

**Notes on Notonectidae (Hemiptera: Heteroptera)  
from southeastern Asia, mostly from Brunei  
and the Philippines**

Herbert ZETTEL<sup>1)</sup>, David J.W. LANE<sup>2)</sup>, Clister V. PANGANTIHON<sup>3)</sup>  
& Hendrik FREITAG<sup>4)</sup>

<sup>1)</sup> Natural History Museum, Entomological Department, Burgring 7, 1010 Vienna, Austria;  
e-mail: herbert.zettel@nhm-wien.ac.at

<sup>2)</sup> Department of Biology, Universiti Brunei Darussalam, Jalan Tungku Link BE1410, Brunei Darussalam;  
e-mail: david.lane@ubd.edu.bn

<sup>3)</sup> Biology Department, University of San Carlos, Cebu City 6000, The Philippines;  
e-mail: clisterpangantihon@yahoo.com

<sup>4)</sup> Ateneo de Manila University, Biology Department, School of Science & Engineering, Loyola Heights,  
Quezon City 1101, The Philippines & Senckenberg Museum of Zoology, Königsbrücker Landstraße 159,  
01109 Dresden, Germany; e-mail: hendrik.freitag@senckenberg.de

**Abstract.** Updated distribution data are presented for the following species of Notonectidae (Heteroptera) in southeastern Asia: *Anisops breddini* Kirkaldy, 1901, *A. kuroiwaie* Matsumura, 1915, *A. nasutus* Fieber, 1851, *A. nigrolineatus* Lundblad, 1933, *A. occipitalis* Breddin, 1905, *A. rhomboides* Nieser & Chen, 1999, *A. stali* Kirkaldy, 1904, *Aphelonecta philippina* Zettel, 1995, *Enithares bakeri* Brooks, 1948, *E. freyi* Brooks, 1948, *E. intha* Paiva, 1918, *E. mandalayensis* Distant, 1910, *E. martini martini* Kirkaldy, 1898, *E. quadrispinosa* Lansbury, 1967, *E. sinica* (Stål, 1854), *E. subparallela* Lansbury, 1968, *E. uncata* Lundblad, 1933, *E. cf. vicintricata* Lansbury, 1968, and *Nychia sappho* Kirkaldy, 1901. There are six first records from Brunei Darussalam (*Anisops breddini*, *A. nasutus*, *A. nigrolineatus*, *Aphelonecta philippina*, *Enithares cf. vicintricata*, and *Nychia sappho*) and one first record each from the Philippines (*Anisops occipitalis*), China (*Enithares mandalayensis*), West Malaysia (*Enithares sinica*) and East Malaysia (Sarawak) (*Enithares uncata*). A short description of the previously unknown female of *Enithares intha* is given. The status of *Enithares quadrispinosa* as a separate species (not a subspecies of *E. freyi*) is confirmed. Check-lists of the Notonectidae of the Philippines and Brunei are provided.

**Key words.** Heteroptera, Nepomorpha, Notonectidae, first record, check-list, Brunei Darussalam, China, Malaysia, Laos, Philippines, Vietnam, Oriental Region

## Introduction

Taxonomically, the backswimmers (Notonectidae) of the Oriental Region are fairly well known. There are several keys to genera (e.g., NIESER 1998, CHEN et al. 2005), and to species of certain countries, e.g., Thailand (NIESER et al. 2008), West Malaysia and Singapore (NIESER 2004). Besides, the revision of *Enithares* Spinola, 1837 by LANSBURY (1968) remains a very important tool for species identification. For the taxonomically difficult genus *Anisops* Spinola, 1837, the key by NIESER et al. (2008) is very useful, although it treats only a limited set of species, but allows identification of both males and females.

We bring to attention some interesting records of backswimmers from southeastern Asia, based on the results of three projects, two of them focusing on the aquatic Heteroptera fauna of Brunei Darussalam (by H. Zettel and D. J. W. Lane) and the Philippines (by H. Zettel and co-researchers; see GAPUD & ZETTEL 1999, ZETTEL & GAPUD 2003), while the third research project, AQUA Palawana (by H. Freitag), although limited to the Greater Palawan group of islands, has a broader taxonomic approach. We also include further interesting material from the southeastern Asian mainland. In addition to ten first country records and uncounted first regional records from various provinces and Philippine islands, a few morphological aspects are treated as well. We describe for the first time the female of the enigmatic *Enithares intha* Paiva, 1918, hitherto known only from types of two males from Shan State, Myanmar. We review again the species-specific differences between *Enithares freyi* Brooks, 1948 and *E. quadrispinosa* Lansbury, 1967, and confirm the full species status of the latter.

## Material and methods

Specimens examined are deposited in the following collections:

HFDG	Hendrik Freitag private collection, Dresden, Germany;
HZWA	Herbert & Salvacion V. Zettel private collection, Vienna, Austria;
HNHM	Hungarian Natural History Museum, Budapest, Hungary;
NHMW	Natural History Museum Vienna, Austria;
NMPC	National Museum, Prague, Czech Republic;
PCSD	Palawan Council for Sustainable Development, Philippines;
UBDB	Biology Department Collection, Universiti Brunei Darussalam, Brunei Darussalam;
UPLB	Museum of Natural History, University of the Philippines, Los Baños, Laguna, Philippines;
USCP	Biological Collections, University of San Carlos, Cebu City, Philippines;
ZMAS	Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia;
ZRCS	Zoological Reference Collection, National University of Singapore, Singapore.

Material examined sections do not include specimens already published in earlier studies (NIESER & ZETTEL 1999, ZETTEL 2003).

Stacked digital images were taken with a Leica DFC camera attached to a Leica MZ16 binocular microscope and processed with the help of Leica Application Suite. They were then stacked with ZereneStacker 64-bit and processed with Adobe Photoshop 7.0.

## Species account

### *Anisops breddini* Kirkaldy, 1901

(Fig. 1)

*Anisops breddini* Kirkaldy, 1901: 5; NIESER (2004: 85); CHEN et al. (2005: 421); NIESER et al. (2008: 254).

**Material examined.** **VIETNAM: DONG NAI PROVINCE:** Nam Cat Tien National Park, 1–16.vi.1994, leg. P. Pacholátko & L. Dembický, numerous ♂♂ and ♀♀ (NHMW). **LAM DONG PROVINCE:** Da Lat City, 21–27.iv.1994, leg. P. Pacholátko & L. Dembický, numerous ♂♂ and ♀♀ (NHMW). **BRUNEI: TUTONG DISTRICT:** Tasik Merimbun, 13.v.1993, leg. K. K. P. Lim & I. Das (ZRC Y845), 8 ♂♂ 3 ♀♀ (ZRCS). Lutuk, Sites 1A, 2B, 4B, 5B, “stagnant” stream, 27.i.2010, leg. D. J. W. Lane (1C, 1F, 1N), 4 ♂♂ 3 ♀♀ (UBDB, NHMW). **PHILIPPINES: CEBU:** Cebu City, Talamban, wetland near Mandaue, viii.2005, leg. C. V. Pangantihon, G. Montejo & V. Salaris, 8 ♂♂ 5 ♀♀ (USCP, HZWA, NHMW). **BOHOL:** northern Bohol, southwest of Talibon, Zamora Dam, 25 m a.s.l., stream, 9.xi.2007, leg. H. Zettel (474a), 1 ♀ (NHMW).

**Distribution.** *Anisops breddini* is widespread from Sri Lanka and India to New Guinea (NIESER 2004, CHEN et al. 2005) and very common on the Malay Peninsula and in Thailand (NIESER 2004, NIESER et al. 2008). Specimens from Brunei represent the first record from Borneo. Specimens from the Philippines are the first specified records from that country. In the checklist by CHEN et al. (2005) ‘PH’ (for ‘remaining Philippine Islands’ excluding the biogeographical regions of Greater Luzon, Greater Mindanao, and Greater Palawan) refers to some of the Cebu specimens mentioned above which were identified by Nico Nieser, Tiel. Listed are first records from Cebu and Bohol.

### *Anisops kuroiwaie* Matsumura, 1915

(Fig. 2)

*Anisops kuroiwaie* Matsumura, 1915: 109; YANO et al. (1981: 24); NIESER & CHEN (1999: 111, 122); ZETTEL (2003: 125).

*Anisops batillifrons* Lundblad, 1933: 463; BROOKS (1951: 420); NIESER & CHEN (1991: 57).

**Material examined.** **PHILIPPINES: LUZON:** Cagayan, Gonzaga, Pateng, 10.iv.2005, leg. C. V. Pangantihon (P146), 1 ♂ 1 ♀ (HZWA). **BURIAS:** San Pasqual, Mabini, irrigation area, 20.ii.2003, leg. H. Zettel (342d), 4 ♂♂ 1 ♀ (NHMW, UPLB). **BOHOL:** northern Bohol, southwest of Talibon, Zamora Dam, small pond, 25 m a.s.l., 9.xi.2007, leg. H. Zettel (474b), 1 ♂ 1 ♀ (NHMW), leg. C. V. Pangantihon (PC474b), 1 ♀ (HZWA). **MINDANAO:** Surigao del Norte, Bacuag, Dugsangon, 9.ii.2000, leg. H. Zettel (234), 1 ♂ (NHMW). **SIARGAO:** 6 km northeast of Dapa, Danau, swamp beside road, 10 m a.s.l., 09°47'N 126°05'E, 20.iv.1995, leg. H. Freitag (50M), 6 ♂♂ 13 ♀♀ (NHMW, HFDG). **PALAWAN:** Puerto Princesa, Cabayugan, Manturon, drain channel of paddy fields, 10°09'24"N 118°53'00" E, 25.v.2001, leg. H. Freitag (CRDrD3, D4, D7), 1 ♂ 5 ♀♀ (PCSD, HFDG). Taytay, Lake Manguao area, Tubog Creek, “Malaipit Campsite” reforestation area, stream with riffles, runs, and/pools, c. 80 m a.s.l., 10°48'52"N 119°30'40"E, 19.xi.2007, leg. H. Freitag, 2 ♂♂ 2 ♀♀ (PCSD, HFDG).

