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Five new species of Caddisflies (Trichoptera: Insecta) from Upper Tenasserim Range, Thailand and Myanmar

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Abstract

Five new species of caddisflies are described from the Upper Tenasserim Range, including *Chimarra keawpradubi* **n. sp.**, *Ecnomus niyomwasi* **n. sp.**, *Psychomyia pinsuwanae* **n. sp.**, *Leptocerus suwannarati* **n. sp.**, and *Setodes lertpongsombatae* **n. sp.**, based on distinctive characters of male genitalia. *Chimarra keawpradubi* **n. sp.** differs from other *Chimarra* spp. in ventral aspect of inferior appendages, each of which is rectangular with a bulging process apicoventrally and with an acute apex. The basal part of each inferior appendage is square and the apical part is narrow in *E. niyomwasi* **n. sp.**, differentiating it from other species in the genus. *Psychomyia pinsuwanae* **n. sp.** differs from *P. amphiaraos* Malicky and Chantaramongkol 1997, a closely similar species, by characters of the inferior appendages; the inner branch of each inferior appendage has a long, straight spine on its inner side. *Leptocerus suwannarati* **n. sp.** can be distinguished from other *Leptocerus* spp. by the processes of segment X, which are long, thin, and symmetrical. *Setodes lertpongsombatae* differs from other *Setodes* spp. in characters of segment X, which is deeply divided subapically into two very long saber-like blades in lateral view.

Key words: Oriental Region Philopotamidae, Ecnomidae, Psychomyiidae, Leptoceridae

Introduction

The Tenasserim Range is part of the Indo-Malayan Mountain system in Southeast Asia. The mountain range runs from north to south on the Thai-Malay Peninsula. The Tenasserim Rage is divided into three parts. Malicky (2010) reported 205 species of caddisflies from Peninsular Malaysia, which has part of the lower Tenessirim Range. Laudee and Malicky (2014) reported 75 species of caddisflies from the Nakhon Si Thammarat Range, in the middle of the Tenessirim Range, in southern Thailand. The upper part of the Tenasserim range is at the border of Thailand and Myanmar. There are many protected areas on both sides of the mountain range, such as Kaeng Krachan National Park, Hui Yang Waterfall National Park, and Kui Buri National Park in Thailand; and Tanintharyi National Park and Lenya National Park in Myanmar. Some new species of caddisflies, such as *Chimarra reasilvia* Malicky and Prommi 2006, *Pseudoneureclipsis zagreus* Malicky and Prommi 2006, *Pseud. zethos* Malicky and Prommi 2006, *Ecnomus zephyros* Malicky and Prommi 2006, *E. stentor* Malicky and Prommi 2006, *E. lapithos* Malicky and Prommi 2006, *Psychomyia sinon* Malicky and Prommi 2006, *Leptocerus zalmoxis* Malicky and Prommi 2006, and *L. rutulus* Malicky and Prommi 2006, have recently been described from this area.

Considering the many protected areas, very few publications report on caddisflies from Myanmar. Until intensive collections of caddisflies are undertaken in this area, probably many species will not be found.

This is a report on some results from a study the biodiversity of caddisflies in the Upper Tennasirim Mountain Range, Thailand and Myanmar.

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Materials and methods

The caddisfly specimens were collected by a UV pan light trap (12 V, 10 W) near a river or stream overnight. The Trichoptera specimens were preserved in 70% ethanol and manually sorted afterwards. Adult male genitalia of the new species were cut and macerated by heating in 10% KOH at 60ºC for 30–60 minutes. The male genitalia of the new species were drawn by compound microscopy with a drawing tube, first with pencil and then with ink. Their holotypes and paratypes are stored in 70% ethanol and are deposited at Princess Maha Chakri Sirindhorn Natural History Museum, Prince of Songkla University, Hat Yai Campus, Hat Yai District, Songkhla Province, Thailand (PSUNHM). Some paratypes are deposited in the collection of Hans Malicky (CHM), the Clemson University Arthropod Collection (CUAC), and the National Museum, Prague, Czech Republic (NMPC). Terminology for genitalic structures is that of Morse (1975), Li & Morse (1997), Hur and Morse (2006), and Blahnik (1997).

Taxonomy

Philopotamidae

***Chimarra keawpradubi* Laudee and Malicky n. sp.**
Figs. 1–7

Type material. Holotype male (PSUNHM). Thailand: Prachuap Khiri Khan Province, Huai Yang Waterfall National Park, 11°36’32”N, 99°37’43”E, ca. 105 m a.s.l., 6 November 2016, leg. Pongsak Laudee.

Etymology. Named for Asst. Prof. Dr. Niwat Keawpradubi, who is the President of Prince of Songkla University.

Description. Length of each male forewing 6 mm; specimens in alcohol with head, thorax, forewings, abdomen, and legs black.

