

NEW *NEPALOMYIA* HOLLIS (DIPTERA: DOLICHOPODIDAE) FROM SINGAPORE AND SOUTH MALAYSIA

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ABSTRACT. — Seven new species of *Nepalomyia* Hollis are described from lowland Southeast Asia. Six species are described from Singapore: *Nepalomyia priapus*, new species; *N. negrobovi*, new species; *N. singaporensis*, new species; *N. spinata*, new species; *N. temasek*, new species; and *N. yangi*, new species; while *N. harpago*, new species is described from South Peninsular Malaysia.

KEY WORDS. — Dolichopodidae, Peloroepodinae, new species *Nepalomyia*, Oriental region

INTRODUCTION

Nepalomyia Hollis is one of the larger genera within the subfamily Peloroepodinae. Some 65 species are known worldwide and its centre of radiation is the mountains of South China and Nepal. In mainland China, 47 species are known (Yang et al., 2011), while Wang & Yang (2004) described three more from Taiwan. Only two species are known from the Palaearctic region (Negrobov, 1984; Yang et al., 2007), and four from the Nearctic region (Runyon & Hurley, 2003). The southernmost record of *Nepalomyia* in the Oriental region is *Nepalomyia baliensis* Yang et al. from Bali, Indonesia. It was found at an altitude of 1,300 m. Grichanov (2010) described two new species from mountains in La Réunion. However the genus was never found on mainland Africa and hence cannot be considered yet as truly Afrotropical. Neither has it been reported from the Neotropical or Australasian region.

In the present paper seven species are described from lowland areas in Southeast Asia: one species from Endau Rompin National Park in Johor province, Malaysia, and six species from Singapore.

MATERIAL AND METHODS

Some 731 samples were taken in 18 different localities in Singapore from 2000 until 2009. A total of 109 specimens of *Nepalomyia* were found in only two of the sampled localities. Only nine specimens were collected by sweep netting, the other 100 specimens were found in Malaise traps.

The species in Malaysia was collected during a three-day intensive search in Endau-Rompin National Park in

South Malaysia during the “Workshop on the Freshwater Invertebrate Fauna of the Malaysian Region” in 2001.

Stations. — SINGAPORE: Sime Forest, 2 traps in rain forest along small streams: Mal 1 (1°21'18.72"N, 103°48'39.76"E; alt. 48 m) was tended across a narrow stream (5 m) in a narrow canyon. The riverbed was generally dry apart from some small pools. It was filled with coarse sand and moss-covered boulders. The riverbed was filled with water only after heavy rain fall or after flushing with excess purified water from the water purification plant upstream; Mal 2 (1°21'16.76"N, 103°48'19.12"E) was placed in a broader, more swampy part of a broad stream (<10 m) that was continuously containing water; Nee Soon, Central Catchment Area, entrance Upper Peirce reservoir Park, swamp forest; 3 traps: Mal 1 (1°22'55.61"N, 103°48'56.92"E; alt. 42 m) on the border of a small permanent stream; Mal 2 (1°23'09.44"N, 103°48'39.96"E) across a small permanent stream; Mal 3 (1°23'07.83"N, 103°48'39.48"E) in drier area of the swamp forest. MALAYSIA, Endau-Rompin N.P. (2°25'N, 103°18'E; alt. 34 m), small torrent in primary rain forest near visitor centre.

All holotypes are stored in alcohol in the Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore (ZRC); most paratypes are in the Royal Belgian Institute of Natural Sciences, Brussels (RBINS). For each record a register number is given (register number in Database linked to collection data such as locality, date, collector, habitat). The locality of the holotype is considered here as the type locality. In addition, each species sample is given an inventory number (e.g., Si200), which indicates where the specimens can be found in the wet collection.

Abbreviations. — Those used in text and figures: acr: acrostichal bristles; ad: anterodorsal; ae: aedeagus; av: anteroventral; c: cercus; dc: dorsocentral bristles; pd: posterodorsal; pv: posteroventral; eb: epandrial bristle; hy: hypandrium; su: surstylus; tp: posterior cross vein (transversalis posterior).

Very few females were found and since several species occurred together in the samples it was almost impossible to relate the males to the females.

TAXONOMY

Family DOLICHOPODIDAE
Subfamily PELOROPEODINAE

Nepalomyia Hollis, 1964

Nepalomyia Hollis, 1964: 110. Type species: *Nepalomyia dytei* Hollis, 1964 (original designation)

Neurigonella Robinson, 1964: 119. Type species: *Neurigonella nigricornis* Van Duzee, 1914 (original designation)

Diagnosis. — Species with arista in apico-dorsal notch of third antennal segment. Hind basal tarsomere with a basal posterodorsal spine articulating with tip of hind tibia. Abdominal segment 7 narrow, elongated, forming a stalk and with seventh sternite attached to internal carina of eighth sternite.

A detailed genus diagnosis can be found in Runyon & Hurley (2003).

The seven species that are found in Singapore and South Peninsular Malaysia are all quite small with a body length varying between 1.7 and 2.1 mm. Body colour is greyish brown, never shining metallic green. They look externally very similar, not exhibiting peculiar secondary sexual characters. There are differences in length and shape of third antennal segment and basal spur on hind basitarsus. Rarely, there is a difference in colour of fore coxa or knob of halter. Sometimes lengths of the marginal bristles of the abdominal terga and sterna are different. However shape and structure of male genitalia are very diverse and specific. Unusual for Dolichopodidae is that the tips of surstyli, aedeagus, and hypandrium are generally hidden inside a concave depression formed by the fourth and fifth abdominal segments. Hence it is necessary to remove them with a watchmaker pin from this sternal cavity in order to perform a quick identification.

Key to male Nepalomyia from Singapore and South Peninsular Malaysia

1. Third antennal segment about as long as wide.....2
- Third antennal segment longer than wide.....3
2. Tip of hypandrium broad, contrastingly black dorsally. Hind metatarsus without black dorsal spines.....
..... *N. temasek*, new species

- Tip of hypandrium yellowish. Hind metatarsus with two black dorsal spines*N. spinata*, new species
- 3. Third antennal segment about 3.5 times as long as wide; vein R2+3 slightly thickened in basal fifth; hind metatarsus with a dorsal ridge; hypandrium and aedeagus yellowish.....
..... *N. singaporensis*, new species
- Third antennal segment shorter: between 1.5 and 2.5 times as long as wide; not the above combination of characters4
- 4. Tip aedeagus anchor-like resembling a grappling iron: i.e., with 4 long appendages (Fig. 11).....*N. harpago*, new species
- Tip aedeagus not anchor-like5
- 5. Aedeagus much swollen in middle containing a black mass (Fig. 11), but this structure is hidden inside 4th and 5th abdominal segment. Cercus dorsally with a broad leaf-like bristle
..... *N. priapus*, new species
- Aedeagus not swollen in middle6
- 6. Aedeagus elongate, yellowish *N. yangi*, new species
- Aedeagus with a globular tip, dorsally contrastingly black
..... *N. negrobovi*, new species

Nepalomyia harpago, new species (Figs. 1, 2–4)

Material examined. — Holotype male, MALAYSIA, Endau Rompin, 12 Jul.2001, primary rain forest (MS name: M 66; reg. 21066, coll. P. Grootaert).

Diagnosis. — A small species with third antennal segment twice as long as wide. Arista three times as long as third

