

Posthumous Papers of Melbourne A. Carriker, Jr.

I. The Mallophagan Genus *Menacanthus* (Insecta: Menoponidae) Parasitic on the Woodpeckers (Aves: Picidae)

Up to the present time, there have been described seven species of the genus *Menacanthus* parasitic on woodpeckers. Three are from European hosts, two from the United States, one from Mexico (Baja California), and one from Brazil. Specimens of five of these species have been studied and figured by the author. Twelve new forms are described and figured in the present report. All are from Neotropical hosts, except two, one from the United States and the other from Korea.

The type of *M. picicola* (Packard) apparently has been lost, and no specimens of it are known to exist. *M. picorum* (Eichler) has not been seen, but it is possibly subspecifically related to *M. koreae*, new species, described below. In the absence of specimens, both *picicola* and *picorum* have been omitted from the key.

The whole group, with a few exceptions, is extremely homogeneous, and in some cases the species are very difficult to separate, even when their hosts are generically distinct.

The avian genus *Phloeoceastes* is host to three species of *Menacanthus*, which may be recognized at a glance by their minute ventral head spines and the male genitalia. It is also interesting to note that from this same host genus was described (Carriker, 1949, Rev. Brasileira Biol., vol. 9, p. 309) the genus *Epipicus* Carriker (family Philopteridae), which was placed by Hopkins and Clay (1952, Checklist of genera and species of Mallophaga, p. 318) in synonymy with *Rallicola* Johnston and Harrison. To this author it seems quite inexplicable to bring together lice from distantly related host birds, Rallidae and Picidae.

In the species studied, the chaetotaxy of the head seems to follow the same pattern (see figures), but that of the prothorax differs in at least six species of those treated, while the remainder follow almost exactly the same pattern, which is as follows: One spine in anterolateral angle, followed closely by a long seta; another long seta near the posterolateral angle and with a small spine more or less midway between them; and four long setae on each side of the posterior margin. There are slight differences in the length of these setae, especially of the spinelike setae on lateral margins. There is, in addition to the above, an extremely minute spine (often almost invisible) at each end of the hyaline carina across anterior portion of prothorax, just inside the curving, deeply pigmented carinae which support the first coxae.

In certain species of the group, the preantennary portion of the head (herein designated as the *frons*) is narrow and more or less bluntly conical, with sides ranging from straight to more or less convex, while in others this portion of the head may be flatly rounded to almost circular.

The pleurites are usually not visible, but when clearly seen are found to be almost entirely ventral. The tergites are always clearly defined, continuous across abdomen, and always separated by a fairly wide hyaline band. The outer ends of the sternites are sometimes visible, slightly separated from the pleurites, but only when the pleurites are clearly defined, and then usually only in the posterior segments (IV to VIII). Evidently the sternites are faintly pigmented, as a rule, and are concealed by the more deeply colored tergites.

In both sexes the chaetotaxy and structure of the distal abdominal segment vary little between species—only in length and density of the fringes of fine setae surrounding the anal opening in the female (see figures). Two figures of the male illustrate the chaetotaxy of this segment.

The male genitalia (excepting those species from *Phloeoceastes*) follow more or less the same pattern, especially the movable sclerite, but there are differences in various details, especially in the length of the basal plate and the carinae of the endomeral sac.

I wish to extend my appreciation to Miss Theresa Clay and Dr. K. C. Emerson for the loan of certain species not found in my collection; without them the present paper would not have been complete.

All measurements are in millimeters; all drawings were prepared by the author, and every effort has been made to secure their accuracy, especially in the chaetotaxy. In many cases, setae which were lost in the demounting or clearing are missing from the specimens, but their alveoli usually have been located by high magnification and whenever possible their approximate length given in proportion to related setae, although there may be small errors in their estimated length. A few species have never been cleared, and certain details are not distinctly visible; however, to preserve the specimens, it seemed best not to demount them for cleaning.

It is apparent that there is a very great similarity between certain species, but it must be recognized that in the Menoponidae there are rarely found the outstanding specific differences that are present so often in the Philopteridae. Very careful study must be made of all the minute differences, and it will be found that there may always be a sufficient number of small differences to warrant nomenclatural recognition, at least subspecifically.

KEY TO SPECIES OF MENACANTHUS PARASITIC ON PICIDAE

1. Sternal head spines very short, scarcely longer than their width at base 2
- Sternal head spines at least twice as long as width at base 4

2. A short spine between the two long setae of anterolateral angle of prothorax and the long setae of posterior margin. Male genitalia very distinctive . . . **M. exsanguis exsanguis** (Paine and Mann)
 A medium long setae instead of short spine on lateral margin of prothorax, followed by six long setae on each side of posterior margin 3
3. Frons flatly rounded; seven or eight spines on lateral margin of pterothorax; movable sclerite of male genitalia very distinctive.
M. exsanguis malherbi, new subspecies
 Frons bluntly conical; five spines on lateral margin of pterothorax; male genitalia very distinctive **M. extraneus**, new species
4. Head spines straight, either slender or thickened basally 5
 Head spines thickened basally and curving to a point 10
5. Head spines slender, with somewhat undulating margins; frons bluntly conical, with convex sides; two long setae after spine in anterolateral angle of prothorax **M. benii**, new species
 Head spines thickened basally; a single long setae after spine in anterolateral angle of prothorax 6
6. Ocular slit partially or entirely covered; frons flatly rounded 7
 Ocular slit clearly visible (not covered) 8
7. Prothorax with posterolateral margin circular; occipital nodi elongated; second and third coxae large, with scattered setae.
M. caquetae, new species
 Prothorax with lateral margins straight; second and third coxae small, oval, and with four fine, short setae along posterior side (σ^7).
M. hoffmanni, new species
8. Second and third pair of coxae elongated, slender and with sides straight, or nearly so; frons very flatly circular 9
 Coxae small and oval; frons decidedly circular.
M. punensis, new species
9. A medium long seta on side of prothorax, instead of small spine, between the two long setae; sternite VIII peculiarly shaped (see fig.) **M. colaptis** (Durrant)
 A short, spinelike seta on sides of prothorax; third coxae long and slender, with straight sides; sternite VIII normal.
M. praecursor (Kellogg)
10. Frons sharply and flatly conical, with rounded tip 11
 Frons broadly circular or rounded, with slightly flattened sides . . . 13
11. Three long setae on each side of prothorax (instead of two and a spine); many short, thick setae on second and third coxae and on all femora **M. koreae**, new species
 Two long setae on each side of prothorax, with a very small spine between them 12