**Distribution.** Common and widely distributed from India through southeastern Asia to Hainan, Taiwan, Iriomote, and the Philippines (NIESER & CHEN 1999). In the Philippines previously recorded from the islands of Luzon (Laguna), Panay, Negros, Catanduanes, Samar, Leyte, Mindanao (Surigao del Sur), and Palawan (YANO et al. 1981, ZETTEL 2003); first records from Burias, Bohol and Siargao Islands, Cagayan Province in northern Luzon, and Surigao del Norte Province in northern Mindanao.

***Anisops nasutus* Fieber, 1851**

(Fig. 3)

*Anisops nasuta* Fieber, 1851: 60; BROOKS (1951: 416).*Anisops nasutus*: NIESER & CHEN (1999: 110); ZETTEL (2003: 126); CHEN et al. (2005: 421); NIESER et al. (2008: 261).

**Material examined. BRUNEI: BRUNEI-MUARA DISTRICT:** west of Bandar Seri Begawan, south of Jerudong, large artificial lake, 5 m a.s.l., 04°55'03.0"N 114°49'54.3"E (GPS), 3.xii.2008, leg. H. Zettel & D. J. W. Lane (# 36), 1 ♂ 3 ♀♀ (UBDB, NHMW). **PHILIPPINES: BOHOL:** northern Bohol, southwest of Talibon, Zamora Dam, 25 m a.s.l., pond, 9.xi.2007, leg. H. Zettel (474b), 5 ♂♂ (NHMW, UPLB, HFDG), leg. C. V. Pangantihon (PC474b), 4 ♂♂ (HZWA).

**Distribution.** *Anisops nasutus* is widely distributed from India to Australia (CHEN et al. 2005). However, listed materials represent the first record from Brunei and the entire island of Borneo. Regarding the Philippines, an unspecific record by NIESER & CHEN (1999) was cited by ZETTEL (2003), but not repeated by CHEN et al. (2005), and was specified 'Mindanao' by NIESER et al. (2008). The examined specimens represent the first record from Bohol Island.

***Anisops nigrolineatus* Lundblad, 1933***Anisops nigrolineata* Lundblad, 1933: 160; BROOKS (1951: 409).*Anisops nigrolineatus*: NIESER & CHEN (1999: 120); ZETTEL (2003: 126); CHEN et al. (2005: 421); NIESER et al. (2008: 262).

**Material examined. BRUNEI: BELAIT DISTRICT:** Sungai Ingei, Site C, pool on East bank opposite Base Camp, 04°09'26.66"N 114°43'06.51"E, 14.vi.2010, leg. D. J. W. Lane (#16), 1 ♂ (UBDB). Sungai Ingei, Site A, pool on East bank opposite Base Camp, 04°09'25.81"N 114°43'08.10"E, 14.vi.2010, leg. D. J. W. Lane (#17), 1 ♂ (UBDB).

**Distribution.** *Anisops nigrolineatus* is widely distributed from India to the Philippines and Java (NIESER & CHEN 1999, CHEN et al. 2005) and very common in southeastern Asia, especially Thailand (NIESER et al. 2008). However, listed materials represent the first record from Brunei and the entire island of Borneo.

***Anisops occipitalis* Breddin, 1905**

(Figs. 4–7)

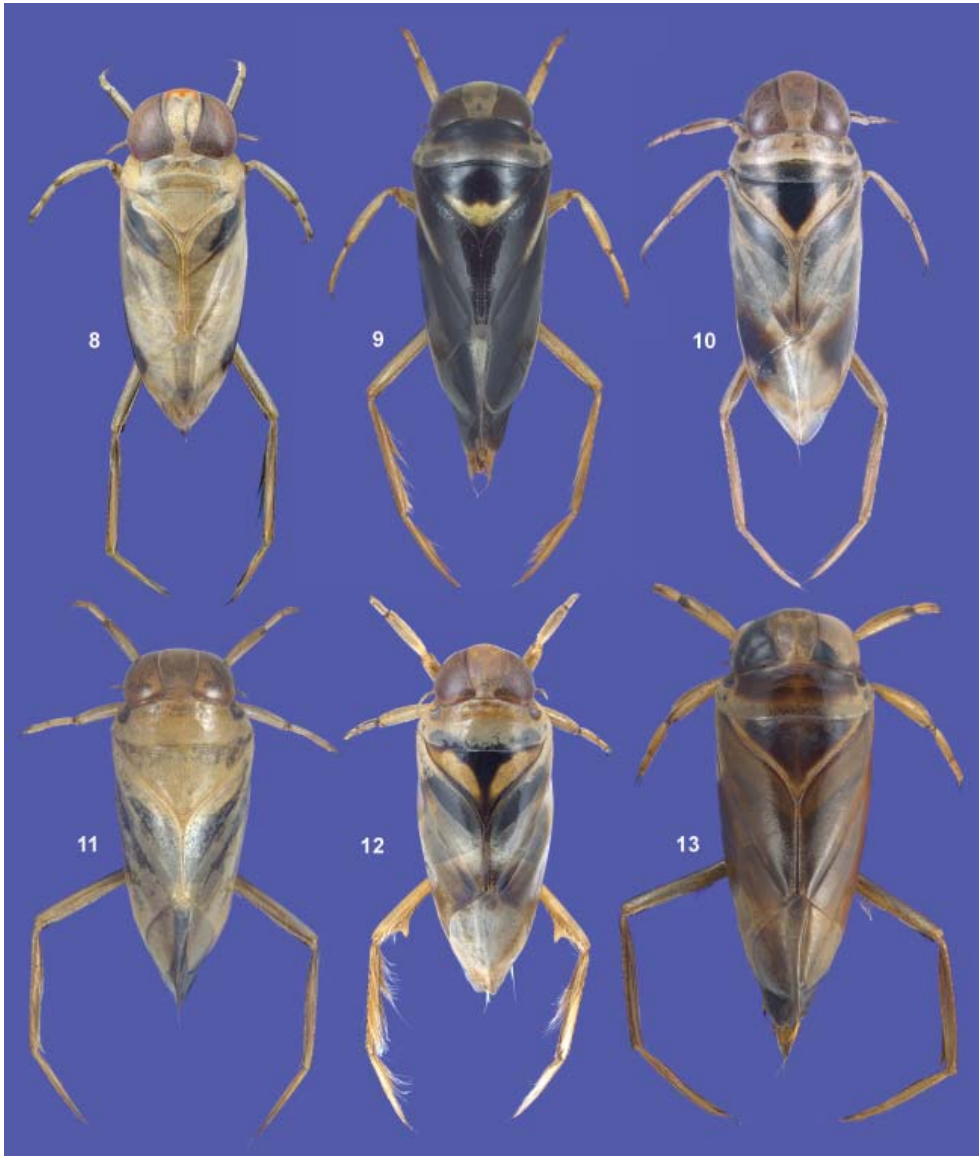
*Anisops occipitalis* Breddin, 1905: 152; LANSBURY (1961: 505); LANSBURY (1965: 61); POLHEMUS (1995: 66); NIESER (2004: 89); CHEN et al. (2005: 421); NIESER et al. (2008: 265).

**Material examined. JAPAN: RYUKYUS:** Ishigaki Island, collected at light, 16.x.1999, leg. S. Belokobylskij, 2 ♂♂ (ZMSP, NHMW). **PHILIPPINES: BOHOL:** northern Bohol, southwest of Talibon, Zamora Dam, 25 m a.s.l., pond, 9.xi.2007, leg. H. Zettel (474b), 9 ♂♂ 6 ♀♀ (NHMW, UPLB), leg. C. V. Pangantihon (PC474b), 8 ♂♂ 9 ♀♀ (HZWA, USCP). **INDONESIA: SULAWESI TENGGARA PROVINCE:** Kolaka, 20 km south of Pomalea, 2.iii.1989, leg. N. Nieser (N8927), det. N. Nieser, 1 ♂ 1 ♀ (NHMW). **CERAM:** near Wahal, 12.ii.1989, leg. M. A. Jäch, det. N. Nieser, 1 ♂ 1 ♀ (NHMW).

**Distribution and notes.** *Anisops occipitalis* is widely distributed from West Malaysia to Australia and New Caledonia (CHEN et al. 2005). In addition to its southern distribution recorded by Nico Nieser in several papers (NIESER 2004, CHEN et al. 2005, NIESER et al. 2008), there are more northern records from southeastern China, Taiwan, and Japan by LANSBURY (1961) and POLHEMUS (1995). In his morphological analysis of *A. occipitalis*, LANSBURY (1965) did not include



Figs. 1–7. Anisopinae. 1–4 – Habitus, dorsal aspect: 1 – *Anisops breddini* Kirkaldy, 1901, male; 2 – *A. kuroiwa* Matsumura, 1915, male; 3 – *A. nasutus* Fieber, 1851, male; 4 – *A. occipitalis* Breddin, 1905, male. 5–7 – *Anisops occipitalis* Breddin, 1905, male, head and pronotum, in dorsal (5), lateral (6) and frontal view (7). © NHMW Hemiptera Image Collection.



