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A NEW GENUS OF SPHAEROMIINI (Diptera: Ceratopogonidae) FROM THE ORIENTAL REGION[1]

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Abstract: *Neosphaeromias* new genus is described from the Oriental Region, with type-species *gibbus* n. sp. from Laos and Thailand. Three additional species are included: *caesius* (Macfie) from Sumatra, *magnus* n. sp. from Vietnam, and *niger* n. sp. from Ceylon.

This paper is the third in a series of revisions of Oriental Ceratopogonidae, with previous studies by Wirth & Delfinado (1964) on *Alluaudomyia* Kieffer, and Das Gupta & Wirth (1968) on *Stilobezzia* Kieffer. The ceratopogonid material which has been sorted and mounted on slides from extensive light trap collections brought to the U. S. National Museum for the study by Wirth & Hubert (in preparation) on the *Culicoides* of Southeast Asia provides a source which we hope will facilitate much needed revisions of other genera of biting midges.

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Neosphaeromias Das Gupta and Wirth, new genus

Type-species: *Neosphaeromias gibbus* Das Gupta and Wirth, new species.

Diagnosis. Species of moderate to large size; body coloration brownish black to black; strong erect spine present on anteromedian margin of scutum; fore femur swollen with 10-30 stout ventral spines; fore tibia arcuate; tarsal claws each with small, external, toothlike process usually present, in ♀ also with a lamellate internal barb.

Head: Eyes bare, their inner margins (fig. 1 a) tending to meet in frontal part of frontovertex. Antenna long and slender, in female (fig. 1 b) with segments 3-10 short, oval to barely cylindrical; 11-15 strongly cylindrical with slightly uneven contour. Maxillary palpus (fig. 1 c) in both sexes with last 2 segments pale, the first 3 dark; 3rd segment slender, without sensory

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pit but with scattered spoon-shaped sensilla apically. Female mandible (fig. 1 d) tapering distad, with 8-12 large, slightly recurved teeth plus 1-3 additional but imperfect toothlike processes basally. *Thorax*: Arched gently dorsad, not projecting over head. Anterior margin of scutum (fig. 1 e, f) bearing medially a short, stout spine. Scutellum strongly arched from side to side, bearing several stout bristles and a number of interspersed smaller hairs. Postscutellum subconical and arched gently dorsad. *Legs*: Coxae to femora blackish on all legs; fore and mid tibiae partly pale, hind tibia entirely dark; 5th tarsomere dark brown, the other tarsomeres more or less pale. Fore femur (fig. 1 h) greatly swollen and armed with 10-30 short, stout spines; fore tibia arcuate: other hairs or spines on femora and tibiae only moderately developed; hind femur with a row of stiff, bristlelike hairs along flexor side, a few of these occasionally spinelike. First tarsomere of mid and hind legs and second tarsomere of hind legs of female (fig. 1 i) with ventral row of small, thorny setae; in male these present only on 1st and 2nd tarsomeres of hind legs; 4th tarsomere of female cordiform; 5th tarsomere of female with 2 marginal rows of stout, blunt, black, ventral spines (batonnets) plus 2 stout apical spines, in male with apical spines only. Claws of female (fig. 1 j) equal and usually with a pair of flattened internal barbs and a pair of toothlike external processes; in male (fig. 1 m) extreme claw tips bifid and only the external toothlike processes present, the internal barbs absent. *Wing* (fig. 1 k): Two anterior radial cells present, 1st small but 2nd quite spacious, about twice as long as 1st; medial fork sessile; costa extending to 0.70-0.87 of wing length. Anal vein characteristically bent at middle. Wing surface with abundant microtrichia; macrotrichia absent. Wing without strong color pattern but darker anteriorly, the veins with variable strong adjacent shading. *Abdomen*: Color intensely blackish; terga with scattered small setae and some long marginal bristles. Female with internal sclerotized gland rods absent; 8th segment without hair tufts or sclerotization. Spermatheca (fig. 1 l) one, strongly sclerotized, suboval to subspherical, with prominent slender neck. Male genitalia (fig. 1 n) with 9th sternum narrow; 9th tergum prominent with shallow to deep caudomedian notch and a pair of setose apicolateral lobes; basistyle with well developed mediangular process; dististyle slender with pointed, hooked tip; aedeagus (fig. 1 o) with slender basal arms, main body broad; parameres separate, long and lamellate, with rounded tips.

