NOTES ON AFRICAN CHALCIDOIDEA—III.

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It cannot be said that any satisfactory division of the TETRASTICHINI has yet been proposed. With the exception of one or two easily recognised groups like *Melittobia*, Westw., *Crataepus*, Först., and *Hyperteles*, Först., the genera are ill-defined, and this is specially the case with *Tetrastichus*, Hal., and its immediate allies. It has become evident that the mesonotal furrows or impressed lines have not the value for diagnosis that many writers have assigned to them. Recently Kurdjumov (Revue Russe d'Entomologie, xiii, p. 246, 1913) has separated *Tetrastichus* from *Geniocerus*, Ratz., by the chaetotaxy of the submarginal, assigning to the former genus those species which have one, and to the latter, species with more than one bristle in this position. Such a division, I believe to be unnatural, as it is certainly inconvenient.* In the following descriptions I have included one species in *Tetrastichus* though it has more than one bristle on the submarginal. I think it impossible, in the present state of our knowledge of the Tetrastichines, to say what characters are of basal importance. For grouping species, the funicle (shape, segments and chaetotaxy), the position of the scrobes, the shape of the pronotum (especially whether straight-edged or emarginate posteriorly), the chaetotaxy of the mesonotum and the propodeon, give generally the most reliable clues, while specific characters appear to lie in colour, proportions and chaetotaxy of the wings. How far the ring joint can or should be used is doubtful. When consisting of a number of equal rings it may be of some assistance, but in other cases, the basal ring is much the greatest, and it is almost impossible to say whether the succeeding lamina is distinct or not. Even with an oil immersion difficulty may be felt, and there is the further question of the morphological equivalence of these laminae. In the present paper four species assigned to *Tetrastichus* are described; of these, three are grouped together, mainly on account of antennal and propodeal characters, the fourth I have placed with some others described from dipterous hosts, but if the absence of whorls of hair from the male funicle proves to be more fundamental than the antennal coloration and the propodeal sculpture, possibly all four should go together. In describing the antennae, details are given of the sensoria, which, though rather variable in number on any individual joint, are more constant for the funicle and club as a whole.

The following features are shared by *Tetrastichus atriclavus*, *T. sculpturatus* and *T. mauripennis*, spp. nov.

♂♀. Wings more or less tinted; propodeon with median keel and pleurae ridged superiorly below the notopleural edge. The whole notum strongly raised reticulate or honeycombed; spiracle opening on the pleura outside the notopleural edge, surrounded by a hollow or sulcus which is distinct posteriorly.

♂. Scape with a large sense organ, fringed ventrally with long hairs. Funicular joint without any long basal or sub-basal whorls of hairs; antennae pale, except the dark club.

♀. Antennae dark, except scape.

* Cf. Crawford, Proc. U.S. Nat. Mus., xlviii, p. 584, May 1915.

***Tetrastichus atriclavus*, sp. nov. (figs. 1, 2).**

♂. Head, thorax and abdomen black, with dark shining, at most submetallic green or bluish green lustre on the notum of the thorax. Wings slightly tinged, nearly clear. Legs mainly yellowish, the femora a little browned and the coxae externally somewhat darker. The club of the antenna shows decidedly black against the yellow of the other joints; the scape is very pale while the pedicel and funicle have a slight tinge of brown.

Fig. 1. *Tetrastichus atriclavus*, sp. n. ; *a*, antenna of ♂ (outside) ; *b*, antenna of ♀ (inside).

T. mauripennis, sp. n. ; *c*, antennae of ♂ (inside) ; *d*, antenna of ♀ (outside).

Head.—Eyes bare, separated by nearly twice the diameter of either, seen from in front ; scrobes set on the base line of the eyes, with about ten bristles (5,5) between ; frons between scrobes and anterior ocellus with many (about forty on each side) bristles in three rows, the post-scapal bare area thus narrow ; about three bristles inside the genal ridge and two transverse rows (6, 4) below the scrobes, while three minute bristles stand on each median clypeal lobe ; genae and occiput with many bristles. **Antennae** (fig. 1*a*) comprising scape, pedicel, ring joint, funicle of four joints, three in club. Length just under .8 mm. Scape deep (20 : 7), internally

