The Drosophila neuromuscular junction as a model for membrane traffic function and dysfunction

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Synapse function is of fundamental biological interest, and is one of the processes affected during neurodegeneration. As well as extensive genetic tools, Drosophila offers a neuromuscular junction synapse that is accessible to eletrophysiological and optical methods, and that exhibits both basic synaptic transmission and mechanisms that regulate this. One essential process is synaptic vesicle recycling, without which our synapses would rapidly be depleted of synaptic vesicles. We have used reverse genetics to study proteins proposed to have a role in synaptic vesicle endocytosis. Surprisingly, two proteins thought to be important in vertebrates, Eps15 and amphiphysin, are not essential for synaptic vesicle endocytosis, but have other roles in membrane traffic and organisation. I will discuss what we have learnt from Drosophila of the roles of these proteins, and of the membrane traffic processes that they are involved in.