



## Three new *Helicopsyche* from Laos (Trichoptera: Helicopsychidae)

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### Abstract

Three new species, *Helicopsyche pathoumthongi*, *Helicopsyche vongsombathi*, and *Helicopsyche laoensis*, are described and illustrated based on material collected in northern Laos from April–May, 2005. With *Helicopsyche antikleia* Malicky, 1997, originally described from Laos, and the discovery of a single male of the widespread Oriental species *Helicopsyche angusta* (Ulmer, 1951) the Laotian *Helicopsyche* fauna now contains 5 recorded species.

**Key words:** Trichoptera, Helicopsychidae, *Helicopsyche*, new species, Laos

### Introduction

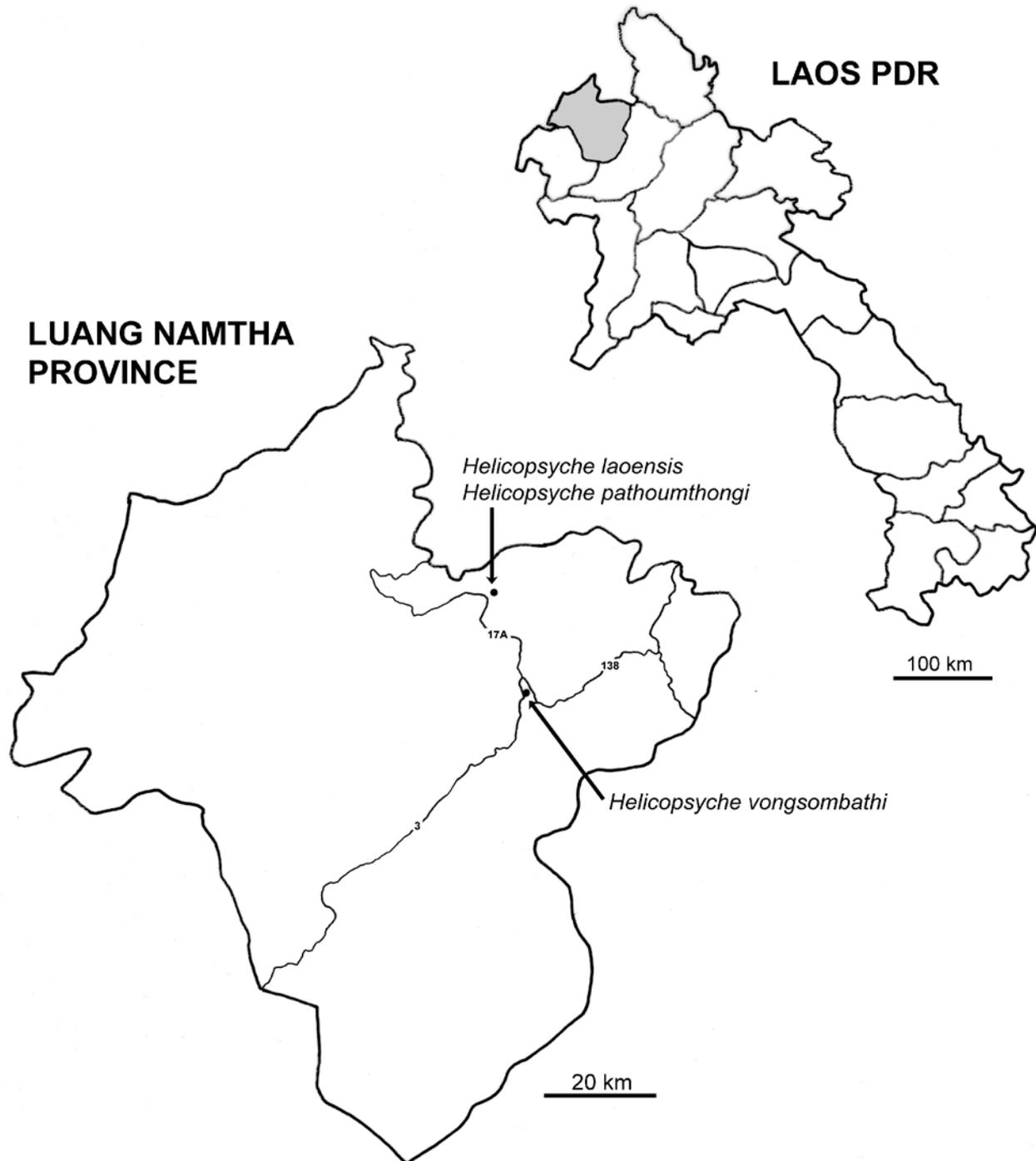
The family Helicopsychidae is a moderately large taxon with nearly 230 extant species described worldwide. Nearly a quarter of the species are known from the Oriental Region, and the highest diversity of the 60 Oriental species was recorded from northern India by Schmid (1993). Previous to this report, only 1 species, *Helicopsyche antikleia* Malicky, 1997, was known from Laos. This species was described from 2 males collected by P. Schwendinger at the Tad Lo Waterfalls in the southern part of Salavan Province in 1996. Interestingly, the male genitalia of that species have a general similarity with those of the European species, especially due to the general shape of the dorsal gonocoxite branch, and the deeply incised gonocoxite with about equally long primary and secondary branches. Among other characters, the species is separated from the European *Helicopsyche* by the absence of the long, inner branches of the gonocoxite. *Helicopsyche antikleia* is unique in the family by the presence of a pair of very long, slender, and tubular branches originating from the base of segment X. The 3 new species described herein were collected by T. Malm, B. Viklund, and N. Jönsson (Swedish Museum of Natural History) from northern Luang Namtha Province situated near the border of China and Myanmar (Fig. 1). The material was collected in a light trap situated close to water courses.

