

ROTIFERS OF WATERFALL MOSSES FROM PHU HIN RONG KLA NATIONAL PARK, THAILAND, WITH THE DESCRIPTION OF *LECANE MARTENSI*, NEW SPECIES (ROTIFERA: MONOGONONTA: LECANIDAE)

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ABSTRACT. – Samples of mosses from Pharadon waterfall in Phu Hin Rong Kla National Park, Phitsanulok Province, Thailand were collected in December 2004 in order to contribute to the record of moss-dwelling rotifers in Southeast Asia. Twelve species of monogonont rotifers were identified, one of which, *Lecane martensi*, new species, is described here. *Lepadella minuta* (Weber & Montet) and *Lecane agilis* (Bryce) are new to Thailand. This contribution provides more evidence illustrating the paucity of records on moss-dwelling rotifers in Thailand.

KEY WORDS. – Rotifera, *Lecane martensi*, new species, Phu Hin Rong Kla National Park, Thailand.

INTRODUCTION

Rotifers are small pseudocoelomate animals, which live in a diverse range of aquatic habitats (see Pejler, 1995). The latter also include semi-terrestrial habitats such as the water film surrounding soil particles, lichens and mosses. Although the Thai rotifer fauna is the best-documented of all Southeast Asian faunae (Segers, 2001), and several additional taxonomic and ecological studies have been published recently (Sanoamuang & Savatnalinton, 2001; Chittapun et al., 2003; Segers et al., 2004; Savatnalinton & Segers, 2005), most of these papers report on rotifers inhabiting the pelagic and littoral zones of diverse habitats like ponds, swamps, lakes, rivers, reservoirs and paddy fields. Precise information on the rotifer fauna of microhabitats in Thailand and, in fact, in tropical Asia, is very scarce. There is only a single report on the community of moss-dwelling rotifers in a tropical freshwater peat swamp on Phuket Island (Segers & Chittapun, 2001). In order to contribute to the knowledge of moss-dwelling rotifers, we examined the rotifer fauna of mosses from Pharadorn Waterfall in Phu Hin Rong Kla National Park.

MATERIALS AND METHODS

We directly picked up mosses soaked with water at the bank

of Pharadorn Waterfall, which is downstream from Romklaio Waterfall in Phu Hin Rong Kla National Park (Fig. 1). This park has a steep mountainous topography, with altitudes ranging between 1,200 and 1,600 m asl. The climate, with an average annual temperature of 26.8 °C, is relatively cool for the region (Rattanathirakul & Boonkerd, 2003). Only one sample was taken on 3 December 2004 during a short visit by the first author to Pharadorn Waterfall. This sample was preserved in 4% formaldehyde. Rotifer specimens were sorted from the sample and examined using an Olympus CH 30 compound microscope. Drawings were made using a camera lucida. Light photomicrographs were taken under an Olympus AX-70 dissecting microscope equipped with an Olympus PM-C 35 DX automatic camera. Type materials are deposited in the Royal Belgian Institute of Natural Sciences (K.B.I.N./I.R.S.N.B.), Brussels, Belgium and the Natural History Museum, Maharakham University, Maharakham, Thailand.

RESULTS AND DISCUSSION

A total of 12 species were recorded from the moss sample (Table 1), one of which is new to science. *Lecane agilis* (Bryce) (Fig. 2) and *Lepadella minuta* (Weber & Montet) (Figs. 3–4) are new to Thailand. Apart from the new species, most of the monogonont rotifers encountered are

Table 1. List of rotifer species found from waterfall mosses from Phu Hin Rong Kla National Park, Thailand, in this study: *new to Thailand, **new species.

