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New Species of *Asyndetus*, Presumed Commensal Flies of Crabs, in Thailand (Diptera, Dolichopodidae, Diaphorinae)

PATRICK GROOTAERT * AND HENK MEUFFELS

Department of Entomology, Royal Belgian Institute of Natural Sciences, Brussels, BELGIUM

ABSTRACT.–Three *Asyndetus* species are described and illustrated from Thailand: *A. ciliatus* sp. nov., *A. aciliatus* sp. nov. and *A. thaicus* sp. nov.. The presence in Thailand of *A. latifrons*, a widespread Palaearctic and possibly Oriental species, is confirmed. A key is given for the four Thai species.

KEY WORDS: *Asyndetus*; Diptera; Dolichopodidae; Diaphorinae; new species; Thailand

INTRODUCTION

The genus *Asyndetus* Loew, 1869 is quite common in the southern hemisphere. Meuffels and Grootaert (1993) listed 11 species from Papua New Guinea. In 1996, Bickel described two more species from Australia and added that he has seen seven more un-described species from Melanesia. In the same paper he reported *Asyndetus latifrons* (Loew), from Chiang Mai, Thailand, a species that is supposedly widespread from Europe to the Philippines.

The ecology of *Asyndetus* is thought to be very diverse. Many species live along the seashore where they are associated with the burrows of crabs (Williams, 1938). Grootaert and Meuffels (1993) found 2 species living in the burrows of ghost crabs on the northern coast of Papua New Guinea. However, several species occur inland as well and it still has to be demonstrated if these are associated with land crabs. The European species *A. latifrons* lives on sandy soils and is not associated with crabs, because the area does not have landcrabs.

Although many burrows of ghost crabs were investigated for the presence of flies, we could not find *Asyndetus* on the coastal beaches in Thailand (Grootaert and Meuffels, 2001). We still speculate that the failure of finding them is due to searching in the wrong seasons. Adult *Asyndetus* probably have a short activity period. Two specimens were observed along a small creek with some mangrove trees on the island of Ko Samed. We do not know if these specimens were associated with crab burrows, but the record suggests that the association is possible. Another specimen was found in the forest, high up the hill and many specimens of *Asyndetus* were caught in a Malaise trap on the border of a bamboo forest at Na Haeo Field Research Station (Loei Province). Two of the collected species are apparently conspecific with the two from Ko Samed raising more questions about the biology of these flies.

When using Becker's key (1922), the new Thai species lead to *Asyndetus latifrons*, the famous European species also reported from the Oriental region. Becker himself was surprised about this wide distribution, but mentioned nevertheless small differences in leg colouration which he attributed to variability.

* Corresponding author.
E-mail: Patrick.Grootaert@naturalsciences.be

Because very few species are originally cosmopolitan, we compared the European *A. latifrons* in detail with the Thai species. Further, we studied the male and female of *A. latifrons* that Bickel (1996) had identified from Chiang Mai and thereby confirming the presence of *A. latifrons* in North Thailand. The four species are very similar and form a species group, but differ distinctly in the bristling of the femora and the structure of the male genitalia. In the present paper we give descriptions of three new Thai species and give a short re-description of the widespread *A. latifrons*. Based on the knowledge we have now about the complexity of the Thai species group, we recommend a thorough revision of *A. latifrons* in Europe with revision of the type material. Further, we suggest revision of all old Oriental material from India, Bangladesh, Taiwan and the Philippines (see Bickel, 1996). All this is however beyond the scope of the present paper, which aims to delineate the species of Thailand and attract the attention of students to its peculiar and puzzling biology.

MATERIALS AND METHODS

The specimens on Ko Samed were collected by net sweeping whereas the specimens from Na Haeo (Loei Province) were caught in a Malaise trap placed along the border of a Bamboo forest (Grootaert and Verapong, 2002). Most material is conserved in 70% alcohol but some specimens were dried in ethylacetate and pinned. To dry them, specimens were first placed in a mixture of half 70% alcohol and half ethylacetate for 10 minutes, then half of the liquid is restored by ethylacetate and left for another 10 minutes. Finally, specimens were left for at least 30 minutes in pure ethylacetate. Flies were then poured onto filter paper, left to dry for 10 minutes and eventually pinned. By using this method, the wings do not stick together and flies are preserved in the same position as if remained in alcohol. All dusting (pollinosity or microtomentum) on the body is perfectly preserved. The eyes and the rest of the body is even better preserved than when pinned immediately after killing them directly in vapours of ethylacetate. Voucher specimens are conserved in both Chulalongkorn University and Srinakharinwirot University.

