

# Laboratory of Animal Morphology

## Graduate School of Science



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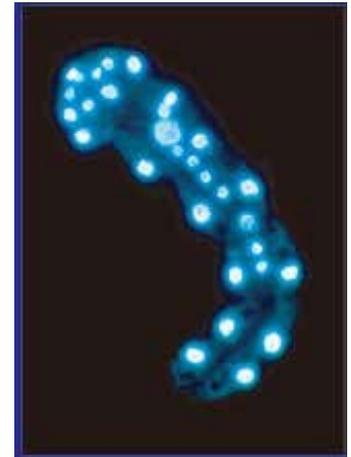
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I have a great interest in the meaning of the diversity of forms of living organisms. I am therefore trying to explain it by using the multicellular animals called dicyemids (phylum Dicyemida). The dicyemid is a unique animal that lives in a urine-filled environment "renal sac" of cephalopod molluscs. I am conducting a comprehensive study of how the form of dicyemids was evolved in the microenvironment of the cephalopod renal sac, from the perspectives of living environment, structure, development, interactions among organisms, genomics, and evolution.

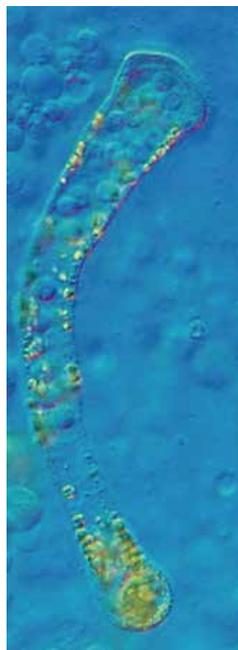
that deserve the name of "mesozoans", but that they belong to the metazoans. It still remains to be explored how such a simple body organization has evolved. Dicyemids are subjected to a number of selecting pressures due to their unique habitat with the renal organs of cephalopod hosts. In terms of morphological and ecological adaptation, this microenvironment could afford a space for a simple natural experiment.



Above: Fluorescence micrograph of a juvenile dicyemid of *Dicyema japonicum* Furuya & Tsuneki, 1992. The dicyemid has a small number of cells, of which nuclei are stained blue by DAPI staining.

### Biology of dicyemids

Organisms are quite small, but the most complicated creations in nature. My lab is interested in reading the meaning of animal forms and uses comparative anatomical approaches to understand the morphological evolution and adaptation. We are studying how the animal form had evolved in the life history using the dicyemid mesozoans (Phylum Dicyemida), a unique group of animals that inhabit the renal organ of cephalopod mollusks. The dicyemid body consists of only 20 to 40 cells and represents the smallest number of cells in the animal kingdom. Dicyemids have neither body cavities nor differentiated organs, and were named "Mesozoa" for the dicyemids as an intermediate between Protozoa and Metazoa in body organization. However, some zoologists regard the simple organization of dicyemids to be the result of specialization of parasitism. Recently we have revealed that dicyemids are not truly primitive animals,



Left: Differential interference micrograph of *Dicyema clavatum* Furuya & Koshida, 1992.

Bottom: Scanning microscopic micrograph of an external surface of the renal organ in *Octopus sinensis*. Dicyemids insert their anterior parts into the hollow of the renal epithelial cell layer.



Let's read the  
shape of nature.

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