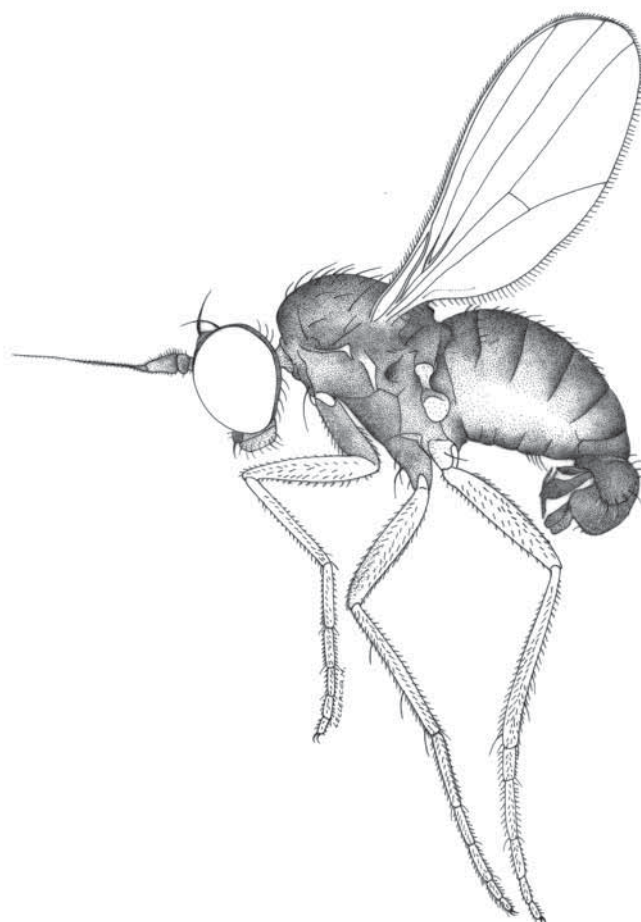


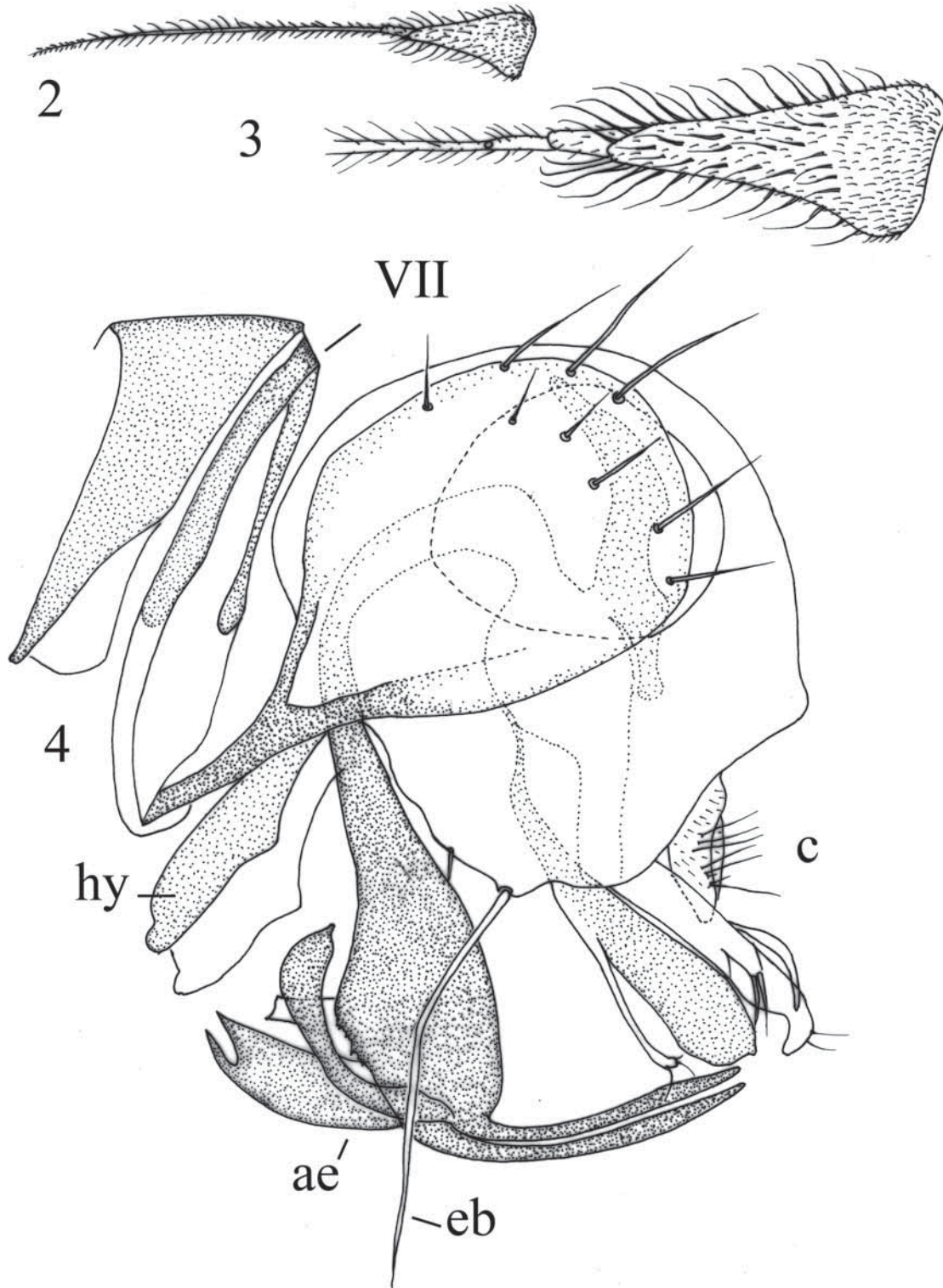
Fig. 1. Habitus of *Nepalomyia harpago*, new species (Endau Rompin, Malaysia).

segment. Aedeagus with tip resembling a grappling iron, i.e., with four recurved appendages.

Etymology. — The name *harpago* (Latin) means grappling iron and refers to the peculiar shape of the tip of the aedeagus.

Male: Body length: 1.7 mm; wing length: 1.5 mm.

Head. Vertex brownish black, surpassing level of upper eye margin. Occiput concave. Face blackish brown, faintly shining, parallel-sided, as wide as the distance between the ocellar bristles; clypeus very feebly bulging out. Palpus dark brown, each with a black apical bristle. Rostrum yellowish brown. Ocellar tubercle prominent. 2 strong black ocellars, 2 postverticals, nearly as long as the postocellars, but less strong; 2 tiny postocellars. Postocular bristles uniseriate,



Figs. 2–4. *Nepalomyia harpago*, new species: 2, third antennal segment; 3, details of the tip of the third antennal segment; 4, postabdomen with hypopygium.

black. Antenna (Figs. 2, 3): basal segments blackish brown, third segment dark brown. Second segment with a circle of short marginal bristles and a long dorsal bristle. Third segment triangular, twice as long as deep, tapering into a rather acute point. Arista pubescent, dorso-apical, inserted in a shallow indentation; three times as long as antenna.

Thorax brown, not shining, pleurae partly somewhat lighter coloured. A shallow prescutellar flattened area. Postscutellum with a median mound. Acr biseriate, very short. 5 dc (growing longer posteriad and ending in a long prescutellar). 1 long humeral and 1 shorter posthumeral, 1 short presutural, 2 short postsutural; 1 very long pre-alar; 2 long notopleurals; scutellum with 2 strong marginals (no laterals visible). 1 fairly long propleural bristle, just above coxa.

Legs. Yellow with fore coxa yellowish-brown; mid and hind coxae brown (mid coxa darkest). Fore coxa anteriorly with short black hairs ending in 3 very long bristles near tip of coxa; near base a few short erect hairs. Fore femur without bristles, bearing only 2 very short, hairlike preapical pv. Fore tibia with a short, black preapical ventral bristle. Mid coxa with numerous anterior bristles and 1 very long bristle just below middle. Mid femur with an anterior preapical, no posterior preapical. Mid tibia: 2 ad, 2 weaker pd; 3 bristles in apical crown (long ventral is rather preapical). Hind coxa with a black exterior bristle. Hind femur with an anterior preapical; no posterior preapical and no other bristles. Hind tibia with a thin and short, hairlike dorsal bristle at about 3/5 from base. No dorsal preapical. No real apical crown of bristles, only a strong ventral. Posterodorsal comb short, with a denticle below. First segment of hind tarsus slightly more than half as long as second segment, a little thicker than following segment; with a basal "spur" pointing to tibia. Claws on all legs minute, symmetrical.

Wing faintly brownish tinged with brown veins R_{4+5} and M_{1+2} and apically very feebly diverging; apical part of M_{3+4} about 2.5-3 times as long as tp. Anal vein faintly indicated, running parallel to posterior wing margin. Squama stalked with a fan of long, black cilia (cf. *Griphophanes*).

Abdomen brown. Hairs and bristles on abdominal terga very short, except for the long marginals on tergite 1. Sterna pale brownish. Genital capsule globular (Fig. 4), dark brown. Cerci very short, pale yellow; surstyli short, brown. Hypandrium furcate. Aedeagus apically with two pairs of dark appendages; dorsal pair slender, long, bent; ventral pair shorter and feebly broadened. Two epandrial bristles: Apical one about as long as genital capsule, posterior one very short.

Female: unknown.

Remarks. — The grappling iron shaped aedeagus is unique in *Nepalomyia*. It is not clear how this structure might function during mating.

***Nepalomyia spinata*, new species**

(Figs. 5–8)

Material examined. — Holotype male, SINGAPORE: Nee Soon, 16 Mar.2005, swamp forest, Mal 3 (MS name Si494; reg25017, Si494, coll. P. Grootaert).

Paratypes: 1 male, Nee Soon, 3 Dec.2003, swamp forest, Mal 2, (reg. 23104, Si38, coll. PG); 2 males, Nee Soon, 25 Mar.2005, swamp forest, Mal 3 (reg25030, Si607, coll. PG).

Etymology. — The name *spinata* refers to the small black spines on the hind basitarsus.

Diagnosis. — A small species with third antennal segment triangular, slightly longer than wide (1.1×). Hind basitarsus in male with 3 black spines.

Male: Body length: 1.82 mm; wing length: 1.56 mm.

Head. Vertex brownish black, surpassing level of upper eye margin. Occiput concave. Face blackish brown, not shining, parallel-sided, as wide as third antennal segment; clypeus very feebly bulging out. Palpus dark brown, with a black apical bristle. Rostrum yellowish brown. Ocellar tubercle prominent. 2 strong black ocellars, 2 postverticals, nearly as long as ocellars, but less strong; 2 tiny postocellars. Postocular bristles uniseriate, black. Antenna brown (Fig. 5), basal segments slightly darker than third segment. Second segment with a circle of short marginal bristles and a longer dorsal bristle. Third segment triangular, 1.1 times as long as wide. Arista 8 times as long as third segment: pubescence short in basal third, longer apically.

Thorax brown, not shining, pleurae partly somewhat lighter coloured. A shallow prescutellar flattened area. Postscutellum with a median mound. Acr biseriate, short, but still half as long as dc. 5 dc (growing longer posteriad and ending in two long prescutellar). 1 long humeral and 1 shorter posthumeral, 1 short presutural, 2 short postsutural; 1 very long pre-alar; 1 very long post alar, 2 long notopleurals; scutellum with 2 strong marginals with a short hair at side. 1 long fine black propleural bristle.