Abbreviations used: ad (anterodorsal bristle), av (anteroventral bristle), d (dorsal bristle), pd (posterodorsal bristle), pv (posteroventral bristle), tp (posterior cross vein), v (ventral bristle)

Asyndetus Loew, 1869

Asyndetus Loew, 1869: 35. Type species: *Diaphorus interruptus* Loew, 1861

Diaphorinae. Both sexes have a broad wing with the costa ending at the tip of third longitudinal vein (vein r 4+5) and not extending to the tip of the fourth vein (M) like in most dolichopodids. The apical part of the fourth vein (M) is either interrupted near the middle or with a bend. A thorough re-description of all the characters can be found in Bickel (1996) as well as the phylogenetic position of the genus. The *latifrons* group forms a well delineated group of species within *Asyndetus*. The common characters are described below and are not repeated in the descriptions of the four species.

latifrons - species group

Small species with a body length of about 2.2 – 3.0 mm. Eyes in male separated: frons and face wide, parallel-sided and covered by a silvery-white shining dust on a metallic green shining ground-colour. A pair of large black ocellar and strong verticals. Postoculars black above, uniseriate; below whitish to yellowish-brown, multiseriate. Antennae black. Third segment triangular with a rounded tip and a little broader than long (cf. Fig. 2). Arista long, subdorsal. Palpi black in ground-colour but covered with a coarse white dusting; set with black hairs and bristles and some long apicals.

Thorax shining dark metallic green (in alcohol) but covered with a fine white dusting (pinned); the shining and the dusting is often extending onto coxae and femora. Mesonotum

when viewed from behind often with a black subshining stripe along the rows of acrostichals and dorsocentrals. All hairs and bristles black. Small biseriate acrostichals and four equally long dorsocentrals; scutellum with minute laterals. One propleural with a few short hairs above it. Halters, squamae and ciliation on squamae white.

Wing vein M with a bend near middle of apical section but not interrupted (sometimes a weakened sclerotisation).

Legs with coxae and femora black in ground-colour (sometimes with a greenish gloss, especially when tibiae and tarsi are black as well). Bristling on femora and tibiae typical. Claws absent on all tarsi, but pulvilli enlarged. Pulvilli on fore tarsi longer than terminal tarsomere; on other legs about as long as terminal tarsomere.

Abdomen shining metallic green (in alcohol) and covered with a fine grey dusting (dry). All bristles and hairs black. Male genitalia sessile. Tip of abdomen (sternum 8) with four strong black setae. Structure and bristling of ventral surstylus and epandrial lobe typical.

Key to the Male *Asyndetus* from Thailand

1. Legs, including all tibiae black, generally with a green metallic shine; dorsal bristle on ventral surstylus long (cf. Fig. 6) 3
- At least fore tibiae yellow, hind tibiae may be infuscated; dorsal bristle on ventral surstylus minute 2
2. Hind tibiae yellowish-brown, at base with a series of long posteroventral hairs; lower postocular bristles white, at most pale yellowish ..... *ciliatus* sp. nov.
- Hind tibiae dark brown, no long posteroventral hairs at base; lower postocular hairs brownish ..... *aciliatus* sp. nov.
3. Hind femur with a double row of ventral hairs, being nearly half as long as femur is deep; epandrial lobe long and slender, with a minute hair near tip ..... *thiacus* sp. nov.
- Hind femur with only minute ventral hairs; epandrial lobe triangular, with a truncate tip, bearing 2 bristles; ventral surstylus more slender with a stronger dorsal bristle .... *latifrons* Loew

Asyndetus ciliatus sp. nov.
(Figs 1-4)

Material examined.– Holotype male: Thailand, Loei Province, Na Haeo FIRS, bamboo wood, 1-8.IV.2001 (Malaise trap, leg. Verapong Kiatsoonthorn).