The localities providing these samples were of markedly different natures. Tong Om is a small village between the town of Luang Namtha and the Luang Namtha Airport. Here the traps were placed in close vicinity to a pond and old rice fields. Specimens may have come from the nearby Namtha River. Lakkhamai Village lies 20 km north of Luang Namtha where the traps were placed close to Nam Leung stream in the village area. The Nam Leung is moderately fast flowing with riffles and pools, featuring a mixed stone and sand bottom.

### Material and methods

The specimens were collected into about 80% alcohol in the field and stored in 80% alcohol at about –20°C in the Swedish Museum of Natural History. In the laboratory, the right wings and entire abdomens were sepa-

rated from the bodies for examination and drawing. The abdomen was extracted for DNA in the Laboratory of Molecular Systematics at Swedish Museum of Natural History. The wings and genitalia were drawn by use of a drawing tube mounted on a Leitz stereomicroscope. The wings were placed in glycerol on a microscope slide before being drawn. To macerate the genitalia and sample DNA, the abdomens were heated in Protienase K at 56°C for 2 hours and then dehydrated in 100% ethanol before being temporarily mounted in euparal on a microscope slide. After being drawn, the genitalia were cleansed from the euparal in 100% ethanol and then transferred back to its voucher vial. The terminology used for describing characters mainly follows Johanson (1998). All material is deposited in the entomological collections at the Swedish Museum of Natural History



**FIGURE 1.** Map of Luang Namtha Province, Laos PDR, showing the localities where the new *Helicopsyche* species were collected. The figures are road numbers.

#### **Species descriptions**

### *Helicopsyche laoensis*, new species

Figs. 2, 5–12

*Helicopsyche laoensis*, new species, has unique male genitalia consisting of a long, slender primary branch of the gonocoxite posteriorly curved at its apex, in lateral view a nearly rectangular segment IX, and a pair of lateral processes on segment X basally attached to segment X shortly after the mid-length.