Male genitalia (Figs. 1–7). In lateral view, segment VIII rectangular with two lobes dorsoapically, apical margin with numerous long and strong setae; in dorsal view with U-shaped incision apicomesally. Segment IX in lateral view longitudinally short, tall, without ventral process; in ventral view U-shaped. Preanal appendages small, round, with short setae. Segment X divided into two processes, upper processes slender, 2/3 as long as lower processes and tapering to acute apices, lower processes long, slender, dilate apically; in dorsal view upper processes of segment X tubular and L-shaped, lower processes tubular, curved inward, and rounded apically. Inferior appendages rectangular, each with bulging process apicoventrally, acute apex; in ventral view cylindrical with claw-like spine apically. Phallus in later view tubular, truncated apically (Figs. 6, 7).

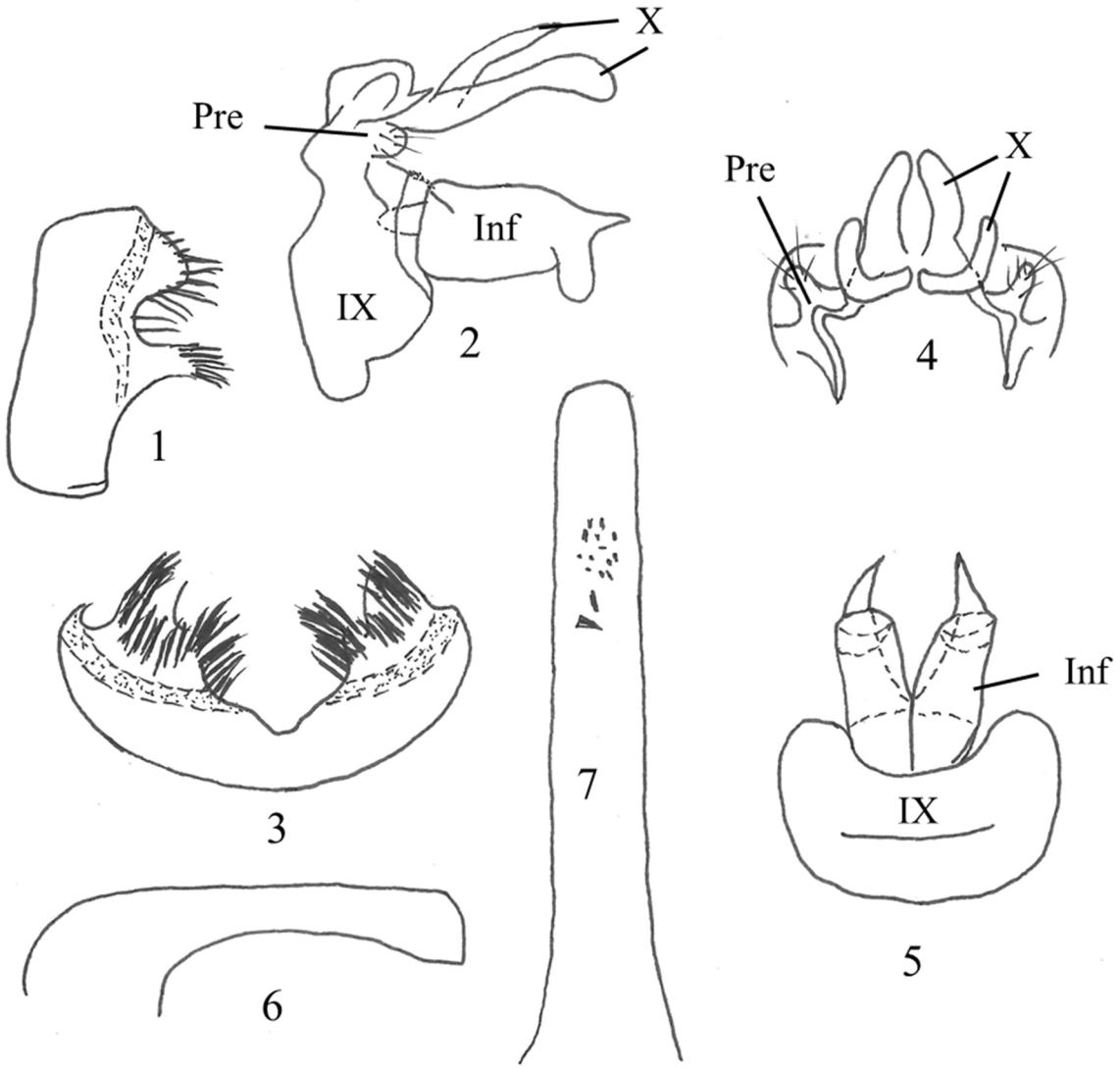
Diagnosis. The male genitalia of *C. keawpradubi* n sp. appear similar to those of *C. aneca* Malicky and Chantaramongkol 1993 and *C. matura* Malicky and Chantaramongkol 1993 found in Thailand, *C. haimuoinam* Malicky 1995 found in Vietnam, and *C. gerson* Malicky 2009 found in Borneo. They share the character that the apicodorsal margins of segment XIII have numerous strong setae and segment X is divided into two pairs of processes. However, the new species is distinguished from the others by the characters of the inferior appendages, each with a bulging process subapicoventrally and a claw-like spine apically, which are not present in the previously described species.

