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In this issue of *Fly*

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Shaping Tissues and Organs pp. 213–27

The elongated Drosophila egg has been traditionally used to examine how tissues and organs are shaped. Drosophila egg elongation requires interactions between a polarized intracellular basal actin network and a polarized extracellular network of basal lamina proteins. In this issue of *Fly*, Gates reviews recent studies that have revealed two novel processes involved in Drosophila egg elongation by using live imaging. These two processes, global tissue rotation and oscillating basal actomyosin contractions, have provided significant insight into how the two polarized protein networks cooperate to produce an elongated egg.

R7 Photoreceptor: An Evolutionary Perspective pp. 228–33

The Drosophila R7 photoreceptor precursor is directed to its fate by signals from adjacent cells that activate its Receptor Tyrosine Kinase and Notch signaling pathways. Notch both promotes and inhibits the photoreceptor fate in the R7 precursor. Mavromatakis and Tomlinson now offer an evolutionary perspective for this process in which earlier ommatidia had fewer photoreceptors and used Notch to inhibit the addition of more photoreceptors.

Capicua and Dorsoventral Polarity pp. 234–9

Dorsoventral axis formation in Drosophila begins during oogenesis through the graded activation of the EGF receptor (EGFR)-Ras-MAPK signaling pathway in the follicle cell layer of the egg chamber. EGFR signaling, which is higher in dorsal follicle cells, represses expression of the gene *pipe*, thereby delimiting a ventral domain of Pipe activity that is critical for the subsequent induction of ventral embryonic fates. The transcriptional circuit that links EGFR signaling to *pipe* repression has been characterized: in dorsal follicle cells, the homeodomain transcription factor Mirror, which is induced by EGFR signaling, directly represses *pipe* transcription, whereas in ventral follicle cells, the HMG-box protein Capicua supports *pipe* expression by repressing *mirror*. In this issue of *Fly*, Andreu et al. consider a model where EGFR-mediated downregulation of Capicua modulates the spatial distribution of Mirror protein in lateral follicle cells, thereby contributing to define the position at which the *pipe* expression border is formed.

Development and Evolution of Abdominal Segment Reduction pp. 240–5

Numerous sexually dimorphic characters can be used to readily distinguish Drosophila males from females, including abdominal pigmentation, male sex combs and genital morphology. Another, usually overlooked, sexual dimorphism is adult abdominal segment number: adult males possess one fewer abdominal segment than females. Homeotic protein Abdominal-B (Abd-B) and the sex-determining transcription factor Doublesex (Dsx) are key regulators of this trait. Recent findings determined that rapid epithelial reorganization during pupation eliminates a nascent terminal male segment. Yoder now discusses his previous work that indicates that this is an Abd-B-dependent process that results from sex- and segment-specific regulation of diverse developmental targets including the *wingless* gene and *dsx* itself. The author discusses this trait as a model of epithelial morphogenesis and evolution of developmental mechanisms.

A Drosophila Protein Interaction Map pp. 246–53

Guruharsha et al. generated a large-scale resource of affinity-tagged expression-ready clones and used co-affinity purification combined with tandem mass-spectrometry to identify protein partners of nearly 5,000 *Drosophila melanogaster* proteins. The resulting protein complex "map" provided a blueprint of metazoan protein complex organization. In this issue of *Fly*, the authors describe how this map has provided valuable insights into protein function in addition to generating hundreds of testable hypotheses.

Larval Hematopoiesis in Drosophila pp. 254–60

During Drosophila development, the sites where hematopoiesis occurs shift. Hemocytes originate de novo during hematopoietic waves in the embryo and in the Drosophila lymph gland. In the larva, the hematopoietic wave is based on the colonization of resident hematopoietic sites by differentiated hemocytes that arise in the embryo. At the transition to the larval stage, embryonic hemocytes retreat to hematopoietic 'niches', which are segmentally repeated hematopoietic pockets of the larval body wall that are jointly shared with sensory neurons and other cells of the peripheral nervous system. Makhijani and Brückner discuss

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larval hematopoiesis as the first Drosophila model for blood cell colonization and niche support by the peripheral nervous system, adding to the growing concept of nervous system dependence of hematopoietic and other organ microenvironments.