Figs. 8–13. Notonectinae. Habitus, dorsal aspect: 8 – *Aphelonecta philippina* Zettel, 1995, male. 9 – *Enithares freyi* Brooks, 1948, male. 10 – *E. intha* Paiva, 1918, female. 11 – *E. quadrispinosa* Lansbury, 1967, male. 12 – *E. sinica* (Stål, 1854), male. 13 – *E. subparallela* Lansbury, 1968, male. © NHMW Hemiptera Image Collection.

the Taiwanese material studied some years earlier (in LANSBURY 1961). Examined specimens from the Ryukyus in southern Japan belong to the same morph as the Philippine material. These samples differ from the typical *A. occipitalis* (e.g., from Sulawesi and Ceram) chiefly in a wide head which is hardly narrower than the pronotum, a characteristic that has been also described for eastern populations of *A. occipitalis* (Russell Island, New Guinea; LANSBURY 1965: figs. 7C, 7D) and in *A. leucothea* Esaki, 1926 from Samoa, which is suspected to be possibly conspecific with *A. occipitalis* (see LANSBURY 1965). Under such circumstances the Philippine population is tentatively identified as *A. occipitalis*. A male from Bohol is illustrated in Figs. 4–7.

### *Anisops rhomboides* Nieser & Chen, 1999

*Anisops tahitiensis* (nec *A. tahitiensis* Lundblad, 1933, misidentifications): LANSBURY (1967: 97); NIESER & ZETTEL (1999: 123).

*Anisops rhomboides* Nieser & Chen, 1999: 111; ZETTEL (2003: 126); CHEN et al. (2005: 422).

**Material examined.** **BRUNEI: BELAIT DISTRICT:** Peat-swampy area draining to Sungai Ingei, 6.vi.2010, leg. D. J. W. Lane (15), 1 ♂ (UBDB). **PHILIPPINES: LEYTE:** Leyte Province, Mahaplag, Hilusig River, 6.iii.2001, leg. F. E. Bendanillo, 1 ♂ (USCP).

**Distribution.** *Anisops rhomboides* is a West Malesian species so far recorded from Borneo, Sulawesi, and the Philippines (NIESER & CHEN 1999, CHEN et al. 2005). This species is the only notonectid species previously recorded from Brunei (from km 29.5 on Labi road [in Belait District], NIESER & CHEN 1999). Philippine records are only from the south: Mindanao (South Cotabato) (NIESER & CHEN 1999), Tawi Tawi (LANSBURY 1967, as *A. tahitiensis*), and Palawan (ZETTEL 2003). This first record from Leyte (Leyte Province) represents the species' northernmost occurrence.

### *Anisops stali* Kirkaldy, 1904

*Anisops stali* Kirkaldy, 1904: 113, 132; BROOKS (1951: 319); NIESER & CHEN (1999: 111); ZETTEL (2003: 127); CHEN et al. (2005: 422).

**Material examined.** **PHILIPPINES: LUZON:** Mountain Province, Sagada, Underground River, downstream cave, 1450 m a.s.l., 17°05'N 120°54'E, 14.iii.1995, leg. H. Freitag (5), 2 ♀♀ (NHMW). **NEGROS:** Negros Oriental Province, Bais Forest, 500 m a.s.l., 21.v.1981, leg. Fr. Schoenig, 1 ♂ (USCP). **CEBU:** Cebu City, Buhisan, 11.ix.1979, leg. A. Creus, 1 ♂ (USCP); Minglanilla, Camp 7, 29.ix.1979, leg. Egula, 1 ♂ (USCP).

**Distributional notes.** *Anisops stali* is distributed from Java in Indonesia and the Philippines eastwards to Australia (CHEN et al. 2005). Despite this wide distribution it has been rarely reported from the Philippines, namely from Mindanao (BROOKS 1951) and Mindoro (ZETTEL 2003). We present first records from Luzon (Mountain Province), Negros Oriental, and Cebu.

### *Aphelonecta philippina* Zettel, 1995

(Fig. 8)

*Aphelonecta philippina* Zettel, 1995: 113, 132; ZETTEL et al. (1998: 63).

**Material examined.** **BRUNEI: TEMBURONG DISTRICT:** Sungai Tunkul Libut (tributary to Sg. Temburong), 30 m a.s.l., 04°34'N 115°07'E (GPS), 1.xii.2008, leg. H. Zettel (35), 1 ♂ (UBDB).

**Notes.** Although the specimen from Brunei has an atypical colour pattern (Fig. 8), it agrees well with studied specimens from Palawan and Sabah in structural characteristics including genitalia.

**Distribution.** *Aphelonecta philippina* was originally described from Palawan Island, the Philippines, and later recorded from Sabah, Borneo (ZETTEL et al. 1998). We present the first record from Brunei.

### *Enithares bakeri* Brooks, 1948

*Enithares bakeri* Brooks, 1948: 40; NIESER & ZETTEL (1999: 129); ZETTEL (2003: 123); CHEN et al. (2005: 422).

**Material examined. PHILIPPINES: LUZON:** Cagayan Province, Gonzaga, Pateng, 10.iv.2005, leg. C. V. Pangantihon (P146), 1 ♀ (HZWA). **BURIAS:** San Pasqual, Mabini, 20.ii.2003, irrigation area, leg. H. Zettel (342d), 1 ♂ (NHMW). **BOHOL:** northern Bohol, southwest of Talibon, Zamora Dam, 25 m a.s.l., pond, 9.xi.2007, leg. H. Zettel (474b), 1 ♀ (NHMW), leg. C. V. Pangantihon (PC474b), 1 ♀ (HZWA).

**Distribution.** *Enithares bakeri* is known from the Philippines, Indonesia (Sulawesi, Nusa Tenggara), and East Malaysia (CHEN et al. 2005). Extrapolating from the limited collections and distributional data, *E. bakeri* can be expected all over the Philippine Islands. It has been previously recorded from Mindoro, Marinduque, Negros, Siquijor, Biliran, Poro, and Mindanao (NIESER & ZETTEL 1999, ZETTEL 2003). Here we present first records from the islands of Luzon (Cagayan Province), Burias and Bohol.

### *Enithares freyi* Brooks, 1948

(Figs. 9, 14)

*Enithares freyi* Brooks, 1948: 48; NIESER & ZETTEL (1999: 130); ZETTEL (2003: 124).

*Enithares freyi freyi*: LANSBURY (1968: 438); CHEN et al. (2005: 422).

**Material examined. PHILIPPINES: LUZON:** Ilocos Norte Province, Solsona, Gargas River, 29.x.2002, leg. H. Zettel (320a), 1 ♀ (NHMW); Nueva Viscaya Province, Santa Fe, Imugan, stream at Imugan Falls, 1000 m a.s.l., 6.xi.2002, leg. H. Zettel (325), 9 ♂♂ 9 ♀♀ (NHMW, UPLB, HFDG); Nueva Viscaya Province, Santa Fe, Barakbak, 620 m a.s.l., Barakbak River, 7.xi.2002, leg. H. Zettel (326), 1 ♂ (NHMW); Nueva Viscaya Province, Santa Fe, Malico, Maliit, Maliit River, 1200 m a.s.l., 8.xi.2002, leg. H. Zettel (329), 2 ♂♂ 2 ♀♀ (NHMW); Nueva Viscaya Province, Santa Fe, Malico, Dulipay River, 8.xi.2002, leg. H. Zettel (331), 1 ♀ (NHMW); Nueva Viscaya Province, Santa Fe, Malico, small creek, 8.xi.2002, leg. H. Zettel (332), 1 ♀ (NHMW).

**Notes.** NIESER & ZETTEL (1999: fig. 16) have illustrated the genitalia of the male; in this figure the characteristic lateral arm of the basal plate of the aedeagus is partly covered by the posterior lobe of the genital capsule. Figure 14 shows its complete outline. See also notes for *E. quadrispinosa*.

Hitherto, *Enithares freyi* has been very rarely collected, but in the municipality of Santa Fe, Caballos Mountains, it commonly inhabits suitable places at elevations from 600 to 1200 m a.s.l. Deep, shaded bays along the edges of the streams are the main requirement of this species.

**Distribution.** Endemic in northern and central Luzon in the Philippines: Mountain Province, Benguet (BROOKS 1948, NIESER & ZETTEL 1999), Laguna (ZETTEL 2003); first records for Ilocos Norte and Nueva Viscaya.



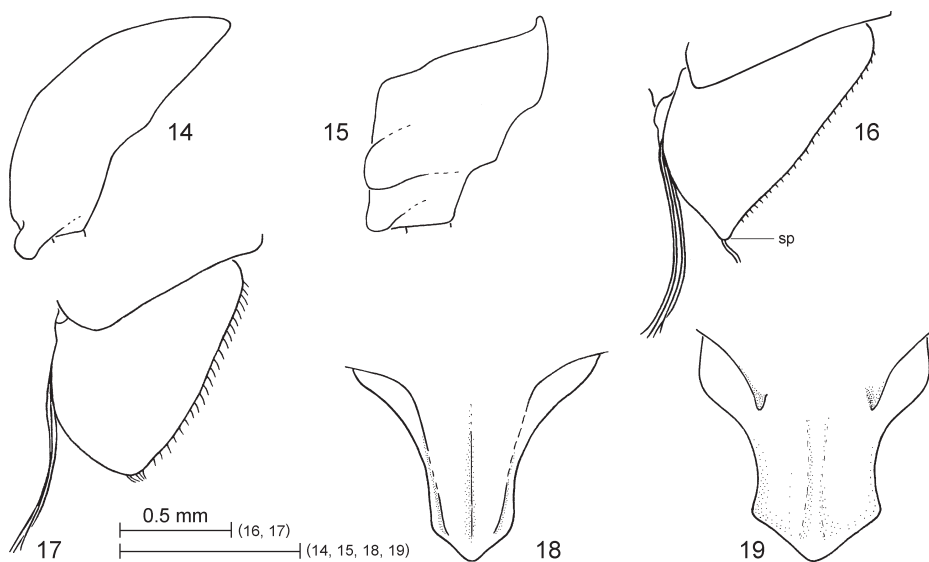


Fig. 14–19. *Enithares* Spinola, 1837, morphological details. 14–15 – lateral arms of basal plate of aedeagus, left aspect: 14 – *E. freyi* Brooks, 1948; 15 – *E. quadrispinosa* Lansbury, 1967. 16–17 – left mesotrochanter of female, ventral aspect: 16 – *E. intha* Paiva, 1918 (sp = spur); 17 – *E. sinica* (Stål, 1854). 18–19 – metaxiphus of female, ventral aspect: 18 – *E. intha*; 19 – *E. sinica*.