12. Frons strongly conical, with slightly convex sides; second and third coxae small, elongated oval **M. pitius**, new species
Frons flatly conical, with sides nearly straight; third coxae smaller than second, and slender (see fig.) **M. bruneri**, new species
13. Frons circular; ocular slit prominent; a short, slender setae on sides of prothorax instead of small spine 14
Frons not circular, but somewhat conical, with rather strongly convex sides; trochanter apparently absent on all legs 15
14. Head small (.314 × .586) **M. ceophloeus ceophloeus**, new species
Head larger (.326 × .63 occipital length).
M. ceophloeus chocoanus, new subspecies
15. Ocular slit almost entirely uncovered; pleurites well developed, but sternal; metasternum prominent, with marginal and surface setae 16
Ocular slit partially covered; pleurites not visible; numerous short setae between second and third coxae; third coxae long and slender, with sides straight; ♂ genitalia distinctive.
M. quercus, new species
16. Pleurites narrow (widest .045); outer ends of sternites not visible, apparently fused with pleurites; segment IX of ♀ shorter and wider (.175 × .48); second and third coxae equal in size and shape.
M. pici pici (Denny)
Pleurites well developed, the widest being .09; outer ends of sternites III–VIII visible and separated from pleurites; second coxae smaller than third; segment IX of ♀ longer and narrower (.45 × .22).
M. pici dryobates (Eichler)

Genus *Menacanthus* Neumann

- Menacanthus* Neumann, 1912, Arch. Parasit., vol. 15, no. 3, p. 353. Type species: *Menopon robustum* Kellogg.
- Neumannia* Uchida (nec Trouessart, 1888), 1926, Journ. Coll. Agric. Univ. Tokyo, vol. 9, p. 27. Type species: *Neumannia okadai* Uchida.
- Eomenacanthus* Uchida, 1926, Journ. Coll. Agric. Univ. Tokyo, vol. 9, p. 30. Type species: *Menopon biseriatum* Piaget.
- Picacanthus* Eichler, 1953, Beitr. Vogelkunde, vol. 3, nos. 3–4, p. 180. Type species: *Picacanthus dryobates* Eichler.

A very large genus found on many families of birds from Passeriformes to Galliformes. In the present article only the parasites on the woodpeckers (Picidae) will be considered.

Menacanthus pici pici (Denny)

FIGURE 1:1

Menopon pici Denny, 1842, Monogr. Anoplurorum Britanniae, pp. 200, 219; pl. 20, fig. 5. Host: *Picus viridis*.

Menacanthus pici—Hopkins and Clay, 1952, Checklist of Mallophaga, p. 214. Host: *Picus viridis* [*pluvius* Hartert].

Through the courtesy of Theresa Clay, I have been able to examine a pair of this species, collected from the type host, from which the figures presented were drawn. The chaetotaxy of the head is shown correctly in the figure, and this pattern seems to be constant throughout the group here treated, differing only in length of the setae.

The cephalic carinae of the antennary fossae differ but slightly in the various species, even to those of the occipital area which are related to the attachment of the prothorax with the head. There are, however, obvious differences in the chaetotaxy of the prothorax, but in most species it is very similar to that of *pici pici* and is as follows: One spine in anterolateral angles, followed closely by a long seta, another long seta in the posterolateral angle, and with a short, spinelike seta midway (or nearly) between them, being sometimes very close to the anterior long setae, and again midway between the two. These long setae range in length from half to entire width of pterothorax. On each side of the posterior margin there are four long setae which vary in length.

The same pattern seems to be present in the abdominal setae, varying only in length, thickness, and number in each segment. In some specimens many abdominal setae are missing, especially the dorsal, but their alveoli have been located and the missing setae inserted, but I cannot be certain that in such cases their length is always correctly shown. The setae along the posterior margin of the tergites are more numerous in some species than in others, especially in *pici pici* (Denny) and *pici dryobates* (Eichler), the latter being considered merely a subspecies of the former.

Another character which seems to be constant in the group is the presence of three long, slender spines at the tip of second and third tibiae, several spines along posterior portion of inner margin, and two or three on surface.

The brushes of setae on the third femur and abdominal sternites are sparse, with the setae rather coarse, and are usually present on segments III to VI, but most abundant on III. The second and third coxae also often bear scattered short setae, which vary in number and position in the different species.

There are also noticeable differences in the length and density of the fringes of setae surrounding the anal opening of the female (see figure).

It is not known whether or not pleurites and sternites are clearly defined in all species of this group. It will require uncleared specimens to definitely prove this point. However, in the species in which they are clearly visible,

they are obviously ventral, with traces of sternites, separated from them, in the posterior segments.

Male genitalia: Of similar type throughout the group, but with more or less important differences in detail (see figure). The basal plate is comparatively short, and thickened, with anterior end slightly expanded; the parameres as long as, or slightly longer than, the endomerical sac, almost unpigmented, slender, and with tips curving outward; basal portion of basal plate with more or less thickened margins; endomerical sac more or less elongated oval, sometimes with lateral margin thickened, and with slender, internal, supporting struts.

The movable sclerite is usually more or less elongated pear shaped, rarely elongated spear shaped, and with usually (but not always) narrow marginal carinae along basal half, and with its enveloping sac (at least partially) with spiculated surface.

Measurements are given in the tabulation below.

	M. p. pici ♂		M. p. pici ♀		M. p. dryobates ♂		M. p. dryobates ♀	
	length	width	length	width	length	width	length	width
Body	1.61		1.94		1.78		1.97	
Head:								
frons	—	.423	—	.467	—	.445	—	.477
temple	.33	.564	.35	.61	.326	.575	.358	.61
occiput	.305	—	.33	—	.303	—	.326	—
Prothorax	.185	.432	.195	.477	.217	.423	.217	.477
Pterothorax	.163	.49	.185	.564	.174	.532	.217	.553
Abdomen	1.02	.76	1.32	.87	1.13	.76	1.35	.868
Basal plate	.26	.097			.23	.093		
Parameres	.163	.015			.155	.023		
Endomerical sac	.16	.092			.14	.102		

Menacanthus pici dryobates (Eichler)

FIGURE 1:2,a,b

Picacanthus dryobates Eichler, 1953, Beitr. Vogelkunde, vol. 3, nos. 3-4, p. 181, figs. 23-24. Host: *Dendrocopus major major* (Linné).

I have seen two males and two females of this species, one pair from the British Museum taken on the type host, the other from Dr. Brelieh, collected on *D. major pinetorum*. There are no appreciable differences between the two pairs. The figures given were drawn from the pair collected on the type host.

The measurements of this species differ somewhat from those of *M. pici pici* (Denny), some being greater, others less. The head in *pici dryobates* is shorter and wider at both temples and frons, while both pro- and pterothorax are larger.

In the male genitalia the endomerical sac seems to be shorter and wider (not a dependable character), but the movable sclerite is the same as in

M. pici pici. There is a short, narrow, pointed, and curving sclerite on each side of the basal portion of the basal plate (see figure), deeply pigmented (blackish), which is also present in *pici pici* but is absent in all other species discussed in this paper. The pleurites are wider and more prominent than in *pici pici*. Nevertheless, *pici dryobates* (Eichler) does not seem to be specifically distinct from *pici pici* (Denny), and it has been classified as a subspecies of *pici pici*. Measurements given under preceding species.

