

New species of the genus *Nanodromia* Grootaert (Diptera: Empidoidea, Hybotidae) from Thailand.

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ABSTRACT.—The genus *Nanodromia* Grootaert is recorded here for the first time in the Oriental region. Four new species for sciences are described from Thailand: *N. narmjeud* (East Thailand), *N. phukhao* (Northeast Thailand), *N. narmkroi* (South Thailand) and *N. taksin* (South Thailand). A key to all species is provided. The gland-like structures on the male abdomen are described for the first time in *Nanodromia*.

KEY WORDS: Empidoidea; Hybotidae; Tachydromiinae; *Nanodromia*; new species; Oriental; gland-like abdominal structures; Thailand

INTRODUCTION

The genus *Nanodromia* Grootaert (Grootaert, 1994) was originally described from Papua New Guinea on the basis of three species. *Nanodromia* is very common in New Guinea and many more species have been identified by the authors, but they have not been described yet. In the present paper we describe four species from Thailand, which represent the first records for the Oriental region.

Nanodromia belongs to the subfamily Tachydromiinae and is a member of an assemblage of genera known nowadays as the tribe Drapetini (Chvála, 1975). It is a genus of very small (about 2 mm long) predaceous flies inhabiting the low-lying vegetation zone. In Thailand *Nanodromia* can easily be confused with *Stilpon* Loew occurring usually in the

same biotopes. Both genera have a short second vein (vein R2+3 ending close to the middle of the costa and not near the wing tip), but, *Nanodromia* has the wing cells br and bm equally long, while cell br is distinctly shorter than cell bm in *Stilpon*. *Stilpon* is fairly common in Southeast Asia with 17 species (Shamshev and Grootaert, in press). Fifteen species are known from Thailand, mainly from Northeast Thailand (11 species). In comparison to *Stilpon*, *Nanodromia* is rather rare in the Oriental region, though undescribed new species can yet be found.

In the original description of the genus, no intersegmental glands were reported in the males of the three species studied. However, in all species described here, the intersegmental spaces between tergites 4 and 5 and also often between 5 and 6, are modified into glandular structures. In two species, the glandular space between tergites 4 and 5 is very specialised and transformed into an internal vessel-like structure that opens between these tergites. This character is a common and well known feature

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of some Drapetini genera. The functional value of these gland-like structures is considered to deal with epigamic behaviour (Smith and Davies, 1965).

MATERIALS AND METHODS

The flies were collected by sweeping or in white pan traps and transferred to 75 % ethanol. Terms used for adult structures primarily follow those of McAlpine (1981), although the terminology for the antenna is taken from Stuckenberg (1999). Homologies for the male and female terminalia follow Cumming and Cooper (1992) and Sinclair (2000). To facilitate observations, the terminalia were macerated in hot 85 % lactic acid and immersed in glycerine. Drawings of morphological features were made with a camera lucida attached to a compound microscope.

In descriptions, right and left side of the male terminalia are based on the unrotated position viewed posteriorly, such that in the illustrations the right surstylus appears on the readers left side and vice versa. All male terminalia are figured in their unrotated position.

Type material is stored at the Royal Belgian Institute of Natural Sciences (RBINS), Chulalongkorn University Museum of Zoology (CUMZ) and Zoology department of Srinakharinwirot University (Bangkok).

ABBREVIATIONS

Br: first basal cell
 Bm: second basal cell
 Hy: hypandrium
 RC: right cercus
 REL: right epandrial lamella
 RS: right surstylus
 LC: left cercus
 LEL: left epandrial lamella
 LS: left surstylus

TAXONOMIC OBSERVATIONS

Nanodromia narmjeud sp. nov.
 (Figs 1-7)

Material examined.— **Holotype** male: Thailand, Chantaburi province, Pliu (alt. 10-50 m), 26.III.2002, sweep netting along stream (sample n° 22001, leg. P. Grootaert & Ping; RBINS). **Paratypes:** 3 females, same data as in holotype. (1 female in coll. Chulalongkorn University); 3 males, 3 females, Trat province, Koh Chang, 12.III.2003, temporary stream on hill (collected by sweep netting the rocks and vegetation) (sample 23071, leg. P. Grootaert, RBINS; 1 male in coll. Chulalongkorn University).

Diagnosis.— Legs wholly yellow; acrostichal and dorsocentral bristles undifferentiated. Male: mid femur with pubescent swelling in basal part, hind tibiae slender, clothed in ordinary setulae only; abdomen with vessel-like internal organ opening between tergites 4 and 5.