### *Enithares intha* Paiva, 1918

(Figs. 10, 16, 18)

*Enithares intha* Paiva, 1918: 27; LANSBURY (1968: 438); LANSBURY (1973: 228); NIESER et al. (2008: 274, 279); THIRUMALAI (2007: 43).

**Material examined.** MYANMAR: SHAN STATE: 2.5 km north of Mintaingbin Forest Camp, 1250 m a.s.l., 20°55.722'N 96°32.913'E, 12.+16.vi.2004, leg. H. Shaverdo & Myint Hlaing (149), 3 ♀♀ (NHMW).

**Distribution and notes.** Until recently, *Enithares intha* was only known from the type series, two males, from Inle Lake, also in Shan State, Myanmar. While the identity of this species was unknown to Ivor Lansbury when preparing his revision of *Enithares* (LANSBURY 1968), he redescribed the types later (LANSBURY 1973). THIRUMALAI (2007) recorded *E. intha* from Meghalaya, northeastern India, based on a personal note by J.T. Polhemus. NIESER et al. (2008) included *E. intha* in a key to species from Thailand and adjacent areas, referring to LANSBURY'S (1973) redescription, without having seen further specimens. Material in NHMW consists only of females. The shape of the metaxiphus agrees well with the illustration provided by LANSBURY (1973) for males and allows identification. The females strongly resemble *E. sinica* (comp. Fig. 12) except for slightly smaller body size, for a distinct spur on the mesotrochanter (Fig. 16), which is absent in *E. sinica* females (Fig. 17) and for the shape of the metaxiphus (Fig. 18), which is not expanded and has less highly elevated margins than in *E. sinica* (Fig. 19). The small spur on the mesotrochanter distinguishes females from all species in the region.

**Description of female.** Body length 8.38–8.95 mm, head width 2.38–2.58 mm, median head length (in exact dorsal aspect of specimen) 1.24–1.30 mm, anterior width of vertex 1.05–1.09 mm, synthlipsis 0.48–0.51 mm, pronotum width 2.95–3.19 mm, median pronotum length 1.03–1.19 mm. Colour see Fig. 10, extension of dark colour on mesoscutellum and hemelytra slightly varying. Head large. Vertex anteriorly convex, clearly surpassing anterior eye margin. Medial margin of pronotal foveae directed slightly laterally. Metaxiphus (Fig. 18), relatively narrow, with distinctly, but not very strongly elevated sides and short apex. Mesotrochanter (Fig. 16) with distinct spur similar to that of male. Metafemur without tooth.

### *Enithares mandalayensis* Distant, 1910

*Enithares mandalayensis* Distant, 1910: 331; LANSBURY (1968: 380); NIESER (2004: 93); CHEN et al. (2005: 423); NIESER et al. (2008: 280).

**Material examined. THAILAND:** LOEI: 2 km west of Phu Kradung, Lam Phong Ko, 4.iv.1994, leg. W.D. Shepard (1952), 1 ♂ (NHMW). PHETCHABUN: 37 km southeast of Sila, north of Ban Nam Nao, Ban Pala Noi, 25.xi.1995, leg. H. Zettel (26), 3 ♂♂ 2 ♀♀ (NHMW). UDON THANI: west of Udon Thani City, 27.xii.1995, roadside pond with *Eichhornia*, leg. P.-p. Chen, 1 ♀, det. N. Nieser (NHMW); 5 km east of Udon Thani City, 28.xi.1995, leg. H. Zettel (32), 1 ♀ (NHMW). SAKHON NAKHON: 11 km northeast of Kham Poem, 5.iii.1994, leg. W.D. Shepard (1026), 1 ♀ (NHMW). KHON KAEN: 30 km northnortheast of Khon Kaen City, Nam Pong, near Ban Hua Phu, 20.xi.1995, leg. H. Zettel (19), 4 ♀♀ (NHMW); Phu Phan Kham NP, Ban Noon Hua Chang, Huai Sam Caen, 21.xi.1995, leg. H. Zettel (20b), 1 ♂ (NHMW). SURIN: Surin City, 150 m a.s.l., 5.–10.xii.1995, leg. P. Schwendinger, 1 ♂ (NHMW). VIETNAM: DONG NAI PROVINCE: Nam Cat Tien National Park, 1.–15.v.1994, leg. P. Pacholátko & L. Dembický, 1 ♂ 3 ♀♀ (NHMW). CHINA: YUNNAN: Syaomon'yan [= Xiaomengyang], 950 m a.s.l., 4.v.1957, leg. Tszan Lin-yao [= Zang Ling-Chao], 1 ♂ (NMPC); Cheli-Damon-Lun [= Cheli-Damenglong], 640 m a.s.l., 29.iv.1957, leg. Van Shu-yun [= Wang Shu-Yong], 1 ♀ (NMPC).

**Distribution.** *Enithares mandalayensis* is widespread in Myanmar, Vietnam, West Malaysia, and Singapore (NIESER 2004); it has been frequently recorded from Thailand (NIESER et al. 2008 and this study). Here we present the first records from China.

### *Enithares martini martini* Kirkaldy, 1898

*Enithares martini* Kirkaldy, 1898: 151; LANSBURY (1968: 432); CHEN et al. (2005: 423).  
*Enithares martini martini*: NIESER & ZETTEL (1999: 131); ZETTEL (2003: 124).

**Material examined. PHILIPPINES:** LUZON: Ilocos Norte Province, east of Batac, Payao, Quiaoit River, 26.x.2002, leg. H. Zettel (315), 1 ♂ (NHMW); Ilocos Norte Province, Bangui – Dumalneg, streams, 27.x.2002, leg. H. Zettel (318), 1 ♂ (NHMW); Ilocos Norte Province, Solsona, Gasgas River, 29.x.2002, leg. H. Zettel (320a), 6 ♂♂ 5 ♀♀ (NHMW, UPLB); Ilocos Norte Province, Carasi, Nagoboban Creek, in forest, 28.x.2002, leg. H. Zettel (319a), 1 ♂ 3 ♀♀ (NHMW); Ilocos Sur Province, Bantay, Taleb, Reforestation Area, Kayan creek, 25.x.2002, leg. H. Zettel (313), 1 ♂ 1 ♀ (NHMW, UPLB); La Union Province, Bacnotan, Don Mariano Marcos Memorial State University, Casiaman Falls, 24.x.2002, leg. H. Zettel (312), 3 ♂♂ (NHMW); Mountain Province, Gonogon, Chico River, 1100 m a.s.l., 21.ii.1999, leg. F. Seyfert (8a), 1 ♂ 7 ♀♀ (HZWA, UPLB); Mountain Province, Gonogon, tributary of Chico River, 1100 m a.s.l., 21.ii.1999, leg. F. Seyfert (8b), 1 ♂ 2 ♀♀ (HZWA); Mountain Province, south of Sagada, Bagnen, slopes of Mount Polis, 1600 m a.s.l., 26.ii.1999, leg. S. Schödl (23) (NHMW), 1 ♀, leg. H. Zettel (189a), 1 ♀ (NHMW); Mountain Province, 5 km south of Bontoc, Balitian River, 900 m a.s.l., 27.ii.1999, leg. S. Schödl (24), 2 ♀♀ (NHMW), leg. H. Zettel (190), 3 ♂♂ (NHMW, UPLB); Nueva Viscaya Province, Santa Fe, Imugan, stream at Imugan Falls, 1000 m a.s.l., 6.xi.2002, leg. H. Zettel (325), 1 ♂ (NHMW); Nueva Viscaya Province, Santa Fe, Barakbak, 620 m a.s.l., Barakbak River, 7.xi.2002, leg. H. Zettel (326), 4 ♂♂ 9 ♀♀ (NHMW, UPLB); Nueva Viscaya Province, Santa Fe, Villafior, Consuelo Creek, 600 m a.s.l., 7.xi.2002, leg. H. Zettel (327), 4 ♂♂ 7 ♀♀ (NHMW,