Paratypes: 7 males, 10 females same provenance as holotype; 4 males, 8 females, Na Haeo FIRS, 8-15.IV.2001; 1 male, 3 females, 21-29.IV.2001; 6 females, 15-21.IV.2001; 1 female, 21.IV-6.V.2001; 1 female, 8-15.IV. 2001 (Malaise trap, leg. Verapong Kiatsoonthorn). The females are tentatively assigned to this species.

Diagnosis.– Legs with coxae and femora black, tibiae yellow, but of tip of hind tibiae infuscated. Hind tibiae in male with a row of long, erect hairs posteroventrally at base. Hind femora densely set with bristles: an anteroventral, ventral and posteroventral row of bristles as long as femur is deep. Dorsal bristle on ventral surstylus minute.

Male

Body length 2.1 - 2.4 mm; wing length 1.95 - 2.1 mm.

Head. Frons and face shining dark metallic green, with coppery reflections; face with a shining white dusting, a little more than twice as wide as the distance between the ocellar bristles; postoculars below pluriseriate, pale yellowish. Palpus black, with short black bristles and two longer black bristles. Antenna black; third segment rounded triangular, with blunt apex, deeper than long; arista subdorsal (Fig. 2).

Legs. Coxae black; trochanters yellowish (hind trochanter darker); femora black, with metallic green shine; extreme apices of fore and middle femora yellow; tibiae yellow; hind tibia infuscated on apical third or more; fore and mid tarsi progressively infuscated from tip of first

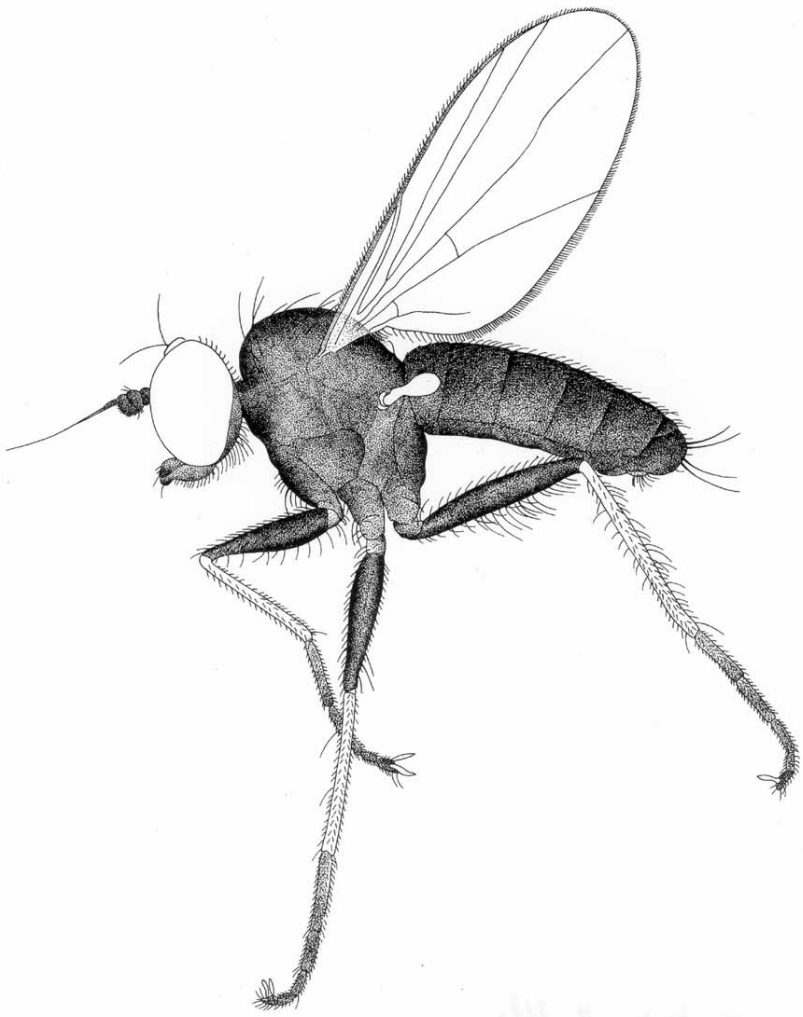

FIGURE 1. *Asyndetus ciliatus* sp. nov., male habitus.

