

# Entomological Research Bulletin

## Contents

Volume 28 2012

### 보문 Research paper

- Taxonomic Review of the Korean Megaloptera with Description of *Sialis koreana*,  
New Species 3  
*Sang Woo Jung and Yeon Jae Bae*
- First Record of *Brachonyx pineti* (Paykull, 1792) (Coleoptera: Curculionidae) from Korea 15  
*Kyungduk Han, Torben Kölkebeck and Hoonbok Yi*
- First Record of *Torleya japonica* (Gose) (Ephemeroptera: Ephemerellidae) from Korea 19  
*Jeong Mi Hwang*

### 곤충의 다양성 Insect diversity

- Proceedings of the 4th International Symposium on Aquatic Entomology in  
East Asia (AESEA), Khon Kaen, Thailand, 2009  
Edited by S. Narumon & S.W. Jung
- Origin of Parthenogenesis in the Geographically Parthenogenetic Mayfly *Ephoron shigae*  
(Ephemeroptera: Polymitarcyidae) - Potential for Parthenogenesis of Females in  
a Bisexual Population - 25  
*Kazuki Sekiné and Koji Tojo*
- Aquatic Insect Fauna of Bidoup-Nui Ba National Park in Lam Dong Province,  
Southern Vietnam 29  
*Van Vinh Nguyen, Quang Huy Nguyen, Thi Minh Hue Nguyen, Sang Woo Jung,  
Jeong Mi Hwang and Yeon Jae Bae*
- Aquatic Insect Fauna of Vang Vieng Area in Northern Laos 35  
*Sang Woo Jung, Bounthob Prayaysombath, Manichanh Nammanivong,  
Chanhvilay Somvongsa and Yeon Jae Bae*
- A Burrowing Mayfly, *Anagenesia minor* (Eaton) in the Mekong River 43  
*Paiboon Getwongsa, Chutima Hanjavanit and Narumon Sangpradub*
- Meiofaunal Community in Different Substrate Types of Headwater Streams of  
Nam Nao National Park, Thailand 49  
*Chaichat Boonyanusith, Chitima Aryuthaka and Narumon Sangpradub*
- Adult Caddisfly Fauna and Physico-chemical Parameters of Pasak Jolasit Dam,  
Central Thailand 55  
*Taeng-On Prommi and Penkhae Thamsenanupap*
- Light-trapping of Caddisflies (Insecta: Trichoptera) at Champathong Waterfall,  
Northern Thailand with Reference to Local Climate 59  
*Kriengkrai Seetapan and Taeng-On Prommi*
- 'Origin of Insect Wings' - An Embryological Approach of the Mayfly *Bleptus fasciatus*  
Eaton (Ephemeroptera, Heptageniidae) 65  
*Koji Tojo and Ken Miyairi*

# Entomological Research Bulletin

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Korean Entomological Institute  
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## Aquatic Insect Fauna of Vang Vieng Area in Northern Laos

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### Abstract

Aquatic insect fauna was investigated from the Vang Vieng area (Nam Xong River, Pamom Stream, Naxeng Stream, and Bahn Don Wetland) in northern Laos. Quantitative (Surber sampler 30 × 30 cm, mesh size 0.2 mm) and qualitative (hand net, sweep net) sampling was conducted from 6 sites (St.1~6: 221~477 m in altitude) in the area, including 5 stream sites and 1 wetland site, in October 2008. As a result, a total of 149 species (most of them undetermined) belonging to 118 genera, 60 families, and 9 orders were identified: Ephemeroptera 38 species (25.5%), Odonata 29 species (19.46%), Coleoptera 24 species (16.11%), Trichoptera 20 species (13.42%), Diptera 17 species (11.41%), Hemiptera 11 species (7.38%), Plecoptera 7 species (4.7%), Lepidoptera 2 species (1.34%), and Megaloptera 1 species (0.67%). Ephemeroptera, Odonata, Coleoptera, and Trichoptera were the most abundant aquatic insect groups in the stream sites, whereas Coleoptera and Odonata contributed to the higher degree of aquatic insect diversity in the wetland site. This is the first comprehensive investigation of aquatic insect fauna in northern Laos.