Legs. Yellow with mid and hind coxae pale brown. Bristles and hairs black. Fore coxa anteriorly with short black hairs ending in 3 longer bristles near tip of coxa; near base a few minute erect hairs. Fore femur without bristles, bearing only 2 very short, hairlike preapical pv. Fore tibia without bristles. Mid coxa with numerous anterior bristles and 1 black exterior bristle. Mid femur with an anterior preapical, no posterior preapical. Mid tibia: 2 ad, 1 weaker pd; only 2 strong bristles in apical crown. Hind coxa with a short, black exterior bristle. Hind femur with an anterior preapical; no posterior preapical and no other bristles. Hind tibia with a thin and short, hairlike dorsal bristle near middle. Dorsal preapical short. No real apical crown of bristles, only a distinct ventral bristle. Posterodorsal comb short (Fig. 6), with a minute denticle below. First segment of hind tarsus about half as long as second segment, a little thicker than following segment; with a brown basal "spur" pointing to

tibia and with 3 distinct black curved spines. Claws on all legs minute, symmetrical.

Wing faintly brownish tinged with brown veins. Basal joint of R_{2+3} and R_{4+5} swollen into an indistinct node. Apical part of M_{3+4} about 2.5 times as long as tp. Anal vein indistinct (merely a fold at base). Squama with fan of long, black cilia. Halter with pale knob and stalk.

Abdomen brown. Hairs and bristles on terga short, marginals not half as long as tergite is long. Sterna pale brownish and long marginals on sternites 3 and 4. Genital capsule (Fig. 7) globular, brown. Cerci pale yellow, with a narrow yellowish leaf-like bristle near tip; surstyli elongate, brown in contrast to paler cerci. Hypandrium pale, large and broad, symmetrical furcate (Fig. 8). Aedeagus rather short, its apex furcate. A long pale, epandrial bristle present, inserted on a short tubercle; with a short bristle at base.

Female: unknown.

Remarks. — *N. spinata*, new species is the only species that has three black spines on the hind femur: two dorsal and one apical. Remarkable is also that the face is grey dusted while in most other species it is shining metallic blue.

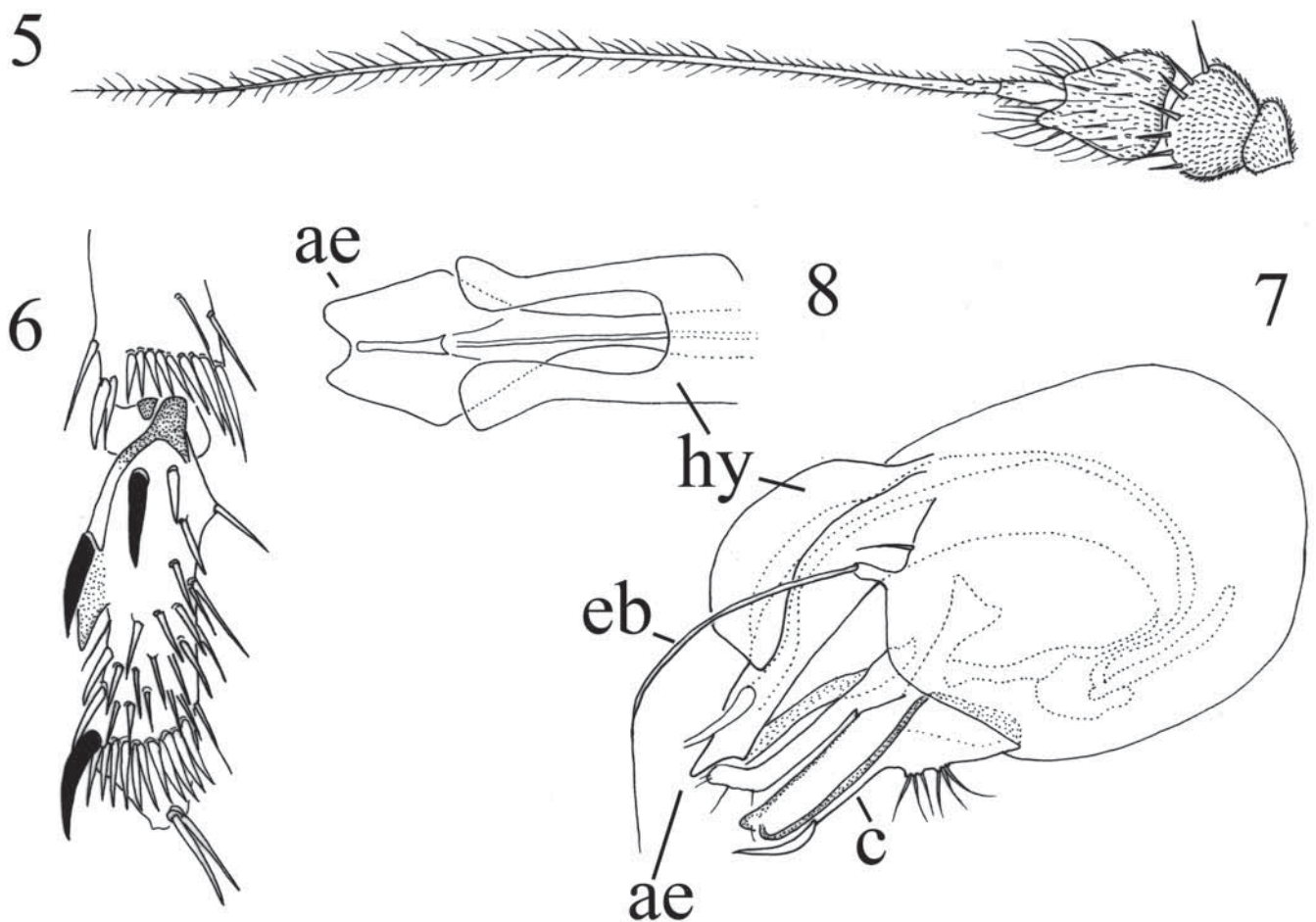
***Nepalomyia priapus*, new species**

(Figs. 9–11)

Material examined. — Holotype male, SINGAPORE: Sime Forest, 3 Jun.2005, forest, Mal 1, (MS name: Si681; reg. 25134, Si905, coll. P. Grootaert).

Paratypes: 3 males, Sime Forest, 1 Apr.2005, forest, Mal 1, (reg. 25040, Si618, coll. PG); 5 males, Sime Forest, 8 Apr.2005, forest, Mal 1, (reg. 25049, Si681, coll. PG), DNA sequences in genbank; 3 males, Sime Forest, 27 Apr.2005, forest, Mal 1, (reg. 25093, Si790, coll. PG); 3 males, Sime Forest, 3 Jun.2005, forest, Mal 1, (reg. 25134, Si905, coll. PG); 3 males, Sime Forest, 20 May 2005, forest, Mal 1, (reg. 25131, Si909, coll. PG); 11 males, Sime Forest, 17 Jun.2005, forest, Mal 1, (reg. 25136, Si913, coll. PG); 4 males, Sime Forest, 13 May 2005, forest, Mal 1, (reg. 25129, Si938, coll. PG); 1 male, Sime Forest, 13 May 2005, forest, Mal 2, (reg. 25130, Si940, coll. PG); 3 males, Sime Forest, 1 Jul.2005, forest, Mal 1, (reg. 25189, Si1062, coll. PG); 2 males, Sime Forest, 3 Jun.2005, forest, Mal 2, (reg. 25135, Si1074, coll. PG); 1 male, Sime Forest, 22 Jul.2005, forest, Mal 2, (reg. 25271, Si1079, coll. PG); 7 males, Sime Forest, 3 Dec.2005, forest, Mal 1, (reg. 25434, Si1318, coll. PG); 4 males, Sime Forest, 6 May 2005, forest, Mal 2, (reg. 25128, coll. PG). 1 male, Nee Soon, 5 Apr.2005, swamp forest, Mal 2, (reg. 25047, Si642, coll. PG).
In genbank as *Nepalomyia* Si681 (Lim et al., 2009).

Etymology. — The species has a remarkable huge aedeagus and hence the name *priapus* (Latin) here used as noun, refers to the huge phallus of mythological Greek king Priapus.



Figs. 5–8. *Nepalomyia spinata*, new species: 5, antenna; 6, hind basitarsus; 7, genital capsule; 8, tip aedeagus and hypandrium.

