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Notes on some rare genera of Hybotidae and Empididae (Diptera) from temperate regions in Thailand

By Patrick GROOTAERT & Igor SHAMSHEV

Abstract. The genus *Megagrapha* Melander is recorded for the first time from the Orient with a new species collected from Thailand: *M. thaica* sp. nov. Its sibling species *M. europaea* is re-examined. Two new species of the genus *Anthalia* Zetterstedt are described: *A. planti* sp. nov. and *A. thaica* sp. nov. The genus *Hormopeza* is recorded for the first time from Thailand.

Key words. Diptera, Empididae, Hybotidae, *Megagrapha*, *Hormopeza*, *Anthalia*, new records, new species, Orient, Thailand

Introduction

This paper is the next contribution in the study of empidoids collected during the TIGER project in Thailand (the Thailand Insect Group for Entomological Research: http://sharkeylab.org/tiger/). Here we provide our data regarding the genera *Anthalia* ZETTERSTEDT and *Megagrapha* MELANDER of Hybotidae and *Hormopeza* ZETTERSTEDT of Empididae, which are poor in species and rare not only in the Orient but also in other realms. Actually, *Megagrapha* is recorded here for the first time from the Orient (6 species of world fauna). *Anthalia* and *Hormopeza* have been reported from the region but each of them is represented only by a single species known only after a unique record from their type localities (FREY, 1953; SAIGUSA & YANG, 2002). Generally, we consider that these groups are temperate elements in the Oriental fauna.

Material and Methods

This study is based on Empidoidea materials obtained during the TIGER project in Thailand (the Thailand Insect Group for Entomological Research). The flies were collected in Malaise traps and transferred to 75% ethanol. Additionally, type materials of one *Megagrapha* species, which are deposited in Hungary National History Museum, Budapest (HNHM), have been examined. Terms used for adult structures primarily follow those of MCALPINE (1981), although the terminology for the male terminalia follows SINCLAIR & CUMMING (2006). 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 description of a new species of the genus *Megagrapha*, 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. The male terminalia are figured in their unrotated position.

The holotype and a number of paratypes of the new species described here are deposited in the Queen Sirikit Botanic Garden (Chiang Mai), Thailand.

Systematic account

Anthalia ZETTERSTEDT, 1838

Currently, the genus *Anthalia* is included to the newly established subfamily Oedaleinae (SINCLAIR & CUMMING, 2006). The group is almost entirely Holarctic (3 species from Palaearctic and 10 from Nearctic) with a single species described from the Orient. The adults are nectar (or pollen) feeders, and are often found in large numbers on blossoming bushes and trees (CHVÁLA, 1983). Below we describe two species of *Anthalia* taken from Thailand.

Key to *Anthalia* species of the Oriental region

1. Wing with vein M_2 incomplete. Halter yellow (Thailand).....*A. planti* sp. n.

–. Wing with vein M_2 complete. Halter at least with brown knob.....2

2. Legs almost entirely yellow. Wing deeply brown infuscate (Thailand).....*A. thaica* sp. n.
–. Legs blackish in male, dark brownish yellow with blackish tibiae and tarsi in female. Wing hyaline (China, Henan).....*A. sinensis* SAIGUSA & YANG

Anthalia planti sp. n.

MATERIAL EXAMINED: Holotype female, THAILAND Chiang Mai Doi Inthanon NP Kew Maepan Trail 18°33.162'N 98°28.81'E, 2200 m, Malaise trap 1–8.05.2007, Y. Areeluck leg. [T1824].

PARATYPES: 1 female, THAILAND Chiang Mai Doi Inthanon NP Kew Maepan Trail, 18°3.162'N 98°8.81'E, 2200 m, Malaise trap, 9–16.02.2007, Y. Areeluck leg. [T1795]; 2 females, THAILAND: Chiang Mai Doi Inthanon NP Kew Maepan Trail, 18°3.162'N 98°8.81'E, 2200 m, Malaise trap, 1–8.05.2007, Y. Areeluck leg. [T1824]; 1 female, THAILAND: Chiang Mai Doi Inthanon NP Summit forest, 18°5.361'N 98°9.157'E, 2500 m, Malaise trap, 16–23.03.2007, Y. Areeluck leg. [T1816]; 1 female, THAILAND: Chiang Mai Doi Inthanon NP Checkpoint 2, 18°1.554'N 98°9.94'E, 1700 m, Malaise trap, 16–23.02.2007, Y. Areeluck leg. [T1805].

