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Three Dragonflies (Odonata) Newly Recorded in Taiwan **【Research report】**

台灣三種新紀錄蜻蜓目昆蟲 **【研究報告】**

Wen-Chi Yeh* Hsin-Chieh Tang Szu-Lung Chen Mei-Hua Tsou
葉文琪* 唐欣潔 陳賜隆 曹美華

*通訊作者E-mail: wcyeh@tfri.gov.tw

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Abstract

Three dragonfly species, namely *Sinolestes edita* Needham (Synlestidae), *Zyxomma obtusum* Albarda (Libellulidae), and *Macromidia ishidai* Asahina (Corduliidae), are reported from Taiwan for the first time, and the genera *Sinolestes* and *Macromidia* are new to Taiwan as well. Morphological diagnosis of both sexes of the three species is provided, including descriptions of their habitats and ecological habits.

摘要

本文報導三種台灣首次紀錄的蜻蜓目昆蟲，分別為黃肩洵蟴 *Sinolestes edita* Needham (Synlestidae)、灰影蜻蜓 *Zyxomma obtusum* Albarda (Libellulidae) 及黃尾弓蜓 *Macromidia ishidai* Asahina (Corduliidae)，而華洵蟴屬 (*Sinolestes*) 及短足弓蜓屬 (*Macromidia*) 為新紀錄屬。根據台灣所採集標本，指出三種雌雄蟲的形態識別特徵，並描述其棲息環境和生態習性。

Key words: *Sinolestes edita*, *Zyxomma obtusum*, *Macromidia ishidai*, new record, Taiwan

關鍵詞: 黃肩洵蟴、灰影蜻蜓、黃尾弓蜓、新紀錄、台灣

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Three Dragonflies (Odonata) Newly Recorded in Taiwan

Wen-Chi Yeh* Division of Forest Protection, Taiwan Forestry Research Institute, 53 Nanhai Road, Taipei 100, Taiwan
Hsin-Chieh Tang Education Division, Taipei Zoo, 30 Hsinkuang Road, Sec. 2, Taipei 116, Taiwan
Szu-Lung Chen Animal Division, Taipei Zoo, 30 Hsinkuang Road, Sec. 2, Taipei 116, Taiwan
Mei-Hua Tsou Department of Pathology and Laboratory Medicine, Koo Foundation Sun Yat-Sen Cancer Center, 125 Lihder Road, Taipei 112, Taiwan

ABSTRACT

Three dragonfly species, namely *Sinolestes edita* Needham (Synlestidae), *Zyxomma obtusum* Albarda (Libellulidae), and *Macromidia ishidai* Asahina (Corduliidae), are reported from Taiwan for the first time, and the genera *Sinolestes* and *Macromidia* are new to Taiwan as well. Morphological diagnosis of both sexes of the three species is provided, including descriptions of their habitats and ecological habits.

Key words: *Sinolestes edita*, *Zyxomma obtusum*, *Macromidia ishidai*, new record, Taiwan

Introduction

Lieftinck *et al.* (1984) published the first checklist of Taiwanese dragonflies with a total of 135 species and subspecies recorded. Additional species have subsequently been added to Taiwan's Odonata fauna, i.e., *Tramea transmarina euryale* Selys (Matsuki and Lien, 1989), *Polycanthagyna ornithocephala* (McLachlan) (Matsuki and Lien, 1991), *Anotogaster flaveola* Lohmann (Lohmann, 1993), *Gynacantha ryukyuensis* Asahina, *Onychargia atrocyana* Selys, *Planaeschna ishigakiana flavostria* Yeh, *Rhyothemis regia regia* (Brauer) (Yeh, 1996a), *Ceriagrion nipponicum* Asahina (Yeh, 1996b), *Sarasaeschna lienii* (Yeh and Chen), *S. tsaopiensis* (Yeh and

Chen) (Yeh and Chen, 2000), *Somatochlora taiwana* Inoue and Yokota (Inoue and Yokota, 2001), *Neurobasis chinensis chinensis* (Linnaeus) (Yeh and Chen, 2004) and *Sympetrum fonscolombii* (Selys) (Tsou, 2005). Up to 2005, 148 species and subspecies were known from Taiwan. In the present study, we report on three species, i.e., *Sinolestes edita*, *Zyxomma obtusum*, and *Macromidia ishidai*, which are new to the Odonata fauna of Taiwan. Habitats and ecological habits of each species are also noted.