clothed with evenly set, short stiff bristles, externally with only a few such bristles, chiefly at the apex and along the dorsal edge; 5-6 long curved bristles on outer ventral edge. Sense-organ broad and covering nearly all the ventral or subventral edge of the scape; apically and basally it lies on the edge, while its median area lies above the edge. Pedicel two-fifths of scape, narrow (2:1); the ring joint is possibly double, as two thin laminae, of which only the first appears to be fused with the visible joint, intervene between it and the first of the funicle; funicle gradually expanded, with equal joints, but as the last pair are sub-quadrate and pedunculate, they appear shorter than the first, which is much longer than broad (3:2); club joints in ratio 4:5:6 (reckoning the spur); whole club much swollen, about twice as broad as the first funicular joint. The first funicular with no sensoria externally, but one on the inside and another ventrally; the second funicular bears four, one on dorsal, ventral, inner and outer aspects respectively; the third has six (1, 2, 1, 2); the fourth eight (1, 3, 1, 3). In the segments of the club the arrangement is, (1st) 1, 6 (outside), 1, 4; (2nd) 1, 8, 1, 6; (3rd) 1, 3, 1, 2. *Mouth-parts*: labrum with four clear stout bristles (2, 2). Mandibles tridentate, the outermost tooth heaviest and most acute, separated deeply from the second, third tooth rounded and inconspicuous; across the mandible runs a transverse row of four bristles; maxillary palpus four times as long as the labial, with one long median outer bristle and a shorter subapical; at the apex stands a third, long and stout, with a fourth very minute alongside. The lingua appears to have only four setigerous cells.

Thorax.—The pattern of the notum is, as a whole, fine and long drawn out. Mesonotum and scutellum with distinct impressed lines. Inside each parapsidal furrow are 4 stout bristles of which the first stands in front of the suture and the last beyond one-half; the side lobes, with reticulations more nearly isodiametric, bear about 10 bristles; axillae bare, with similar pattern to that of side lobes; scutellum quadrate, with two well-defined furrows enclosing rather more than the median third, where the pattern is faint, while on the side areas it is more definite. The mid-area shows besides a very ill-defined central depression or weak impressed line. The post-scutellum (notum of the morphological metathorax) is honeycombed or deeply pitted and declivous about the middle line; pleurae long and smooth. *Propodeon* with one median keel (a fusion of two) and two lateral, starting anteriorly just inside the large oval spiracles and converging posteriorly to enclose the peduncle; at the anterior end of each lateral keel a ridge (at first thick, then thinning rapidly) rises on the pleura extending posteriorly and downwards, while below the spiracle is another much shorter pleural ridge. The spiracle thus lies in a rather deep narrow sulcus which extends to the suture with the metathorax. The notum of the propodeon is also sunk considerably on each side before the lateral keels. Between these hollows and the spiracle the surface is raised, crescentic, broadest behind. Except round the spiracle and about the middle of the central keel the notum and pleurae of the propodeon are coarsely raised reticulate. There are five or six bristles on the pleurae below the spiracle. On the mesosternum the prepectus is somewhat long and very coarsely raised reticulate; on the sternum proper the reticulation is little raised; the pleurae are rougher.

Wings (fig. 2).—Forewings not quite three times as long as broad (20:7); length, 1 mm.; breadth, 0.35 mm. Submarginal: marginal: radius, as 4:4:1. The

submarginal bears a long bristle at one-third from the base ; a little nearer the base, but below, is a clear non-setigerous pustule. Submarginal cell narrow, with about 10 bristles below ; 10 to 12 stout bristles fringing the marginal appear over the costa. Radius with 4 bristles on stalk, one at the heel and one below the clear cells. There is a bare area below the origin of the marginal vein, and the basal triangle before the < row of hairs is also bare. Elsewhere the pubescence is regular and dense.

Fig. 2. *Tetrastichus atriclavus*, sp. n., ♀; a, right wing; b, radius; c, junction of marginal and submarginal.

Legs.—Forelegs : coxae two-thirds as long as the femora, which are only moderately swollen and have a ventral row of bristles (8–10) ; on the posterior aspect the femora are covered with evenly set bristles, but anteriorly the surface is bare ventrally to near the apex ; apex of tibia with a row of 5 spines, and 6 along the anterior edge of first tarsal joint. Mid legs : femur bare both anteriorly and posteriorly on an area defined by a line from the upper basal to the lower apical angle, except for one or two posterior subventral bristles, one before and one after one-half respectively, and two rather strong subapical ventral bristles ; numerous bristles along the dorsal edge on both sides broadening towards the apex ; apical spine as long as the first tarsal joint. Hind legs : femur sparsely clothed ; two bristles about the middle of the ventral edge, and 10 to 11 in a subventral row anteriorly ; apical comb on tibia of 10 or 11 spines ; tibial spur shorter than the first tarsal joint. The proportions of the tarsal joints are :—

	i.	ii.	iii.	iv.
Front	20	24	22	35
Mid	30	30	25	35
Hind	35	30	30	45

the fourth joint is reckoned to the bend of the claw.

Abdomen.—First tergite bare medianly, with three post-median bristles at each side; second tergite with bristles 5, 5; from the third to the fifth the arrangement is 8, 8, with about four on each side in front. On tergite vi. the spiracle is somewhat large, with one bristle inside and a post-median row of about 10. There are nine to ten bristles between the stylets. The retinacula of the penis are single and stout.

Length, $1\frac{1}{2}$ mm.; alar expanse, $2\frac{1}{2}$ mm.

