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## SURVEY OF TAIWANESE LITERATURE ON THE NATURAL ENEMIES OF RICE LEAFHOPPERS AND PLANTHOPPERS\*

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### Abstract

Literature on the natural enemies of rice leaf- and planthoppers published in Taiwan are investigated, and a list of the natural enemies of the pest hoppers is compiled. Scientific names of the green rice leafhoppers are also mentioned.

### 1. Scientific names of the green rice leafhoppers occurring in Taiwan

When Ishihara (1964) published the revision of the genus *Nephotettix*, he recognized three species from Taiwan (also three same species from Japan) and identified them as *N. cincticeps* (Uhler), *N. impicticeps* Ishihara and *N. apicalis* (Motschulsky). Since then, these names have been appeared in Taiwanese literatures. Seven years later, Ghauri (1971) published a world review of the same genus based on the type material. Ghauri recognized 8 species and 1 subspecies from the world. He divided them into two groups, the African (2 species only) and the Asian, based on the genitalic characters. According to Ghauri, the three species of Taiwan named by Ishihara, which belong to the Asian group (sensu Ghauri), are recognized as follows :

1. ***Nephotettix cincticeps*** (Uhler, 1896)  
= *N. cincticeps* (Uhler) sensu Ishihara, 1964
2. ***Nephotettix virescens*** (Distant, 1908)  
= *N. impicticeps* Ishihara, 1964
3. ***Nephotettix nigropictus*** (Stål, 1870)  
= *N. apicalis* (Motschulsky) sensu Ishihara, 1964

Although Ghauri did not see any specimens of *virescens* and *nigropictus* from

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Taiwan, it is very likely that these two species also occur in Taiwan. Entomologists should refer to the papers of Ishihara and Ghauri carefully to identify these difficult species.

M. H. Chen and Sōgawa (1969) and Chen (1972) dealt with the distribution and relative abundance of the three species in Taiwan.

## Reference

- Chen, C. C. (1972) The distribution of *Nephotettix* leafhoppers in Taiwan. *Plant Prot. Bull., Taipei*, 14(1): 41-45. (In Chinese with English summary)
- Chen, M. H. and K. Sōgawa (1969) Three different species of green rice leafhoppers in Taiwan. *Plant Prot. Bull.*, 11 (3) : 109-114. (In Chinese with English summary)
- Ghauri, M. S. K. (1971) Revision of the genus *Nephotettix* Matsumura (Homoptera: Cicadelloidea: Euscelidae) based on the type material. *Bull. ent. Res.*, 60: 481-512.
- Ishihara, T. (1964) Revision of the genus *Nephotettix* (Hemiptera: Deltocephalidae). *Trans. Shikoku ent. Soc.*, 8(2) : 39-44, 1 pl.

## 2. Chronological list of literature

- (1) 福田 計 (1934) トビイロウンカに関する調査研究. 台湾総督府中央研究所農業部彙報, (99): 1-19.
- (1a) 林珪瑞 (1967) 稻葉蟬及飛蝨之寄生昆蟲. 台灣省水稻主要害虫學術討論會資料集 (農林庁), 38 pp.
- (1b) 何火樹・陳慶忠 (1968) 黑尾浮塵子類之生態研究 (I). 植物保護学会會刊, 10(1): 15-36.
- (2) 陳慶忠 (1968) 黑尾浮塵子類兩種寄生性天敵之初步調查報告. 台灣農業, 4(4): 140-144.
- (3) 嚴奉琰・蔡友德 (1970) 寄生偽黑尾浮塵子的一種蟲生菌之研究. 植物保護学会會刊, 12(1): 15-20.
- (4) 朱耀沂・王清澄 (1972) 六點狼蛛之研究. I. 外部形態与生活習性. 植物保護学会會刊, 14(4): 169-174.
- (5) —— (1973) 六點狼蛛食性之研究. 植物保護学会會刊, 15(1): 13-20.
- (6) 嚴奉琰 (1973) 台灣害虫之天敵. 台灣大學昆蟲研究室編. 106 pp.
- (7) 林珪瑞 (1974) 台灣偽黑尾葉蟬及褐飛蝨之寄生天敵. 農業研究, 23(2): 91-115.
- (8) 邱瑞珍・朱耀沂・龍艷華 (1974) 裂頭小盤蛛 (*Oedothorax insecticeps* Boes. et Str., Micryphantidae) 之外部形態与生活習性. 植物保護学会會刊, 16(3-4): 153-161.
- (9) 邱瑞珍・龍艷華 (1975) 稻飛蝨与葉蟬之捕食性天敵——黑盲椿与綠盲椿 (1975年度植物保護学会講演要旨). 植物保護学会會刊, 17(4): 452.
- (10) 邱瑞珍 (1978) 水稻偽黑尾葉蟬与褐飛蝨之天敵. 水稻病虫害: 生態学与流行病学, pp. 47-82. 農復會刊行, 331 pp.

