NEUROENDOCRINE AND CIRCADIAN CONTROL OF POSTEMBRYONIC DEVELOPMENT IN THE FRUIT FLY, *DROSOPHILA MELANOGASTER*.

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Insects have a rigid exoskeleton. Continuous growth therefore requires the periodic replacement of the exoskeleton of one stage with a larger one for the next stage. The process of making a new exoskeleton, called molting, culminates with ecdysis, the behavior used to shed the exoskeleton from the previous stage. The expression of ecdysis at the correct developmental time at the end of the molt is critical to the insect's survival, and failures at ecdysis are rapidly and invariably fatal. We are using a genetic approach to understand how ecdysis is controlled using the fruit fly, *Drosophila melanogaster*. This is an attractive model system for understanding how neuropeptides cause changes in physiology and behavior because of the powerful genetic and molecular tools available in *Drosophila*. Ecdysis is regulated by a series of interacting neuropeptides. Three main neuropeptides control the behavioral routines as well as other related physiological events expressed at ecdysis: Ecdysis Triggering Hormone (ETH), Eclosion Hormone (EH), and Crustacean Cardioactive Peptide (CCAP). Following ecdysis, the release of the neuropeptide bursicon causes wing inflation, and the hardening and melanization of the new exoskeleton, which are the final steps of the ecdysis sequence. I will discuss our progress in understanding how ETH, EH, CCAP and bursicon regulate ecdysis to ensure the flawless passage from one stage to the next during insect postembyonic development. The ecdysis to the adult (eclosion or emergence) is also regulated by the circadian clock, which restricts the time of day when eclosion can occur. I will present our current understanding of how the biological clock regulates the timing of the molt and of ETH, EH and CCAP release in order to impose a daily rhythmicity to the pattern of adult emergence. This is a unique system for understanding how the biological clock regulates the timing of behavior.

Keywords: insect, molt, ecdysis, neuropeptide, circadian