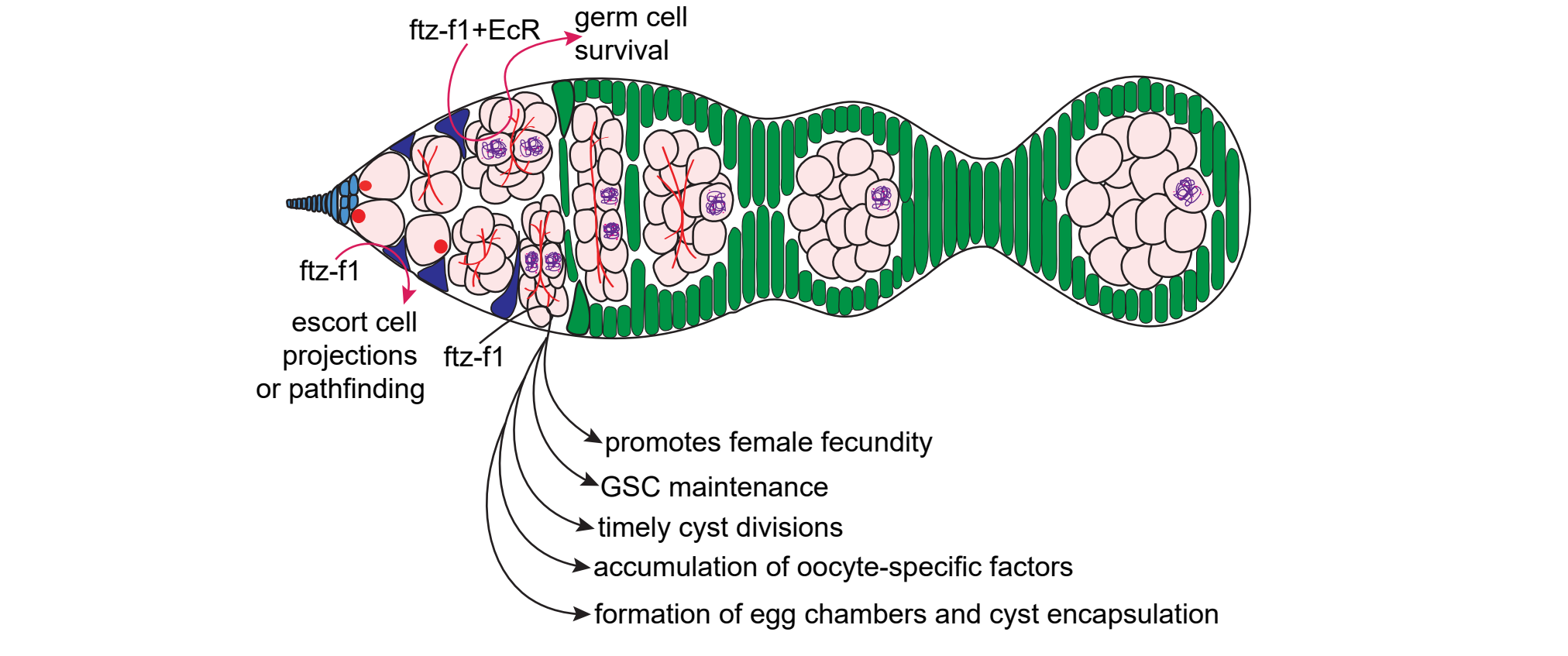