Description.— Male. Body length 2.1 mm, wing length 0.9 mm. **Head** black in ground-colour. Frons triangular, broad, strongly widened toward ocellar tubercle, above antennae narrower than pedicel, shining. Eyes contiguous in facial part, with uniform ommatidia. Face moderately convex, somewhat widened below. 2 laterocline anterior ocellars, 2 laterocline posterior ocellars, 2 inclinate inner verticals; outer verticals inclinate, short, hardly distinguished from postoculars; inner verticals rather widely separated, all bristles black, ocellars and inner verticals long, of equal length. Antenna largely yellow, style brownish yellow. Scape very small. Pedicel large, globose, with moderately long ventral bristle. Postpedicel rather subconical, with very short dorsal extension, nearly 2.5 times longer than wide. Style dorsoapical, about 4 times longer than postpedicel. Proboscis brownish yellow, short. Palpus pale yellow, small, with short brownish yellow subapical bristle.

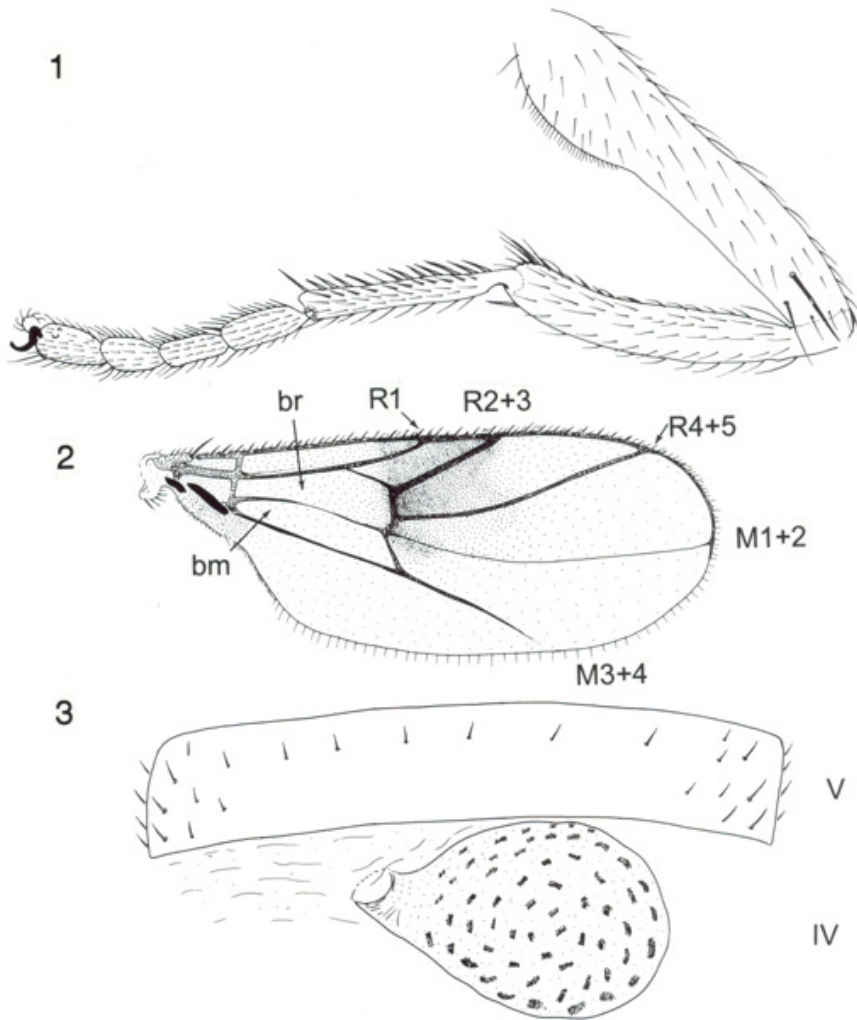


FIGURE 1-3. *Nanodromia narmjeud* sp. nov., male: 1. Mid leg, anteriorly; 2. Wing; 3. Intersegmental gland between tergite 4 and 5.

Thorax wholly black, with yellowish brown to brown (stronger bristles) setation, subshining. Postpronotal lobe small, with hardly prominent bristle. Scutum lacking tomentum. Mesonotal bristles: 1 long notopleural, 1 postalar and 4 scutellars (outer at least 2 times shorter) present. Acrostichal and dorsocentral bristles undifferentiated, scutum

uniformly covered with numerous short bristles arranged in more or less regular rows.

