Thesis Title N-Acetyltransferase and Melatonin Levels in Optic Lobe of Giant Freshwater Prawn Macrobrachium rosenbergii de Man.

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ABSTRACT

Since the crustacean optic lobe has the ability to regulate the physiological activities through photoperiodic environment similar to the pineal gland of vertebrates, the relationship between the crustacean optic lobe, or a part of it, and the pineal gland of higher species is therefore suspected. In this study, a key enzyme in mammalian pineal, N-acetyltrensferase (NAT), and a pineal hormone, melatonin, were determined at 3-hr intervals in the optic lobe of the giant freshwater prawn, Macrobrachium rosenbergii de Man, compared to those in rat pineal. A relative high activity of NAT and detectable levels of melatonin were

found in the tissue. The enzyme did not show a significant diurnal rhythm although the activity seemed to increase at daytime. The melatonin levels varied considerably and show a peak at daytime (1500 hr) and a nadir at nighttime (2400 hr). Although melatonin levels seemed to follow those of NAT activities, they were much lower than rat pineal melatonin levels. The distribution of NAT in various parts of optic lobe was determined in three parts of the optic lobe. Part I comprised the lamina ganglionalis, medulla externa and medulla interna; Part II was the medulla terminalis and Part III was the optic peduncle. The NAT activity was mainly localized in Part I and Part II of the tissue.

This study demonstrated that NAT and melatonin exist in the optic lobe of M. rosenbergii and they differ from those in rat pineal in terms of rhythm and magnitude. The enzyme NAT seemed to localize in all parts of the optic lobe, suggesting that the enzyme plays a general role in the optic lobe. It is likely that the enzyme exerts other unknown functions beside melatonin synthesis.