UPLB); Nueva Viscaya Province, Santa Fe, Malico, Maliit, Maliit River, 1200 m a.s.l., 8.xi.2002, leg. H. Zettel (329), 1 ♀ (NHMW); Nueva Viscaya Province, Santa Fe, Malico, small creek, 8.xi.2002, leg. H. Zettel (332), 1 ♀ (NHMW); Cavite Province, Indang, Mendez River tributary, 14°12'03"N, 120°51'40"E, 31.i.2010, leg. H. Freitag (285M), 2 ♂♂ 1 ♀ (NHMW); Cavite Province, Alfonso, Pajo River, 14°08'48"N, 120°51'26"E, 31.i.2010, leg. H. Freitag (283M), 1 ♂ (NHMW); Cavite Province, Alfonso, Pajo, 7.ii.2010, leg. C. V. Pangantihon (P345), 3 ♂♂ 1 ♀ (HZWA, USCP); Laguna Province, Los Baños, Mt. Makiling, Flat Stones, 10.ii.1998, leg. H. Zettel (132), 1 ♂ 1 ♀ (NHMW). **MARINDUQUE:** 1 km north of Sihi, Malinao Spring, 16.ii.1998, leg. H. Zettel (139), 8 ♂♂ 7 ♀♀ (NHMW, UPLB). **SIQUIJOR:** Bandila-an National Park, Little Waterfall, small pool, 23.x.2004, leg. H. Zettel (395), 5 ♂♂ 6 ♀♀ (NHMW, UPLB). **NEGROS:** Negros Oriental, Canlaon City, Mapud, Sudlon Falls, 25.i.2007, leg. H. Zettel (452), 1 ♂ (HZWA); Negros Oriental, Cuernos de Negros, Valencia, Apolong, Casaroro Falls, 25–26.x.2004, leg. C. V. Pangantihon (P400), 5 ♂♂ 1 ♀ (HZWA), 3–4.iii.2008, leg. H. Zettel (513), 1 ♀. **CEBU:** Cebu City, Cantipla-Uno forest reserve, 800 m a.s.l., 8.ii.2008, leg. H. Zettel & C. V. Pangantihon (503), 1 ♂ (HZWA); west of Cebu City, Minglanilla, Camp 7, creek and waterfall 16.xi.2003, leg. H. Zettel & C. V. Pangantihon (358), 9 ♂♂ 8 ♀♀ (HZWA, UPLB, NHMW, USCP); Argao, barangay Canalum, Bugasug Falls, 9.ii.2008, leg. H. Zettel & C. V. Pangantihon (504), 2 ♂♂ 2 ♀♀ (HZWA). **BILIRAN:** Almeria, Kabungasan, Upper, slopes of Mt. Panamao, 15.xi.2009, leg. C. V. Pangantihon (P334), 1 ♂ 1 ♀ (HZWA). **BOHOL:** northern Bohol, southwest of Trinidad, San Isidro, Kawasan Falls, 11.xi.2007, leg. H. Zettel (480), 1 ♀ (NHMW); southern Bohol, 10 km northeast of Jagna, Tinugdan Spring, 23.xi.1996, leg. H. Zettel (105), 1 ♂ 1 ♀ (NHMW). **LEYTE:** Southern Leyte Province, Maasin, Rizal, 13.xi.1969, leg. C. Plateros, 1 ♀ (USCP). **MINDANAO:** Misamis Occidental Province, western slopes of Mount Malindang, east of Gandawan, 8°18.392'N 123°36.243'E, 1311 m a.s.l., 3.xi.2004, pond, leg. M. Sztatcsny, 2 ♀♀ (NHMW). **PORO** (Camotes Islands): Poro, Libertad, Panganuron Falls, 26.ii.2001, leg. H. Zettel (277), 2 ♂♂ (NHMW).

**Distribution.** The nominotypical subspecies occurs probably throughout the Philippine Islands except in the Palawan Region and in Mindoro. It has been recorded from numerous islands and provinces (NIESER & ZETTEL 1999, ZETTEL 2003). Here are first records from the islands of Poro (Camotes group), Bohol and Siquijor; and from the provinces Ilocos Norte, Ilocos Sur, La Union, Nueva Viscaya, Cavite (all on Luzon island), and Southern Leyte.

### *Enithares quadrispinosa* Lansbury, 1967

(Figs. 11, 15)

*Enithares freyi quadrispinosus* Lansbury, 1967: 94; LANSBURY (1968: 436); CHEN et al. (2005: 422); YOUNG (2010: 47).

*Enithares quadrispinosa*: NIESER & ZETTEL (1999: 132).

**Material examined. PHILIPPINES: PALAWAN:** El Nido, barangay Villa Libertad, 50 m a.s.l., 11°12'N 119°26'E, small creek, 15.x.1994, leg. H. Freitag (113bM), 1 ♂ (HFDG); Taytay, one-third of way to Lake Manguao, Manguao stream tributary, in primary forest, 35 m a.s.l., 10°47'N 119°31'E, 29.iv.1995, leg. H. Freitag (13bM), 1 ♂ 1 ♀ (NHMW); Taytay, Poblacion, southern Manguao stream tributary, 30 m a.s.l., 10°46'00"N 119°30'43"E, 14.ix.2007, leg. H. Freitag (63aM), 2 ♂♂ 1 ♀ (HFDG); Taytay, Poblacion, Manguao southwestern bay, Malibongbong Creek, 20 m a.s.l., 10°44'29"N 119°31'25"E, 7.v.2008, leg. H. Freitag (72aM/E), 2 ♂♂ (PCSD); Taytay, Manguao tributary east of Sinangalit Creek, 20 m a.s.l., 10°46'58"N 119°31'25"E, 3.xi.2008, leg. H. Freitag (73aM), 1 ♀ (UPLB); Taytay, Lake Manguao, northeastern tributary, Pahok creek, 10°46'56"N 119°32'01"E 100 m a.s.l., residual pool, 7.v.2008, leg. H. Freitag (74aM), 1 ♂ 1 ♀ (PCSD); Taytay, barangay Abongan, Ibangley, Abongan River tributary, km 177.9 on Northern Highway, 10°37'23"N 119°23'17"E, 3.xi.2007, leg. H. Freitag (118M), 1 ♀ (UPLB); Taytay, Poblacion, Manguao, temporary tributary at northern coast, Mechico Creek, 10°46'37"N 119°33'14"E, 20 m a.s.l., in degraded primary forest, 4.xi.2007 and 29.viii.2008, leg. H. Freitag (119M), 1 ♂ 3 ♀♀ (NHMW); Taytay, Poblacion, Manguao, Malarad Creek, 20 m a.s.l., 10°46'22"N 119°33'36"E, 4.xi.2008, leg. H. Freitag (120M), 1 ♂ 1 ♀ (USCP); Taytay, Poblacion, Manguao, Enolbong Creek, 20 m a.s.l., 10°46'40"N 119°32'19"E, 5.xi.2008, leg. H. Freitag (121bM), 1 ♂ (HFDG); Taytay, Poblacion, Manguao, Mecadlum Creek, 30 m a.s.l., 10°45'45"N 119°34'00"E, 29.viii.2008, leg. H. Freitag (146M), 1 ♂ (HFDG); Taytay, barangay Poblacion, 4 km southeast of town proper,

15 m a.s.l., 10°48'05"N 119°33'02"E, small hill stream, 21.viii.2007, leg. H. Freitag (100M), 1 ♂ 2 ♀♀ (ZRCS); Taytay, barangay Bato, mountain creek beside highway, 80 m a.s.l., 10°44'56"N 119°30'20"E, 22.viii.2007, leg. H. Freitag (101M), 1 ♀ (HFDG); northern Palawan, Taytay, Poblacion, Malaipit Camp Site, Tuboc Creek, 30 m a.s.l., 19.xi.2007, leg. H. Zettel (490), 3 ♂♂ 1 ♀ (NHMW); northern Palawan, northeast of Roxas, Bagongbayan Falls, 40 m a.s.l., 17.xi.2007, leg. H. Zettel (488), 3 ♂♂ 3 ♀♀ (NHMW, ZRCS); Roxas, barangay Abaroan, Candelaria, Road to Port Barton, 10°20'14"N 119°16'29"E, small temporary creek, 16.xi.1995, leg. H. Freitag (127cM), 1 ♂ (HFDG); Roxas, Barangay 4, Umalad Falls, 3.5 km west of town proper, near water plant, 15 m a.s.l., 10°19'36"N 119°19'30"E, 24.iv.1995, leg. H. Freitag (69M), 1 ♂ 1 nymph (HFDG); southwest of Roxas Poblacion, Umalad Falls, 50 m a.s.l., 16.xi.2007, leg. H. Zettel (485), 5 ♂♂ (NHMW, UPLB); Puerto Princesa, Concepcion, Taranaban River, 6 km upstream from Highway, 150 m a.s.l., 10°02'30"N 119°00'45"E, mountainous river, 20.i.1995, leg. H. Freitag (16bM), 1 ♂ (HFDG); Puerto Princesa, Concepcion, Taranaban River, 8 km upstream from Highway, 450 m a.s.l., 10°05'N 119°01'E, mountainous river, 28.i.1995 leg. H. Freitag (16fM), 1 ♀ (HFDG); Puerto Princesa, Langogan, Highway km 79.9, 10°01'23"N 119°06'52"E, 20 m a.s.l., roadside pool under secondary vegetation, 21.viii.1994, leg. H. Freitag (142bM), 1 ♂ (HFDG); Puerto Princesa, Sabang, Mount Bloomfield Waterfall, 150 m a.s.l., 10°12'03"N 118°53'04"E, 8.x.2007, leg. H. Freitag (18M), 1 ♀ (HFDG); Central Palawan, 9 km southsouthwest of Puerto Princesa, Luzviminda, 50 m a.s.l., 9°39'N 118°38'E, forest creek and falls, 14.xii.1994, leg. H. Freitag (17cM), 2 ♀♀ (NHMW); Puerto Princesa, Santa Lourdes, km 15 of Northern Highway, stream at Magarwak Bridge, 28.xi.2007, leg. H. Zettel (499), 1 ♂ (NHMW); Puerto Princesa, Simpucan, Tagkuriring Falls, 120 m a.s.l., 9°47'26"N 118°33'25"E, 8.ix.1994, leg. H. Freitag (150bM), 2 ♂♂ 1 ♀ (HFDG); Napsan, km 43 of Napsan Road, Salakot Waterfalls, 310 m a.s.l., 30.xi.2007, leg. F. E. Bendanillo (4), 2 ♂♂ 1 ♀ (USCP); Puerto Princesa, barangay Napsan, km 42.5 of Napsan Road, Salakot Falls, small tributary to Iwahig River, 9°42'05"N 118°31'18"E, 30.xi.2008, leg. Freitag (132aM), 1 ♂ 1 ♀ (HFDG); Espanola, barangay Abo-Abo, sitio Tumarbong, Liang River headwater, 1 km southwest of Highway, 9°10'N 118°03'E, 13.v.1995, leg. H. Freitag (76bM), 1 ♀ (HFDG); Narra, 5 km west of town proper, Taritien River, 9°18'11"N 118°22'35"E, 100 m a.s.l., 17.iv.1994, leg. H. Freitag (182a), 1 ♀; Brookes Point, Salogon, Sitio Tagbinacao, 130 m a.s.l., 8°43'41"N 117°42'16"E, 24.iv.2010, leg. C. V. Pangantihon (147M), 2 ♀♀ (NHMW); Brookes Point, Salogon, Sitio Tagbinacao, temporary tributary to Tagbinacao River, 130 m a.s.l., 8°43'41"N 117°42'16"E, 1.ix.1994, leg. H. Freitag (147cM), 1 ♂ (HFDG); Brookes Point, Salogon, Sitio Tagbinacao, 8°43'44"N 117°42'32"E, 120 m a.s.l., small temporary creek, 1.ix.1994, leg. Freitag (149M), 1 ♀ (HFDG). **BALABAC:** barangay Indalawan, Indalawan Falls, 7°54'44"N 117°02'40"E, pool, 23.v.1994, leg. H. Freitag (85M), 1 ♂ (NHMW).