segments onward; hind tarsus entirely infuscated. Fore coxa with black hairs and near apex with 2 black bristles. All legs without claws, and with enlarged pulvilli. Fore femur with a double row of ventral bristles: anterior row limited to basal half and there about as long as femur is deep; posterior row extends on apical ¾ and are slightly longer than femur is deep. Fore tibia with a small ad near base. Mid femur posteroventrally and anteroventrally with 2-3 thin, preapical bristles and ventrally (anteriorly) with a row of bristles half as long as femur is deep. Mid tibia: 2 small pd, and 2 ad. Hind femur anteroventrally, ventrally and posteroventrally with rows of hairs and thin bristles, the longest of which are about as long as femur is deep; 1 preapical av. Hind tibia on basal third with a row of long (about as long as tibia is deep) posteroventral hairs (Fig. 3); 2 short and weak ad, posterodorsally 2 short and weak bristles. Wing hyaline, brownish tinged. Apical part of m1+2 with an upward bend beyond middle, and from there attenuated, and strongly diverging from r 4+5, ending below tip of wing; apical part of m3+4 more than 5 times as long as tp.

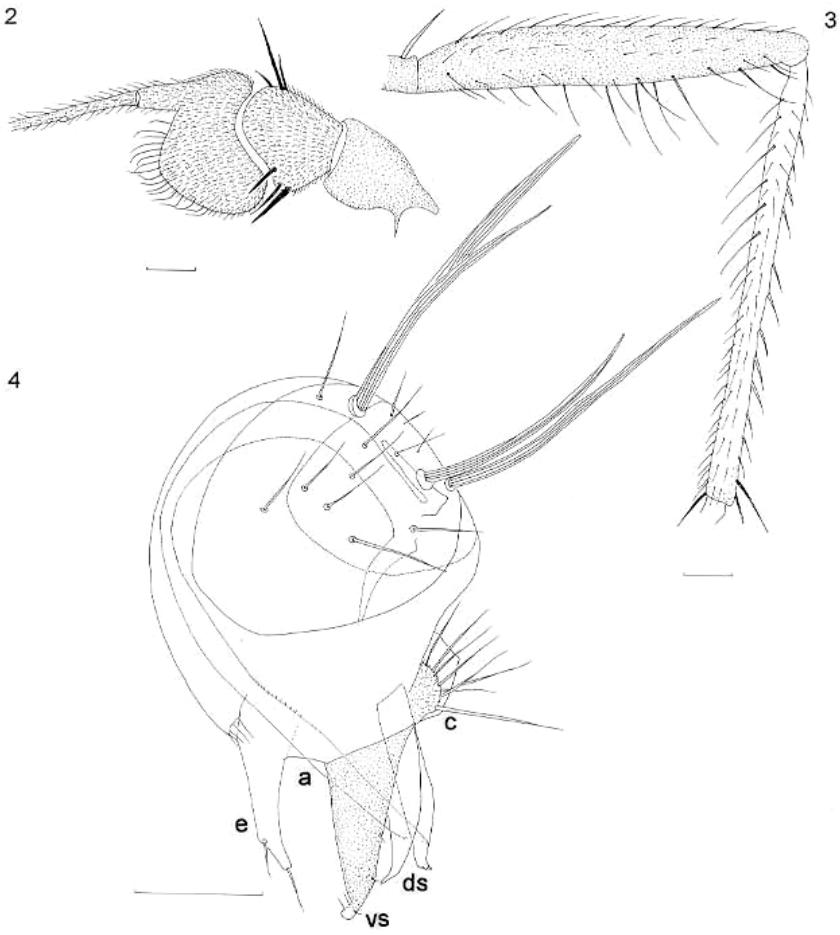

FIGURE 2-4. *Asyndetus ciliatus* sp. nov., male. 2. Antenna; 3. Hind femur and tibia from behind (arrow points to the long posteroventral hairs); 4. Hypopygium (a: aedaeagus; c: cercus; d: dorsal bristle on ventral surstylus; ds: dorsal surstylus; e: epandrial lobe; vs: ventral surstylus). Bar = 0.1 mm.

Tip of abdomen with 4 strong macrochetae. Cerci small, dark brown, haired. Ventral surstylus with a minute dorsal bristle (Fig. 4).