Legs including coxae, completely yellow, with pale setation, claws black. Coxae and trochanters of all legs with scattered setae. Fore femur somewhat thickened, with hardly prominent ventral bristles. Mid femur (Fig. 1) with swelling in basal part; bearing 1 short

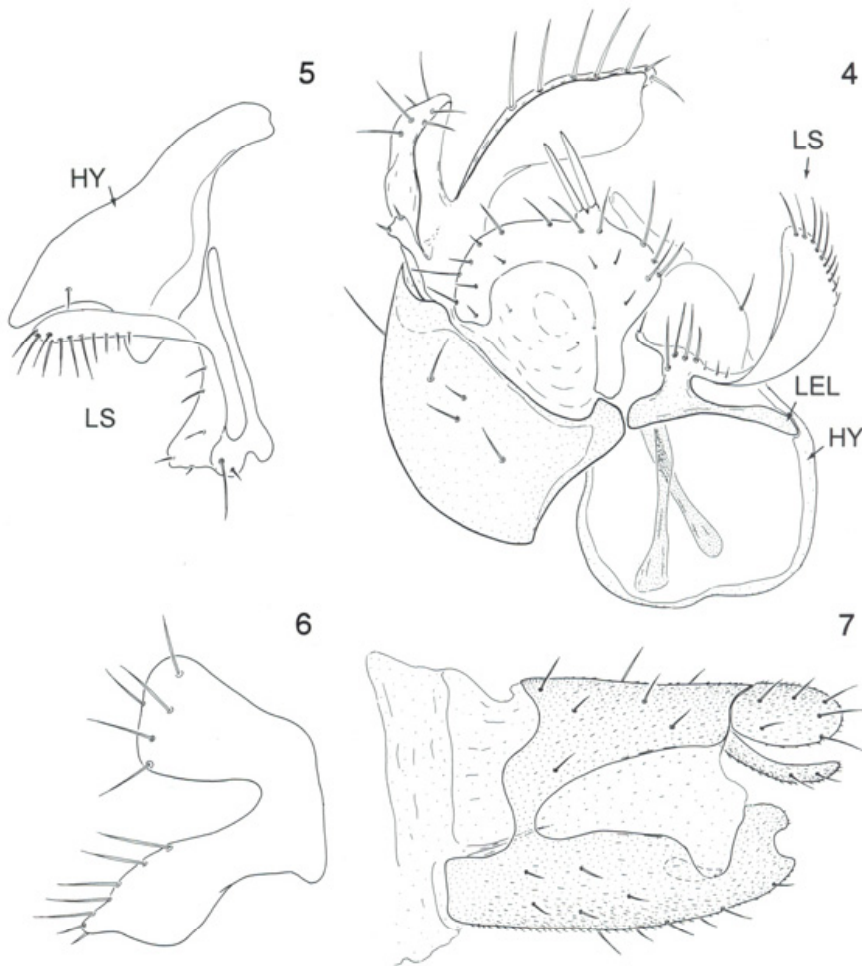


FIGURE 4-7. *Nanodromia narmjeud* sp. nov., male: 4. Epandrium; 5. Left surstylus (right view); 6. Right cercus, female; 7. Female terminalia.

anterior apical and hardly prominent ventral bristles; basal swelling pubescent. Hind femur narrowed in basal 1/3, with 1 row of short anteroventral bristles beyond narrow part. Fore tibia spindle-like, lacking prominent bristles. Mid tibia shorter than fore tibia, thickened, arcuate; bearing 1 longer, pale, ventral apical bristle, with ventral spinules somewhat prominent in apical 1/3 and adpressed to tibia. Hind tibia with ordinary structure and vestiture, lacking prominent dorsal bristles. Tarsi

unmodified; fore and mid tarsomere 1 longer than tarsomere 2, but shorter than tarsomeres 2-5 combined; tarsomeres 2-5 subequal in length.

Wing (Fig. 2) normally developed, of usual shape, bearing ordinary microtrichia; with pattern including infuscate space just near wing base and broad, median, more or less distinct band becoming darker toward anterior margin of costa; apical part of wing slightly infuscate, space between basal darkening and median band

hyaline. Veins mostly brownish, brownish yellow to pale yellow on paler parts of wing. Costal vein with ordinary setulae on anterior margin, bearing 1 moderately long brown basicostal bristle. Humeral crossvein present. Radial veins complete. Rs originating beyond midpoint of vein R1, with unpigmented base. R1 meeting costa somewhat beyond apices of cells Bm and Br. R1, R2+3 and R4+5 thickened. Vein R2+3 very short, nearly 2 times longer than Rs, straight. Distance between apices of R2+3 and R4+5 nearly 3 times longer than distance between apices of R1 and R2+3. R2+3 joining costa somewhat beyond midpoint of wing. R4+5 and M divergent toward wing apex. R4+5 joining costa well before wing apex. M straight, ending near wing apex. CuA1 not quite reaching wing margin. A1 absent. Cells bm and br contiguous at apex, of subequal width. Crossvein Bm-Cu oblique. Squama pale, with pale cilia. Halter entirely pale, with knob short ovate.

Abdomen short, conical, with tergite 1 wholly pale, tergite 2 narrowly brown along posterior margin; remainder tergites brown; sternites 1-2 pale, remainder sternites pale brown. Tergites with scattered pale setulae dorsally and short lateral bristles becoming more numerous toward tergite 8. Sclerites of segment 8 fused to form narrow ring. Intersegmental gland-like structures represented by 1 vessel-like internal organ opening between tergites 4 and 5 (Fig. 3).