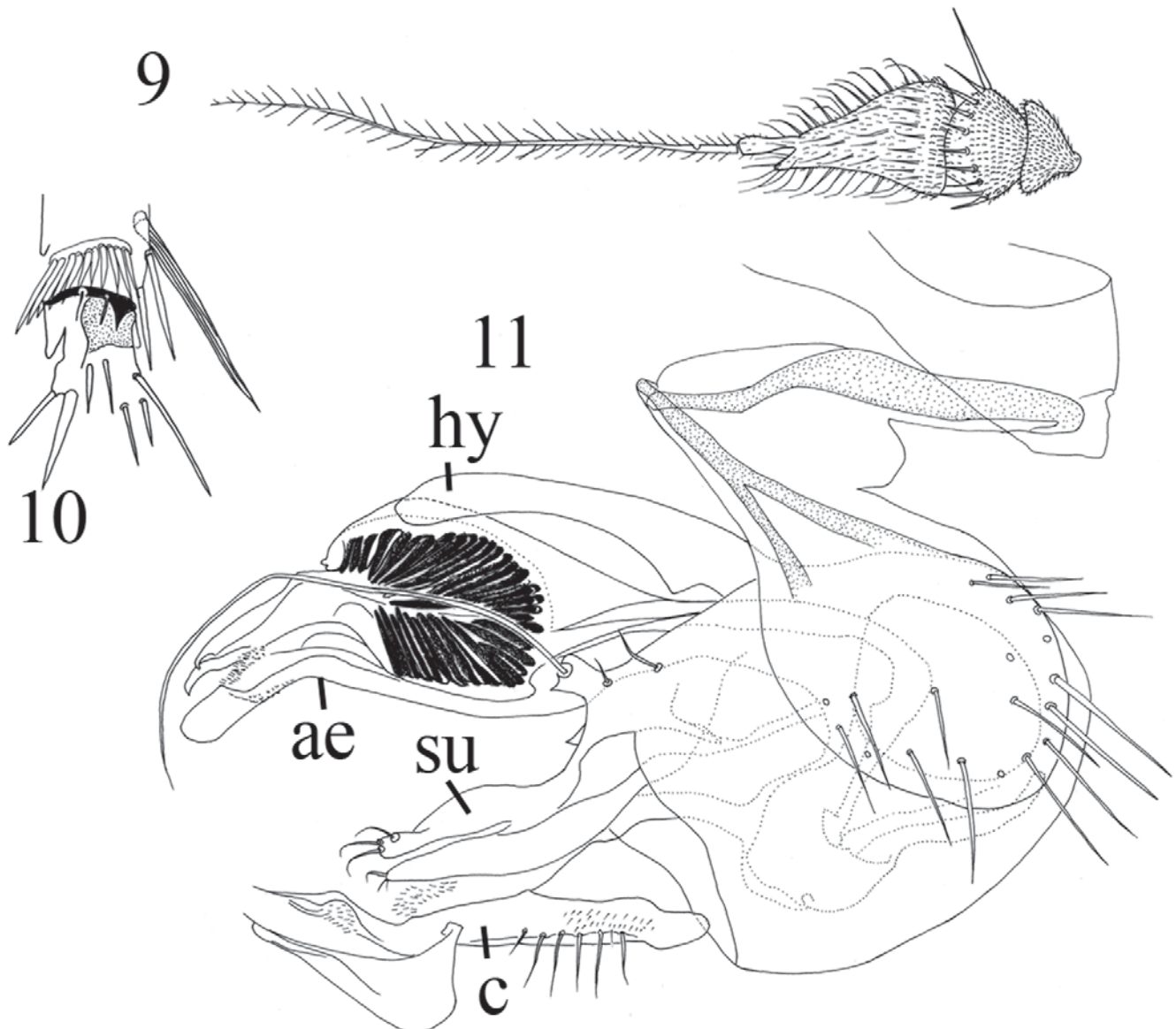
Diagnosis. — A small species with triangular third antennal segment 1.6 times as long as wide. Tip of hypandrium, aedeagus and surstyli hidden in cavity of segments 4 and 5. Aedeagus much swollen, containing a black mass.

Male: Body length: 2.1–2.34 mm; wing length: 1.56–1.82 mm.

Head. Vertex brownish black, surpassing level of upper eye margin. Occiput concave. Face shining blue metallic, parallel-sided, as wide as the distance between the ocellar bristles; clypeus very feebly bulging out, grey dusted. Palpus dark brown, with a black apical bristle. Rostrum yellowish brown. Ocellar tubercle prominent. 2 strong black ocellars, 2 postverticals, nearly as long as the postocellars, but less strong; 2 tiny postocellars. Postocular bristles uniseriate, black. Antenna (Fig. 9) brown: second segment with a circle of short marginal bristles and a long dorsal bristle. Third segment triangular, 1.6 times as long as wide. Arista 3.5 times as long as third segment: pubescence short in basal third, longer apically. Basal segment of arista swollen at apex.

Thorax brown, not shining, pleurae partly somewhat lighter coloured. A shallow prescutellar flattened area. Postscutellum with a median mound. Acr biseriate, half as long as dc. 5 dc (growing longer posteriad and ending in a long prescutellar). 1 long humeral and 1 shorter posthumeral, 1 short presutural, 2 short postsutural; 1 very long pre-alar; 1 very long post alar, 2 long notopleurals; scutellum with 2 strong marginals with a short hair at side. 1 long black propleural bristle, just above coxa.

Legs. Yellow with mid and hind coxae brown (mid coxa darkest). Bristles and hairs black. Fore coxa anteriorly with short black hairs ending in 4 long bristles near tip of coxa; near base a few minute erect hairs. Fore femur without bristles, bearing only 2 very short, hairlike preapical pv. Fore tibia without bristles. Mid coxa with numerous anterior bristles and 1 very long black bristle below middle. Mid femur with an anterior preapical, no posterior preapical. Mid tibia: 2 ad, 2 weaker pd; 3 bristles in apical crown. Hind coxa with a black exterior bristle, shorter than on mid coxa. Hind femur with an anterior preapical; no posterior preapical and no



Figs. 9–11. *Nepalomyia priapus*, new species: 9, antenna; 10, hind basitarsus; 11, post abdomen.

other bristles. Hind tibia with a thin and short, hairlike dorsal bristle near middle. A long dorsal preapical. No real apical crown of bristles, only a strong ventral. Posterodorsal comb short (Fig. 10), with a denticle below. All tarsi slender and tapering toward tip. First segment of hind tarsus about half as long as second segment, a little thicker than following segment; with a brown basal “spur” pointing to tibia. Claws on all legs minute, symmetrical.

Wing faintly brownish tinged with brown veins. Basal joint of R_{2+3} and R_{4+5} swollen into a small node. Apical part of M_{3+4} about 2.5 times as long as tp. Anal vein also brown, running parallel to posterior wing margin, but not reaching the margin. Squama with fan of long, black cilia. Halter with dark knob, but paler stalk.

Abdomen brown. Hairs and bristles on terga short, but all marginals very long. Sterna pale brownish and long marginals on sternites 3 and 4. Genital capsule (Fig. 11) globular, dark brown. Cerci long, pale yellow, with a large yellowish leaf-like bristle near middle; surstyli elongate, brown in contrast to paler cerci. Hypandrium pale, large and broad, symmetrical broadly furcate. Aedeagus much swollen in middle, its apex furcate, hidden inside fifth sternite, with a contrastingly black

mass near middle, probably containing sperm. A long pale, epandrial bristle present, inserted on a short tubercle; with two very short bristles at base.

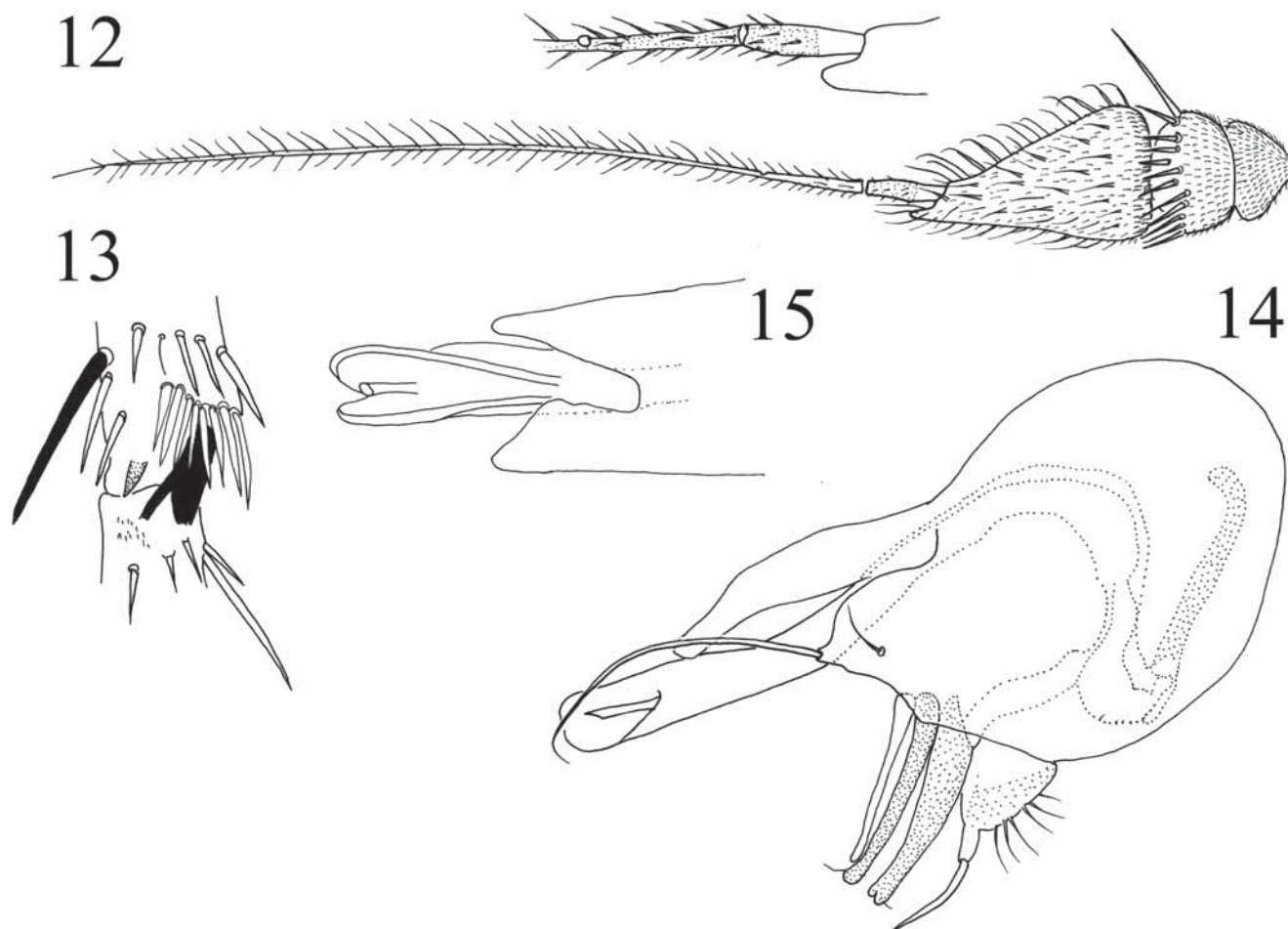
Female: Identical to male in most characters. No spur on hind metatarsus.