Menacanthus picorum (Eichler)

Picacanthus picorum Eichler, 1953, Beitr. Vogelkunde, vol. 3, nos. 3-4, p. 181, figs. 25-27. Host: *Picus canus canus* Gmelin.

I have not been able to secure a specimen of this species. The only figures of this species given by the author are: The inner end of first and second coxae, with the setae between them; the sternal head spine and setae on abdominal sternite IV. The measurements are too close to those of *pici dryobates* to be of any value. Apparently, the only differences between *picorum* and *pici dryobates* are: Head spine slightly shorter and thicker in *pici dryobates*; sternal patch of setae on IV slightly more abundant in *picorum*. I do not consider these very small differences to be specific; in fact, the figure showing the setae of *pici dryobates* does not agree with my specimens, there being more setae than shown in Eichler's figure, while his figure of the head spine does not agree at all with those of my specimens. I can see no difference between the setae arising between the first and second coxae of Eichler's figure of *picorum* and those of my specimens of *pici dryobates*. Without an examination of specimens from *Picus c. canus*, I am not prepared to assert the status of *M. picorum*.

For comparison with the above species the measurements of *M. picorum* as given by Eichler are: Length of temples .30, width of temples .55, length of body 1.75.

Menacanthus praecursor (Kellogg)

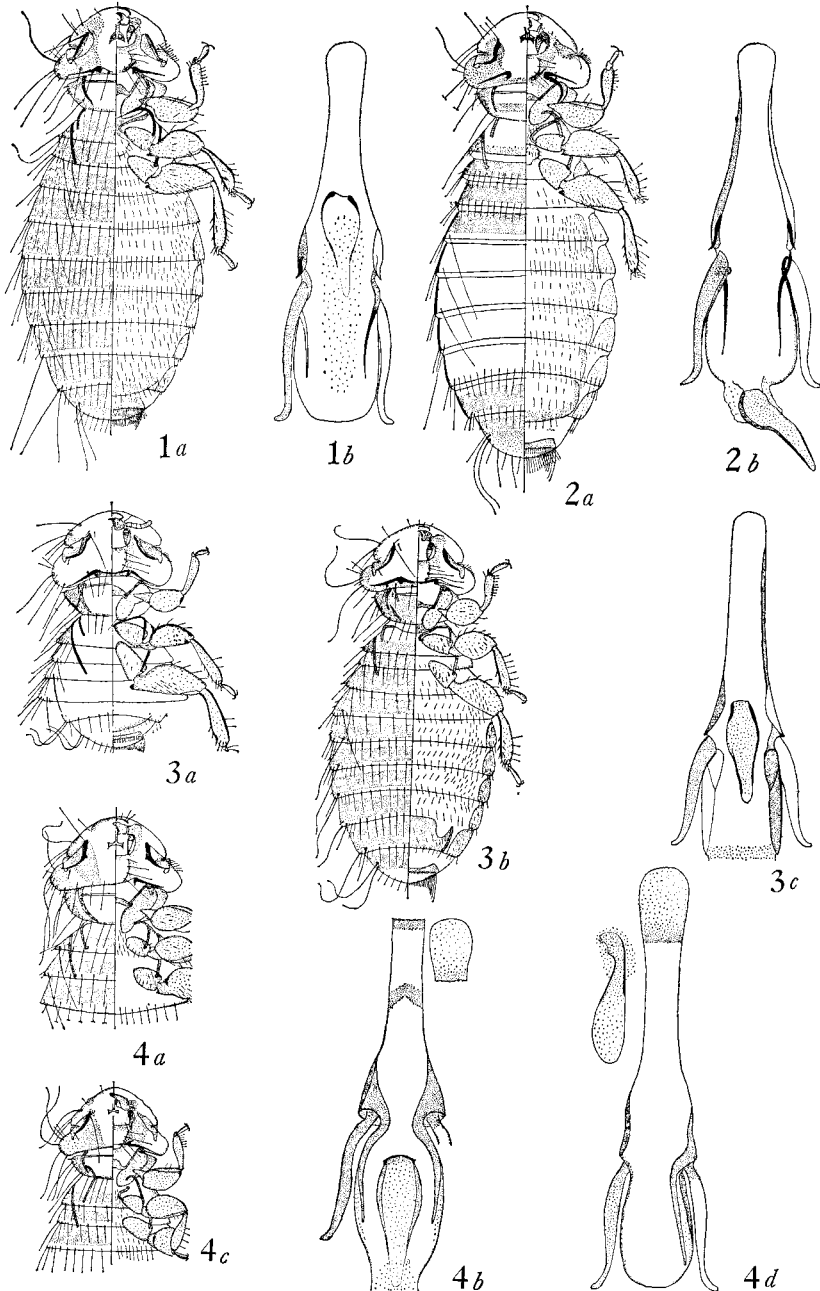
FIGURE 1:3,a

Menopon praecursor Kellogg, 1899, Occ. Papers California Acad. Sci., vol. 6, p. 46, pl. 4, fig. 8. Host: *Melanerpes uropygialis*.

Menacanthus praecursor.—Hopkins and Clay, 1952, Checklist of Mallophaga, p. 214. Host: *Melanerpes [hypopolius] uropygialis* (Baird) [= *M. hypopolius cardonensis* Grinnell].

Through the kindness of K. C. Emerson, I have been able to examine and figure two cotypes of this species, both females. The male has not been seen.

The head differs decidedly in shape from that of *M. pici pici* and its races, being twice as wide as long (occiput to frons); the sides of frons are flattened, with tip rounded, with temples small, and occipital margin deeply concave;



FIGURES 1:1-4.—1,*a,b*, *Menacanthus pici pici* (Denny): *a*, ♀, body; *b*, ♂, genitalia. 2,*a,b*, *M. p. dryobates* (Eichler): *a*, ♀, body; *b*, ♂, genitalia. 3,*a*, *M. praecursor* (Kellogg), ♀, head, thorax, legs, abdominal segments I, II, IX. 3,*b,c*, *M. colaptis* (Durrant): *b*, ♀, body; *c*, ♂, genitalia. 4,*a,b*, *M. punensis*, new species: *a*, ♀, head, thorax, legs, abdominal segments I, II; *b*, ♂, genitalia. 4,*c,d*, *M. benii*, new species: *c*, ♀, head, thorax, legs, abdominal segments I, II; *d*, ♂, genitalia.

the thoracic segments and abdomen are of more or less the same proportions as in the other species of the group, as well as the chaetotaxy. Pleurites are not visible, nor are they shown in Kellogg's figure, tergites are the usual dark transverse bands, with intermediate hyaline spaces, common to the group.

Measurements of a cotype are given below.

