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Data Article

Data of sperm-entry inability in *Drosophila melanogaster* ovarian follicles that are depleted of s36 chorionic protein

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ABSTRACT

This paper presents data associated with the research article entitled "Targeted downregulation of s36 protein unearths its cardinal role in chorion biogenesis and architecture during *Drosophila melanogaster* oogenesis" [1]. *Drosophila* chorion is produced by epithelial follicle cells and one of its functional serving role is egg fertilization through the micropyle, a specialized narrow channel at the anterior tip of the egg [2]. Sperm entry during fertilization is necessary for the egg to complete meiosis [3]. *D. melanogaster* flies being characterized by severe downregulation of the s36 chorionic protein, specifically in the follicle-cell compartment of their ovary, appear with impaired fly fertility (Velentzas et al., 2016) [1]. In an effort to further investigate whether the observed infertility in the s36-targeted flies derives from a fertilization failure, such as the inability of sperm to pass through egg's micropyle, we mated females carrying s36-depleted ovaries with males expressing the GFP protein either in their sperm tails, or in both their sperm tails and sperm heads.

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Specification Table

Subject area	*Biology*
More specific subject area	*Cell and Developmental Biology*
Type of data	*Confocal Laser Scanning micrographs*
How data were acquired	*Using a Nikon Eclipse C1 Confocal Laser Scanning Microscope (CLSM)*
Data format	*Analyzed data*
Experimental factors	*Female virgin control and s36-targeted flies were mated with dj-GFP or protamineB-eGFP; dj-GFP males. The deposited eggs were collected every one hour and observed under a Nikon CLSM*
Experimental features	*Comparison of successful fertilization levels between laid s36-depleted ovarian follicles and control ones*
Data source location	
Data accessibility	*All data are included in this article*

Value of data

- Insemination and not sperm entry into mature follicles seems responsible for the activation of ovulation process in *D. melanogaster*: new prospects for control of oogenesis by sperm microenvironment.
- Flies carrying s36-depleted ovaries may serve as a primary model system for deciphering the sperm-regulated ovulation and egg-deposition rhythms in *D. melanogaster*, through the use of spermatozoa with various genetic backgrounds.
- Imaging and quantification of *D. melanogaster* fertilization via employment of transgenic -fluorescent- spermatozoa technology most likely provide a useful and valuable platform for the assessment of, other than s36, major chorionic-components' contribution to follicles' competence for efficient fecundity.

1. Data

In order to examine *Drosophila melanogaster* sperm's ability to penetrate ovarian egg's micropyle [2] and enter into oocyte's cytoplasm of the s36-downregulated follicles, we mated s36-targeted virgin female flies with males expressing either the don juan-GFP fusion protein (dj-GFP), or both the dj-GFP and Mst35Bb/ProtamineB-eGFP proteins (Fig. 1A and B). The *Drosophila* don juan (dj) protein is expressed along the axoneme of each sperm tail [3–4], while protamineB is specifically localized in sperm heads [5]. To validate sperm's GFP-mediated fluorescence in the transgenic male flies, their testes expressing either the dj-GFP (Fig. 1A) or both the dj-GFP and protamineB-eGFP proteins (Fig. 1B) were visualized under a CLSM, clearly revealing bright green staining patterns for both spermatozoa populations examined.

More than half in number of the freshly-laid eggs ($n=90$) obtained from control (c355-GAL4/+) female flies after they have been crossed to males expressing dj-GFP (Fig. 1C and G) proved to be successfully fertilized, with GFP-tagged sperm being readily detected in their cytoplasm. Similarly, a 67% mean value of laid eggs ($n=105$), derived from control female flies mated with protamineB-eGFP; dj-GFP transgene-carrying males, were also presented with GFP-tagged sperm (see, its coiled shape within the anterior region of the herein shown representative follicle) inside each fertilized egg's cytoplasm (Fig. 1D and G). In contrast, GFP-tagged sperm could not be detected inside the cytoplasm of the freshly-laid s36-depleted eggs produced by female flies that have been inseminated either by dj-GFP ($n=110$; Fig. 1E and G) or by dj-GFP and protamineB-eGFP transgene-containing males