**Key words:** aquatic insects, fauna, northern Laos, tropical streams, Vang Vieng

### Introduction

Lao PDR is a landlocked country in Southeast Asia surrounded by Vietnam, China, Thailand, and Cambodia. It has a high conservation value with the highest biodiversity in peninsular Southeast Asia (IUCN, 2002). The land is composed of high mountain areas with thick tropical forest such as the highest peak Phou Bia (2,819 m). The Mekong River forms a large part of the western boundary with Thailand. The Vang Vieng area is located in 160 km north of Vientiane, the capital city of Lao PDR. This area belongs to the limestone karst region and the climate is typical of the tropical monsoon with a rainy season extending from May to October (Vientiane, 1,700 mm in annual precipitation). Although streams, rivers, lakes and wetlands of Laos are known to constitute rich habitats for diverse groups of freshwater organisms, the aquatic insect fauna remains poorly studied and only some aquatic insect taxa have been taxonomically studied (e.g., Peschet, 1921; Jäch, 1997; Wooldridge, 1977; Mey, 2001; Yochitomi, 2003; Yoshitomi & Satô, 2003a, b). In previous faunistic studies on aquatic insects in tropical Southeast Asia, Nguyen *et al.* (2001) conducted "Aquatic insects from Tam Dao National Park in northern Vietnam," Hoang

and Bae (2006) "Aquatic insect diversity in tropical stream in southern Vietnam," Cao *et al.* (2008) "A faunistic study of aquatic insects in Bach Ma National Park in central Vietnam," and Jung *et al.* (2008) "Aquatic insect faunas and communities of Sapa Highland in northern Vietnam." This is the first comprehensive investigation of aquatic insect fauna in northern Laos.

### Materials and Methods

Six sites (St.1~6) were sampled in the Vang Vieng area (Nam Xong River, Pamom Stream, Bahn Don Stream, and Naxeng Wetland) in northern Laos as follows (Fig. 1).

St.1 (19° 07'14.2"N, 102° 20'43.2"E): Pamom Stream (477 m in altitude)

St.2 (19° 06'24.2"N, 102° 22'24.0"E): Pamom Stream (340 m in altitude)

St.3 (19° 03'13.9"N, 102° 25'45.1"E): Nam Xong River (241 m in altitude)

St.4 (18° 55'02.9"N, 102° 26'42.4"E): Nam Xong River (236 m in altitude)

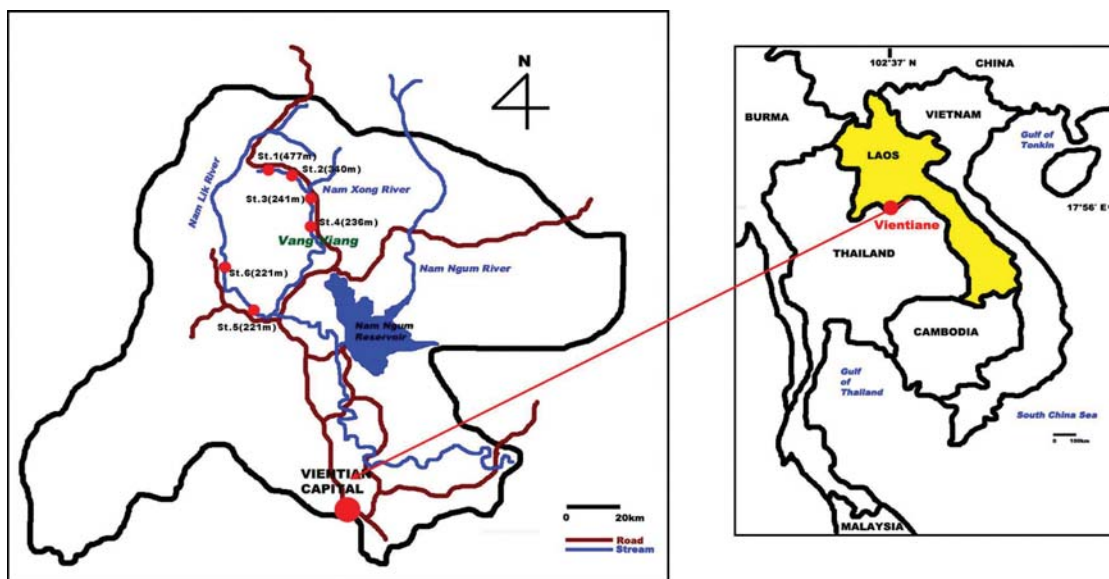


Fig. 1. Study sites (St.1-St.6) in the Vang Vieng area in northern Laos.