DIAGNOSIS: Recognised by postpedicel about 2.0 times as long as wide, incomplete vein M_2, yellow halter, wing finely infuscate.

DESCRIPTION: Female. Wing 2.4 mm. Head black. Frons very broad, shining, bare. Ocellar tubercle pollinose, with 2 long lateroclinate setae and 2 minute setulae. Occiput finely pollinose, with black setae, upper postoculars longer. Antenna entirely brown; postpedicel trapezium-like, about 2.0 times as long as wide; stylus minute. Proboscis brown. Palpus brown, elongate oval, with scattered short dark setae.

Thorax with scutum and patch on sternopleuron shining, otherwise finely tomentose, with black setation. Postpronotal lobe with 1 moderately long seta and 2 minute setulae. Mesonotum with 1 presutural supra-alar, 2 notopleurals, 1 postalar and 4 scutellars (apical pair very long), additionally, some minute setulae present on notopleural depression and on supra-alar face (several postsutural setulae arranged in regular row); acrostichals broadly irregularly multiserial (about 6 rows), short, hardly separated from dorsocentrals, which are mostly arranged in 1-2 irregular row (even more numerous anteriorly) and subequal in length to acrostichals, 2 prescutellar pairs long.

Legs almost entirely yellow, only fore tarsomeres 2–5, mid and hind tarsomeres 3–5 brownish. Coxae and trochanters with black setae. Fore tibia spindle-shaped. Legs lacking prominent setae (except some short subapicals).

Wing uniformly finely brownish infuscate. Stigma distinct, darker than wing ground colour. Basal costal seta present, short, black. Veins M_2 and anal vein incomplete. Calypter dusky yellow, yellowish ciliate. Halter yellow.

Abdomen with brown finely pollinose tergites, tergite 1 brownish yellow, covered with scattered short black setae; sternites 1–5 brownish yellow, remaining sternites brown, with scattered black setae. Cercus long, slender, with black setulae.

Male: Unknown.

DERIVATIO NOMINIS: The present species is named in honor of Dr. Adrian Plant (National Museum of Wales, Cardiff).

DISTRIBUTION: Thailand.

DISCUSSION: *Anthalia planti* sp. n. can be readily distinguished from two other species of the genus known from the Orient by incomplete vein M_2. This character is known to be present in the Palaearctic species of *Anthalia*, however, these species have different shape of the postpedicel or (when the shape of the postpedicel is quite similar) blackish halteres (*A. schoenherri* ZETTERSTEDT).

Anthalia thaica sp. n.

MATERIAL EXAMINED: Holotype female, THAILAND: Chiang Mai Doi Inthanon NP Checkpoint 2 18°1.554'N 98°9.94'E, 1700 m, Malaise trap, 23.02–2.03.2007, Y. Areeluck leg. [T1775].

DIAGNOSIS: Recognised by postpedicel about 1.5 times as long as wide, complete vein M_2, halter with brown knob, wing brown infuscate.

DESCRIPTION: Female. Wing 2.0 mm. Head black. Frons very broad, shining, bare. Ocellar tubercle pollinose, with 2 long lateroclinate setae and 2 minute setulae. Occiput finely pollinose, with black setae, upper postoculars longer. Antenna entirely brown; postpedicel trapezium-like, broad, about 1.5 times as long as wide; stylus minute. Proboscis brown. Palpus brown, elongate oval, with scattered short dark setae.

Thorax dark brown, finely tomentose, with black setation. Postpronotal lobe with 2 short setae. Mesonotum with 1 presutural supra-alar, 4 notopleurals, 1 postalar and 4 scutellars; acrostichals broadly irregularly multiserial, short, hardly separated from dorsocentrals, which are mostly arranged in 1-2 irregular row (even more numerous anteriorly) and subequal in length to acrostichals, 1 prescutellar pair apparently long (missing).

