Origin and evolution of the nervous system viewed from the diffuse nervous system: Nerve ring of cnidarians

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Our temporal conclusions about the origin of the nervous system are "The nervous system had the all basic elements of the nervous system from the early period of evolution ". I suggest that it is the case also for the central nervous system. Structure called the nerve ring was observed around the mouth of the hydra, which showed the nerve bundle and neural association. As a result of detailed studies of the structure, function, and development of the nerve ring, we propose it is a CNS (central nervous system)-like structure.

In that regard, presence of the nerve ring and its function as central control in medusae of various marine cnidarians (jellyfish) was known. In contrast, the nerve ring in the polyp of marine cnidarians was completely unknown. So the nerve ring was screened covering all cnidarians including hydrozoans, scyphozoans (jellyfish), and anthozoans (sea anemone and coral). As a result, the nerve rings are found to be ubiquitous neural structures in cnidarians' polyps, including the ancestral form of cnidarians; sea anemone and coral.

Now we are doing molecular evolutional study of the nerve ring. We identify genes which are expressed specifically in the nerve ring of hydra. Using these genes, we will clarify the relationship between nerve rings of cnidarians, nematode, and starfish.