Remarks. — The huge aedeagus is unique in *Nepalomyia*. Remarkable is that it is filled in the middle with black rod-like structures that may be spermatozooids and thus this swelling represents a kind of spermatheca.

Nepalomyia yangi, new species
(Figs. 12–15)

Material examined. — Holotype male, SINGAPORE: Sime Forest, 8 Apr.2005, forest, sweep netting (MS name: Si740; reg. 25053, Si740, coll. P. Grootaert).

Paratypes: 1 male, Sime Forest, 8 Apr.2005, forest, Mal 1, (reg. 25049, Si683, coll. PG); 1 male, Sime Forest, 27 Apr.2005, forest, Mal 1, (reg. 25093, Si904, coll. PG); 1 male, Sime Forest, 3 Jun.2005, forest, Mal 1, (reg. 25134, Si908, coll. PG); 1 male, Sime Forest, 20 May 2005, forest, Mal 1, (reg. 25131, Si910, coll. PG); 1 male, Sime Forest, 13 May 2005, forest, Mal 1, (reg. 25129,



Figs. 12–15. *Nepalomyia yangi*, new species: 12, antenna with detail of apex; 13, hind basitarsus; 14, genital capsule; 15, tip of aedeagus and hypandrium dorsally.

Si937, coll. PG); 1 male, Sime Forest, 13 May 2005, forest, Mal 2, (reg. 25130, Si942, coll. PG); 1 male, Sime Forest, 23 Sep.2005, forest, Mal 2, (reg. 25364, Si1072, coll. PG).

Etymology. — The present species is dedicated to Prof. Ding Yang (China Agricultural University) who described many *Nepalomyia* species from Oriental China.

Diagnosis. — Small species with triangular third antennal segment about 1.8 times as long as wide. Aedeagus long, pale; surstyli finger-like brown; cerci very short.

Male: Body length: 2.1 mm; wing length: 1.8 mm.

Head. Vertex brownish black, surpassing level of upper eye margin. Occiput concave. Face blackish brown, shining, parallel-sided, as wide as base of third antennal segment. Clypeus very feebly bulging out. Palpus dark brown, with a black apical bristle. Rostrum yellowish brown. Ocellar tubercle prominent. 2 strong black ocellars, 2 postverticals, nearly as long as the postocellars, but less strong; 2 tiny postocellars. Postocular bristles uniseriate, black. Antenna brown: Second segment with a circle of short marginal bristles and a long dorsal bristle. Third segment triangular (Fig. 12), 1.8 times as long as wide. Arista 3.8 times as long as third segment: pubescence short in basal third, longer apically.

Thorax brown, not shining, pleurae partly somewhat lighter coloured. A shallow prescutellar flattened area. Postscutellum with a median mound. Acr biseriate, short. 5 dc (growing longer posteriad and ending in a long prescutellar). 1 long humeral and 1 shorter posthumeral, 1 short presutural, 2 short postsutural; 1 very long pre-alar; 1 very long post alar, 2 long notopleurals; scutellum with 2 strong marginals with a short hair at side. 1 long black propleural bristle, just above coxa.

Legs. Yellow with mid and hind coxae brown. Bristles and hairs black. Fore coxa anteriorly with short hairs ending in 3 long bristles near tip of coxa. Fore femur without bristles, bearing only 2 very short, hairlike preapical pv. Fore tibia without bristles. Mid coxa with numerous anterior bristles and 1 very long black bristle below middle. Mid femur with an anterior preapical, no posterior preapical. Mid tibia: 2 ad, 2 weaker pd; 3 bristles in apical crown. Hind coxa with a black exterior bristle, shorter than on mid coxa. Hind femur with an anterior preapical; no posterior preapical and no other bristles. Hind tibia with a thin and short, hair like dorsal bristle beyond middle. A short dorsal preapical. No real apical crown of bristles, only a distinct ventral. Posterodorsal comb short (Fig. 13), with a minute denticle below. First segment of hind tarsus less than half as long as second segment, a little thicker than following segment; with a brown basal pointed “spur” pointing to tibia. Claws on all legs minute, symmetrical.

Wing faintly brownish tinged with brown veins. Joint of R_{2+3} and R_{4+5} indistinctly swollen. Apical part of M_{3+4} about 2.5 times as long as tp. Anal vein distinct at base, running parallel to posterior wing margin, but not reaching the

margin. Squama with fan of long, black cilia. Halter with pale knob and stalk.

Abdomen brown. Hairs and bristles on terga short, all marginals distinct but only half as long as tergite is long. Sterna pale brownish with indistinct marginals. Genital capsule (Fig. 14) globular, dark brown. Cerci very short, with a wide basal part and very short apical part bearing a strong bristle. Surstyli elongate, simple in structure, brown in contrast to paler aedeagus; hardly half as long as genital capsule is long. Hypandrium (Fig. 15) pale, furcate. Aedeagus yellowish, long, quite simple. A long pale, epandrial bristle present, inserted on a short tubercle; with a short bristle at base.

Female: unknown.

Remarks. — See key to the species.

Nepalomyia temasek, new species

(Figs. 16–20)

Material examined. — Holotype male, SINGAPORE: Sime Forest, 1 Apr.2005, forest, Mal 1, (MS name: Si898; reg. 25040, Si898, coll. P. Grootaert).

Paratypes: 2 males, Sime Forest, 8 Apr.2005, forest, Mal 1, (reg. 25049, Si682, coll. PG); 1 male, Sime Forest, 1 Apr.2005, forest, Mal 1, (reg. 25040, Si898, coll. PG); 2 males, Sime Forest, 27 Apr.2005, forest, Mal 1, (reg. 25093, Si903, coll. PG); 1 male, Sime Forest, 3 Jun.2005, forest, Mal 1, (reg. 25134, Si907, coll. PG); 1 male, Sime Forest, 20 May 2005, forest, Mal 1, (reg. 25131, Si911, coll. PG); 6 males, Sime Forest, 17 Jun.2005, forest, Mal 1, (reg. 25136, Si912, coll. PG).

In genbank as *Nepalomyia* Si898 (Lim et al., 2009).

Etymology. — The present species is named after the ancient name of Singapore that was Temasek or city at the sea.

Diagnosis. — Small species with triangular third antennal segment as long as wide. Tip of hypandrium very broad, darkened. Cerci longer than surstyli.

Male: Body length: 2.34 mm; wing length: 2.1 mm.

Head. Vertex brownish black, surpassing level of upper eye margin. Occiput concave. Face blackish brown, shining, parallel-sided, as wide as base of third antennal segment. Clypeus very feebly bulging out. Palpus dark brown, with a black apical bristle. Rostrum yellowish brown. Ocellar tubercle prominent. 2 strong black ocellars, 2 postverticals, nearly as long as the postocellars, but less strong; 2 tiny postocellars. Postocular bristles uniseriate, black. Antenna brown: Second segment with a circle of short marginal bristles and a long dorsal bristle. Third segment triangular (Fig. 16), as long as wide. Arista 5 times as long as third segment: pubescence short in basal third, longer apically.

Thorax brown, not shining, pleurae partly somewhat lighter coloured. A shallow prescutellar flattened area. Postscutellum with a median mound. Acr biseriate, short. 5 dc (growing

longer posterior and ending in a long prescutellar). 1 long humeral and 1 shorter posthumeral, 1 short presutural, 2 short postsutural; 1 very long pre-alar; 1 very long post alar, 2 long notopleurals; scutellum with 2 strong marginals with a short hair at side. 1 long black propleural bristle, just above coxa.

