Pterocles senegalensis*, Licht. var. *orientalis*.¹

Two females and one male were obtained from the Indian Common Sandgrouse (*Pterocles exustus erlangeri* Neum.), shot in Lyallpur, 28-viii-1931. They differ from the type in some minor details, viz., in being smaller and in having evenly parabolic forehead in the male and slightly angulate in the female.

Measurements (mm.).

	Female (2).	Male (1).
Head index	0.77-0.85	0.73
Body	2.065-2.105 × 0.466	1.453 × 0.333
Head	0.466-0.493 × 0.360-0.373	0.400 × 0.293
Thorax	0.333-0.346 × 0.333	0.240 × 0.240
Abdomen	1.266 × 0.466	0.813 × 0.333

Waterston (1928) gave the measurements of female and male as 2.14-2.37 mm. × 0.51-0.58 mm. and 1.43-1.69 mm. × 0.4-0.45 mm. respectively, while head index as 0.76-0.77 and 0.76-0.80 respectively.

38. *Upupicola melanophrys* (Nitzsch).

1866. *Nirmus melanophrys*, Nitzsch, in Giebel, *Zeit. f. ges. Nat.*, XXVIII, p. 369.

It was originally described from the specimens taken from the European Hoopoe (*Upupa epops epops* Linn.). The present specimens were obtained from the Indian Hoopoe (*Upupa epops orientalis* Stuart Baker), shot in Lyallpur, 19-ii-1928. It has also been recorded from the African Hoopoe (*Upupa epops africana*), by Waterston (1914) and Bedford (1919).

¹ *Pterocles senegalensis* Licht. (name preoccupied) = *P. exustus* Temm. (F.B.I., V, 271). There appears to be some discrepancy in Waterston's record (1928), as there seems to be no such Sandgrouse as *P. senegalensis orientalis* Hass. from within Indian region. By *P. s. orientalis* Hass., the author probably means *P. exustus orientalis* Hartert. (Stuart Baker, 1928, *Faun. Brit. Ind.*, V, p. 271.)

Measurements (mm.).

	Female (4)	Male (2).
Body	1.811-1.866 × 0.506-0.530	1.719-1.836 × 0.466-0.488
Head	0.546-0.573 × 0.426-0.440	0.493-0.530 × 0.400
Thorax	0.293-0.333 × 0.360-0.400	0.293-0.333 × 0.360-0.400
Abdomen	0.930-1.000 × 0.506-0.530	0.933-0.973 × 0.466-0.480

Piaget (1880) gave the measurements of female and male as 1.7 mm. × 0.48 mm. and 1.6 mm. × 0.46 mm. respectively.

39. Kelerinirmus fusca (Nitzsch).

1842. *Nirmus fuscus*, Nitzsch, in Denny, *Anop. Brit.*, p. 118, pl. 9, f. 8.

This is a long known species, recorded under different names, from all over the world, from numerous diurnal birds of prey (Accipitres). Most of the hosts are known to occur within Indian limits, viz., the Lesser Kestrel (*Cerchneis naumanni*, Fleisch), the Booted Eagle (*Hieraeetus pennatus*, Gmel.), the Black Kite (*Milvus migrans migrans*, Bodd.), the Black-winged Kite (*Elanus coeruleus*, Desf.), the Marsh-Harrier (*Circus a. aeruginosus*, Linn.), the Goshawk (*Astur g. gentilis*, Linn.).

The present specimens were obtained from the Indian Red-headed Merlin (*Falco c. chiquera*, Dauden), 4-i-1929 and 16-iii-1928; the White-eyed Buzzard Eagle (*Buteo t. teesa*, Frankl.), 26-iii-1928, 4-v-1928 and 14-vi-1929; and the Common Pariah Kite (*Milvus migrans govinda* Sykes), 4-i-1929, 15-iii-1930 and 15-iv-1930, all from Lyallpur.

Measurements (mm.).

	Female (3).	Male (2).
Body	1.892-2.109 × 0.460-0.573	1.705-1.953 × 0.400-0.490
Head	0.546-0.600 × 0.410-0.453	0.493-0.530 × 0.360-0.400
Thorax	0.266-0.333 × 0.400-0.480	0.266-0.333 × 0.360-0.426
Abdomen	0.950-1.200 × 0.460-0.573	0.946-1.000 × 0.401-0.493

Piaget (1880) gave the measurements of female and male as 1.7-1.8 mm. × 0.48 mm. and 1.5-1.6 mm. × 0.43 mm. respectively, while Kellogg's (1896) female was 2.4 mm. × 0.62 mm.

40. Kelerinirmus rufa (Nitzsch).

1838. *Nirmus rufus*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 430.

This species has been recorded from various Accipitres, many of which also occur within Indian limits, viz., the Eastern Peregrine Falcon (*Falco peregrinus calidus*, Lath.), the Hobby (*F. s. subbuteo*, Linn.), the European Kestrel (*Cerchneis t. tinnunculus*, Linn.), the Indian Crested Hawk Eagle (*Spizaetus* (= *Limnaetops*) *c. cirrhatus*, Gmel.), the Montagu's Harrier (*Circus pygargus*, Linn.), the Pale Harrier (*Circus macrourus*, Gmel.), the Hem Harrier (*Circus cyaneus cyaneus*, Linn.), the Marsh Harrier (*Circus a. aeruginosus*, Linn.), the Desert Buzzard (*Buteo vulpinus*, Gloger), the Sparrow Hawk (*Accipiter nisus*, Linn.), etc.

The specimens referred to below were obtained from the Lagger Falcon (*Falco jugger* Gray), 29-iii-1928, 5-i-1929 and 11-iv-1929, and the Himalayan Kestrel (*Cerchneis tinnunculus interstinctus*, McClell), 19-iv-1936, both shot in Lyallpur.

Measurements (mm.).

	Female (2).	Male (4).
Body	1.876-2.079 × 0.440-0.560	1.599-1.810 × 0.440-0.460
Head	0.530-0.573 × 0.400-0.440	0.453-0.506 × 0.306-0.370
Thorax	0.266-0.306 × 0.373-0.440	0.266-0.280 × 0.320
Abdomen	1.080-1.200 × 0.440-0.560	0.880-1.026 × 0.440-0.460

Piaget (1880) gave the measurements of female and male as 1.9 mm. × 0.53 mm. and 1.6 mm. × 0.46 mm. respectively.

Painjunirmus, gen. nov.