Hypopygium (Figs 4-6). Small, brown. Epandrium completely divided. Left epandrial lamella very narrow, separated from hypandrium; left surstylus undivided, elongate, tapered, bearing row of bristles in basal part and at apex. Right epandrial lamella large, with several bristles of different length; right surstylus subdivided into 2 broad lobes, bearing rows of long bristles along upper margin. Cerci fused forming almost semicircular unit; left cercus somewhat produced, bearing several long bristles and 2 long spines in apical part.

Hypandrium with 1 short bristle in apical part. Two ejaculatory apodemes present.

Female.— Body length 2.0-2.1 mm, wing length 0.8-0.9 mm. In most respects identical to male. Palpus brownish yellow. Mid femur slender. Mid tibia slender, straight. Abdominal tergite 2 with broader brown space. Sclerites of segment 8 narrowly fused anteroventrally. Cercus (Fig. 7) brownish yellow, clothed in setulae of different length.

Differential diagnosis.— The new species is most closely related to *N. taksin* described below. Both species have very similar structure of the male terminalia and an intersegmental gland-like organ on the male abdomen. However, they can be readily distinguished from each other in structure of mid and hind legs in the male. In *N. narmjeud*, mid femur has a pubescent swelling in basal part and slender hind tibiae clothed in ordinary setulae only. In *N. taksin*, mid femur is slender, but, hind tibia is somewhat curved, has a small swelling in middle, and bears squamiform bristles in apical half. Females of *N. narmjeud* differ from females of *N. taksin* by entirely yellow legs. In females of *N. taksin* hind femur and tibia are somewhat brownish in middle.

Etymology.— The specific name “*narmjeud*” (Narm Jeud means fresh water in Thai language it is pronounced like Naam Djeud) refers to the habitat where the species was found i.e. along the riverbed of a small stream in the forest.

Distribution.— Thailand. *N. narmjeud* was found in lowland in the East of Thailand (Chantaburi province).

Nanodromia phukhao sp. nov.
(Figs. 8-13)

Material examined.— **Holotype** male: Thailand, Loei province, Na Haeo (alt. 500 m), Field Research Station), 1 male, 24-30.IV.2000, dry mixed deciduous forest (Malaise trap, leg. Verapong Kiatsoonthorn). **Paratypes:** 2 females, 30.IV-7.V.2000; 2 females, 7-

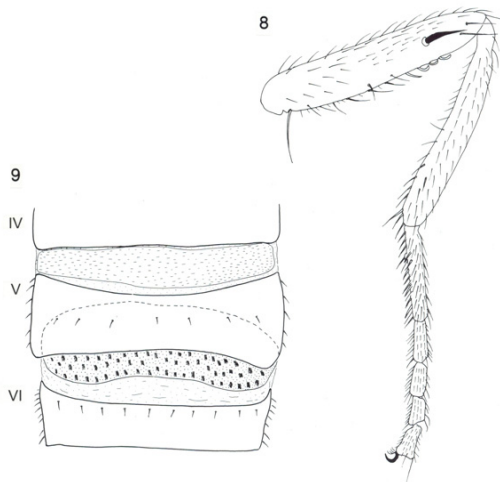


FIGURE 8-9. *Nanodromia phukhao* sp. nov., male: 8. Mid leg, anteriorly; 9. Tergites 4-6 with intersegmental spaces.

14.V.2000, same locality as in holotype. Na Haeo, 3 females, 24.IV.2003 (Malaise trap 2), 1 female, 28.V.2005 (Malaise trap 2; leg. P. Grootaert; coll. RBINS; 1 female in coll. Srinakharinwirot University).

Diagnosis.— Hind femur broadly brownish in middle; acrostichal and dorsocentral bristles undifferentiated. Male: mid femur and hind tibia slender; mid femur with a short, broad black anterior preapical bristle; abdomen with gland-like fields between tergite 4-5 and tergite 5-6.

Description.— Male. Body length 2.1 mm, wing length 0.9 mm. **Head** black to dark brown. Frons triangular, broad, shining. Eyes contiguous in facial part, with uniform ommatidia. Face moderately convex, somewhat widened below. 2 laterocline anterior ocellars, 2 laterocline posterior ocellars, 2 inclinate inner verticals; inner verticals rather widely separated, all bristles pale yellow, ocellars and inner verticals long, of equal length. Scape, pedicel and style brownish yellow, postpedicel pale yellow. Pedicel large, globose, with moderately long ventral bristles. Postpedicel rather subconical, with very short dorsal extension, nearly 3.5 times longer than

wide. Style dorsoapical, about 2.5 times longer than postpedicel. Arista brown. Proboscis brownish yellow, short. Palpus light brown, small, with short pale subapical bristles.

