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The Developmental and Molecular Basis of Allometry in Drosophila

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The Developmental and Molecular Basis of Allometry in *Drosophila*

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Allometry is the scaling relationship between the size of an organism and the size of its constituent parts. Despite its obvious developmental and evolutionary importance, very little is known of the mechanisms that regulate allometries. Here, we look at one particular type of allometry—that created by rearing *Drosophila* under different nutritional conditions. *Drosophila* larvae that are fed increasingly suboptimal diets eclose into increasingly small adults with increasingly small body parts. Surprisingly, however, the male genitals remain approximately the same size under a range of nutritional conditions. The genitals therefore maintain a different allometric relationship with the body than other structures. The

insulin-signaling pathway is known to regulate growth with respect to nutrition, and suppression of the insulin receptor has less of an effect on the size of the genitals than it does on the wing, the maxillary palp, and the leg. Genetic and micro-array data suggest that the unusual allometric relationship between the genitals and the body is explained by differential expression of insulin-pathway genes in the genitals relative to other body parts. Organ-specific regulation of the insulin signaling pathway may therefore be a general method by which animals maintain the size of key structures under variable nutritional conditions.