This genus is distinguished from the other Degeeriellidae by the shape of the head and abdomen, narrow marginal bands, absence of tergal plates, and male genitalia. Head conical; clypeal margins bordered with yellowish-brown to black bands; clypeal signature entirely absent; internal band absent; trabeculae small, narrow, antennae filiform in both sexes; temporal margins rounded, slightly extended beyond the lateral clypeal margin; occipital band absent; occipital signature triangular but not sclerotic. Cephalic band conspicuous. Prothorax quadrangular; pterothorax with strongly diverging sides and rounded posterior margin. Abdomen elongated, with sub-parallel sides, not tapering posteriorly until after segments VII-VIII; last segment rounded posteriorly in male and bilobed in female; pleurites distinct, with re-entrant heads; tergal plates not distinct; chaetotaxy very scarce; female genital plate conspicuous on segment VII, with fine row of posterior hairs. Male genitalia characteristic as shown in figure.

The genus is erected to include species of the type usually referred to *interrupto-fasciati* Piaget. Specimens of *Painjunirmus* have been examined from various Passerine genera.

Genotype.—*Painjunirmus pengya* sp. nov. (*vide infra*) ex the Bengal Jungle Babbler (*Turdoides terricolor terricolor*, Hodgs).¹

41. Painjunirmus pengya,² sp. nov.

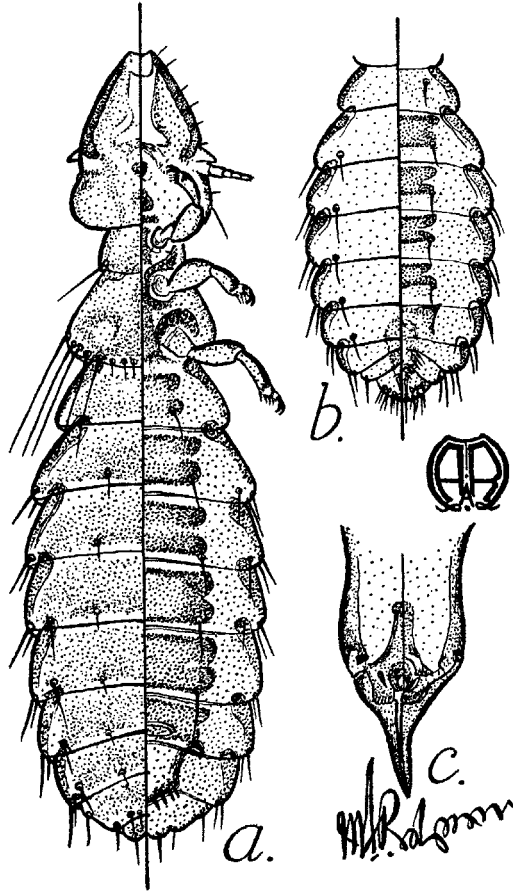
Female (Text-fig. 10a) yellowish white with distinct, narrow, deep yellow, lateral bands and marginal markings; median abdominal blotches well pigmented, body otherwise poorly sclerotised.

Head conical, slightly longer than broad; clypeal front narrow, parabolic, angularly concave; one short hair at the anterior angle, one such on the submarginal region, four hairs along the latero-frontal margin; clypeal band deep yellow-brown; fused with the antennal band which turns angularly inwards at antennal fossae; clypeal signature indistinct, internal bands not well marked; trabeculae small, extending in length to the middle of the first antennal segment; antennae small, segment II longest, I smaller than II but robust, III-V smallest and subequal;

¹ It has been pointed out that the Punjab form appears to be *Turdoides terricolor sindianus* Ticehurst. I retain the name *Turdoides t. terricolor* on the authority of Bombay Natural History Society who identified this specimen (*Jour. Bombay Nat. Hist. Soc.*, 1937, XXXIX, p. 2).

² 'Pengya-mains' in vernacular means the Bengal Jungle Babbler.

temporal margin about half the frontal region in length, well rounded, with a long hair and a seta towards the posterior angle; temporal band narrow but distinct; occipital margin slightly convex, bare; occipital signature triangular, not well marked. Eyes protruding, each with a sub-basal seta; ocular blotch not distinct; ocular band narrow, conspicuous.



TEXT-FIG. 10. *Painjunirmus pengya*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of male; c. Male genital armature.

Prothorax narrow, quadrangular with slightly rounded lateral margin; lateral band yellowish brown, distinct; a single hair in posterior lateral angle; posterior margin convex marginally and concave in the middle, bare; inter-coxal plates well developed; sternal plate elongate, hexagonal, bare. Meso- and metathoraces completely fused into pterothorax, trapezoidal, projecting laterally; posterior angles rounded with five long hairs; posterior margin convex with 3 submarginal hairs; marginal markings narrow; sternal plate bottle-shaped with two hairs in the centre; intercoxal plates deeply pigmented, sclerotic. Legs short, concolorous with the body, marginal markings slightly darker; annular markings at the distal end of femoral and tibial segments.

Abdomen elongate, slender, sides sub-parallel, tapering posteriorly to segments VIII-IX; segment I without and others with a single weak hair in posterior angles,

and 1-2 weak submarginal hairs; posterior margin with one submedian hair; segment VIII with one latero-marginal hair in the middle and one in the posterior angle. Posterior margin with 2 such hairs; segment IX broadly rounded with angular emargination; one fine seta set in each posterior angle; segments I-VII with distinct, narrow lateral marginal band. Sternum with pale, broad, rectangular transverse blotches on segments II-VIII, segment IX uncoloured; genital plate distinct on segment VIII with 3-4 peg like spines on each half.

Male (Text-fig. 10b) similar to female, but shorter; abdominal segment VIII shorter and concave; segment IX protruding, rounded with fine posterior hairs; genital armature (Text-fig. 10c) well developed, short, extending as far as segment VI; parameres well developed, narrow and run more or less parallel to each other, median endomeral plate well developed with concave posterior margin.

Measurements (mm.).

	Female (Holotype).	Female (7)	Male (5)
Body ..	1.848 × 0.572	1.720-1.883 × 0.533-0.610	1.431-1.617 × 0.427-0.520
Head ..	0.451 × 0.362	0.420-0.466 × 0.347-0.373	0.400-0.444 × 0.293-0.373
Prothorax ..	0.121 × 0.231	0.120-0.126 × 0.231-0.242	0.120-0.126 × 0.220-0.240
Pterothorax ..	0.176 × 0.301	0.171-0.184 × 0.280-0.347	0.146-0.181 × 0.293-0.307
Abdomen ..	1.100 × 0.572	1.000-1.107 × 0.533-0.610	0.780-0.866 × 0.427-0.520

Holotype (female) and *Allotype* (male) from Lyallpur, 16-iii-1933, *ex* the Bengal Jungle Babbler (*Turdoides t. terricolor* Hodgs.)¹ mounted together on slide No. MI.057. *Paratypes*: numerous females and males *ex* type-host and the Common Babbler (*Argya c. caudata*, Dumont), shot in Lyallpur.