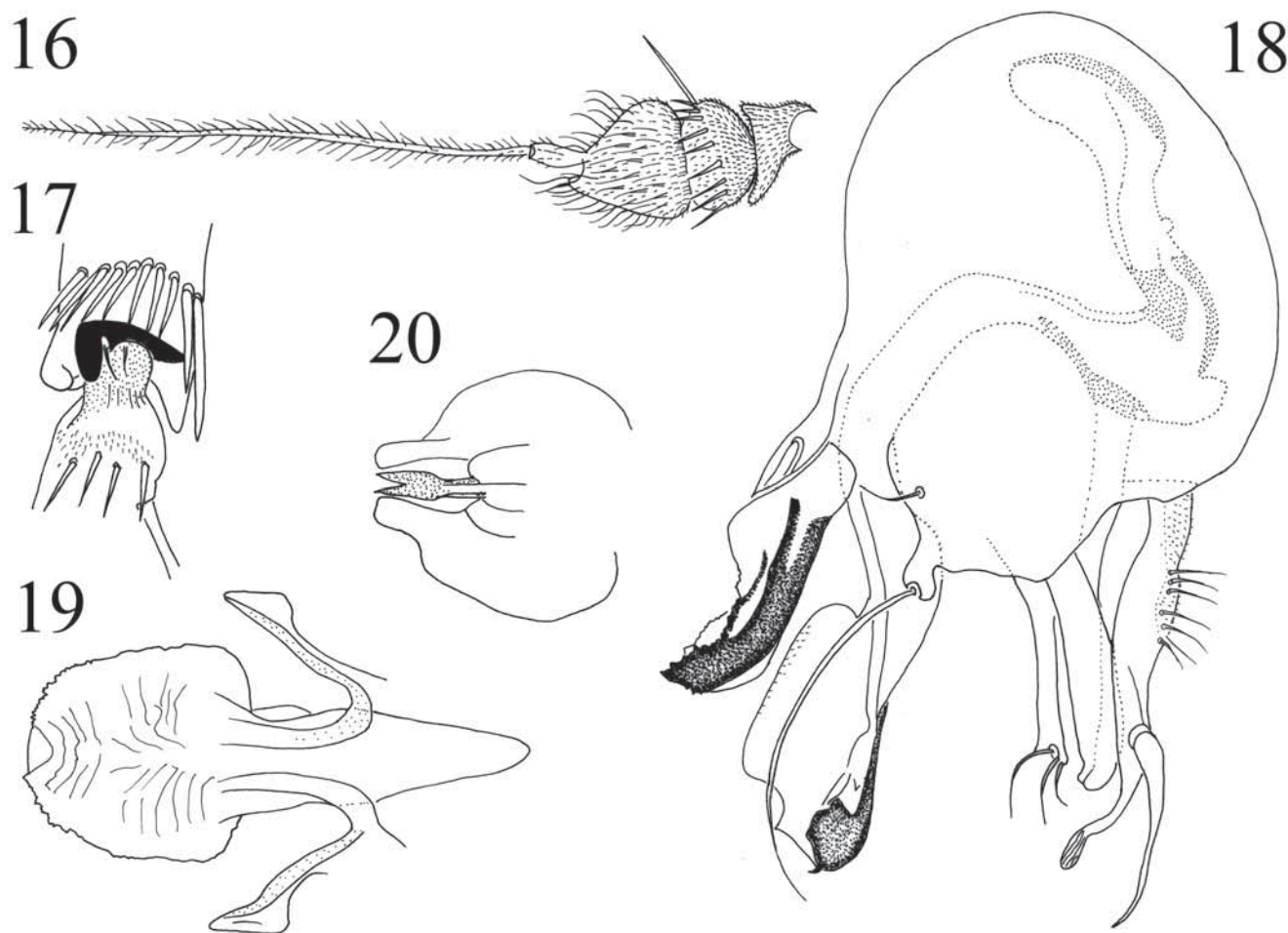
Legs. Yellow with mid and hind coxae brown. Bristles and hairs black. Fore coxa anteriorly with short hairs ending in 4 long bristles near tip of coxa. Fore femur without bristles, bearing only 2 very short, hair like preapical pv. Fore tibia without bristles. Mid coxa with numerous anterior bristles and 1 very long black bristle near middle. Mid femur with a strong anterior preapical, no posterior preapical. Mid tibia: 2 ad, 2 weaker pd; 3 bristles in apical crown. Hind coxa with a black exterior bristle, only a little shorter than on mid coxa. Hind femur with an anterior preapical; no posterior preapical and no other bristles. Hind tibia with a thin and short, dorsal bristle beyond middle. A long dorsal preapical. No real apical crown of bristles, only a distinct ventral. Posterodorsal comb short (Fig. 17), with a black denticle below. First segment of hind tarsus less than half as long as second segment, a little

thicker than following segment; with a brown basal “spur” pointing to tibia. Claws on all legs minute, symmetrical.

Wing faintly brownish tinged with brown veins. Joint of R_{2+3} and R_{4+5} a little swollen. Apical part of M_{3+4} about 2.5 times as long as tp. Anal vein indistinct at base. Squama brown with fan of long, black cilia. Halter with brownish knob and paler stalk.

Abdomen brown. Hairs and bristles on terga short, all marginals distinct, slightly longer as tergites are long. Sterna pale brownish with indistinct marginals. Genital capsule (Fig. 18) globular, dark brown. Cerci elongate, with a strong, yellowish bristle near tip. Surstyli elongate, brown in contrast to paler cerci; about half as long as genital capsule is long. Hypandrium (Fig. 18, 19) contrastingly black, not furcate, but tip rounded with two short “wings” at sides. Aedeagus (Fig. 18, 20) yellowish, with a darkened tip. A long pale, epandrial bristle present, inserted on a short tubercle; with a short bristle at base.

Female: unknown.



Figs. 16–20. *Nepalomyia temasek*, new species: 16, antenna; 17, hind basitarsus; 18, genital capsule; 19, tip of hypandrium dorsally; 20, tip of aedeagus dorsally.

Nepalomyia singaporensis, new species

(Figs. 21–24, 25–27)

Material examined. — Holotype male, SINGAPORE: Sime Forest, 1 Apr.2005, forest, Mal 1, (MS name: Si899; reg. 25040, Si899, coll. P. Grootaert).

Paratypes: 1 male, Nee Soon, 8 Jul.2005, swamp forest, Mal 2, (reg. 25206, Si894, coll. PG); 2 males, Sime Forest, 27 Apr.2005, forest, Mal 1, (reg. 25093, Si902, coll. PG), male in genbank; 1 male, Sime Forest, 3 Jun.2005, forest, Mal 1, (reg. 25134, Si906, coll. PG); 1 male, Sime Forest, 17 Jun.2005, forest, Mal 1, (reg. 25136, Si914, coll. PG); 1 male, Sime Forest, 13 May 2005, forest, Mal 2, (reg. 25130, Si943, coll. PG); 5 males, Sime Forest, 6 May 2005, forest, Mal 2, (reg. 25128, Si1063, coll. PG); 1 male, Sime Forest, 3-Jun.2005, forest, Mal 2, (reg. 25135, coll. PG); 1 male, Sime Forest, 3 Dec.2005, forest, Mal 1, (reg. 25434, coll. PG). In genbank as *Nepalomyia* Si899 (Lim et al., 2009).

Etymology. — The name refers to the type locality of the species.

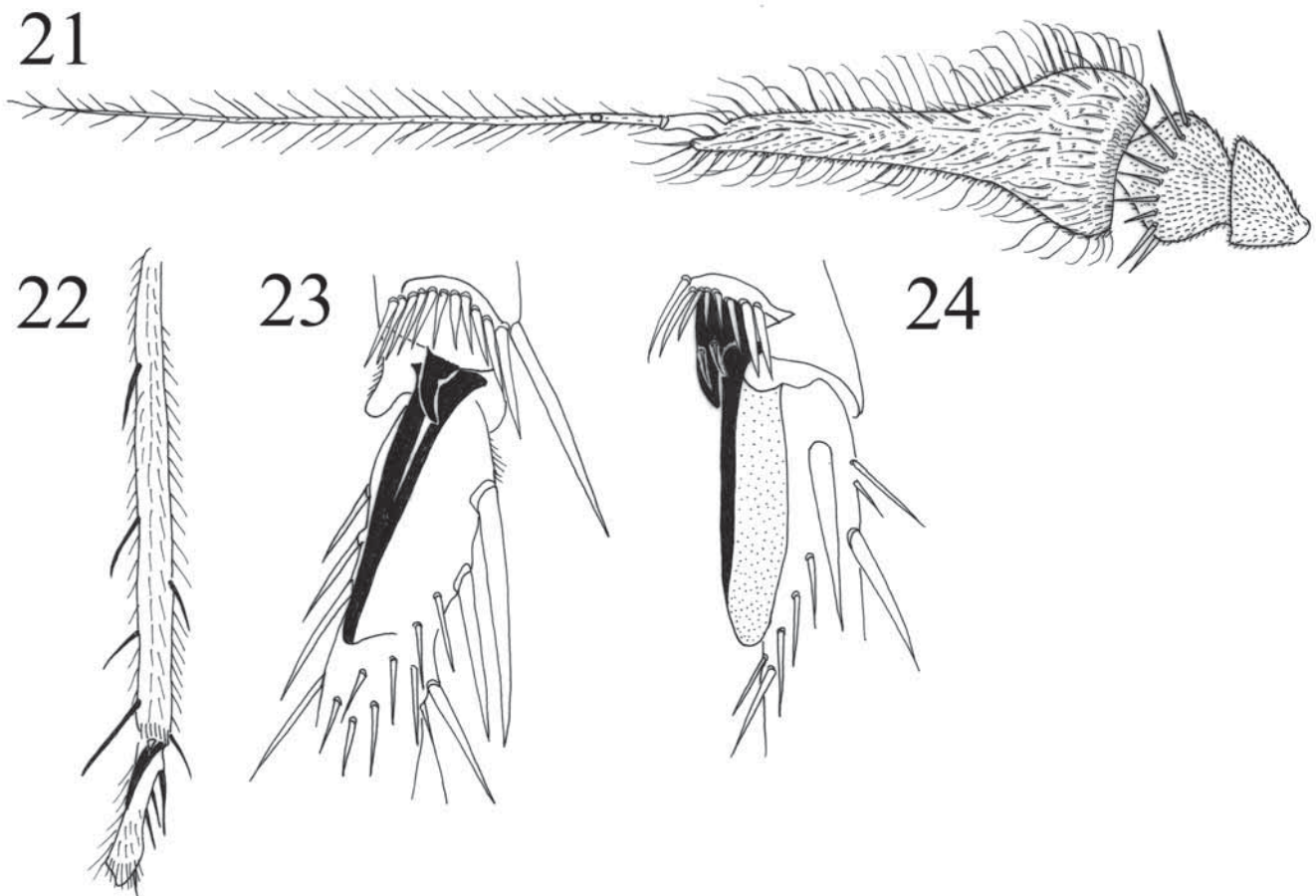
Diagnosis. — Small species with triangular third antennal segment almost 3 times as long as wide (2.7×); arista 1.6 times as long as third segment. Basal fifth of vein R2+3 thickened. Hind metatarsus with a dorsal ridge.