Discussion. The sessile media, absence of macrotrichia on the wing, ventral batonnets of ♀ 5th tarsomere, and absence of internal sclerotized gland rods in the ♀ abdomen are characters placing *Neosphaeromias* in the tribe Sphaeromiini. The stout body, ventral black spines of fore femur, 8th abdominal segment of ♀ without tufts or sclerotization, and presence of 2 radial cells are similar to *Sphaeromias* Curtis, but the short costa and presence of a strong external tooth on the ♀ claws are quite different from that genus. The combination of the strong external tooth and the internal lamellate process on the ♀ claws of 2 of the species is unique in the tribe Sphaeromiini. In Wirth's (1962) key to the genera of Sphaeromiini and related tribes, *Neosphaeromias* was keyed out in couplet 16 as "New Genus (S. E. Asia)" near *Mallochohelea* Wirth and *Nilobezzia* Kieffer.

Key to the species of Neosphaeromias

1. Small species, ♀ wing less than 2.0 mm long; wing with brownish streak from middle of anal vein small and vague; tarsomeres 1-4 entirely pale, only 5th dark brown ... **gibbus** n. sp.
   Large species, ♀ wing more than 2.0 mm long; wing with brownish streak from middle of anal vein prominent and almost reaching posterior wing margin; at least 3 distal tarsomeres partly or entirely dark brown 2
2. Dorsal surface of scutum with patches of silvery pruinescence ..... **caesius** (Macfie)

Dorsal surface of scutum dull black or with vittae of dull grayish tomentum 3
3. Tarsomeres 1-5 partly or entirely dark brown, none totally pale; 5th tarsomere of female with batonnets covering only proximal half of tarsomere ..... **magnus** n. sp.
Tarsomeres 1-2 entirely pale, 3-5 each partly or entirely dark brown; 5th tarsomere of female with batonnets covering entire length of tarsomere ..... **niger** n. sp.

Neosphaeromias gibbus Das Gupta and Wirth, new species Fig. 1.

♀. Small blackish species; wing length 1.75 (1.69-1.79, n=15) mm; breadth 0.63 (0.61-0.64, n=15) mm.

Head: Dark brown. Eyes large, broadly separated on their inner margins; vertex small, with 4-5 bristles caudad and 1 in middle, behind interocular bridge (fig. 1 a). Antenna (fig. 1 b) with lengths of segments 3-15 in proportion of 13-7-7-7-8-8-8-8-29-28-31-36-35, antennal ratio 2.42; segments 3-7 each mostly pale yellow, dark brown only distally; segments 8-10 pale yellow on basal half, dark brown distally; segment 11 pale yellow at extreme base, dark brown distally; segments 12-15 entirely dark brown; segments 11-15 strongly cylindrical with slightly irregular contour, slightly swollen at extreme bases; segments 3-10 each with basal whorl of shorter hairs; sensory hairs or sensilla absent. Maxillary palpus (fig. 1 c) slender; lengths of segments in proportion of 5-10-11-8-9; 3rd segment more slender distally, with a few long spoon-shaped sensilla scattered on distal portion, sensory pit absent. Mandible (fig. 1 d) with 11 (9-12) strong, recurved teeth. *Thorax*: Shining black. Scutellum with 6 stout bristles plus 12 interspersed smaller hairs. *Legs*: Color pattern diagrammed in fig. 1 g; all femora and mid and hind tibiae shining black; fore tibia brown at base, pale yellow distad; tarsi yellow, 5th tarsomere dark brown. Lengths of segments from femur to 5th tarsomere in proportion of 56-48-19-11-6-4-10 on fore leg; 62-55-31-10-5-4-10 on mid leg; and 68-60-38-17-7-5-10 on hind leg; corresponding tarsal ratios 1.7, 3.1, and 2.2. Fore femur (fig. 1 h) with 10-17 (n=8) stout spines along flexor side in 2 rows on distal 2/3, plus a similar but longer spine on extensor side subapically, otherwise sparsely hairy; other femora moderately stout with weak hairs, hind femur with some longer hairs; fore tibia arcuate, the others straight; mid tibia with 1 strong apical spine; hind tibia with 10-13 stronger extensor hairs; hind tibial comb of 6-7 spines, the second from the spur longest; tip of spur frayed. Hind tarsus as in fig. 1 i; 5th tarsomere of all legs armed with 12 batonnets along entire length of tarsomere. Claws equal, each with a short, external, toothlike basal process and a prominent internal barb (fig. 1 j). *Wing* (fig. 1 k): Very feebly infuscated around r-m crossvein and along other veins, otherwise pale; anterior veins strong, but others feeble though brownish. Costa extending to 0.78 (0.77-0.80, n=10) of wing length; wing surface bare, only 1 hair on radius close to basal arculus. Halter infuscated, the knob more intensely. *Abdomen*: Dark brown, terga with slightly pearly pruinescence. Spermatheca (fig. 1 l) one, strongly sclerotized, subspherical with prominent slender neck, measuring 0.099 by 0.072 mm including neck.