This small species of Piaget's (1880) group *interrupto-fasciati* is allied to *Degeeriella vulgatus* (Kellogg) (*New Mallophaga*, II, 1896, p. 496) and other similar forms.

42. *Painjunirmus vulgata* (Kellogg).

1896. *Nirmus vulgatus*, Kellogg, *Proc. Calif. Aca. Sci.*, (2) VI, p. 496, pl. 67, f. 5.

Kellogg (1896) and Kellogg and Chapman (1899) recorded it from a number of Passeriformes in U.S.A. Waterston (1914) recorded it from the Cape Sparrow (*Passer melanurus*) and the Red-headed Finch (*Amadina erythrocephala*) from South Africa. The present specimens referred to were obtained from the White-throated Munia (*Uroloncha malabarica*, Linn.), shot in Lyallpur, 11-v-1928, and the Brown-backed Indian Robin (*Saxicoloides fulvicata cambaiensis*, Lath.), shot in Lyallpur, 5-ix-1939.

Measurements (mm.).

	Female (2).
Body ..	1.532-1.629 × 0.413-0.427
Head ..	0.444-0.466 × 0.266-0.280
Thorax ..	0.239-0.266 × 0.293-0.333
Abdomen ..	0.800-0.946 × 0.413-0.427

Kellogg (1896) gave its measurement as 1.62 mm. × 0.41 mm.

¹ See foot note 1 on page 33.

43. *Painjunirmus iliaci* (Denny).1842. *Nirmus iliaci*, Denny, *Anop. Brit.*, p. 130, pl. 9, f. 4.

Denny (1842) described this species from the Rose-coloured Starling (*Pastor roseus*, Linn.) from England; and also from the Red Wing (*Turdus iliacus*). Numerous specimens of the Mallophaga referred to this species were obtained from the Rosy Pastor (*Pastor roseus*, Linn.), 1932-1936, the Blackheaded Mayna (*Temenuchus pagodarum*, Gmel., 11-v-1928, the Common Mayna (*Acridotheres tristis tristis*, Linn.), 9-iv-1931, and the Bank Mayna (*Acridotheres ginginianus*, Lath.) 29-iii-1930, all shot in Lyallpur.

Measurements (mm.).

Female.	Rosy Pastor.	Black-headed Mayna.	Common Mayna.
Body	1.613-1.640 × 0.386-0.400	1.613 × 0.360	2.346 × 0.466
Head	0.414 × 0.280	0.414 × 0.266	0.427 × 0.320
Thorax	0.239-0.266 × 0.266-0.288	0.250 × 0.266	0.253 × 0.320
Abdomen	0.960 × 0.386-0.400	0.946 × 0.360	1.066 × 0.466

Male.	Rosy Pastor.	Bank Mayna.	Common Mayna.
Body	1.545 × 0.400	1.479 × 0.347	1.439 × 0.400
Head	0.400 × 0.280	0.400 × 0.266	0.373 × 0.280
Thorax	0.239 × 0.293	0.213 × 0.266	0.253 × 0.266
Abdomen	0.906 × 0.400	0.866 × 0.347	0.813 × 0.400

Denny (1842) gave its length as $\frac{3}{4}$ "', i.e. 1.905 mm.

44. *Painjunirmus cyclothorax* (Nitzsch).1838. *Nirmus cyclothorax*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 429.

This species was first described from the Tree Sparrow (*Passer montanus*, Linn.) from Europe and the House Sparrow (*Passer domesticus* Linn.) and the Brambling (*Fringilla montifringilla*, Linn.). All the three birds also occur within Indian limits. My specimens were obtained from the Indian Yellow-throated Sparrow (*Gymnoris x. xanthocollis*, Burt.), 13-vi-1933, the Indian House sparrow (*Passer domesticus indicus* Jard. & Selby.), 11-iv-1931, and the Indian Pipit (*Anthus richardi rufulus* Vieill.), 20-iii-1928, all shot in Lyallpur.

Measurements (mm.).

	Female (3)	Male (1).
Body	1.500-1.653 × 0.307-0.400	1.354 × 0.330
Head	0.360-0.413 × 0.253-0.280	0.354 × 0.247
Thorax	0.247-0.257 × 0.253-0.307	0.200 × 0.253
Abdomen	0.893-1.000 × 0.307-0.400	0.800 × 0.333

Denny (1842) gave the length as $\frac{3}{4}$ "', i.e. 1.905 mm., while Piaget (1880) gave it as $4\frac{7}{7}$ "', i.e. 1.45 mm.

45. *Bruelia* (= *Degeeriella*) *varia* (Nitzsch).

1838. *Nirmus varius*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 430.

It is a familiar parasite of crows and has been reported from all over the world. Kellogg and Paine (1914) recorded it from the Raven (*Corvus corax* Linn.) from Yarkand and Gilgit, the Eastern Rook (*C. frugilegus* Linn.) from Gilgit and Herat, the Jackdaw (*C. monedula* Linn.) from Yarkand and Gilgit, and the Magpie (*Pica rustica* Blanf.) from Gilgit and Ladak.

My specimens were obtained from the Punjab Raven (*Corvus corax laurencei* Hume), the Eastern Rook (*Corvus frugilegus tshusii* Hartert), 21-ii-1929 and the Common Indian House Crow (*Corvus s. splendens* Vieill.), 1928-1929, all from Lyallpur.

Measurements (mm.).

	Female (3).	Male (3).
Body	1.692-1.933 × 0.560-0.666	1.453-1.652 × 0.506-0.573
Head	0.453-0.560 × 0.440-0.493	0.440-0.480 × 0.401-0.460
Thorax	0.306-0.360 × 0.466-0.533	0.280-0.333 × 0.440-0.460
Abdomen	0.920-1.013 × 0.560-0.666	0.693-0.893 × 0.506-0.573

Piaget (1880) gave the measurements of female and male as 1.5 mm. × 0.54 mm. and 1.3 mm. × 0.52 mm. respectively.

46. *Bruelia* (= *Degeeriella*) *munda* (Nitzsch).

1866. *Nirmus mundus*, Nitzsch, in Giebel, *Ziet. f. ges. Nat.*, XXVIII, p. 366.

