

Marine rotifers from the Northern Adriatic Sea, with description of *Lecane insulaconae* sp. nov. (Rotifera: Monogononta: Lecanidae)

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During a survey of the marine rotifers of the Northern Adriatic Sea, Italy, we found a total of 20 taxa, including a new species of Lecane. This novelty, Lecane insulaconae sp. nov., occurred in the interstitial area of sandy sediment in the outlet of the Isonzo River, at a salinity of 30‰ and is therefore the first exclusively marine representative of this diverse (~200 species) genus. It is characterized by unique sets of anterolateral projections on the ventral and dorsal lorica. Here, we present the description of the species, together with scanning electron microscopy pictures of trophi of this and some other species, and an account of the marine rotifers encountered during the survey.

Keywords: faunistic survey, Italy, marine meiofauna, Mediterranean Sea

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INTRODUCTION

While the European Register of Marine Species (ERMS) project compiled a list of marine species in Europe, it quickly became obvious that our knowledge of the fauna of the European seas remains patchy. This is particularly so for some groups of small animals, such as Rotifera (Costello *et al.*, 2006). A recent detailed analysis of literature data on the global distribution of rotifers in the sea confirmed this suggestion (Fontaneto *et al.*, 2006), and pointed out a strange inconsistency between the number of faunistic studies and species richness from different European areas: more than 100 taxa are listed in only five studies on the Black Sea, yet the 25 studies on the Mediterranean only reported 90 rotifer taxa. The aim of this study is to address this inconsistency by sampling an area in the Mediterranean.

We selected the Northern Adriatic, as it is illustrative for the paradox: it is one of the most studied areas in all the Mediterranean, with extensive studies of diverse habitats, yet only 32 rotifer species belonging to 14 genera are recorded (Pasquali, 1940; Wulfert, 1942; Rubino *et al.*, 2000).

MATERIALS AND METHODS

Samples were collected from 28 June to 6 July 2006 in the Northern Adriatic (Table 1). Plankton samples were collected using a plankton net with 50 µm mesh; other samples were

directly collected with plastic bottles of 250 ml capacity. Samples were immediately brought to the laboratory located at the Foce dell'Isonzo Natural Park at Isola della Cona, Staranzano, GO, Northern Italy.

Living animals were extracted under a dissecting microscope while samples were washed with filtered saltwater collected directly in the field. Specimens for identification were fixed in ethanol, anaesthetizing them with a 0.5% marcaine solution when appropriate. Permanent glycerine slide mounts were prepared for all species and Giulio Melone at the University of Milan kept stubs with trophi prepared for scanning electron microscopy (SEM) observation. Trophi were prepared for SEM by sequentially dissolving tissues in 5% NaOCl solution on a circular cover slip, and rinsing with distilled water (Segers, 1993; De Smet, 1998).

RESULTS

We obtained 47 samples from plankton, periphyton on rocks, sandy bottom, algae and gravel littoral, at depths ranging from 0.2 m to 38 m. We obtained rotifers from 31 of these samples. A total of 545 specimens belonging to 20 taxa were found (Table 1), 12 of these have not been recorded from the region before. Species richness varied from 1 to 7, and abundance of individuals varied from 1 to 85 per sample.

Two of the samples contained specimens of a hitherto unnamed species, which we describe here. In addition, we illustrate some other species recorded by SEM pictures of their trophi (Figure 1).

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Subclass MONOGONONTA

Order PLOIMA

Family LECANIDAE Bartoš, 1959

F33	Cherso, Croazia	sandy detritus	36	5.0	2 July 2006	45° 6' 10"	14° 16' 46"												1						
F37	Cherso, Croazia	gravel littoral	NA	0.0	2 July 2006	NA	NA												1						
F13	Lido di Staranzano	sandy detritus	34	0.2	30 June 2006	45° 45' 47"	13° 31' 20"												35						
F10	Lignano Sabbiadoro	sand	34	2.0	29 June 2006	45° 41' 6"	13° 8' 42"												2	1					
F14	Marina Julia	periphyton on rocks	34	0.5	30 June 2006	45° 45' 18"	12° 30' 9"												9						
F43	Miramare, Bagno Ducale	periphyton on rocks	36	1.0	5 July 2006	45° 42' 6"	13° 42' 40"												20	1					
F45	Miramare, Bagno Ducale	sand	36	4.0	5 July 2006	45° 42' 6"	13° 42' 40"													1					
F40	Miramare, Baietta delle Scuderie	periphyton on rocks	36	0.2	5 July 2006	45° 42' 1"	13° 42' 44"													3					
F44	Miramare, Baietta delle Scuderie	periphyton on rocks	36	0.1	5 July 2006	45° 42' 1"	13° 42' 44"													5	80				
F15	Panzano	plankton	34	0.3	30 June 2006	45° 46' 43"	13° 32' 22"														5				
F2	Punta Barene	sandy detritus	30	0.5	28 June 2006	45° 45' 7"	13° 31' 21"														2	1	1		
F3	Punta Barene	plankton	30	0.3	28 June 2006	45° 45' 7"	13° 31' 21"																1	3	
F25	Punta Barene	sandy detritus	30	0.5	3 July 2006	45° 45' 7"	13° 31' 21"																9	2	
F46	Punta Barene	sandy detritus	30	0.5	6 July 2006	45° 45' 7"	13° 31' 21"																5	1	16
F47	Punta Barene	plankton	30	0.5	6 July 2006	45° 45' 7"	13° 31' 21"																	4	6

