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A NEW GENUS OF PREDACEOUS MIDGES OF THE TRIBE SPHAEROMIINI FROM THAILAND (DIPTERA: CERATOPOGONIDAE)[1]

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Abstract. *Niphanohelea bannae,* a new genus and species of predaceous midges of the tribe Sphaeromiini from Thailand, is described and illustrated. This new genus most closely resembles *Jenkinshelea* and *Crispomyia* in the greatly expanded anal lobe of the wing. *Niphanohelea* differs from those genera and all others in the family by its highly modified wing venation, especially the distal fusion of veins R_{4+5} and M_1. It also differs from all other genera in the family, except for those in the Leptoconopinae, in lacking the r-m crossvein. *Niphanohelea* is also closely allied to *Calyptopogon* and *Macropeza,* which also are markedly apotypic, mainly Old World Sphaeromiini.

An unusual predaceous midge was collected by T. C. Maa in southern Thailand during May 1958. This specimen was deposited in the Bishop Museum, in Honolulu, where it has remained until recently, when we had the opportunity to examine it. It is in only fair condition, the antennal flagella and mid tibiae and tarsi being lost, but it is so different from its nearest relatives that a new genus is here proposed for it.

This specimen has been slide-mounted in phenol-balsam in the manner of Wirth & Marston (1968). For an explanation of general terminology of Ceratopogonidae see Wirth (1952) and Wirth et al. (1977).

Niphanohelea Grogan & Wirth, **new genus**

Type-species: *Niphanohelea bannae* Grogan & Wirth, n. sp.

Diagnosis. A genus of large predaceous midges of the tribe Sphaeromiini distinguished from all other ceratopogonid genera by the following combination of characters: wing with 1 large radial cell, venation highly modified, lacking r-m crossvein, veins R_{4+5} and M_1 fused distally, anal lobe greatly expanded. Fourth tarsomere of fore leg cordate or heart-shaped, 4th tarsomere of hind leg elongated, cylindrical; 5th tarsomere of fore leg fusiform with 6 batonnets; 5th tarsomere of hind leg elongated, inflated, with only an apical pair of batonnets; fore tarsal claws subequal, hind claws equal. Two well-developed spermathecae.

Etymology. We are pleased to name this new genus in honor of Niphan Chanthawanich Ratanaworabhan of the Thailand Institute of Scientific and Technological Research, Bangkok, Thailand, in recognition of her many contributions to the study of ceratopogonids. The gender of the genus is feminine.

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Niphanohelea bannae Grogan & Wirth, **new species** FIG. 1

Diagnosis. Since only 1 species of the genus is known, its diagnosis is that of the genus.

Holotype ♀. Wing length 3.18 mm; breadth 1.33 mm. *Head.* Brown. Eyes bare, broadly separated (FIG. 1D), by a distance of 0.12 mm. Antenna with moderately long scape bearing only a single seta; pedicel dark brown bearing 3 setae; flagellum lost. Palpus (FIG. 1C) lighter brown, 5-segmented, short, segments with lengths in proportion of 6-9-14-8-11; 3rd segment moderately broad, bearing 6 capitate sensilla on ventromesal surface; palpal ratio 1.75. Mandible (FIG. 1E) with 7 large apical teeth and 3–5 small proximal teeth on inner margin. *Thorax.* Dark brown. Scutum broad, convex, apparently without anterior spine or humeral pits; scutellum with 4 bristles; postscutellum long but not elevated. Legs brownish, slender; femora and tibiae with yellowish pattern as in FIG. 1B; mid tibia and tarsus lost; fore and hind tarsi as in FIG. 1B; fore 1st and 2nd tarsomeres each with a pair of weak apical spines, hind 1st and 2nd tarsomeres very elongate with dense palisade setae and a pair of weak subapical spines; fore 4th tarsomere (FIG. 1G) cordate or heart-shaped, covered with fine dense pile, hind 4th tarsomere elongated, cylindrical; fore 5th tarsomere (FIG. 1G) with 6 batonnets, fore claws moderately long and subequal; hind 5th tarsomere (FIG. 1H) elongated, greatly inflated with only an apical pair of batonnets, the claws equal, about same size as fore claws. Wing (FIG. 1A) moderately broad, anal lobe greatly expanded, surface covered with dense microtrichia on anterior ½, posterior portion with finer microtrichia, fringe long, fine; 1 large radial cell present, costa extending 0.94 of wing length; R_{4+5} bowing posteriorly and fusing distally with vein M_1; r-m crossvein absent; media petiolate, M_2 complete to base; an adventitious pale vein arising near tip of M_1, interrupted at its base and apex; mediocubital fork arising proximal to fork of M_1 and M_2; anal veins weak. Halter stem light brown; knob white. *Abdomen.* Dark brown; distal margins of terga 2 and 5 and most of terga 6 and 7 whitish previous to clearing in NaOH. Genitalia as in FIG. 1F. Eighth tergum extending onto ventral surface and overlapping 8th sternum, which is more lightly sclerotized than the former; 8th sternum with shallow posterior cleft and 2 small, very heavily sclerotized arms, covered posteriorly with long dense pale setae. Ninth sternum divided into 2 slender arms that are moderately sclerotized. Tenth sternum moderately sclerotized, covered with dense pile of fine setae and 2 large apical very heavy setae; cerci also with apical heavy setae. Spermathecae 2, ovoid, unequal with broad openings but no discernible necks plus a small rudimentary 3rd spermatheca.