Thorax wholly black, with yellowish setation, subshining. Postpronotal bristle short. Mesonotal bristles: 1 notopleural, 1 postsutural supra-alar, 1 postalar and 4 scutellars (inner ones long cruciate, outer ones very short) present. Acrostichal and dorsocentral bristles undifferentiated, scutum uniformly covered with numerous short bristles arranged in more or less regular rows.

Legs with hind femur broadly brownish in middle, otherwise yellow. Mid femur (Fig. 8) slender; bearing 1 very thick short anterior preapical bristle, 1 long bristle in extreme base and row of curved bristles in apical 1/3. Mid tibia lacking ventral spinules, at most with somewhat longer setulae.

Wing as in *N. narmjeud*.

Abdomen with tergite 1 pale, tergite 2 narrowly brown along posterior margin; remainder tergites brown; sternites 1-2 pale, remainder sternites pale brown. Tergites with scattered pale setulae dorsally and short lateral bristles becoming more numerous toward tergite 8. Intersegmental gland-like modifications represented by dark large space between tergites 5-6 (Fig. 9) and paler narrower space between tergites 4-5, internal vessel-like structure absent.

Hypopygium (Figs 10-13). Brown, rather large. Epandrium completely divided. Left epandrial lamella very narrow, separated from hypandrium; left surstylus undivided, subrectangular, bearing row of long marginal bristles. Right epandrial lamella very large, elongate oval, with numerous long bristles in upper part; right surstylus undivided, long, narrow, bearing row of fairly long bristles along upper margin of right half and 2 spine-like marginal bristles in left half. Cerci fused

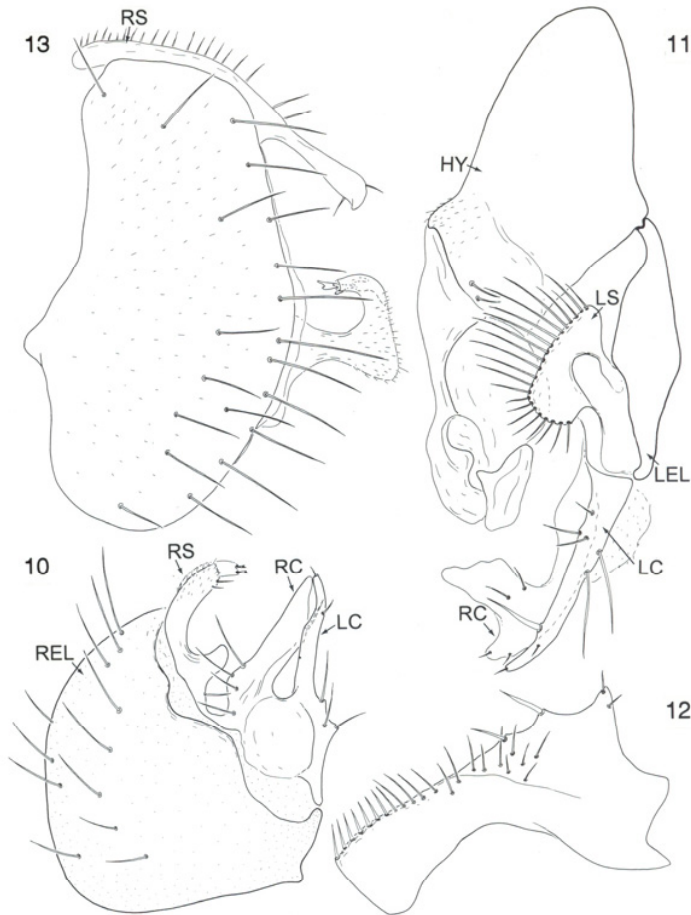


FIGURE 10-13. *Nanodromia phukhao* sp. nov., male: 10. Hypopygium; 11. Epandrium and left cercus; 12. Right surstylus dorsally; 13. Right epandrial lamella.

basally; left cercus long, slender, bearing several bristles of different length in basal part and 1 long spine-like bristle in apical part; right cercus branched. Hypandrium with 2 long bristles in apical part. Two ejaculatory apodemes present.

Female.— Body length 2.0-2.1 mm, wing length 0.8-0.9 mm. In most respects identical to male. Abdominal tergite 2 with broader brown space. Sclerites of segment 8 narrowly fused

anteroventrally. Cercus brownish yellow, clothed in setulae of different length.

Differential diagnosis.— In having gland-like spaces between male abdominal tergites 4-5 and 5-6, the new species is likely to be most closely related to *N. narmkroi*. However, *N. phukhao* differs from *N. narmkroi* by broadly brownish hind femora, ordinary shape of thorax, undeveloped posthumeral lobes, undifferentiated acrostichal and dorsocentral bristles, different structures of the male terminalia and abdominal gland-like organ.