Ecnomidae

***Ecnomus niyomwasi* Laudee and Malicky n. sp.**
Figs. 8–11

Type material. Holotype male (PSUNHM). Myanmar: Tanintharyi Division, Myeik Province, Tanintharyi, Tanintharyi bridge, 12°05’27”N, 99°00’38”E, ca. 24 m a.s.l., 16 November 2016, leg. Pongsak Laudee.

Paratypes: Same data as holotype, 22 males: 7 males (PSUNHM), 5 males (CHM), 5 males (CUAC), 5 males (NMPC).



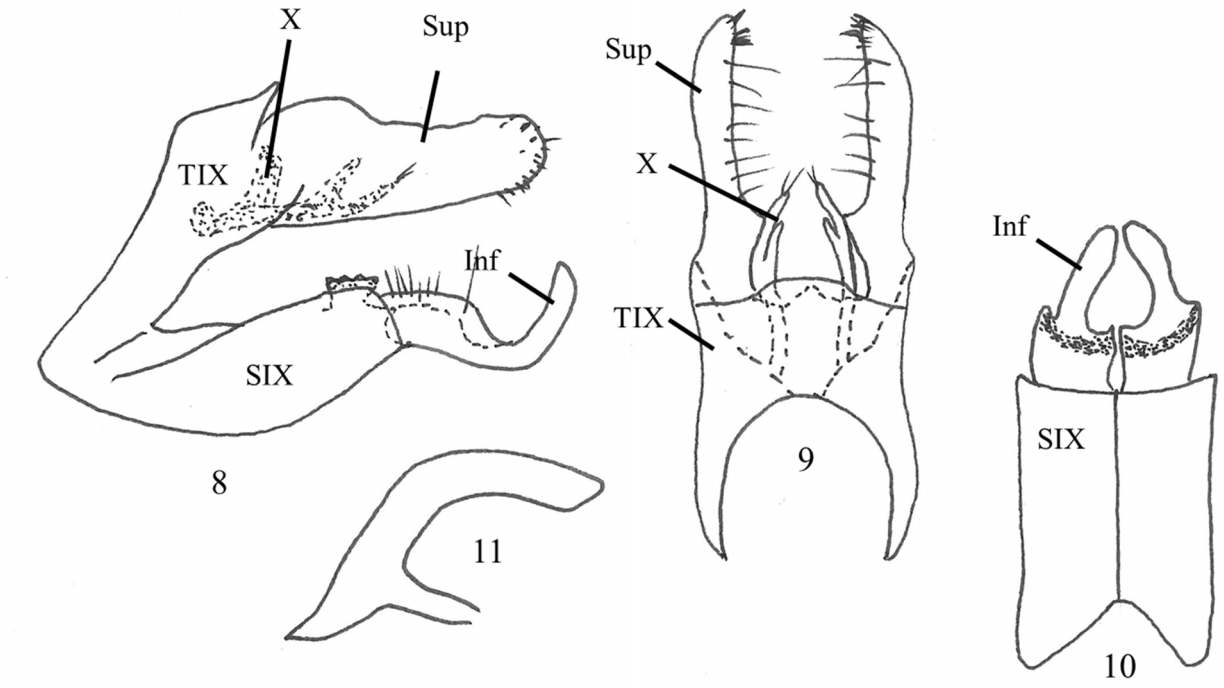
FIGURES 1–7. Male genitalia of *Chimarra keawpradubi* **n. sp.** 1, segment VIII, left lateral; 2, preanal appendages, segments IX and X, inferior appendages, left lateral; 3, segment VIII, dorsal; 4, preanal appendages, segments IX and X, dorsal; 5, segment IX and inferior appendages, ventral; 6, phallus, left lateral; 7, phallus, dorsal. Inf = inferior appendage (paired), IX = segment IX, Pre = preanal appendage, X = segment X.

Etymology. Named for Assoc. Prof. Dr. Sutham Niyomwas, who was the Director of the Research and Development Office, Prince of Songkla University, Hat Yai Campus.

Description. Length of each male forewing 4.0 mm; specimens in alcohol with head, thorax, forewings, abdomen, and legs light brown.