♂. Unknown.

Distribution. Thailand; known only from the type-locality.

Type. Holotype ♀ (BISHOP 11,596). THAILAND: Nakhon Si Thammarat Prov, Banna, 360 ft (109 m), 8–10.V.1958, virgin forest, partly destroyed, at the foot of Khao Luang Mt, T.C. Maa.

Etymology. The specific name *bannae* refers to the type-locality in southern Thailand where this unusual midge was taken.

Discussion. *Niphanohelea* will not key out satisfactorily in Wirth et al. (1974) because it lacks crossvein r-m. It differs from all other genera in the family, except for the Leptoconopinae, in lacking this crossvein. In other aspects, i.e., the presence of batonnets on the 5th tarsomeres, the absence of internal sclerotized gland rods in the abdomen, and the patches of long pale setae on the 8th sternum, it appears to be a highly modified member of the tribe Sphaeromiini. It most closely resembles *Jenkinshelea* Macfie (1934) and *Crispomyia* Debenham (1974) in the greatly expanded anal lobe of the wing. It is even more highly modified than either in the distal fusion of veins R_{4+5} and M_1 and the modified 4th and 5th tarsomeres. The nearctic *Jenkinshelea* species were recently revised by Grogan & Wirth (1977), who compared that genus with *Crispomyia*. These 2 genera are apparently closely related, differing mainly in

