With compliments to Dr. J. Clay

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SECTION : AGRICULTURE

Studies on the Amblyceron Mallophaga Infesting Birds in Pakistan.

The genus *Colpocephalum* Nitzsch, 1818.

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The author compared the lice from the birds of Pakistan with the type species at the British Museum (Natural History), London, and the findings are given below.

(i) COLPOCEPHALUM LAURENCEI Nomen Novum.

Nitzsch (1838) described *Colpocephalum subaequale* from *Corvus corax* Linn. Miss Clay pointed out that this name is preoccupied (nec Haan, 1829). We propose the above name for it. The specimens referred to this species were collected from the Punjab Raven (*Corvus corax laurencei* Hume). The females measured 1·42—1·51 × 0·59—0·62 mm.

(ii) COLPOCEPHALUM SPLENDENS sp. nov.

Male :—Head with large, rounded forehead. Ocular emargination distinct, moderately deep. Ocular speck small. Gular plate with four marginal hairs. Prothorax short and broad. Prothoracic sternum hexagonal. Mesothorax narrow. Metathorax normal. Metasternum triangular with three long hairs. Posterior femora with three combs of 10-15 hairs, arranged in descending order of size. Tergal plates well developed. Segments II-VIII with two rows of hairs. Sternites with numerous small hairs. IV sternite with two combs of 14-16 setae. Genitalia long, basal plate slender; parameres straight and slender; endomeral plate well developed, genital sac complex, chitinuous structure.

Female :—It is similar to the male.

Holotype (male) :—Preantennal region 0·30 mm. long, hind head 0·35 × 0·45 mm., prothorax 0·09 × 0·32 mm., mesothorax 0·05 × 0·21 mm., metathorax 0·09 × 0·41 mm., and abdomen 0·85 × 0·49 mm.

Allotype (female) :—Preantennal region 0·32 mm., long, hind head 0·35 × 0·51 mm., prothorax 0·13 × 0·34 mm., mesothorax 0·05 × 0·29 mm., metathorax 0·14 × 0·51 mm., and abdomen 0·91 × 0·62 mm.

Type-host :—The Common House Crow (*Corvus splendens splendens* Vieill).

(iii) COLPOCEFHALUM GRIFFONEAE sp. nov.

Female :—Head broader than long, flatly rounded in front. Ocular notch acute and shallow. Ocular blotch trilobed. Ventral carina well developed. Occipital and ocular bands well formed. Gular plate with four hairs. Prothorax very narrow, transverse. Pterothorax short. Posterior femora with four

subequal combs of setae. Abdomen elongate with two rows of hairs to each segment. Segment IX with 11-12 stout lateral hairs curving upward and four or five curving downwards. Ventrum with small hairs, III sternite with two combs of 10-11 hairs.

Holotype (female) :—Preantennal region 0·29 mm., long, hind head 0·33 × 0·42 mm., prothorax 0·06 × 0·28 mm., metathorax 0·07 × 0·29 mm. and abdomen 0·89 × 0·46 mm.

Type-host :—The Himalayan Griffon Vulture (*Gyps himalayensis* Hume).

(*iv*) COLPOCEPHALUM ZERAFAE sp. nov.

Female :—Head rounded in front. Ocular notch well developed but feebly pigmented. Gular plate with at least eight hairs. Prothorax well developed, about twice as long as in *Colpocephalum griffoneae*, posterior femora with three subequal combs of 9-14 hairs and a fourth row of four hairs and a few scattered setae. Abdomen oblong, with two rows of hairs to each segment. Ventral hairs short. Sternal plate III with two combs of 13-18 setae.

Holotype (female) :—Preantennal region 0·35 × 0·51 mm., hind head 0·39 × 0·51 mm., prothorax 0·14 × 0·35 mm., metathorax 0·11 × 0·38 mm., and abdomen 1·04 × 0·61 mm.

Type-host :—The Larger Falcon (*Falco jugger* Gray).

The genus *Myrsidea* Waterston, 1915,

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(*i*) MYRSIDEA ANASPILA (Nitzsch).

Several male and female specimens of this species were collected from the Punjab Raven (*Corvus corax laurencei* Hume). The type-host of this species is *Corvus corax corax* Linn.

(*ii*) MYRSIDEA SPLENDENS sp. nov.