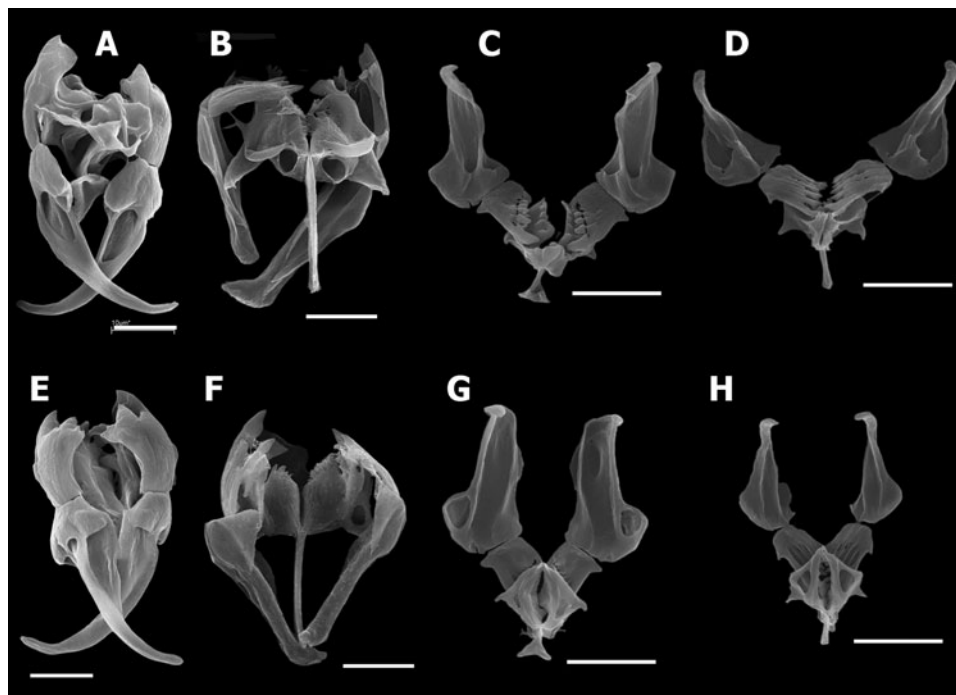


Fig. 1. Scanning electron microscopy pictures of trophi of marine rotifer species collected during the survey in Northern Adriatic. (A&E) *Lecane grandis*, sample F22; (B&F) *Pleurotrocha atlantica*, sample F28; (C&G) *Colurella colurus*, sample F25; and (D&H) *Proales similis*, sample F22. (A–D) Ventral view. (E–H) Dorsal view. Scale bar = 10 μm .

Genus *Lecane* Nitzsch 1827
Lecane insulaconae sp. nov.
 (Figures 2A–B & 3A–C)

TYPE LOCALITY

Open sea part of outlet of the Isonzo River, sandy bottom, -0.5 m, Foce dell'Isonzo Natural Park at Isola della Cona, Staranzano, GO, Friuli Venezia Giulia, Northern Italy, salinity 30‰, collected on 30 June, 2006; approximate coordinates 45° 43' 23'' N, 13° 33' 36'' E.

TYPE MATERIAL

Holotype: a single specimen in glycerine permanent slide mount, deposited in the Royal Belgian Museum of Natural Sciences, Belgium, catalogue number IG30743, RIR 169, from the type locality.

Paratypes: three specimens in a glycerine permanent slide mount each, deposited in the Royal Belgian Museum of Natural Sciences, Belgium, catalogue number IG30743, RIR 170–172, from the type locality. One stub with 5 trophi prepared for SEM, deposited in the collection of G. Melone at the University of Milan, Department of Biology.

ADDITIONAL MATERIAL

Ten specimens from the type locality preserved in ethanol in an Eppendorf vial, and another two from a sample a few metres from the type locality, but at 2 m depth, preserved in ethanol in an Eppendorf vial, all kept in the collection of G. Melone at the University of Milan, Department of Biology.

ETYMOLOGY

This species is named after its type locality, the beautiful Natural Park Isola della Cona.

