The Rotifer Communities of Temporary Waters in Northeast Thailand

ชุมชนโรติเฟอร์ในแหล่งน้ำชั่วคราวในเขตภาคตะวันออกเฉียงเหนือของประเทศไทย

La-orsri Sanoamuang (ละออศรี เสนาะเมือง)[1]

Abstract

The rotifer communities from 456 temporary waters in northeast Thailand were investigated during the rainy seasons of 1999-2002. The samples were collected qualitatively from small temporary pools, shallow roadside canals and paddy fields, using a 30 μm mesh net. One hundred and twenty-seven species were identified. The majority of the species recorded are widely distributed tropical taxa similar to those found in the Thai permanent waters. The most diverse genus was *Lecane* with 37 species (29.1%), followed by *Trichocerca* (17 species, 13.4%), *Brachionus* (14 species, 11.0%), *Lepadella* (10 species, 7.9%), and *Testudinella* (6 species, 4.8%).

บทคัดย่อ

ศึกษาชุมชนของโรติเฟอร์จากแหล่งน้ำชั่วคราวในเขตภาคตะวันออกเฉียงเหนือของประเทศไทย ทำการเก็บตัวอย่างเชิงคุณภาพโดยใช้ถุงลากแพลงก์ตอนที่มีขนาดตา 30 ไมโครเมตร จากแหล่งที่มีน้ำขังชั่วคราว ได้แก่ บ่อขนาดเล็ก คลองข้างถนน แอ่งน้ำในนาข้าว จำนวน 456 แหล่ง ในช่วงฤดูฝนระหว่างปี พ.ศ. 2542 ถึง 2545 พบโรติเฟอร์ 127 ชนิด ส่วนใหญ่เป็นชนิดที่พบแพร่กระจายอยู่ทั่วไปในเขตร้อนเช่นเดียวกับที่พบในแหล่งน้ำถาวรของประเทศไทย สกุลที่พบว่ามีความหลากหลายของชนิดมากที่สุดคือ *Lecane* 37 ชนิด คิดเป็นร้อยละ 29.1 รองลงมาคือ *Trichocerca*, *Brachionus*, *Lepadella* และ *Testudinella* โดยพบคิดเป็นร้อยละ 13.4, 11.0, 7.9 และ 4.8 ตามลำดับ

Keywords: rotifers, temporary waters, northeast Thailand
คำสำคัญ: โรติเฟอร์ แหล่งน้ำชั่วคราว ภาคตะวันออกเฉียงเหนือของไทย

[1]*Professor, Applied Taxonomic Research Center and Department of Biology, Faculty of Science, Khon Kaen University, Khon Kaen, Thailand, e-mail: la_orsri@kku.ac.th*

Introduction

Thailand lies within the humid tropics having a monsoon climate of three distinct seasons; the hot season (March to April), the rainy or monsoon season (May to October), and the cool season (November to February). The annual rainfall in northeast Thailand ranges from 800-2,000 mm. In general, the monsoon season produces severe rain that lasts for short periods of time and myriads of temporary waters are created. Water in the ponds will dry during December or January. Although several works have been published on the rotifer fauna of Thailand (Segers and Sanoamuang, 1994; Sanoamuang et al., 1995; Sanoamuang, 1996, 1998; Sanoamuang and Segers, 1997; Segers and Pholpunthin, 1997; Chittapun et al., 1999; Sanoamuang and Savatenalinton, 1999, 2001; Chittapun and Pholpunthin, 2001), most of the studied samples were collected from permanent waters. As northeast Thailand is richly supplied with temporary water habitats, it was of interest to document the rotifer composition in these special habitats. Hence, in this contribution I report the rotifer species sampled from 456 localities in the northeast during 1999-2002.

Material and Methods

Four hundred and eighty-three samples were collected qualitatively from 456 temporary water habitats (Figure 1) ranging from pools, shallow roadside canals and paddy fields in Udon Thani, Khon Kaen, Maha Sarakham, Roi Et, Sakon Nakhon, Nakhon Phanom, Nong Khai and Ubon Ratchathani provinces, using a 30 μm mesh net during May and June of 1999-2002. The animals were preserved in 4% formaldehyde. During the sampling periods, water temperature ranged between 25-40 ^{o}C; pH 6-9, conductivity 11-816 μS cm^{-1} and salinity 0-0.5 psu. Specimens were sorted under a dissecting microscope, and examined using an Olympus CHD microscope. Figures were drawn using a camera lucida. Scanning electron microscopy (SEM) was performed with a LEO 1450VP microscope.