Male :—Head rounded in front with slight concavity in the middle. Ocular speck irregularly square. Antennal band continuous to the frontal spot. Gular plate with four long hairs. Prothorax large. Prosternal plate well built, rectangular with considerably pulled out posterior margin. Mesothorax distinct. Metathorax diverging laterally. Posterior leg with a patch of 37-40 long hairs. Abdomen elongate, tergal plates entire, each with a row of long hairs. Ventral chaetotaxy profuse, segment IV-VII with definite brushes of hairs, segment II beset with 3-4 heavy spines. Male genitalia slender, beset plate moderately long, parameres small, sclerite of the genital sac well developed.

Female:—It is similar to the male, more robust, Chaetotaxy at the last abdominal segments exhibiting sexual differences.

Holotype (male):—Preocular region 0·31 mm., long, post-ocular head 0·36 × 0·52 mm., prothorax 0·15 × 0·29 mm., Mesothorax 0·09 × 0·30 mm., metathorax 0·17 × 0·41 mm., and abdomen 0·63 × 0·42 mm.

Allotype (female):—Preocular region 0·33 mm., long, postocular head 0·36 × 0·55 mm., prothorax 0·15 × 0·31 mm., mesothorax 0·11 × 0·32 mm., metathorax 0·19 × 0·50 mm., and abdomen 0·76 × 0·62 mm.

Type-host:—The Indian Common House Crow (*Corvus s. splendens* Vieill).

(*iii*) MYRSIDEA ISOSTOMA (Nitzsch).

This species was described from *Corvus f. frugilegus* Linn. The specimens referred to here were obtained from the Eastern Rook (*Corvus frugilegus tschusii*, Hartert).

(*iv*) MYRSIDEA BRUNNEA (Nitzsch)

The type host of this species is *Nucifraga c. caryocatectes* Linn. Our specimens were obtained from the Himalayan Nut Cracker (*Nucifraga caryocatectes hemispila* Vigors).

(*v*) MYRSIDEA PENENSULARIS sp. nov.

Male:—Head broad, front rounded. Ocular speck minute, three lobed. Gular plate with three hairs. Prothorax slightly convex in front and behind. Prosternum well developed. Mesothorax and metathorax well developed, with slight lateral divergence. Posterior femora with a group of 25-30 hairs. Abdomen elliptical, tergal plates not well developed, each segment with one row of long hairs. Ventrum more hairy, segments III-VII with definite patches of hairs in addition to two or three rows of longer hairs, other segments with irregular rows of hairs. Sternite II with five heavy spines. Male genitalia slender with long basal plate. Sclerite of the genital sac typical.

Holotype (male):—Preocular region 0·28 mm., long, postocular region 0·31 × 0·43 mm., prothorax 0·14 × 0·27 mm., mesothorax 0·11 × 0·33 mm., metathorax 0·17 × 0·37 mm., and abdomen 0·55 × 0·46 mm.

Type-host:—The Indian Black Drongu (*Dicrurus macrocercus peninsularis* Ticehurst).

The genus *Menacanthus* Neumann, 1912.

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1. MENACANTHUS MAMOLA sp. nov.

Female:—Head short, front broadly rounded with a median angulation. Ocular fleck small. Gular plate with four long hairs. Ventral spinous process

hyaline, blunt. Prothorax short, protruding. Metathorax well marked laterally and very narrow and transverse dorsally. Metathorax almost as long as mesothorax on the lateral margin while it overlaps as to envelop the mesothorax on the dorsum. Posterior femora with a small patch of small hairs. Abdomen broadly elliptical. Tergal plates weak ; Ventrum with a row of small hairs. Sternites IV-VI with distinct patches of hairs ultimately merging with transverse rows.

Holotype (female) :—Head 0·37×0·39 mm., prothorax 0·09×0·35 mm., mesothorax 0·05×0·25 mm., metathorax 0·05×0·29 mm., and abdomen 0·61×0·39 mm.

Type-host :—The mamola.

(*ii*) MENACANTHUS LATICEPS Blagoveshtchensky

This species was recorded from the Eastern Rock (*Corvus frugilegus tschusii* Hartert). The type-host is *Corvus frugilagus frugilagus* Linn.

(*iii*) MENACANTHUS TRISTIS Qadri.

This species is most common on the type-host the Indian Mynah (*Acridotheres tristis tristis* (Linn.) Our specimens were also collected from the common Mynah.

(*iv*) MENACANTHUS ANNULATUS (Giebel)

This is most familiar species and has been recorded from practically all over the world from the House sparrow (*Passer domesticus domesticus* (Linn). Our specimens were collected from the Indian representative of the same host *Passer domesticus indicus* Jard and Selby.