Legs almost entirely yellow, only mid and hind coxae, and mid and hind tarsomeres 2–5 brownish yellow (fore leg missing). Coxae and trochanters with black setae. Fore tibia spindle-shaped. Legs almost lacking prominent setae (except some short subapicals), only hind femur with some short anteroventral (longer subapically) and dorsal setae.

Wing uniformly brown infuscate. Stigma distinct, darker than wing ground colour. Basal costal seta present, short, black. Vein M_2 complete, anal vein incomplete. Calypter dusky yellow, yellowish ciliate. Halter with brown knob and brownish yellow stem.

Abdomen with dark brown finely pollinose tergites, covered with scattered short black setae; sternites brownish, with scattered black setae. Cercus long, slender, with black setulae.

Male. Unknown.

DERIVATIO NOMINIS: The new species is named after the country of its origin, Thailand.

DISTRIBUTION: Thailand.

DISCUSSION: *Anthalia thaica* sp. n. resembles *A. sinensis* described from Funiu Mountains (China, Henan) (SAIGUSA & YANG, 2002). Primary differences between these species have been given in the key.

Megagrapha MELANDER, 1928

Megagrapha belongs to the tribe Drapetini (Hybotidae, Tachydromiinae), however, its precise relationships remain unclear. The group retains many plesiomorphic characters (uniform, hardly differentiated setation of body, 3–4 pairs of scutellar setae, broadened wings with subequally long, broad basal cells and distinct vein A_1, abdominal segments unmodified, left epandrial lamella separated from hypandrium) that probably will nest *Megagrapha* closer to the base of this lineage of Tachydromiinae. A remarkable feature of some species of *Megagrapha* is strong sexual dimorphism involving differences in shape of postpedicel and stylus, structure of fore or mid tarsus and even colour of head, thorax and wings (e.g., yellow head or thorax in male vs. black head and thorax in female or maculate wing in male vs. hyaline wing in female).

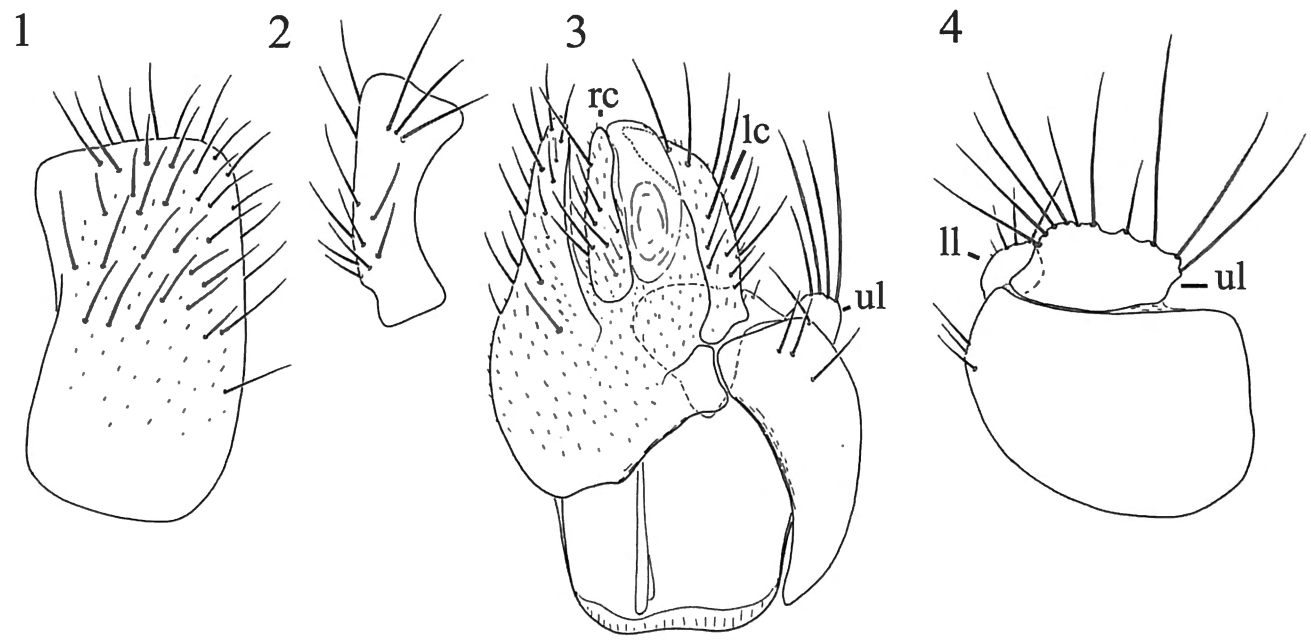
Currently, the genus *Megagrapha* includes 3 species from eastern North America (CHILLCOTT & TESKEY, 1983) and 3 species from Europe (PAPP & FÖLDVÁRI, 2002; STARK, 2009), although, it is also known from the Russian Far East and Kurile Islands (SHAMSHEV, unpublished data).