Male genitalia (Figures 8–11). Segment IX constricted near midheight into tergum and sternum, with acute angle between them; tergum IX in lateral view long, anterior margins broadly and shallowly concave, posterior margin pointed dorsally; square with anterior U-shaped incision half its length; sternum IX long, ventral margin broadly convex, posterior margin truncate; in ventral view rectangular, with anterior V-shaped incision 1/4 its length. Superior appendages in lateral view somewhat rectangular, slightly tapering to round apex, with scattered setae apically; in dorsal view each parallel-sided with broad subbasal tooth and blunt apex. Segment X visible only in dorsal view, tiny, slender, bifurcate. Inferior appendages each with tuft of long setae subbasodorsally, hooked dorsad in apical half; in ventral view square basally, tapering to tubular apical half, bent mesad, blunt apically, space between pair of inferior appendages shaped like sacred fig leaf. Phallus tubular in lateral view, bifurcate basally, bent subapically, obliquely truncate apically.

Diagnosis. The male genitalia of *E. niyomwasi* **n. sp.** in lateral aspect appear similar to those of *E. dikla* Malicky 2009 found in Vietnam, but can be distinguished from them by the characters of inferior appendages. In *E. niyomwasi* **n. sp.**, in lateral view the basal part of each inferior appendage is square, but is curved and tubular in *E. dikla*; the apical part is significantly narrower than the apical part of an inferior appendage of *E. dikla*, which is more expanding. In ventral view the inferior appendages of *E. niyomwasi* **n. sp.** are square basally and tubular apically, but triangular in *E. dikla*.



FIGURES 8–11. Male genitalia of *Ecnomus niyomwasi* **n. sp.** 8, left lateral; 9, dorsal; 10, ventral; 11, phallus, left lateral. Inf = inferior appendage (paired), SIX = sternal portion of segment IX, Sup = superior appendage (paired), TIX = tergal portion of segment IX, X = tergum X.

***Psychomyia pinsuwanae* Laudee and Malicky n. sp.**
Figs. 12–15

Type material. Holotype male (PSUNHM). Thailand: Prachuap Khiri Khan Province, Pala U waterfall, Kaeng Krachan National Park, Hua Hin, 12°32'47"N, 99°28'19"E, ca. 357 m a.s.l., 23 October 2016, leg. Pongsak Laudee.

Paratypes. Same data as holotype, 5 males (PSUNHM)

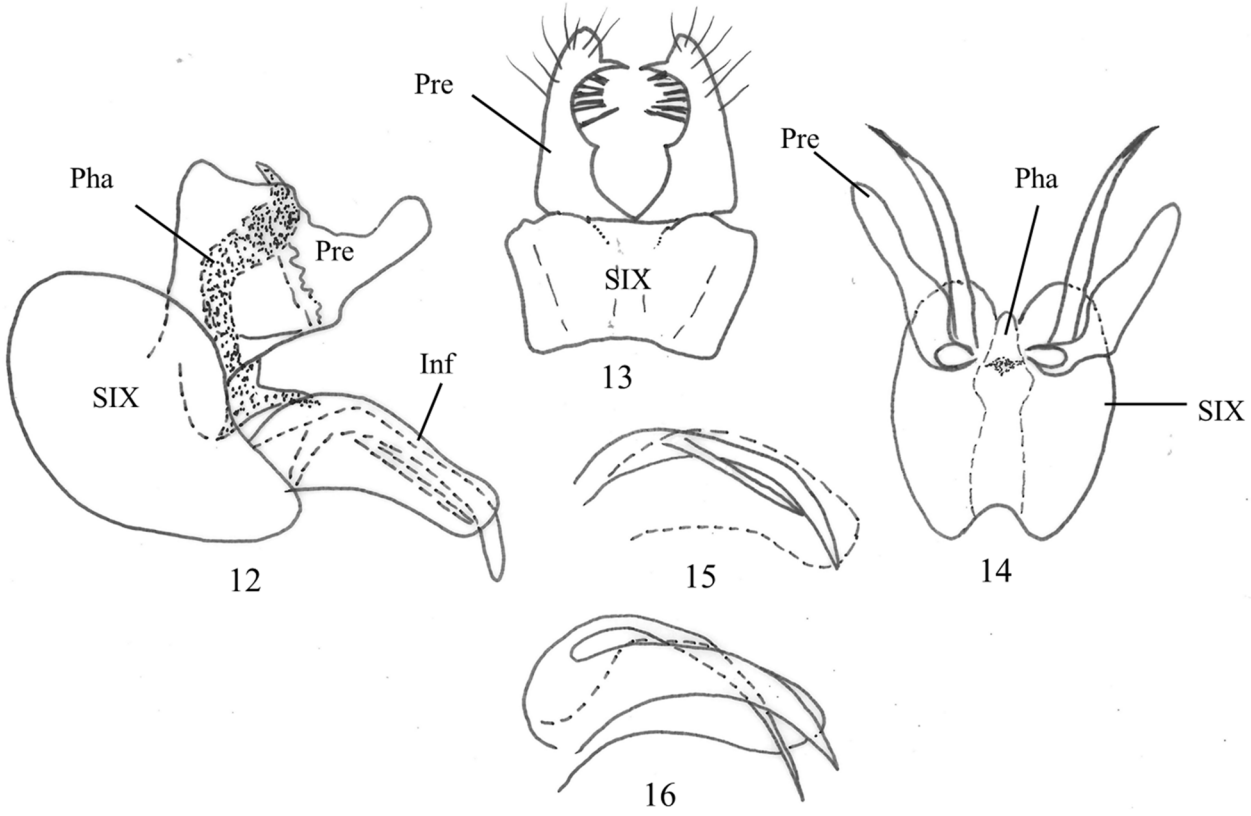
Etymology. Named for Asst. Prof. Dr. Sirirat Pinsuwan who was the Dean of Faculty of Pharmacy, Prince of Songkla University, Hat Yai Campus.