Table 1. Number of aquatic insect taxa in the Vang Vieng area in northern Laos

Order	Family	Genera	Species
Ephemeroptera	9	27	38
Odonata	11	23	29
Plecoptera	3	6	7
Hemiptera	8	11	11
Coleoptera	8	20	24
Megaloptera	1	1	1
Diptera	10	13	17
Trichoptera	9	15	20
Lepidoptera	1	2	2
Total	60	118	149

St.5 (18° 38'51.1"N, 102° 11'25.3"E): Bahn Don Stream (221 m in altitude)

St.6 (18° 47'15.9"N, 102° 07'46.3"E): Naxeng Wetland (221 m in altitude)

Aquatic insects were quantitatively sampled using a Surber sampler (30 × 30 cm, mesh size 0.2 mm) and using a hand net and a sweep net for qualitative purposes. Aquatic insects were identified to species or higher taxonomic levels using available references (Wiederholm, 1983; Morse *et al.*, 1994; Jäch and Ji, 1995, 1998, 2003; Merritt and Cummins, 1996; Wiggins, 1998; Dudgeon, 1999; Jill, 2001; Cao, 2002, 2008; Nguyen, 2003; Sangpradub and Boonsoong, 2004; Yule and Sen, 2004; Chen *et al.*, 2005; Hoang, 2005; Kawai and Tanida, 2005; Bedjanič *et al.*, 2007; Tungpairajwong, 2007). Larvae were preserved in 80% ethanol and adults were pinned in insect boxes. They were housed in the Entomological Museum

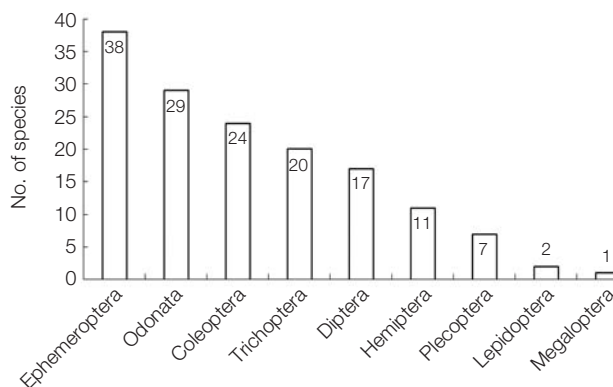


Fig. 2. Species richness of aquatic insect orders in the Vang Vieng area in northern Laos.

of Korea University (KU).

## Results

The aquatic insect taxa sampled from the Vang Vieng area is listed in Appendix 1. A total of 149 species (most of them unidentified) belonging to 118 genera, 60 families, and 9 orders were identified (Table 1 and Fig. 2): Ephemeroptera 38 species (25.5%), Odonata 29 species (19.46%), Coleoptera 24 species (16.11%), Trichoptera 20 species (13.42%), Diptera 17 species (11.41%), Hemiptera 11 species (7.38%), Plecoptera 7 species (4.7%), Lepidoptera 2 species (1.34%), and Megaloptera 1 species (0.67%). Ephemeroptera, Odonata, Coleoptera, and Trichoptera were the most abundant aquatic



**Fig. 3.** Habitats of aquatic insects. a-b: Pamom stream (477 m in alt.), St.1. a, macrohabitat; b, microhabitat: c-d: Pamom stream (340 m in alt.), St.2. c, macrohabitat; d, microhabitat: e-f: Nam Xong River (241 m in alt.), St.3. e, macrohabitat; f, microhabitat: g-h: Nam Xong River (236 m in alt.), St.4. g, macrohabitat; h, microhabitat: i-j: Bahn Don stream (221 m in alt.), St.5. i, macrohabitat; j, microhabitat: k-l: Naxeng Wetland (221 m in alt.), St.6. k, macrohabitat; l, microhabitat.

insect ordres in the stream sites (St.1~5), whereas Coleoptera and Odonata contributed to the higher degree of aquatic insect diversity in the wetland site (St.6). We herein describe the aquatic insect fauna, and provide macrohabitat and microhabitat characteristics (Fig. 3) and species photographs (Fig. 4).

