P-12

Sexual Dimorphism on the Genus *Paracalanus* (Copepoda: Paracalanidae) in Korean Waters

Kyu Hee Cho*, Won Choel Lee[1] and Saywa Kim

*Department of Life Science, Yong-In Univ.
[1]Department of Life Science, Hanyang Univ.

ABSTRACT

The genus *Paracalanus* Boeck, 1864 dominate zooplankton communities in waters off Korean peninsula. Zooplankton samples collected from four waters (Uljin, Hadong, Youngkwang, Cheju) were sorted for specimens belonging to the genus *Paracalanus*. *Paracalanus* sp. regarded to *P. parvus* or *P. indicus* were examined. Body of male has cephalosome dorsal hump (CDH). Urosomites have four segments in female and five segments in male. In male, antennule is symmetry and fused without geniculation. The male antennule carries more aesthetascs than those in female antennule. Female P1-P4 is similar to those of male in seta and spine formular. Spinules on surface of legs are different each other. The female P5 is symmetrical, and composed of 2 segment. In male, it is aymmetrical and left leg composed of 5 segments, right leg 2-segmented. Male found patch of fine spinule on terminal inner surface of outer process on fifth segment. Sexual dimorphism appear saliently in mouth appendages. Mandible lacks of gnathobase; maxillule is apparently reduced; maxilla degrades it in female and remains vestiges between maxillule and maxilliped; maxilliped terminal part indistinctly articulated and carrying behind three strong plumose setae. With the absence of gnathobase in male, we conclude that male *Paracalanus* sp. does not feed.

I. INTRODUCTION

Paracalanids consists of approximately 20 species in the world ocean. Most of them are habiting in costal waters and abundant in zooplankton

fauna. The genus *Paracalanus* Boeck, 1864 has been reported to be dominant zooplankters (Shim and Yun, 1990; Suh *et al*, 1991; Soh and Suh, 1993; Kim *et al*, 1993) in Korean waters, too.

Meanwhile, taxonomic studies of copepoda described the morphological feature of the female and male. The taxonomic descriptions of the genus *Paracalanus* are incomplete, in particular with regard to the mouthparts and details of ornamentation (Claus, 1863; Sars, 1918; Mori, 1937; Chen & Zhang, 1965; Tanaka, 1956; Bowman, 1971; Kim, 1985; Kim, 1987). Mouthparts of *P. parvus* is the only described species by Sars (1918) so far. With incomplete description, he merely described solely mandible and maxilliped of male.

Sexual dimorphism is well know in Copepods (Huys & Boxshall, 1991), nevertheless, studies on sexual dimorphism of many orders or families are limited. Ohtsuka and Huys (2001) showed mouthparts of *Acrocalanus gibber* in paracalanid without any morphological description.

The objectives of the study is to investigate sexual dimorphism in the genus.

II. MATERIALS AND METHODS

Zooplankton samples collected from four waters (Uljin, Hadong, Youngkwang, Cheju) off the coast of Korean peninsula (Fig. 1).

Copepods belonging to the genus *Paracalanus* were sorted under a dissecting microscope (Olympus ST40) in the laboratory. Specimens were cleared in lactic acid, then dissected. Dissected parts were mounted on slides with lactophenol mounting media. Preparations were sealed with transparent nail varnish. Drawing were carried out using a drawing tube attached to Olympus BX 51 differential interference contrast microscope.

III. RESULTS AND DISCUSSION

Sexual dimorphism was reveald to be general in many parts of the body in the genus *Paracalanus*. Particularly it is clear in mouthparts.

Body of male has cephalosome dorsal hump (CDH)-keel-shaped and located on the dorsoanterior surface of cephalosome, and is a male-specific character (Nishida, 1989) (Fig. 2). Urosomites have four segments in female and five segments in male (Fig. 7). Genital segment in female is double-somite and show an amazing complexation in genital segment. Genital segment in male short than first abdominal segment (Fig. 7). In male, antennule is symmetry and fused without geniculation. The male antennule carries aesthetasc more than female antenneule (Fig. 3). In male, Antenna second segment of exopod is elongate it of female (Fig. 4).

