

**SOME RECENT GENERIC DERIVATIVES OF THE MALLOPHAGAN
GENUS PHILOPTERUS NITZSCH (PHILOPTERIDAE).**

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The genus *Philopterus* Nitzsch, like a few other genera of the order Mallophaga, has long included a vast assemblage of species that infest hosts of almost all the larger bird groups. In recent years various genera have been split off from the old cosmopolitan group, and in 1916 Cummings established at one time four new genera for certain of its components. But even with these various subtractions the genus yet includes upward of two hundred valid species.

THE PHILOPTERI OF OWLS.

Osborn (1896) pointed out that his *Philopterus bubonis* of the great horned owl, *Bubo virginianus virginianus*, showed "decided affinities to *ceblebrachys*" and approached *Nirmus*, particularly in the form of the head and in the rigidity of the trabeculae. Mjöberg (1910) was the first to separate any of the owl-infesting species into a separate taxonomic group. In this year he established his subgenus *Strigiphilus*, which has been rightly raised to a genus by Harrison (1916), for the peculiar owl-infesting species, *Philopterus heterocerus*

Nitzsch. Into this genus Harrison (1916) places two other owl-infesting species, *Philopterus hexophthalmus* Nitzsch and *Philopterus remotus* Kellogg and Chapman. That this genus is very distinctive in that the males have appendiculate antennae and that the genital armature is peculiar is at once admitted. In the shape of the head *Strigiphilus* species approach *Philopterus ceblebrachys* Nitzsch, to be further considered.

Kellogg (1913) pointed out that the owl-infesting Philopteri group themselves about three well differentiated types represented by Nitzsch's three species, *P. rostratus*, *P. cursor* and *P. ceblebrachys*. If Mjöberg's subgenus is excluded from consideration this undoubtedly is the case as far as our present knowledge of the different species goes. Cummings (1916) followed Kellogg in recognizing the latter's three types of owl-infesting Philopteri, and gave us for the first time a detailed account of the genital armature of the species typifying the three groups.

Kellogg believed that much of the variation found among the owl Philopteri was of the individual type brought about "probably through the unusual isolation of the separate groups of individuals that compose the species."

Cummings (1916) admitted the distinctness of the three types of owl Philopteri, but believed a close relationship existed between these types and the hawk-infesting Philopteri in their male copulatory apparatus.

Up to the present only nineteen species of Philopteri (exclusive of the three species of *Strigiphilus*) have been described from owls as type hosts, and of these Harrison (1916) recognizes as valid only thirteen. These thirteen species are represented by only eight type host species, which fall into as many genera.

Thus out of about a hundred owl species known from the entire world, representing about a fourth as many genera, only a small percentage of their lice has been studied and described. Because of this paucity of knowledge concerning the Mallophaga of owls as a group much hesitation is felt in making generalizations of any kind. However, the writer would like to summarize what is known regarding the distinctness of the three types of owl-infesting Philopteri mentioned by Kellogg and by Cummings, and also give a suggestion or two in regard to the possible significance of the group differentiation observed.

The most distinctive group of the three is the *ceblebrachys* group. In *ceblebrachys* itself the forehead is greatly shortened, the sides being rounded; the trabeculae are short and immovable, and do not reach the tip of segment one of the antenna; the eyes are reduced and the cornea lacks the uniform curve found in typical Philopteri; the male genital armature shows a long slender basal plate, fused endomeres and short, stubby, free parameres.

P. cursor, typifying the *cursor* group of owl-infesting Philopteri, has the forehead more or less quadrangular, of medium length, with the sides broadly incurved (concave); the trabeculae are of medium size, longer than segment one of antenna, and movable; the eyes are normal with evenly rounded corners; the male reproductive organs are similar to those of *ceblebrachys* except, as pointed out by Cummings, the vesicula seminalis is very large and rather peculiarly shaped.

P. rostratus, representing the *rostratus* group of owl-infesting Philopteri, is similar to *cursor* except that the forehead is much longer and the vesicula seminalis is much smaller and differently shaped.

In regard to the significance of these different types a note should be given. After studying many species of Philopteri infesting birds other than owls, it appears to the writer that in two of the three mentioned groups, the *cursor* group and the *rostratus* group, there are no characters that would differentiate these from the great body of Philopteri left in Nitzsch's old genus after subtracting Cumming's genera, *Anatoecus*, *Ibidocetus*, *Neophilopterus* and *Dollabella*. More than this, these two groups run together completely in the shape of the head; and even in the types of male genital armature we have an intermediate type in *P. syrni* Packard.

In the *ceblebrachys* group conditions are different. In the shape of the head, the reduction in size of the trabeculae and their fusion with the head and in the reduction of the eyes there exists a combination of characters that sets apart these species from all other Philopteri.

The writer believes that in the *ceblebrachys* group there has been a parallel phylogenetic development of the parasites with their hosts. It is probable that the members of this group have been longest isolated on the owls, hence have to a much greater degree adapted themselves in response to the environment imposed upon them by their owl hosts. Could not the degeneration of the eyes, most noted in *bubonis* Osborn, be explained through adaptive responsiveness to the nocturnal habits of the host in conjunction with their avoidance of bright light in the daytime? The eyes being practically useless in the night or in the dark places during the daytime, may have degenerated just as they have in many cave-dwelling insects. However, with their hosts, the owls, that are compelled to seek out free-living prey widely scattered over the landside the eyes have become acutely sharpened in their function. Do we not have here, therefore, a remarkable case of a physical element of an environment (darkness) working in opposite directions in its modification effect upon a specialized organ of similar function common to both host and parasite.—a subtle difference caused by the diversity of the food and other habits of the two?