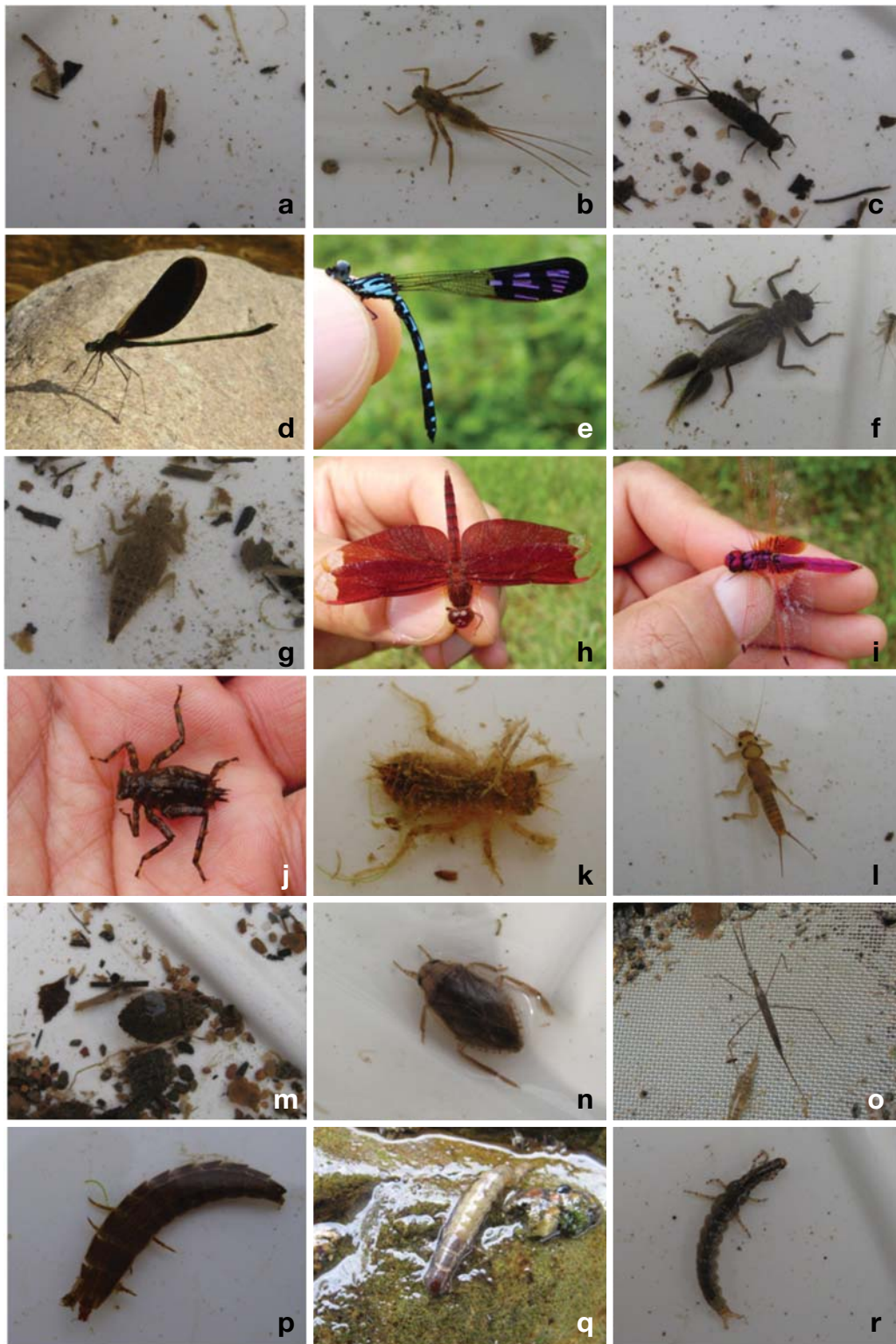
**Ephemeroptera**

Ephemeroptera is one of the most diverse aquatic insect orders in streams and rivers (St.1~5). Baetidae was the most species-

rich and abundant mayfly family in all study sites, whereas Austremerellidae (*Vietnamella* sp.), Ephemeridae (*Ephemer*a sp.), and Teloganellidae (*Teloganella* sp.) were rarely found in St.2 and St.5. *Rhithrogena* sp., *Thalerosphyrus* sp. (Heptageniidae) and *Procloeon* sp. (Baetidae) occurred only in the wetland site (St.6).