Material and Methods

Adults, larvae, and exuviae were collected from the field by insect net, by

*Correspondence address
e-mail: wcyeh@tfri.gov.tw

aquatic net, and by hand, respectively; adult specimens were subsequently treated with acetone for 8-24 h for permanent preservation. Diagnosis of each species was based on the examination of acetone-treated specimens, with the naked eye or under a 10× magnifier and 45× stereomicroscope, with reference to color photos of living insects. Adult identities of larvae or exuviae were confirmed according to the references of Chao (1947) and Ishida (1996). Morphological terminology and methodology of measurements follow Sugimura *et al.* (2001).

***Sinolestes edita* Needham** (Figs. 1-6)

Sinolestes edita Needham, 1930. Zool. Sin. Series A, 11(1): 243.

Sinolestes truncata Needham, 1930. Zool. Sin. Series A, 11(1): 243-244.

Sinolestes ornata Needham, 1930. Zool. Sin. Series A, 11(1): 244.

Type depository: Bureau of Entomology, Nanking, China.

Diagnosis

Male (Fig. 1): Body deep metallic-green with pale-yellow markings. Posterior portion of head yellow, compound eyes pale-green. Pronotum yellow laterally, anterior side of synthorax with broad longitudinal humeral stripe extending from ventral part to upper 1/5 of mesepisternum; lateral side of synthorax with yellow metepisternum and metepimeron, except for an upper small metallic area on the former. Wings transparent, pterostigma large and conspicuous, pale yellowish-brown, darkening with age and ultimately becoming totally black. Legs black. Abdomen dark, lateral sides of 2nd segment yellow; 3rd-7th segments with basolateral spots, 9th and 10th segments pruinose when mature. In dorsal view, superior anal appendages forcipate, long, pointed, and incurved, inferior anal appendages very short and obscure (Fig. 3).

Female (Fig. 2): Similar to male, but

yellow abdominal markings more developed, lateral sides of each segment predominantly yellow. Pterostigma remaining pale yellowish-brown when mature. Ovipositor yellow at upper edge, stout and prominent, lateral valvulae ventrally with a series of strong teeth (Fig. 4).

Measurements (in mm): ♂, abdomen 52-58, hindwing 41-47; ♀, abdomen 54, hindwing 46-48.

Materials examined: ILAN: Datong, Mingchi, 1 ♂ 1 ♀, 10-IV-2005, W. C. Yeh; 2 ♂ 1 ♀, 19-IV-2005, S. L. Chen, H. C. Tang and W. C. Yeh; Nanao, Shenmihu, 5 penultimate stadium larvae, 20-X-2005, W. C. Yeh.

Distribution: Apart from the records in Taiwan, this species has only been recorded from southeastern China (Fujian, Guangdong, Guangxi, and Zhejiang provs.) (Wilson, 2003). A photo by Ugai (1999) suggests its occurrence in northern Vietnam.

Notes on habitat and habits:

Currently, *S. edita* is recorded only from the mountain forests at 1000 m in elevation from Ilan Co., northeastern Taiwan. The habitat of this species is composed of small puddles in semi-shaded brooks with clear and slowly flowing water, which is similar to that of *Megalestes maai*. These two species are syntopic in Mingchi and Shenmihu. The adult males of *S. edita* adopt a guarding strategy for its breeding sites by hanging on branches or tall grasses growing around the small puddles; they seldom change their perching sites. The reaction of a resident male against to a conspecific intruder is not intense. The resident may chase the intruder for a while for only a short distance, and the face-to-face territorial dispute between them in the air is usually short. Sometimes, up to three males may occupy and share the same puddle. The female oviposits on soft shoots of branches or vines 1-2 m above the water surface, and the partner male guards her nearby. We have recorded



Figs. 1-6. *Sinolestes edita*. 1, Male; 2, female; 3, male anal appendages, dorsal view; 4, female ovipositor, lateral view; 5, eggs inserted inside plant shoot; 6, penultimate stadium larva.