Male. Cephalic setal warts small, oval; interantennal setal warts absent. Maxillary and labial palps with brushes of setae or sensillae on dorsal face; labial palps with distal segment very short, about 1/4 the length of segment 2; maxillary palps 2-segmented, with distal segment slightly longer than proximal segment and slightly shorter than eye diameter. Antennal scape as long as eye diameter. Tibial spurs 1, 2, 4. Forewing brownish grey with characteristic pattern of small, pale spots scattered over wing surface (Fig. 2), without modified setae along R5, length 4.1 mm; hind wing length 3.1 mm, with 14 hamuli; wing venation as in Fig. 5.

Male abdomen and genitalia (Figs. 6–12). Sternal process VI short, oriented posteroventrally, tubular along its length, densely covered by long microtrichiae. Segment IX nearly rectangular in lateral view, anterodorsal corner nearly right-angled, anteroventral margin nearly straight; without sub-marginal anterior apodeme; horizontal lateral apodeme present; dorsal margin nearly straight; inner margin U-shaped in dorsal view, shallowly concave in ventral view; posterior margin weakly convex in ventral view. Segment X straight, parallel-sided in lateral view; with 8 small megasetae confined to apex; 1 pair of lateral knife-shaped processes originating shortly after mid-length, separated from segment X at base, running posteriorly in parallel with lateral margin of segment X along their lengths. Superior appendage moderately long, tubular, nearly straight. Gonocoxite primary branch slightly broadening distally in lateral view, bent posteriorly before apex; secondary branch with single apical seta, short, completely hidden by primary branch; basal branch absent; gonocoxite basal plate short, ending before anterior margin of segment IX, anterior part slightly tapering towards rounded apex; in ventral view, anterior part sharply narrowing apically. Phallus without processes, more or less uniformly curved ventrally along its length, with strongly undulating ventral margin; basal half about equally wide, posterior half nearly 3x wider than anterior half; in ventral view, anterior half about as wide as in lateral view; posterior half about 3x broader than anterior part.

**Holotype male:** LAOS PDR: **Luang Namtha Prov.:** Nam Ha NBCA, Lakkhammai Village, Niam Leung stream, light trap, loc. 29, 21.152°N, 101.355°E [UTM 47Q 0744602, 2339873], el. 749 m, 30.iv.2005, Jönsson, Malm, Viklund (NRM, alcohol). **Paratypes:** same data as for holotype — 1 male, 1 female. Etymology. *laoensis*, named after the type locality Laos PDR.

### *Helicopsyche vongsombathi*, new species

Figs. 3, 13–20

*Helicopsyche vongsombathi*, new species, is unique in the genitalia by the nearly uniformly wide, sigmoid, primary branch of the gonocoxite, the presence of a short secondary branch on gonocoxite bearing 2 long, posteriorly oriented setae; the slightly up-curving segment X having 4 pairs of megasetae at its truncated apex; and the widely and deeply incised segment X apex.

Male. Cephalic setal warts narrowly pyriform, pointed anteriorly; interantennal setal warts bean-shaped, concave laterally. Maxillary and labial palps without brushes of setae or sensillae; labial palps short, with nearly equally long segments; maxillary palp 2-segmented, with nearly equally long segments. Antennal scape as long as maxillary palp segments, slightly shorter than eye diameter. Tibial spurs 1, 2, 4. Forewing brownish grey with characteristic pattern of small, pale spots scattered over wing surface (Fig. 3), and without modified setae along R5, length 3.6 mm; hind wing length 2.8 mm, with 13 hamuli; wing venation as in Fig. 13.



