SOME ULTRASTRUCTURAL FEATURES OF THE REPRODUCTIVE MORPHOLOGY AND SPERMATOPHORE PLACEMENT OF TEMORA STYLIFERA DANA, 1849 (COPEPODA, CALANOIDA)

BY

M. GRAZIA CORNI, VANESSA VIGONI and FRANCA SCANABISSI

Dipartimento di Biologia Evoluzionistica Sperimentale, Università degli Studi di Bologna, Via Selmi, 3, I-40126 Bologna, Italy

ABSTRACT

Ultrastructural observations have been made on specimens of Temora stylifera collected from a planktonic community in the northern Adriatic Sea, to examine the reproductive morphology of both sexes with particular attention to the mating appendages in the male and the spermatophore structure. These observations proved useful to understand some mechanisms involved in spermatophore transfer and placement.

RÉSUMÉ

Des observations ultrastructurales on été faites sur des spécimens de Temora stylifera récoltés à partir d’une communauté planctonique de la mer Adriatique septentrionale, afin d’examiner la morphologie de l’appareil reproducteur chez les deux sexes, et en particulier les appendices copulateurs du mâle, ainsi que la structure du spermatophore. Ces observations se sont révélées utiles pour comprendre certains mécanismes intervenant dans le transfert et le dépôt du spermatophore.

INTRODUCTION

Temora stylifera Dana, 1849, is a neritic species of calanoid living in the Adriatic Sea, especially rich in numbers during the summer and autumn months (e.g., Hure & Scotto di Carlo, 1968; Hure et al., 1980; Vigoni et al., 1998).

Papers published on the reproduction of copepods are important to understand the mechanisms regulating population density and seasonal distribution. Studies on the reproductive cycle, egg production, and fertility of Temora stylifera have been performed by Ianora et al. (1989). In addition, Ianora & Poulet (1993) have shown that the number of fertilized eggs reaching the nauplius stage also depends on diet: a dinoflagellate rather than a diatom-based diet is especially important for
successful development; furthermore, this diet seems to favour the production of spermatophores in males.

Observations on the reproductive morphology of this species were made by Barthélémy et al. (1998). This study included a discussion of many species amongst which some observations on the morphology of the female genital somite of Temora stylifera.

The reproductive morphology of calanoid copepods has been considered very important to determine interspecific reproductive isolation. The morphological differences in the fifth pair of swimming legs in the male, the urosome of the female, and the shape of the spermatophore constitute the major obstacles to hybridization. It is, therefore, possible that a strict link exists among these different structures that assures success of the spermatophore transfer, as it does in Centropages, where the spermatophore is shaped in such a way that it fits to only one type of female urosome (Lee, 1972; Blades, 1977; Vigoni et al., 1999; Corni et al., 2000).

Some of the data thus far obtained on reproductive morphology have led to several hypotheses regarding the possibility that pheromones mediate sexual encounters; they may constitute another cause of reproductive isolation on the base of their specificity (Katona, 1973; Griffith & Frost, 1976; Fleminger, 1985). Doubts still remain, however, concerning the places where these attractants are produced and how they are detected (e.g., Fleminger, 1973; Blades & Youngbluth, 1979; Von Vaupel Klein, 1982a, b; Vigoni et al., 1999).

The aim of the present study is to give a detailed description of the morphology of the external reproductive organs and spermatophore in Temora stylifera, a species that has colonized the Mediterranean Sea from the Atlantic Ocean.

MATERIALS AND METHODS

Plankton sampled during the months of June and July 1996 was used for this study. The specimens collected at 7 a.m. off the coast of Cesenatico (northern Adriatic Sea) were fixed in 2.5% glutaraldehyde and cacodylate buffer 0.2 M (pH 7.2) for 1 hour at 4°C and postfixied in 2% OsO$_4$ in cacodylate buffer at 4°C. Samples were processed through a graded acetone series, critical-point dried, fixed on stubs with double-sided adhesive tape and vacuum coated with gold, 3 minutes at 30 mA, before being viewed with a JEOL JSM5200 scanning electron microscope.