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Rotifers from Kalasin Province, Northeast Thailand, with Notes on New and Rare Species

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Sukonthip Savatenalinton and Hendrik Segers (2005) Rotifers from Kalasin Province, Northeast Thailand, with notes on new and rare species. *Zoological Studies* **44**(3): 361-367. We report on a survey of rotifers from 30 habitats in Kalasin Province, Northeast Thailand, collected during Dec. 2001. One hundred and fifty species were identified. One of them, *Lecane lungae* sp. nov. is new to science, and two, *L. opias* (Harring and Myers), and *L. stichoclysta* Segers are new to the Oriental region and Thailand; the record of *L. stichoclysta* is the second record ever of the species after its description from Nigeria (Africa). In addition, we illustrate a remarkable morphological variant of *Keratella cochlearis*. These records, together with the new occurrences of other endemic rotifer species illustrate the remarkable diversity of the Thai rotifer fauna, and add to our knowledge of rotifer chorology. http://zoolstud.sinica.edu.tw/Journals/44.3/361.pdf

Key words: Rotifera, Biodiversity, Southeast Asia, *Lecane lungae* new species.

Thailand, a tropical country, is situated between 5°32'N~20°8'N, and 97°21'E~105°38'E. It has an area of 513,115 km^2 and has a wide variety of freshwater ecosystem types. In recent years, the Thai rotifer fauna has been comprehensively investigated, focusing on three main parts of Thailand: the northeastern part (e.g., Sanoamuang et al. 1995, Sanoamung and Savatenalinton 1999 2001, Segers et al. 2004), the northern part (e.g., Sanoamuang 1998), and the southern part (Segers and Pholpunthin 1997, Chittapun et al. 1999 2003). Herein we report on the first extensive survey of rotifers in Kalasin Province (Fig. 1, 16°10'N~17°3'N, 103°7'E~104°16'E), Northeast Thailand. Results include a hitherto unknown species of *Lecane*, and several other rare or otherwise interesting rotifer species. The results are discussed in a biogeographical context.

MATERIALS AND METHODS

Rotifer samples were qualitatively collected from the littoral zone of 30 habitats using a 40-μm-mesh plankton net, and immediately preserved in 4% formaldehyde. Specimens were sorted and examined using an Olympus-CH30 compound microscope, and drawings were made with a camera lucida. Light microscopic photographs were taken under an Olympus AX 70 dissecting microscope equipped with an Olympus PM - C 35 DX automatic camera.

RESULTS AND DISCUSSION

In total, 150 rotifer species were identified from the 30 samples collected (Table 1). Of these, the majority (50 species, 33.3%) belong to the genus *Lecane*, followed by *Lepadella* (15 species,

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Table 1. List of Rotifera from Kalasin Province, Thailand

