

Part II

Neurobiology

Introduction to the Symposium

The research presented in this two-day symposium attests not only to the coming of age of coelenterate neurobiology, but also to provocative and far-reaching questions posed by the unique organization of the coelenterate coordinating system. Molecular, biochemical, ultrastructural, immunocytochemical, and electrophysiological techniques have stimulated new questions, even as old ones have been resolved. They are forcing a renewed appreciation of the subtlety and precision of the coelenterate behavioral design.

The papers that follow bear witness to the growing consensus that coelenterates are exceedingly catholic in their coordinating mechanisms. Epithelial conduction, by means of electrically conducting gap junctions, and gas-mediated epithelial coordination of cnidae and myonemes, together with classical, neurotransmission and peptidergic modulation in the same nerves – and, importantly, the highly organized eyes of some forms – make it clear that the apparent simplicity of coelenterate neuro-effector systems is just that, an apparent simplicity. Micro-anatomical and chemical differentiation within a nervous system, inter-tissue communication between neurons and epithelia, between neurons and cnidocytes, and between epithelia and cnidocytes, reveal the surprising complexity of these once seemingly homogeneous coordinating systems.

The intricate and specific integration of sensory signals, the diverse array of receptors, ligands, conduction pathways, and effectors, and the molecular relationships to other species are forcing a revised assessment not only of the place of coelenterates in evolution, but also of their highly developed physiology. The research that follows presents a review of the state of coelenterate neurobiology that is at the same time satisfying and challenging.