Almost nothing is known about biology of *Megagrapha*. CHILLCOTT & TESKEY (1983) indicate very long flight periods for the Nearctic species dating from the middle of May to the second half of September and note a specimen reared from decaying elm. CHILLCOTT (1958) collected *M. pubescens* in second growth maple woods. Two European species were taken by fogging of canopy of primeval forest in Slovenia and Poland (STARK, 2009). It should be noted that *Megagrapha* is very rare in collections.

Megagrapha thaica sp. n.
(Figs 1-4)

DIAGNOSIS: Recognised by entirely yellow antenna, densely pubescent stylus, halter with brown knob, wings finely brownish; in male thorax largely yellow, scutum on prescutellar depression, entire scutellum and metanotum brown; in female thorax largely brownish.

DESCRIPTION: Male. Body 1.4–1.5 mm; wing 1.4–1.5 mm. Head black. Eyes almost touching above antennae, frons slightly widened toward ocellar tubercle, subshining. Face linear. Ocellars pale, minute. Occiput subshining, covered with numerous pale setae longer



Figs 1-4. – *Megagrapha thaica* sp. nov. male paratype genitalia. 1. right epandrial lamella; 2. left cercus, lateral view 3. epandrium with cerci. 4. lobes of left surstylus. lc: left cercus; ll: lower lobe of left surstylus; rc: right cercus; ul: upper lobe of left surstylus.

beyond ocellar tubercle, verticals not prominent. Antenna yellow; postpedicel rather short, at most 2.0 times as long as wide, slightly attenuated apically; stylus apical, short, brown, nearly 1.5 times as long as postpedicel, long pubescent. Proboscis brownish yellow. Palpus unmodified, subglobular, brownish, with scattered short pale setae.

Thorax almost entirely yellow, mostly subshining, with pale setation; scutum on prescutellar depression, entire scutellum and metanotum brown, additionally, antepronotum, proepisternum and suture between sternopleuron and mesopleuron yellowish brown, scutum on anterior corners with narrow yellowish brown marking appearing as border of postpronotal lobe; scutellum tomentose. Postpronotal seta not prominent. Mesonotum covered with numerous, almost uniform short setae, prescutellars longer (1 pair nearly as long as scutellars), bearing 4–5 short notopleurals arranged in regular row running toward postsutural supra-alar face, 1 very short postalar and 4 pairs of scutellars.

Legs quite robust, entirely yellow, with inconspicuous setation. Coxae and trochanters with pale unmodified setae. Femora of subequal width, with similar pattern of setation, bearing rows of mostly short anteroventral and posteroventral pale setae, mid femur with longer posteroventral setae (especially basally), hind femur with longer 2-3 subapical anteroventral setae. Fore and mid tibiae of subequal width, with some hardly prominent dark dorsal setulae (except circlet of subapicals), hind femur with unmodified posterior subapical comb. Hind tibia with row of short anterodorsal setae. Tarsi unmodified, mid basitarsus about 3.0 times as long as mid tarsomere 2.