**Notes.** The taxon was originally described as a subspecies of *E. freyi*, but raised to species rank by NIESER & ZETTEL (1999). Erroneously, it was listed again as a subspecies by CHEN et al. (2005) and YOUNG (2010). *Enithares freyi* and *E. quadrispinosa* differ in a good number of characters including body size, colour and genitalia of males. In their key, NIESER & ZETTEL (1999) give a body length of 11.4–11.7 mm for *E. freyi* and ‘up to 10.6 mm’ for a set of specimens including *E. quadrispinosa*. Measuring more specimens, the range of body lengths is 11.3–12.7 mm ( $n = 27$ ) in *E. freyi*, and 8.6–9.9 mm ( $n = 45$ ) in *E. quadrispinosa*. The body shape is slightly more elongated but less acuminate in *E. freyi* than in *E. quadrispinosa* (comp. Figs. 9 and 11). Both species show wide variations in body colour. In *E. freyi* dark forms are dominant; the mesoscutellum is mostly black (Fig. 9), and we have seen only a single specimen with yellow spot covering an area slightly exceeding 50 % of the entire visible surface. In contrast, most specimens of *E. quadrispinosa* are pale, the yellow area covering 75 to (usually) 100 % of the mesoscutellum (Fig. 11). Chaetotaxy of the first mesotarsomere of the male differs considerably: Whereas *E. freyi* possesses four setae in a row, as in the female, *E. quadrispinosa* has two pairs of short, stout setae at the segment’s basal half. The distal part of the paramere is slender-triangular in *E. freyi* and narrow-digitiform in *E. quadrispinosa* (NIESER & ZETTEL 1999). However, the most distinctive character in males is the very different shape of the lateral arms of the basal plate (comp. Figs. 14 and 15). From an ecological viewpoint, both species inhabit similar microhabitats, i.e. pools and quiet bays

in streams, but *E. freyi* is a mountain species (ca. 600–1200 m a.s.l.) and *E. quadrispinosa* occurs in lowlands (ca. 20–150 m a.s.l.).

From LANSBURY'S (1968) description of the pale type specimens, YOUNG (2010) concluded that he described the flightless morph, and the 'normal morph' is unknown. However, the situation is more complicated. As a preliminary study, we have dissected 37 specimens with varying colour pattern and only 6 pale specimen of both sexes had reduced indirect flight muscles. Among the 31 specimens with well-developed flight muscles, some are completely pale, too. All examined specimens had completely developed hind wings. Despite the small number of examined specimens, the high frequency of individuals with flight abilities corresponds well with the rather unstable conditions of the species' microhabitats.

**Distribution.** *Enithares quadrispinosa*, endemic to the Palawan region, is widespread and common on Palawan Island, and recorded from Balabac Island for the first time.

### *Enithares sinica* (Stål, 1854)

(Figs. 12, 17, 19)

*Enithares sinica* Stål, 1854: 241; LANSBURY (1968: 378); NIESER (1998: 12).

**Material examined.** CHINA\*: 'China Coll. Signoret', 'sinica Stal det. Signoret', 'Compared with the original type in Stockholm colln., by G. W. Kirkaldy.', 2 ♀♀ (NHMW; these specimens may represent paralectotypes). YUNNAN: Symao [= Simao], 1400 m a.s.l., 10.v.1957, leg. Ban Shu-yun [= Wang Shu-Yong], 1 ♂ 2 ♀♀ (NMPC); Syaomon'yan [= Xiaomengyang], 850 m a.s.l., 4.v.1957, leg. Van Shu-yun [= Wang Shu-Yong], 3 ♂♂ 3 ♀♀ (NMPC, NHMW); Syaomon'yan [= Xiaomengyang], 950 m a.s.l., 4.v.1957, leg. Tszan Lin-yao [= Zang Ling-Chao], 1 ♂ 4 ♀♀ (NMPC); Syaomon'yan [= Xiaomengyang], 850 m a.s.l., 4.v.1957, leg. Lyan Tsyu-chzhen [= Liang Qiu-Zhen]', 1 ♂ (NMPC); Syaomon'yan [= Xiaomengyang] environs, 940 m a.s.l., 5.v.1957, leg. Zhun Guan-di [= Hong Guang-Ji], 1 ♀ (NMPC); Cheli-Damon-Lun [= Cheli-Damenglong], 640 m a.s.l., 29.iv.1957, leg. Van Shu-yun [= Wang Shu-Yong], 5 ♀♀ (NMPC); 30. km southwest of Tszin'pin [= Jinping, Mengla], 370 m a.s.l., 30.iv.1956, leg. Khuan Ke-zhen' [= Huang Ke-Ren et al.], 1 ♀ (NMPC); Xishuangbanna Dai Autonomous Prefecture, Mengla County, Mengyuan Village, ca. 50 km southsoutheast of Menglun, 700 m a.s.l., pools, 8.xi.1999, leg. M. A. Jäch, H. Schönmann, M. Wang & Y. Wei (CWBS loc. 362), 1 ♂ (NHMW); Xishuangbanna Dai Autonomous Prefecture, Mengla County, near Mengla, 700 m a.s.l., pools, 9.xi.1999, leg. M. A. Jäch, H. Schönmann, M. Wang & Y. Wei (CWBS loc. 366), 1 ♂ 6 ♀♀ (NHMW). GUANGXI: Liuzhou Prefecture, 10 km northeast of Liuzhou City, Shanmenjiang Forest Station; small stream, 200 m a.s.l., 10.xi.1993, leg. H. Schillhammer (17) [= CWBS loc. 38], 1 ♂ 3 ♀♀ (NHMW); Liuzhou Prefecture; 10 km northeast of Liuzhou City; 3 km northwest of Shanmenjiang Forest Station; small stream, 150–200 m a.s.l., 11.xi.1993, leg. H. Schillhammer (18a) [= CWBS loc. 40], 1 ♀ (NHMW); Guilin Prefecture, Lipu County; 120 km south of Guilin, 80 km east of Liuzhou City; Siuren Village, fast flowing stream, 350 m a.s.l., 12.xi.1993, leg. H. Schillhammer (19) [= CWBS loc. 41], 1 ♂ (NHMW); Yulin Prefecture, Liuwan Da Shan, small, steep mountain streams on the southern slope of Kui Shan Ding (= Helmet Mountain), 600–700 m a.s.l., 17.xi.1993, leg. H. Schillhammer (21) [= CWBS loc. 43], 1 ♂ (NHMW). HUBEI: Enshi, 25 km north of Badong, 450 m a.s.l., 20.x.2004, leg. H. Schönmann & M. Wang (CWBS loc. 545), 1 ♀ (NHMW). HUNAN: Huaihua Prefecture, Huitong County, Guangping Township, Moshao Village, 15 km west of Guangping, 5 km north of Upper Forest Research Station, rain water pools, 350 m a.s.l., 4.xi.1993, leg. H. Schillhammer (10a) [= CWBS loc. 31], 1 ♂ 1 ♀ (NHMW). FUJIAN: Wuyi Mountain, Guadun [Kuatun, Fukien], leg. Tschung Sen, 9.vii.1946, 2 ♂♂; 12.vii.1946, 1 ♂; 15.vii.1946, 9 ♂♂ 7 ♀♀; 22.vii.1946, 4 ♂♂ 10 ♀♀; 27.vii.1946, 2 ♂♂; 15.viii.1946, 2 ♂♂ (NMPC, NHMW); Wuyi Mountain, Guadun [Kuatun, Fukien], 2300 m a.s.l., 27.40°N 117.40°E, 25.vii.1946, leg. J. Klapperich, 2 ♀♀ (NMPC). GUANGDONG: Zhaoqing Prefecture, Zhaoqing County, southeastern margin of Dinghu Nature Reserve, near Zhuzhai Village, northeast of Dinghu Town, 20–40 m a.s.l., 23°11'03"N 112°33'06"E, small pools, 29.x.2001, leg. M. A. Jäch & A. Komarek (CWBS loc. 452), 2 ♂♂ 2 ♀♀ (NHMW); Zhaoqing Prefecture, Zhaoqing County, Dinghu Nature Reserve, 50–150 m a.s.l., at light, 30.x.2001, leg. M. A. Jäch & A. Komarek, 1 ♀ (NHMW); Zhaoqing Prefecture, Fengkai County, 50 km east of Fengkai, 5 km west

\* CWBS = China Water Beetle Survey; more details on locality data in JÄCH & JI (1995, 1998, 2003).