	M. praecursor ♀	
	length	width
Body	1.52	-
Head:		
frons	-	.467
temples	.326	.575
occiput	.303	-
Prothorax	.185	.445
Pterothorax	.152	.52
Abdomen	.96	.79

Menacanthus picicola (Packard)

Menopon picicola Packard, 1873, in Hayden, Rept. U.S. Geol. Surv. Terr. 1872, p. 731, fig. 58. Hosts: *Picoides arcticus* and *P. dorsalis*.

Menacanthus picicola.—Hopkins and Clay, 1952, Checklist of Mallophaga, p. 214. Hosts: *Picoides arcticus* (Swainson) and *P. [tridactylus] dorsalis* Baird.

I have not been able to secure a specimen of this species. Packard's figure and description leave no doubt of the correctness of the host, but the details of both description and figure are of very little comparative value, and until fresh material can be secured from the type host (*Picoides arcticus*), its correct systematic position must remain uncertain. It is certainly very closely related to other species of *Menacanthus* from North American Picidae.

Menacanthus colaptis (Durrant)

FIGURE 1:3,b,c

Menopon colaptis Durrant, 1908, Ohio Nat., vol. 8, no. 7, p. 355, fig. 1 H. Host: *Colaptes auratus*.

Menacanthus colaptis.—Hopkins and Clay, 1952, Checklist of Mallophaga, p. 209. Host: *Colaptes auratus* [luteus Bangs].

Through the kindness of K. C. Emerson, I have been able to examine a fine pair of what is presumably this species, from *Colaptes auratus borealis* Ridgway, collected by R. B. Williams at Ruke Bay, Alaska, Sept. 5, 1949.

There is very little resemblance between this species and *M. pitius*, new species, from the Chilean flicker (*Colaptes pitius*), even the ♂ genitalia being quite distinct (see figures). The head is short and wide, with flatly rounded frons.

There are two distinguishing characters: the small spine on lateral margin of prothorax (between the two long setae) is replaced by a slender seta, almost half the length of the long ones; the pleurites are narrow but distinctly visible, but only the last sternite, which has a deep excavation on anterior margin at each side, can be seen; the anterior fringe of setae around anal opening is extremely short and of almost uniform length (see figure).

See key for complete details of separation. Measurements follow next species.

The following three species are from South American species of *Colaptes*.

Menacanthus punensis, new species

FIGURE 1:4,a,b

Types, ♂ and ♀ adults, from *Colaptes rupicola puna* Cabanis, collected by the author at Obrajillo, Peru, Nov. 18, 1929. Type in USNM.

Diagnosis: The frons is quite circular, much more so than in *colaptis*; the ocular slit is completely covered by dorsal membrane; the prothorax is much wider than in *colaptis*; first coxae very large, second and third very small, while there is the usual small spine on lateral margins of prothorax (not a rather long seta between the two very long ones). Male genitalia are also distinctive (see figure). It may be noted that the three new species here described from the genus *Colaptes* all have similar coxae, the first pair large, the second and third unusually small and oval, smaller and of a distinct shape to those of *M. colaptis* (Durrant). Species represented by ♀ holotype, ♂ allotype, and 3 ♂♂ and 10 ♀♀ paratypes; also 3 ♂♂ and 3 ♀♀ from *Colaptes rupicola cinereicapillus*, collected at Yanac, Peru, which cannot be separated from type series described above.

Measurements are given below.

	M. colaptis ♂		M. colaptis ♀		M. punensis ♂		M. punensis ♀	
	length	width	length	width	length	width	length	width
Body	1.49		1.69		1.89		2.04	
Head:								
frons	—	.40	—	.435	—	.456	—	.488
temples	.293	.50	.314	.55	.347	.586	.347	.63
occiput	.27	—	.30	—	.314	—	.32	—
Prothorax	.17	.37	.175	.412	.185	.456	.217	.48
Pterothorax	.152	.44	.16	.51	.185	.52	.195	.57
Abdomen	.944	.63	1.09	.80	1.30	.825	1.35	.91
Basal plate	.24	.085			.143	.097		
Paramer	.12	.016			.155	.013		
Endomerale sac	.13	.098			.168	.10		

Menacanthus benii, new species

FIGURE 1:4,c,d

Types, ♂ and ♀ adults, from *Colaptes campestris* (Vieillot), collected by the author at Chatarona, Rio Beni, Bolivia, Sept. 22, 1934. Type in USNM.

Diagnosis: Much smaller than *punensis*, with an exceptionally small prothorax (♀: .14 × .41 against .217 × .48); head much narrower at both frons and temples (♀: .303 × .53 against .347 × .586). Temples are smaller and frons more pointed (flatly circular in *punensis*); pterothorax .14 × .488 against .195 × .57; abdomen, 1.12 × .78 against 1.35 × .91. Coxae of all three legs differ in size and shape (see figures). Male genitalia differ in several details, especially the movable sclerite (see figures). Represented by the ♀ holotype, ♂ allotype, and 1 ♂ and 3 ♀♀ paratypes.

Measurements of types are given below.

	<i>M. benii</i> ♂		<i>M. benii</i> ♀		<i>M. pitius</i> ♂		<i>M. pitius</i> ♀	
	<i>length</i>	<i>width</i>	<i>length</i>	<i>width</i>	<i>length</i>	<i>width</i>	<i>length</i>	<i>width</i>
Body	1.73	-	1.77	-	1.67	-	2.00	-
Head:								
frons	-	.40	-	.423	-	.456	-	.467
temples	.305	.50	.303	.53	.33	.586	.358	.61
occiput	.282	-	.286	-	.307	-	.337	-
Prothorax	.195	.390	.185	.41	.195	.43	.205	.458
Pterothorax	.197	.445	.23	.488	.185	.50	.184	.52
Abdomen	1.08	.76	1.24	.78	1.09	.74	1.41	.846
Basal plate	.32	.07			.26	.09		
Parameres	.146	.02			.143	.015		
Endomerical sac	.14	.08			.148	.087		

Menacanthus pitius, new species

FIGURE 1:5,a,b

Types, ♂ and ♀ adults, from *Colaptes pitius pitius* (Molina), collected by Prof. H. Toro, near Valparaiso, Chile. Type in collection of Catholic University of Valparaiso, Chile.

Diagnosis: Body much larger than that of *benii* (♀: 2.00 against 1.77) and about the same size as in *punensis*. Head larger than in *benii* (.358 × .61 against .303 × .53); slightly longer and narrower than that of *punensis* (.358 × .61 against .347 × .63).

The preantennary portion of head decidedly conical in shape, with rounded tip, with sides but slightly convex, and with the temples wider (longitudinally) than in both *benii* and *punensis*. Prothorax smaller than in *punensis*, larger than in *benii*; in all three species the different segments

of the legs, especially coxae and femora, differ somewhat in shape from the neotropical species of *Colaptes*.