Mouth part structures in male is apparently reduce to these of female. The most non-feeding males occurs the reduction or atrophy of mouthparts.

Mandibular gnathobase absented in male. The lack of gnathobase mean that males seem not to feed. And maxillule exhibit reductions inner lobes. Maxilla remains vestiges between maxillule and maxilliped. The segments of maxilliped is recognizable the five segments in the endopod in female (Fig. 8). But in male, terminal part indistinctly articulated and carrying behind 3 strong plumose setae. Coxa of male without setae.

P1-P4 is similar the seta and spine formular. But spinules on surface of legs is different each other (Fig. 8, 9, 10, 11). The female fifth legs is symmetrical, and composed of 2 segment. In male, it is aymmetrical and left leg composed of 5 segments, right leg 2-segmented.

Tufts of fine setules on the terminal portion of left exopodal of male are found in Calanoidae (Ohtsuka and Huys, 2001). *Paracalanus* found on terminal inner surface of outer process on fifth segment.

Sexual dimorphism appear saliently in mouth appendages of genus

Paracalanus. With the absence of gnathobase in male, we conclude that male *Paracalanus* sp. does not feed.

REFERENCES

Bowman TE. 1971. The distribution of calanoid copepods off the Southeastern United States between Cape Hatteras and Southern Florida. Smithsonian Cont. Zool. 96: 18-32.

Bradford JM. 1972. Systematics and Ecology of New Zealand Central East Coast Plankton Sampled at Kaikoura. Bull. N. Z. Dep. Sci. Ind. Res. 207: 1-35.

Bradford JM. 1972. Paracalanus indicus Wolfenden and Corycaeus aucklandicus Kraemer, Two Neritic Pelagic Copepods from New Zealnd. J. Royal Soc. New Zealand 8: 133-141.

Chen QC. and SZ Zhang. 1965. The planktonic copepods of the Yellow Sea and the East China Sea. I. Calanoida. Stud. Mar. Sin. 7: 39-43.

Claus C. 1863. Die freilebenden Copepoden mit besonderer Berücksichtingung der Fauna Deuthschlands, der Nordsee und des Mittelmeeres. Leipzig 230. 172-174.

Huys R and GA Boxshall. 1991. Copepoda Evolution. The Ray Society, London 468.

Kim DY. 1985. Taxonomical study on Calanoid Copepod (Crustacea: Copepoda) in Korean Waters. Ph.D. Thesis, Hanyang Univ. 187. 46-51.

Kim DW. 1987. Taxonomy and distribution of calanoid copepod in the western waters of Korea. Bull. KORDL, BSPE000096-148-3 153. 30-35.

Kim WS, JM Yoo and CS Myung. 1993. A Riview on the Copepods in the South Sea of Koea. Bull. Korean Fish. Soc. 26: 266-278.

Mori T. 1937. The pelagic Copepoda from the neighbouring water of Japan. Tokyo 150. 29-30.

Nishida S. 1989. Distribution, structure and importance of the cephalic dorsal hump, a new sensory organ in calanoid copepods. Mar. Biol. 101: 173-185.

Ohtsuka S and R Huys. 2001. Sexual dimorphism in calanoid copepods: morphology and function. Hydrobiologia 453/454: 441-466.

Sars GO 1918. Copepoda Calanoida. An account of the Crustacea of Norway, with short descriptions and figures of all the species. 4: 16-18.

Sewell RB. 1947. The free swimming planktonic copepoda. Systematic Account. Scient. Rep. John Murray Exped. 8: 51-52.

Shim JH. and GH Yun. 1990. Seasonal variation and production of zooplamkton in Chonsu Bay, Korea. J. Oceanol. Soc. Korea 25: 229-239.

Soh HY and HL Suh. 1993. Seasonal fluctuation of the abundance of the planktonic copepods in Kwangyang Bay. Korean J. Environ. Biol. 11; 26-34.

Suh HL, HY Soh and SS Cha. 1991. Salinity and distribution of zooplankton in the Estuarine System of Mankyonh River and Dongjin River. J. Oceanol. Soc. Korea 26; 181-192.