This species was described from the European Golden Oriole (*Oriolus o. oriolus* Linn.) which is a migrant into North-Western India in winter. Several immature specimens of this species were obtained from the Indian Golden Oriole (*Oriolus o. kundoo* Sykes), shot in Lyallpur, 5-vii-1928; and the Indian Bush Chat (*Saxicola torquata indica* Blyth), shot in Lyallpur, 5-viii-1939. Piaget's specimens were $\frac{1}{2}$ "', i.e. 1.27 mm. long.

47. *Bruelia* (= *Degeeriella*) *marginallis* (Nitzsch).

1938. *Nirmus marginalis*, Nitzsch, in Burmeister, *Handbuch der Ent.*, II, p. 131, f. 37.

It was described *ex* the Field Flare (*Arceuthornis pilaris* Linn.) from Europe. Kellogg and Paine (1914) recorded it from *Dendrocitta r. rufa*, Lath., *Dendrocitta sinensis himalayensis* Blyth., and *Urocissa malanocephala occipitalis*, Blyth., all from India.

The present specimens were obtained from the Indian Red-billed Blue Magpie (*Urocissa erythrorhyncha occipitalis*, Blyth.), shot in Lyallpur, 16-ix-1928; the Yellow-billed Magpie (*Urocissa f. flavirostris*, Blyth.), shot in Kulu, 5-iv-1939; and the Simla Streaked Laughing Thrush (*Trochaloxyron lineatum grisescentior*, Hart.), shot in Kulu, 14-iv-1934 and 6-x-1939.

Measurements (mm.).

	Female (1).	Male (1).
Body ..	1.548 × 0.436	1.126 × 0.422
Head ..	0.422 × 0.309	0.380 × 0.338
Thorax ..	0.239 × 0.330	0.211 × 0.309
Abdomen ..	0.887 × 0.436	0.535 × 0.422

Piaget (1880) gave the measurements of female and male as 1.3–1.35 mm. × 0.48 mm. and 1.0–1.1 mm. × 0.44 mm. respectively.

48. *Bruelia* (= *Degeeriella*) *myiophoneae* (Clay).

1935. *Degeeriella myiophoneae*, Clay, *Proc. Zool. Soc.*, London, p. 911.

This species was described from the specimens taken off the Himalayan Whistling Thrush (*Myophonus coeruleus temminckii* Vigors), shot in Kashmir. I obtained only one mutilated specimen from the type-host in Kulu, 10-vi-1939.

49. *Bruelia* (= *Degeeriella*), sp.

Several immature specimens were collected from the Pied Chat (*Oenanthe picata* Blyth.), shot in Lyallpur, 9-xii-1930.

Traihoriella, gen. nov.

This genus is proposed to accommodate the species described below from *Megalaima virens marshallorum* Swinh. The species may be distinguished from other *Degeeriella* by the shape of its head, pterothorax, pleural plates and male genitalia. The description of the type species is given below.

Genotype.—*Traihoriella punjabensis* sp. nov., *vide infra*, ex the Himalayan Great Barbet (*Megalaima virens marshallorum* Swinh.).

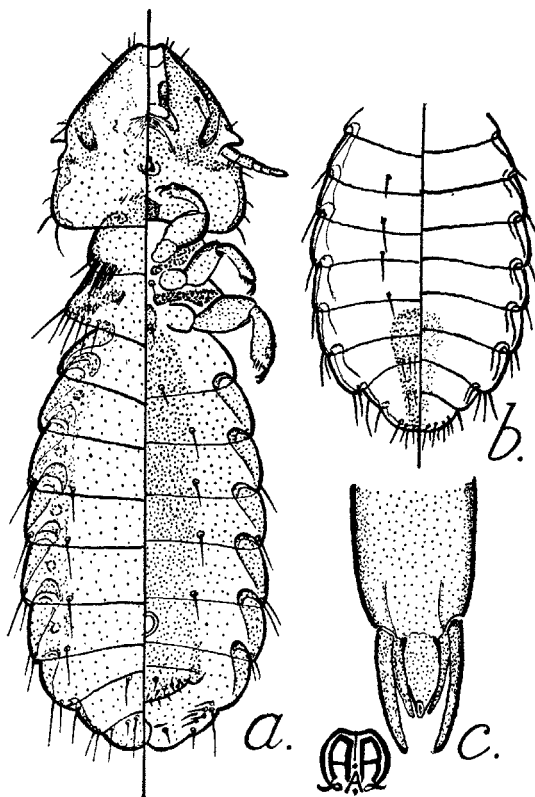
50. *Traihoriella punjabensis*, sp. nov.

Female (Text-fig. 11a) yellowish white with pale yellow to golden yellow body markings.

Head more or less equilatero-triangular in shape; clypeal front shallow, concave, uncoloured; two inconspicuous hairs on the anterior angle, one a short distance behind; clypeal band deep yellow, slightly brown anteriorly; clypeal suture entirely absent; clypeal signature indistinct or absent; antennal band darker, short, not running beyond antennal fossa; trabeculae short, but well developed; antenna short, concolorous with the body; temporal lobes flatly rounded, not swollen; posterior angles with two long hairs, a short hair between the eye and the posterior angle and one such hair in the base of the eye; temporal bands narrow, not very conspicuous; eyes small, not conspicuous; occipital margin almost straight, bare; occipital band absent; occipital signature shield-shaped, yellowish, internal band well formed.

Prothorax rectangular with distinct pale yellow lateral border; re-entrant head showing through the occipital margin; sternum narrow, intercoxal plate well formed, highly pigmented. Meso- and metathorax fused to form pterothorax; pterothorax strongly projecting laterally, lateral borders distinct with squat re-entrant heads, latero-posterior angle rounded with two long hairs; posterior margin angulated

with 5 long hairs along the projecting latero-posterior margin, intercoxal blotch well pigmented; sternal plates narrow. Legs short with distinct outer bands.



TEXT-FIG. 11. *Traihoriella punjabensis*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of abdomen of male; c. Male genital armature.

Abdomen narrow anteriorly, wider posteriorly to segment VI; tergal plates not distinct; pleural plates absent; marginal bands distinct with re-entrant heads conspicuously showing through in the preceding segment; chaetotaxy very scarce. Venter with distinctly coloured median area, genital plate distinct on the VII segment. Last segment bilobed.

Male (Text-fig. 11b) mutilated, similar to female, shorter; the abdomen oval, last abdominal segment entire, rounded with small marginal hairs. Genitalia as shown in text-fig. 11c.

Measurements (mm.).