♀. Similar to the ♂ in the colour of the body, wings and legs but the coxae are all clear yellow and the fore femora are never more than faintly darker near the apex. The general colour is a little duller than in the ♂. In the antennae the scape is pale, almost milky white, while the pedicel, funicle and club are black. The contrast between the sexes is here decided.

Head.—*Antennae* (fig. 1b): scape, pedicel, ring joint, funicle of three joints, and three in club; length just under 0.7 mm. Scape swollen medianly (19:5); hairs on inside sparsely set and on outside confined mainly to upper edge and towards the apex. Pedicel long and narrow (2:1), rather less than half of the scape (8:19). Ring joint as in the ♂. Funicular joints in the ratio 7:5:5 and expanded considerably on the third, so that the latter does not stand out so sharply as in the ♂. The club segmented in the ratio 11:10:14, and half as broad again as the first funicular joint; the sensoria are shorter, broader and fewer than in the ♂. *Mouth-parts*: the maxillary palpus bears medianly two bristles, an outer and an inner, not one as in the ♂.

In the *thorax* the ♀ differs slightly from the ♂ in that the scutellum is longer and not quite quadrate. On the *propodeon* the spiracle is large and the notum about the central keel more extensively smooth, while the reticulation is even coarser.

Wings.—Forewings a little shorter and broader than in the ♂. Length, .95 mm.; breadth, .37 mm.

Legs not so hirsute as in the ♂; the subventral rows of the femora have about three bristles less and the femora themselves are narrower. The proportions of the tarsal joints are the same in both sexes, except that while in the ♀ the second hind tarsal joint exceeds the first a little, the reverse is the case in the ♂.

Abdomen.—Ovipositor with only the apical one-twelfth to one-thirteenth of the sting serrate, but with many teeth (9–10) which are well developed. Free portion of sheath one-third of base. Sheath with one external bristle beyond one-half, and three to four stout, along the ventral edge, with in addition a patch (6) of much smaller bristles at the apex.

Length, slightly over $1\frac{1}{2}$ mm.; alar expanse, $2\frac{1}{2}$ mm.

SOUTHERN NIGERIA: Agege, 1913 (*Dr. W. A. Lamborn*).

Type—a ♂ in the British Museum; one of a series of 5 ♂♂ and 1 ♀, and 4 broken examples.

***Tetrastichus mauripennis*, sp. nov. (figs. 1, 3).**

♀. Antennae blackish brown, the pedicel, the last funicular joint and the club almost black, the scape, especially on the ventral half, somewhat lighter. Head and thorax dull black. Wings brown-tinted, nearly as dark as scape. Legs, all coxae

and femora to near the apex blackish brown; trochanters paler. Abdomen bluish black, shining but hardly metallic; ovipositor light brown, the sheath black.

Head.—The eye is larger and more prominent than in *atriclavus*, and the head thus a little broader. In general the chaetotaxy is the same, the frons being very bristly. The infra-scapal bristles (10) are arranged differently; in *mauripennis* they form a U-shaped row, dipping down to above the clypeus; in *atriclavus* they are set in two horizontal rows (6, 4). *Antennae* (fig. 1d): scape hardly swollen (7:2), with two long ventral bristles, one before and one after one-half; pedicel (3:2), one-third of scape; ring joint, one distinct joint succeeded by two laminae, much more clearly separated than in the ♀ of the preceding species; joints one and two of funicle equal, and about one-twelfth longer than the third; club segments in ratio 12:9:7. The club is hardly appreciably expanded, the whole antenna after the ring joint being cylindrical. Sensoria numerous; on joints of funicle: (1st) 1 (upper edge), 10 (outside), 1, 10; (2nd) like 1st; (3rd) 2, 12, 2, 12; on club: (1st) 2, 9, 2, 9; (2nd) like 1st; (3rd) 2, 3, 2, 3. Length of antenna, 1.3 mm. *Mouth-parts*: mandibles of the same type as *atriclavus*, but they might be better described as bidentate, the upper inner edge being rounded off after the second tooth. Maxillary palpus a little over two and a half times as long as the labial.

Fig. 3. *Tetrastichus mauripennis*, sp. n., ♀; a, right wing; b, radius; c, junction of marginal and submarginal.

Thorax.—Pronotum with moderate regular raised reticulation, the mid region weakly chitinized; on each side of the mid line are over 30 minute bristles, becoming stronger posteriorly, while there is a posterior row of 20 bristles; episternite and sternum with coarse raised pattern. Mesonotum with a deep central furrow; inside

each parapsidal furrow a row (8–9) of bristles extending from the scutellar suture to three-fourths. Side lobes with 10 to 11 minute bristles. The pattern of the mid lobe so drawn out and fine that the surface shows many irregular closely set striae, on the scutellum the pattern is again regular, the cells being raised, so that the surface of the middle area especially is finely mammillated. Post-scutellum pitted and rounded in some specimens, but in most the propodeal keel is carried forward. Structure of the propodeon as in *atriclavus*, but the whole notum is honeycombed deeply and coarsely; 7 to 8 cells on each side of median keel; five bristles below the spiracle; pleurae below the spiracle smoother.