♂. Length of wing 1.24 mm; breadth 0.42 mm (n=2).

Similar to ♀ with such sexual differences as follows: Interorbital space larger, vertex broader (antennae missing in available specimens). Leg coloration as in ♀ but fore tibia paler and 5th tarsomere pale on all legs, mid tibia dark; fore femur characteristically swollen but armed with fewer stout spines, 12-14 in number; fore, mid and hind tarsal ratios 2.0, 2.7, 2.2. Fourth tarsomere not strongly cordiform; 5th tarsomere with batonnets absent, armed with only the subapical pair of small conical spines; legs less spinose in ♂, with the characteristic small thorny setae only on tarsomeres 1-2 of hind legs. Claws (fig. 1 m) each with short external tooth at base but without internal barb; each claw bifid at extreme tip. Wing color lighter than in ♀; costa extending to 0.70 of wing length. *Genitalia* (fig. 1 n): Small, compact, well sclerotized; 9th sternum narrow, with shallow, broad, caudomedian excavation, ventral membrane

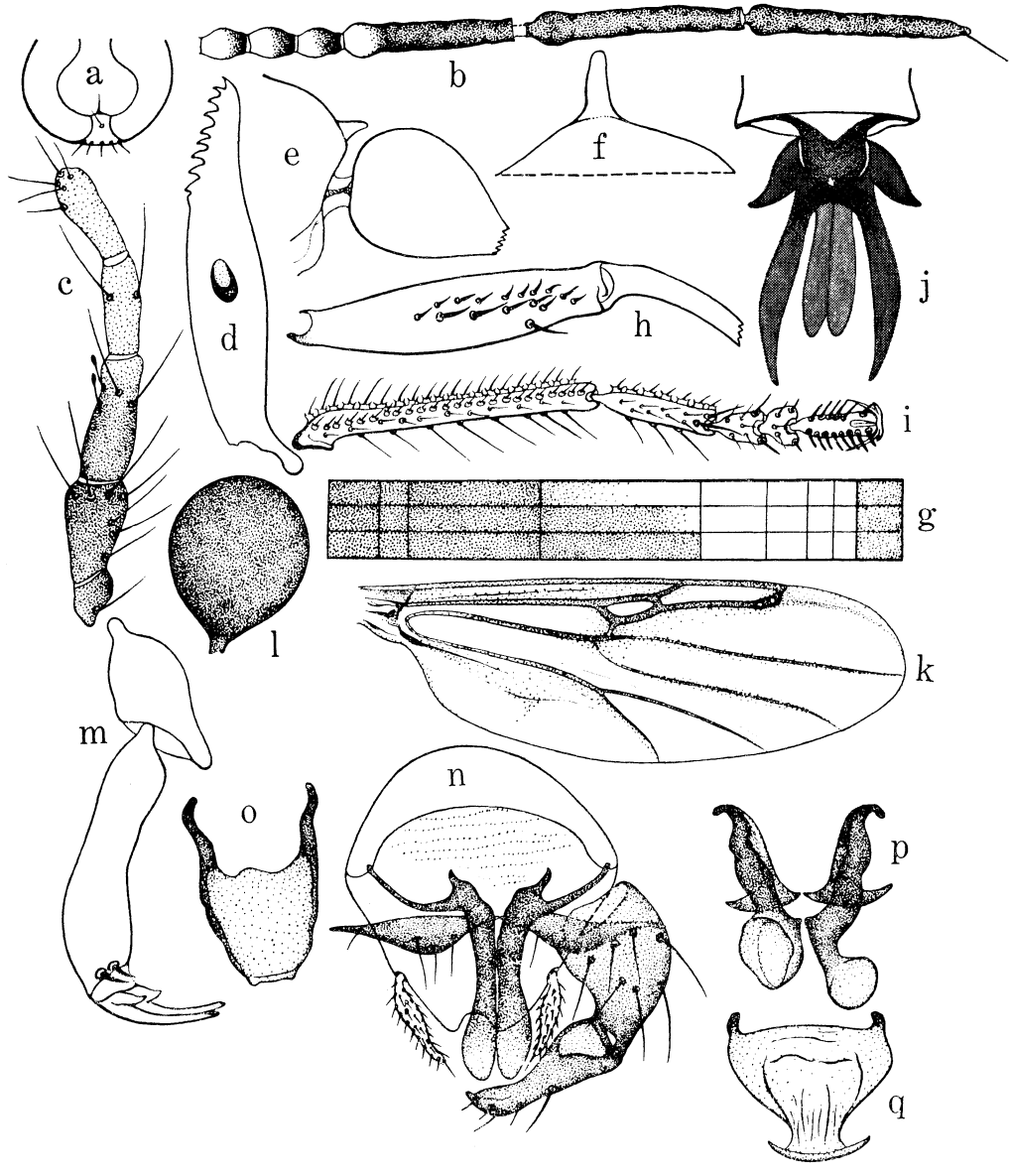

Fig. 1. *Neosphaeromias gibbus*, ♀ (a-l) and ♂ (m-q). a, frontovertex (× 21); b, antennal segments 8-11 and 14-15 (× 70); c, palpus (×140); d, mandible (×140); e, lateral outline of head and anterior half of thorax (×21); f, anterior view of dorsal outline of thorax (×70); g, diagram of coloration of legs, fore leg above, coxa left to tarsus right; h, flexor view of fore femur and proximal half of tibia (×42); i, hind tarsus (×50); j, hind tarsal claws with their external teeth and internal barbs (×350); k, wing (×21); l, spermatheca (×140); m, hind tarsomeres 4 and 5 and claws (× 210); n o genitalia of allotype (×140); p-q, parameres and aedeagus of paratype (×140).