**Odonata**

Twenty-nine species of Odonata belonging to 11 families



**Fig. 4.** Aquatic insects. a-c Ephemeroptera: a, Baetidae, *Baetis* sp.; b, Ephemerellidae, *Ephacereella* sp.; c, Neophemeridae, *Potamanthellus edmundsi*; d-k Odonata: d, Calopterygidae, *Neurobasis chinensis*; e, Chlotocyphidae, *Heliocypha perforata perforata*; f, Euphaeidae, *Euphaea* sp.; g, Gomphidae, *Trigomphus* sp.; h-k Libellulidae: h, *Neurothemis theminata*; i, *Trithemis aurora*; j, *Brachythemis* sp.; k, *Orthetrum* sp.; l, Plecoptera, Perlidae, *Neoperla* sp.; m-o Hemiptera: m, Naucoridae, *Ctenipcoris* sp.; n, Belostomatidae, *Lethocerus* sp.; o, Nepidae, *Ranatra* sp.; p, Diptera, Stratiomyidae, *Ptecticus* sp.; q-r Trichoptera: q, Hydropsychidae, *Hydropsyche* sp.; r, Stenopsychidae, *Stenopsyche* sp.

were found (Fig. 4d~4k). Most species inhabited the wetland (Fig. 3k, 3l). However, *Brachythemis* sp. (Libellulidae) was found in a riffle area in a stream site (Fig. 3a). Gomphidae and Libellulidae were relatively more diverse than other families. In adults, *Neurobasis chinensis* (Linnaeus, 1758), *Helio-cypha perforata perforata* (Percheron, 1835), *Neurothemis terminata* (Ris, 1911), and *Trithemis aurora* (Burmeister, 1839) were reported from other regions in tropical Asia (Sri Lanka, Thailand, Vietnam, Philippine, Malaysia, China) (Steinmann, 1997; Bedjanič *et al.*, 2007; Orr and Hämäläinen, 2007; Dow and Reels, 2008).

### Plecoptera

Species richness and abundance of Plecoptera were relatively low, and only 7 species were found in the stream sites, particularly in the NamXong River. Perlidae was the most diverse Plecoptera family as in other tropical streams (Nguyen *et al.*, 2001; Hoang and Bae, 2006; Cao *et al.*, 2008; Jung *et al.*, 2008). The wetland site (St.6) lacked Plecoptera.

### Hemiptera

Eleven species of Hemiptera were identified from the streams, rivers, and wetlands. *Gestroiella* sp. and *Ctenipcoris* sp. (Nauroridae) were found from the riffle areas and submerged roots and other families were found from the pool areas.

### Coleoptera

Majority Coleoptera species were found in the wetland site. Elmidae and Psephenidae were found in the riffle areas in the river site (NamXong), while Dytiscidae, Noteridae, and Hydrophilidae were found in the pool areas of streams with aquatic plants and in the wetland site (St.6).

### Megaloptera

One species, *Protohermes* sp. (Corydalidae) occurred in the riffle areas in streams and rivers. The substrate was composed of cobble (30%), pebble (40%), gravel (20%), and coarse sand (10%).

### Diptera

Seventeen species occurred throughout the sampling sites. Chironomidae was the most diverse and abundant group of Diptera. Simuliidae occurred in the riffle area of streams, whereas *Ptecticus* sp. (Stratiomyidae) (Fig. 4p) was found only in the wetland site (St.6).

### Trichoptera

Twenty species occurred throughout the study sites. The net-spinning caddisflies Hydropsychidae (*Amphipsyche*, *Ceratopsyche*, *Cheumatopsyche*, *Hydropsyche*, and *Potamyia*), are

the most diverse and abundant group of Trichoptera in streams. Leptoceridae was frequently found in the pool area of streams, while Helicopsychidae was found in the shallow run area with coarse sand and gravel.

### Lepidoptera

Two species of Crambidae, *Ecoophyla* sp. and *Paracymoriza* sp., were found from the riparian area in rivers.