Results and Discussion

One hundred and twenty-seven rotifer species were identified from the samples examined (Table 1), excluding some unidentified bdelloid species. The numbers of species in each locality ranged from 0-46 species. A single specimen of an unknown *Lecane* also was found. This species is not named here until more specimens are found. The total species number in this study is rather high in comparison with the 37 species recorded from temporary ponds in the Donana National Park, Spain (Mazuelos et al., 1993; Fahd et al., 2000). However, the species diversity in these temporary waters is lower than that recorded in the Thai permanent lake, Lake Kud-Thing where 183 species were encountered (Sanoamuang and Savatenalinton, 2001).

The majority of the recorded species are widely distributed tropical taxa similar to those found in Thai permanent waters (Sanoamuang et al., 1995; Segers and Pholpunthin, 1997; Sanoamuang and Savatenalinton, 2001; Segers, 2001). The most diverse genus was *Lecane* with 37 species (29.1%), followed by *Trichocerca* (17 species, 13.4%), *Brachionus* (14 species, 11.0%), *Lepadella* (10 species, 7.9%), and *Testudinella* (6 species, 4.8%). These genera also are reported from some tropical floodplain lakes of the Brahmaputra river basin of

northeast India (Sharma and Sharma, 2001). The most frequently recorded species were *Polyarthra* cf. *vulgaris* Carlin, *Lecane papuana* (Murray), *Plationus patulus* (Muller) (Figure 2), *Lecane bulla* (Gosse), *Brachionus falcatus* Zacharias, *Filinia longiseta* (Ehrenberg) (Figure 3), *B. quadridentatus* Hermann (Figure 4), *F. opoliensis* (Zacharias), *Anuraeopsis fissa* (Gosse) and *Testudinella patina* (Hermann) found in 55.9, 36.2, 35.8, 31.5, 26.1, 24.8, 22.8, 20.7, 20.3 and 19.9% of the sampled localities, respectively. Some common species in the temporary waters are shown in Figures 5-10.

Other infrequently recorded species in temporary waters were *Brachionus durgae* Dhanapathi, *B. lyratus* Shephard, *Lepadella dactyliseta* Stenroos, *L. vandenbrandei* Gillard, *Lecane decipiens* (Murray), *L. donneri* Chengalath and Mulamoottil, *L. doryssa* Harring, *L. monostyla* (Daday), *L. obtusa* (Murray), *L. ruttneri* Hauer, *L. thienemanni* (Hauer), *Testudinella parva* (Terntz), *Trichocerca chattoni* (De Beauchamp), *T. hollaerti* De Smet, *T. inermis* (Linder), *T. insulana* (Hauer), *T. longiseta* (Schrank), *T. stylata* (Gosse) and *Macrochaetus danneeli* Koste and Shiel.

In contrast to the rotifers recorded from Thai permanent waters, there were no records of either Thai (e.g., *Colurella sanoamuangae* Chittapun, Pholpunthin and Segers; *Lecane isanensis* Sanoamuang and Savatenalinton; *L. junki* Koste; *L. segersi* Sanoamuang; *L. shieli* Segers and Sanoamuang; *L. superaculeata* Sanoamuang and Segers) or Oriental (e.g., *Brachionus murphyi* Sudzuki, 1989; *Lecane minuta* Segers; *L. thailandensis* Segers and Sanoamuang) endemics in these temporary habitats. Of the seven Australasian endemics found in Thailand, three (*Brachionus dichotomus* Shephard f. *reductus* Koste and Shiel; *B. lylatus* Shephard; *Macrochaetus danneeli* Koste and Shiel) were encountered here. The latter two species appear to be found only in temporary waters, as they were not recorded in permanent waters (Sanoamuang, unpublished data). Eight of the rotifers found (6.3%) are restricted to the Eastern Hemisphere. These are *Brachionus forficula* Wierzejski, *Lecane lateralis* Sharma, *L. unguitata* (Fadeev), *Lepadella discoidea* Segers, *L. vandenbrandei* Gillard, *Testudinella brevicaudata* Yamamoto and *T. greeni* Koste.