Wings (fig. 3).—Fore wings rather over twice as long as broad; length, 2.25 mm.; breadth, 1 mm. Submarginal: marginal: radius, as 10:15:4. Submarginal with 5 bristles; submarginal cell with about 14 bristles; marginal with 20 stout bristles, appearing beyond the costa. The radius bears about 12 bristles disposed as in the figure. There are 4–5 bristles below the submarginal vein on the basal triangle. Hind wings barely $3\frac{1}{2}$ times as long as broad. Submarginal: marginal, as 5:7. Whole surface densely hairy, except on the small triangle subtended by the submarginal, where there are only one or two minute scattered bristles; the comb of short bristles at the end of the marginal below the hooks of the frenulum numbers 9–10. Length, 1.7 mm.; breadth, 0.5 mm.

Legs.—Fore legs: coxae with three subapical external stiff bristles, and as many more (shorter) on the outer surface; femur nearly bare anteriorly, but below the dorsal edge there are 8–10 short bristles in a row; a similar ventral row of stiff, rather long bristles; on the posterior aspect are about 20 stout bristles widely but evenly spaced; tibiae bare posteriorly, with sparsely set bristles anteriorly; apical comb of 6 spines; comb on first tarsal joint with 9–10 spines. Mid legs: femora very bare, there being only a scattered row (4 or 5) of bristles about the middle of both aspects and a few shorter on dorsal edge and near the apex, besides the usual apical bristles; no ventral row; hind femora with only one or two long bristles more than the mid pair; the tibial comb with only 6 to 7 spines. The proportions of the tarsal joints are:—

	i.	ii.	iii.	iv.
Fore	30	35	35	65
Mid	45	45	35	75
Hind	60	55	45	75

Abdomen.—The integument, which has lost practically all its pattern, is smooth and shining, but highly magnified it shows numerous minute raised points. The tergites are extremely pilose, 80 to 90 bristles, occurring on the sixth alone. Anteriorly the bristles or hairs are sparser, but even tergite i. bears about 20. Between the stylets are about 30 straight stiff bristles, with many more outside. The ovipositor is similar in proportions and shape to that of the preceding species; the free portion of the sheath is narrower, with the superficial bristles nearer the apex; it is rather over one-third of the base.

Length, $2\frac{3}{4}$ mm.; alar expanse, 5–5½ mm.

♂. Antennae yellowish brown, the club very black. The thorax not so dull as in the ♀. Wings more faintly brown-tinted than in the ♀. Legs yellowish brown, the mid femora with a darker streak superiorly; the coxae blackish near the base, otherwise clear brown; hind coxae distinctly blue-black and shining above. Abdomen as in ♂, except the median basal one-third, which is transparent yellow.

Head.—*Antennae* (fig. 1c) with the sense-organ on the scape slightly longer than in *atriclavus*, with only three long bristles standing on the outer aspect, and subventral rather than ventral. Pedicel shorter and broader than in *atriclavus* (4:3), and two-sevenths of the scape in length; in *mauripennis* the pedicel is shorter than the first funicular joint (8:11), in *atriclavus* it considerably exceeds the first funicular joint (7:5). The funicular joints are sub-equal, the second being very slightly longest and the fourth the shortest; the first pair are cylindrical and the others, having the angles rounded, appear to be shorter than they really are. The club is not quite three-fourths as long as the last pair of funicular joints together, while in *atriclavus* the sum of those joints is not quite as long as the club; in *mauripennis* the club, segmented in ratio 8:7:6, is hardly swollen and not more than one-sixth wider than the first joint of the funicle. Sensoria as follows: first funicular, 1, 3, 1, 3; second to fourth 2, 4, 2, 4; on club: (1st) 1, 5, 1, 4; (2nd) 1, 4, 1, 4; (3rd) 1, 1, 1, 1. Length of antenna, 1.1 mm.

Length of ♂, over 2 mm.; alar expanse, 3.8 mm.

NYASALAND: Mt. Mlanje, 6.i.1914 (*S. A. Neave*).

Type, a ♀ in the British Museum, one of a series of 1 ♂ and 44 ♀♀.

***Tetrastichus sculpturatus*, sp. nov. (figs. 4, 5).**

♀. Antennae with the funicle and club black, scape pale, pedicel darker, but not so black as the funicle. Head and abdomen purplish black, with indefinite reflections. Thorax with the pleurae dull black, notum with a slight dark blue or green tinge. Wings distinctly tinted, darker a little below the marginal. Legs with the coxae nearly black, fore femora darker brown, all tibiae, tarsi and trochanters pale; mid and hind femora a little darker.