feebly spiculate; 9th tergum subtriangular, its caudal end tapering with caudal margin mesally notched, a pair of slender, setose, apicolateral lobes present. Basistyle stout at base, mediangular process large; dististyle stout at base, narrowed abruptly past middle, its tip bluntly hooked. *Aedeagus* (fig. 1 o) a broad, lightly sclerotized plate; basal arms slender and slightly crooked; main body broad, the caudal margin blunt with tip sometimes flattened, caplike (fig. 1 q). Parameres separate, strongly sclerotized, each with slender anterolateral process and shorter anterior process; main portion long and clavate, with rounded caudal tip; in one slide (fig. 1 p) foreshortening produces the appearance of a strongly capitate tip.

DISTRIBUTION. Laos, Thailand.

Holotype ♀, allotype ♂, Loei Prov., Thailand, June 1959, Manop-R., light trap (Type no. 70655, USNM). Paratypes, 3 ♂♂, 52 ♀♀. LAOS: Muong Sing, 7.VI.1960, L. and S. Quate, 1 ♀. THAILAND: Same data as types, 3 ♂♂, 42 ♀♀. Khon Kaen Prov., Ban Pai and Choom Pae Dists., V.1959, Manop-R., 8 ♀♀. Udonthani Prov., Nong Han Dist., VI.1959, Manop-R., 1 ♀.

Discussion. Neosphaeromias gibbus is apparently abundant in Thailand, as evidenced by the relatively large number of specimens taken in light traps. Some differences appear in the ♂ genitalia, according to orientation of the slide mounts, and an extreme is figured in which the parameres (fig. 1 p) and aedeagus (fig. 1 q) are foreshortened due to nearly perpendicular orientation on the slide.

Neosphaeromias niger Das Gupta and Wirth, new species Fig. 2.

♀. Large stout blackish species; wing length 2.60 (2.56-2.64, n=5) mm, breadth 1.12 (1.05-1.18, n=5) mm.

