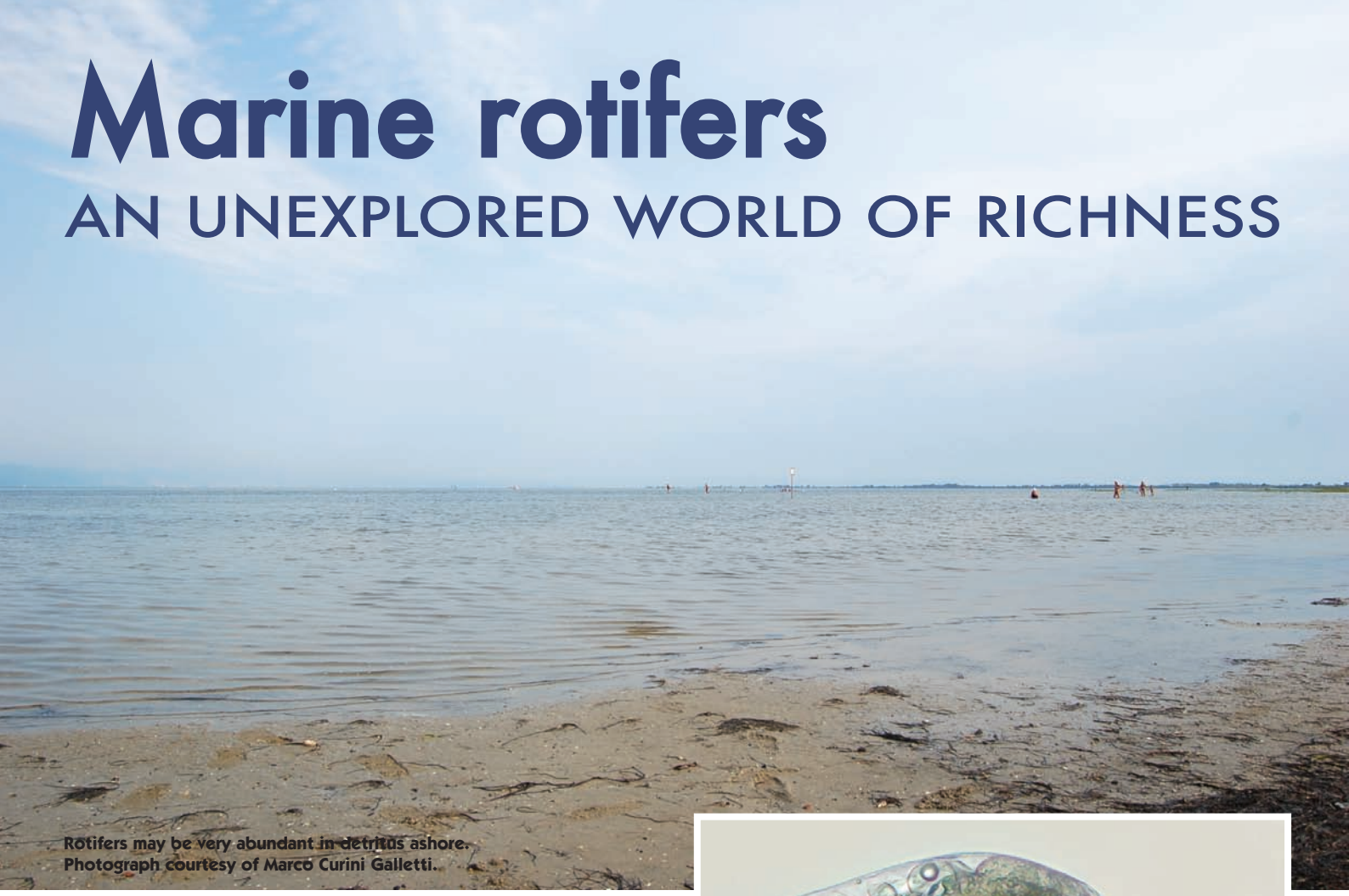
Marine rotifers

AN UNEXPLORED WORLD OF RICHNESS



Rotifers may be very abundant in detritus ashore. Photograph courtesy of Marco Curini Galletti.