Polygonum chinense Linnaeus (Polygonaceae) and *Hydrangea angustipetala* (Saxifragaceae) being used as oviposition media by females. Interestingly, females use a unique penetrating method when laying eggs. Unlike most other female damselflies, the female of *S. edita* use its powerful

ovipositor to drill a tiny hole, instead of cutting a slit, on vegetation surface, and then lays several eggs through the hole into the pith of the shoot (Fig. 5). Each instance of ovipositing behavior, including drilling a single hole and laying several eggs, may take 2-4 min, and the entire

oviposition process on a single shoot may last for more than 1 h, if not disturbed. In May under normal indoor conditions, eggs hatched about 25 days after oviposition.

In China, *S. edita* occurs in mountainous areas around 220-1900 m in elevation, and adults appear from March to July (Kadoorie Farm and Botanic Garden, 2002, 2003). Taiwan adults of this species were only found in April and May, and disappeared at the beginning of June. Hence their emergence season is estimated to start from the beginning or middle of March. The discovery of the penultimate stadium larvae (Fig. 6) in Shenmihu in October and final stadium larvae in Mingchi in January and February reveals that their larvae usually overwinter in the full-grown stage and can emerge quickly when the weather becomes warm in spring. Furthermore, at Mingchi, we found that the larvae of *S. edita* and *M. maai* can live together in the same water body, but they reach the final stadium in different seasons, and hence also the appearance of their adults as well, i.e., the latter appeared only after the disappearance of the former. Based on these observations, we suggest that, at least in northeastern Taiwan, these two species might have evolved an emergence-segregating strategy to avoid competition within the same niche.

Remarks: When Needham established the genus *Sinolestes*, three new species, viz. *S. edita*, *S. ornata*, and *S. truncata*, were accommodated in it. According to Needham, these three species could be distinguished from each other by the male wing pattern; that is, the wings are either hyaline or with dark cross-bands of different widths. However, these characters were later corroborated to be intraspecific variations (Chao, 1947; Wilson and Reels, 2003), and now only *S. edita* can be regarded as the valid name representing the three "forms". Re-descriptions and detailed illustrations of *S. edita* were

provided by May (1933, as *S. ornata*) and Asahina (1956), respectively. At present, no wing-banded form has been observed among the specimens collected in Taiwan.

***Zyxomma obtusum* Albarda, 1881** (Figs. 7, 8)

Zyxomma obtusum Albarda, 1881. In Veth (ed.), Midden Sum. Exped. Neur.: 1, pl. 1, figs. 1-2

Type depository: National Museum of Natural History, Leiden, The Netherlands.

Diagnosis

Male (Fig. 7): Heavily pruinose on entire body or abdomen only when mature, compound eyes deep gray. Wings transparent with whitish veins, dark brown at basal extremes and apical areas beyond pterostigmas.

Female (Fig. 8): Overall appearance similar to *Z. petiolatum* Rambur, but has a thicker and robust abdomen. Base of abdomen oval-shaped and less tumid than in *Z. petiolatum*. Body dull brownish, compound eyes greenish. Wings with apical dark brown areas smaller than on male or totally lacking.

Measurements (in mm): ♂, abdomen 34-36, hindwing 38; ♀, abdomen 33-37, hindwing 38-41.