Male: Body length: 2.1 mm; wing length: 1.95 mm.

Head. Vertex brownish black, surpassing level of upper eye margin. Occiput concave. Face shining metallic blue, clypeus grey dusted. Face above about twice as wide as second antennal segment, narrowing downwards. Clypeus very feebly bulging out. Palpus dark brown, with a black apical bristle. Rostrum yellowish brown. Ocellar tubercle prominent. 2 strong black ocellars, 2 postverticals, nearly as long as the postocellars, but less strong; 2 tiny postocellars. Postocular bristles uniseriate, black. Antenna brown: Second segment with a circle of short marginal bristles and with 1 or 2 long dorsal bristles. Third segment elongate triangular (Fig. 21), 2.7 times as long as wide. Arista 1.6 times as long as third segment, base pale brownish, rest almost white.

Thorax brown, not shining, pleurae hardly lighter coloured. A shallow prescutellar flattened area. Postscutellum with a median mound. Acr biseriate, long, half as long as dc. 5 dc (growing longer posteriad). 1 long humeral and 1 only slightly shorter posthumeral, 1 short presutural, 2 long postsutural; 1 very long pre-alar; 1 very long post alar, 2 long notopleurals; scutellum with 2 strong marginals with a short hair at side. 1 very long black propleural bristle, just above coxa.

Legs yellow with mid and hind coxae brown. Bristles and hairs black. Fore coxa anteriorly with short hairs ending in 4 long bristles near tip of coxa. Fore femur without bristles,



Figs. 21–24. *Nepalomyia singaporensis*, new species: 21, antenna; 22, hind tibia and basitarsus; 23, hind basitarsus dorsally; 24, hind metatarsus laterally.

bearing only 2 very short, hairlike preapical pv. Fore tibia with short apical bristles. Mid coxa with numerous anterior bristles and 1 very long black bristle below middle. Mid femur with a strong anterior preapical, no posterior preapical. Mid tibia: 2 strong ad, 2 weaker pd; 3 strong bristles in apical crown. Mid tarsomeres with a pair of black apical bristles. Hind coxa with a black exterior bristle, half as long as the one on mid coxa. Hind femur with an anterior preapical; no posterior preapical and no other bristles. Hind tibia (Fig. 22) with ad on basal quarter and distinct dorsal just beyond middle followed by a few less distinct dorsal, a strong anterodorsal preapical. No real apical crown of bristles, only a distinct ventral. Posterodorsal comb short (Figs. 23, 24), with a black denticle below. First segment of hind tarsus a little longer than half as long as second segment, with a elongate ridge ("spur") at base. All hind tarsomeres with black apical bristles. All claws minute, symmetrical.

Wing faintly brownish tinged with brown veins. Basal fifth of vein R_{2+3} thickened. Joint of R_{2+3} and R_{4+5} a little swollen. Apical part of M_{3+4} about 2.5 times as long as tp. Anal vein pale brownish near base, but fading and not reaching wing border. Squama brown with fan of long, black cilia. Halter with pale knob and pale stalk.

Abdomen brown. Hairs and bristles on terga short, all marginals distinct, slightly longer as tergites are wide. Sterna pale brownish with long marginals. Tip of surstyli and aedeagus hidden in sternites 4 and 5. Genital capsule (Fig. 25) globular, dark brown. Cerci elongate, with a strong, yellowish bristle near tip. Surstyli elongate, brown in contrast to paler cerci; about half as long as genital capsule is long. Hyandrium (Fig. 26) yellowish; tip with 4 long narrow teeth. Aedeagus (Fig. 27) yellowish. A long pale, epandrial bristle present, inserted on a short tubercle; with a short bristle at base.

Female: unknown.

Remarks. — *N. singaporensis*, new species seems to be related to *N. horvati* Wang & Yang (2004) in that both species have a long triangular third antennal segment, 2.7 times as long as wide in *N. singaporensis*, but 4.6 times in *N. horvati*. Both species have the basal spur on hind metatarsus rim-like. The basal portion of vein R_{2+3} is not swollen in *N. horvati* as it is in *N. singaporensis*, new species. The genitalia are similar in general structure but much different in the details. Cercus in *N. singaporensis* bears a broad leaf-like bristle. This bristle is slender and much longer in *N. horvati*.

Wang & Yang (2004) assigned *N. horvati* to the *N. longa*-group, and due to the many similarities, *N. singaporensis*, new species should also belong to this group. However *N. singaporensis*, new species does not have basal tubercles on the cercus or at least it is not recognised as such here in this study.

Nepalomyia negrobovi, new species

(Figs. 28–33)

Material examined. — Holotype male, SINGAPORE: Nee Soon, 5 Apr.2005, swamp forest, Mal 2, (MS name: Si501; reg. 25047, Si901, coll. P. Grootaert).

Paratypes: 1 male, Nee Soon, 5 Apr.2005, swamp forest, Mal 2, (reg. 25047, Si901, coll. PG); 3 males, Sime Forest, 13 May 2005, forest, Mal 2, (reg. 25130, Si941, coll. PG); 1 male, Nee Soon, 3 Dec.2005, swamp forest, Mal 2, (reg. 25437, Si1322, coll. PG); 3 males, Sime Forest, 3 Jun.2005, forest, Mal 2, (reg. 25135, on pin, coll. PG); 1 male, Sime Forest, 6 May 2005, forest, Mal 2, (reg. 25128, coll. PG).

Etymology. — The present species is dedicated to Prof. Oleg Negrobov (Voronesh) in honour of his life-long work on dolichopodid taxonomy.

Diagnosis. — Small species with triangular third antennal segment 1.5 times as long as wide. Face grey dusted. All coxae brown. Tip of aedeagus globular, black.

Male: Body length: 1.8 mm; wing length: 1.5 mm.

Head. Vertex brownish black, surpassing level of upper eye margin. Occiput concave. Face brown, grey dusted, parallel-sided, as wide as base of third antennal segment. Clypeus very feebly bulging out. Palpus dark brown, with a black apical bristle. Rostrum yellowish brown. Ocellar tubercle prominent. 2 strong black ocellars, 2 postverticals, nearly as long as the postocellars, but less strong; 2 tiny postocellars. Postocular bristles uniseriate, black. Antenna brown, but basal segments darker than third segment. Second segment with a circle of short marginal bristles and with 1 or 2 long dorsal bristles. Third segment elongate triangular (Fig. 28), 1.5 times as long as wide. Arista 3.8 times as long as third segment.

Thorax brown, not shining, pleurae hardly lighter coloured. A shallow prescutellar flattened area. Postscutellum with a median mound. Acr biseriate, long, half as long as dc. 5 dc (growing longer posteriad). 1 long humeral and 1 only slightly shorter posthumeral, 1 short presutural, 2 long postsutural; 1 very long pre-alar; 1 very long post alar, 2 short notopleurals; scutellum with 2 strong marginals with a short hair at side. 1 long black propleural bristle, just above coxa.

Legs yellow, but all coxae brown, including fore coxae. Bristles and hairs black. Fore coxa anteriorly with short hairs ending in 4 long bristles near tip of coxa. Fore femur without bristles, bearing only 2 very short, hair like preapical pv. Fore tibia with short preapical ventral bristle. Mid coxa with numerous anterior bristles and 1 long black bristle below middle. Mid femur with a strong anterior preapical, no posterior preapical. Mid tibia: 2 strong ad, 2 weaker pd; 3 strong bristles in apical crown. Mid tarsomeres with a pair of short apical bristles. Hind coxa with a black exterior bristle, half as long as the one mid coxa. Hind femur with an anterior preapical; no posterior preapical and no other

bristles. Hind tibia with a short dorsal bristle just beyond middle and a short anterodorsal preapical. No real apical crown of bristles, only a distinct ventral bristle. Posterodorsal comb short (Fig. 29), with a short, black denticle below. First segment of hind tarsus more than half as long as second segment. All hind tarsomeres with short apical bristles. All claws minute, symmetrical.

Wing faintly brownish tinged with brown veins. Joint of R_{2+3} and R_{4+5} a little swollen. Apical part of M_{3+4} about 2–2.5 times as long as tp. Anal vein distinct at base, gradually fading. Squama brown with fan of long, black cilia. Halter with brownish knob and stalk.

Abdomen brown. Hairs and bristles on terga short. Marginals on first tergite as long as tergite is wide; marginals on following tergites only half as long as tergites are wide. Sterna pale brownish with only sternite 4 having distinct marginals. Genital capsule (Fig. 30) globular, dark brown. Cerci short, with a strong, yellowish bristle near tip. Surstyli elongate, brown in contrast to paler cerci; less than half as long as genital capsule is long. Hypandrium (Fig. 31) yellow, furcate. Aedeagus (Figs. 31, 32) brownish, but tip dorsally darkened. A long pale, epandrial bristle present, inserted on a short tubercle; with a short bristle at base.