Description. Length of each male forewing 3.0–3.5 mm (n = 9); specimens in alcohol with head, thorax, abdomen, forewings, and legs dark brown.

Male genitalia (Figures 12–15). Segment IX membranous dorsally; sternum IX mango-shaped in lateral view, rounded basodorsally and anteriorly, protruding apicoventally to rounded apex. Preanal appendages large, in lateral view square basally, tubular apically, with apex round; in dorsal view bird-head-shaped, with strong setae apicoventrally. Tergum X membranous. Inferior appendages tubular, protruding ventrocaudad, rounded apically, each with long straight spine on its inner side. Phallus long vertically, arched anteriorly with acute apex, branched with short acute apex basally in lateral view.

Diagnosis. The male genitalia of the new species very closely resemble those of *P. amphiaraos* Malicky and Chantaramongkol 1997 and other species similar to *P. capillata* Ulmer 1910 found in Thailand, including *P. kuni*

Malicky and Chantaramongkol 1993, *P. kiskinda* Malicky and Chantaramongkol 1993, and *P. lak* Malicky and Chantaramongkol 1993. However, *P. pinsuwanae* **n. sp.** can be distinguished from these by characters of the inferior appendages. The inner (dorsal) branch of each inferior appendage has a long, straight spine on its inner side without spinulets. *Psychomyia amphiaraos* (Fig. 16) has no such inner spine, and in the other species this spine has various short spinulets.



FIGURES 12–16. Male genitalia of *Psychomyia* spp. 12–16, *Psychomyia pinsuwanae* **n. sp.**: 12, left lateral; 13, dorsal; 14, ventral; 15, right inferior appendage, mesal. 16, right inferior appendage of *P. amphiaraos* Malicky and Chantaramongkol 1997, mesal. Inf = inferior appendage (paired), Pre = preanal appendage (paired), SIX = sternal portion of segment IX, Pha = phallus.

Leptoceridae

Leptocerus suwannarati Laudee and Malicky n. sp.

Figs. 17–21

Type material. Holotype male (PSUNHM). Thailand: Prachuap Khiri Khan Province, Kuiburi National Park, Kui Buri, 12°04’52”N, 99°37’43”E, ca. 150 m a.s.l., 2 February 2016, leg. Pongsak Laudee.

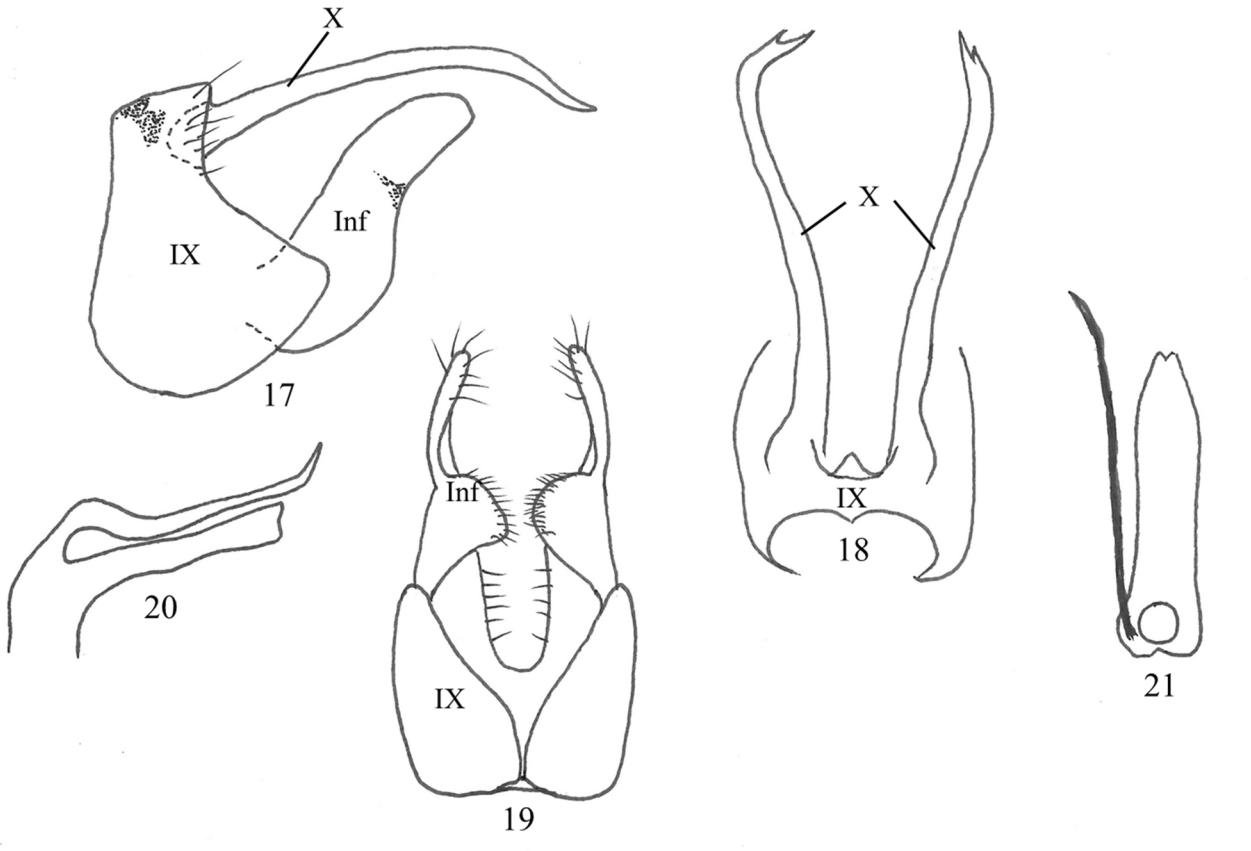
Etymology. Named for Asst. Prof. Wasin Suwannarat who is the Vice President of Prince of Songkla University, Hat Yai Campus.

