A Direct Role of JH in the Control of Imaginal Disc Formation and Growth in Manduca

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CPF3 aggregated, but did not bind to chitin columns. The other family (CPTC) has two conserved cysteine residues and no homology to other known proteins, i.e. no matches in the arthropod nr database. *A. gambiae* has four CPTC genes. The four CPTC proteins were abundant in the MS/MS data; indeed we obtained peptides that covered 60% of the sequence of CPTC2. Peptides from CPTC1 and CPTC4 were recovered from material that bound to chitin beads. No CPF proteins were detected in this material. The specific role of these two families of proteins in cuticle formation remains to be elucidated.

**Role of the JAK/STAT pathway in Tribolium oogenesis**

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*Tribolium castaneum* exhibits ovaries of the telotrophic meroistic type which differs fundamentally from the polytrophic meroistic ovary present in *Drosophila*. In the telotrophic meroistic ovary, nurse cells do not accompany the maturing follicles but remain located in the apical portion of the ovariole, the tropharium. The growing oocytes stay connected to the tropharium by nutritive cords. We are interested in the mechanisms of stem cell regulation, clusterogenesis and embryonic axis formation in this ovary type. We have initiated loss-of-function studies of *Tribolium* oogenesis using RNA interference against *Teadomeless*, the transmembrane receptor of the JAK/STAT pathway. Depending on the developmental stage of injection, *domeless* dsRNA is able to induce phenotypes indicative of three separate functions of the JAK/STAT pathway in *Tribolium* oogenesis and early embryogenesis: germ cell proliferation, follicle formation and embryonic patterning. The phenotypes we obtained are specific to *domeless* as RNAi for the Bmp-orthologues *glass bottom boat* and *decapentaplegic* lead to completely different phenotypes. These results demonstrate the applicability of systemic RNAi for analyzing oogenesis in *Tribolium* and they identify the JAK/STAT pathway as a central player in this developmental system.

**A direct role of JH in the control of imaginal disc formation and growth in Manduca**

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In Lepidoptera the eye and the leg imaginal discs form only in the final larval instar from imaginal primordia that make larval cuticle during the earlier instars but remain diploid. Formation of these discs in the tobacco hornworm, *Manduca sexta*, begins about 18 hr after ecdysis with the appearance of Broad in these cells and the detachment of the primordium, followed by the onset of proliferation by 24 hr. Starvation from the time of ecdysis prevents this formation, which can be restored by feeding on sucrose plus casein; sucrose only permits the up-regulation of Broad, but not proliferation. By contrast, these discs form and grow slowly in starved allatotroped larvae lacking juvenile hormone (JH), and this formation can be prevented by JH. Ligation experiments show that this disc morphogenesis induced by the removal of JH is independent of ecdysteroid action. Starvation experiments and JH treatment both *in vivo* and *in vitro* showed that JH acted directly on the primordia to suppress morphogenesis and that a second unidentified factor dependent on nutrients is necessary for the morphogenesis to occur. This factor that we call "metamorphosis initiating factor" appears only in the final instar and can override the JH suppression of disc formation. Thus, disc growth in the final instar is comprised of both morphogenetic growth under the suppressive control of JH and nutrient-dependent growth. One major role of JH then during larval life is to allow isomorphic growth of these imaginal primordia as the larva grows. This suppression of morphogenesis is also seen in embryos of more basal insects where premature exposure to JH suppresses embryonic patterning and induces precocious terminal differentiation. Thus, the ancient role of JH is to allow switching between growth and morphogenesis. Supported by grants from NSF to JWT and LMR, USDA to LMR, Japan Society for the Promotion of Science to KH, and Bioscience Research Institute of Southern Maine to DTC.

**Cloning of Anopheles gambiae antennal odorant receptors and functional expression in silkmoth cells**

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