Head broad across the frons; eyes separated by more than two diameters; otherwise as in the preceding species. *Antennae* (fig. 4b), length 1 mm.; the scape narrow (9:3), with six to seven weak short bristles along the ventral edge, the two subapical being a little stronger; pedicel narrow (7:3) and more than one-third of the scape (7:18); funicle gradually expanded, the last joint wider (9:7) and very slightly shorter than the first, while i. and ii. are equal; club segmented in the ratio 9:6:7, but not much wider than the last funicular joint. Sensoria on funicle: (1st) 2, 2, 2, 2; (2nd) 2, 4, 2, 4; (3rd) 2, 4, 2, 5; on club: (1st) 2, 9, 2, 9; (2nd) 2, 6, 2, 6; (3rd) 1, 3, 1, 3. *Mouth-parts*: maxillary palpus thrice the labial, with one outer median bristle.

Thorax.—Pronotum with posterior row of ten bristles, the edge distinctly excavated at the spiracle. Mid lobe of mesonotum with three stout bristles inside the parapsidal furrows, all on the mid region and none near the scutellum. Propodeon similar to that of *atriclavus*, the notum being coarsely reticulate anteriorly with a smoothed median area round the central keel and sunk before the lateral keel, but

not irregularly deeply honeycombed as in *mauripennis*; all round the spiracle, between the pleural and the upper keels, the surface is roughened and raised. The fused keels composing the central keel, which is continued through the metanotum, are more plainly distinguishable in this species than in either of the others.

Wings.—Fore wings (fig. 5) over $2\frac{1}{2}$ times as long as broad; length, nearly 1.6 mm., and breadth, 0.6 mm. Submarginal : marginal : radius, as 7 : 8 : 2. One bristle on the submarginal; 10 or 11 on the narrow cell below; 9 to 10 stout bristles appearing

Fig. 4. *Tetrastichus sculpturatus*, sp. n.; a, antenna of ♂ (outside); b, antenna of ♀ (inside).

T. balteatus, sp. n.; c, antenna of ♂ (outside); d, antenna of ♀ (outside).

over the edge below the marginal vein; 8 to 9 bristles on the radius above. Alar pubescence dense, coming close up to the veins and extending nearly to the origin of the marginal. Hind wings $3\frac{1}{2}$ times as long as broad; length, 1.3 mm.; breadth, 0.4 mm. Submarginal five-sixths of the marginal.

Legs.—Fore legs: the anterior surface of the femora bears more bristles, only the ventral two-fifths being bare; the row of bristles at that level numbers 13–14; the apical tibial comb is peculiar, consisting of three pustulated spines with a bristle at (C205)

either side; comb of the first tarsal joint of 9-10. Mid legs: coxae bare, except for two stout bristles, one above the trochanter and one apical; tibial spur short, not three-fourths of first tarsal joint. Hind legs with tibial comb of 9 or 10 spines. The proportions of the tarsal joints are:—

	i.	ii.	iii.	iv.
Front	30	35	30	50
Mid	50	45	35	55
Hind	55	50	35	60

Abdomen.—Surface not densely clad; the bristles short; first and second tergites with 6 each; third and fourth tergites, 7 to 9 on each side, with one or two in front; on the fifth tergite, one or two more bristles in each row; the sixth and seventh

Fig. 5. *Tetrastichus sculpturatus*, sp. n., ♀; a, right wing; b, radius; c, junction of marginal and submarginal.

have a posterior row of about 14 bristles, with at each side, 6 or 7; 16 bristles between the stylets; the free sheath is one-third of the base.

Length, 2 mm.; *alar expanse*, 3·75 mm.

♂. Antennae pale to the end of the funicle, with sense organ on the scape narrowly darker; club darker. Head, body and wings as in the ♀, the wings of nearly the same tint in both sexes. Legs with coxae black, the remainder yellowish, the femora at most with darker upper and lower edges; the fore femora hardly darker than the others.

Head.—*Antenna* (fig. 4a). Length, 0·9 mm.; scape much swollen, about half as broad as long, with one or two more bristles on the apical external surface than in the

two preceding species. Sense-organ extending from near the apex to within one-fourth from the base and lying mainly along the ventral edge, with a fringe of 9 bristles. Pedicel two-fifths of the scape; longer than the first funicular joint; the club segmented as in *mauripennis*, shorter than the two preceding joints together, but wider than the first funicular joint (7:4). Sensoria on funicle: (1st) 1, 0, 1, 1; (2nd) 1, 1, 1, 1; (3rd) 1, 2, 1, 2; (4th) 1, 3, 1, 3; on club: (1st) 1, 4, 1, 5; (2nd) 1, 4, 1, 6; (3rd) 1, 3, 1, 2. In the antennal characters therefore, *sculpturatus* is intermediate between *atriclavus* and *mauripennis*.

