CBI Toulouse
Centre de Biologie Intégrative

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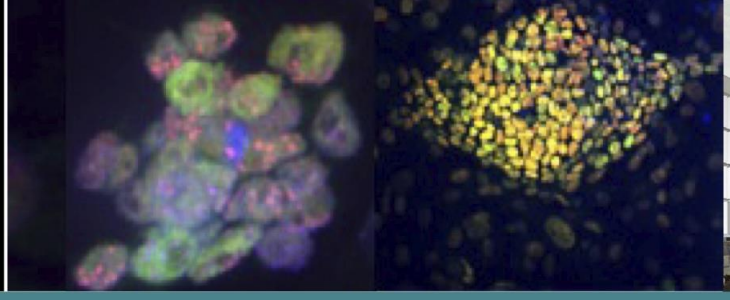

Chromatin Organisation Dynamics & Evolution

11h A.M

Monday
MAY 18TH 2023

Dr. Yifat Eliezer

Hebrew University of Jerusalem (Israel)

"Epigenetic Inheritance of odor associative memories in *C.elegans* "

Organisms often face changing environments; hence, the ability to predict future conditions is essential for survival. Associative memories play a central role in this regard as memory reactivation generates fast physiological responses that aid in coping with impending developments. But could these valuable associative memories be transferred to subsequent generations? We show that parental associative memories of traumatic experiences are indeed inheritable. We trained worms to associate a naturally favorable odor with starvation. When worms were presented with the training odor, they withdrew and initiated stress response processes. This stressful associative memory was also transmitted to the F1 and F2 generations, even though these animals were never exposed to the odorant nor starved before. Moreover, the stress responses provided both the parents and the offspring with a fitness advantage. The memory is transmitted through epigenetic mechanisms, namely histone methylation, small RNA pathways and neuropeptide signaling via the sperm, but not the oocytes. Furthermore, activation of a single chemosensory neuron (AWC OFF) sufficed to induce a systemic stress response in both the parents and their progeny, suggesting that this neuron is part of the memory engram. Our findings provide an important evidence, to the yet debatable idea, that associative memories can be epigenetically inherited.

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