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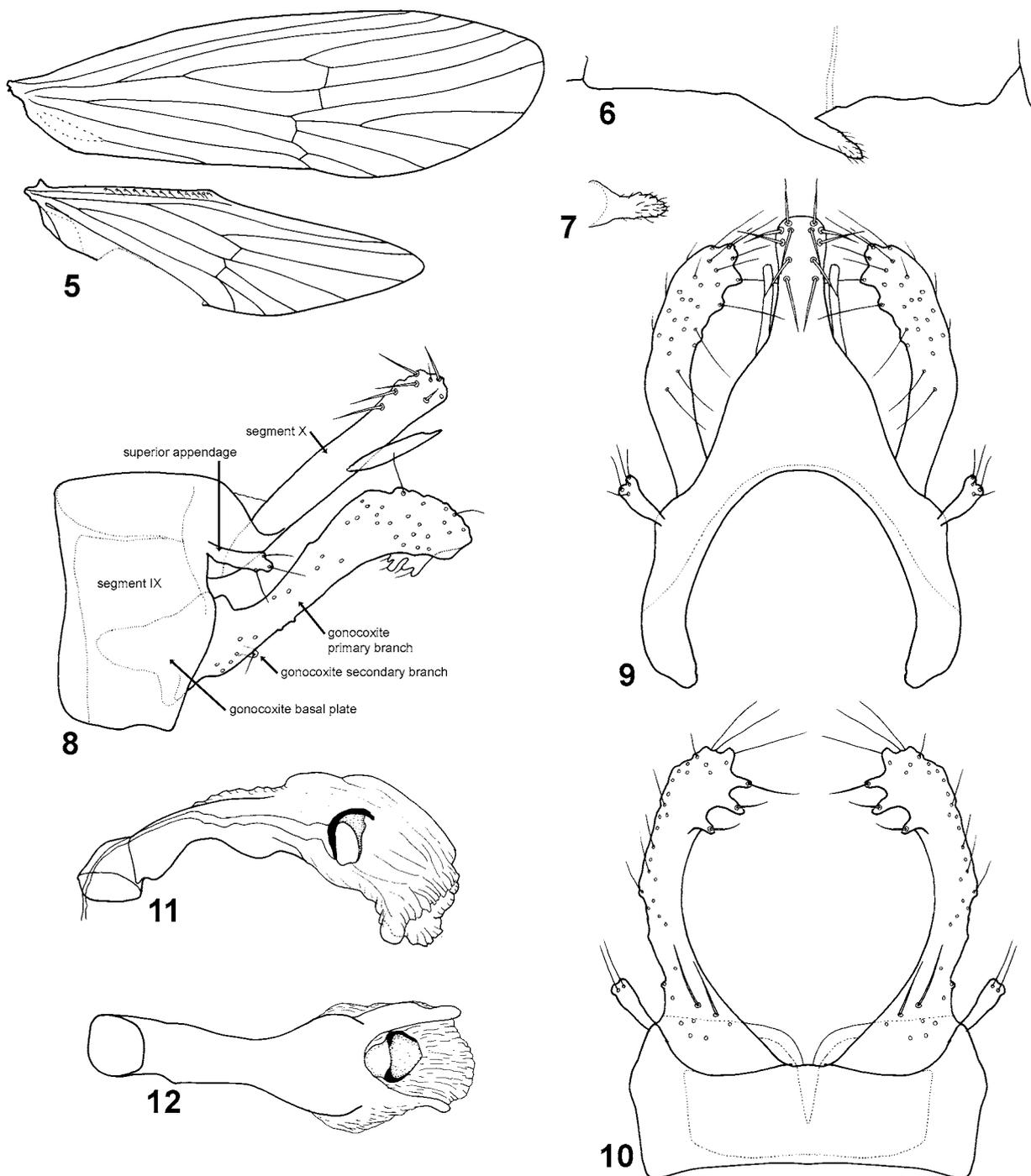
3