Wing normally developed, finely brownish infuscate, slightly darker on apical part of cell r_1 and on cells r_{2+3} and r_{4+5}. Basal costal seta short, thin, yellowish. Costal index: 57:45:27. Vein R_1 meeting costa somewhat before wing midway. Vein Rs long, considerably longer than proximal section of vein R_{4+5}. Vein R_{2+3} straight. Veins R_{4+5} and M_{1+2} divergent toward wing-apex. Anal vein distinct. Crossveins r-m and bm-cu contiguous. Costal cell broad. Cells br and bm extending to about 1/3 of wing. Calypter brown, with long brown setae. Halter with brown knob and yellow stalk.

Abdomen with tergites unmodified, brownish (tergites 1 and 2 weaker sclerotised), subshining, bearing unmodified short pale and dark setae denser laterally; sternites 1 and 2 yellowish, reminding sternites brownish, covered with numerous short pale setae; no gland-like structures.

Terminalia (Figs 1-4) very small, brownish yellow, rather subglobular. Cerci separated; right cercus digitiform, slightly tapered, with several long unmodified setae; left cercus longer than right cercus, viewed dorsally digitiform, somewhat narrowed subapically, viewed laterally subrectangular, with several long unmodified setae. Epandrium completely divided. Right epandrial lamella subrectangular (viewed laterally), with numerous long setae on apical half. Right surstylus not prominent. Left epandrial lamella separated from hypandrium, with 3 short setae apically. Left surstylus differentiated from epandrium, represented by two elements; upper lobe rather elongate oval, with several very long marginal setae; lower lobe (apparently undistinguishable from subepandrial sclerite) smaller but stronger sclerotised, with several moderately long setae. Hypandrium with 2 short setae apically. Phallus very short. Ejaculatory and ventral apodemes subequally long.

Female: Antennal stylus about 1.5 times longer than in male. Thorax with entire scutum, scutellum and metanotum dark brown, prothoracic sclerites and mesothoracic pleurae yellowish to yellowish brown. Otherwise as in male. Cercus long, slender, brownish.

Material examined: Holotype male: THAILAND: Chiang Mai Doi Inthanon NP Kew Maepan Trail, 18°33.162'N 98°28.81'E, 2200 m, Malaise trap, 8–15.05.2007, Y. Areeluck leg. [T1829];

Paratypes: 4 males, 1 female, THAILAND: Chiang Mai Doi Inthanon NP Summit marsh, 18°35.361'N 98°29.157'E, 2500 m, Malaise trap, 15–22.04.2007, Y. Areeluck leg. [T1840]; 4 males, 1 female, THAILAND: Chiang Mai Doi Inthanon NP Kew Maepan Trail, 18°33.162'N 98°28.81'E, 2200 m, Malaise trap, 1–8.05.2007, Y. Areeluck leg. [T1824]; 1 male, THAILAND: Chiang Mai Doi Inthanon NP Summit marsh, 18°35.361'N 98°29.157'E, 2500 m, Malaise trap 1–8.05.2007, Y. Areeluck leg. [T1823]; 1 female, THAILAND: Chiang Mai Doi Inthanon NP Kew Maepan Trail, 18°33.162'N 98°28.81'E, 2200 m, Malaise trap, 22–29.04.2007, Y. Areeluck leg. [T1847]; 2 females, THAILAND: Chiang Mai Doi Inthanon NP Summit marsh 18°35.361'N 98°29.157'E, 2500 m, Malaise trap 29.04–6.05.2007, Y. Areeluck leg. [T1852].

Derivatio nominis: The new species is named after the country of origin, Thailand.

Distribution: Thailand.

Discussion: *Megagrapha thaica* sp. nov. resembles very much *M. europaea* described by Papp & Földvári in 2001 from Hungary. Examination of the paratype that served for the drawings showed that differences between the two species are indeed subtle. The mid metatarsus in *M. thaica* is three times longer than the mid tarsomere 2; it is about 2.5 times as long in *M. europaea*. The antenna is completely yellow in *M. thaica*, while in *M. europaea* the postpedicel is brown in contrast to the yellow pedicel. The left surstyli are also different. The upper lobe is almost bifid in *M. europaea*, while simple in *M. thaica*. The lower lobe is in both species dark sclerotised bearing a cluster of spine-like bristles in *M. europaea*, while simple bristles not clustered in *M. thaica*.