Brachionus angularis Gosse, 1851
Brachionus forficula Wierzejski, 1891
Colurella adriatica Ehrenberg, 1831
Keratella cochlearis (Gosse, 1851)
Keratella tropica (Apstein, 1907)
 **Lecane agilis* (Bryce, 1892)
Lecane arcuata (Bryce, 1891)
Lecane lunaris (Ehrenberg, 1832)
 ***Lecane martensi*, new species
Lecane paxiana Hauer, 1940
 **Lepadella minuta* (Weber & Montet, 1918)
Trichocerca pusilla (Jennings, 1903)

cosmopolitan; two (*Brachionus forficula* Wierzejski and *Lecane paxiana* Hauer) are Eastern-hemisphere species. Most are characteristically thermophilic. The record of *Lecane paxiana* is the second Thai record of this rare species (see Savatenalinton & Segers, 2005), the same holds for the more common *Lecane arcuata* (Bryce) (see Sanoamuang et al., 1995). There is however, a single, non-illustrated record of *Lecane agilis* from the Oriental region (Singapore: Karunakaran & Jonhson, 1978, sub. *Lecane aquilis*).

Both *Lepadella minuta* and *Lecane agilis* are particularly small species, which are nevertheless widespread. We surmise that, by their minute size, they may have been overlooked before. The occurrence of *Lecane agilis* and *Lecane arcuata* in the present investigation conforms to previous reports on their habitat. *Lecane agilis* (Bryce) occurs in submerged mosses such as *Sphagnum*, whereas *Lecane arcuata* (Bryce) inhabits various aquatic habitats such as filamentous algae, submerged mosses, puddles and peat swamps. Based on the few earlier records available (Pejler & Berzin, 1994; Segers, 1995) and the present observations, it is probably premature to note that the ecological range of *Lecane agilis* is relatively narrow. However, we found the two in slightly

basic water (pH 7.2), while they were previously documented from acidic waters (Segers, 1995; Chittapun & Pholpunthin, 2001; Jersabek, 2003). Too little is known of the habitat of *Lecane paxiana* to generalize. We prefer a series of extensive surveys of semi-terrestrial habitats to illustrate the actual habitat specificity of these taxa.

Although the sample we studied is collected in a limnoterrestrial habitat, we also found planktonic rotifers such as *Keratella cochlearis*, *Keratella tropica* and *Trichocerca pusilla*. These specimens probably originate from an upstream pool that spills in the waterfall. The low number of species recorded may be due to the small size of the sample, and the availability of only a single sample. In addition, we ignored the bdelloid rotifers, which are particularly diverse, and characteristic, together with tardigrades, to limnoterrestrial habitats (Ricci et al., 2003).

To date, very few records exist of moss-dwelling rotifers in Thailand. Segers & Chittapun (2001) identified two samples of hygrosummon from coastal freshwater peat swamp on Phuket Island and reported six taxa new to Thailand including three new species. Our results extend the knowledge of the