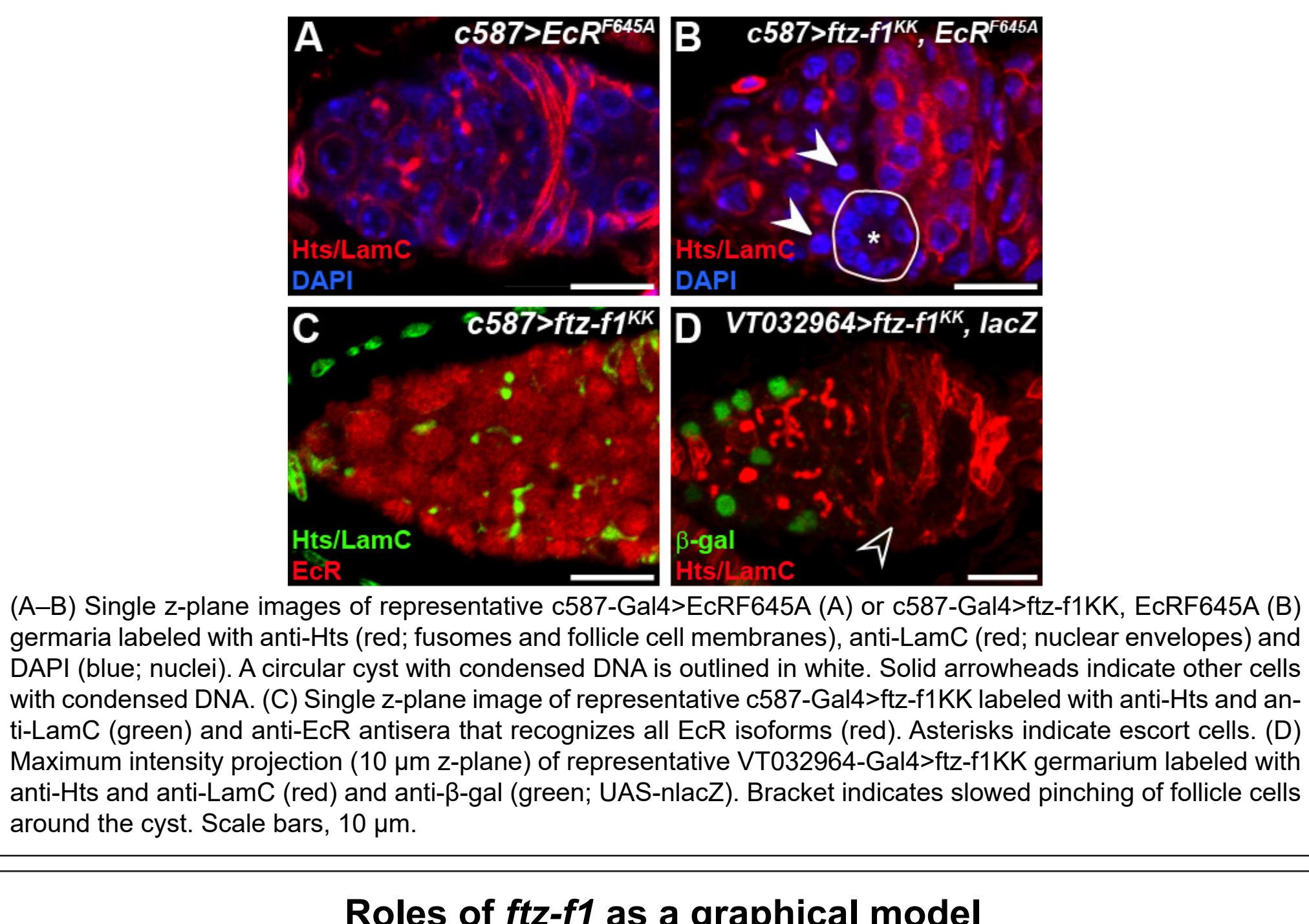