4

1.0 mm

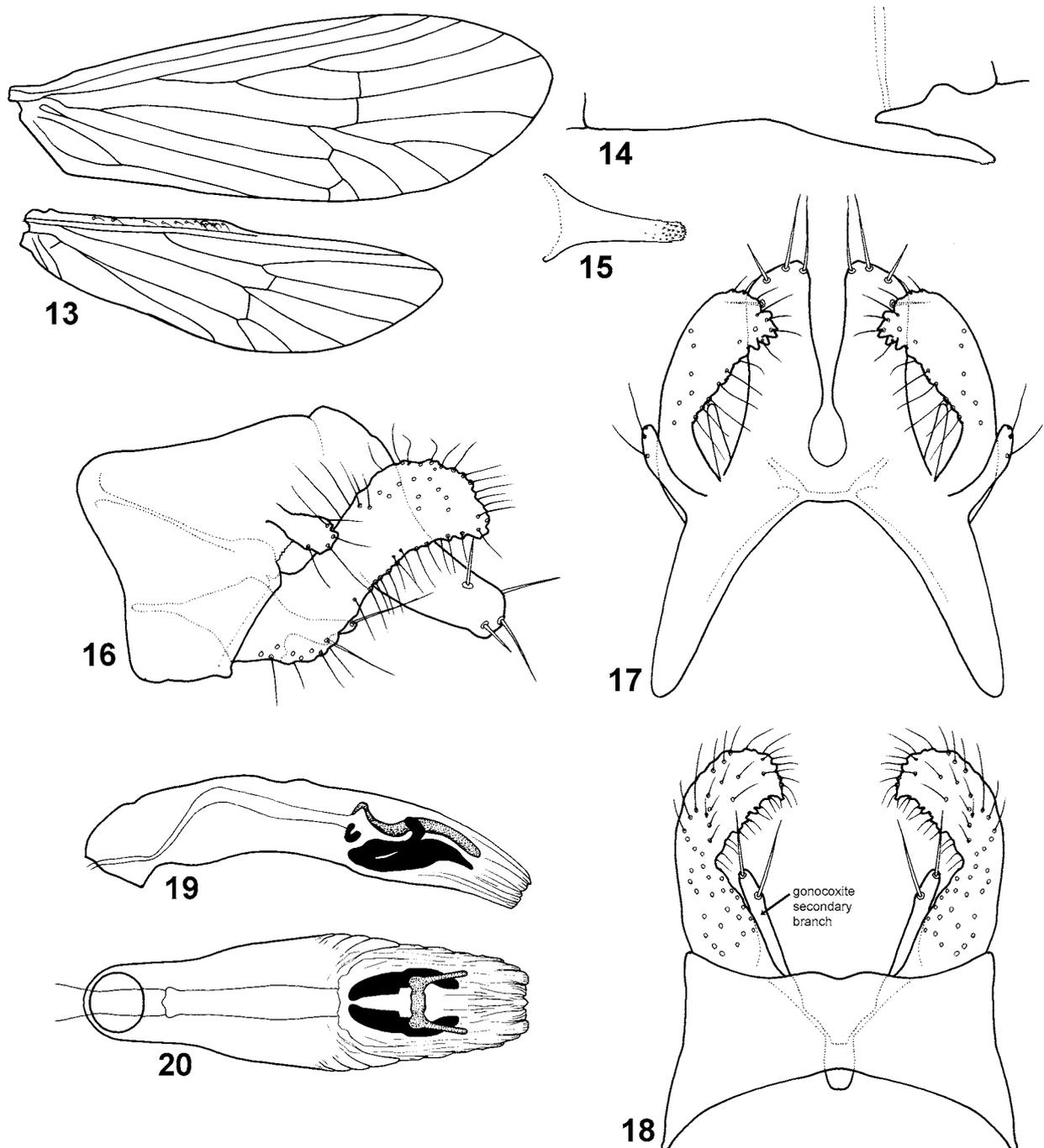
**FIGURES 2–4.** Distal part of forewings of the new *Helicopsyche* species. 2 — *H. laoensis*, **new species**; 3 — *H. vongsombathi*, **new species**; 4 — *H. pathoumthongi*, **new species**.



**FIGURES 5–12.** *Helicopsyche laoensis*, **new species**, holotype. 5 — right wings; 6 — abdominal sternite VI, lateral view; 7 — process on abdominal sternite VI, ventral view; 8 — genitalia, lateral view; 9 — genitalia, dorsal view; 10 — genitalia, ventral view; 11 — phallus, lateral view; 12 — phallus, ventral view.