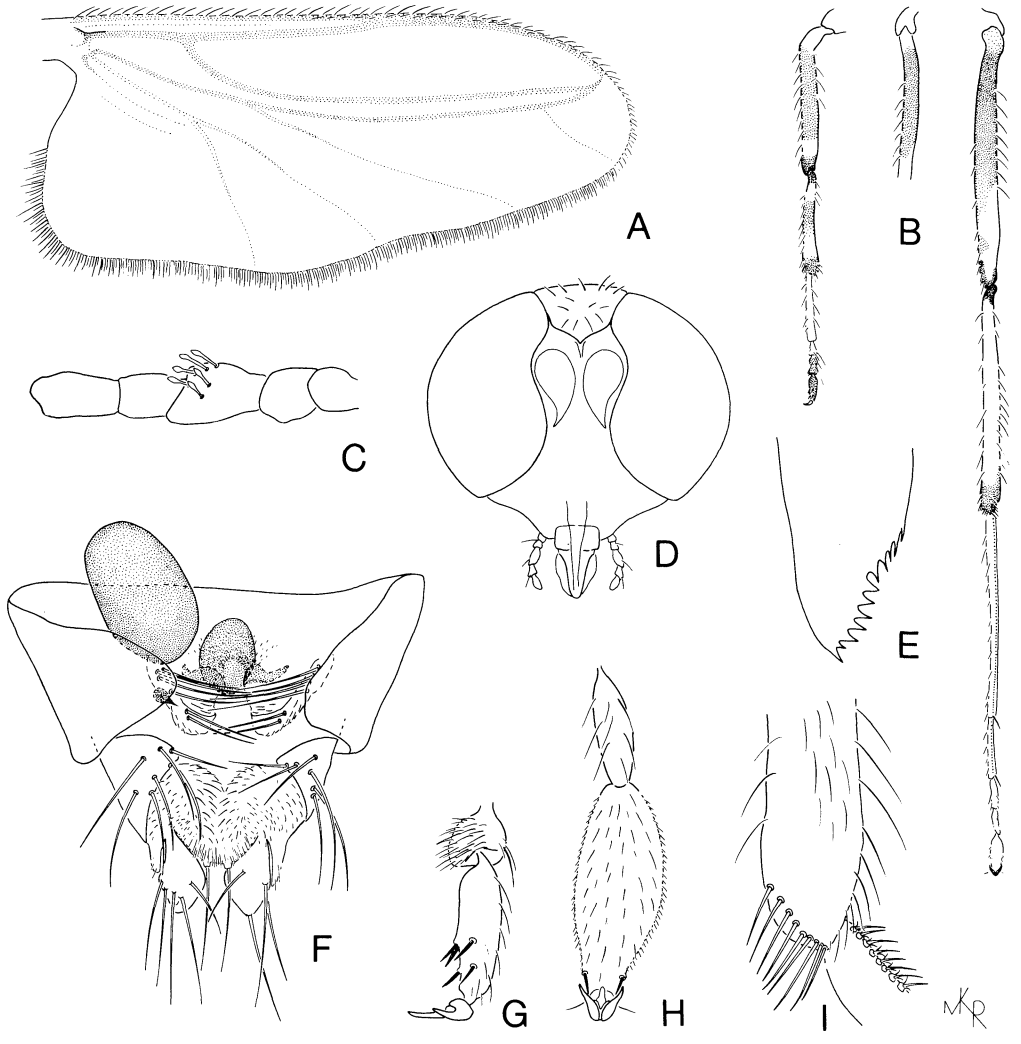

FIG. 1. *Niphanohelea bannae,* ♀: A, wing; B, legs (mid tibia and tarsus lost); C, palpus; D, head, anterior view; E, mandible; F, genitalia; G, tarsomeres IV and V and claws of fore leg; H, same, hind leg; I, hind tibial comb.

the configuration of their 4th tarsomeres and the number of radial cells. *Niphanohelea,* however, is more apotypic, possessing several character states not present in *Jenkinshelea* or *Crispomyia,* but more closely resembling species of *Macropeza* Meigen and *Calyptopogon* Kieffer.

Apparently the greatly expanded anal lobe of the wing, which distinguishes *Jenkinshelea, Crispomyia* and *Niphanohelea* from all other Sphaeromiini, is not a trustwor-

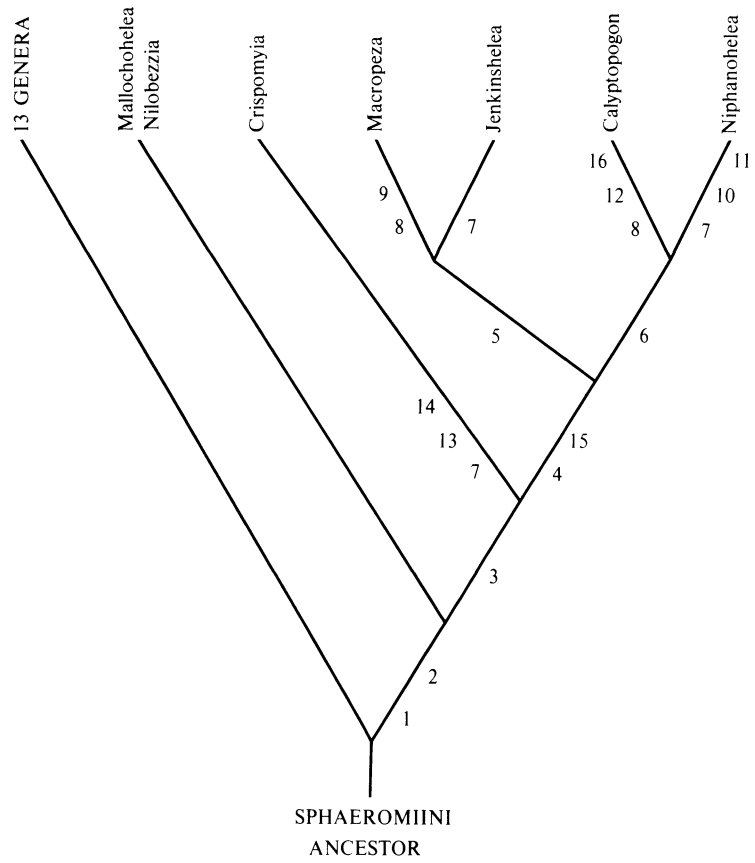

FIG. 2. Hypothetical phylogeny of *Niphanohelea* and related genera of Sphaeromiini. Apotypic character states numbered as explained in text.

thy indicator of common ancestry. In all the Sphaeromiini the nature of the 4th and 5th tarsomeres, the armature of batonnets, and the development of the female tarsal claws are much more reliable in distinguishing genera and presumably also as indicators of common ancestry. For this reason we would reconstruct the hypothetical lineage of the genera related to *Niphanohelea* as in FIG. 2.