Asyndetus aciliatus sp. nov.
(Fig. 5)

Material examined.– Holotype male: Thailand, Loei Province, Na Haeo, bamboo wood, 8-15.IV.2001 (alt. 500 m, Malaise trap, leg. Verapong Kiatsoonthorn).

Paratypes: 1 male of same provenance as holotype; 2 males, 4 females, 1-8.IV.2001; 4 males, 25.III-1.IV.2001 (Malaise trap, leg. Verapong Kiatsoonthorn); Rayong Province, Ko Samed, 2 males, 3 females, 28.III.2001 (1 male on pin; others in alcohol; sea level, n° 21027, leg. P. Grootaert). The females are tentatively assigned to this species because none were found with completely brown infuscated hind tibiae, a feature characteristic of specimens from other locations.

Diagnosis.–Postocular bristles yellowish brown. Femora black with yellow knees; fore and mid tibia yellow; hind tibia completely brown; no erect hairs at base of hind tibia. Dorsal bristle on ventral surstylus minute.

Male

Body length 2.5 - 2.6 mm; wing length 2.2 - 2.3 mm.

Legs. Coxae and all femora black, but knees yellow. Fore and mid tibiae yellow, but hind tibia entirely infuscated (sometimes dark brown). Fore coxa with 3 black bristles on apical half (one of the two specimens with more and stronger bristles). Fore femora with a double row of long, brown ventral bristles; the anterior ventral row in basal half about as long as femur is deep; the posterior ventral row extends over the entire length and the bristles are especially in the apical half longer than the femur is deep; in addition, a row of long posterior bristles. Fore tibia with 2 very small dorsal bristlets. Mid femur with a double row of long ventral bristles; anterior row extends over the entire length and the bristles at least as long as femur is deep; posterior row also long in basal half but shorter in apical half. Mid tibia: 2 ad, 3-4 pd. Hind femur with a double row of ventrals, all bristles at least as long as femur is deep; a row of short (half as long as femur is deep) av ending in 2 strong preapicals. Hind tibia with 4-6 rather short d, with lengthened hairs between them; no row of posteroventral hairlike bristles, as in *A. ciliatus*.

Hypopygium (Fig. 5) with a minute dorsal bristle on ventral surstylus.

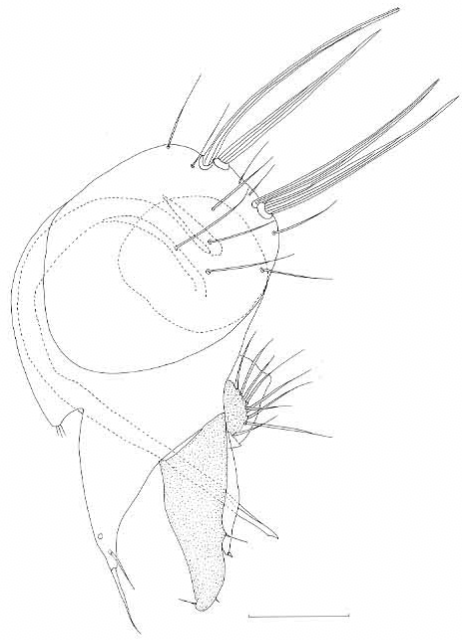

FIGURE 5. *Asyndetus aciliatus* sp. nov., hypopygium. Bar 0.1 = mm.

Asyndetus thaicus sp. nov.
(Fig. 6)

Material examined.– Holotype male: Thailand, Rayong Province, Ko Samed, Tarn Tawan, creek near the sea, 10.XI.2001 (leg. P. Grootaert).

Paratypes: 1 male with same provenance as holotype. Loei Province, Na Haeo FIRS, 1 male, 8-15.IV.2001; 1 male, 1-8.IV.2001 (alt. 500 m, Malaise trap, leg. Verapong Kiatsoonthron).

Diagnosis.– Legs completely black. Fore femur on basal half with a row of ventral bristles, half as long as femur is deep. Hind femur with 2 to 3 strong preapical anteroventral bristles. Epandrial lobe elongate, with a single minute bristle near tip. Epandrial lobe not so slender as in *A. latifrons*.

Male

Body length 2.7 mm; wing length 2.4 mm.