The genera *Kurodaia* Uchida, 1926 and *Ciconiphilus* Bedford, 1939.

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(i) KURODAIA SUBPACHYCASTER (Piaget)

The specific host of this species is *Tyto abba* (Scopoli). Our collection was obtained from the Indian Barn Owl (*Tyto abla stertens* Hartert).

(*ii*) KURODAIA LONGIPES (Giebel)

The true host of this species is *Bubo B. bubo* (Linn). We obtained several female specimens from the Indian Great Horn Owl (*Bubo bubo bengalensis* (Frankl).

3. CICONIPHILUS NYCTARDIS (DENNY).

This is one of the best known species from herons. It was described from *Nycticorax n. nycticorax* (Linn.). Our specimens were collected from the type-host shot in Karachi, 7-6-1954.

Female : Frontal margin to the ocular notch 0.15 × 0.43 mm., ocular notch to the occipital margin 0.15 × 0.59 mm., ocular notch to the posterior extremities of the temporal lobes 0.20 mm., prothorax 0.19 × 0.38 mm., pterothorax 0.17 × 0.46 mm., and abdomen 0.91 × 0.68 mm.

The genus *Actornithophilus* Ferris, 1916.

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(*i*) ACTORNOTHOPHILUS LYALLPURENSIS sp. nov.

Male : Head slightly broader than long, front broadly rounded, subtruncate. Flap across the ocular margin with a distinct shallow notch before the eyes. Cephalic carinae extended as far as the frontal margin. Prothorax large, broader than long, boat-shaped. Prosternum a little longer than broad. Mesothorax distinct, narrow. Metathorax large, about as long as prothorax. Posterior femora with a patch of 18—20 setae on the inferior surface. Abdomen oblong with two rows of setae to each segment. Ventrum with rows of hairs and definite patches of hairs on segments IV—VI. Pleural plates well built, each with 2—3 rows of heavy setae. Male genitalia well developed, with long rod-like parameres and shovel-shaped mesosomal plate.

Female : It it similar to the male. Genital plate with a marginal row of fragile hairs.

Balat (1953) has placed all the *Actorinithophilus* with two rows on tergal plates under the genus *Diactornithophilus.*

Holotype (*male*) : Head 0.33 × 0.38 mm. prothorax 0.15 x 0.25 mm, mesothorax 0.05 × 0.21 mm. metathorax 0.14 × 0.32 mm, and abdomen 0.85 × 0.43 mm.

Allotype (*female*) : Head 0.38 × 0.38 mm, prothorax 0.16 × 0.31 mm, mesothorax 0.05 × 0.30 mm. metathorax 0.19 × 0.56 mm, and abdomen 1.25 × 0.51 mm

Type host : The Common Green Sand Piper (*Tringa ochrophus* Linn.)

(*ii*) ACTORNITHOPHILUS RAVIENSIS sp. nov.

Female : Head broader than long. Front rounded with a small central concavity. Ocular notch a little more marked, deep. Cephalic carinae confied as far as the ocular notch. Ocular speck three-armed. Prothorax boat-shaped. Prosternum almost as long as broad. Mesothorax transverse narrow. Metathorax longer than prothorax. Posterior femora with about 28 hairs. Abdomen broad, elliptical. Tergal plates with only one row of setae. Pleural plates well formed. Sternites with 2-3 rows of small hairs. V-VI sternites with definite patches of setae. Terminal segment with a brush of setae.

Holotype (*female*) : Head 0.42 × 0.50 mm, prothorax 0.19 × 0.33 mm. mesothorax 0.08 × 0.28 mm, metathorax 0.22 × 0.46 mm, and abdomen 1.21 × 0.63 mm.

Type-host : The Black Winged Stilt (*Himantopus h. himantopus* Linn.)

The genus *Austromenopon* Beadford, 1939.

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(i) AUSTROMENOPON MOHNI sp. nov.

Female : Head tringular, as to shape like a meniscus. Front straight in the middle Dorsal antennary flap continuous with the eyes as to form no notch or slit. Temples narrow. Gular plate with four marginal hairs. Cephalic carinae confined to the antennal grooves. Prothorax well developed, extended almost to the temples. Meso- and meathoraces fused, smaller than the prothorax. Posterior femora with a patch of setae. Abdomine ovate. Tergal plates well formed, each with a row of setae. Pleural and sternal plates well built, IV—VI sternites with dense submarginal setae.

Holotype (female) : Head 0·22×0·55 mm. depth of the occipital arch 0.06 mm, prothorax 0.20×0.41 mm. mesothorax 0·05×0·22 mm, methathorax 0.10×0.43 mm. and abdomen 0·77×2·64 mm.