of Qixing, Yulao–Mocun road, below Heishiding Nature Reserve head office, 150 m a.s.l., 23°27'36"N 111°54'36"E, River Qixing, 31.x.+2.xi.2001, leg. M. A. Jäch & A. Komarek (CWBS loc. 455), 1 ♀ (NHMW); Zhaoqing Prefecture, Fengkai County, 50 km east of Fengkai, 5 km west of Qixing, Yulao–Mocun road, Heishiding Nature Reserve, 300–400 m a.s.l., 23°27'04"N 111°53'53"E, small streams through primary forest, 1.xi.2001, leg. M. A. Jäch & A. Komarek (CWBS loc. 456), 1 ♀ (NHMW); Zhaoqing Prefecture, Huaiji County, 35 km northeast of Huaiji, Huaiji–Yangshan road, near Sanmianliang Village, 130 m a.s.l., 24°00'25"N 112°26'09"E, River Madi, 3.xi.2001, leg. M. A. Jäch & A. Komarek (CWBS loc. 463), 1 ♂ (NHMW); Shaoguan Prefecture, Ruyuan County, Chengjia–Ruyuan road, 40 km southwest of Ruyuan, 550 m a.s.l., 24°40'36"N 113°05'16"E, pools, 5.xi.2001, leg. M. A. Jäch & A. Komarek (CWBS loc. 472), 2 ♂♂ (NHMW); Shaoguan Prefecture, Shixing County, 10 km southwest of Chebaling Village, at Jiangciao Village, Chebaling–Siqian road, 270 m a.s.l., 24°41'11"N 114°07'17"E, pools, 7.xi.2001, leg. M. A. Jäch & A. Komarek (CWBS loc. 472), 1 ♂ (NHMW); Shaoguan Prefecture, Shixing County, 5 km west-south-west of Chebaling Village, 2 km northeast of Jiangciao Village, 330 m a.s.l., stream through primary forest, 7.xi.2001, leg. M. A. Jäch & A. Komarek (CWBS loc. 478), 1 ♂ (NHMW). **HAINAN:** Tongza City Region, Mao'an Town, 250 m a.s.l., rice fields, 20.i.1996, leg. M. A. Jäch (CWBS loc. 200), 1 ♂ (NHMW); Ledong County, Jianfeng Mountains, 5 km east of Tian Chi Village, 800 m a.s.l., fish pond, 23.i.1996, leg. M. A. Jäch (CWBS loc. 209), 1 ♂ (NHMW); Ledong County, Jianfeng Mountains, Tian Chi Village, 750 m a.s.l., pool, 23.i.1996, leg. M. A. Jäch, L. Ji & M. Wang (CWBS loc. 211), 1 ♂ (NHMW). **TAIWAN:** Nantou County, Wucheng ('Fuhosho'), v.1909, leg. H. Sauter S.v., 1 ♀ (NHMW); Kaohsiung County, Kaohsiung ('Takao'), 10.iii.1907, leg. H. Sauter S.v., 1 ♂ (NHMW); Miaoli County, Tunghsiao, 25.ix.1994, leg. L. J. Wang, 2 ♀♀ (NHMW). **LAOS:** **CHAMPASAK PROVINCE:** Bolavens Plateau, Paksong, 1250 m a.s.l., 27.xii.1995, leg. P. Schwendinger, 5 ♂♂ 3 ♀♀ (NHMW). **VIETNAM:** **LAO CAI PROVINCE:** Ta Phinh, 1400 m a.s.l., 23.xi.1971, leg. Topál & Matskási (No. 82), 3 ♂♂ 3 ♀♀ (HNHM, NHMW). **DONG NAI PROVINCE:** Nam Cat Tien National Park, 1–15.v.1994, leg. P. Pacholátko & L. Dembický, 1 ♂ 5 ♀♀ (NHMW). **SO LA PROVINCE:** Moc Chau, 800 m a.s.l., 24–26.x.1986, leg. T. Vásárhelyi (93), 2 ♂♂ 1 ♀ (HNHM). **HOA BINH PROVINCE:** Hoa Binh, 500 m a.s.l., 21.x.1986, leg. T. Vásárhelyi (83), 1 ♀ (HNHM). **VINH PHUC PROVINCE:** Tam Dao, 1200 m a.s.l., collected at light, 13.x.1986, leg. T. Vásárhelyi (37), 1 ♀ (HNHM). **MALAYSIA:** **KELANTAN:** 30 km northwest of Gua Musang, Kampong Sungai Om, slopes of Bukit Ulu Lalat, 800–1000 m a.s.l., 4°59'–5°00'N 101°52'–53'E, 21.vi.–14.vii.2010, leg. P. Cechovsky, 2 ♂♂ 6 ♀♀ (NHMW).

**Notes.** The male of *E. sinica* possesses a large tooth on the metafemur (Fig. 12) and a spur on the mesotrochanter, both characters being absent in the female (see Fig. 17 for mesotrochanter). The shape of the metaxiphus (Fig. 19) is characteristic for both sexes. See also notes for *E. intha*.

**Distribution.** *Enithares sinica* is widespread in subtropical Japan, China, Taiwan, and Vietnam (LANSBURY (1968) and references therein; see also POLHEMUS (1995), CHENG et al. (2006), NIESER et al. (2008); and material listed above). NIESER (1998) lists *E. sinica* for 'Laos and Cambodia', NIESER et al. (2008) published a detailed record for Laos (based on specimens in NHMW listed above) and several for China (Henan, Hubei, Guizhou, Sichuan, Yunnan). The species is still entirely unknown from Thailand. In this paper we present the first collection data from West Malaysia, which is a considerable southwards expansion of the known distribution. The species was previously unknown from the Malesian biogeographical region.

### *Enithares subparallela* Lansbury, 1968

(Fig. 13)

*Enithares subparallela* Lansbury, 1968: 408; NIESER & ZETTEL (1999: 132).

**Material examined.** **PHILIPPINES:** **MINDANAO:** Davao Province, Kidapawan, Mount Apo base camp, 200 m north of Lake Argo; mountain forest creek, 1200 m a.s.l., 07°02'N 125°13'E, 13.iv.1995, leg. H. Freitag (33M), 2 ♂♂ (NHMW).

**Notes.** This is a rarely collected backswimmer that was so far only reported from the type series (eleven specimens) from Mt. Kitanglad (alternative spelling: Mt. Katanglad) in Bukidnon Province, Central Mindanao, sampled at an elevation of 1480 m a.s.l. (LANSBURY 1968). A field survey by the first author in the same mountain area at lower elevations (ca. 800–950 m a.s.l.) did not yield more specimens, but led to the discovery of another endemic species, *E. gantsophora* Nieser & Zettel, 1999. The fourth author collected *E. subparallela* for the first time in Davao Province, in the Mt. Apo area at an elevation of ca. 1200 m a.s.l. A male is illustrated in Fig. 13.

**Distribution.** Endemic in Mindanao, Philippines: Bukidnon (Mt. Kitanglad) (LANSBURY 1968), first record from Davao (Mt. Apo).

### *Enithares uncata* Lundblad, 1933

*Enithares uncata* Lundblad, 1933: 179.

**Material examined.** MALAYSIA: SARAWAK: 25 km south of Miri, near entrance and headquarter of Lambir Hills National Park, 24–25.ii.1993, pond, leg. H. Zettel (9), 3 ♀♀ (NHMW); 50 km south of Kuching, Tapah, 18.ii.1993, pond, leg. H. Zettel (5), 1 ♂ (NHMW); ca. 40 km southeast of Kapit, ‘Rumah Ugap Ng marating bena Kapit Sut’, iii.1994, leg. J. Kodada, 1 ♀ (NHMW). INDONESIA: KALIMANTAN TENGAH: Kayahan Basin, near Tumbang Mahuroi, 20.vii.2004, leg. P. Mazzoldi, 1 ♂ 1 ♀ (NHMW, HZWA).

**Distribution.** Hitherto *Enithares uncata* was recorded from Sumatra and Java in Indonesia (LUNDBLAD 1933). The examined specimens represent the first records from the island of Borneo and the first country record for Malaysia (Sarawak).

### *Enithares cf. vicintricata* Lansbury, 1968

*Enithares vicintricata* Lansbury, 1968: 430.

**Material examined.** BRUNEI: BELAIT DISTRICT: Labi, Rampayar, Sungai Menderam, 4°20'30.7"N 114°26'55.2"E, 19.v.1996, leg. H. H. Tan, Y. Y. Goh, H. H. Ng & D. Yeo (THH9634, ZRC 6.18843), 1 ♂ 1 ♀ (ZRCS). Peat-swampy area draining to Sungai Ingei, 6.vi.2010, leg. D. J. W. Lane (15), 6 ♂♂ 4 ♀♀ (UBDB). Sungai Ingei, forest pool, 4°08.921'N 114°43.364'E, 8.vi.2010, leg. D. J. W. Lane (#22), 1 ♂ 1 ♀ (NHMW, UBDB).

**Notes.** *Enithares vicintricata* was described from two males and one female from Sarawak by LANSBURY (1968) and is regarded as an endemic species of Borneo (CHEN et al. 2005). Similar, closely related species live on Java and Sumatra (*E. intricata* Breddin, 1905) and on the Andaman Islands (*E. rogersi* Distant, 1910) (see LANSBURY 1968). The specimens from Brunei differ slightly from the types of *E. vicintricata*, e.g., by smaller size (7.3–7.9 mm vs. 9.0 mm in the types); male with three stout setae on the first mesotarsomere (vs. two in the types of *E. vicintricata* and four in *E. intricata*; fide LANSBURY 1968) and basal plate of the phallus bluntly produced posteroapically (more acutely produced in all other forms). Specimens similar to those of the Brunei population are known from several locations in Sarawak (specimens in NHMW, unpublished), but it seems that there is more than one species of the *E. vicintricata* complex in western Borneo. A careful analysis on the population structure of ‘*E. vicintricata*’ will be required before drawing further taxonomic conclusions. For that reason, the identification of the Brunei material should be regarded as preliminary.