	Female (Holotype).	Female (2).
Body	1·839 × 0·613	1·760–1·786 × 0·526
Head	0·480 × 0·466	0·466 × 0·453–0·466
Prothorax	0·133 × 0·293	0·093–0·120 × 0·253–0·266
Pterothorax	0·186 × 0·453	0·200–0·201 × 0·400–0·426
Abdomen	1·046 × 0·613	1·000 × 0·526

Holotype (female) mounted on slide No. MI.082. *Allotype* (male) preserved in alcohol. *Paratypes*: 2 females on slide and 3 females in spirit. All from Kulu, 16-ix-1928, ex the Himalayan Great Barbet (*Megalaima virens marshallorum* Swinh.).

V. LIPEURIDAE.

51. *Cuclogaster* (= *Gallipeurus*) *heterographus* (Nitzsch).

1866. *Lipeurus heterographus*, Nitzsch, in Giebel, *Zeit. f. ges., Nat.*, XXVIII, p. 381.

This is a long known species of lice infesting domestic fowl (*Gallus g. domesticus* Linn.) all over the world. My specimens were obtained from the Common Domestic Fowl (*Gallus g. domesticus* Linn.), the Northern Chukor (*Alectoris graeca pallescens*, Hume), shot in Hoshiarpur, 14-vii-1928, and Kulu, 9-x-1939, and the Common Pariah Kite (*Milvus migrans govinda* Sykes) shot in Lyallpur, 21-v-1932. On the latter bird the parasite is probably a straggler and appears to have been transferred from a Gallinaceous bird, probably chicken, on which it preyed prior to having been shot.

Measurements (mm.).

	Female (15).	Male (5).
Body ..	1.958-2.146 × 0.666-0.693	1.892-2.093 × 0.506-0.560
Head ..	0.600-0.626 × 0.400-0.518	0.520-0.600 × 0.493
Thorax ..	0.266-0.333 × 0.400-0.493	0.306-0.400 × 0.440-0.490
Abdomen	1.066-1.200 × 0.666-0.693	1.066-1.093 × 0.506-0.560

Piaget (1880) gave the measurements of female and male as 1.85 mm. × 0.68 mm. and 1.7-1.8 mm. × 0.5 mm. respectively.

52. *Lipeurus pavo* Clay.

1938. *Lipeurus pavo*, Clay, *Proc. Zool. Soc., London* (B), CVIII, p. 125.

Clay's (1938) specimens were taken off the Common Pea Fowl (*Pavo cristatus* Linn.) from Nepal and Yorkshire. My specimens were obtained from the type-host (*Pavo cristatus* Linn.), shot in Hoshiarpur and Atari (near Lahore).

Measurements (mm.)

	Female (3).	Male (3).
Body ..	2.733-2.745 × 0.422-0.451	2.381-2.409 × 0.338-0.366
Head ..	0.634-0.704 × 0.352-0.408	0.563-0.606 × 0.296-0.309
Thorax ..	0.408-0.422 × 0.324-0.381	0.324-0.381 × 0.281-0.324
Abdomen	1.619-1.691 × 0.422-0.451	1.437-1.479 × 0.338-0.366

53. *Lipeurus caponis* (Linn.).

1758. *Pediculus caponis*, Linnaeus, *Syst. Nat.*, p. 614.

This cosmopolitan species has been recognised under various varietal names according to the host and geographical area. These varieties are entirely based

upon size, intensity and presence or absence of body markings and slight variations in chaetotaxy. I prefer to retain the specific name only. It has been recorded from the domestic fowl and other Gallinaceous birds from all over the world. Kellogg and Paine (1914) recorded it from India on *Gennaesus melanotus*, *G. swinhoe*, *Argusianus argus*, *Phasianus torquata* and *Pavo nigripennis*. The specimens in my collection were obtained from the Domestic Fowl (*Gallus g. domesticus* Linn.).

54. *Lipeurus tropicalis* Peters.

1931. *Lipeurus tropicalis*, Peters, *Ent. News*, XLII, p. 195, f. 1, 2.

Peters (1931) described it from domestic fowls in Bahama Islands, Caicos Islands, Venezuela and Liberia. He also recorded it from five species of wild guinea fowls in Africa. Bedford (1932) recorded a male from domestic fowl in Onderstepoort (South Africa). My specimens were taken off the domestic fowl (*Black Minorca*) at Lyallpur, 9-ii-1936, and were markedly longer than Peters' specimens, especially the males.

Measurements (mm.).

	Female (1).	Male (1).
Body ..	3.35 × 0.85	3.44 × 0.61
Head ..	0.80 × 0.53	0.82 × 0.53
Thorax ..	0.55 × 0.56	0.61 × 0.56
Abdomen ..	2.00 × 0.85	2.01 × 0.61

Peters (1931) gave the measurements of female and male as 3.264 mm. × 0.837 mm. and 3.196 mm. × 0.637 mm. respectively.

55. *Lipeurus cinereus* Nitzsch.

1874. *Lipeurus cinereus*, Nitzsch, in Giebel, *Ins. Epiz.*, p. 221.

This species was first obtained from *Perdix coturnix*. My specimens were obtained from the Common Grey Quail (*Coturnix c. coturnix*, Linn.), shot in Lyallpur, 28-i-1928, and differ from Piaget's figure in some important particulars, viz., the shape of the head, and the last abdominal segment of the male. The shape of the head in this case resembles *Lipeurus unicolor* Piaget (*Pediculines*, p. 354, pl. 28, f. 6), while the last abdominal segment in male is entire and furnished with four long hairs. In other particulars the present examples agree well. The species may be recognised by its pointed head with dark-brown bands; body with dark-black lateral bands on thorax and abdomen; and by its yellowish ground colour and yellowish brown transverse blotches.

Measurements (mm.).

	Female (4)	Male (3).
Body ..	1.692-1.906 × 0.333-0.506	1.478-1.665 × 0.293-0.333
Head ..	0.506-0.560 × 0.320-0.346	0.466-0.506 × 0.266-0.293
Thorax ..	0.226-0.280 × 0.240-0.320	0.226-0.266 × 0.226-0.266
Abdomen ..	0.933-1.066 × 0.333-0.506	0.786-0.946 × 0.293-0.333

Piaget (1880) gave the measurements of female and male as 1.8 mm. \times 0.52 mm. and 1.5 mm. \times 0.31 mm. respectively.

56. *Lipeurus caponis* var. *delta* Piaget.

1880. *Lipeurus caponis* var. *delta*, Piaget, *Les Pediculines*, p. 366, pl. 29, f. 5.