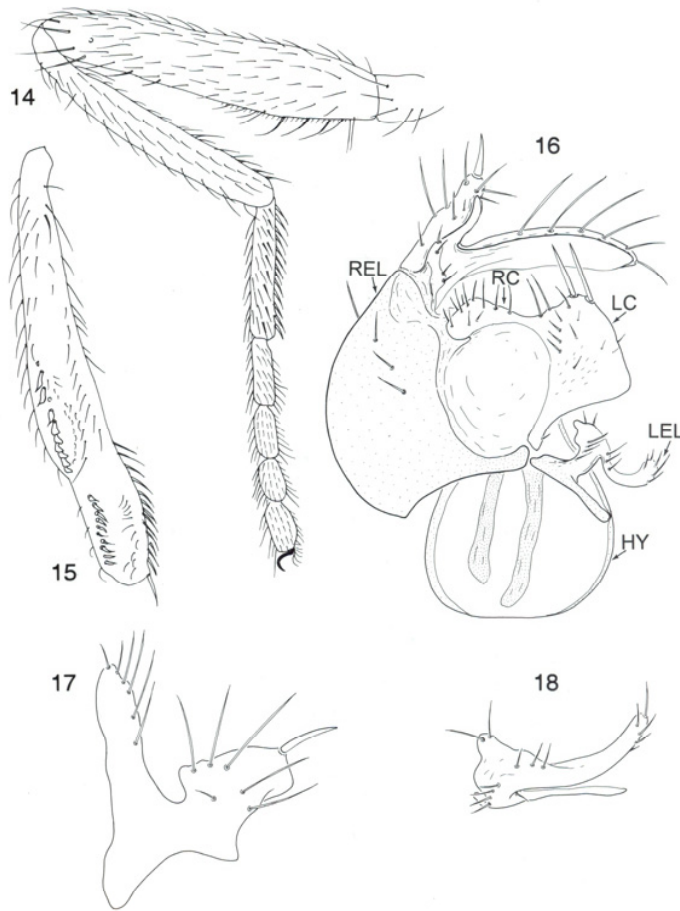


FIGURE 14-18. *Nanodromia taksin* sp. nov., male: 14. Mid leg, anteriorly; 15. Hind tibia; 16. Epandrium; 17. Right surstylus; 18. Left surstylus.

Etymology.— The name “*phukhao*” (Phu Khao means mountain in Thai) refers to the fact that the species was found in the hills at Na Haeo.

Distribution.— Northeast Thailand.

Remarks.— There is an undescribed male found at Khring Nam Tok at Na Haeo (19.V.2003, sample 23041, leg. P. Grootaert) which is closely related to *N. phukhao*. It differs from the latter in having antennae completely yellow except for the dark brown arista; completely yellow legs; mid femur a little thickened in basal third; no broad black anterior bristle in

mid femur, but the usual fine anterior bristle; shape of intersegmental spaces different; left epandrial lamella well developed.

Nanodromia taksin sp. nov.
(Figs 14-18)

Material examined.— **Holotype** male: Thailand, Songkhla province, Ban Klong Kua, secondary rain forest, 29.X.1997 (sample n° 97142, leg. P. Grootaert, coll. RBINS). **Paratypes:** 1 male, 2 females, same data as in holotype (1 female in coll. Chulalongkorn University).

Diagnosis.— Hind femur and tibia somewhat brownish in middle; acrostichal and dorsocentral bristles undifferentiated. Male: mid femur slender, hind tibia somewhat curved, bearing squamiform bristles in apical half; abdomen with vessel-like internal organ opening between tergites 5 and 4.

Description.— Male. Body length 2.1 mm, wing length 0.9 mm. **Head** with 2 pairs of equally long ocellar and 2 short inner vertical bristles. Style about 3 times longer than postpedicel. Palpus brownish yellow.

Thorax wholly black, subshining. Postpronotal bristle moderately long. Mesonotal bristles: 1 notopleural, 1 postsutural supra-alar, 1 postalar and 4 scutellars (inner ones long) present. Acrostichal and dorsocentral bristles undifferentiated, scutum uniformly covered with numerous short bristles arranged in more or less regular rows.

Legs with hind femur and tibia somewhat brownish in middle, otherwise yellow. Mid femur slender, with short bristles in basal 1/3 (Fig. 14). Mid tibia with ordinary setation, lacking prominent ventral spinules. Hind tibia somewhat curved, with small swelling in middle, bearing squamiform bristles in apical half (Fig. 15).

Wing as in *N. narmjeud*.

Abdomen with tergite 1 pale, tergite 2 narrowly brown along posterior margin; remainder tergites brown; sternites 1-2 pale, remainder sternites pale brown. Tergites with scattered pale setulae dorsally and short lateral bristles becoming more numerous toward tergite 8. Intersegmental gland-like structures represented by 1 vessel-like internal organ opening between tergites 5 and 4.