Head: Dark brown. Eyes large, narrowly separated on inner margins (fig. 2 a); vertex reduced with a few marginal bristles. Antenna (fig. 2 b) with lengths of segments 3-15 in proportion of x-x-5-5-5-5-6-6-26-21-23-24-29; similar to *gibbus* except segments 3-10 suboval and more broadly pale. Palpus as in *gibbus*; lengths of segments in proportion of 6-12-13-8-12. Mandible with 9-11 teeth. *Thorax:* Shape, setation, and color as in *gibbus*; scutellum with 8 stout bristles and 8 smaller interspersed hairs. *Legs*: Color pattern diagrammed in fig. 2 c; lengths of segments from femur to 5th tarsomere in proportion of 77-66-22-13-7-6-12 on fore leg, 83-73-42-11-6-5-13 on mid leg, and 100-82-51-19-7-7-13 on hind leg; tarsal ratio on fore, mid, and hind leg 1.69, 3.82, 2.67; hind tibial comb with 9-11 spines. Fore femur with 17-19 stout spines arranged as in *gibbus*. Fifth tarsomere with 16 batonnets; tarsal claws as in *gibbus*. *Wing* (fig. 2 d): Brownish infuscation more extensive than in *gibbus*; costa extending to 0.76 of wing length. Halter infuscated. *Abdomen*: Deeply infuscated; terga setose with longer marginal bristles. Spermatheca (fig. 2 e) well sclerotized and suboval with prominent slender neck, measuring 0.099 by 0.077 mm including neck.

♂. Length of wing 2.26 mm, breadth 0.53 mm (n=2). Similar to ♀ with usual sexual differences as outlined for *gibbus*. Genitalia (fig. 2 f): Ninth sternum narrow with broad, deep, caudomedian excavation, ventral membrane spiculate; 9th tergum elongate, tapering caudad with rounded, slightly bilobed caudal margin; apicolateral lobes elongate and setose. Basistyle not as stout as in *gibbus* with smaller mediangular process; dististyle longer and not as abruptly narrowed as in *gibbus*, the distal tip slender and bent inwards. *Aedeagus* (fig. 2 g) with basal arch extending nearly to half of total length, the basal arms slender and not diverging; main body ovoid, apex rounded. Parameres separate, each with basal process bent abruptly to connect with mediangular process of basistyle; main body slender, slightly bent, distal portion slightly expanded and more lightly sclerotized, clavate, with rounded tip.

