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Keeping track of embryo development: new insights in the coupling between local and global changes TIMON IDEMA, PHILIP NELSON, ANDREA LIU, University of Pennsylvania, JULIEN DUBUIS, LISA MANNING, THOMAS GREGOR, Princeton University — Modern imaging techniques allow us to study biological systems such as Drosophila in vivo during early development. Between the ninth and fourteenth cell cycles of the Drosophila embryo, nuclei are positioned at the embryo's surface and are observed to divide at the end of each cycle in a highly synchronized fashion. We have implemented a new tracking technique that allows us to determine the shapes of the nuclei as they elongate and divide, and to follow their motion on the surface. We find that during each cycle, the nuclei shapes evolve with time in a consistent way from nucleus to nucleus. These shape changes spread as waves with a well-defined wave velocity through the embryo, coupling local (nucleus) and collective (entire embryo) development. The waves in turn induce collective motions of the nuclei, not just after division but also before it.

Timon Idema
University of Pennsylvania

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