Piaget (1880) described it from *Francolinus capensis*. One male was obtained by me from the Indian Black Partridge (*Francolinus f. asiae* Bonap.) shot in Lyallpur, 12-xi-1933. It differs from *delta* Piaget in minor details; such as the presence of a long hair behind the eyes, two long hairs on the temporal margin of the head; abdomen with two longitudinal submedian rows of hairs, each segment being furnished with four median hairs and one marginal hair. It stands midway between *L. caponis formosanus* Sugimoto (*Rept. Dept. Agric., Formosa*, XLIII, 1926, p. 53, pl. 6, f. 4, 5) and *L. introductus* Kellogg (*Proc. Calif. Acad. Sci.*, (2) VI, (1896), p. 500, pl. 68, f. 1, 5.).

Measurements (mm.).

		Male.
Body	..	1.546 \times 0.400
Head	..	0.466 \times 0.306
Thorax	..	0.280 \times 0.333
Abdomen	..	0.800 \times 0.400

Piaget (1880) gave the measurements of female as 1.75 mm. \times 0.39 mm.

VI. GONIODIDAE.

57. *Goniodes minor* Piaget.

1880. *Goniodes minor*, Piaget, *Les Pediculines*, p. 256, pl. 21, f. 3.

This parasite of doves and pigeons has been recorded from most parts of the world. The following recorded hosts of it are also found within Indian limits: *Columba livia livia* Gmel., the Burmese Spotted Dove (*Streptopelia chinensis tigrina*, Temm.) and Ring Dove (*Streptopelia d. decaocta*, Frivaldszky). My specimens were obtained from the Indian Spotted Dove (*Streptopelia chinensis suratensis*, Gmel.) and the Indian Ring Dove (*Streptopelia d. decaocta*, Frival.), both shot in Lyallpur, 23-iii-1929 and 14-v-1928 respectively.

Measurements (mm.).

		Female (3).	Male (1).
Body	..	1.746-1.853 \times 0.566-0.733	1.392 \times 0.506
Head	..	0.533 \times 0.600-0.626	0.426 \times 0.493
Thorax	..	0.280-0.320 \times 0.426-0.466	0.240 \times 0.360
Abdomen	..	0.933-1.000 \times 0.566-0.733	0.726 \times 0.506

Piaget (1880) gave the measurements of female and male as 1.7 mm. \times 0.73 mm. and 1.45 mm. \times 0.65 mm. respectively.

58. *Goniodes pavonis* (Linn.).1758. *Pediculus pavonis*, Linnaeus, *Syst. Nat.*, p. 613.

This is one of the best known *Goniodes* and has been recorded from the Common Pea-Fowl (*Pavo cristatus*) from all over the world. Numerous specimens were obtained by me from the Common Pea-Fowl, shot in Hoshiarpur, 14-v-1928; Amritsar, 9-x-1935; and Attari (near Lahore), 9-vi-1935.

Measurements (mm.).

	Female (7).	Male (4).
Body ..	3.506-3.799 × 1.600-2.100	3.066-3.265 × 1.86
Head ..	0.840-0.933 × 1.200-1.240	0.800-0.866 × 1.04-1.06
Thorax ..	0.866-0.933 × 0.800-1.026	0.866-0.933 × 1.066
Abdomen ..	1.800-1.933 × 1.600-2.100	1.333-1.533 × 1.86

Piaget (1880) gave the measurements of female and male as 3.3 mm. × 1.8 mm. and 3.05 mm. × 1.74 mm. respectively.

59. *Goniodes dissimilis* Nitzsch.1818. *Goniodes dissimilis*, Nitzsch, *Germ. Mag.*, III, p. 294.

This species has been recorded from all parts of the world on *Gallus domesticus*, *G. furcatus*, *G. bankiva*. It is evidently rare in the Punjab, as only four females were taken by me, off the Domestic Fowl (*Black Minorca*) at Gurdaspur, 3-vii-1934.

Measurements (mm.).

	Female (1).
Body ..	2.69 × 1.51
Head ..	0.90 × 1.13
Thorax ..	0.61 × 0.78
Abdomen ..	1.18 × 1.51

Piaget (1880) and Sugimoto (1929) gave the measurement of female as 2.6 mm. × 1.36 mm. and 2.8 mm. × 0.85 mm. respectively.

60. *Goniodes brevi antennatus* Piaget.1885. *Goniodes brevi antennatus*, Piaget, *Les Pediculines*, *Suppl.*, p. 50, pl. 5, f. 8.

The type-host of this species is the Chukor (*Alectoris graeca chukor* Grey). The specimens in my collection were obtained from the type-host shot in Kulu and Hoshiarpur, 12-vi-1938 and 14-vii-1928 respectively. They agree well with Piaget's figure in general shape and scriptural markings on the abdomen, but differ in three particulars, viz., the shape of the pterothorax, thoracic hairs and size. The pterothorax in these examples is obtusely angulate on the abdomen with a series of long hairs on posterior margin, the dorsal surface of the abdomen is medially beset with hairs. Piaget's figure does not show these details.

Measurements (mm.).

	Female (3).	Male (1).
Body ..	2.366-2.493 × 1.098-1.126	1.661 × 0.915
Head ..	0.718-0.803 × 0.943-1.000	0.605 × 0.803
Thorax ..	0.338-0.437 × 0.704-0.705	0.253 × 0.577
Abdomen ..	1.141-1.309 × 1.098-1.126	0.803 × 0.915

Piaget (1885) gave the measurements of female and male as 3.5 mm. × 1.64 mm. and 2.5 mm. × 1.25 mm. respectively.

61. *Goniodes asterocephalus* (Nitzsch).

1874. *Goniocotes asterocephalus*, Nitzsch, in Giebel, *Ins. Epiz.*, p. 182, pl. 13, f. 3-4.

This species was first described from specimens obtained from the Common Grey Quail (*Coturnix c. coturnix* Linn.). Since then it has been recorded on the type-host from most parts of the Old World. My specimens were obtained from the Common Indian Grey Quail (*C. c. coturnix* Linn.), shot in Lyallpur, 14-vii-1927.

Measurements (mm.).

	Female (5).	Male (1).
Body ..	2.354-2.563 × 0.591-0.845	2.051 × 0.605
Head ..	0.591-0.634 × 0.563-0.605	0.635 × 0.591
Thorax ..	0.338-0.381 × 0.437-0.490	0.290 × 0.486
Abdomen ..	1.425-1.549 × 0.591-0.845	1.126 × 0.605

Piaget (1880) gave the measurements of female as 2.9 mm. × 0.8 mm., while Taschenberg (1882) gave it as 3.06 mm. × 1.08 mm. His male was 2.21 mm. × 0.75 mm.

62. *Paragoniocotes*, spp.