Notes on *Megagrapha europaea* Papp & Földvári, 2001

(Figs 5-7)

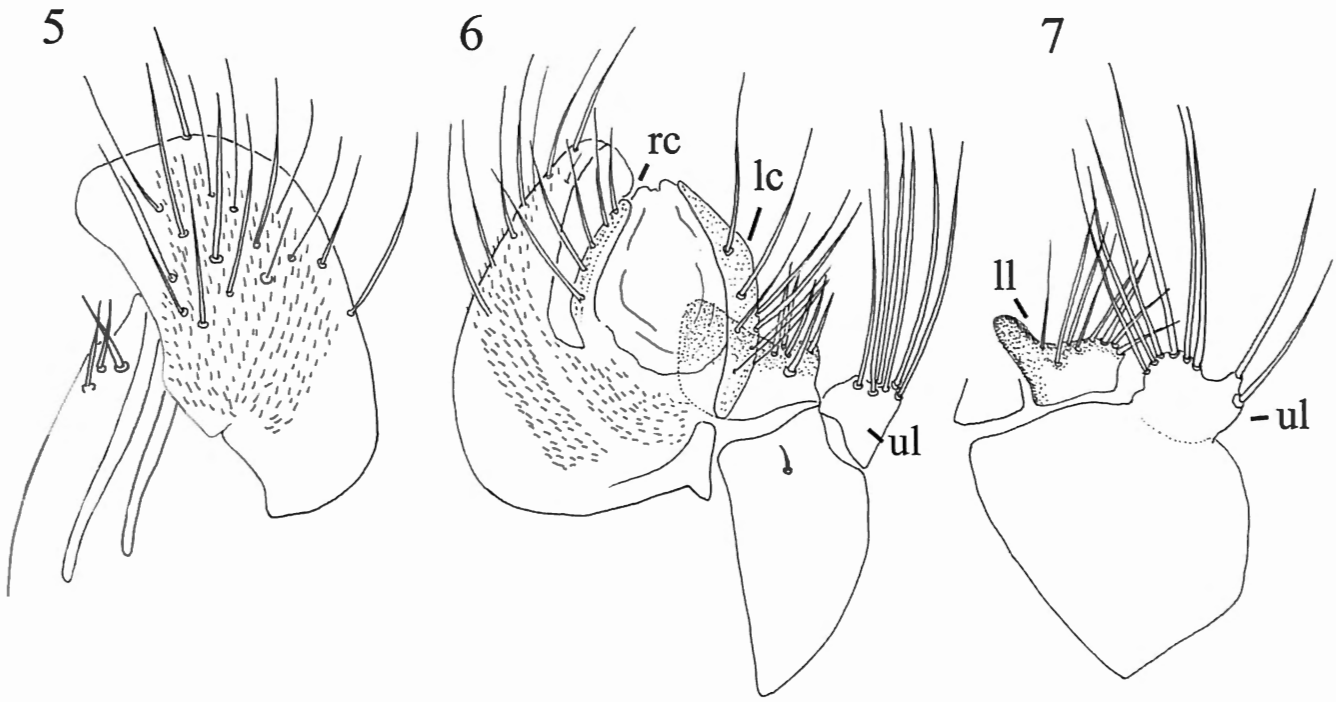
Papp & Földvári, 2001: 350, Figs 1–5.

Material examined: Paratype male: Hungary, Kelet Meczek, TK: Óbánya; Óbanyai-p. föllöt és mellett, 2000 junius 14. leg. L. Papp (diss. in HNHM). Male, Hungary, Koszegi TK: Harmas-p föllöt és mellett, 2001.06.27, leg. Papp L. (RBINS).

Papp & Földvári (2001) described this species after several specimens taken from Hungary. Due to a great similarity between *M. europaea* and the new species described above we examined the type materials of *M. europaea* and clarified some characters that lack in its original description. So, the genitalia of the paratype of *M. europea* have been re-macerated and re-illustrated.

Diagnosis: Resembling *M. thaica* very much except for following features. Postpedicel brown in contrast to the yellow pedicel. Mid tarsomere 1 about 2.5 times as long as mid tarsomere 2.

