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Notes on the water bugs (Hemiptera: Heteroptera) in urban areas of Hanoi

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Abstract. In the present study, faunistic data on water bugs from urban area of Hanoi has been catalogued for the first time. From our surveys, we have identified a total of 23 species of 12 genera and nine families of aquatic bugs (Nepomorpha) and semi-aquatic bugs (Gerromorpha) from the studied area. The water bug fauna in Hanoi is of a typical lowland fauna in Southeast Asia mainland, comprising many species with wide distribution. Several taxa are expected to exist in the studied area, but they have not been seen during our field collection, suggesting further field studies are needed.

Keywords: water bugs, Hemiptera, Gerromorpha, Nepomorpha, Hanoi.

1. Introduction

Hanoi is situated in the centre of the Red River delta, in the North of Vietnam, with a typical humid subtropical climate. Hanoi is a city between rivers, thus has many natural lakes (which are traces of ancient rivers). Its central town has several "rivers" which are in fact channels created few hundreds years ago, such as To Lich River and Nhue River. Natural rivers in Hanoi run mostly through its rural districts [1]. Recent developments have caused various levels of pollution in Hanoi area, especially in the central town [1]. This certainly affects the lives of aquatic organisms like water bugs (order Hemiptera).

The water Hemiptera comprises two infra-orders, namely Gerromorpha (semi-aquatic bugs) and Nepomorpha (true aquatic bugs). The fauna of Vietnamese water bugs has been studied over past few decades, mainly by foreign scientists. Those studies mostly based on samples collected from natural habitats. To date, there has yet any study on aquatic and semi-aquatic bugs in urban water bodies. There have been only few incidental records of aquatic bugs from Hanoi in published literature, i.e., *Hydrometra albolineata, H. annamana* [2].

This study aims to catalogue the water bug fauna in the central town of Hanoi. The results from this study are to be served as the first base-line data for subsequent studies on the fauna and ecology of water bugs from the urban area.

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2. Materials and methods

Field surveys were conducted during the period of April - November 2010 from various localities in the central town of Hanoi. Samples were collected by hand nets and pond nets from selected water bodies, representing still waters (ponds, lakes, and paddy-fields) and running ones (artificial rivers). The following list of sampling localities contains the collecting codes used also in the results and discussion section.

(a) Still waters:

- Ponds, lakes:

HN01: Lotus pond 1 near West Lake Water Park (left)

HN02: Lotus pond 2 near West Lake Water Park (right)

HN03: West Lake

HN04: Thanh Huong Lake (used for recreational fishing), near Khuat Duy Tien road, (Thanh Xuan district)

HN05: Linh Dam Lake

HN06: Anh Duong Lake (used for recreational fishing), Me Tri area (Thanh Xuan district)

- Paddy-fields:

HN11: Paddy-field at Thuan village, Phu Lam ward (Ha Dong district)

HN13: Paddy-field at Dai Mo area (Tu Liem district)

HN14: Paddy-field at Ngoc Truc area (Tu Liem district)

HN15: Paddy-field near Noi Bridge of Nhue River

(b) Running waters:

HN07: Nhue River, at Doi Bridge

HN08: Nhue River, at Lien Mac area

HN09: Nhue River, at Noi Bridge

HN10: To Lich River

HN12: Day River, at Mai Linh Bridge (Ha Dong district)

Voucher specimens are deposited in the Hydrobiology Laboratory, Department of Invertebrate Zoology, Hanoi University of Science. Specimens collected were kept in 70 % ethanol.

Identification of various water bug groups were mainly based on the keys provided by Chen *et al.* (2005), and other studies on each respective group, i.e. Lansbury (1972) for *Ranatra* (Nepidae); Nieser (2002) for Micronectidae; Nieser (2004) for Notonectidae and Pleidae; Andersen *et al.* (2002) for *Microvelia* (Veliidae); Andersen (1990), Cheng *et al.* (2001) for Gerridae [3-11].

3. Results and discussion

From our surveys, we have identified a total of 23 species of 12 genera and nine families of aquatic bugs (infra-order Nepomorpha) and semi-aquatic bugs (infra-order Gerromorpha) from the studied area (Table 1). Among these species, six species could only be keyed down to generic level, because these are poorly studied genera and species identities are difficult to confirm. *Laccotrephes* specimen is a nymph, thus not possible to be identified to species level. Most species found in the studied area have wide distribution in Southeast Asia, and commonly found at lowland area [3-11]. The most common species at various habitats are *Aquarius padulum padulum, Mesovelia vittigera, Microvelia douglasi, Diplonychus rusticus, Micronecta quadristrigata, Micronecta ludibunda*, and *Anisops kuroiwae*.

Species diversity in different habitats: We have observed better species richness and higher abundance of aquatic bugs in certain sampling sites, i.e. site number HN01, HN02, HN04, HN06, HN12. These sites are relatively

"natural and clean", meaning to have little artificial impact and relatively good aquatic vegetation (or submerged grass). In other sites with significantly lower species richness and abundance, we have observed certain levels of artificial disturbance, e.g. pollution, agricultural work, concretised banks, and absence (or removal) of aquatic vegetation. From our observations, we believe that the presence of aquatic vegetation significantly contribute to the richness of water bug fauna. Several studies have already reported that aquatic vegetation provides shelters and resting places for many water bug species [3].