DIFFERENTIAL DIAGNOSIS

The new species is unmistakable by the presence of unique bifid, anterolateral projections on the ventral lorica plate, and by a pair of series of smaller projections on the anterolateral parts of the dorsal lorica plate (Figure 2). In fully extended and living animals these features may be hidden, but proper contraction of the body inside the lorica immediately reveals these species-specific features. Using the key by Segers (1995), the species will key out to *L. hastata* (Murray, 1913)

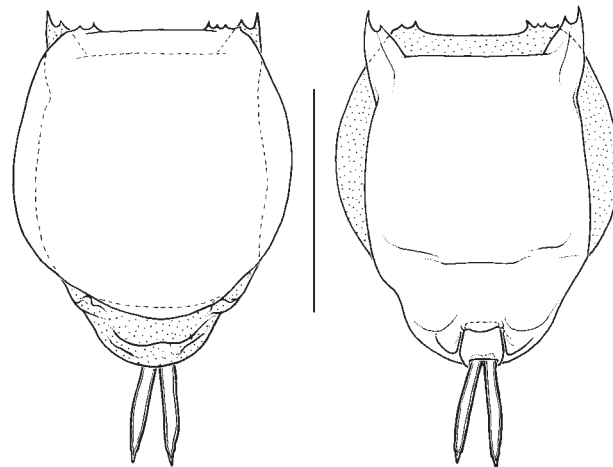


Fig. 2. *Lecane insulaconae* sp. nov., habitus. (A) Dorsal view; and (B) ventral view. Scale bar = 50 μm .

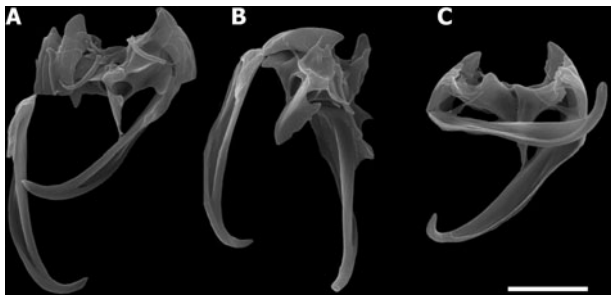


Fig. 3. Scanning electron microscopy pictures of trophi of *Lecane insulaconae* sp. nov. (A) Ventral view. (B) Ventral-caudal view. (C) Dorsal view. Scale bar = 10 μm .

or *L. rhenana* Hauer, 1929, depending on whether the toe tips are interpreted as true claws or pseudoclaws, but neither of these has the unique disposition of anterolateral spines on the lorica.

DESCRIPTION

Body loricate (Figure 2), but lorica relatively soft, easily deformed; anterolateral projections on the ventral plate well developed, bifid and acutely pointed; anterolateral parts of dorsal plate with series of 2 to 4 minute, acute projections. Dorsal head aperture margin clearly protruding, both ventral and dorsal margins nearly straight; ventral plate almost parallel-sided, anteriorly wider, medially narrower than dorsal plate. Posterior margin of dorsal and ventral plate convex, without projections. Lateral sulci indistinct. Ventral plate with a weak, incomplete transverse fold, no longitudinal folds. Foot pseudosegment slightly longer than wide, diverging to terminally, scarcely projecting. Prepedal fold broad, rounded posteriorly. Coxal plates present. Two completely separated toes, with rather straight inner and curved external edge. Toe tips with a weak terminal bulb and incompletely separated claws.

Trophi modified malleate (Figure 3). Fulcrum a wide and rather short lamina, terminally truncated. Rami weakly asymmetrical; right and left ramus with rounded alulae. Unci slightly asymmetrical, with one major ventral, and three or four minor teeth dorsally. Manubria elongate, posterior chambers extend up to the curved tips.

Measurements (average (range)). Body (N = 5): total length (without toes) 75 μm (68–85), maximum width 60 μm (59–62), toe length 25 μm (23–27). Trophi (N = 5): manubrium 24 μm (23–25), unci 10 μm (9–11).

DISTRIBUTION AND ECOLOGY

Lecane insulaconae sp. nov. have been found only in the open sea part of the outlet of the Isonzo River. The sandy bottom sample of the type locality, at 0.5 m depth contained numerous specimens, whereas a few animals were found a few metres further, at a greater depth of 2 m. None of the other samples collected in the Northern Adriatic contained the species. Whereas the outlet of the Isonzo River could be considered brackish, because of the high supply of freshwater by the river, the salinity in both samples, at about 30‰, clearly indicated marine conditions. No other ecological data are available for this new species.

The most recent estimate of diversity in the genus *Lecane* reports 200 different species-level taxa (Segers, 2007a, b). The genus is predominantly freshwater, with few

brackish water species (e.g. *L. grandis* (Murray, 1913) and *L. punctata* (Murray, 1913)) but without any exclusively marine representative. *Lecane insulaconae* sp. nov. is the first, and probably not the last, truly marine *Lecane*.

DISCUSSION

This survey of the marine rotifers of the Northern Adriatic confirms the low diversity of rotifers, both in terms of specimens and species, in the marine environment, when compared to the diversity of phylum Rotifera in freshwater habitats (Wallace *et al.*, 2006). Nevertheless, we add 12 taxa to the 32 already recorded from the Northern Adriatic, and describe a new species. Both the increase in species diversity on record for the region and the new species, suggest that our knowledge of marine rotifer diversity is far from being exhaustive, and that more sampling and taxonomic efforts are needed, even in well studied areas such as the Mediterranean. Therefore, the inconsistency between number of studies and richness of species lists of rotifers from different marine areas may be an artefact, due to the low number of comprehensive studies available, rather than being a feature of marine rotifer diversity.

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