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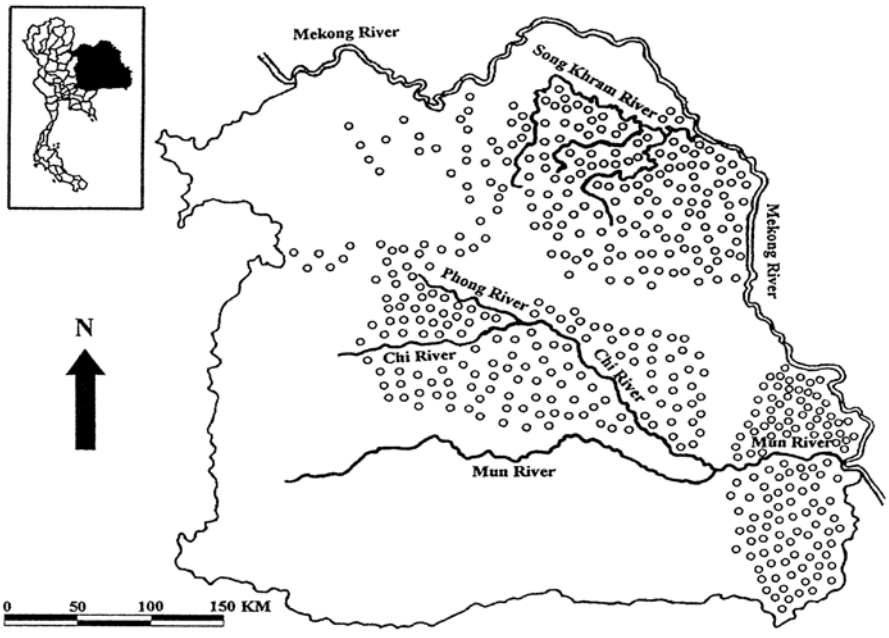


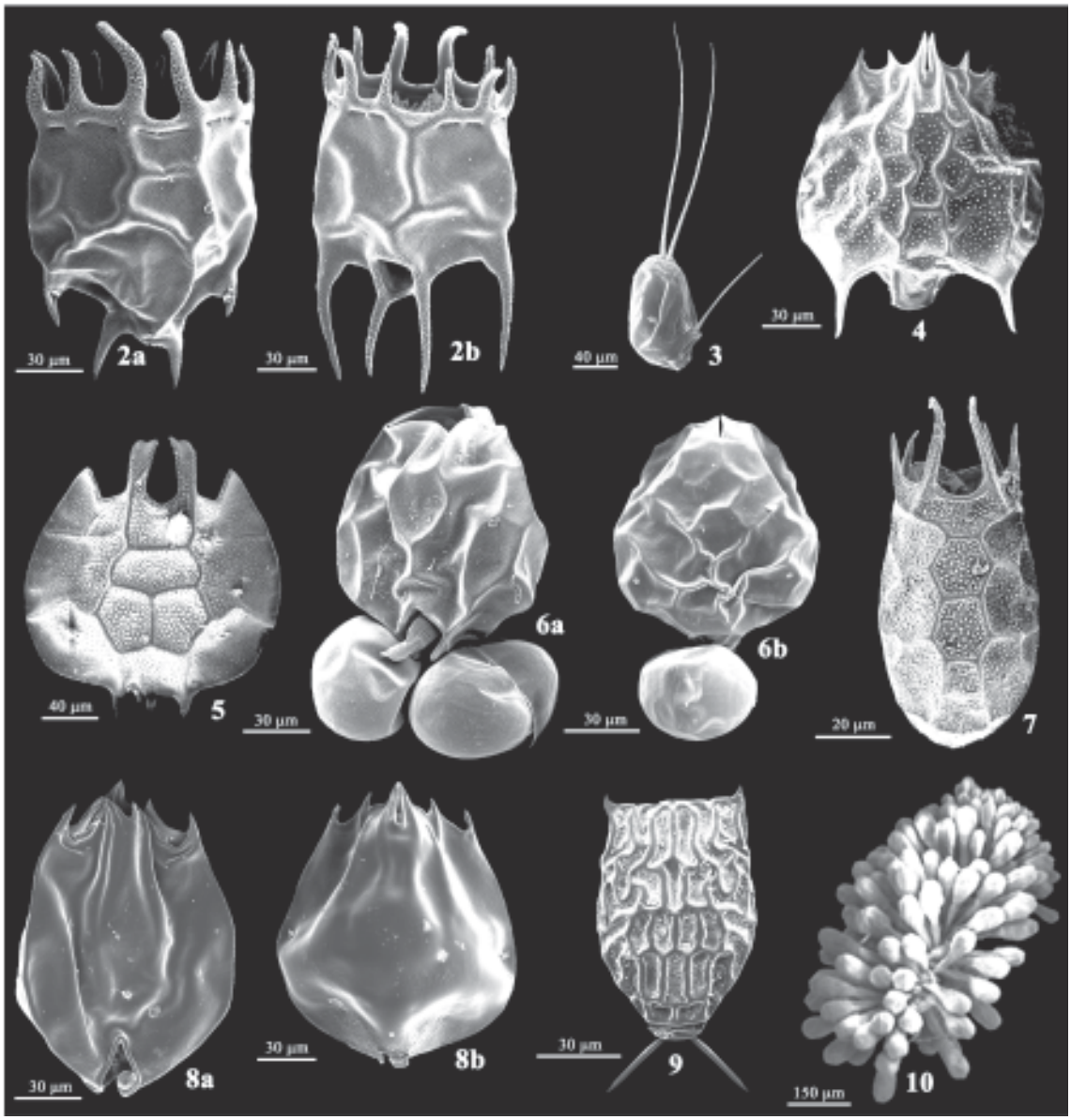
Figure 1. Map of northeast Thailand showing sampled localities.