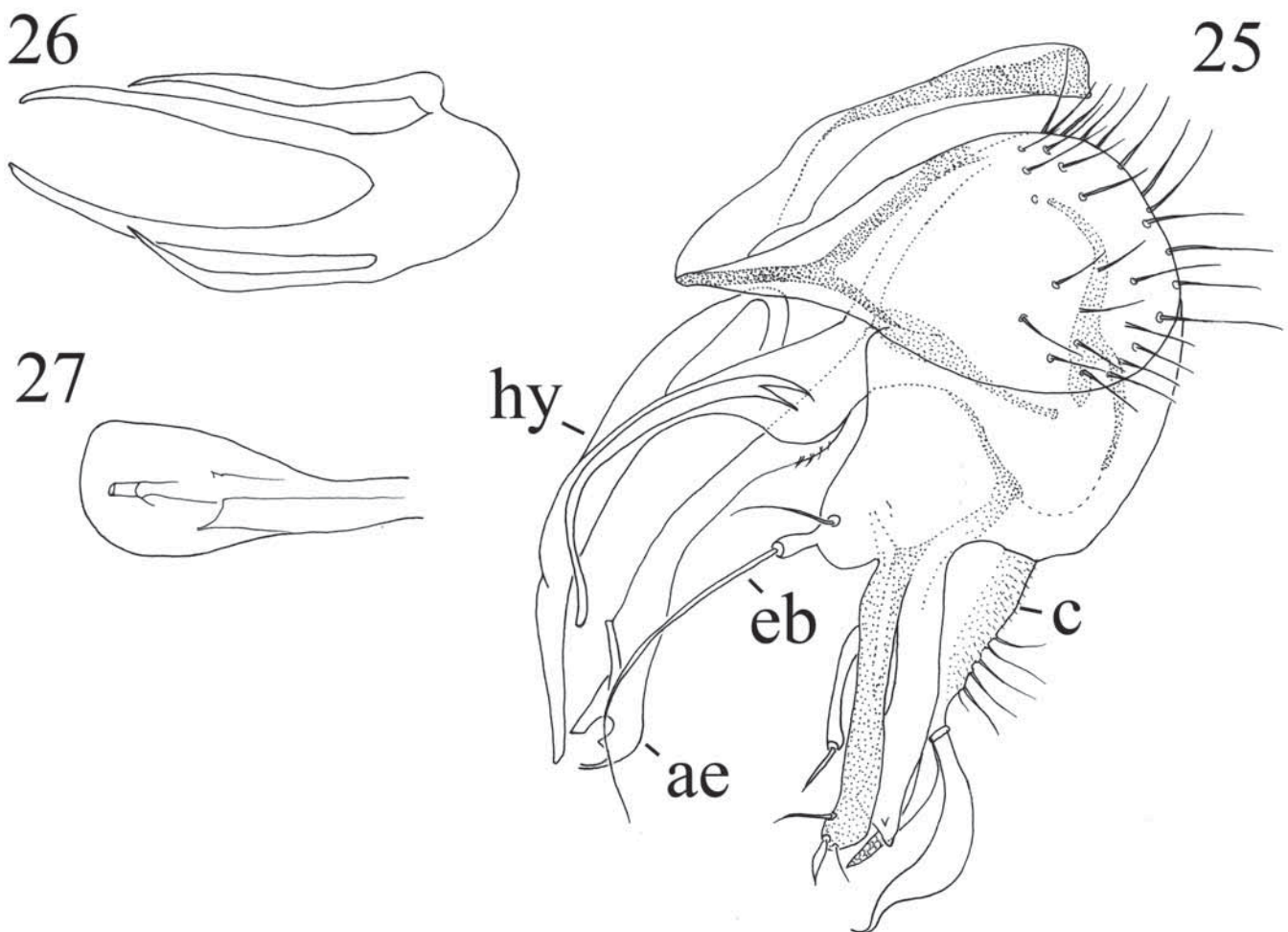
Female: unknown.

Remarks. — *N. negrobovi*, new species is the only species in Singapore with all coxae brownish. It is easily recognised in the male sex by the black globular tip of the aedeagus.

GENERAL DISCUSSION

In the present paper, seven *Nepalomyia* species are reported for the first time from true tropical lowland conditions. Before this, *Nepalomyia* was always found in mountainous areas, at least in the Oriental region.

Several attempts were made to categorise the species into species groups (Yang & Saigusa, 2001; Wang et al., 2007). A key to the six groups can be found in Wang et al. (2007). Only *N. singaporensis*, new species that is clearly related to *N. horvati* Wang & Yang from Taiwan could be assigned here to one of the species groups, i.e., the *longa*-group sensu Wang et al. (2007) and Wang & Yang (2004). However Yang et al. (2011) recently assigned *N. horvati* to the *henanensis*-group. The classification of the other six Southeast Asian species into the *henanensis*-group is only tentative. Nevertheless I am convinced that a thorough revision of the characters of



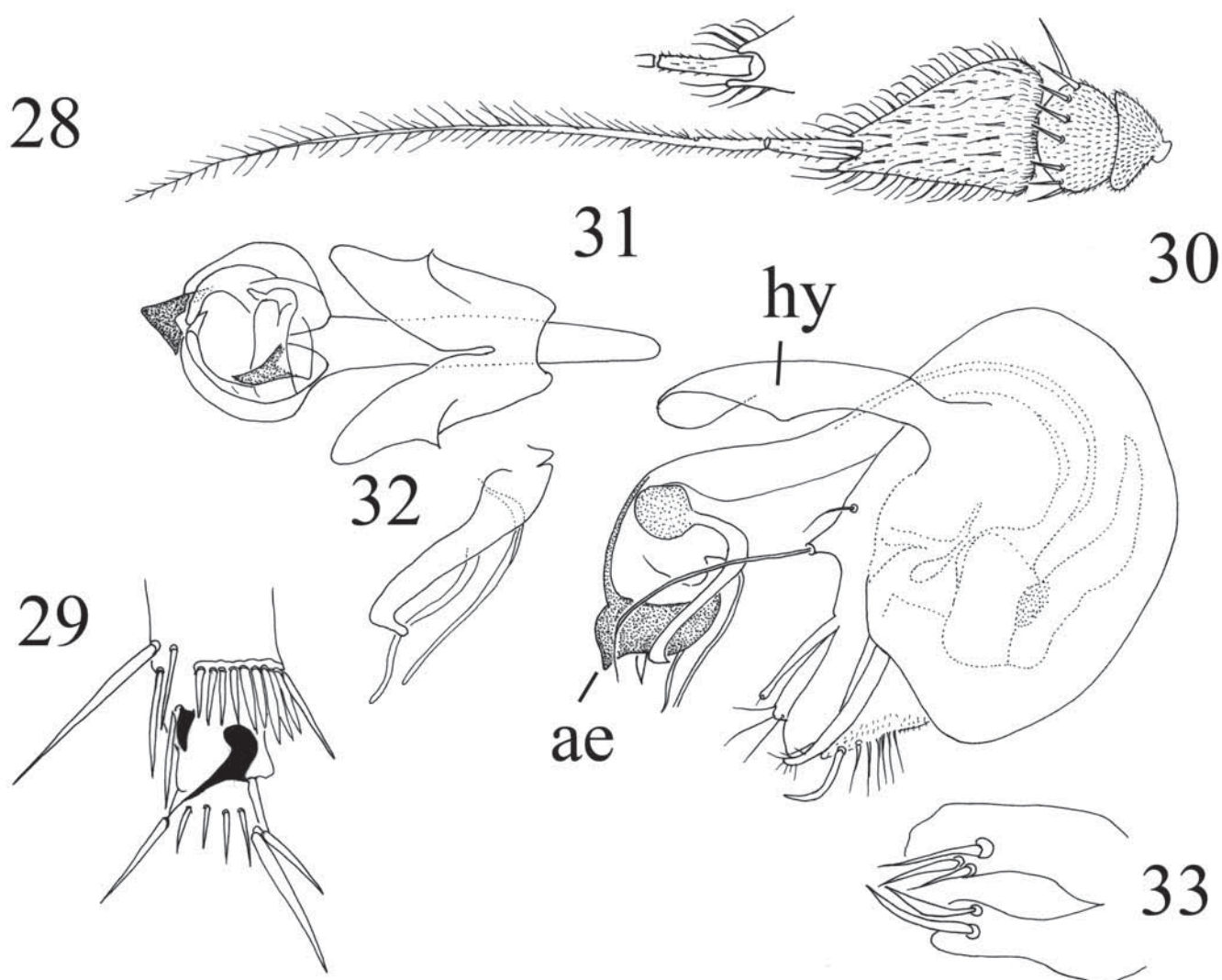
Figs. 25–27. *Nepalomyia singaporensis*, new species: 25, postabdomen; 26, tip hypandrium; 27, tip aedeagus.

all the Oriental *Nepalomyia* could lead to a more consistent grouping.

Nepalomyia is classified in the Peloropeodinae by Yang et al. (2007). However Lim et al. (2009), using four mitochondrial and two nuclear genes, showed that the Peloropeodinae were polyphyletic. It was especially surprising that *Nepalomyia* did not cluster with *Acropsilus* and *Scotiomyia* although they share various characters such as the insertion of the arista in an apico-dorsal notch of the third antennal segment and, especially, the stalk-like seventh abdominal segment that is connected to a V-shaped internal crista of the eighth sternite. Genital morphology of these three genera is also very similar. In fact, the type genus *Peloropeodes* and the related genus *Griphophanes* do not have a lengthened seventh abdominal segment connected to a V-shaped crista on the eighth sternite, and neither do the two *Nepalomyia* described from La Réunion (Grichanov, 2010). Hence it is important to find out if the latter two species are really related to the Oriental, Palearctic, and Nearctic *Nepalomyia*, or do they represent an independent homoplastic line. Future molecular studies using more conservative nuclear genes will show if Peloropeodinae should be split up in different subfamilies.

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Figs. 28–33. *Nepalomyia negrobovi*, new species: 28, antenna with detail of tip; 29, hind basitarsus; 30, genital capsule; 31, tip of aedeagus; 32, appendages on tip of aedeagus; 33, tip of cerci.

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