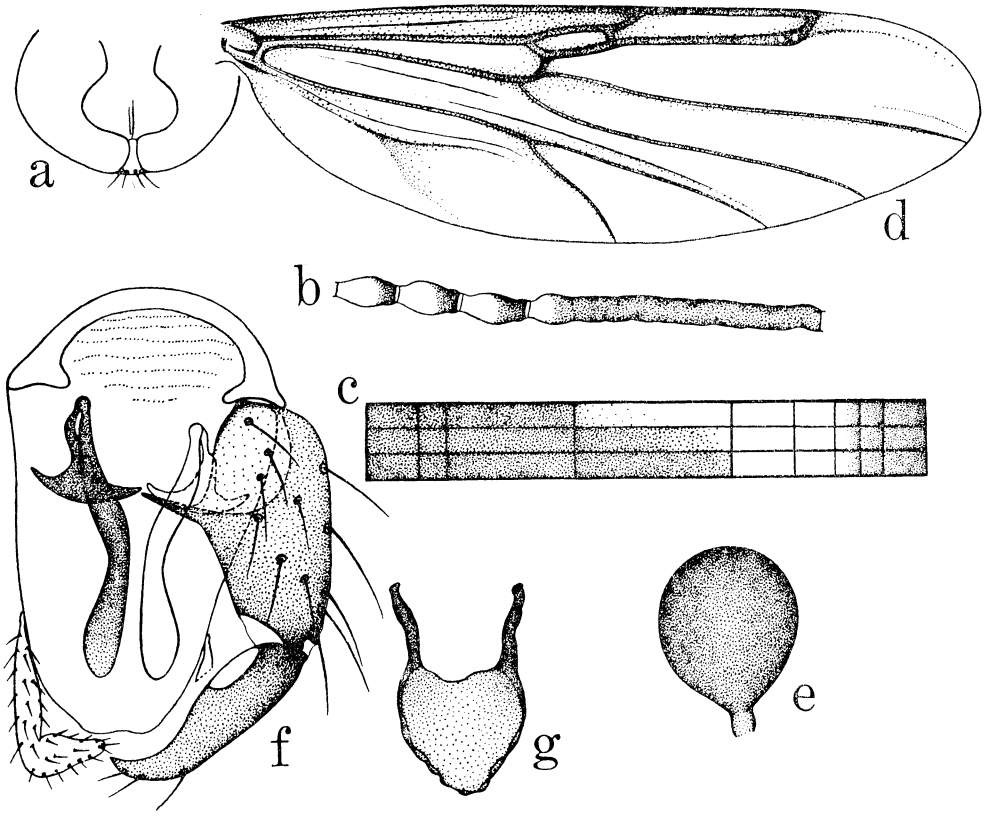

Fig. 2. *Neosphaeromias niger*, ♀ (a-e) and ♂ (f-g). a, frontovertex; b, antennomeres 8-11); c, diagram of coloration of legs; d, wing; e, spermatheca; f, ♂ genitalia, aedeagus removed; g, ♂ aedeagus (all drawn to same scale as in fig. 1).

DISTRIBUTION. Ceylon.

Holotype ♀, allotype ♂, Kalutaluwewa, Colombo, Ceylon, 19.II.1958, Med. Res. Inst., light trap (Type no. 70656, USNM). Paratypes, 8 ♀♀, same data as types.

Discussion. Neosphaeromias niger is quite similar to *gibbus* n. sp. but is much larger, the proximal antennal segments are more elongate with the pale proximal bands more extensive, and the tarsi are darker with all of the 4th tarsomeres and part of the 3rd brownish. The ♂ genitalia of *niger* are more elongate, the bases of the parameres lack the slender anterolateral processes, and the tip of the aedeagus is not truncate. We have seen this species only from Ceylon.

Neosphaeromias magnus Das Gupta and Wirth, new species Fig. 3.

♀. Very large blackish species; wing length 3.12 mm, breadth 0.92 mm.

Head: Blackish. Eyes large, narrowly separated on their inner margins; vertex reduced, bearing a few marginal bristles, those in center rather short. Antenna broken off in the avail-

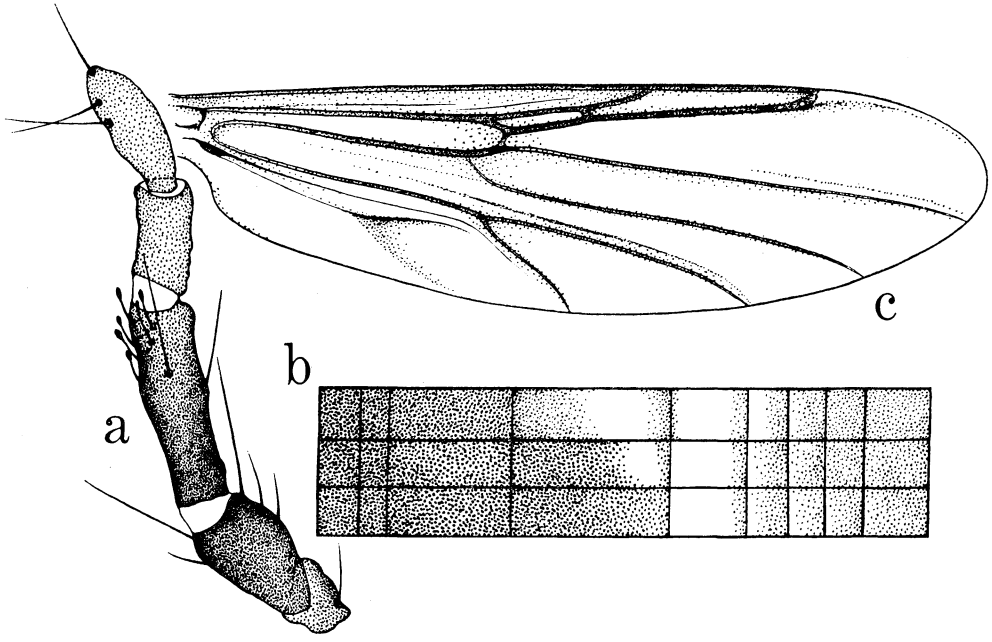

Fig. 3. *Neosphaeromias magnus*, ♀. a, palpus; b, diagram of coloration of legs; c, wing (drawn to same scale as in fig. 1)