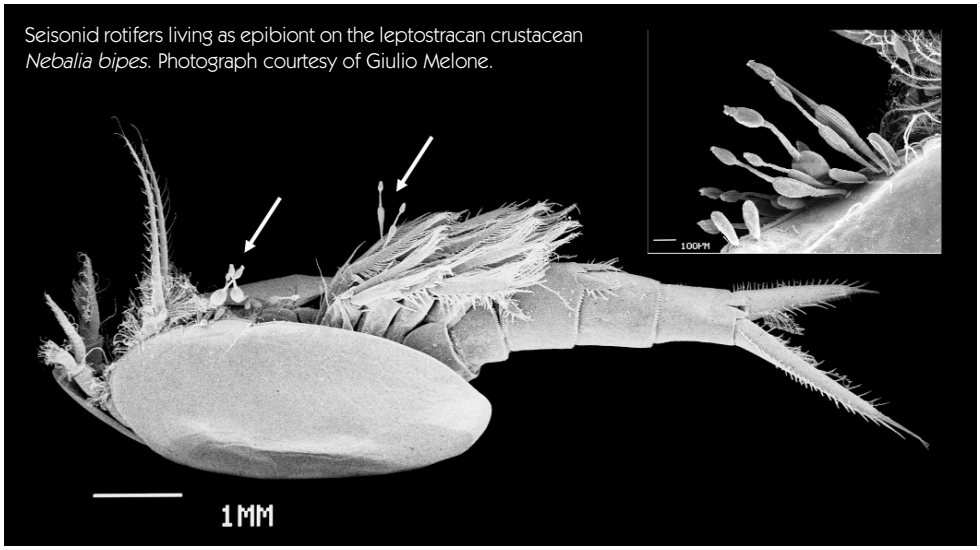
The marine meiofauna (interstitial animals <1mm) is known as one of the Earth's most diverse communities, and yet one of the least known. Few scientists are working on meiofauna, still neglecting some taxa, and rotifers are among the most neglected ones. Rotifers are bilaterally symmetrical, tiny transparent aquatic animals, characterized by an anterior ciliated corona on the head, a foot with toes and spurs, and a complex masticatory apparatus called the mastax, with hard jaws named trophi. Their body shape and ecological traits are highly diversified and they have been able to colonise almost every habitat on the planet, but while they are known as extremely abundant and diverse in freshwater, rotifers have generally been ignored and believed to be poorly represented in marine habitats.

Littoral algae host many rotifer species. Photograph courtesy of Marco Curini Galletti.

Brachionus plicatilis, one of the best known monogonont rotifers, living in brackish water, and widely used for aquaculture purpose as food for juvenile fishes. Photo graph courtesy of Scott Mills.

They are peculiar for two aspects: desiccation resistance, and parthenogenetic reproduction. Monogonont rotifers may survive desiccation by producing dormant stages called resting eggs and bdelloid rotifers by entering anhydrobiosis in every period of their life. As for their reproductive traits, seisonids (3 species) have a 1:1 sex ratio and cannot reproduce through partenogenesis as the other rotifers usually do, sexual reproduction is rare in monogononts (~1450 species) and completely absent in bdelloids (~450 species). Bdelloids have been famed by the late and great biologist John Maynard Smith as an 'evolutionary scandal', as they survived and speciated in the absence of sexual recombination.

Rotifers may be thus extremely interesting from an evolutionary perspective. While applying for a grant comparing different habitats and parthenogenetic reproduction in rotifers, one reviewers' comment we got was something like: "why are you looking for marine



Seisonid rotifers living as epibiont on the leptostracan crustacean *Nebalia bipes*. Photograph courtesy of Giulio Melone.

rotifers? there is no such thing!". Thus, we were pushed to perform a literature review providing evidence of "such a thing" before re-applying. We discovered an unexpected diversity: out of the ~2000 species known in total worldwide, more than 400 are reported in saltwater habitats (Fontaneto et al., 2006; Segers, 2007).

The common misperception of paucity of rotifers in marine habitats is the result of biased sampling and extraction techniques not yielding rotifers, and of a lack of taxonomists. Rotifers can be easily found in saltwater by looking directly at the sample, however, and during a recent workshop on marine meiofauna by the Swedish Taxonomy Initiative in Tjärnö Marine Biological Laboratory, rotifers came out as one of the richest taxa in the shore. They are also known from deep sediments (Sommer et al., 2003), and have been found on crustaceans and sea cucumbers.

Almost every survey in marine habitats may provide new rotifer species (e.g. De Smet & Chernyshev, 2006): rotifers' diversity is unexplored in the sea, and we just have to look for it.

Right: *Lecane grandis*, a cosmopolitan benthonic rotifer common in saline waters.

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Further Reading

Segers, H. 2007. Annotated checklist of the rotifers (Phylum Rotifera), with notes on nomenclature, taxonomy and distribution. *Zootaxa* **1564**, 3–104.

Sommer, S., Gutzmann, E., Ahlrichs, W., Pfannkuche, O. 2003. Rotifers colonising sediments with shallow gas hydrates. *Naturwissenschaften* **90**, 273–276.

Also Published in *JMBA*

De Smet, W.H., Chernyshev, A.V. 2006. Two new species of Dicranophoridae (Rotifera : Monogononta) from Peter the Great Bay, Sea of Japan. *JMBA* **86**: 657–663.

Fontaneto, D., De Smet, W.H., Ricci, C. 2006. Rotifers in saltwater environments, re-evaluation of an inconspicuous taxon. *JMBA* **86**, 623–656.

Hard jaws (trophi) of different species of marine rotifers. Photograph courtesy of Willem H. De Smet and Hendrik Segers. From left to right, first row: *Trichocerca pediculus, Dicranophorus forcipatus, Erignatha clastopis, Asplanchna priodonta*; second row: *Itura myersi, Zelinkiella synaptae, Testudinella clypeata, Seison annulatus*. Scale bar = 10µm.