### Acknowledgements

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**Appendix 1.** Aquatic insect taxa in the Vang Vieng area in northern Laos

<b>Order Ephemeroptera</b>	44. <i>Cercion</i> sp.	82. <i>Hydrotrepes</i> sp.
Family Leptophlebiidae	45. <i>Coenagrion</i> sp.	Family Gerridae
1. <i>Choroterpides</i> sp.	Family Platystictidae	83. <i>Cylindrostethus</i> sp.
2. <i>Choroterpes</i> sp.	46. <i>Copera</i> sp.	84. <i>Ptilomera</i> sp.
3. <i>Habrophlebiodes</i> sp.1	Family Protoneuridae	Family Veliidae
4. <i>Habrophlebiodes</i> sp.2	47. <i>Prodasineura</i> sp.	85. <i>Baptista</i> sp.
5. <i>Thraululus</i> sp.	Family Euphaeidae	<b>Order Coleoptera</b>
Family Ephemeridae	48. <i>Euphaea</i> sp.	Family Gyrinidae
6. <i>Ephemerella</i> sp.	Family Lestidae	86. <i>Orectochilus</i> sp.
Family Ephemerellidae	49. <i>Indolestes</i> sp.	Family Dytiscidae
7. <i>Ephacerella</i> sp.	Family Aeshnidae	87. <i>Cybister</i> sp.
8. <i>Torleya</i> sp.	50. <i>Aeschnophlebia</i> sp.	88. <i>Copelatus</i> sp.
9. <i>Uracanthella</i> sp.	Family Gomphidae	89. <i>Hydroporus</i> sp.
Family Neophemeridae	51. <i>Labrogomphus</i> sp.1	90. <i>Leiodytes</i> sp.
10. <i>Potamanthellus edmundsi</i>	52. <i>Lamelligomphus</i> sp.1	91. <i>Microdytes</i> sp.
Family Austremerellidae	53. <i>Lamelligomphus</i> sp.2	92. <i>Llybius</i> sp.
11. <i>Vietnamella</i> sp.	54. <i>Davidius</i> sp.	Family Noteridae
Family Caenidae	55. <i>Nihonogomphus</i> sp.	93. <i>Notomicus</i> sp.
12. <i>Caenoculis</i> sp.1	56. <i>Trigomphus</i> sp.	Family Hydrophilidae
13. <i>Caenoculis</i> sp.2	Family Corduliidae	94. <i>Amphiops</i> sp.
14. <i>Caenis</i> sp.1	57. <i>Ephideca</i> sp.	95. <i>Enochrus</i> sp.1
15. <i>Caenis</i> sp.2	Family Libellulidae	96. <i>Enochrus</i> sp.2
Family Heptageniidae	58. <i>Brachythemis</i> sp.	97. <i>Laccobius</i> sp.1
16. <i>Afronurus</i> sp.	59. <i>Neurothemis theminata</i>	98. <i>Laccobius</i> sp.2
17. <i>Compsoneuria</i> sp.	60. <i>Orthetrum</i> sp.1	Family Scirtidae
18. <i>Ecdyonurus</i> sp.	61. <i>Orthetrum</i> sp.2	99. <i>Cyphon</i> sp.
19. <i>Rhithrogena</i> sp.	62. <i>Crocotthemis</i> sp.1	Family Dryopidae
20. <i>Thalerosphyrus</i> sp.	63. <i>Crocotthemis</i> sp.2	100. <i>Elmomorphus</i> sp.
Family Baetidae	64. <i>Libellula</i> sp.1	Family Psephenidae
21. <i>Acentrella</i> sp.	65. <i>Libellula</i> sp.2	101. <i>Eubrianax</i> sp.
22. <i>Baetis</i> sp.1	66. <i>Trithemis aurora</i>	102. <i>Psephenoides</i> sp.
23. <i>Baetis</i> sp.2	67. <i>Trithemis</i> sp.	Family Elmidae
24. <i>Baetis</i> sp.3	<b>Order Plecoptera</b>	103. <i>Leptelmis</i> sp.
25. <i>Baetis</i> sp.4	Family Peltoperiidae	104. <i>Stenelmis</i> sp.
26. <i>Baetiella</i> sp.1	68. <i>Cryptoperla</i> sp.	105. <i>Optioservus</i> sp.
27. <i>Baetiella</i> sp.2	Family Perlidae	106. <i>Ordobrevia</i> sp.1
28. <i>Centroptella</i> sp.1	69. <i>Neoperla</i> sp.1	107. <i>Ordobrevia</i> sp.2
29. <i>Centroptella</i> sp.2	70. <i>Neoperla</i> sp.2	108. <i>Zaitzevia</i> sp.1
30. <i>Heterocloeon</i> sp.	71. <i>Paragnetina</i> sp.	109. <i>Zaitzevia</i> sp.2
31. <i>Labiobaetis</i> sp.1	72. <i>Phanoperla</i> sp.	<b>Order Megaloptera</b>
32. <i>Labiobaetis</i> sp.2	73. <i>Togoperla</i> sp.	Family Corydalidae
33. <i>Labiobaetis</i> sp.3	Family Nemouridae	110. <i>Protohermes</i> sp.
34. <i>Labiobaetis</i> sp.4	74. <i>Amphinemura</i> sp.	<b>Order Diptera</b>
35. <i>Nigrobaetis</i> sp.	<b>Order Hemiptera</b>	Family Tipulidae
36. <i>Platybaetis</i> sp.	Family Aphelocheiridae	111. <i>Antocha</i> sp.
37. <i>Procloeon</i> sp.	75. <i>Aphelocheirus</i> sp.	112. <i>Hexatoma</i> sp.
Family Teloganellidae	Family Naucoridae	Family Blephariceridae
38. <i>Teloganella</i> sp.	76. <i>Gestroiella</i> sp.	113. <i>Blepharicera</i> sp.
<b>Order Odonata</b>	77. <i>Ctenipcoris</i> sp.	Family Simuliidae
Family Calopterygidae	Family Belostomatidae	114. <i>Simulium</i> sp.
39. <i>Neurobasis chinensis</i>	78. <i>Lethocerus</i> sp.	Family Chironomidae
40. <i>Neurobasis</i> sp.	Family Nepidae	115. Chironominae sp.1
Family Chlorocyphidae	79. <i>Ranatra</i> sp.	116. Chironominae sp.2
41. <i>Heliocypha perforata perforata</i>	80. <i>Cercotmetus</i> sp.	117. Chironominae sp.3
42. <i>Phinocypha</i> sp.	Family Corixidae	118. Chironominae sp.4
Family Coenagrionidae	81. <i>Micronecta</i> sp.	119. Tanypodinae sp.1
43. <i>Ceriagrion</i> sp.	Family Helotrephidae	120. Tanypodinae sp.2