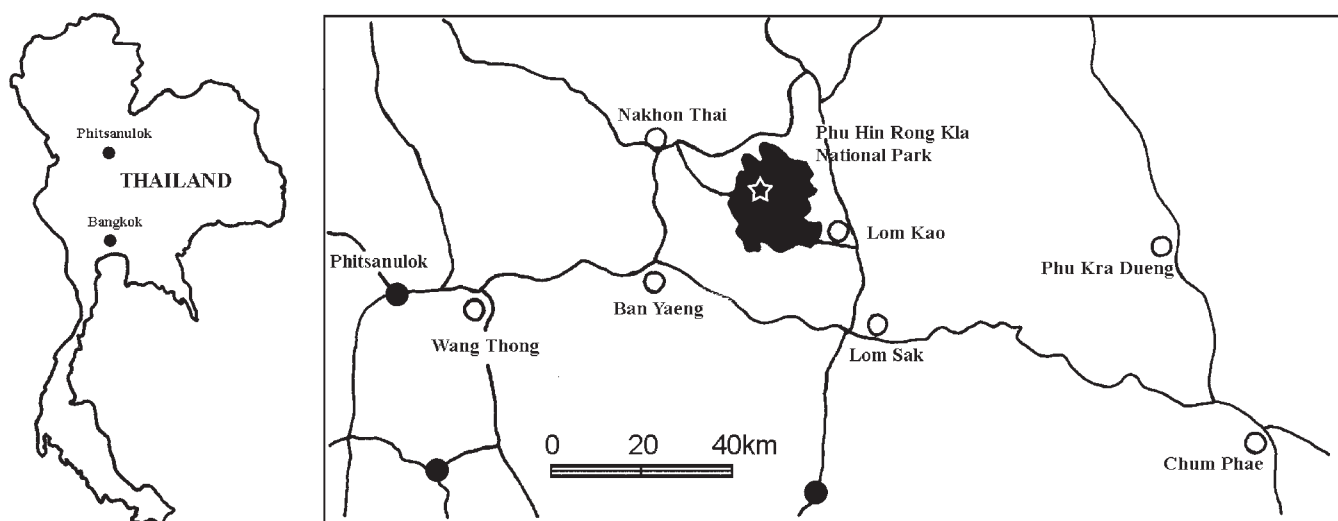


Fig. 1. Sampled locality in Phu Hin Rong Kla National Park (☆), Phitsanulok Province, Thailand.

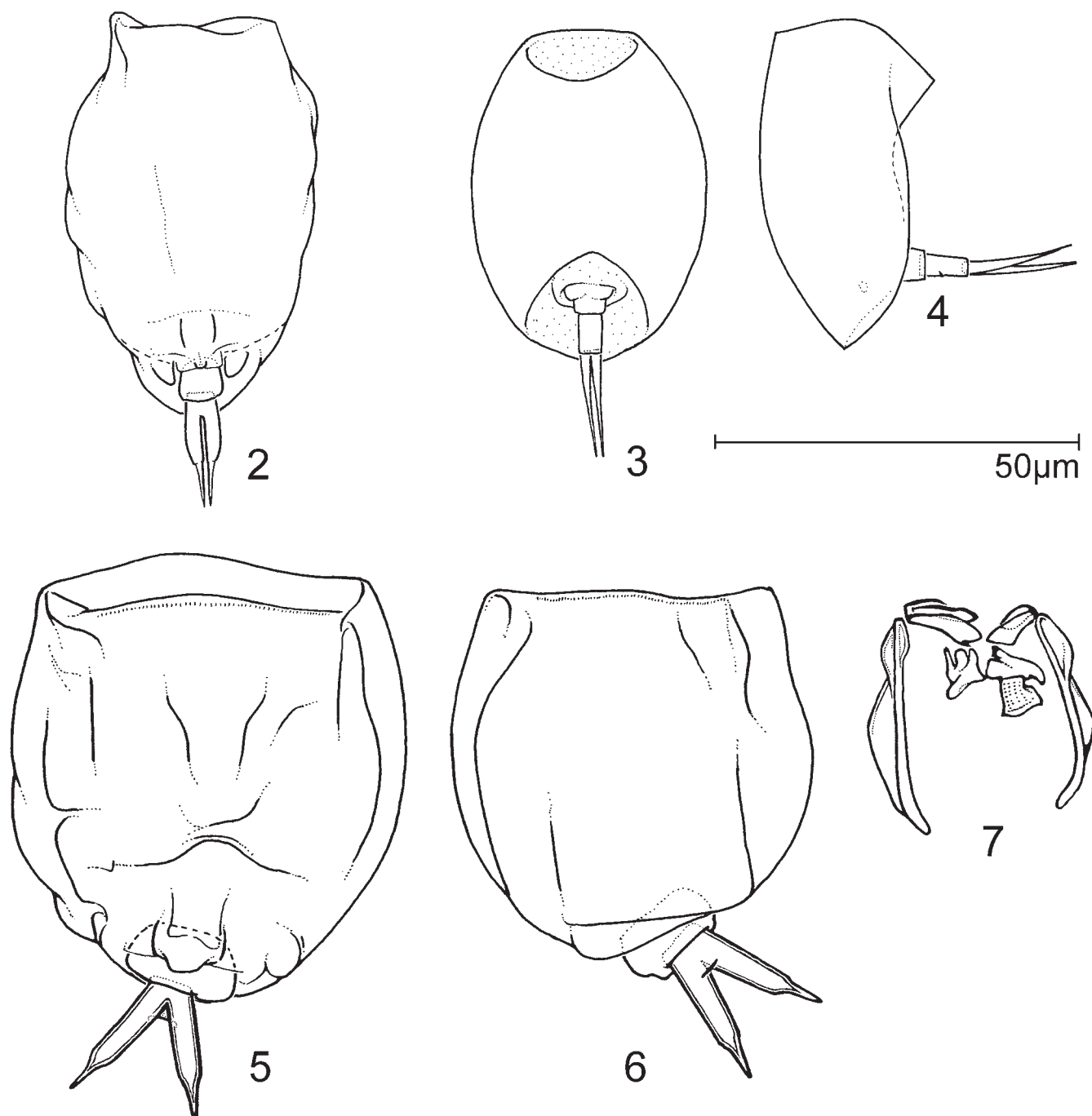
rotifer community in such semi-terrestrial habitats, revealing a new *Lecane* and two new records from the country. It can reasonably be expected that an even higher diversity of rotifers exists in Thailand, which will be revealed if more extensive studies are performed in all types of aquatic habitats including microhabitats.