able specimens. Palpus (fig. 3 a) as in *gibbus* but with more sensilla on 3rd segment. Mandible with 8-10 teeth. *Thorax*: Dull black, scutum with fine scalelike tomentum; a submedian pair of grayish vittae anteriorly. Otherwise as in *gibbus*. *Legs*: Color pattern as diagrammed in fig. 3 b; lengths of segments from femur to 5th tarsomere in proportion of 60-55-21-11-5-4-10 on fore leg, 77-52-37-14-5-4-12 on mid leg, and 80-69-48-18-6-5-14 on hind leg; tarsal ratios on fore mid, and hind legs 1.91, 2.64, 2.67. Fore femur greatly swollen, with 28-29 stout spines as in *gibbus*; legs with setation as in *gibbus* but mid and hind femora with a few very stout distal spines on flexor side; hind tibial comb with 10 spines. Fifth tarsomere with 9-10 batonnets, restricted to proximal half of tarsomere; claw with external toothlike process absent, only the small, slender, internal barb present. *Wing* (fig. 3c): Infuscation nearly as in *niger*; costa extending to 0.8 of wing length. Halter infuscated. *Abdomen*: Deeply infuscated. Spermatheca not clearly visible due to opaqueness of slide mount.

DISTRIBUTION. Vietnam.

Holotype ♀ (BISHOP 9229), Kontum, N of Pleiku, Vietnam, 13.V.1960, S. Quate (deposited in B. P. Bishop Museum, Honolulu). Paratype ♀, pinned, Balao, Vietnam, 500 m, 14-21.X.1960, C. Yoshimoto.

Discussion. This species differs considerably from *gibbus* and *niger* in lacking the external basal tooth on the ♀ tarsal claws, and in the restriction of the batonnets to the proximal half of the 5th tarsomere. Less striking are such differences as the more extensive dark color of the distal tarsomeres and the greater number of spines on the fore femur.

Neosphaeromias caesius (Macfie), NEW COMBINATION

Palpomyia caesia Macfie, 1934: 224 (♀; Sumatra).

Although we have not seen this species, we are convinced from reading Macfie's description that it belongs in *Neosphaeromias*, and is closely related to *magnus* n. sp. Macfie mentions particularly the following:

♀. Length of wing 3.5 mm, breadth 0.9 mm. Head almost black; eyes separated widely. Antenna dark brown, but bases of segments, especially 3-10, paler yellowish. Thorax almost black, with silvery pruinescence, notably a long oval patch on each side of midline, and 3 small spots external to it. Thoracic tubercle well formed, sharply pointed. Scutellum almost black; bearing 8 dark bristles. Wing unadorned, but anterior margin and veins brown or brownish. Costa extending to about 7/8 of wing length. Halter infuscated. Legs with all femora and hind tibiae entirely very dark brown, almost black; fore tibia dark brown at base and (more narrowly) apex, paler brown between; mid tibia with dark brown portion wider, covering nearly basal 2/3. Tarsi rather pale brown, but last 2-3 segments and apices of others infuscated. Fore femur much swollen, armed below with 25 black spines; mid and hind femora normal, each armed with 2 spines. Fore tibia slender, curved, the tip on the flexor side projecting a little but not forming a large black spur as in *Palpomyia calcarata*. Tarsi with 4th tarsomere cordiform on hind legs; last tarsomere on all legs armed with 8-9 dark, blunt-ended spines; tarsal ratio on hind leg 3.0. Claws on all legs equal, about 1/2 length of last tarsomere, each with a small basal barb on inner side. Abdomen almost black. No sclerotized gland rods. Spermatheca single, highly sclerotized, oval, measuring 0.093 by 0.085 mm, the sclerotized neck measuring 0.011 mm long.

DISTRIBUTION. Sumatra.

Holotype ♀, Fort de Kock, Sumatra, 920 m, 1925, E. Jacobson (in BMNH).

Discussion. The costa of *N. caesius* is longer than in the 3 new species here described, but not so long as in the species of *Sphaeromias*. The presence of the internal barb on the ♀ claws, together with the lack of the external basal tooth, allies *caesius* with *magnus* n. sp., which it also resembles in the presence of markings on the scutum.

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