Spermatid Individualization in *Drosophila melanogaster* pp. 261–72

Spermatogenesis in all animal species occurs within a syncytium. Individual sperm cells are resolved at the end of spermatogenesis in a process known as individualization. In Drosophila, a membrane-cytoskeletal complex known as the individualization complex (IC) assembles around the sperm heads and proceeds down the flagella, removing cytoplasm from between the sperm tails and shrink-wrapping each spermatid into its own plasma membrane. The *mulet* (*mlt*) mutation results in severely disrupted ICs, indicating that the *mlt* gene product is required for individualization. In this issue of *Fly*, Fabrizio et al. studied spermatid individualization by investigating the role of *mlt*, *CG12214* (the Drosophila tubulin-binding cofactor (TBC) E-like homolog) and *KCNQ* (a large voltage-gated potassium channel). Their results suggest that the removal of microtubules by TBCE-like is a necessary pre-requisite for proper coordinated movement of the IC.

On the Relationships of Wolbachia and Native Hawaiian Insects pp. 273–83

Wolbachia is one of the most common, widespread endosymbionts known. This parasitic bacterium affects a variety of reproductive functions in its host causing, for example, male killing, cytoplasmic incompatibility and parthenogenesis, which have the potential to dramatically impact host evolution and species formation. Now, Bennett et al. present the first broad-scale study to screen natural populations of native Hawaiian insects for Wolbachia. Phylogenetic relationships and allele diversity provide evidence for horizontal transfer of Wolbachia among Hawaiian arthropod lineages.

Using Near-Infrared Spectroscopy to ID Flies pp. 284–9

Drosophila subobscura and *Drosophila obscura* (also known as vinegar flies) are commonly used as study organisms for evolutionary biology. Their high morphological similarity renders traditional species determination difficult, especially when living specimens for setting up laboratory populations need to be identified. Fischnaller et al. tested the usefulness of cuticular chemical profiles collected via the non-invasive method near-infrared spectroscopy for discriminating live individuals of the two species. The authors conclude that the cuticular chemistry is genetically determined, despite changes in the cuticular fingerprints, which may be due to laboratory adaptation, genetic drift and/or diet changes, suggesting that laboratory-reared specimens should not be used to predict the species.

Drosulfakinin, Larval Locomotion and Escape Response pp. 290–7

Neuropeptides are ubiquitous in both mammals and invertebrates and play essential roles in regulation and modulation of many developmental and physiological events. Chen et al. investigated the functions of Drosulfakinin (DSK), the Drosophila homolog of vertebrate neuropeptide cholecystokinin (CCK), which is the most abundant neuropeptide in the central nervous system. Their results suggest that DSK signaling promotes larval body wall muscle contraction and is necessary for mediating locomotor behavior in the stress-induced escape response.

Drosophilids of the Scattered Islands pp. 298–302

In this issue of *Fly*, Yassin et al. report 13 drosophilid species belonging to seven genera and two subfamilies from three coral islands that belong to the Scattered Islands in the Indian Ocean. On the island of Juan de Nova, most captured flies had pollinia belonging to the genus Leptadenia (Apocynaceae). This is the first reported association between this plant and drosophilids.

A High-Throughput and Sensitive Method to Study Neurological Disorders pp. 303–8

Drosophila melanogaster is widely used as a model system for the study of neurologic disorders. Locomotive impairment is a commonly used diagnostic for screening and characterization of these models, but a sensitive method to compare behavior has not been described. In this issue of *Fly*, Jakubowski et al. present a high-throughput method to quantify the crawling behavior of larvae. Using this method, the authors studied larvae with altered expression of the *shaggy* gene, a homolog of Glycogen Synthase Kinase-3 (GSK-3), which has been implicated in Alzheimer disease. The authors found that both increased and decreased expression of dGSK-3 lead to similar larval crawling impairment, a finding that has implications for the use of GSK-3 inhibitors recently proposed for Alzheimer treatment.