Anuraeopsis coelata (de Beauchamp)
A. fissa (Gosse)
Ascomorpha ecaudis (Perty)
A. ovalis (Carlin, 1943)
A. saltans Bartsch
Asplanchna brightwellii (Gosse)
A. priodonta Gosse
Brachionus angularis Gosse
B. calyciflorus Pallas
B. caudatus Barrois and Daday
B. dichotomus Shephard f. *reductus* Koste and Shiel
B. diversicornis (Daday)
B. donneri Brehm
B. falcatus Zacharias
B. forficula Wierzejski
B. quadridentatus Hermann
B. rubens Ehrenberg
Cephalodella forficula (Ehrenberg)
C. gibba (Ehrenberg)
C. songkhlaensis Segers and Pholpunthin
Collotheca species
Colurella adriatica Ehrenberg
C. obtusa (Gosse)
C. sulcata (Stenroos)
C. uncinata (Müller)
Conochilus coenobasis (Skorikov)
C. hippocrepis (Schrank)
C. natans (Seligo)
Dicranophoroides caudatus (Ehrenberg)
Dicranophorus epicharis Harring and Myers
Dipleuchanis propatula (Gosse)
Epiphanes clavulata (Ehrenberg)
Euchlanis dilatata Ehrenberg
E. incisa Carlin
Filinia camasecla Myers
F. longiseta (Ehrenberg)
F. novaezealandiae Shiel and Sanoamuang
F. opoliensis (Zacharias)
Floscularia species
Hexarthra intermedia Wiszniewski
H. mira (Hudson)
Keratella cochlearis (Gosse)
K. lenzi Hauer
K. procurva (Thorpe)
K. tecta (Gosse)
K. tropica (Apstein)
Keratella species
Lecane aculeata (Jakubski)
L. arcula Harring
L. batillifer (Murray)
L. bifurca (Bryce)
L. blachei Berzins
L. bulla (Gosse)
L. clara (Bryce)
L. closterocerca (Schmarda)
L. crepida Harring
L. curvicornis (Murray)
L. decipiens (Murray)
L. doryssa Harring
L. elegans Harring
L. flexilis (Gosse)
L. furcata (Murray)
L. haliclysta Harring and Myers
L. hamata (Stokes)
L. hastata (Murray)
L. hornemanni (Ehrenberg)
L. inermis (Bryce)
L. inopinata Harring and Myers
L. lateralis Sharma
L. leontina (Turner)
L. ludwigii (Eckstein)
L. luna (Müller)
L. lunaris (Ehrenberg)
[b]*L. lungae* sp. nov.
L. nana (Murray)
L. obtusa (Murray)
[a]*L. opias* (Harring and Myers)
L. papuana (Murray)
[a]*L. paxiana* Hauer
L. punctata (Murray)
L. pusilla Harring
L. pyriformis (Daday)
L. rhenana Hauer
L. robertsonae Segers
L. ruttneri Hauer
L. segersi Sanoamuang
L. shieli Segers and Sanoamuang
L. signifera (Jennings)
L. sola Hauer
L. stenroosi (Meissner)
[a]*L. stichoclysta* Segers
L. tenuiseta Harring
L. thailandensis Segers and Sanoamuang
L. thienemanni (Hauer)
L. undulata Hauer
L. unguitata (Fadeev)
L. ungulata (Gosse)
Lepadella acuminata (Ehrenberg)
L. amphitropis Harring
L. apsicora (Myers)
L. costatoides Segers
L. ehrenbergi (Perty)
L. elliptica Wulfert
L. elongata Koste
L. heterostyla Murray
L. lindaui Koste
L. ovalis (Müller)
L. patella (Müller)
L. rhomboides (Gosse)
L. triba Myers
L. triptera (Ehrenberg)
L. vandenbrandei Gillard
Lophocharis salpina (Ehrenberg)
Macrochaetus collinsi (Gosse)
M. sericus (Thorpe)
Monommata species
Mytilina ventralis (Ehrenberg)
Notommata pachyura (Gosse)
Notommata species
Plationus patulus (Müller)
Ploesoma hudsoni (Imhof)
Polyarthra vulgaris Carlin
Pompholyx complanata Gosse
Ptygura species indet.
Scaridium longicaudum (Müller)
Sinantherina ariprepes Edmondson
S. semibullata (Thorpe)
S. spinosa (Thorpe)
Synchaeta stylata Wierzejski
Testudinella ahlstromi Hauer
T. parva (Ternetz)
T. patina (Hermann)
T. tridentata Smirnov
T. walkeri Koste and Shiel
Trichocerca bicristata (Gosse)
T. bidens (Lucks)
T. braziliensis (Murray)
T. capucina Wierzejski and Zacharias
T. chattoni (De Beauchamp)
T. cylindrica (Imhof)
T. insignis (Herrick)
T. insulana Hauer
T. longiseta (Schrank)
T. pusilla (Lauterborn)
T. siamensis Segers and Pholpunthin
T. similis (Wierzejski)
T. tenuior Gosse
T. tigris (Müller)
T. weberi (Jennings)
Trichotria tetractis (Ehrenberg)