**Appendix 1.** Continued

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Family Athericidae	Family Hydropsychidae	141. <i>Lepidostoma</i> sp.
121. <i>Asuragina</i> sp.	129. <i>Amphipsyche</i> sp.	Family Leptoceridae
Family Dolichopodidae	130. <i>Cheumatopsyche</i> sp.1	142. <i>Mystacides</i> sp.
122. <i>Hemerodromia</i> sp.	131. <i>Cheumatopsyche</i> sp.2	143. <i>Oecetis</i> sp.
Family Stratiomyidae	132. <i>Cheumatopsyche</i> sp.3	144. <i>Setodes</i> sp.
123. <i>Ptecticus</i> sp.	133. <i>Ceratopsyche</i> sp.1	Family Odontoceridae
Family Ceratopogonidae	134. <i>Ceratopsyche</i> sp.2	145. <i>Marilia</i> sp.
124. <i>Bezzia</i> sp.	135. <i>Ceratopsyche</i> sp.3	Family Calamoceratidae
Family Culicidae	136. <i>Ceratopsyche</i> sp.4	146. <i>Ganonema</i> sp.
125. <i>Anopheles</i> sp.	137. <i>Hydropsyche</i> sp.	Family Psychomyiidae
126. <i>Topomyia</i> sp.	138. <i>Potamyia</i> sp.	147. <i>Psychomyia</i> sp.
Family Tabanidae	Family Stenopsychidae	<b>Order Lepidoptera</b>
127. <i>Tabanus</i> sp.	139. <i>Stenopsyche</i> sp.	Family Crambidae
<b>Order Trichoptera</b>	Family Hydroptilidae	148. <i>Eoophyla</i> sp.
Family Helicopsychidae	140. <i>Hydroptilia</i> sp.	149. <i>Paracymoriza</i> sp.
128. <i>Helicpsyche</i> sp.	Family Lepidostomatidae	

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