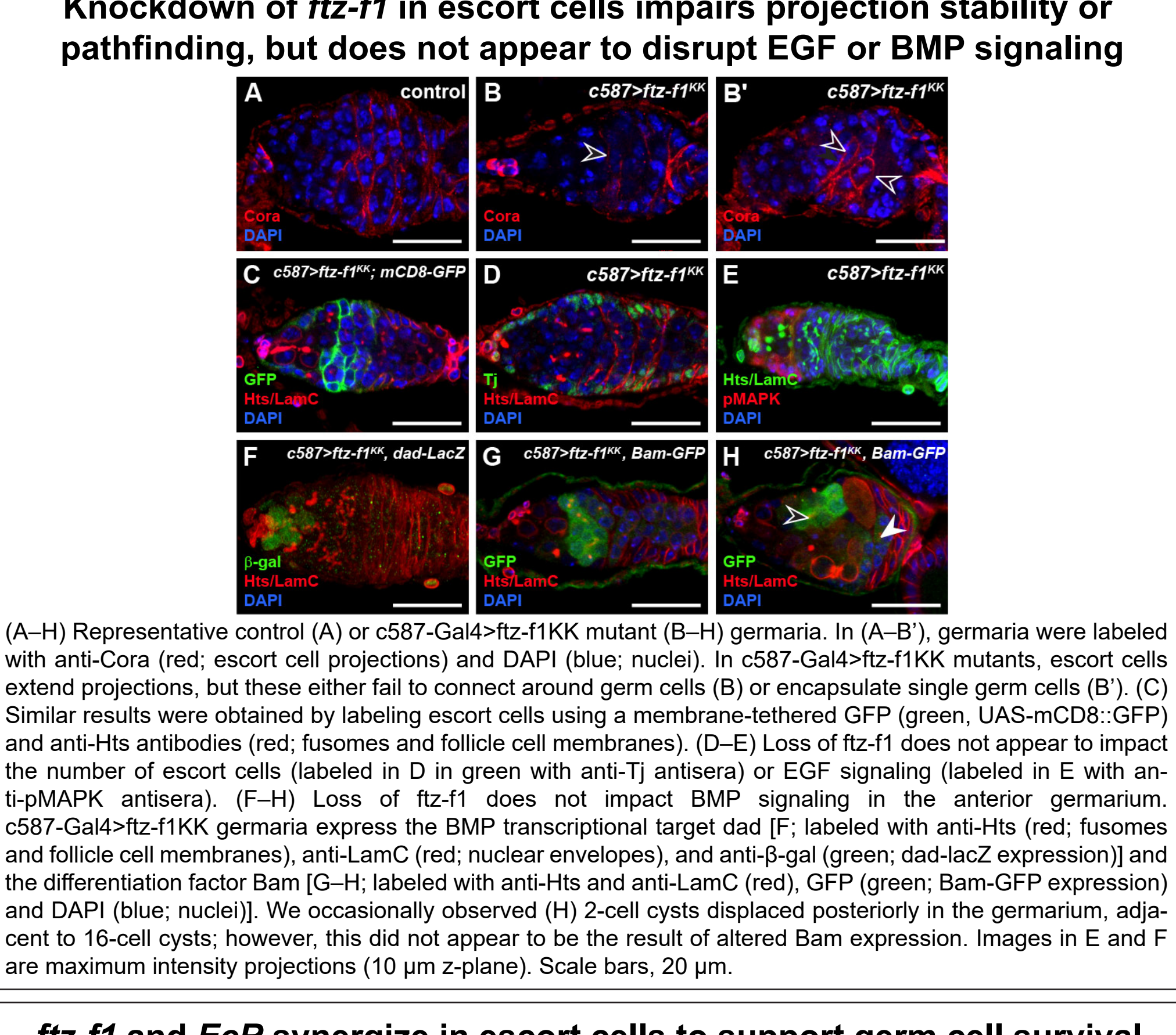
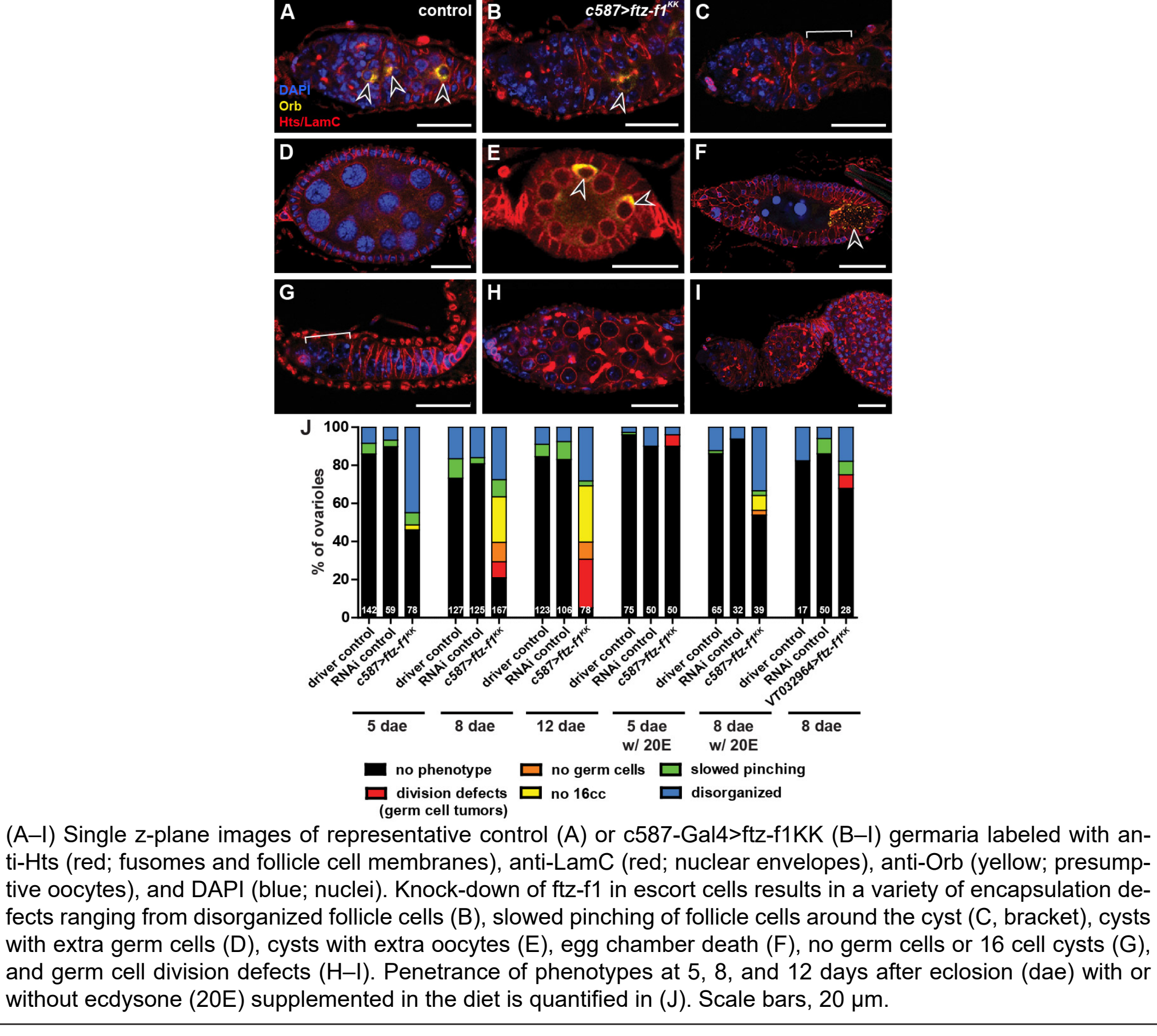