Type-host : The Black Winged Stilt (*Himantopus h. himantopus* Linn.)

(ii) AUSTROMENOPEN SOHNI sp. nov.

Female : Head triangular, rounded in front. Gular plate with six long hairs. Cephalic carina feebly sclerotised. Prothorax longer or at least as long as broad. Meso- and metathoraces fused dorsally. Prosternum squarish. Meso- and meta-sterni narrow. Abdomen ovate, with well developed tergal plates. Dorsal hairs alternate in size, one or two smaller hairs after each 3-4 long hairs. Pleural plates well developed and equipped with 4-5 stout setae. Sternal plates not distinct, profusely hairy.

Holotype (female) : Head 0.24×0.50 mm, depth of the occipital arch 0.03 mm, prothorax 0.18×0.36 mm, metathorax 0.05×0.26 mm, metathorax 0.11×0.47 mm, and abdomen 0.74×0.55 mm.

Type-hoste. The Common Green Sand Piper (*Tringa ochrophus* Linn).

The genera *Trinoton* Nitzsch, 1818, and Laemabothrion Nitzsch, 1818.

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(i) TRINOTON NYROCAE Eichler

This is one of the best known parasites from Anatidae. We collected several specimens from the type host, the Pochard (*Nyroca f. ferina* Linn.)

An immature female specimen was also collected from the White-eyed Pochard - *Nyroca r. rufa* Linn.

(ii) TRINOTON CASARCAE Eichler

This species has been recorded from most parts of the world. The specimens referred to here were collected from the Ruddy Sheldrake (*Casarca ferrugines* Vroeg).

(iii) LAEMOBOTHRION AUQUAB sp. nov.

Male : Clypeal region trapezoidal, lateral slope steady. Temples angulate. Eyes two, hemispherical. Gular plate without setae, Prothorax trapezoidal in the anterior half and arched posteriorly so as to form a crab-shaped structure. Prosternum well developed, resembling an ancient chisel-shaped stone weapon, proximal setae wanting. Posterior setae of the first femur and meso femur salient. Abdomen elongate, oval. Lateral angles inferior. Tergal plates entire, without central uncoloured area.

Female similar to the male, terminal abdominal segment is considerably modified.

Holotype (*male*) : Length from the frontal margin to the occipital margin 1.32 mm, length from the frontal margin to the posterior extremities of the temples 1.58 mm, width of the head 1.62 mm, prothorax 0.84 × 1.12 mm; mesothorax 0.78 × 1.34 mm, metathorax 0.26 × 1.54 mm, and abdomen 3.76 × 1.94 mm.

Allotype (*female*) : Length from the frontal margin to the occipital margin 1.36 mm, length from the frontal margin to the posterior extremities of the temples 1·62 mm, width of the head 1·7 mm, prothorax 1.04 × 1.22 mm., mesothorax 0.82 × 1.54 mm, metathorax 0.36 × 0.78 mm, and abdomen 4.68 × 2.06 mm.

Typehost : The Lagger Falcon (*Falco jugger* Gray).

(iv) LAEMOBOTHRION SIDDIQII sp. nov.

This species resembles *L. aquab*, from which it differs in the absence of gular setae, dorsal abdominal setae of subequal size, tergal plates with a narrow uncoloured area in the middle.

Holotype (*female*) : length from the frontal margin to the occipital margin 1.33 mm., length from the frontal margin to the posterior extremities of the temples 1.53 mm., greatest width across the temples 1.53 mm., prothorax 1.26 × 1.07 mm., mesothorax 0.77 × 1.40 mm., metathorax 0.43 × 1.77 mm., abdominal 4.90 × 2.33 mm.

Type-host : The Short-toed Eagle : *Circaetus ferox* (Gmelin) shot in Sakrand (Nawabshah), Sind, 6-12-1951.

(v) LAEMOBOTHRION HIERAAETI Eichler

Female : Length from the frontal region to the occipital margin 1.40 mm., length from the frontal margin to the posterior extremities of the temples 1.66 mm. greatest width across the temples 1.66 mm., prothorax 1.33 × 1.37 mm., mesothorax 1.03 × 1.83 mm., metathorax 0.50 × 2.16 mm., and abdomen 3.73 × 2.93 mm.

Host : The Booted Eagle : *Hieraaetus pennatus* (Gmelin), shot in Shujawal (Tatta), Sind, 15th November, 1953.