Length, 1.5 mm.; alar expanse, 3 mm.

UGANDA: South of Lake George, bred from larvae of a butterfly, *Neptis agatha*, Cram., 6.vi.1911 (C. C. Gowdey).

Type, a ♀ in the British Museum, one of a series of 2 ♂♂ and 55 ♀♀.

The species described below, belongs to a group which shows more or less completely the following characters:—

♂♀. Antennae concolorous, at most the scape lighter. Propodeon simple, the surface smooth and raised reticulate, but not pitted; one keel or raised edge between notum and pleura, with the spiracle lying outside without surrounding hollow. Scutellar furrows deep. Legs robust, generally dark to near apex of femora and lighter afterwards. Wings with one hair on the submarginal, and a non-setigerous pustule a little nearer the wing base. Steel blue or black species; many described from dipterous hosts.

***Tetrastichus balteatus*, sp. nov.** (figs. 4, 6).

♀. Scape and pedicel of antenna pale, the latter a little darkened or smoky; funicle and club blackish brown. Head very dark, shining green, submetallic, becoming blacker near the clypeus, with a tinge of blue on the frontal side of the genal ridge. Mesonotum before the suture like the head; on the scutellum the dark blue tint is more apparent; pleurae blackish brown. Wings hyaline, veins light brown. Coxae black, with blue reflections on outer aspect of first pair; femora black to before the apex, thence to the claws the entire legs are yellow; claws black. Propodeon duller, abdomen more shining, like the head

Head a little wider than deep (6:5), with the eyes rather prominent and separated by nearly $3\frac{1}{2}$ diameters. The bare post-scapal area is broad, but there are the usual small bristles about the sides of the frons. Scrobes clear of the base line of the eyes, with only 1-2 minute bristles between. Below each scrobe are two similar bristles, but only one or two occur lower above the clypeus. *Antennae* (fig. 4 d): length, 0.8 mm.; scape with subparallel sides (4:1); four widely spaced ventral bristles; outside bare, except narrowly towards the apex; one stout ring joint and two thin laminae; funicular joints, 6:5:5; club, 10:9:6. The funicle is cylindrical and the club slightly expanded, its breadth compared with that of the first funicular being as 5:4. Sensoria numerous; on funicle: (1st) 2, 10, 2, 10; (2nd) 2, 6, 2, 8; (3rd) like 2nd; on club (1st) 2, 10, 2, 10; (2nd) 1, 8, 1, 8; (3rd) 1, 3, 1, 3. *Mouth-parts*. Mandibles with the lowermost tooth strong and deeply separated from the inner pair, which are rounded; the upper edge is narrowly incised in the middle. Labial palpus one-quarter of the maxillary.

Thorax.—Pronotum with the spiracular incision distinct, though not deep; surface rather coarsely reticulate and raised, posterior row of fourteen bristles, none standing in front of the spiracular incision. Mesonotum with two rows of bristles inside the parapsidal furrows; the outermost with six to seven; the inner one complete near the suture, with one or two fewer bristles; median sulcus distinct; on the scutellum the two sulci are very deep and the first bristle occurs behind one-half; all the pattern, both on mid lobe and scutellum, striate reticulate; all the sterno-pleural surfaces rough, the prepectus and episternite coarsely so. Post-scutellum rough, carinate. Propodeon with the spiracle outside the lateral ridge, notum and pleurae nowhere smooth, raised reticulate or roughened, six to eight hairs below the spiracle, which distinctly opens on the pleurae.

Fig. 6. *Tetrastichus balteatus*, sp. n., ♀: a, left wing; b, radius; c, junction of marginal and submarginal.

Wings (fig. 6) twice as long as broad; length, 1.4 mm.; breadth, 0.7 mm. Submarginal: marginal: radius, as 8:8:3. One bristle on submarginal, 15 on marginal, about 12 on radius, and bare on a spot on the other side of the < line of hairs. Beneath the marginal the hairs stand a little back and are more sparse, while on the broad apex they are denser; the posterior bare margin is rather broad. Hind wings four times as long as broad; length, 1.2 mm.; breadth, 0.3 mm.; submarginal: marginal, as 7:6.