TAXONOMY

Lecane martensi, new species

(Figs. 5–8)

Type locality. – Pharadorn Waterfall (17°02'12"N 101°03'27.6"E), Phu Hin Rong Kla National Park, Phitsanulok province, Thailand.



Figs. 2–7. *Lecane* spp. and *Lepadella*: 2, *Lecane agilis* (Bryce), ventral view; 3, *Lepadella minuta* (Weber & Montet), ventral; 4, *Lepadella minuta*, lateral; 5, *Lecane martensi*, new species, ventral; 6, *Lecane martensi*, new species, dorsal; 7, *Lecane martensi*, new species, trophi, ventral view.

Material examined. – Female holotype, deposited in the Royal Belgian Institute of Natural Sciences (K.B.I.N./I.R.S.N.B., IG 30898 RIR 178), Brussels, Belgium.

Paratypes: two females deposited in the Royal Belgian Institute of Natural Sciences (K.B.I.N./I.R.S.N.B., IG 30898 RIR 179–180), Brussels, Belgium and two females deposited in the Natural History Museum, Mahasarakham University (MSU-ZRC 002–003), Mahasarakham, Thailand. All specimens from the type locality, coll. S. Savatenalinton, 3 Dec.2004.

Differential diagnosis. – *Lecane martensi*, new species, can be confused with *Lecane paxiana* Hauer (Fig. 9) by its small size and presence of pseudoclaws. The two can be distinguished by the relatively soft lorica, broad prepedal fold and large pseudosegment of *Lecane martensi*, new species. Although both species have toes that are fused basally, the degree of fusion in *Lecane paxiana* is distinctively less than in *Lecane martensi*, new species. Furthermore, no connective membrane between the toes exists in *Lecane paxiana*.