Male abdomen and genitalia (Figs. 14–20). Process of sternum VI moderately long, oriented posteriorly, in ventral view narrowing towards apex, ventral face of apex covered by spinose microtrichiae. Segment IX, in lateral view, expanded anteriorly into rounded lobe, anteroventral margin shallowly concave; horizontal lateral apodeme present; dorsal margin nearly straight; inner margin wide, V-shaped in dorsal view and shallowly concave in ventral view; in ventral view, posterior margin forms 2 short, wide lobes. Segment X weakly

up-curving, narrowest at apex; with 4 megasetae confined to truncate apex; lateral processes absent. Superior appendage moderately long, club-shaped, oriented posteroventrally. Gonocoxite primary branch uniformly broad in lateral view, weakly sigmoid; secondary branch short, straight, tube-shaped in ventral view, with 2 posteriorly oriented apical setae; gonocoxite basal branch absent; gonocoxite basal plate nearly reaching anterior margin of segment IX in lateral view; anterior part very slender, nearly equally broad along its length; in ventral view, wider than in lateral view, parallel-sided and apically truncate. Phallus apparently with internal processes in addition to phallic sclerite; in lateral view, nearly parallel-shaped and weakly curving ventrally along its length; in ventral view, cigar-shaped; central part nearly 2x wider than anterior and posterior parts.



**FIGURES 13–20.** *Helicopsyche vongsombathi*, new species, holotype. 13 — right wings; 14 — abdominal sternite VI, lateral view; 15 — process on abdominal sternite VI, ventral view; 16 — genitalia, lateral view; 17 — genitalia, dorsal view; 18 — genitalia, ventral view; 19 — phallus, lateral view; 20 — phallus, ventral view.

**Holotype male: LAOS PDR: Luang Namtha Prov.:** Tong Om Village, loc. 30, 20.935°N, 101.407°E [UTM 47Q 0750111, 2321825], el. 552 m, 1.v.2005, Jönsson, Malm, Viklund (NRM, alcohol).

Etymology. *vongsombathi*, named after PhD student Chanda Vongsombath for his helpful assistance in the collecting of this new species.

***Helicopsyche pathoumthongi*, new species**

Figs. 4, 21–30

*Helicopsyche pathoumthongi*, new species, has forewing R5 densely covered by blackish rod-shaped setae (Fig. 4). The species is unique in the genitalia by the nearly uniformly wide, sickle-shaped primary branch of the gonocoxite, the presence of a secondary branch of the gonocoxite that is shorter than the width of the dorsal branch, and by the long basal branches that curve slightly mediad and bear 2 distal and 2 median setae. Segment X is club shaped in lateral view, with very slender lateral processes running parallel with the lateral margins. Also *H. antikleia* has long, slender processes on segment X, but in *H. antikleia* only the anterior part of the processes are attached to segment X, while in *H. pathoumthongi* the processes are attached to segment along their length.

Male. Cephalic setal warts small, oval; interantennal setal warts absent. Maxillary and labial palps with brushes of sensillae on dorsal face of segments; labial palp distal segment very small, about 1/4 as long as 2nd segment; maxillary palp distal segment slightly longer than basal segment, shorter than eye diameter. Antennal scape length equal to eye diameter. Tibial spurs 1, 2, 4. Forewing brownish grey with characteristic pattern of small, pale spots scattered over wing surface (Fig. 4), and with short, dark setae along R5, length 4.4 mm; hind wing length 3.3 mm, with 14 hamuli; wing venation as in Fig. 23.