The basal plate and the parameres are shorter, the endomerale sac slightly different, and the movable sclerite differs decidedly in shape from those of *M. benii* (see figures).

Represented by a large series of both sexes, all paratypes. The types will be deposited with the Catholic University of Valparaiso, together with most of the paratypes, many of which are in poor condition. Several pairs of paratypes will remain in the author's collection.

Note on setae of *M. pitius*: Setae of posterior margin of tergites fewer in number, segments IV and V having but 8 on each side (excluding lateral angle), while in *M. pici pici* there are 15 on each side. Setae of posterior margin of sternites also fewer in number. Measurements follow preceding species.

Menacanthus ceophloeus ceophloeus, new species

FIGURE 1:6,a,b

Types, ♂ and ♀ adults, from *Dryocopus lineatus mesorhynchus* (Cabanis and Heine), collected by the author at Guapiles, Costa Rica, March 1903. Type in USNM.

Diagnosis: Head narrower, longer (proportionately) than in the above species, parasitic on the genus *Colaptes*, with almost circular, wide frons and with temples smaller and narrower, the difference in width between frons and temples being considerably less; chaetotaxy of head of same pattern, but the four setae on the occipital margin are longer.

The sternal pleurites are clearly visible and bear 5-7 short stout setae; only sternite VIII visible with flatly rounded posterior margin bearing 6-9 fine, short setae on each side; the fairly long setae of posterior margin of sternites range from five on I, to ten on IV, and six on VIII; tibiae longer and more slender, but with same arrangement of spines.

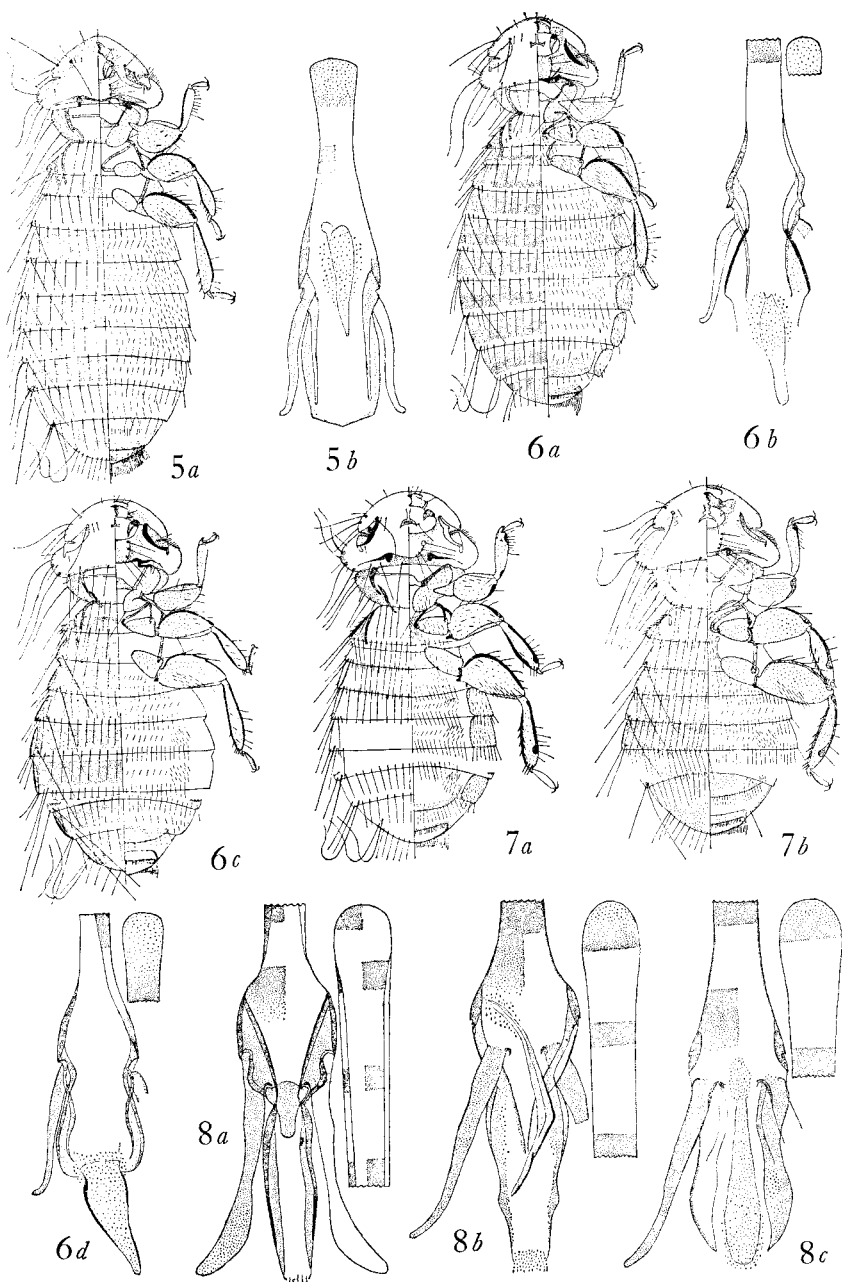
Male genitalia differ considerably in detail, especially the basal portion of the basal plate, while the endomerale sac is smaller, especially shorter, and with movable sclerite unusually small and without chitinized margins.

Represented by ♀ holotype, ♂ allotype, and 3 ♀♀ paratypes. Measurements follow next species.

Menacanthus ceophloeus chocoanus, new subspecies

FIGURE 1:6,c,d

Types, ♂ and ♀ adults, from *Dryocopus lineatus nuperus* (Peters), collected by the author at Acandí, Dept. of Chocó, Colombia, Jan. 6, 1950. Type in USNM.



FIGURES 1:5-8.—5,*a,b*, *Menacanthus pitius*, new species: *a*, ♀, body; *b*, ♂, genitalia. 6,*a,b*, *M. ceophloeus ceophloeus*, new subspecies; *a*, ♀, body; *b*, ♂, genitalia. 6,*c,d*, *M. choacoanus*, new subspecies: *c*, ♀, body; *d*, ♂, genitalia. 7,*a*, *M. exsanguis exsanguis* (Paine and Mann), ♀, head, thorax, legs, abdominal segments I-IV, VIII, IX. 7,*b*, *M. e. malherbi*, new subspecies, ♀, head, thorax, legs, abdominal segments I-IV, IX. 8,*a*, *M. extraneus*, new species, ♂, genitalia. 8,*b*, *M. exsanguis malherbi*, new subspecies, ♂, genitalia. 8,*c*, *M. e. exsanguis* (Paine and Mann), ♂, genitalia.

Diagnosis: Closely related to *ceophloeus ceophloeus*, with same pattern of abdominal chaetotaxy, but differs from it as follows: Body length greater in both sexes; frons wider and more circular; temples wider (longitudinally), with occipital margin less concave, so that length of head at occiput is the same in both races but longer at temples in *ceophloeus chocoanus*.