Hypopygium. Brown, small. Epandrium completely divided (Fig. 16). Left epandrial lamella very small and narrow, separated from

hypandrium; left surstylus undivided, elongate, slender, with several fairly long bristles in basal part and at apex. Right epandrial lamella large, with several bristles of different length; right surstylus subdivided into 2 lobes (Fig. 17); right surstylar lobe elongate, with row of long bristles along upper margin; left surstylar lobe broad, with row of long bristles in middle part and 1 long spine at apex. Cerci fused (Fig. 16); left cercus large, subrectangular, with 2 long spines near upper right corner; right cercus oval, bearing several short bristles. Hypandrium with 1 short bristle in apical part. Two ejaculatory apodemes present.

Female.— Body length 2.0-2.1 mm, wing length 0.8-0.9 mm. In most respects identical to male. Hind tibia with ordinary setation. Abdominal tergite 2 with broader brown space. Sclerites of segment 8 narrowly fused anteroventrally. Cercus brownish yellow, clothed in setulae of different length.

Differential diagnosis.— In having very similar structure of the male terminalia and gland-like organ of the male abdomen *N. taksin* is closely related to *N. narmjeud*. However, it differs from *N. narmjeud* by slender mid femora and greatly modified hind tibia of the male. The female of *N. taksin* can be distinguished from the female of *N. narmjeud* in partly brownish hind femora only.

Etymology.— The name “*taksin*” (Taksin means south in Thai Language) refers to the fact that the species was found in the South of Thailand.

Distribution.— South Thailand.

Nanodromia narmkroi sp. nov.
(Figs 19-24)

Material examined.— **Holotype** male: Thailand, Trang province, Palian (alt. sea level), 1 male, 1.XI.1997, mangrove (sample n° 97152, leg. P. Grootaert; coll. RBINS).

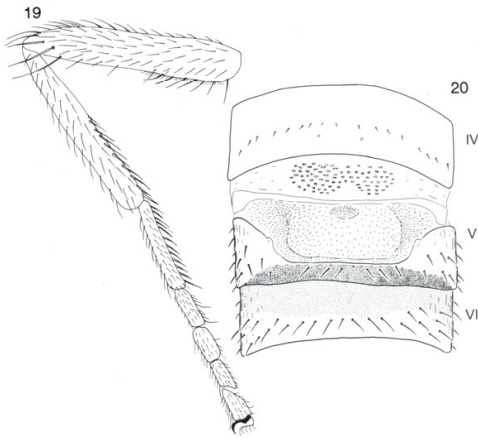


FIGURE 19-20. *Nanodromia narmkroi* sp. nov., male: 19. Mid leg, anteriorly; 20. Tergites 4-6 with intersegmental spaces.

Diagnosis.— Bristles of head and thorax pale; legs wholly yellow; thorax somewhat flattened, with strongly developed postpronotal lobes; acrostichal and dorsocentral bristles well-differentiated; abdomen with gland-like spaces between tergite 6-5 and tergite 5-4; left epandrial lamella of hypopygium completely reduced.

Description.— Male. Body length 2.1 mm, wing length 0.9 mm. **Head** black to dark brown. Frons triangular, broad, shining. Eyes contiguous in facial part, with uniform ommatidia. Face moderately convex, somewhat widened below. 2 laterocline anterior ocellars, 2 laterocline posterior ocellars, 2 inclinate inner verticals; ocellars and inner verticals pale, long, of equal length; additionally, occiput with few long pale bristles in middle part behind eyes. Antenna largely yellow, style brownish yellow. Pedicel large, globose, with moderately long ventral bristles. Postpedicel rather subconical, with very short dorsal extension, nearly 2.5 times longer than wide. Style dorsoapical, about 3 times longer than postpedicel. Palpus yellow, small, with short yellow subapical bristles.

Thorax wholly black, somewhat flattened, with pale setation. Postpronotal lobes strongly developed, lacking prominent bristles. Scutum lacking tomentum, shining. Mesonotal bristles well-differentiated: 1 short presutural supra-alar, 1 notopleural, 1 postsutural supra-alar, 1 postalar, 4 scutellars (inner ones very long, cruciate); additionally, mesopleuron with 3 fairly long bristles in upper hind corner. Acrostichals minute, arranged in 2 rows, present in anterior part only. Dorsocentrals long, 1-serial, 5 per row, of different length.

Legs entirely yellow. Fore coxa densely pale pubescent anteriorly, lacking prominent bristles. Mid femur with circlet of fairly long subapical bristles, bearing some short bristles and pubescent in basal half (Fig. 19). Mid tibia lacking prominent ventral spinules, at most with somewhat longer ventral setulae.

Wing as in *N. narmjeud*.