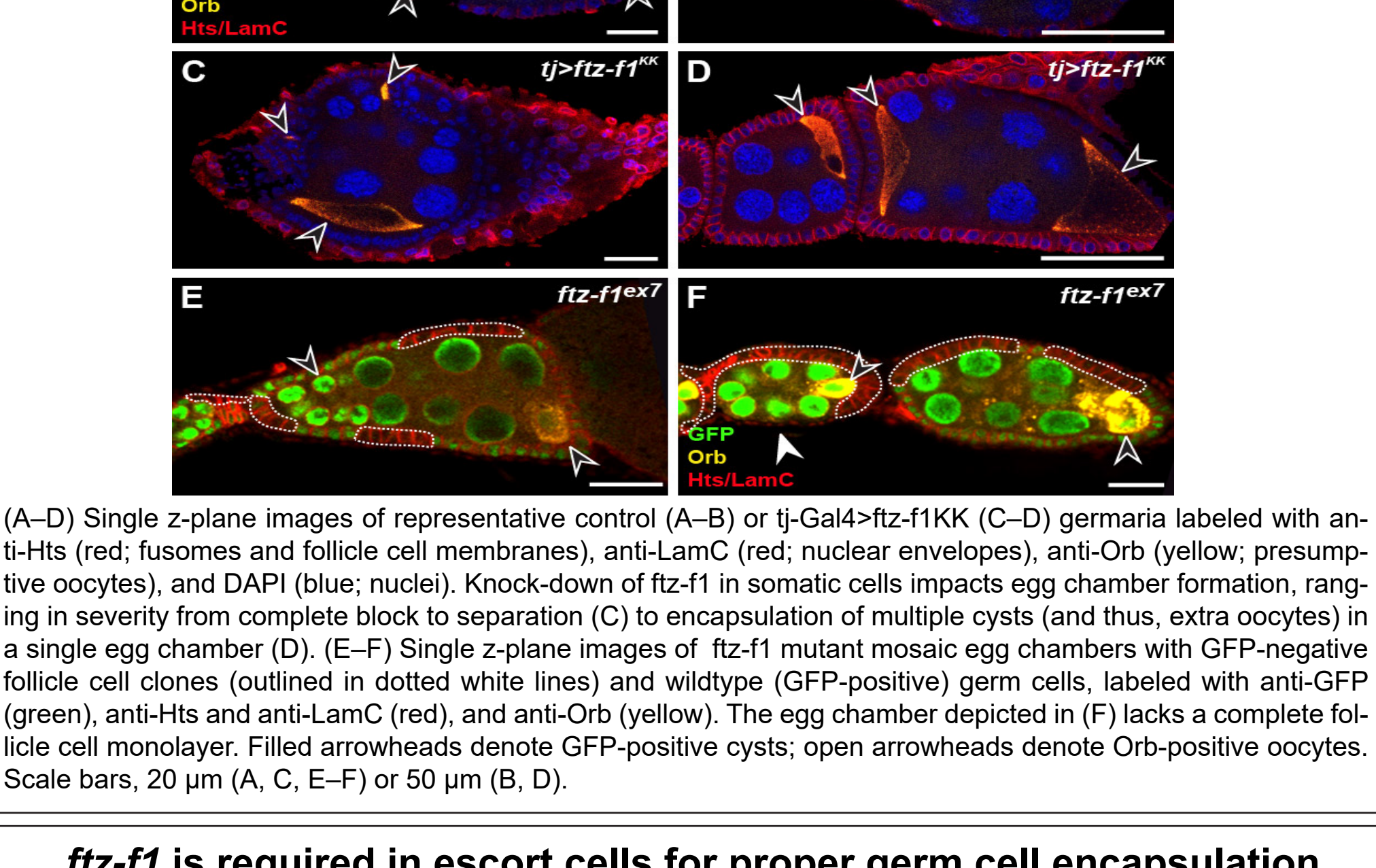