I obtained one immature specimen from the Indian Rose-ringed Paroquet (*Psittacula krameri manillensis*, Bechst.), 2-ii-1928, and one immature specimen from the Egyptian White-breasted King-fisher (*Halcyon s. smyrnensis*, Linn.), 17-ii-1928, both shot in Lyallpur.

63. *Goniocotes bidentatus* (Scopoli).

1763. *Pediculus bidentatus*, Scopoli, *Ent. carn.*, p. 385.

This familiar species, has been recorded from America, Europe, Africa and Asia on various pigeons and doves. Several immature specimens were obtained from the Indian Blue Rock Pigeon (*Columba livia intermedia* Strick) and the Indian Ring Dove (*Streptopelia d. decaocta*, Frival.), both shot in Lyallpur, 22-iii-1929 and 10-ii-1936 respectively.

Measurements (mm.).

	Female (immature).
Body ..	1.225 × 0.451
Head ..	0.338 × 0.366
Thorax ..	0.169 × 0.195
Abdomen	0.718 × 0.415

Piaget (1880), Kellogg (1896) and Sugimoto (1929) gave the measurements of female as 1.4 mm. × 0.55 mm., 1.06 mm. × 0.48 mm. and 1.3–1.5 mm. × 0.55 mm. respectively.

64. *Goniocotes rectangulatus* Nitzsch.

1818. *Goniocotes rectangulatus*, Nitzsch, *Germ. Mag.*, III, p. 294.

This species was first recorded from *Pavo cristatus*, *Pavo spiciferus* and *Numida meleagies*. My specimens were taken off the Common Pea-Fowl (*Pavo cristatus* Linn.), shot in Hoshiarpur, 14-v-1928.

Measurements (mm.).

	Female (3).
Body ..	1.064–1.168 × 0.465–0.493
Head ..	0.324–0.394 × 0.408–0.436
Thorax ..	0.197–0.211 × 0.324–0.366
Abdomen ..	0.563 × 0.465–0.493

Piaget (1880) gave the measurements of female and male as 1.05 mm. × 0.52 mm. and 0.8 mm. × 0.45 mm. respectively.

65. *Goniocotes hologaster* Nitzsch.

1818. *Goniocotes hologaster*, Nitzsch, *Germ. Mag.*, III, p. 294.

This familiar species has been recorded, from practically all over the world, on the fowls (*Gallus domesticus* Linn. and others). Piaget (1880) also recorded it from *Gallus bankiva* Tem., *Ortyx virginianus* and *Euplocamus cuvieri*. Bedford (1932) recorded it from the Bush Partridge (*Dendroperdix* (= *Francolinus*) *sephaena*), *Numida papillus transvaalensis* and *Pternistis castaneiventer krebsi*, all from Africa. Numerous specimens were taken by me from the type-host (*Gallus g. domesticus* Linn.).

Measurements (mm.).

	Female (6).	Male (4).
Body ..	1.228–1.338 × 0.563–0.704	0.815–0.886 × 0.422–0.450
Head ..	0.352–0.394 × 0.422–0.465	0.266–0.309 × 0.309–0.352
Thorax ..	0.225–0.282 × 0.352–0.380	0.141–0.183 × 0.268–0.297
Abdomen ..	0.636–0.704 × 0.563–0.704	0.366–0.408 × 0.422–0.450

Piaget (1880), Mjöberg (1910) and Sugimoto (1929) gave the measurements of female as 1.3 mm. × 0.66 mm., 1.3375 mm. × 0.625 mm. and 1.3–1.6 mm. × 0.66–0.88 mm. respectively, while male of Piaget (1880) and Sugimoto (1929) was 0.8–0.9 mm. × 0.5 mm. only.

66. *Goniocotes* (? *Goniodes*) *gigas* Taschenberg.

1869. *Goniocotes gigas*, Taschenberg, *Zeit. f. ges. Nat.*, LII, p. 104, pl. 1, f. 10.

It has been recorded from all over the world from the Domestic Fowl (*Gallus domesticus* Linn.). Bedford (1932) took it from *Numida coronata*, *N. papillus* and *N.p.transvaalensis*. My specimens were collected from the Domestic Fowl (*Gallus g. domesticus* Linn.).

Measurements (mm.).

	Female (8).	Male (5).
Body ..	2.960–4.015 × 1.370–1.840	2.676–3.280 × 1.366–1.500
Head ..	0.845–1.090 × 1.000–1.200	0.845–0.910 × 0.873–1.100
Thorax ..	0.636–0.650 × 0.732–0.970	0.564–0.580 × 0.774–0.910
Abdomen ..	1.479–2.356 × 1.370–1.840	1.267–1.790 × 1.366–1.500

Piaget (1880) and Taschenberg (1882) gave the measurements of female as 3.3 mm. × 1.6 mm. and 4.05 mm. × 2.07 mm., while of male as 2.9 mm. × 1.5 mm. and 3.33 mm. × 1.95 mm. respectively.

67. *Goniocotes alatus* Piaget.

1885. *Goniocotes alatus*, Piaget, *Les Pediculines, Suppl.*, p. 45, pl. 5, f. 4.

Piaget (1885) obtained it from the Chukor (*Perdix* (= *Caccabis*) *chukor*). I collected one female from the Northern Chukor (*Alectoris graeca pallescens*, Hume), shot in Hoshiarpur, 9-x-1939.

Measurements (mm.)

	Female
Body ..	1.084 × 0.493
Head ..	0.324 × 0.422
Thorax ..	0.243 × 0.352
Abdomen ..	0.517 × 0.493

