

# SPERM STRUCTURE OF THE PANDALID SHRIMP, *PANDALUS GRACILIS* (Stimpson, 1869)

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## Introduction

Sperm structure of natantian decapod may vary according to superfamilies. Recently, the ultrastructures of sperm have been extensively used for recognizing phylogenetic linkages in decapod taxa (Medina, 1994; Tudge, 1997; Tudge *et al.*, 1991; Medina *et al.*, 1998). Therefore, it appears that knowledge of the sperm morphology and components is very useful for estimating phylogeny in decapod.

Of the caridean superfamilies, sperm ultrastructures of the *Pandalus* shrimps, including *Pandalus gracilis* have not been previously described. In addition, the characteristics of reproductive biology, including sperm structure are little known.

This results presents the morphology of mature sperm in the vas deferens of *Pandalus gracilis* to exemplify the structural characteristics of sperm of superfamily Pandaloidea and to compare the spike with that of other caridean shrimps as well as other decapod crustaceans.

## Materials and Methods

A total of 62 specimens of *Pandalus gracilis* were collected by shrimp traps at a depth 35m or less from the oceanic zone off the coast of southern Korea in May 2002. After selection of individuals, which had external characteristics of males, their vas deferentia were dissected, and fixed with Bouin's solution for 24 hours. Tissues were dehydrated in ethanol, and embedded in paraffin. Alternate slides were stained with hematoxylin-eosin, PAS (periodic acid-Schiff) and Feulgen stains for light microscopic observation. For examination with transmission electron

microscopy, the vas deferentia were dissected, and fixed in 2.5% glutaraldehyde in phosphate buffer (pH 7.2) for 4h in cold. The tissues were postfixed in 1% osmium tetroxide in the same buffer for 2hr, rinsed in distilled water, and embedded in Epon 812. The thin sections were stained with uranyl acetate and lead citrate, and examined.

## Results

We determined the mature sperm morphology and ultrastructure of *Pandalus gracilis* by means of light and electron microscopy and compared them with the known morphology and ultrastructure from other carideans. Spermatogenesis is initiated in the testicular tissue of the male-phased *Pandalus gracilis* ranging from 6 to 11  $\mu\text{m}$  in carapace length. The sperm are 52 to 55  $\mu\text{m}$  in length and 40 to 42  $\mu\text{m}$  in diameter, non-motile, and consist of the cup-shaped main body and the spike extending from the convex surface of the main body. The main body, 40 to 42  $\mu\text{m}$  in width and 2 to 3  $\mu\text{m}$  in height, has a nucleus and cup shaped base. The spike, 48 to 50  $\mu\text{m}$  long and approximately 3  $\mu\text{m}$  thick, surrounded by a membrane could be divided into the two parts by structural difference: the central core region containing electron-lucent material and the electron dense wall containing a number of tubular-like structures which are aligned along the length of the longitudinal spike. The unique structure of *Pandalus gracilis* sperm, particularly in the spike possessing tubular-like structures of approximately 28 to 30 nm in the outer diameter, offers a good taxonomic tool among shrimp species in the carideans.

## Reference

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