

Mating behaviour of *Pseudodiaptomus annandalei* (Copepoda, Calanoida) at calm and hydrodynamically disturbed waters

Chien-Huei Lee · Hans-Uwe Dahms ·
Shin-Hong Cheng · Sami Souissi · Francois G. Schmitt ·
Ram Kumar · Jiang-Shiou Hwang

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Abstract Behavioural observations of male copepods revealed that they commonly follow female footprints to find their mates. Copepods can perceive signals generated by females either hydromechanically or chemically. Signal intensity is affected by hydrodynamic conditions which clear chemical and mechanical cues and modulate copepod's ability to sense signals of their biotic environment, such as in their search for mates. We studied the patterns and efficiency of the copepod *Pseudodiaptomus annandalei* to mate in calm and hydrodynamically disturbed waters, in illuminated and dark conditions in experimental containers

of different shapes and volumes. Courtship in *P. annandalei* was a negative function of hydromechanical disturbance, since successful mating events were observed in calm water only. In weakly turbulent conditions (air-bubbling of 100 ml/min), males were not able to pursue females properly; swimming speed decreased about three times in comparison with that in calm water. In calm water conditions, sequential and simultaneous taxis mechanisms were used by *P. annandalei* males to pursue females. The ability of *P. annandalei* males to track a three-dimensional trail probably depended on the persistence of fluid-borne signals.

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Chien-Huei Lee and Hans-Uwe Dahms contributed equally to this work.

C.-H. Lee · R. Kumar · J.-S. Hwang (✉)
Institute of Marine Biology, National Taiwan Ocean University,
2 Pei-Ning Road, Keelung 202, Taiwan, ROC
e-mail: jshwang@mail.ntou.edu.tw

H.-U. Dahms
Green Life Science Department, College of Convergence,
Sangmyung University, 7 Hongij-dong, Jongno-gu,
Seoul 110-743, South Korea

S.-H. Cheng
Tungkang Biotechnology Research Center, Fisheries Research
Institute, Tungkang, Pingtung 928, Taiwan, ROC

S. Souissi · F. G. Schmitt
Laboratoire d'Océanologie et de Géosciences, CNRS UMR 8187
LOG, Station Marine de Wimereux, Université de Lille 1
Sciences et Technologies, 28 av. Foch, 62930 Wimereux, France

R. Kumar
Department of Zoology, Acharya Narendra Dev College,
University of Delhi, Delhi 10007, India

Introduction

Being abundant, widely distributed primary consumers of pelagic production, and being an important food source for a wide range of invertebrate and vertebrate predators, pelagic copepods provide an important link in the transfer of matter and energy in pelagic systems (e.g. Hwang et al. 2004; Dahms et al. 2006a; Souissi et al. 2007). Methodical approaches to the study of copepod behaviour are critical for a better understanding of plankton population dynamics (e.g. Yamazaki et al. 2002). Behaviour mediates the way animals interact with each other conspecifically and interspecifically, and with the abiotic environment (Dusenbery 1992; Forward and Ritschoff 2000). Individual behaviour affects growth and development at the level of individuals and populations (Buskey 1984, 1998; Paffenhöfer et al. 1995). Mating is an important behavioural aspect in the life history of copepods (Checkley 1980; Cheng et al. 2008; Hwang et al. 2004; Titelman et al. 2007). An enhanced rate of mate encounters could increase the reproduction of copepods (Bagøien and Kiørboe 2005). Mate finding is