Materials examined: PINGTUNG: Hengchun, Kenting, 2 ♂ 1 ♀, 26-IV-2005, W. C. Yeh. TAITUNG: Lanyu (Orchid I.), Hongtuo, 1 ♀ and 15 exuviae, 22-IX-2004, W. C. Yeh; Ludao (Green I.), Gungguan, 1 exuvia, 11-XI-2005, S. L. Chen.

Distribution: India, Indonesia, Japan (only in the Daito Islands of the Ryukyus), Malaysia, the Philippines (Tsuda, 2000), and Taiwan (new record).

Notes on habitat and habits: In Japan, according to Sugimura *et al.* (1999), *Z. obtusum* mainly inhabits in shaded ponds and swamps with rich organic detritus on the bottom and dense stands of *Pandanus odoratissimus* Linnaeus (Pandanaeae) on the banks. Adults are active from late March to early December.

On the main island of Taiwan, and the offshore islands of Lanyu and Ludao, we have collected or witnessed adults in January, April, May, September and November. Adults were observed ovipositing or holding their breeding sites in various kinds of water bodies, including a lake in a low-elevation mountain forest, a water-containing concrete tank, and temporary pools in arid woodlands and grasslands. It seems that they were well adapted to those water bodies, which are frequently disturbed by human activities, and apparently can tolerate highly turbid water. Like *Z. petiolatum*, *Z. obtusum* is a crepuscular species in that adults are more active at dusk, and it frequently coexists with *Tholymis tillarga* whose adults also tend to be crepuscular. In Kenting, in addition to *T. tillarga*, we also observed the adults of *Z. petiolatum* and *Z. obtusum* appearing simultaneously at the same water body. Copulation is completed in flight and lasts for only 5-10 seconds. After copulation, the male then guards the female as it oviposits by hovering around her. Females adopt the same oviposition style as *Z. petiolatum*, flying to and fro swiftly above the water surface and, by means of a dipping action, attach eggs to floating materials or intervening areas between rocks and the water.

Remarks: *Zyxomma obtusum* is a well-known species, and its detailed morphological description and illustration were given by Sugimura *et al.* (2001).

***Macromidia ishidai* Asahina** (Figs. 9-12)
Macromidia ishidai Asahina, 1964; Kontyu 32(2): 304-306.

Type depository: The Collection of Kyushu University, Kyushu, Japan (probably the Collection of the Entomological Laboratory).

Diagnosis

Male (Fig. 9): Body metallic-green with yellow markings. Labium yellow, labrum black, face entirely metallic-green,

compound eyes vividly deep green. Synthorax anteriorly with short yellow dorsal stripe at lower 2/5 of mesepisternum, laterally with 2 longitudinal yellow stripes at center of metepisternum and posterior 1/3 of metepimeron, and dorsally with 2 transverse stripes before and behind base of forewings, anterior stripe covering posterior part of ante-alar sinus. Wings transparent, pterostigma dark brown, 2 mm long, and subtending 2 cells. Legs black, basal 3/5 of fore femora yellow both dorsally and ventrally, middle and hind tibiae with indistinct pale keels on apical 1/2 and 4/5, respectively. Abdomen clubbed at 7th-9th segments, black, with slim longitudinal dorsal stripes on 2nd-7th segments; lateral side of 2nd abdominal segment with 2 spots on auricle and posteroventral corner, respectively. Superior anal appendages crescent-shaped in dorsal view, largely yellow medially (Fig. 11).

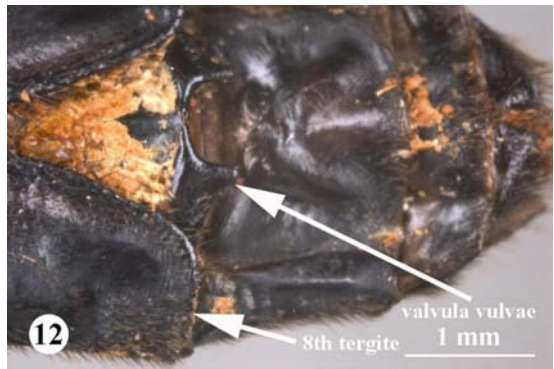
Female (Fig. 10): Similar to male, but abdomen not clubbed and tibiae unkeeled. Wings tinted brownish (probably variable with age). Valvula vulvae (subgenital plate) of 8th abdominal segment short, reaching a little beyond apical margin of 8th tergite, apex broadly and squarely notched (Fig. 12).