[a]New to Southeast Asia; [b]new to science irrelevant

10%) and *Trichocerca* (14 species, 9.33%). This is in general agreement with other reports on tropical littoral rotifer taxocoenoses (e.g., Dussart et al. 1984), including Southeast Asia (Segers 2001), and, in particular, Thailand (Segers et al. 2004). Most of the rotifers found have already been recorded from Thailand (Sanoamuang et al. 1995, Segers and Pholpunthin 1997, Sanoamuang 1998, Sanoamuang and Savatenalinton 1999 2001). Some of these, however, deserve special mention as Thai (*Cephalodella songkhlaensis* Segers and Pholpunthin, Fig. 3; *Lecane segersi* Sanoamuang *L. shieli* Segers and Sanoamuang, Fig. 8), or Oriental (*Lecane blachei* Berzins *L. thailandensis* Segers and Sanoamuang, Fig. 9) endemics. Three taxa are Australasian (*Brachionus dichotomus* Shephard f. *reductus* Koste and Shiel, Fig. 2; *Lecane batillifer* (Murray), *Testudinella walkeri* Koste and Shiel), five are Eastern-Hemispheric taxa (*Brachionus diversicornis* (Daday), *Brachionus forficula* Wierzejski, and the tropical *Lecane lateralis* Sharma, *Lecane unguitata* (Fadeev), and *Lepadella vandenbrandei* Gillard). These, together with the species treated below, account for a sizable fraction of the biogeographically interesting taxa in the record.

The new species described below and two other taxa (*Lecane opias* (Harring and Myers) and *L. stichoclysta* Segers) are new to the Oriental region, while *L. paxiana* Hauer is new to Thailand and Southeast Asia. Additionally, we found a single specimen representing a peculiar taxon belonging to the *Keratella cochlearis* group. This result increases the Thai rotifer record from 343 (Sanoamuang and Savatenalinton 1999 2001, Sanoamuang 2001, Chittapun et al. 2003, Segers et al. 2004) to 347. Our additions confirm the Thai rotifer fauna as the best documented of all Southeast Asian countries (see Segers 2001).

NOTES ON SELECTED SPECIES

Lecane lungae sp. nov.
(Figs. 6, 11, 12)

Type locality: Chalerm Prakiat Reservoir, Kalasin Prov., Thailand.

Material examined: Holotype and two paratypes deposited in the Science Museum, Mahasarakham University, Mahasarakham, Thailand (MSU-KS 013-001). One female paratype deposited in the collections of the Royal Belgian Institute for Natural Science (K.B.I.N.), Brussels, Belgium. All specimens from the type locality, collected 23 Dec. 2001.

Differential diagnosis: *Lecane lungae* sp. nov. can easily be confused with a whole series of rela-