Description. Length of each male forewing 6.0 mm; specimens in alcohol with head, thorax, abdomen, and legs light brown. Forewings white.

Male genitalia (Figs. 17–21). Segment IX in lateral view flask-like, longitudinally short (narrow) dorsally and long (expanded) ventrally, rounded basoventrally, projected apicoventrally; in dorsal view with small sharp projection anteriorly and rounded excision posteriorly; in ventral view transverse anterior margin nearly straight,

posteriorly with deep V-shaped incision nearly dividing venter into two parts. Preanal appendages reduced to pair of setal patches on posterodorsal submesal margins of segment IX. Segment X divided into pair of long, slender rods, slightly diverging through most of their length and then curved ventrad and slightly asymmetrically mesad apically. Inferior appendages stout, protruding upward, fused basally with U-shaped space between them in ventral view; each with middle portion broader and with short setae on mesal margin especially in ventral view, distal portion rounded apically in lateral view, in ventral view narrow and curved slightly mesad subapically, blunt apically. Phallus tubular with long slender acute spine dorsally in lateral view, torpedo-shaped with very long slender spine in ventral view.

Diagnosis. The male genitalia of the new species are very similar in lateral aspect to those of *L. agaue* Malicky and Chantaramongkol 1996 and *L. ganymedes* Malicky and Chantaramongkol 2002 (in Malicky *et al*. 2002) found in Thailand, but can be distinguished from them by the characters of segment X. In *L. agaue* and *L. ganymedes*, the long slender processes of segment X are asymmetrical, but nearly symmetrical in the new species. The phallus of *L. suwannarati* **n. sp.** is cylindrical, but oval in *L. agaue* and stout and tubular in *L. ganymedes*.