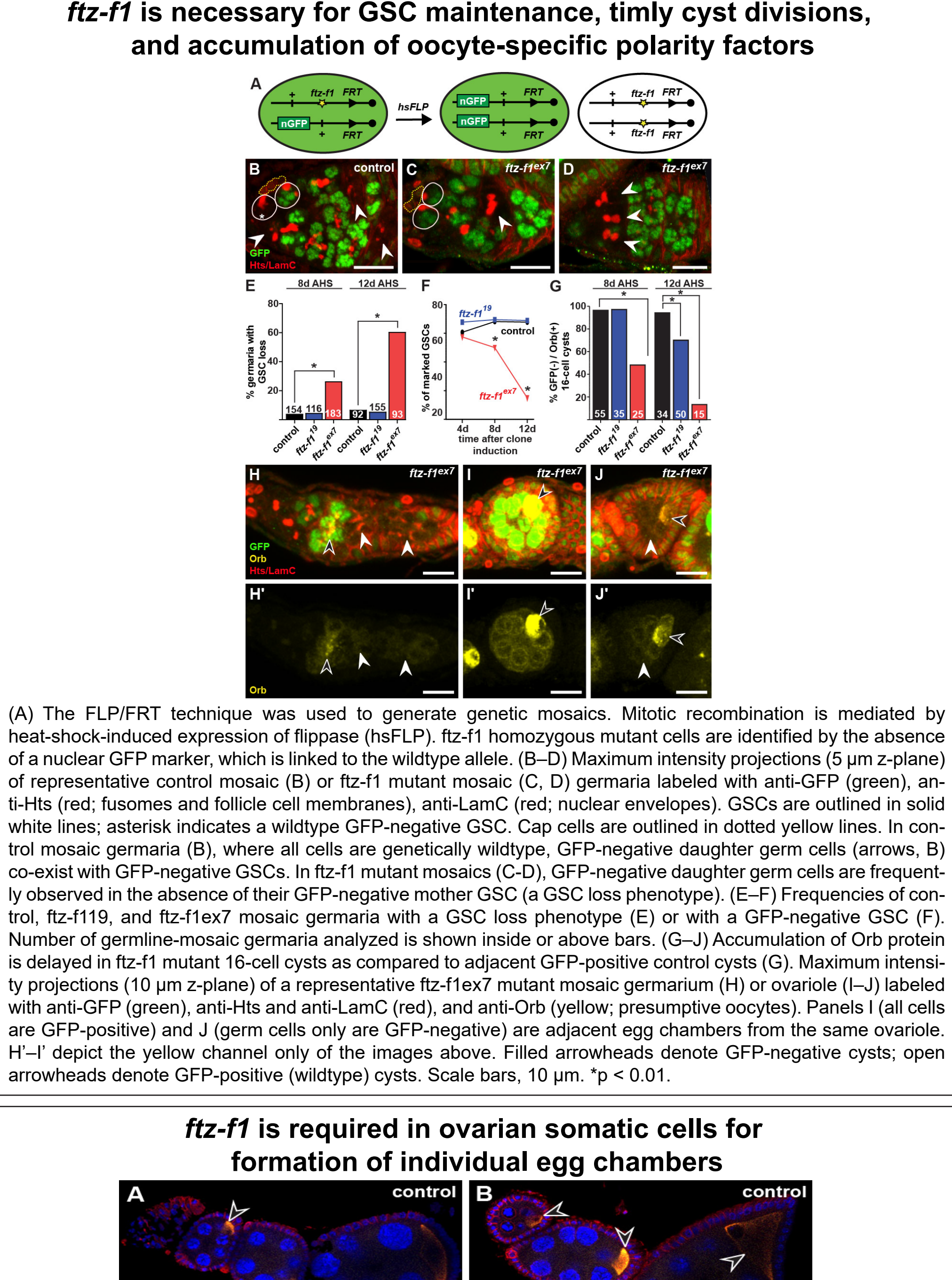