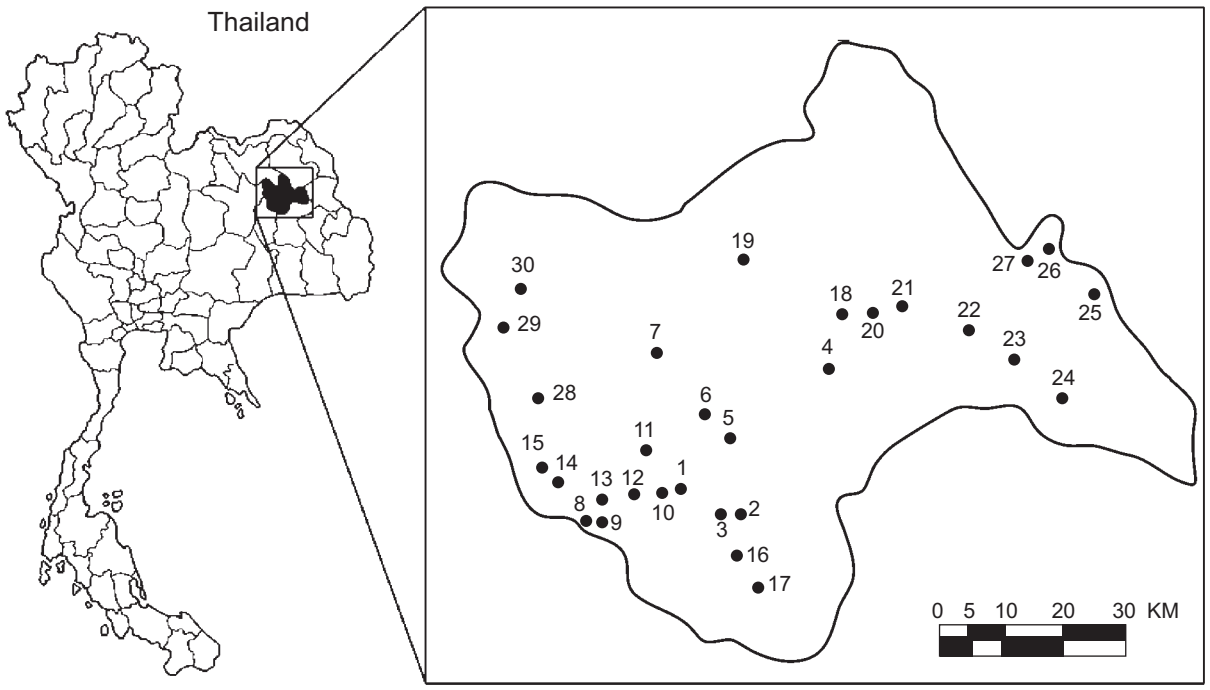
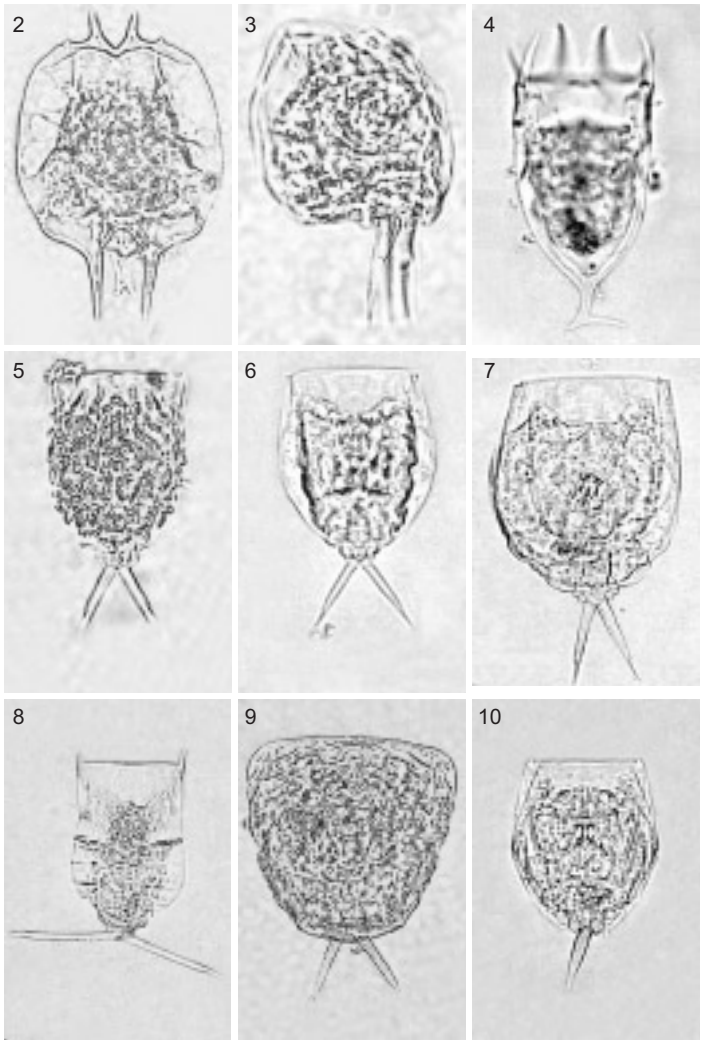