## 3. A list of the natural enemies of rice hoppers recorded in Taiwan

A list of the natural enemies of rice hoppers recorded in Taiwan, based on literature listed above, are given below. It is very probable that no authentic systematic study has been made on any group of these natural enemies. For example, 4 species of *Oligosita* can be detected in literature as the egg parasites of *Nephotettix incincticeps*, but nobody knows the accurate systematic relationships of them as yet. The same is true of the mymarid wasps (6 spp.) or the pipunculid flies (11 spp.) recorded as parasitic on the same hopper species.

Table 1. Natural enemies of rice hoppers recorded in Taiwan.

Hopper species	Egg parasites	Nymphal and adult parasites	Predators
<i>Nephotettix cincticeps</i>	INSECTA	INSECTA	INSECTA
	Mymaridae	Pipunculidae	Formicidae
	<i>Anagrus flaveolus</i> , (6)	<i>Dorylomorpha lini</i> , (10)	<i>Iridomyrmex</i> sp., (6) (10)
	<i>Anagrus</i> sp., (7) (10)	<i>Pipunculus javanensis</i> , (7) (10)	Miridae
	<i>Anaphes</i> sp., (2)	<i>P. mutillatus</i> , (7) (10)	<i>Cyrtorhinus Zividipennis</i> , (9) (10)
	<i>Gonatocerus</i> sp., (6)	<i>P. orientalis</i> , (6) (7) (10)	<i>Tytthus mundulus</i> , (9) (10)
	<i>Gonatocerus</i> sp., (7) (10)	<i>P. roralis</i> , (6) (7) (10)	Veliidae
	<i>Mymar</i> ? <i>indica</i> , (7) (10)	<i>Pipunculus</i> sp., (6)	<i>Microvelia douglasi</i> , (6) (10)
	Trichogrammatidae	<i>Tomosvaryella epichalca</i> , (7) (10)	ARACHNIDA
	<i>Oligosita shibuyae</i> , (6)	<i>T. oryzaetora</i> , (6) (7) (10)	Lycosidae
	<i>Oligosita nephoteticum</i> , (6)	<i>T. subvirescens</i> , (6) (7) (10)	<i>Lycosa pseudoannulata</i> , (10)
	<i>Oligosita</i> sp. A, (7) (10)	<i>T. sylvatica</i> , (6)	Erigonidae (Micryphantidae)
	<i>Oligosita</i> sp. B, (7) (10)	<i>Eudorylas cruciator</i> , (6)	* <i>Notioscopus pallidulus</i> , (6) (10)
	<i>Paracentrobia</i> (= <i>Japania</i> )	NEMATODA	<i>Oedothorax insecticeps</i> , (10)
	<i>andoi</i> , (6) (7) (10)	<i>Amphimeris zuimushi</i> , (6)	
	<i>Epigonatopus sakaii</i> , (6)		
	FUNGI		
	<i>Entomophthora</i> sp., (3) (6) (10)		
	<i>Beauveria</i> sp., (6)		
	INSECTA	INSECTA	
	Pipunculidae	Formicidae	
	<i>Pipunculus</i> sp., (6)	<i>Iridomyrmex</i> sp., (6)	
	NEMATODA	Veliidae	
	<i>Epigonatopus sakaii</i> , (6)	<i>Microvelia douglasi</i> , (6)	
	<i>Amphimeris zuimushi</i> , (6)	ARACHNIDA	
	FUNGI	Erigonidae (Micryphantidae)	
	<i>Entomophthora</i> sp., (6)	* <i>Notioscopus pallidulus</i> , (6)	
<i>Nephotettix nigropictus</i>	INSECTA	INSECTA	INSECTA
	Trichogrammatidae	Pipunculidae	Formicidae
	<i>Paracentrobia</i> (= <i>Japania</i> )	<i>Pipunculus</i> sp., (6)	<i>Iridomyrmex</i> sp., (6)
<i>andoi</i> , (6)	NEMATODA	Veliidae	
	<i>Epigonatopus sakaii</i> , (6)	<i>Microvelia douglasi</i> , (6)	
	<i>Amphimeris zuimushi</i> , (6)	ARACHNIDA	
	FUNGI	Erigonidae (Micryphantidae)	
	<i>Entomophthora</i> sp., (6)	* <i>Notioscopus pallidulus</i> , (6)	