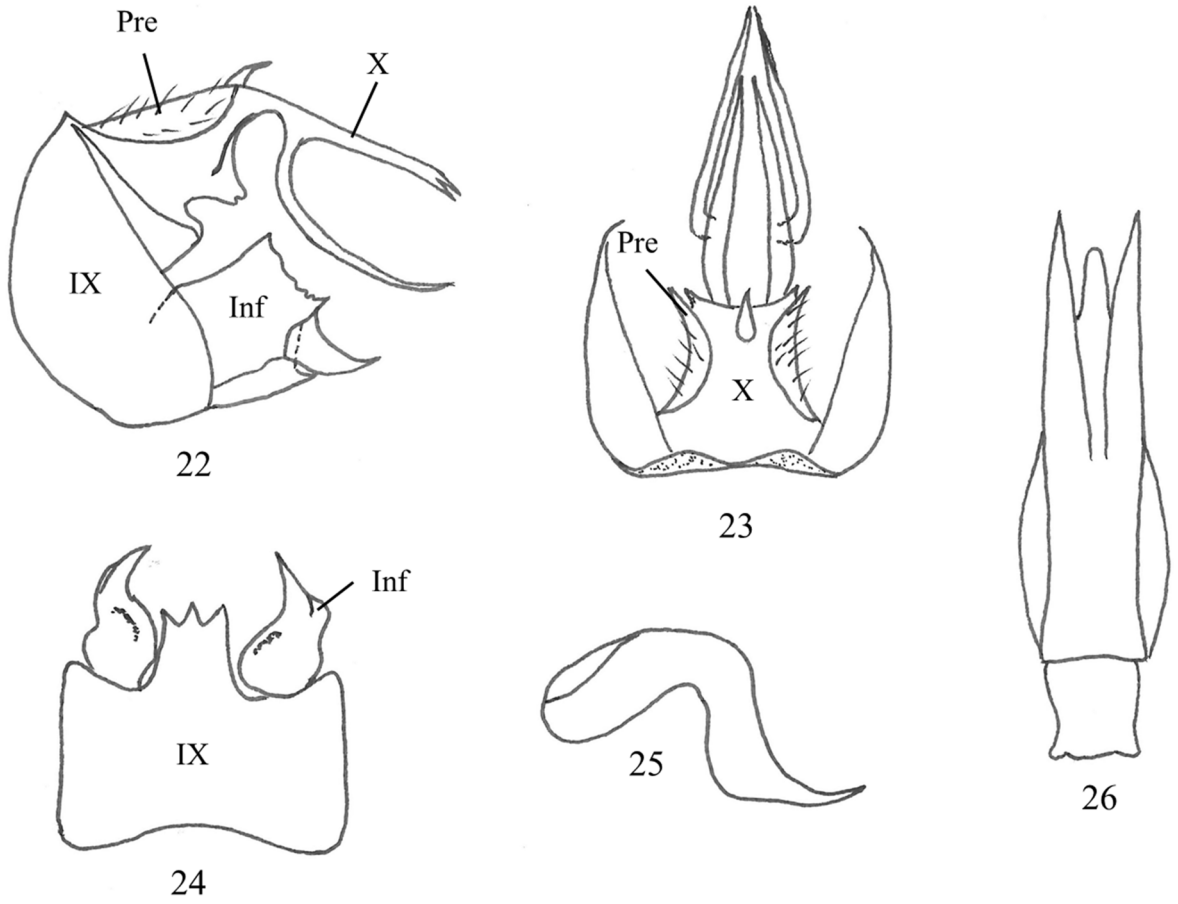
FIGURES 17–21. Male genitalia of *Leptocerus suwannarati* **n. sp.** 17, left lateral; 18, dorsal; 19, ventral; 20, phallus, left lateral; 21, phallus, ventral. Inf = inferior appendage (paired), IX = segment IX, X = tergum X.

Setodes lertpongsombatae Laudee and Malicky n. sp.

Figs. 22–26.

Type material. Holotype male (PSUNHM). Myanmar: Tanintharyi Division, Myeik Province, Tanintharyi, Ngawun Chaung River, 12°03’49”N, 99°00’57”E, ca. 15 m a.s.l., 18 November 2016, leg. Pongsak Laudee.

Paratypes: Same data as holotype, 36 males: 10 males (PSUNHM), 10 males (CHM), 10 males (CUAC); Myanmar: Tanintharyi Division, Myeik Province, stream near Yin Nhung Waterfall, 12°27’50”N, 98°42’30”E, ca. 58 m a.s.l., 19 November 2016, leg. Pongsak Laudee, 4 males (PSUNHM); Tanintharyi Division, Myeik Province, Tanintharyi Bridge, 12°05’27”N, 99°00’38”E, ca. 24 m a.s.l., 16 November 2016, leg. Pongsak Laudee, 30 males (NMPC), 30 males (PSUNHM).



FIGURES 22–26. Male genitalia of *Setodes lertpongsombatae* **n. sp.** 22, left lateral; 23, dorsal; 24, ventral; 25, phallus, left lateral; 26, phallus, ventral. Inf = inferior appendage (paired), IX = segment IX, Pre = preanal appendage (paired), X = tergum X.

Etymology. Named for Assoc. Prof. Imjit Lertpongsombat who is Vice President of Prince of Songkla University, Pattani Campus.

Description. Length of each male forewing 4.0–5.5 mm (n = 12); specimens in alcohol with head, thorax, and forewings dark brown; abdomen white.

Male genitalia (Figures 22–26). Segment IX semicircular in lateral view with round anterior margins; posterior margins convex subventrally; in dorsal view membranous mesally; in ventral view rectangular with anterior margin broadly and shallowly concave and posterior margin with prominent trifurcate process. Preanal appendages semicircular in lateral view and crescentic and concave laterally in dorsal view, with small setae. Segment X with single dorsal spine and then deeply divided into pair of complex projections, in lateral view each projection trapezoidal basally, deeply divided into 2 very long saber-like blades: Upper blade straight and bifurcate apically, lower blade directed ventrad basally and then curved and pointed caudad; in dorsal view basal portion hourglass-like with short acute spine posteromesally, distal portion bifurcating into pair of long blade-like spines straight and convergent apically. Inferior appendages in lateral view square with posteroventral spine; in ventral view oval, each with large, pointed apical spine directed caudomesad. In lateral view, phallus long, larger basal part curved downward then apical part with pair of pointed projections directed caudad and pointed apically; in ventral view long and rectangular basally, slender and blunt apically, with deep V-shaped incision apically separating pair of pointed projections.