We could not find any water bug sample from To Lich River (HN10) probably due to heavy pollution there. This river is the main drainage of wastewater for the city. The pollution here is probably over the limit that aquatic and semi-aquatic bugs could tolerate.

Missing taxa: The first author has previously examined the collection of the Budapest Natural History Museum and found specimens collected from the central town of Hanoi. They belong to the following species *Hydrometra albolineata, H. annamana* [2], *Rhagadotarsus kraepelini, Neogerris parvulus*. These samples were collected by Hungarian scientists during 1960s-1980s, when Hanoi was much less urbanised than today. However, in recent surveys, we did not encounter any individual of these species. These species may vanish due to urbanisation and water pollution. However, they may still live around the rural districts of Hanoi, which is out of the scope of this study. Future field collection, both in the rural and urban parts, may help to re-confirm the occurrence of these species in Hanoi area.

Table 1. Aquatic Hemiptera collected from Hanoi city during field survey in 2010
(Notes: x = *present; Site number HN10 is excluded as no water bug was found there*)

No.	Sampling localities / Taxon	HN 01	HN 02	HN 03	HN 04	HN 05	HN 06	HN 07	HN 08	HN 09	HN 11	HN 12	HN 13	HN 14	HN 15
	Infra-order Gerromorpha														
	Family Gerridae														
1	*Aquarius paludum paludum* (Fabricius, 1794)	x	x		x		x		x		x	x			
2	*Limnomogus fossarum fossarum* (Fabricius, 1775)	x	x		x		x								
3	*Limnogonus nitidus* (Mayr, 1865)		x												
	Family Hebridae														
4	*Hebrus* sp.		x									x			
	Family Mesoveliidae														
5	*Mesovelia horvathi* Lundblad, 1933	x	x												
6	*Mesovelia vittigera* Horváth, 1915	x		x	x	x	x	x		x		x			
	Family Veliidae														
7	*Microvelia douglasi* Scott, 1847	x	x			x						x	x	x	x
8	*Microvelia leveillei* (Lethierry, 1877)													x	
9	*Microvelia* sp.1				x	x						x	x		x
10	*Microvelia* sp.2		x		x	x						x	x		x
11	*Microvelia* sp.3		x		x	x						x		x	

No.	Taxon \ Sampling localities	HN 01	HN 02	HN 03	HN 04	HN 05	HN 06	HN 07	HN 08	HN 09	HN 11	HN 12	HN 13	HN 14	HN 15
	Infra-order Nepomorpha														
	Family Belostomatidae														
12	*Diplonychus rusticus* (Fabricius, 1871)	x	x		x	x	x					x		x	
	Family Micronectidae														
13	*Micronecta quadristrigata* Breddin, 1905	x	x	x	x	x	x		x	x	x	x	x	x	x
14	*Micronecta ludibunda* Breddin, 1905	x	x	x	x		x		x	x		x			
15	*Micronecta scutellaris* (Stål, 1868)	x					x			x					
16	*Micronecta tarsalis* Chen, 1960								x						
	Family Nepidae														
17	*Ranatra longipes longipes* Stål, 1861				x										
18	*Laccotrephes* sp.					x									
	Family Notonectidae														
19	*Anisops breddini* Kirkaldy, 1901	x	x				x								
20	*Anisops kuroiwae* Matsumura, 1905	x					x		x			x		x	x
21	*Anisops* sp.				x		x					x		x	x
22	*Nychia sappho* Stål, 1859	x	x				x								
	Family Pleidae														
23	*Paraplea* sp.	x	x												

4. Conclusion

Based on our surveys, the fauna of water bugs in Hanoi is a typical lowland fauna in Southeast Asia mainland, comprising many species with wide distribution. Several taxa are expected to exist in the studied area, but they have not been seen during our field collection. Thus, further field studies are needed for more comprehensive understandings of water bug diversity in the studied area.

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Dẫn liệu về thành phần côn trùng nước thuộc bộ Hemiptera tại khu vực nội thành Hà Nội

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Kết quả phân tích vật mẫu thu được trong các đợt khảo sát năm 2010 tại khu vực nội thành Hà Nội đã xác định được 23 loài thuộc 12 giống, 9 họ, 2 phân bộ (Gerromorpha và Nepomorpha) của Côn trùng nước bộ Hemiptera. Phần lớn những loài thu được tại khu vực nghiên cứu đều thuộc khu hệ vùng đồng bằng điển hình của Đông Nam Á, với nhiều loài có phân bố rộng. Tuy nhiên, cần có thêm những nghiên cứu đầy đủ hơn để có thể đánh giá chính xác hiện trạng côn trùng nước bộ Hemiptera tại khu vực Hà Nội cả ở khu vực nội thành và các huyện ngoại thành.