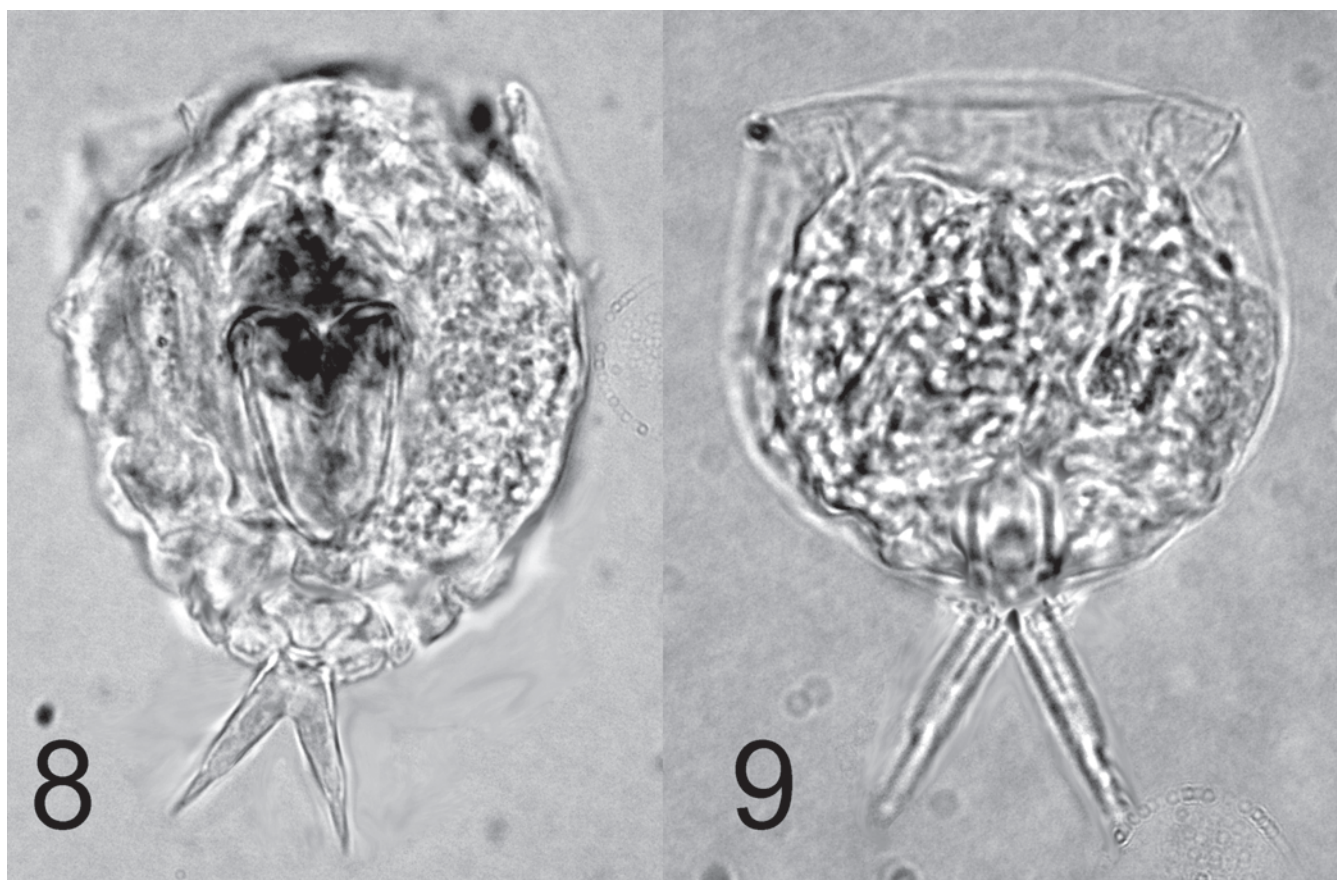
Description. – Female (male unknown): Lorica relatively soft. Dorsal plate wider than ventral, smooth, irregularly folded. Head aperture margins nearly coincident, ventrally and dorsally rather straight, antero-lateral corners angulate. Inner margins of head aperture with transverse rows of minute spinules. Ventral plate slightly longer than wide, with weak, incomplete transverse and elongate longitudinal folds, smooth. Lateral margins smooth or irregularly undulate. Foot plate broad, coxal plate rounded. Prepedal fold relatively

broad, posterior margin with medial projection. Foot pseudosegment large, rectangular, not or slightly projecting. Toes fused basally, fixed in a spread position, connected basally by a membrane. Toes with distinct pseudoclaws. Trophi (Fig. 7): fulcrum short, curved, rod-shaped in ventral, squarish in oblique view. Rami asymmetrical, with rounded right, and curved left alulus. Inner margins of right ramus with three well-developed processi, left with indication of weaker processi. Unci asymmetrical, right stronger than left, consisting of fused plates with two unequal but large, and one much smaller tooth. Manubria elongate, distally curved, shafts expanded dorso-ventrally into broad lamellas.

Measurements. – Dorsal plate length 38–50 (45), width 43–53 (49), ventral plate length 40–53 (49), width 40–50 (46), toe length 11–13 (12), pseudoclaw 5–6 (5) (range and mean, in μm . All type specimens measured).

Etymology. – The species is named after Dr. Koen Martens (Royal Belgian Institute of Natural Sciences, Brussels) in recognition of his outstanding contributions to biodiversity of freshwater organisms.

Distribution and ecology. – *Lecane martensi*, new species is a rare species, with only a small number of specimens found inhabiting waterfall mosses. This species is to date only known from its type locality, during the cool season (December). Water temperature was 25°C, pH was 7.2.



Figs. 8–9. *Lecane* spp., photomicrograph (composite images): 8, *Lecane martensi*, new species; 9, *Lecane paxiana* (Hauer).

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