Fig. 1. Sampled localities in Kalasin Province, northeastern Thailand.

tively small *Lecane* species with straight or slightly convex and coincident anterior margins, angulate anterolateral corners of the lorica, and toes with claws (Table 2). Following the key by Segers (1995), the species will key out to *L. aeganea* Harring (Fig. 7) and *L. pusilla* Harring. It can be distinguished from the former by its projecting foot pseudosegment, relatively short and incompletely separated claws, and smaller size; and from *L. pusilla* by its projecting foot pseudosegment, incompletely separated claws, and weakly pronounced lorica ornamentation. The animal could also be confused with *L. nana* (Murray) and *L. paxiana* Hauer (see Fig. 14), from which it differs by its clearly narrower dorsal than ventral anterior margin of the lorica and basally separated toes.

Description: Lorica stiff. Dorsal plate anteriorly slightly narrower, medially wider than ventral plate, weakly ornamented. Dorsal and ventral head aperture margins straight, nearly coincident, straight or weakly convex. Ventral plate slightly longer than wide, with incomplete transverse and longitudinal folds. Lateral margin straight, smooth or irregularly folded. Lateral sulci shallow. Foot plate with narrow, elongate coxal plates. Prepedal fold narrow, elongate, distally with median projection. Foot pseudosegment slightly projecting, with small lateral lobes. Toes parallel-sided, completely separated. Claws incompletely separated.

Measurements (range and mean, in μm): Dorsal plate length 66-68 (67.2), width 60-61 (60.67), ventral plate length 71-72 (71.5), width 52-



Figs. 2-10. Various Rotifera, photomicrographs. **2.** *Brachionus dichotomus* f. *reductus*, ventral view; **3.** *Cephalodella songkhlaensis*, lateral view; **4.** *Keratella* cf. *cochlearis*, ventral view; **5.** *Lecane stichoclysta*, dorsal view; **6.** *L. lungae* sp. nov., ventral view; **7.** *L. aeganea* Harring and Myers, ventral view (Thai specimen from the Kuang River, Lamphun Province); **8.** *L. shieli*, ventral view; **9.** *L. thailandensis*, ventral view; **10.** *L. opias*, ventral view. (To facilitate comparisons, Figs. 6 and 7 are reproduced to the same scale).

54 (53.17), toe length 22-23 (22.67), pseudoclaw 7-8 (7.33).

Etymology: The species is named after Mrs. Lung Savatenalinton in recognition of her long-term moral support to the first author.

Distribution and ecology: *Lecane lungae* sp. nov. is a rare species and occurred in small numbers only. This species has to date only been recorded from the type locality during the cool season. The water temperature was 25°C and the pH was 7.27.

Lecane opias **(Harring and Myers)**

(Figs.10, 13)

Lecane opias is considered a Holarctic

Table 2. Comparison of *Lecane lungae* sp. nov. with some related taxa

	Lecane lungae sp. nov.	*Lecane aeganea* Harring, 1914	*Lecane baimaii* Sanoamuang and Savatenalinton, 1999[a]
Dorsal: ventral lorica width medially	1.14 - 1.19	1.0 - 1.1	1.16 - 1.17
Dorsal: ventral lorica width anteriorly	0.88 - 0.90	0.84 - 0.89	0.71 - 0.76
Ornamentation	weak	weak	strong
Lateral sulci	shallow	deep	shallow
Lateral margins of foot pseudosegment	lobed	lobed	smooth
Foot pseudosegment relative to posterior margin of ventral plate	projecting	posterior margins coincident	completely covered
Toe: (pseudo)claw length (μm)	3.0 - 3.5	2.7 - 3.1	2.3 - 2.5
Separation of (pseudo)claws	incomplete	complete, distinct	complete, distinct
Insertion of (pseudo)claws	weakly eccentric	strongly eccentric	central
Lorica length (μm)	71 - 72	79 - 82	82 - 84
Toe length (μm)	22 - 23	24 - 25	26 - 28
Special features	-	-	-