Head. Postoculars below pluriseriate, whitish. Palpus black, with short black bristles and one longer black bristle; rostrum dark brown. Antenna black; third segment triangular, with blunt apex, deeper than long.

Legs. Coxae and legs black; femora with metallic green shine. Fore coxa with black hairs and near apex with 2 black bristles. All legs without claws, and with enlarged pulvilli. Fore femur ventrally on basal 3/5 with about 7 short, hairlike bristles (nearly as long as greatest depth of femur); posteroventrally a few hairs, and 4

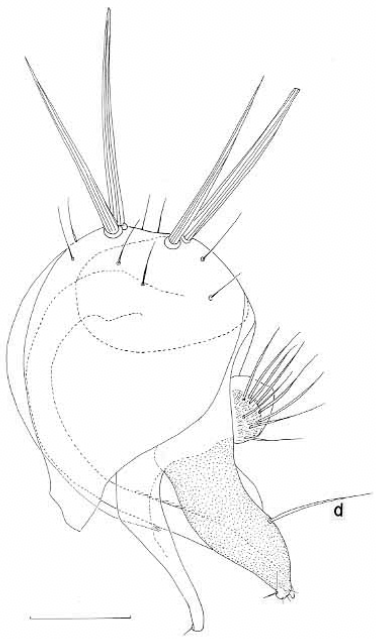

FIGURE 6. *Asyndetus thaicus* sp. nov., hypopygium (d: dorsal bristle on ventral surstylus). Bar = 0.1 mm.

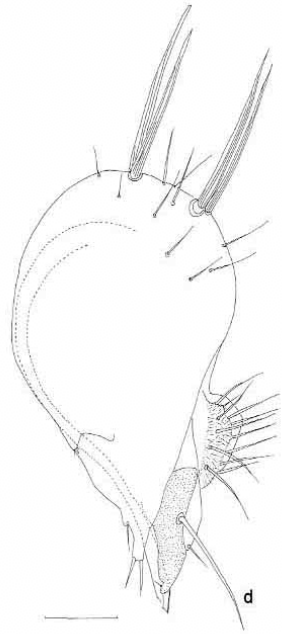

FIGURE 7. *Asyndetus latifrons* Loew, hypopygium (d: dorsal bristle on ventral surstylus). Bar = 0.1 mm.

hairlike, straight bristles on apical fourth (about half as long as greatest depth of femur). No posterior bristles. Fore tibia with a small ad near base, and a small, thin d beyond middle. Mid femur with a row of short anteroventrals ending in two stronger preapicals; a row of short ventrals less than half femur is deep. Some stronger preapical posteroventrals also present. Mid tibia: 2 pd, and a large anterior bristle near base. Hind femur with a row of anteroventrals over the entire length, nearly half as long as femur is deep and ending in 2 strong preapical av. A double row of ventrals also extending over the entire length, nearly half as long as femur is deep. Hind tibia: 3 large ad, a row of pd, 2 of which are as long as the ad.

Wing hyaline. Apical part of m1+2 with an upward bend beyond middle, and from there attenuated, and distinctly diverging from r4+5, ending just below tip of wing; apical part of m3+4 more than 5 times as long as tp. Tip of abdomen with 4 strong macrochetae. Cerci (Fig. 6) very small, dark brown, haired.

Asyndetus latifrons (Loew)
(Fig. 7)

Material examined

Thailand: Chiang Mai Province: 1 male, 7 km NW of Fang Horticultural Experimental Station 550-600 m, 27.X.1979; 1 female, 30.X-2.XI.2002 (in Zool. Museum Copenhagen).

Belgium: 10 males, 8 females, Harelbeke, De Gavers, 1988 (Malaise trap, leg. M. Pollet).

Diagnosis.– All legs completely black. Postoculars white. Fore femur more or less ventrally with a double row of bristles: bristles in posterior row in apical half slightly longer than half the width of the femur; bristles in anterior row only developed in basal half and less than half width of femur. Mid femur with minute ventral bristles: in posterior row, 3 longer preapical bristles with a posteroventral position; in anterior row, 2 long preapicals. Hind femur with minute ventrals (about a

quarter of width of femur). One long black preapical.