### *Nychia sappho* Kirkaldy, 1901

*Nychia marshalli* var. *sappho* Kirkaldy, 1901: 809.

*Nychia sappho*: LANSBURY (1985: 4); NIESER (2004: 94); CHEN et al. (2005: 423); NIESER et al. (2008: 285); CHEN & NIESER (2011: 230).

*Nychia* cf. *sappho*: ZETTEL (2003: 125).

**Material examined** (all brachypterous). **BRUNEI: BELAIT DISTRICT:** Sungai Ingei, upstream of Base Camp, Site 8, 13.vi.2010, leg. Mayyer Ling (#13), 1 ♀ (UBDB). Sungai Ingei, east bank, swamp/stream, South trail opposite Base Camp, N 04°09'26.45" E 114°43'04.54", 16.vi.2010, leg. D. J. W. Lane (28), 1 ♂ 1 ♀ (NHMW, UBDB). **TUTONG DISTRICT:** Sungai Tutong Survey, site 14, 6.xii.2004, leg. D. J. W. Lane, 1 ♂ (UBDB). Lutuk, Sites 1A, 2A, 2B, 3A, 3B, 4B, 5A, "stagnant" stream, 27.i.2010, leg. D. J. W. Lane (1C, 1D, 1F, 1N, 1O, 1P, 1Q), 15 ♂♂ 6 ♀♀ (UBDB, NHMW). **BRUNEI-MUARA DISTRICT:** west of Bandar Seri Begawan, south of Jerudong, large artificial lake, 5 m a.s.l., 04°55'03.0"N 114°49'54.3"E (GPS), 3.xii.2008, leg. H. Zettel (36), 1 nymph (NHMW). **PHILIPPINES: MINDORO:** Oriental Mindoro Province, Calapan City, Parang, 26.–27.v.2008, leg. C. V. Pangantihon (P290), 7 ♂♂ (HZWA, USCP). **PALAWAN:** Sabang, 0–30 m a.s.l., 29.iii.1994, leg. H. Zettel (52d), 2 ♂♂ (NHMW). Puerto Princesa, Cabayugan, Manturon, 10°09'24"N 118°53'00"E, drain channel of paddy fields, 25.v.2001, leg. H. Freitag (CRDrD3), 13 nymphs (HFDG). **BOHOL:** northern Bohol, southwest of Talibon, Zamora Dam, 25 m a.s.l., stream, 9.xi.2007, leg. H. Zettel (474a), 3 ♂♂ 3 ♀♀ (NHMW, UPLB), leg. C. V. Pangantihon (PC474a), 4 ♂♂ 5 ♀♀ (HZWA, USCP); northern Bohol, southwest of Trinidad, San Isidro, Kawasan Falls, 11.xi.2007, leg. H. Zettel (480), 1 ♂ (NHMW).

**Distribution.** Common and widely distributed from Myanmar to Australia (see, e.g., LANSBURY 1985, ZETTEL 2003, NIESER 2004, CHEN et al. 2005, NIESER et al. 2008, CHEN & NIESER 2011). The specimens from Brunei represent the first country records. In the Philippines, *N. sappho* has been recorded from Sibuyan, Masbate, Western Samar, and Leyte (ZETTEL 2003, as *Nychia* cf. *sappho*); here first records are provided from the islands of Mindoro, Palawan and Bohol. In addition, nymphs of *Nychia* sp. from the Loboc River in southern Bohol are deposited in USCP. So far, there are no records from northern Philippine islands.

## Discussion

While the taxonomy of Notonectidae in southeastern Asia (including the islands of the Malay Archipelago) is relatively well known, there is still a lack of distribution data covering the area. A comprehensive list for the entire western Malesian Region was given by CHEN et

Tab. 1. Check-list of Notonectidae recorded from Brunei Darussalam

<b>Anisopinae</b>	
<i>Anisops</i> Spinola, 1837	
<i>Anisops breddini</i> Kirkaldy, 1901	Tutong District
<i>Anisops nasutus</i> Fieber, 1851	Brunei-Muara District
<i>Anisops nigrolineatus</i> Lundblad, 1933	Belait District
<i>Anisops rhomboides</i> Nieser & Chen, 1999	Belait District
<b>Notonectinae</b>	
Notonectini	
<i>Aphelonecta</i> Lansbury, 1965	
<i>Aphelonecta philippina</i> Zettel, 1995	Temburong District
<i>Enithares</i> Spinola, 1837	
<i>Enithares</i> cf. <i>vicintricata</i> Lansbury, 1968	Belait District
Nychiini	
<i>Nychia</i> Stål, 1859	
<i>Nychia sappho</i> Kirkaldy, 1901	Belait District, Tutong District, Brunei-Muara District



al. (2005: pp. 421–423). For countries within this region, there are more detailed treatments for West Malaysia, Singapore (NIESER 2004) and the Philippines (NIESER & ZETTEL 1999, ZETTEL 2003, and this study). In Indonesia, the island of Sulawesi has been studied in details (NIESER & CHEN 1991, 1999). Knowledge of the notonectid fauna on the other large Sunda Islands remains inadequate. The most recent summary on the faunas of Sumatra and Java was that by LUNDBLAD (1933), while there is only fragmentary knowledge on the fauna of Borneo. For example, common species like *Anisops breddini*, *A. nigrolineatus* and *Nychia sappho* were not recorded from Borneo prior to this study.

Regarding the fauna of Indochina (in a broad sense, including Myanmar, Thailand and southern China, see MYERS et al. 2000), Thailand has been studied in more detail (NIESER et al. 2008 and references cited therein). Distribution data for Vietnam are scattered in several papers

Tab. 2: Check-list of Notonectidae recorded from the Philippine Islands. \* Taxon endemic to the Philippines.

### Anisopininae

#### *Anisops Spinola, 1837*

<i>Anisops breddini</i> Kirkaldy, 1901	Cebu, Bohol
<i>Anisops kuroiwae</i> Matsumura, 1915	Luzon, Catanduanes, Mindoro, Palawan, Burias, Panay, Negros, Samar, Leyte, Bohol, Siargao, Mindanao
<i>Anisops nigrolineatus</i> Lundblad, 1933	Sibuyan
<i>Anisops nasutus</i> Fieber, 1851	Bohol
<i>Anisops nodulatus</i> Brooks, 1951	Luzon
<i>Anisops occipitalis</i> Breddin, 1905	Bohol
* <i>Anisops philippinensis</i> Brooks, 1951	Luzon, Mindanao
<i>Anisops rhomboides</i> Nieser & Chen, 1999	Palawan, Leyte, Mindanao, Tawi Tawi
<i>Anisops stali</i> Kirkaldy, 1904	Luzon, Mindoro, Mindanao, Negros, Cebu
* <i>Anisops yanoi</i> Miyamoto, 1981	Luzon (Mountain Province, Ifugao)

### Notonectinae

#### Notonectini

#### *Aphelonecta Lansbury, 1965*

<i>Aphelonecta philippina</i> Zettel, 1995	Palawan
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#### *Enithares Spinola, 1837*

<i>Enithares bakeri</i> Brooks, 1948	Luzon, Marinduque, Mindoro, Burias, Negros, Siquijor, Biliran, Poro, Bohol, Mindanao
* <i>Enithares foveata</i> Lansbury, 1968	Leyte, Biliran, Samar
* <i>Enithares freyi</i> Brooks, 1948	Luzon (Ilocos Norte, Mountain Province, Benguet, Nueva Viscaya, Laguna)
* <i>Enithares gantsophora</i> Nieser & Zettel, 1999	Mindanao (Bukidnon)
* <i>Enithares m. martini</i> Kirkaldy, 1898	Luzon, Marinduque, Catanduanes, Ticao, Masbate, Sibuyan, Tablas, Panay, Negros, Siquijor, Cebu, Bohol, Samar, Biliran, Leyte, Poro, Camiguin, Mindanao, Jolo
* <i>Enithares m. mindoroensis</i> Nieser & Zettel, 1999	Mindoro
* <i>Enithares nieseri</i> Zettel, 2003	Mindanao (Surigao del Norte)
* <i>Enithares quadrispinosa</i> Lansbury, 1967	Palawan, Balabac
* <i>Enithares subparallela</i> Lansbury, 1968	Mindanao (Bukidnon, Davao)

#### Nychiini

#### *Nychia Stål, 1859*

<i>Nychia sappho</i> Kirkaldy, 1901	Mindoro, Palawan, Sibuyan, Masbate, Samar, Leyte, Bohol
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(e.g., LANSBURY 1964), while knowledge of the faunas for Myanmar, Laos, and Cambodia is only fragmentary (see NIESER 1998: table on p. 12).

Prior to this study, the notonectid fauna of Brunei Darussalam was poorly known, with only one species recorded (NIESER & CHEN 1999). At present seven species are known (Tab. 1), but more are expected to be found during further surveys.

The notonectid fauna of the Philippines is rich in species. Of the twenty-one species listed so far (ZETTEL 2003; Tab. 2), ten species are endemic. This number may increase slightly due to anticipated additional species records for *Anisops*, a genus which is under-represented in the material studied. There is at least one *Anisops* species to be added which remains unidentified and is possibly new to science.

From the Palawan region, five notonectid species in four genera are recorded. The most widely distributed species is *Enithares quadrispinosa*, which is a common inhabitant of side pools and lentic bays of streams. It is the only endemic backswimmer in the Palawan region.

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