	Lecane formosa Harring and Myers, 1926[b]	*Lecane pusilla* Harring, 1914	*Lecane sagula* Harring and Myers, 1926[b]	*Lecane subtilis* Harring and Myers, 1926
Dorsal: ventral lorica width medially	1.00	1.16	1.10	1.04
Dorsal: ventral lorica width anteriorly	0.80	0.79	0.81	0.84
Ornamentation	none	strong	strong	strong
Lateral sulci	deep	deep	?	shallow
Lateral margins of foot pseudosegment	parallel-sided	lobed	convex	parallel-sided
Foot pseudosegment relative to posterior margin of ventral plate	posterior margins coincident	completely covered	projecting	projecting
Toe: (pseudo)claw length (μm)	3.13	3.11	4.75	2.9
Separation of (pseudo)claws	complete; eccentric	complete	complete	complete
Insertion of (pseudo)claws	central	central	central	central
Lorica length (μm)	80	60	60	60 - 75
Toe length (μm)	25	15 - 21	19	20 - 24
Special features	-	-	foot pseudosegment large, rounded	straight transverse ridge dorsally on foot plate

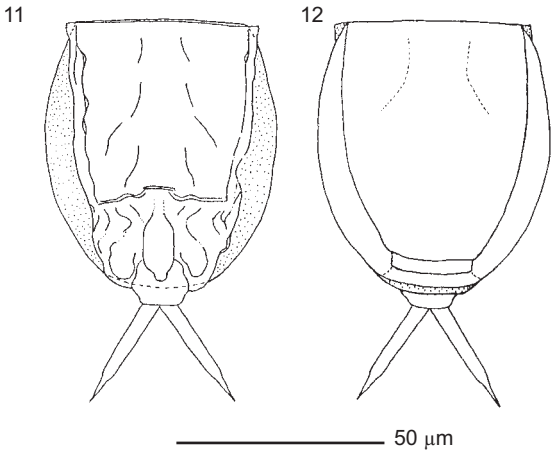
[a]Information based on Sanoamuang and Savantenalinton (1999), Baribwegure and Segers (2000), and Segers et al. (1993: fig. 2); published dimensions by Sanoamuang and Savantenalinton (1999) might not be correct: see difference in scales in drawings and photographs.

[b]No actual specimens seen. Information based on Harring and Myers (1926).

species by Segers (1995), notwithstanding that some non-illustrated, hence unreliable records of the species from Tasmania (Koste et al. 1988), South America, and Africa (De Smet 1988) exist. The South American record from Lake Titicaca (de Beauchamp 1939 may well concern the superficially similar *L. boliviana* Segers (Segers et al. 1994). Herein, we record this species from Thailand and the Oriental region for the first time, from a sample of the Poa River (no. 16 in Fig. 1) with a temperature of 26.1°C and a pH of 7.14. The situation is reminiscent of that of similarly distributed *Notholca* species, which have recently been recorded from warm waters in northern India (Sarma 1988). Sharma (1991) attributed such isolated occurrences of pronouncedly cold-water taxa in tropical situations to drift from higher latitudes.

Lecane paxiana Hauer
(Fig. 14)

This rare species was previously recorded only from Europe and Africa (Segers 1995). Recent records are from three localities in Burundi (Baribwegure and Segers 2000) and from backwaters of the Delhi segment of the Yamuna River, India (Arora and Mehra 2003). Our present Thai record (Chalerm Prakiat Reservoir, no. 13 in Fig. 1) confirms the presence of *L. paxiana* in Asia and further illustrates the peculiar Eastern-Hemispheric distribution of the species. *Lecane paxiana* is considered to be a thermophilic species (Baribwegure and Segers 2000), which concurs with the present observations (habitat temperature of 25°C and pH of 7.27).