Pro- and pterothorax wider and longer (except length of prothorax in ♀, which is the same); chaetotaxy of abdomen the same but brushes of setae on third femora sparser in *C. chocoanus* and tibiae slightly wider, especially first pair. Pleurites (not shown in figure) are sternal and equal in size with those of *C. ceophloeus*, with the same accompanying short setae, but in only one female out of nine examined are they visible, being completely concealed by the tergites. The abdominal chaetotaxy of the male is the same as that of the female, but since the male is smaller, the abdomen has the appearance of being more densely hirsute.

The ♂ genitalia differ considerably. The basal plate is longer and differs in shape basally; the parameres are longer and the movable sclerite much wider basally, of different shape and with the narrow, chitinized margins more pronounced on one side. Represented by ♀ holotype, ♂ allotype, and 4 ♂♂ and 8 ♀♀ paratypes.

Measurements of the types are given below.

	M.c. ceophloeus ♂		M.c. ceophloeus ♀		M.c. chocoanus ♂		M.c. chocoanus ♀	
	length	width	length	width	length	width	length	width
Body	1.57	—	1.82	—	1.65	—	2.00	—
Head:								
frons	—	.423	—	.465	—	.434	—	.50
temples	.315	.54	.335	.575	.314	.575	.347	.63
occiput	.282	—	.303	—	.282	—	.326	—
Prothorax	.17	.413	.20	.434	.195	.434	.195	.48
Pterothorax	.163	.456	.152	.522	.188	.488	.195	.553
Abdomen	1.03	.65	1.24	.83	1.09	.76	1.40	.89
Basal plate	.23	.087			.265	.08		
Parameres	.123	.015			.12	.016		
Endomeral sac	.10	.097			.135	.10		

Menacanthus exsanguis exsanguis (Paine and Mann)

FIGURES 1:7,a,8,c

Menopon exsanguis Paine and Mann, 1913, Psyche, vol. 20, no. 1, p. 19, fig. 4. Host: *Campophilus melanoleucus*.

Menacanthus exsanguis.—Hopkins and Clay, 1952, Checklist of Mallophaga, p. 210. Host: (*Campophilus melanoleucus*)=*Phloeocastes melanoleucus?* *albirostris* (Vieillot) [= *Phloeocastes m. melanoleucus* (Gmelin)]. (The host for this species is given in the 1952 Checklist as *P. melanoleucus albirostris* (Vieillot), but Paine and Mann give the host as *P. m. melanoleucus* and state that all hosts were collected and identified by Dr. E. Sneathledge and were from the Museu Emílio Goeldi, Pará, Brazil, thus clearly within the range of *P. m. melanoleucus*.)

In the author's collection are 1 ♂ and 2 ♀♀ from the type host, collected by him at Rio Chinchipe, Peru, from which the figures were made.

In this species and *exsanguis malherbi* and *extraneus*, also with the same generic host, we have the largest species of the genus known from the Picidae. All three species are characterized by an unusual type of male genitalia and head spines. The head is short and wide, with temples much wider than frons and with the portion of head anterior to ocular slit as long as the posterior portion. These species are characterized by extremely short, thickened head spines (see figures), very much shorter than any other known species found on the Picidae; prothorax extends much farther under the head, and the chaetotaxy of the head seems to be the same as the rest of the genus, but that of the prothorax is decidedly different, as follows: The usual short spine in anterolateral angle is followed by two very long setae, then a small spine, and in the posterolateral angle two very long setae, with five more on each side of the posterior margin, all very long, longer than width of pterothorax. There are 9 long setae on each side of pterothorax, with numerous short sternal setae in median portion, between second and third coxae; 9 to 15 setae along posterior margin of tergites (including the angle); setae on posterior margin of sternites shorter, finer and very numerous (about 20-21 on III and IV); the patches of setae on third femora and sternite IV are short, fine, and rather dense, much more so than in *pici pici* and allies; fringe of setae around anal opening and on margin of last sternite as shown in figure, as well as that of the legs.

Measurements are given below.

	M.e. <i>exsanguis</i> ♂		M.e. <i>exsanguis</i> ♀		M.e. <i>malherbi</i> ♂		M.e. <i>malherbi</i> ♀	
	length	width	length	width	length	width	length	width
Body	1.80	-	1.97	-	1.95	-	2.04	-
Head:								
frons	-	.48	-	.51	-	.54	-	.54
temples	.365	.65	.37	.684	.39	.70	.392	.705
occiput	.326	-	.337	-	.358	-	.358	-
Prothorax	.23	.521	.228	.53	.25	.553	.25	.564
Pterothorax	.205	.586	.205	.60	.195	.61	.195	.61
Abdomen	1.16	.846	1.30	.87	1.28	.95	1.34	1.04
Basal plate	.39	.112			.42	.125		
Paramer	.224	.023			.24	.026		
Endomerical sac	.19	.117			.20	.092		

Menacanthus exsanguis malherbi, new subspecies

FIGURES 1:7,b,8,b

Types, ♂ and ♀ adults, from *Phloeoceastes melanoleucus malherbi* (G. R. Gray), collected by the author at Rio Jurubidá, Dept. Chocó, Colombia, Mar. 26, 1951. Type in USNM.

Diagnosis: Head wider at frons and temples; sides of frons slightly flattened (not circular) and temples narrower (longitudinally); a medium long seta, instead of short spine, following two long setae in anterolateral angle; eight spines on lateral margin of pterothorax instead of four in *exsanguis exsanguis*.

Both sexes larger in nearly all measurements (see table); setae in angles of abdominal segments I-V shorter than in *e. exsanguis*. Male genitalia very distinctive (see fig. 8,b). Species represented by the ♀ holotype, ♂ allotype, and 1 ♂ paratype. Measurements follow preceding species.