Abdomen with tergite 1 pale, tergite 2 narrowly brown along posterior margin; remainder tergites brown; sternites 1-2 pale, remainder sternites pale brown. Tergites with scattered pale setulae dorsally and short lateral bristles becoming more numerous toward tergite 8. Intersegmental gland-like modifications represented by dark narrow space between tergites 6-5 and setulose space between tergites 5-4, internal vessel-like structure absent (Fig. 20).

Hypopygium (Figs 21-24). Brown, small. Epandrium completely divided. Left epandrial lamella completely reduced; left surstylus undivided, broad oval, with few long bristles. Right epandrial lamella large, subglobular, with several bristles of different length; right surstylus undivided, elongate oval, with several bristles of different length. Cerci fused basally; left cercus rather short, slender, with 1 short spherical spine in apical part; right cercus branched. Hypandrium with row of fairly long bristles in upper subapical part. Two ejaculatory apodemes present.

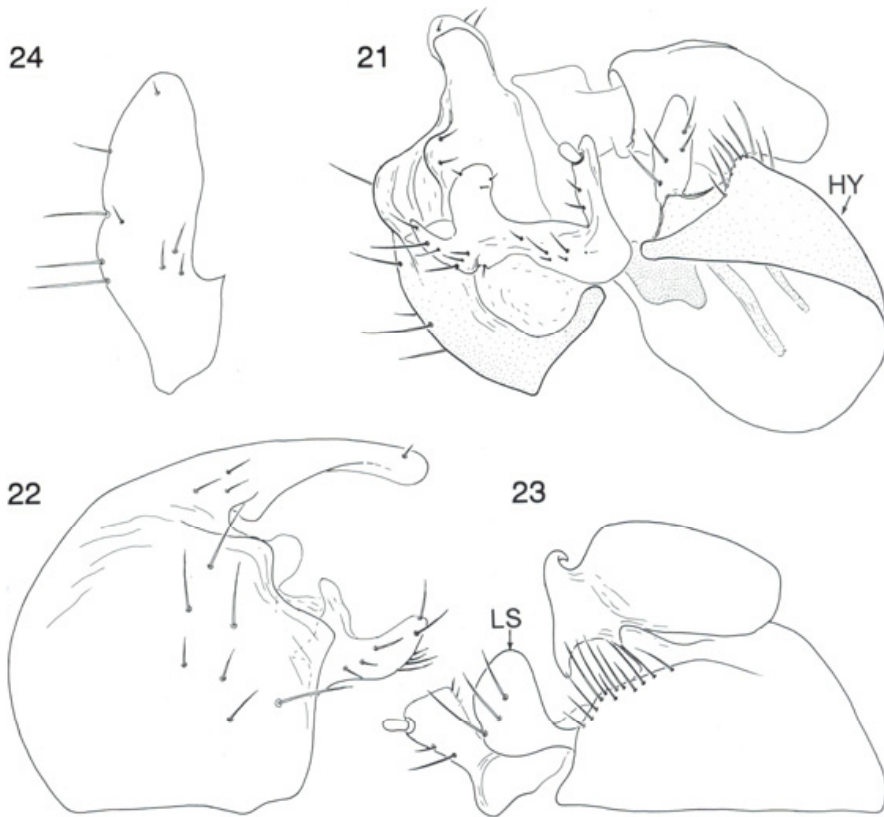


FIGURE 21-24. *Nanodromia narmkroi* sp. nov., male: 21. Epandrium; 22. Right epandrial lamella; 23. right lateral view of epandrium (left cirrus and left surstylus, left epandrial lamella apparently absent); 24. Right surstylus.

Female.— Unknown.

Differential diagnosis.— *N. narmkroi* can be readily distinguished from its allies by a greatly modified thorax, which is somewhat flattened and has strongly developed postpronotal lobes. Additionally, acrostichal and dorsocentral bristles are well-differentiated and left epandrial lamella of hypopygium is completely reduced.

Etymology.— “*Narmkroi*” (Narm Kroi means brackish water in Thai language) refers to the mangrove habitat where the species was found.

Distribution.— South Thailand.

Key to Male *Nanodromia* from Thailand

1. Acr and dc undifferentiated 2
- Acr and dc well differentiated.....
..... *N. narmkroi* sp. nov.
2. Legs completely yellow; mid femur with a basal swelling (Fig. 1)
..... *N. narmjeud* sp. nov.
- Legs with mid femur and or tibia brownish near middle; mid femur slender 3
3. Hind tibia simple; intertergal spaces between tergites 4-5 and 5-6 modified (Fig. 9)
..... *N. phukhao* sp. nov.
- Hind tibia somewhat curved and with squamiform bristles in apical half (Fig. 15); abdomen with a vessel-like organ opening between tergites 4-5 *N. taksin* sp. nov.

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