The ancestral lineage is distinguished from all other Sphaeromiini by the presence of equal tarsal claws (apotypic character state 1 in FIG. 2) on all legs of the female, each claw with a short, blunt, external, basal tooth (apotypic character state 2). The long costa, over 0.84 of the wing length (apotypic character state 3), will separate the *Niphanohelea* lineage from the genera *Mallochohelea* Wirth and *Nilobezzia* Kieffer, which have the costal ratio about 0.8. *Crispomyia,* with relatively short hind tarsi, is apparently the most primitive member of the *Niphanohelea* lineage delimited thus far,

while the remaining 4 genera have the hind tarsi moderately to greatly elongated (apotypic character state 4). *Jenkinshelea* and *Macropeza* have tarsomere 4 cordiform on all legs (apotypic character state 5), while the other 2 genera, *Calyptopogon* and *Niphanohelea,* have tarsomere 5 of the fore leg fusiform (apotypic character state 6). *Jenkinshelea* is separable from *Macropeza* by the greatly expanded anal lobe (the relatively unstable apotypic character state 7), while *Macropeza* is distinguished by the costa extending to the wing tip (apotypic character state 8) and the separate male parameres (apotypic character state 9). Apotypic character state 8 will also distinguish *Calyptopogon* from *Niphanohelea.* The latter is distinguished by the expanded anal lobe (apotypic character state 7), as well as 2 unique and highly apotypic character states, tarsomere 5 of the hind leg inflated (apotypic character state 10), the great displacement of vein R_{4+5}, its apical fusion with M_1, and the absence of the r-m crossvein (apotypic character state 11). The absence of the anal lobe of the wing (apotypic character state 12) is unique to *Calyptopogon. Crispomyia* is distinguished by the broadly contiguous eyes (apotypic character state 13), and the 4-segmented palpus (apotypic character state 14). The elongation and more perpendicular position of the r-m crossvein and the consequent broadening of the basal cell of the wing (apotypic character state 15) is a trend observed in *Macropeza, Jenkinshelea,* and *Calyptopogon.* In *Niphanohelea* the venation of this area of the wing can be interpreted as the culmination of this tendency in the proximal movement and anteroproximal orientation of the r-m crossvein and its capture by the posteriorly arched vein R_{4+5} (apotypic character state 11). *Calyptopogon* is further distinguished by the elongation of the terminal abdominal segments (apotypic character state 16).

The evolutionary trends in this section of the Sphaeromiini can be summarized then as follows: *Crispomyia* stands as perhaps the most generalized, with larger claws, cylindrical 4th tarsomere, cylindrical 5th tarsomere with evenly distributed abundant ventral batonnets, and relatively large, equal tarsal claws in the female, each with blunt external basal tooth; the expanded anal lobe of the wing and the broadly contiguous eyes are relatively weak apotypies. In various combinations, the lineages have split and evolved the following tendencies: anal lobe of the wing greatly expanded (apotypic character state 7) or greatly reduced to practically absent (12); costa elongate (8), extending to wing tip; and the venation showing modifications, such as the broadening of the basal cell (15) or the loss of the r-m crossvein and distal fusion of veins R_{4+5} and M_1 (11). The hind legs tend to lengthen, until in 2 genera the hind tarsi are greatly elongated (4), and along with this the 5th tarsomere becomes inflated (10), perhaps as a sexual recognition feature. The fore tarsi may become modified by the fusiform swelling of the 5th tarsomere (6), somewhat like that found in some Heteromyiini. The 4th tarsomere became cordiform or heart-shaped in all the genera of this lineage except *Crispomyia,* but this character state was secondarily lost on the hind legs of *Calyptopogon* and *Niphanohelea* with the great elongation of the hind tarsi. In *Calyptopogon* the general elongation and attenuation of the body and appendages

is carried even further in the elongated 8th and 9th segments of the female abdomen (16); while in *Macropeza* there is a secondary separation of the basal union of the male parameres (9).

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