Menacanthus extraneus, new species

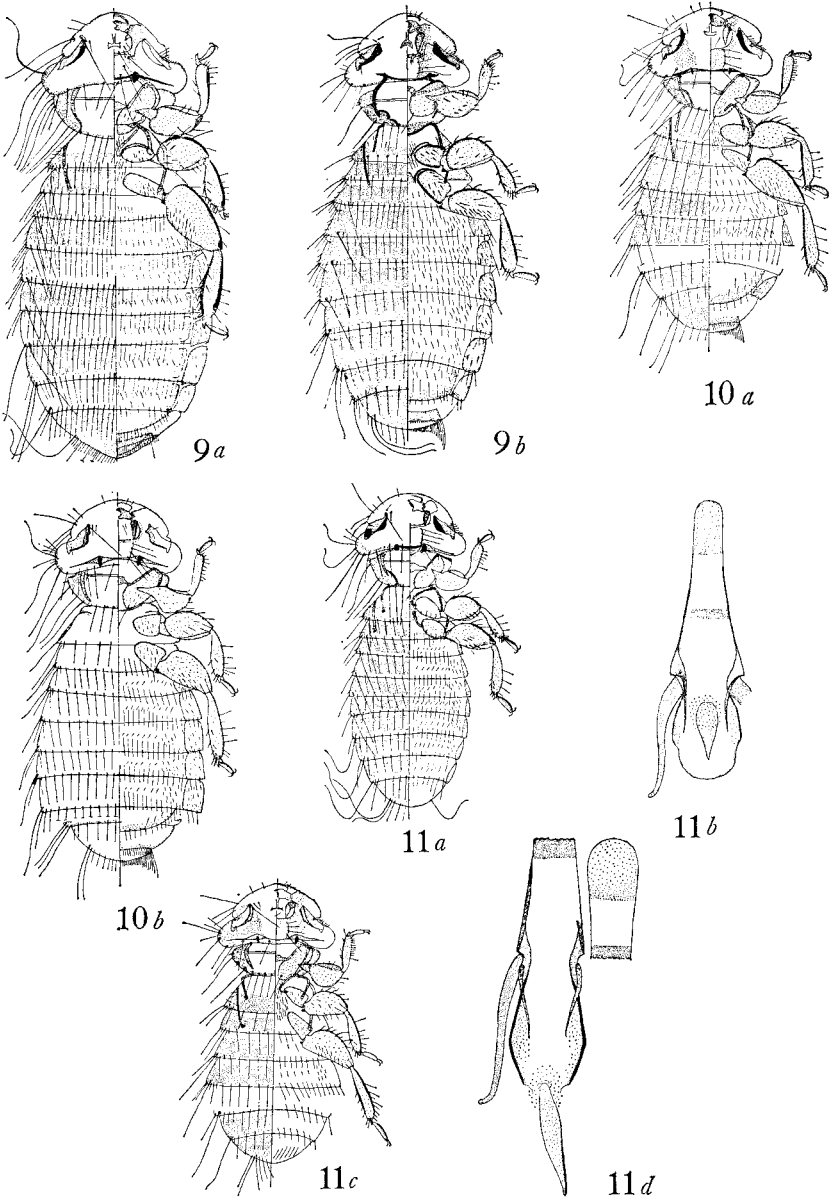
FIGURES 1:8,a,9,a

Types, ♂ and ♀ adults, from *Phloeoceastes rubricollis trachelopyrus* (Malherbe), collected by the author at Palmar, Dept. Cochabamba, Bolivia, July 4, 1937. Type in USNM.

Diagnosis: About the same size as *exsanguis exsanguis*, but slightly smaller than *e. malherbi*. Shape of head very different from both, with frons roughly conical, similar to that of *pitius*, new species, but the temples are wider and longer, wider than in *e. exsanguis*. Chaetotaxy of head equal to that of *e. exsanguis*, with the addition of four short ventral spines back of head spines; both pro- and pterothorax are larger than in *e. exsanguis*, and the chaetotaxy of both differ, there being 11 long and 1 medium setae on each side of prothorax and 9 long setae on each side of pterothorax, with four to five spines on lateral margin.

Chaetotaxy of abdomen more abundant, with 12-18 long, strong, dorsal setae on posterior margin of tergites, and 12-15 shorter and more slender setae on posterior margin of sternites and also a median row of short setae in addition to the patches of setae on sternites III and IV. Pleurites are entirely ventral, well defined and heavily pigmented and divided from sternites by a narrow hyaline area, but only outer ends of sternites are visible; terminal sternite with a rather dense fringe of setae on posterior margin.

Male genitalia very unusual, with parameres constricted medially and expanded distally, with endomerical sac very narrow and with heavy marginal carinae. There is a peculiar sclerite at the base of the endomerical sac of unknown functions, unless it is the movable sclerite, which I doubt. It seems that this sclerite may have been extruded and lost. The heavy,



FIGURES 1:9-11.—9,*a*, *Menacanthus extraneus*, new species, ♀, body. 9,*b*, *M. koreae*, new species, ♀, body. 10,*a*, *M. bruneri*, new species, ♀, head, thorax, legs, abdominal segments I-IV, VIII, IX. 10,*b*, *M. caquetae*, new species, ♀, head, thorax, legs, abdominal segments I-VI, IX. 11,*a*,*b*, *M. hoffmanni*, new species: *a*, ♂, body; *b*, ♂, genitalia. 11,*c*,*d*, *M. quercus*, new species: *c*, ♂, head, thorax, legs, abdominal segments I-III, VIII, IX; *d*, ♂, genitalia.

diagonal carinae across basal portion of basal plate are very unusual and seem to be the support of the endomerale sac. Species represented by the ♀ holotype, ♂ allotype, and 3 ♂♂ and 1 ♀ paratypes.

Menacanthus koreae, new species

FIGURE 1:9,b

Type, ♀ adult (♂ unknown) from *Picus canus jessoensis* Stejneger, collected by C. Fennel, at Kwangnung Kyonggi-do, Korea, Apr. 7, 1957. Type in USNM.

Note: The name of host on slide is *Picus canus griseoviridis*, which has been placed under the synonym of *P. c. jessoensis*.

Diagnosis: The host of this species is conspecific with that of *Menacanthus picorum* (Eichler), but since specimens of *picorum* have not been seen by the author it is not possible to make a comparison between the two. It is possible that the present species may prove to be conspecific with *picorum* (Eichler), but it is hardly likely.

M. koreae is very close to *pici dryobates* (Eichler) in size, but the thoracic segments differ considerably (see table). The frons is decidedly conical, with rounded tip; the temples are rather narrow, giving the head a triangular shape; thoracic segments small, in comparison to abdomen and head, and abdominal pleurites clearly visible, as well as the outer end of sternite VIII. The coxae are unusually large, with femora and tibiae short and thick, the tibiae thickened distally. Especially noticeable are the rather heavy spines on second and third coxae and all femora, with the usual spines on tibiae somewhat thicker. The patches of setae on femora are more like spines than setae, while the patches on the sternites are of usual thickness.

Unfortunately the species is known by a single female so that the male genitalia cannot be checked with others. Measurements follow next species.

Menacanthus bruneri, new species

FIGURE 1:10,a

Holotype, ♀ adult, and only specimen, from *Dendrocopos v. villosus* (Linnaeus), collected by Prof. Lawrence Bruner at Harrison, Nebr., Feb. 25, 1895. Type in USNM.

Diagnosis: Of rather large size, with very short and wide head, the frons being very flatly conical, the ocular slit prominent, and the temples narrow (longitudinally); sides of prothorax straight and of pterothorax but slightly convex; narrow pleurites and last, wide sternite clearly visible, the fringe of setae on the latter short and sparse; first and second coxae large, third small and elongate; third femora and tibiae unusually long.

Measurements of types are given below.

