# Preliminary Note on the Postembryonic Development of Ovary in *Propallene longiceps* (Pycnogonida, Callipallenidae)

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The adult ovarian structure and oogenetic mode in pycnogonids have some similarities to those in chelicerates, as well as some peculiar characteristics (Miyazaki and Makioka, 1990). In order to evaluate these features correctly, the study on the postembryonic development of the ovary is needed, but the previous studies have paid attention mainly to the external change of the larvae. Dogiel (1913), Sanchez (1959) and Berry (1980) described the first appearances of germ cells in some pycnogonids, but they all did not follow the further development of these cells. Morgan (1891) studied the development of the gonad, but his brief description was restricted in the period between the 5th and 8th larval stages. In the present study, we observed the postembryonic development of the ovary in *Propallene longiceps*, the only pycnogonid species whose postembryonic stages had been described (Nakamura, 1981).

We collected many specimens of *P. longiceps* from the sandy bottom of about 40 m deep, off Shimoda, Izu, Central Japan. After decided the postembryonic stage based on Nakamura (1981), most specimens were fixed at once, and some larvae were reared until the needed stages with an artificial seawater, Jamarin U, in the incubator at 18℃, using live *Artemia* as food. The specimens were fixed with seawater-Bouin's solution and then were made into serial paraffin sections in 5-7 $\mu$m thick or into epoxy semithin sections in 1-3 $\mu$m thick. These sections were stained with hematoxylin and eosin, Heidenhain's azan or Masson's trichrome methods.

*P. longiceps* has 9 postembryonic stages (Nakamura, 1981). Until the early 3rd stage, we could not detect any germ cells so far in the larval body. In the later 3rd stage, a pair of the youngest gonads appeared above the gut in the cephalothoracic trunk region with the primordial 1st walking legs. The youngest gonad consisted of the spherical and relatively large gonial cells (7-10 $\mu$m in diameter) and some flat mesodermal cells. In the 4th stage, the double-layered horizontal septum was formed, separating the dorsal and the ventral hemocoel, and sandwiching the paired gonads between the dorsal and the ventral layer. During the 5th and 6th stages, the gonads extended forward and backward, and then united into a single one, zipping up from the anterior toward the posterior region. In the 7th stage, the gonad in the trunk region separated again to become paired, and at the same time, it extended its lateral branches to four pairs of the walking legs. The sexual differentiation first appeared in this stage; each pedal gonadal branch reaching the femoral segment in females became tubular and some oogonia developed into the previtellogenic oocytes. Larger oocytes protruded outward from the ventral ovarian wall accompanied with cellular stalks. In the early 8th stage, the posterior ends of the paired trunk ovaries turned medially and united with each other in the last pedigerous segment, forming an incomplete U-shaped trunk ovary, nearly similar to those in many other pycnogonids. However, the trunk ovary stopped further development and then disappeared during the late 8th and 9th stages. The female germ cells in the trunk ovary remained in the oogonial stage, but the stalked oocytes in the pedal ovary developed gradually. As the stalked oocytes located more centrally in the pedal ovary, they grew faster and became vitellogenic. In the adult stage, the trunk ovary completely disappeared, and the ovaries were separately located in eight femoral segments of the corresponding walking legs. Throughout the postembryonic stages, the gonadal tissues never occurred in the abdomen.

In the 2nd coxal segment of each walking leg, in the 8th stage, an oviduct branched from the right side of the ovary and extended toward an area of the ventral epidermis of this segment, where the epidermis was invaginated to form a female genital pore. The oviduct was united with the epidermal invagination in the 9th

stage, but the latter was covered by the larval cuticle. The genital pore with a cuticular lid opened only in the adult stage.

The results obtained so far bring some conclusions as follows: (1) Lack of the adult trunk ovary in *P. longiceps* is the secondary condition, derived from the primary condition with a U-shaped adult trunk ovary seen in many other pycnogonids. (2) There is no evidence to believe some authors' speculation that the gonad was originally located in the abdomen as those in recent arachnids and secondarily shifted to the cephalothorax. (3) Uniquely multiple pedal genital pores are considered as the primary condition in pycnogonids, based on their development.

We intend to make more detailed observations in order to discuss some relationships between the germ cells and the coelom in earlier stages.

**References**

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