Diagnosis. The male genitalia of *S. lertpongsombatae* **n. sp.** appear similar to those of *S. guptapara* Malicky 1979, found in the Andaman Islands. These share the character that the apical part of each half of segment X is

deeply divided subapically into 2 very long saber-like blades in lateral view, at least on one side. However, the apical part of segment X is asymmetrical in *S. guptapara*, deeply divided on only the left side and the upper saber-like blade of the divided half is more curved and obviously thicker than for the new species, in which the upper blade is slender and straight. In ventral view, the prominent process on the posterior margin of segment IX of *S. lertpongsombatae* **n. sp.** is trifurcate but not in *S. guptapara*. Also, the inferior appendages of the new species each have a single claw-like spine apically, whereas those of *S. guptapara* each have two shorter spines apically.

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References

Blahnik, R.J. (1997) Systematics of Chimarrita, a new subgenus of Chimarra (Trichoptera: Philopotamidae). *Systematic Entomology*, 22, 199–243.
https://doi.org/10.1046/j.1365-3113.1997.d01-39.x

Hur, J.M. & Morse, J.C. (2006) Two new species of caddisflies from East Asia (Trichoptera: Philopotamidae, Psychomyiidae). *Insect Science*, 13, 217–220.
https://doi.org/10.1111/j.1744-7917.2006.00085.x

Laudee, P. & Malicky, H. (2014) Trichoptera fauna from Nakhon Si Thammarat Range (southern Thailand), with the description of a new species of *Rhyacophila* Pictet, 1834 (Trichoptera: Rhyacophilidae). *Aquatic Insects*, 36 (3–4), 161–169.
https://doi.org/10.1080/01650424.2015.1064965

Li, Y.J. & Morse, J.C. (1997) Species of the genus *Ecnomus* (Trichoptera: Ecnomidae) from the People's Republic of China. *Transactions of the American Entomological Society*, 123, 85–134.

Malicky, H. (1979) Neue Köcherfliegen (Trichoptera) von den Andanen-Inseln. *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen*, 30, 3–4 + 97–109. [in German]

Malicky, H. (1995) Neue Köcherfliegen (Trichoptera, Insecta) aus Vietnam. *Linzer Biologische Beitraege*, 27 (2), 851–885. [in German]

Malicky, H. (2009) Beitrage zur Kenntnis asiatischer Trichopteren. *Braueria*, 36, 11–58. [in German]

Malicky, H. (2010) *Atlas of Southeast Asian Trichoptera*. Faculty of Science Printing Unit, Chiang Mai University, Chiang Mai Province, 346 pp.

Malicky, H. & Chantaramongkol, P. (1993) Neue Trichopteren aus Thailand. Teil 2. Rhyacophilidae, Philopotamidae, Polycentropodidae, Ecnomidae, Psychomyidae, Xiphocentronidae, Helicopsychidae, Odontoceridae (Arbeiten über thailändische Köcherfliegen Nr.12) (Fortsetzung). *Linzer Biologische Beitraege*, 25 (2), 1137–1187. [in German]

Malicky, H. & Chantaramongkol, P. (1996) Neue Köcherfliegen aus Thailand (Trichoptera).
Arbeit Nr. 19 über thailändische Köcherfliegen. *Entomologische Berichte Luzern*, 36, 119–128. [in German]

Malicky, H. & Chantaramongkol, P. (1997) Weitere neue Köcherfliegen (Trichoptera) aus Thailand Arbeit Nr. 20 über thailändische Köcherfliegen. *Linzer Biologische Beitraege*, 29 (1), 203–215. [in German]

Malicky, H., Chantaramongkol, P., Saengpradab, N Prachuab, Chaibu, P., Thani, I., Changthong N, Cheunbarn, S., Laudee, P., Prommi, T. & Sompong, S. (2002) Neue asiatische Leptoceridae (Trichoptera) (Zugleich Arbeit Nr. 33 über thailändische Köcherfliegen). *Braueria*, 29, 13–15. [in German]

Malicky, H & Prommi, T. (2006) Beschreibungen einiger Köcherfliegen (Trichoptera) aus Süd-Thailand. *Linzer Biologische Beitraege*, 38 (2), 1591–1608. [in German]

Morse J.C. (1975) A phylogeny and revision of the caddisfly genus Ceraclea (Trichoptera, Leptoceridae). *Contributions of the American Entomological Institute*, 11, 1–97.

Ulmer, G. (1910) Über einige von Herrn E. Jacobsen auf Java gesammelte Trichopteren. *Notes from the Leyden Museum*, 32, 47–66.