Male abdomen and genitalia (Figs 24–30). Sternal process VI short, oriented posteroventrally; in ventral view narrowing towards midlength, apex slightly club-shaped, densely covered by small spines. Segment IX, in lateral view, strongly expanded anteriorly, anteroventral margin nearly straight except concave near posterior corner; with sub-marginal anterior apodeme and horizontal lateral apodeme; dorsal margin nearly straight; inner margin V-shaped in dorsal view and U-shaped in ventral view; posterior margin forms 2 short, wide lobes in ventral view. Segment X straight, narrowest at mid-length; with 9 megasetae confined to club-shaped apex; 1 pair of lateral, tube-shaped processes originating from basal part of segment X, running posteriorly and attached to central segment X forming a ridge, distal-most part separated from segment X. Superior appendage long, tubular, slightly bent upwards and club-shaped at apex. Gonocoxite primary branch nearly uniformly wide in lateral view, forming a half-circle; secondary branch slightly tapering towards apex, slightly curving ventrally in lateral view and medially in ventral view, with 1 basal, 2 median, and 1 apical setae; gonocoxite basal branch short, truncated distally, with few long setae oriented posteriorly; gonocoxite basal plate long, exceeding segment IX in lateral view, anterior part nearly equally broad; in ventral view, anterior part needle-shaped. Phallus without additional sclerites, curved posteriorly at 1/3 its length and ventrally at 2/3 its length; about equally wide along its length in lateral view; in ventral view, anterior half about as wide as in lateral view; distal half about 3x broader than anterior part.

**Holotype male: LAOS PDR: Luang Namtha Prov.:** Nam Ha NBCA, Lakkhammai Village, Niam Leung stream, light trap, loc. 29, 21.152°N, 101.355°E [UTM 47Q 0744602, 2339873], 749 m, 30.iv.2005, Jönsson, Malm, & Viklund (NRM, alcohol).

**Paratypes:** same data as for holotype — 1 male, 1 female.

Etymology. *pathoumthongi*, named after Mr. Bounnam Pathoumthong for his helpful assistance in the collecting of this new species.