	<i>M. extraneus</i> ♂		<i>M. extraneus</i> ♀		<i>M. koreae</i> ♀		<i>M. bruneri</i> ♀	
	length	width	length	width	length	width	length	width
Body	1.80	—	2.08	—	1.95	—	1.84	—
Head:								
frons	—	.485	—	.50	—	.467	—	.457
temples	.358	.694	.369	.716	.347	.597	.337	.586
occiput	.337	—	.33	—	.326	—	.31	—
Prothorax	.228	.542	.303	.553	.250	.546	.195	.456
Pterothorax	.228	.565	.24	.67	.195	.542	.195	.542
Abdomen	1.03	.80	1.34	.97	1.28	.846	1.24	.803
Basal plate	.48	.115						
Parameres	.25	.026						
Endomeral sac	.22	.059						

Menacanthus caquetae, new species

FIGURE 1:10,b

Type, ♀ adult, from *Melanerpes cruentatus extensus* (Todd), collected by the author at Puerto Venecia, Dept. Caquetá, Colombia, June 13, 1952. Type in USNM.

Diagnosis: This species is very close to the following two forms, as well as to *M. praecursor* (Kellogg), and should be compared with the latter, but the relationship between the four cannot be properly delineated because *praecursor* and *caquetae* are known only from the female and *quercus* and *hoffmanni* by the male. To further complicate matters, all four of these species are parasitic on different species of the avian genus *Melanerpes*, and undoubtedly they have many characters in common.

M. quercus and *M. hoffmanni* are easily separated by the male genitalia, but the genitalia are unknown in *praecursor* and *caquetae*.

In relation to *praecursor*, the species *caquetae* has the frons slightly more circular and the occipital margin less concave; because of the poor condition of the specimens of *praecursor* studied, there is, as far as one can tell, no appreciable difference in the chaetotaxy of any portion of the body. There are, however, considerable differences in shape and size of all coxae and femora and in the size and chaetotaxy of the last abdominal segment, that of *caquetae* being larger and the posterior margin of last sternite much wider. The pleurites are large and clearly visible in *caquetae* but apparently are not separated from sternites by a hyaline area, while in *praecursor* they are distinctly separated in segments VI–VIII.

When better material of both sexes is available their true relationship can be established; they may prove to be conspecific, but for the present I prefer to classify them as distinct species. Represented by the ♀ holotype and 1 ♀ paratype, neither in the best condition. Measurements follow *M. quercus*.

Menacanthus hoffmanni, new species

FIGURE 1:11,a,b

Holotype, ♂ adult and 1 ♂ paratype from *Melanerpes aurifrons hoffmanni* (Cabanis), collected by the author at Juan Viñas, Costa Rica, March 1902. Type in USNM.

Diagnosis: The frons is decidedly circular, more so than in *praecursor*, and the temples are narrower, but since *hoffmanni* is a male, comparison as to size is impossible. The thoracic segments are of the same shape, but the coxae and femora are of very different shape (see figure).

The male genitalia are unusually small, especially the basal plate, and the movable sclerite is different from all of the others that have been seen in this group.

See key to species for further details. Measurements of types are given below.

	<i>M. caquetae</i> ♀		<i>M. hoffmanni</i> ♂		<i>M. quercus</i> ♂	
	length	width	length	width	length	width
Body	1.87	-	1.48	-	1.60	-
Head:						
frons	-	.456	-	.415	-	.445
temples	.323	.50	.314	.532	.314	.564
occiput	.303	-	.232	-	.303	-
Prothorax	.20	.467	.174	.39	.185	.423
Pterothorax	.195	.586	.163	.456	.174(?)	.50
Abdomen	1.15	.88	.91	.61	1.04	.694
Basal plate			.19	.08	.265	.077
Parameres			.14	.016	.173	.013
Endomeral sac			.09	.076	.14	.087

Menacanthus quercus, new species

FIGURE 1:11,c,d

Holotype, ♂ adult, and only specimen, from *Melanerpes formicivorus flavigula* (Malherbe), collected by the author at Virolin, Santander, Colombia, Sept. 16, 1943. Type in USNM.

Diagnosis: As stated above, this species may be compared only with *M. hoffmanni*, since the three other closely related species are represented (in the author's collection) by females only. It is larger than *hoffmanni* in all measurements except the length of head, which is the same. The head is wider both at frons and temples, with sides of frons flattened (perfectly circular in *hoffmanni*); the head spines are curved instead of straight, the temples are wider, and occipital margin less concave; sides of prothorax are convex, straight in *hoffmanni*; the coxae and femora are differently

shaped; sternal short setae between the coxae more abundant and the setae of posterior margins of tergites and sternites longer and slightly more abundant.

The male genitalia are very different in shape of basal plate, parameres longer and endomerical sac, with movable sclerite, different from all others of this group (see figure). Measurements follow preceding species.

References

- CARRIKER, M. A., JR.
1949. Neotropical Mallophaga miscellany no. 5. New genera and species. *Rev. Brasileira Biol.*, vol. 9, no. 3, pp. 297-313, 24 figs.
- DENNY, HENRY
1842. *Monographia Anoplurorum Britanniae*, 262 pp., 26 pls.
- DURRANT, E. P.
1908. Descriptions of new Mallophaga, 3. *Ohio Nat.*, vol. 8, no. 7, pp. 355-358, 1 fig.
- EICHLER, WOLFDIETRICH
1953. Notulae Mallophagologicae, 12: Neue Menacanthinae. *Beitr. Vogelkunde*, vol. 3, nos. 3-4, pp. 166-183, 25 figs.
- HOPKINS, G. H. E., and CLAY, T.
1952. A check list of the genera and species of Mallophaga, 362 pp.
- KELLOGG, VERNON L.
1899. Mallophaga from birds of Panama, Baja California, and Alaska. *Occas. Pap. California Acad. Sci.*, vol. 6, pp. 1-52, 4 pls.
- NEUMANN, L. G.
1912. Notes sur les Mallophages, 2. *Arch. Parasit.*, vol. 15, no. 3, pp. 353-384, 29 figs.
- PACKARD, A. S., JR.
1873. Descriptions of new species of Mallophaga collected by C. H. Merriam while in the Government Geological Survey of the Rocky Mountains, Professor F. V. Hayden, U.S. Geologist. *In* Hayden, F. V., Sixth Annual Report of the U.S. Geological Survey of the Territories, 1872, pp. 731-734, figs. 58-62.
- PAINE, JOHN H., and MANN, WILLIAM M.
1913. Mallophaga from Brazilian birds. *Psyché*, vol. 20, no. 1, pp. 15-23, 5 figs.
- UCHIDA, SEINOSUKE
1926. Studies on amblycerous Mallophaga of Japan. *Journ. College Agric. Imperial Univ. Tokyo*, vol. 9, no. 1, pp. 1-54, 17 figs.