Table 1. List of rotifers recorded from temporary waters in northeast Thailand.

Scientific name	Total localities recorded
Family Asplanchnidae	
Asplanchna priodonta Gosse, 1850	7
A. sieboldi (Leydig, 1854)	53
Family Brachionidae	
Anuraeopsis coelata (De Beauchamp, 1932)	21
A. fissa (Gosse, 1851)	98
A. navicula (Rousselet, 1910)	7
Brachionus angularis Gosse, 1851	92
B. bidentatus Anderson, 1889	14
B. budapestinensis Daday, 1885	6
B. calyciflorus Pallas, 1766	16
B. caudatus Barrois and Daday, 1884	8
B. dichotomus Shepard f. *reductus* Koste and Shiel, 1980	13
B. diversicornis (Daday, 1883)	1
B. donneri Brehm, 1951	5
B. durgae Dhanapathi, 1974	1
B. falcatus Zacharias, 1898	126
B. forficula Wierzejski, 1891	7
B. lyratus Shephard, 1911	1
B. quadridentatus Hermann, 1783	110
B. rubens Ehrenberg, 1838	42
Keratella cochlearis (Gosse, 1851)	13
K. lenzi Hauer, 1953	17
K. tropica (Apstein, 1907)	75
Plationus patulus (Müller, 1786)	173
Platyias quadricornis (Ehrenberg, 1832)	55
Family Conochilidae	
Conochilus coenobasis (Skorikov, 1914)	27
C. hippocrepis (Schrank, 1803)	34
C. natans (Seligo, 1900)	4
Family Dicranophoridae	
Dicranophorus claviger (Hauer, 1965)	3
Family Epiphanidae	
Epiphanes clavulata (Ehrenberg, 1832)	25
Family Euchlanidae	
Dipleuchlanis propatula (Gosse)	30
Euchlanis dilatata Ehrenberg, 1832	32
E. incisa Carlin, 1939	10
Family Flosculariidae	
Sinantherina spinosa (Thorpe, 1893)	4
Family Gastropodidae	
Ascomorpha ovalis (Bergendal, 1892)	2
Family Hexarthridae	
Hexarthra intermedia Wiszniewski, 1929	60
H. mira (Hudson, 1871)	43
Family Lecanidae	
Lecane aculeata (Jakubski, 1912)	3
L. arcula Herrring, 1914	8
L. bifurca (Bryce, 1892)	3
L. bulla (Gosse, 1851)	152
L. closterocerca (Schmarda, 1859)	12
L. crepida Harring, 1914	17
L. curvicornis (Murray, 1913)	77
L. decipiens (Murray, 1913)	1
L. donneri Chengalath and Mulamoottil, 1974	1
L. doryssa Harring, 1914	1
L. elegans Harring, 1914	2
L. furcata (Murray, 1913)	17
L. haliclysta Harring and Myers, 1926	16
L. hamata (Stoke, 1896)	49
L. hastata (Murray, 1913)	30
L. hornemanni (Ehrenberg, 1834)	37
L. inopinata Harring and Myers, 1926	12
L. lateralis Sharma, 1978	4
L. leontina (Turner, 1892)	79
L. ludwigii (Eckstein, 1883)	7
L. luna (Müller, 1776)	52
L. lunaris (Ehrenberg, 1832)	25
L. monostyla (Daday, 1897)	1
L. obtusa (Murray, 1913)	1
L. papuana (Murray, 1913)	175
L. pyriformis (Daday, 1905)	21
L. quadridentata (Ehrenberg, 1832)	30

Table 1. List of rotifers recorded from temporary waters in northeast Thailand. (Cont.)