Because of the viewpoint of the present writer in regard to the *ceblebrachys* group the liberty is here taken of establishing a new genus for it.

EUSTRIGIPHILUS, new genus.

Forehead irregularly rounded, broader than long and with sides outwardly rounded; signatural plate undivided and extending forward almost to the front margin of head; clypeal bands well pigmented and extending to the margin of head. Trabeculae reduced and immovable, not reaching the tip of the first segment of antenna. Eyes small and with distorted corneas. Antennae the same in the two sexes; short; segments one and two of about the same length. Abdomen broad, stout. Male genital armature with long basal plate, fused endomeres, and short, stubby, free parameres; a true penis wanting.

Genotype.—*Philopterus ceblebrachys* (Nitzsch).

Contained species.—In addition to the type species, *Philopterus bubonis* (Osborn) and *Philopterus clypeatus* (Mjöberg).

The type species shows the extreme diversification from the typical Philopteri. In *P. bubonis* the forehead is not so well rounded. The same is even more true of *P. clypeatus*. In addition, the last mentioned species has much larger trabeculae than those of the type species. Doubtless other species will be added to this genus in the future.

THE PHILOPTERI OF CUCKOOS.

Four species of cuckoo-infesting Philopteri contained in the National Museum Collection have been studied. All of these show a clypeal region which is characteristic, having an expanded hyaline margin with the front part incurved and a tuft of three or more long setae on top of each clypeal band. Among the bird hosts cuckoos are held to occupy a rather isolated and primitive position. It is interesting to note, therefore, that some of their Philopteri have a distinctive appearance. A new genus is here established for certain cuckoo-infesting species.

CUCULOECUS, new genus.

Clypeal region with a hyaline margin throughout, which in front is incurved or concave; signatural plate entire; clypeal bands not reaching the lateral margins of the head and each bearing dorsally at its anterior end a tuft of three or more long setae. Trabeculae very large and movable. Antennae medium and similar in the two sexes. Eyes normal with evenly rounded corneas. Abdomen broad and stout; tergites of female interrupted in the middle. Genital armature of male with slender basal plate; parameres stout, free, incurved; endomeres fused into an endomeral plate which usually protrudes beyond the parameres; penis present, but small and not well developed.

Genotype.—*Philopterus coccyi* (Osborn).

Contained species.—In addition to the type species, *P. latifrons* (Nitzsch), and two other undescribed species, one from a Cuban cuckoo and one from a Chinese cuckoo.

Cummings's Genera.

The genera established by Cummings (1916) are quite distinctive. These four genera, the two new ones established in this paper and Mjöberg's owl-infesting genus are separated from each other in the following key.

Key to Seven of the Generic Derivatives of *Philopterus* Nitzsch.

1. Clypeal region expanded, with free margin hyaline throughout, in front incurved, or emarginate, and bearing above on each lateral chitinization (clypeal band) a tuft of three or more long setae. Parasitic on cuckoos. *Cuculoecus*, new genus. 2.
2. Clypeal region without such characters. 2.
3. Clypeal region expanded and with hyaline free margin throughout but rounded and not emarginate in front; antennae very short. Parasitic on geese, ducks and swans. *Anatoecus* Cummings. Clypeal region but little if at all expanded, not evenly rounded and not bounded throughout by a hyaline margin. 3.
4. Antennae of males appendiculate, or having a lateral process; forehead short; broader than long. Parasitic on owls. *Strigiphilus* Mjöberg. Antennae of males not appendiculate, but the same as those of females. 4.
5. Forehead irregularly rounded, much broader than long and with sides outwardly rounded; trabeculae reduced, immovable, and not reaching the distal end of first antennal segment; eyes reduced. Only found on owls. *Eustrigiphilus*, new genus. Forehead more or less rectangular with sides broadly emarginate (concave); trabeculae larger and usually movable; eyes with rounded hyaline corneas. 5.
6. Signatural plate divided; antennae long, with segment two distinctly longer than any of the others. Parasitic on ibises. *Ibidoecus* Cummings. Signatural plate not divided; antennae shorter. 6.
7. Tergites of females interrupted dorsally. Parasitic on storks. *Neophilopterus* Cummings. Tergites of females extending across the abdomen and uniting the pleurites of the two sides. Parasitic on *Numenius* species. *Dollabella* Cummings.

THE PHILOPTERI OF BIRDS OF PREY.

Cummings (1916) calls attention to the similarity of the male genital armature of the Philopteri of owls to those of the birds of prey. Undoubtedly there is a rather marked similarity between the two. It should be noted, however, that whereas the genital armature of the owl-infesting species shows the penis either vestigial or wanting, it is present, though small, in the birds-of-prey type. Also in the Philopteri of birds of prey the

endomeres are not united distally, hence a true endomerical plate is wanting.

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Actual date of publication, June 28, 1926.