*Nepkotettix virescens*

INSECTA

Trichogrammatidae

*Paracentrobia* (= *Japania*)  
*andoi*, (6)

INSECTA

Pipunculidae

*Pipunculus* sp., (6)

NEMATODA

*Epigonatopus sakaii*, (6)  
*Ampkimeris zuimushi*, (6)

FUNGI

*Entomopktkora* sp., (6)  
*Beauveria* sp., (6)

INSECTA

Formicidae

*Iridomyrmex* sp., (6)

Veliidae

*Microvelia douglasi*, (6)

ARACHNIDA

Erigonidae (Micryphantidae)

\**Notioscopus pallidulus*, (6)

*Inazuma dorsalis*

INSECTA

Veliidae

*Microvelia douglasi*, (6)

*Nilaparvata lugens*

INSECTA

Trichogrammatidae

*Aphelinoidea* sp., (1) (6) (10)  
*Oligosita skibuyae*, (6)  
*Oligosita nepkotetticum*, (6)  
*Oligosita* sp., (6)  
*Oligosita* sp. A, (7) (10)  
*Oligosita* sp. B, (7) (10)  
*Paracentrobia* (= *Japania*)  
*andoi*, (6) (7) (10)  
*Trickogramma* sp., (1) (10)  
Mymaridae  
*Anagrus flaveolus*, (6)  
*Anagrus* sp., (7) (10)  
*Anapkes* sp., (1)  
*Gonatocerus* sp., (6)  
*Gonatocerus* sp., (7) (10)  
*Mymar indica*, (6) (7) (10)

INSECTA

Dryinidae

*Ecktkrodelpkax bicolor*, (10)  
*Monogonatopus* sp., (10)  
*Pseudogonatopus flavifemur*, (1) (10)  
*Pseudogonatopus* sp., (10)  
Pipunculidae  
*Pipunculus javanensis*, (10)  
*Tomosvaryella oryzaetora*, (10)  
*T. ephichalca*, (10)  
*T. subvirescens*, (10)

INSECTA

Formicidae

*Tetramorium guineense*, (1) (10)

Carabidae

*Acupalpus inornatus*, (10)  
*Bembidion semilunium*, (10)

Staphylinidae

*Paederus fuscipes*, (10)  
*Stenue cicindelloides*, (10)

Miridae

*Cyrtorhinus lividipennis*, (1) (10)  
*Tyttkus mundulus*, (9) (10)

ARACHNIDA

Argiopidae

*Araneus inustus*, (10)

Lycosidae

*Lycosa pseudoannulata*, (4) (5) (10)

Erigonidae (Micryphantidae)

*Oedotkorax insecticeps*, (8) (10)

*Sogatella furcifera*

Theridiidae

***Theridion octomaculatum*, (10)**

Tetragnathidae

***Tetragnatha japonica*, (10)**

***T. mandibulata*, (10)**

***T. nititens*, (10)**

INSECTA

Carabidae

***Ophonus sinicus*, (6)**

Staphylinidae

***Paederus fuscipes*, (6)**

Veliidae

***Microvelia douglasi*, (6)**

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\* According to Okuma (personal communication), this species cannot be found in any systematic literature. It is said to be named by Kishida.

Note : Papers written by 林珪瑞 (1967) and 何火樹・陳慶忠 (1968) are not referred to in the above list.