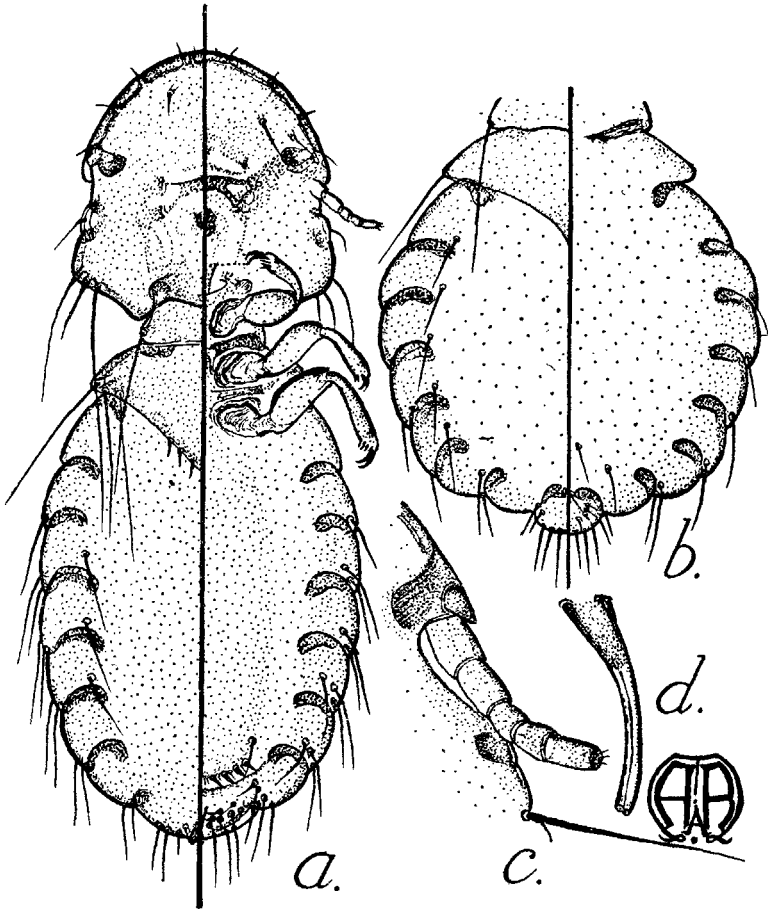
Piaget (1885) gave the measurements of female as 1.5 mm. × 0.63 mm.

68. *Goniocotes jirufti*,¹ sp. nov.

Female (Text-fig. 12a) small; head subpentagonal; prothorax narrow; pterothorax acutely angulate posteriorly, medianly overlapping the first abdominal segment; abdomen similar to *Goniocotes hologaster* with simple markings.

¹ 'Jirufti' in vernacular means the Indian Black Partridge.

Head somewhat hexagonal, usually longer than broad, sometimes slightly wider than long; front broad, convex, with ten short hairs distributed as in *G. hologaster*; clypeal band deep yellow, narrow, ending posteriorly into a big antennal blotch; trabeculae small, blunt and immovable; antennae normal; eyes not protruding, flatly rounded, bearing small hair at the base; ocular blotch deep yellow; temporal margin straight with a small hair and two long hairs at the pointed anterior angle, marginal band narrow, not very distinct but near the eye; posterior margin concave in the middle with obtuse angles at each end of concavity, bare; occipital band sinuous, dark yellow to brown.



TEXT-FIG. 12. *Gonicotes jirufti*, sp. nov.

a. Dorsal and ventral aspects of female; b. Dorsal and ventral aspects of thorax and abdomen of male; c. Antenna of male; d. Male genital armature.

Prothorax narrow, short, trapezoidal, with anteriorly converging lateral margins; posterior angle slightly produced, acute, bearing a long hair; posterior margin straight, slightly concave in the middle, bare, meso- and metathorax fused, pterothorax with blunt lateral angles, bearing 2 long hairs; posterior margin acutely angulate on the first abdominal segment, bare, except two long hairs near the lateral angles.

Abdomen broadly elliptical, segments subequal, marginal band indistinct; intersegmental bands at the pleural re-entrant heads, deep yellow, narrow; transverse bands absent; sternal blotches absent; chaetotaxy scarce, segment II-VIII with 1-3 long, finely pointed hairs on the slightly projecting angles, segments III-V with one submarginal hair at the curved lateral band; dorsum bare; ventrum with marginal hairs on segments II-VIII, last segment angularly emarginate with short hairs.

Male (Text-fig. 12*b*) similar to female; abdomen rather rounded, last segment truncate and globular, posterior margin with tuft of hairs. Genital armature (Text-fig. 12*d*) distinct, with narrow feebly chitinised basal plate; parameres short, median endomeral plate slightly broad, concave posteriorly; penis elongated, enclosed in a tube with an aperture at its tip.

Measurements (mm.).

	Female (Holotype).	Female (3).	Male (3).
Body ..	1.108 × 0.493	0.999-1.106 × 0.466-0.493	0.666-0.679 × 0.320-0.360
Head ..	0.350 × 0.333	0.346-0.360 × 0.333-0.386	0.253-0.266 × 0.280-0.293
Prothorax ..	0.055 × 0.200	0.040-0.066 × 0.160-0.200	0.040 × 0.120-0.143
Pterothorax ..	0.103 × 0.266	0.080-0.120 × 0.240-0.280	0.080-0.093 × 0.213
Abdomen ..	0.600 × 0.493	0.533-0.566 × 0.466-0.493	0.293-0.306 × 0.320-0.360

Holotype (female) and *Allotype* (male) from Lyallpur, 14-viii-1928, ex the Indian Black Partridge (*Francolinus francolinus asiae* Bonap.) both mounted together on slide No. MI. 157. *Paratypes*: 3 females and 2 males in spirit (same data as above).

SUMMARY.

An account of sixty-five species of Ischnoceron Mallophaga, belonging to thirty-two genera, is given. This includes the description and figures of three new genera, viz., *Picophilopterus*, *Painjunirmus* and *Traihoriella* and twelve new species, viz., *Ardeicola gaibagla* from the Cattle Egret (*Bubulcus ibis coromandus* Bodd.), *Aegypocercus griffoneae* from the Himalayan Griffon Vulture (*Gyps himalayensis* Hume), *Echinophilopterus tota* from the Rose-ringed Paroquet (*Psittacula krameri manillensis* Bechst.), *Picophilopterus tuktola* from the Himalayan Scaly-bellied Woodpecker (*Picus s. squamatus* Vigors), *Penenirmus raji* from the Indian Yellow-throated Sparrow (*Gymnoris z. xanthocollis*, Burt.), *Psittaconirmus chandabani* from the Large Parrot (*Psittacula eupatria nepalensis* Hodgs.), *Psittaconirmus lybartota* from the Indian Rose-ringed Paroquet (*Psittacula krameri manillensis* Bechst.), *Quadriceps kekra* from the Gullbilled Tern (*Gelochelidon n. nilotica* Gmel.), *Syrhaptocercus emahusaini* from the Indian Sand Grouse (*Pterocles exustus erlangeri* Neum.), *Painjunirmus pengya* from the Bengal Jungle Babbler (*Turdoides t. terricolor* Hodgs.), *Traihoriella punjabensis* from the Himalayan Great Barbet (*Megalaima virens marshallorum* Swinh.) and *Goniocotes jirufti* from the Indian Black Partridge (*Francolinus f. asiae* Bonap.). About fifty species have been recorded for the first time from the Punjab. A few of the recorded species differ from the description and figures of previous works in certain morphological details and size and seem well differentiated to warrant their being treated as varieties, but as type specimens were not available, no attempt has been made to alter their existing status.

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