Terminalia (Figs. 5-7) very small, brownish yellow, rather subglobular. Cerci separated; right cercus digitiform, slightly tapered, with several long unmodified setae; left cercus longer and stronger than right cercus, viewed dorsally digitiform, somewhat narrowed subapically, viewed laterally subrectangular, with several long unmodified setae. Epandrium completely divided. Right epandrial lamella subrectangular (viewed laterally), with numerous long setae on apical half. Right surstylus not prominent. Left epandrial



Figs 5-7. – *Megagrapha europaea* PAPP & FÖLDVÁRI, 2001 male genitalia: 5. right epandrial lamella with tip of hypandrium and apodemes. 6. epandrium with cerci. 7. left surstylus with lower (ll) and upper lobe (ul).

lamella separated from hypandrium, with 1 short seta apically. Left surstylus differentiated from epandrium, represented by two elements; upper lobe bi-lobed, with a cluster of long bristles on one lobe, two long bristles on the second lobe; lower lobe strongly sclerotised, with a cluster of shorter, spine-like setae. Hypandrium with 3 short setae apically. Phallus very short. Ejaculatory and ventral apodemes subequally long.

Hormopeza ZETTERSTEDT, 1838

This genus was traditionally placed within the subfamily Oreogetoninae of Empididae (CHVÁLA & WAGNER, 1989). However, recently *Hormopeza* was assigned to the *Ragas* genera group of *incertae sedis* within Empididae, which includes (together with some other genera) more plesiomorphic representatives of the family (SINCLAIR & CUMMING, 2006).

Currently, the genus *Hormopeza* includes 12 species, most of which are known from the Holarctic (2 from the Palaearctic and 6 from the Nearctic), while in each of other realms the group is represented by a single species. FREY (1953) described *H. nitida* after a female taken from northeast Burma and since that time *Hormopeza* has never been reported from the Orient. A single specimen that we have examined belongs to an undescribed species primarily differing from *H. nitida* by yellow knob of the halter and yellow legs.

Hormopeza sp.

MATERIAL EXAMINED: 1 female, THAILAND Loei Phu Kradueng NP, Forest protection unit Loei 5 (Phakbung), 16° 50.463'N 101° 41.687'E, 401 m, Malaise trap, 25.02–1.03.2007, Sonkgran Kamtue leg. [T1504].

DIAGNOSIS: Female. Wing 1.9 mm. Head brown. Frons finely pollinose, with scattered marginal setulae. Ocellar tubercle with anterior ocellars moderately long, lateroclinate, posterior ocellars minute. Occiput finely pollinose, with pale setation. Antenna yellowish brown. Proboscis brownish yellow. Palpus yellow, with scattered short pale setae. Thorax brown, finely pollinose, with yellowish to brownish yellow setae. Postpronotal lobe with 1 long and 2 short setae. Mesonotum with 1 intra-alar, 1 presutural supra-alar, 2 notopleurals, 1 postsutural supra-alar, 1 postalar, 3–4 pairs of scutellars, additionally, some setulae present on notopleural depression and on supra-alar face; acrostichals scattered, short, 1–2-serial, present on anterior part of scutum; dorsocentrals

1–2 serial, numerous, slightly longer than acrostichals, prescutellars longest. Legs almost entirely yellow, only tarsomere 1 apically and remaining tarsomeres entirely brownish yellow. Coxae and trochanters with yellowish setae. Legs lacking prominent setae (except some short subapicals). Wing hyaline, veins brownish yellow, very faint on posterior half of wing. Basal costal seta present, short, yellowish. Anal vein not quite reaching wing margin. Halter with yellow knob and somewhat darker stem. Abdomen with tergites brown, covered with scattered minute setulae; sternites yellowish to brownish yellow, sternite 8 brown. Cercus brown.

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Patrick Grootaert
Department of Entomology
Royal Belgian Institute of Natural Sciences
Rue Vautier 29
B - 1000 Brussels
Belgium.
E-mail: Patrick.Grootaert@naturalsciences.be

Igor Shamshev
All-Russian Institute of Plant Protection
Shosse Podbel'skogo 3
188620 St. Petersburg – Pushkin
Russia
(temporarily at RBINS)
E-mail: shamshev@mail.ru