Measurements (in mm): ♂, abdomen 40, hindwing 37; ♀, abdomen 39, hindwing 38.

Materials examined: PINGTUNG: Shizi Neiwen, 1 ♂, 12-VI-2005, M. H. Tsou; 1 ♀, 25-VI-2005, M. H. Tsou and W. C. Yeh; 15 exuviae, 24-V-2005, H. C. Tang and S. L. Chen.

Distribution: Taiwan and Japan (Iriomote Island and Ishigaki Island of the Yaeyama Islands).

Notes on habitat and habits: Information regarding the habit of *M. ishidai* in Taiwan is limited. Preliminary field observations show that it prefers small shallow creeks with a slow current and clear water in low-elevation mountain forests. It is assumed that adults emerge



Figs. 7-12. 7 and 8, *Zyxomma obtusum*; 9-12, *Macromidia ishidai*. 7, Male; 8, female; 9, male; 10, female; 11, male anal appendages, dorsal view; 12, female valvula vulvae, ventral view.

earlier in May, since numerous exuviae collected in late May were already badly worn. Males were observed to hold their territories at an open stretch, by cruising to and fro at a short distance and 1.5-2 m high above the water surface. A female was once observed to oviposit singly at

dusk near a gravelly shore adjacent to a small pool, in a similar manner as other flowing water corduliids, i.e., by quickly flying to and fro for a short distance (less than 1 m) very close to the water surface, using the end of the abdomen to repeatedly dip into the water surface at

the same spot.

Remarks: A male adult collected in Taiwan was recently compared with a male *M. ishidai* from Iriomote Island, and the result confirmed that they are identical. The most evident difference between the Taiwanese and Japanese *M. ishidai* is the coloration of the mesinfraepisternum. According to published information (Asahina, 1964; Sugimura *et al.*, 2001) and the specimen examined, this sclerite is described as being or appearing yellow, but it is bronze-black in the Taiwanese specimens. Generally, the yellow markings of Taiwanese specimens are smaller and less developed. In Japanese specimens, for example, dorsal stripes are usually present on each abdominal segment except for the 10th, and the lateral sides of the 2nd abdominal segment are largely yellow; in Taiwanese specimens, dorsal stripes are lacking behind the 7th abdominal segment and the lateral sides of 2nd abdominal segment retain only 2 small yellow spots.

This species is listed in the *IUCN Red List of Threatened Animals* (1996) as endangered, and deserves further investigation and study for its conservation status on the island.

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台灣三種新紀錄蜻蜓目昆蟲

葉文琪* 林業試驗所森林保護組 台北市南海路 53 號
唐欣潔 臺北市立動物園推廣組 台北市新光路2段30號
陳賜隆 臺北市立動物園動物組 台北市新光路2段30號
曹美華 和信治癌中心醫院病理檢驗科 台北市立德路 125 號

摘 要

本文報導三種台灣首次紀錄的蜻蜓目昆蟲，分別為黃肩洵蟴 *Sinolestes edita* Needham (Synlestidae)、灰影蜻蜒 *Zyxomma obtusum* Albarda (Libellulidae) 及黃尾弓蜒 *Macromidia ishidai* Asahina (Corduliidae)，而華洵蟴屬 (*Sinolestes*) 及短足弓蜒屬 (*Macromidia*) 為新紀錄屬。根據台灣所採集標本，指出三種雌雄蟲的形態識別特徵，並描述其棲息環境和生態習性。

關鍵詞：黃肩洵蟴、灰影蜻蜒、黃尾弓蜒、新紀錄、台灣。