The specimens from Thailand were compared with those of Belgium. Even the structure of the male genitalia looked almost identical. However, preliminary examination of specimens considered as *A. latifrons* from The Netherlands, South of France and Cyprus revealed variation in leg bristling. So, a revision of all European material is necessary in order to see if cryptic species are present.

Check List of the Oriental Species

Asyndetus aciliatus sp. nov. Thailand.
Asyndetus calcaratus Becker, 1922: 84. Taiwan, male and female.
Asyndetus ciliatus sp.nov. Thailand.
Asyndetus latifrons Loew, 1869: 46. Europe, Bangladesh, India, Thailand, Taiwan, Philippines.
Asyndetus lineatus de Meijere, 1916: 243. Java.
Asyndetus mutatus Becker, 1922: 84. Taiwan, female only.
Asyndetus semarangensis Dyte, 1975: Java, female only.
tibialis de Meijere, 1916: 243 preocc.
Asyndetus thaicus sp. nov. Thailand.
Asyndetus tristis Parent, 1935: 441 Malaysia, Sabah, female only.

DISCUSSION

In the present study we made no effort to characterise females. The females of *A. ciliatus* and *A. aciliatus* look very similar and we could be mistaken by describing them now. The main problem is that both species are sympatric and occur in the same samples. The distinctive bristling of the femora in the males is a secondary male sexual character and therefore not present in the female. The colouration of the hind tibia, useful in the male, is not helpful to distinguish females.

We are convinced that *A. lineatus* de Meijere (Java) and *A. mutatus* Becker (Taiwan) also belong to the *latifrons* group. Both species have a brown median stripe on the thorax extending along the acrostichals. None of the species examined here have this character.

A. tristis Parent from Sabah, is also comparable to the others. Unfortunately it is known from 2 females only. The legs are completely black, but apparently have only 2 dorsocentrals, an unusual character in *Asyndetus* that should be verified.

A. calcaratus Becker, described from Taiwan, probably does not belong to the *latifrons* group because it has white palpi (indeed many *Asyndetus* species have palpi with a yellow or white ground-colour). The hind tibia is swollen at the tip and bears a strong bent ventral bristle inserted on the basal quarter that reaches the base of the metatarsus.

As can be seen above, three species of the nine known from the Oriental region are known from females only and at the moment are unrecognisable. It makes no sense to assign their names to species here. Males should be collected in the respective type localities and female characters are to be identified. This is beyond the scope of the present paper where we want to point out that there are at least 4 recognisable species in Thailand. Finally, unravelling the biology of the *Asyndetus* in Thailand is another challenge.

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LITERATURE CITED

Becker, T. 1922. Dipterologische Studien, Dolichopodidae der indo-australischen Region. Capit. Zool. 1(4): 1-247.

Bickel, D. 1996. Australian *Asyndetus* and *Cryptophleps* Lichtwardt (Diptera: Dolichopodidae), with notes on the Oriental and Western Pacific Faunas. Invertebr. Taxon. 10: 1151-1170.

Grootaert, P. and H. Meuffels, H.J.G. 2001. Notes on marine dolichopodid flies from Thailand

(Insecta, Diptera, Dolichopodidae). Raffles Bull. Zool. 49(2): 339-353.

Grootaert, P. and V. Kiatsoonthorn. 2002. Insects of Na Haeo: A preliminary survey and seasonal dynamics of dolichopodid and empidid flies. In: L. Ampornpan and S. S. Dhillion. (eds.), The Environment of Na Haeo, Thailand: A Source-book: 14 pp. (in press)

Meijere, J. C. H. de. 1916. Studien über südostasiatische Dipteren. XII. Javanische Dolichopodiden und Ephydriden. Tijdschr. Entomol. 59: 225-273.

Meuffels, H. and P. Grootaert 1993. Dolichopodidae (Diptera) from Papua New Guinea XI: the genus *Asyndetus* Loew, 1869 on the northern coast. Bull. Ann. Soc. R. Belge Entomol. 129: 245-273.

Parent, O. 1935. Diptères conservés au Muséum des Etats Malais confédérés. Annls Mag. Nat. Hist. (London) 15: 194-215, 354-369, 426-441, 519-531.

Williams, F. X. 1938. *Asyndetus carcinophilus* (Diptera, Dolichopodidae). Proc. Hawaii. Entomol. Soc. 10: 126-129.

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