Scientific name	Total localities recorded
L. rhenana Hauer, 1919	3
L. ruttneri Hauer, 1938	1
L. signifera (Jenning, 1896)	61
L. sola Hauer, 1936	2
L. tenuiseta Harring, 1914	15
L. thienemanni (Hauer, 1938)	1
L. undulata Hauer, 1938	3
L. unguitata (Fadeev, 1925)	12
L. ungulata (Gosse, 1887)	14
Lecane sp.	1
Family Lepadellidae	
Colurella adriatica Ehrenberg, 1831	4
C. obtusa (Gosse, 1886)	5
C. uncinata (Müller, 1773)	44
Lepadella acuminata (Ehrenberg, 1834)	1
L. apsicora (Myers, 1934)	5
L. dactyliseta Stenroos, 1898	1
L. costatoides Segers, 1992	1
L. discoidea Segers, 1993	6
L. ovalis (Müller, 1786)	9
L. patella (Müller, 1786)	15
L. rhomboides (Gosse, 1886)	57
L. triba Myers, 1934	4
L. vandenbrandei Gillard, 1952	3
Family Mytilinidae	
Lophocharis salpina (Ehrenberg, 1834)	9
Mytilina bisulcata (Lucks, 1850)	2
M. ventralis (Ehrenberg, 1832)	9
Family Notommitidae	
Cephalodella forficula (Ehrenberg, 1832)	23
Monommata sp.	9
Family Scaridiidae	
Scaridium longicaudum (Müller, 1786)	14
Family Synchaetidae	
Polyarthra cf. *vulgaris* Carlin, 1943	270
Family Testudinellidae	
Pompholyx complanata Gosse, 1851	9
Testudinella ahlstromi Hauer, 1956	17
T. brevicaudata Yamamoto, 1951	1
T. greeni Koste, 1981	2
T. parva (Ternetz, 1892)	1
T. patina (Hermann, 1783)	96
T. tridentata Smirnov, 1931	10
Family Trichocercidae	
Trichocerca bicristata (Gosse, 1887)	18
T. bidens (Lucks, 1912)	2
T. braziliensis (Murray, 1913)	6
T. capucina Wierzejski and Zacharias, 1893	3
T. chattoni (De Beauchamp, 1907)	1
T. cylindrica (Imhof, 1891)	7
T. flagellata Hauer, 1937	11
T. hollaerti De Smet, 1990	1
T. inermis (Linder, 1904)	1
T. insignis (Herrick, 1885)	3
T. insulana (Hauer, 1938)	2
T. longiseta (Schrank, 1802)	1
T. pusilla (Lauterbom, 1898)	48
T. similis (Wierzejski, 1893)	82
T. simonei De Smet, 1989	1
T. stylata (Gosse, 1851)	1
T. tenuior (Gosse, 1886)	17
Family Trichotriidae	
Macrochaetus collinsi (Gosse, 1867)	12
M. danneeli Koste & Shiel , 1983	1
M. longipes Myers, 1934	1
M. sericus (Thorpe, 1893)	12
Trichotria tetractis (Ehrenberg, 1830)	4
Wolga spinifera Western, 1894	6
Family Trochosphaeridídae	
Filinia camasecla Myers, 1938	6
F. longiseta (Ehrenberg, 1834)	120
F. novaezealandiae Shiel and Sanoamuang, 1993	62
F. opoliensis (Zacharias, 1898)	100



Figures 2-10. SEMs of some common rotifers in Thai temporary waters. 2: *Plationus patulus*, a. typical form, dorsal view, b. long spine form, ventral view; 3: *Filinia longiseta*, lateral view; 4: *Brachionus quadridentatus*, dorsal view; 5: *Platyias quadricornis*, dorsal view; 6: *Brachionus angularis*, a. ventral view, b. dorsal view; 7: *Keratella lenzi*, dorsal view; 8: *Brachionus rubens*, a: ventral view, b. dorsal view; 9: *Lecane signifera*, dorsal view; 10: a colony of *Conochilus hippocrepis*.