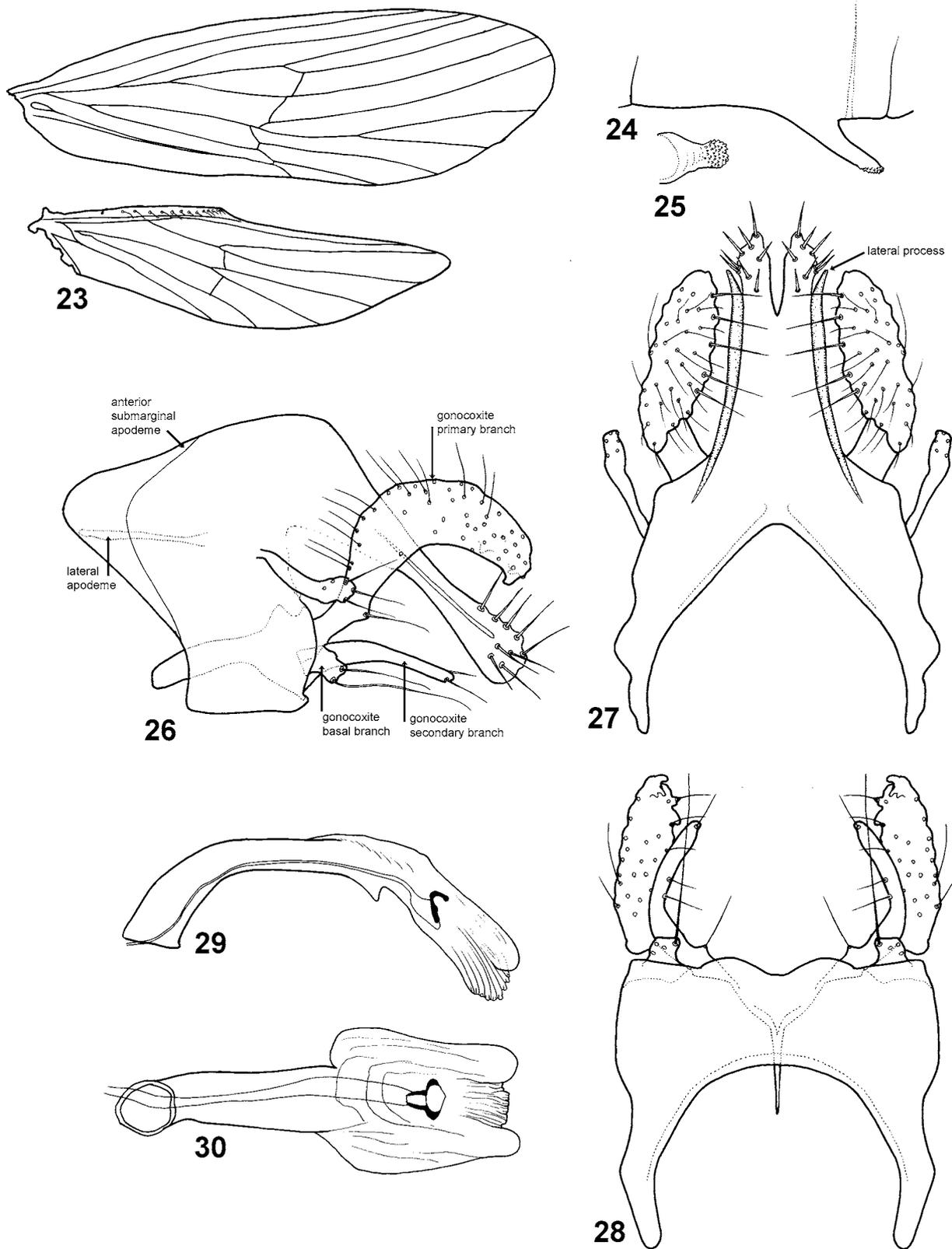


**FIGURES 21–22.** *Helicopsyche pathoumthongi*, **new species**, holotype. 21 — head, anterolateral view; 22 — head, frontal view.

### **New species record**

#### ***Helicopsyche angusta* Ulmer, 1951**

LAOS PDR: Vientiane Prov.: Phanom stream, 125 m upstream Phahom Village, Malaise trap, 19.1135°N, 102.372°E [UTM 48Q 0223506 2115465], 363 m, 26.iv–3.v.2005, Jönsson, Malm, Viklund, 1 male (NRM, alcohol).



**FIGURES 23–30.** *Helicopsyche pathoumthongi*, new species, holotype. 23 — right wings; 24 — abdominal sternite VI, lateral view; 25 — process on abdominal sternite VI, ventral view; 26 — genitalia, lateral view; 27 — genitalia, dorsal view; 28 — genitalia, ventral view; 29 — phallus, lateral view; 30 — phallus, ventral view.

## Key to male *Helicopsyche* of Laos

- 1 Maxillary palp 5-segmented ..... *Helicopsyche angusta* Ulmer
- Maxillary palp 2-segmented ..... 2
- 2 In genitalia, gonocoxite with long secondary branch clearly exceeding primary branch margin ..... 3
- In genitalia, gonocoxite with short secondary branch exceeding primary branch margin for a short distance, or secondary branch absent ..... 4
- 3 In genitalia, segment X with lateral processes forming a ridge on segment X, separated from segment X only at distal part; gonocoxite primary branch at most 2x broader at mid-length than proximally .....  
..... *Helicopsyche pathoumthongi*, **new species**
- In genitalia, segment X with lateral process separated from segment X along its length; gonocoxite primary branch about 3x broader at mid-length than proximally ..... *Helicopsyche antikleia* Malicky, 1997
- 4 In forewing, fork 3 about as long as its stalk; in genitalia, segment IX nearly triangular; segment X deeply incised in dorsal view, without lateral processes, slightly curved dorsally; gonocoxite parallel-sided in lateral view ..... *Helicopsyche vongsombathi*, **new species**
- In forewing, fork 3 nearly twice as long as its stalk; in genitalia, segment IX nearly rectangular, not incised in dorsal view, with free lateral processes, nearly straight; gonocoxite club-shaped in lateral view .  
..... *Helicopsyche laoensis*, **new species**

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