Legs.—Fore legs: coxae rough outside, with minute bristles near the base, and about 12 scattered on the surface—3 near the apex larger; smoother on the inside, with 5 to 6 fringing bristles at the apical edge and 2 or 3 in a vertical row above;

on the anterior aspect of the femur, the median row of bristles has a broad, bare space above, while the ventral bristles are stout; apical tibial comb of 6 spines, comb of first tarsal joint of 9. Mid legs: coxae with 4 stiff bristles in a row parallel to exterior apical edge; internally bare, whole surface rough. Hind legs: coxae with coarse reticulations; about 12 minute bristles on the basal two-thirds of the exterior aspect, and 6 to 8 larger towards the apex; interiorly 4 bristles near the apex. Tibial comb of 9 to 10 spines. The proportions of the tarsal joints are:—

	i.	ii.	iii.	iv.
Fore	25	30	25	40
Mid	35	40	27	40
Hind	40	40	35	55

Abdomen.—On all the tergites the surface is smooth, broadly along the mid line, but the reticulations appear on the sides and overlapping flaps. From the third segment onwards the tergites are, especially laterally, very bristly; from the third tergite onwards the posterior row of bristles is uninterrupted; on tergite iii. this row contains 16–17 bristles and as many more in a patch on each side; on tergite iv. the row numbers about 20 bristles and the patches are correspondingly increased; the bristles increase in number on the fifth tergite and are reduced again on the sixth, where the posterior row contains 20. The spiracle is minute. The mid lobe of the fifth sternite is narrow and produced, and there are exceptionally one or two minute bristles on each side of the central pair. There are only 12–13 bristles between the stylets.

Length, 2 mm.; alar expanse, nearly 3·25 mm.

♂. More intensely black than the ♀, with the metallic reflections more pronounced. Antennae wholly black. Legs with femoral tips more narrowly pale.

Head.—*Antennae* (fig. 4 c): scape (3:1) with large sense-organ lying wholly on and occupying two-thirds of the ventral edge, and equidistant terminally from base and apex; internal surface bare, except for two rather strong bristles subventral and basal in position; externally above the hollow into which the pedicel folds are numerous scattered short bristles; two subapical ventral bristles between the sense-organ and the pedicel, placed in a subventral line above the organ, and hardly extending beyond the ventral edge. Pedicel shorter than the first funicular joint; funicle and club cylindrical, the latter elongated, and about one-sixth broader than the first funicular joint. The joints of the funicle (7:5) are equal in pairs, the first and second being a trifle longer than the third and fourth. The bristles of the funicle are irregularly placed and nowhere form definite rows with contiguous pustules; all are of the same calibre and the largest not more than four-fifths of the joint on which they stand. Club $2\frac{1}{2}$ times as long as the preceding joints and segmented in the ratio 6:8:5. Sensoria on funicle: (1st) 2, 4, 2, 3; (2nd) and (3rd) 2, 6, 2, 5; (4th) 2, 5, 2, 8; on club: (1st) 1, 4, 1, 5; (2nd) 1, 6, 1, 5; (3rd) 1, 2, 1, 2. Length of antenna, 0·8 mm.

Length, 1·5 mm.; alar expanse, 3 mm.

NYASALAND : Port Herald, bred from pupa of a Lymantriid moth (*Dr. J. E. S. Old*).

Type, a ♀ in the British Museum, one of a series of 1 ♂, 20 ♀♀.

Several species closely related to *T. balteatus* have recently been described by Prof. Silvestri, viz. : *giffardi* (1913), *oxyurus* (1913), *giffardianus* (1915) and *dacicida* (1915). Silvestri's species are all parasitic on fruit-flies (*Dacus*, etc.). From *giffardi*, *giffardianus*, and *dacicida*, *balteatus* ♂ differs in the chaetotaxy of the funicle, in the relative length of the first funicular joint, in the size of the scapal sense-organ and its fringing bristles. With *giffardi* I have been able to make direct comparison (a series from Aburi; identification confirmed by Prof. Silvestri) and there appear to be numerous minor differences between the species. The ♀ of *balteatus* may likewise be known by the first funicular, the radius, etc. Of the African *Tetrastichus*, *balteatus* probably stands nearest to *dacicida*, but the proportions of the hind tarsal joints appear to be different. In going over the collection in the British Museum an even closer ally was found in *Tetrastichus tachos*, Wlk. (Ann. Mag. Nat. Hist. ii, p. 352, 1839), from England.

A note on the antennal characters of *T. tachos* may be given.

Tetrastichus tachos, Walk. ♂.—*Antennae* (fig. 7 a): length over 1 mm.; scape with sense-organ covering four-fifths of the ventral edge; eight bristles fringing the sense-organ; outside bare, inside with sparse, evenly set bristles which tend to form a regular subventral row, especially near the apex. Each funicular joint bears near the base a whorl of tubular bristles (8–9) on the outer and dorsal aspects; the first pair of joints equal and slightly shorter than the second pair, which are also equal. The sensoria are fewer in number and shorter, and with longer flanges than in *balteatus*. *Wings*. There are more bristles on the radius than in *balteatus* (figs. 7 b, 8 b).

Syntomosphyrum phaeosoma, Wtrst. (figs. 7, 8).