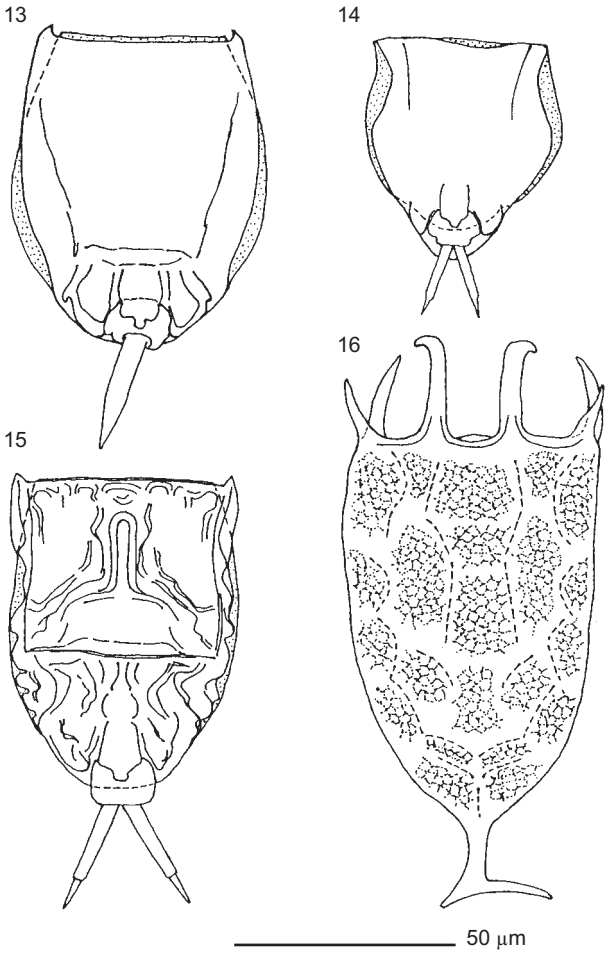
Figs. 11-12. *Lecane lungae* sp. nov. **11.** ventral view; **12.** dorsal view.

Lecane stichoclysta Segers
(Figs. 5, 15)

Lecane stichoclysta was recently described from Nigeria (Segers 1993). To date, it has not been recorded again, and the present record is the second ever of this species. Hence, *L. stichoclysta* is new to Thailand and Asia. This species is herein considered a tropical Eastern-Hemispheric taxon. A small number of *L. stichoclysta* were found in Chalerm Prakiat Reservoir (no. 13 in Fig. 1), at a temperature of 25°C and a pH of 7.27.

Keratella cf. *cochlearis* (Gosse)
(Figs. 4, 16)

A sample from Huay Sriton Reservoir (no. 5 in Fig. 1) contained a single peculiar specimen of



Figs. 13-16. 13. *Lecane opias*, ventral view; **14.** *Lecane paxiana*, ventral view; **15.** *Lecane stichoclysta*, ventral view; **16.** *Keratella* cf. *cochlearis*, dorsal view.

Keratella cf. *cochlearis*. The animal has an asymmetrically bifid posterior spine. Notwithstanding that *K. cochlearis* is reputedly variable morphologically, especially regarding the length of the anterior and posterior spines (e.g., see Koste and Shiel 1987), deformations or teratological conditions as illustrated in the specimen we found are very rare. Interestingly, the caudal spine morphology of our specimen is surprisingly similar to that of a Swedish *K. cochlearis* specimen reported by Thomasson (1957), although the projections are much longer in the Swedish specimen. In both the Thai and Swedish animal the caudal spine is provided with a barb on the left side, and the insertion of the barb is almost angular anteriorly, whereas the posterior is a smooth curve. As only a single specimen was found, we refrain from speculating about the possible relevance of the record.

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