Since describing this species (Bull. Ent. Res., v, p. 370, 1915) I have seen 1 ♂ and 5 ♀♀ bred from the cotton leaf-roller (*Sylepta derogata*), at Dedza, Nyasaland, by Mr. E. Ballard. In these examples the first two joints of the funicle are a little lighter than in the type (bred from the same host, in N. Nigeria), but the agreement is otherwise complete. I take this opportunity of describing the species in more detail and of noting the differences between it and *S. glossinae*, Wtrst. Both species have the mesonotum densely pilose on the mid lobe, while the first of the scutellar bristles occurs *before* one-half from the suture. There is a short, stout bristle immediately above the spiracular emargination on the pronotum, and the submarginal bears three bristles. The propodeal spiracle lies *inside* the notopleural ridge.

♀. *Antennae* pale, clear yellowish brown from scape to nearly end of funicle; last funicular joint obscured and club darker.* Head and thorax non-metallic purplish black, a little shining; eyes reddish chocolate. Wings clear, veins very light brown. Fore coxae entirely, and mid coxae (above), concolorous with thorax; hind coxae transparent, light brown; legs elsewhere yellowish brown—at most the fore femora with a smoky streak. Abdomen with the peduncle narrowly

* In the type the 1st and 2nd joints are also smoky.

transparent brown, like the hind coxae, so that under a low power there is a clear space behind the propodeon, otherwise coloured like head and thorax; the tergites (especially the first) show in some lights slight greenish or bluish reflections; ovipositor pale yellow, contrasting with the body colour; sheath like the rest of the abdomen.

Head wider than deep (6:5); eyes separated by about $3\frac{1}{2}$ times their own diameter, and with scattered short pubescence. *Antennae*: length. 0.5 mm.;

Fig. 7. *Tetrastichus tachos*, Walk.; a, antenna of ♂ (inside); b, radius. *Syntomosphyrum phaeosoma*, Wtrst.; c, antenna of ♂ (inside), chaetotaxy shown only as far as 1st funicular joint. *S. glossinae*, Wtrst.; d, scape of antenna of ♂ (inside).

scape hardly expanded medianly, $3\frac{1}{2}$ times as long as broad; with 6-7 ventral bristles and few others on either surface. Pedicel (3:2) half as long as scape; ring joint half as long as the first funicular; funicular joints quadrate, equal; club segmented in the ratio 7:5:5, and $2\frac{1}{2}$ times as long as a funicular joint, and half as broad again. Sensoria on funicular joints: from 5 on first to 7 or 8 on third; on club: (1st) 1, 4, 4, 1; (2nd) 1, 3, 3, 1; (3rd) 1, 1, 1, 1. *Mouth-parts*: mandibles short, with the second tooth sloping away from the first.

Thorax. Pronotum with a stout bristle above the spiracle, and a posterior row of 8 to 9; surface with moderately coarse reticulations and numerous (about 100) short bristles. Prosternite with coarse raised pattern. The mesonotum is similar to that of *S. glossinae*, there being 60-70 short bristles on the mid lobe, 2 at the postero-lateral corners stronger, and over 12 on the side lobes; the anterior bristle lies well before one-half and the non-setigerous pustule is a little inwardly displaced. The prepectus is coarsely reticulate; the episternite lower down is extensively rough, while the epimeron again is smoother. Reticulation of sternum most definite posteriorly. Metanotum shining, not so roughened on notum and pleurae as in *glossinae*. Propodeon entirely roughened (raised reticulate); the lateral keels posteriorly convergent and the spiracle lying just inside the anterior angle.

Fig. 8. *Syntomosphyrum phaeosoma*, Wtrst., ♀; a, right wing; b, radius; c, junction of marginal and submarginal.

Wings (fig. 8) twice as long as broad; length, 1 mm.; breadth, 0.5 mm.; submarginal a little shorter than the marginal; but roughly the proportions of the veins are 4 : 4 : 1. Submarginal with 3 bristles; marginal fringe of 10 bristles; radius with 3 bristles. Hind wings, 0.9 mm. long, and four times as long as broad.

Legs. The coxae, especially of the hind legs are coarsely raised reticulate above. The first tibial comb consists of five spines and there are as many along the anterior edge of the first fore tarsal joint. In the forelegs the proportions of the tarsal joints are exactly as in *glossinae*, but the species differ in the posterior pairs.

	i.	ii.	iii.	iv.
Mid leg	35	30	25	35

The hind tarsus has the second joint a little longer.

♂. Similar in colour to the ♀. The antennae (fig. 7 *c*) are concolorous, pale, but a little and evenly smoky; length, .44 mm.; the first funicular joint shorter than the second; sense-organ on scape more basal in position and shorter than in *S. glossinae*.

Length, 1 mm.; alar expanse, over 2 mm.

S. phaeosoma may be separated from *S. glossinae* by the colour, proportions (♂, ♀) and sense-organ (♂) of the antennae (fig. 7 *c, d*); the chaetotaxy of the mesonotum and the shape of the propodeon; the sculpture and colour of the abdomen; the colour and breadth of the wings; the colour of coxae and the proportions of the mid tarsal joints.