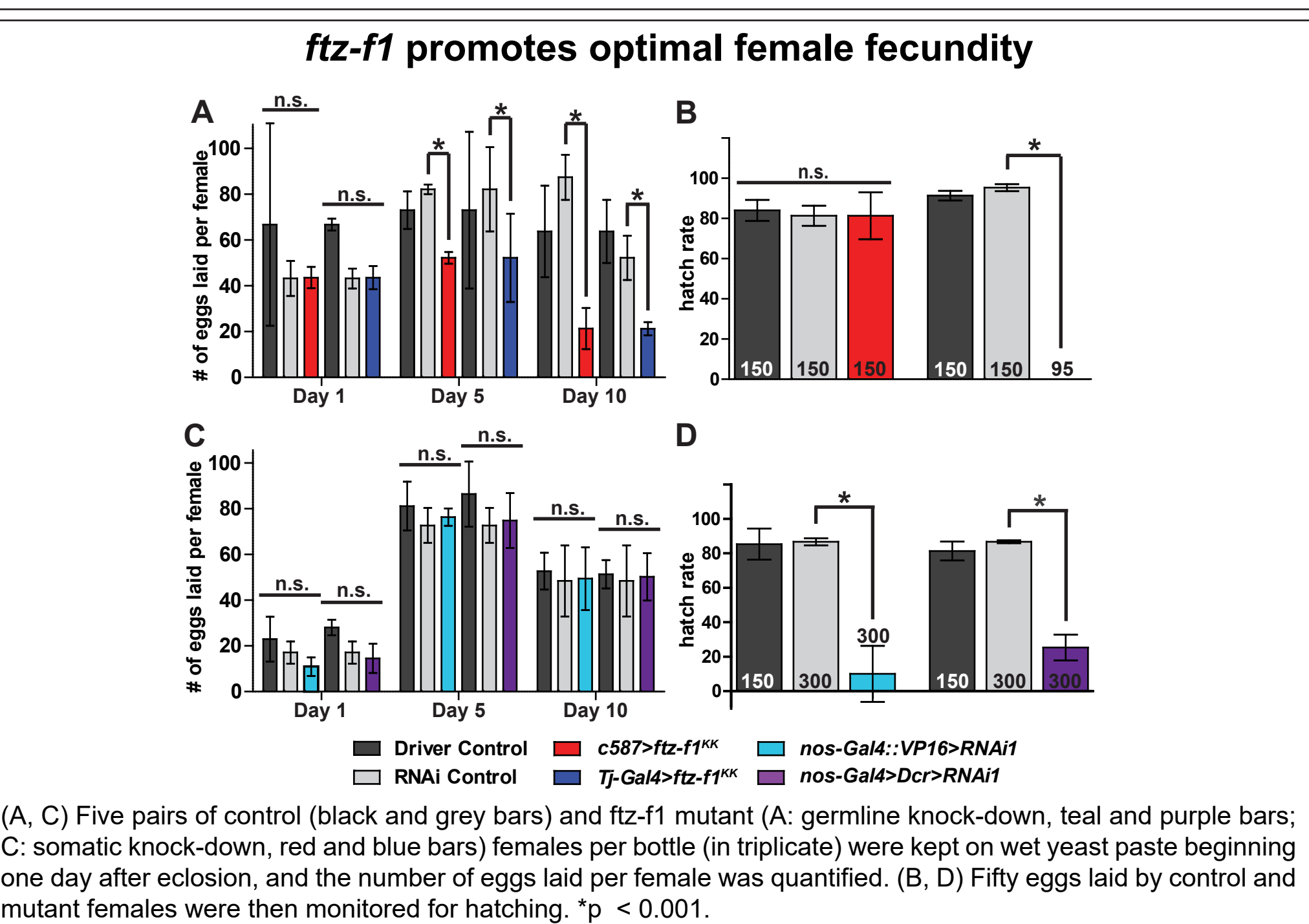
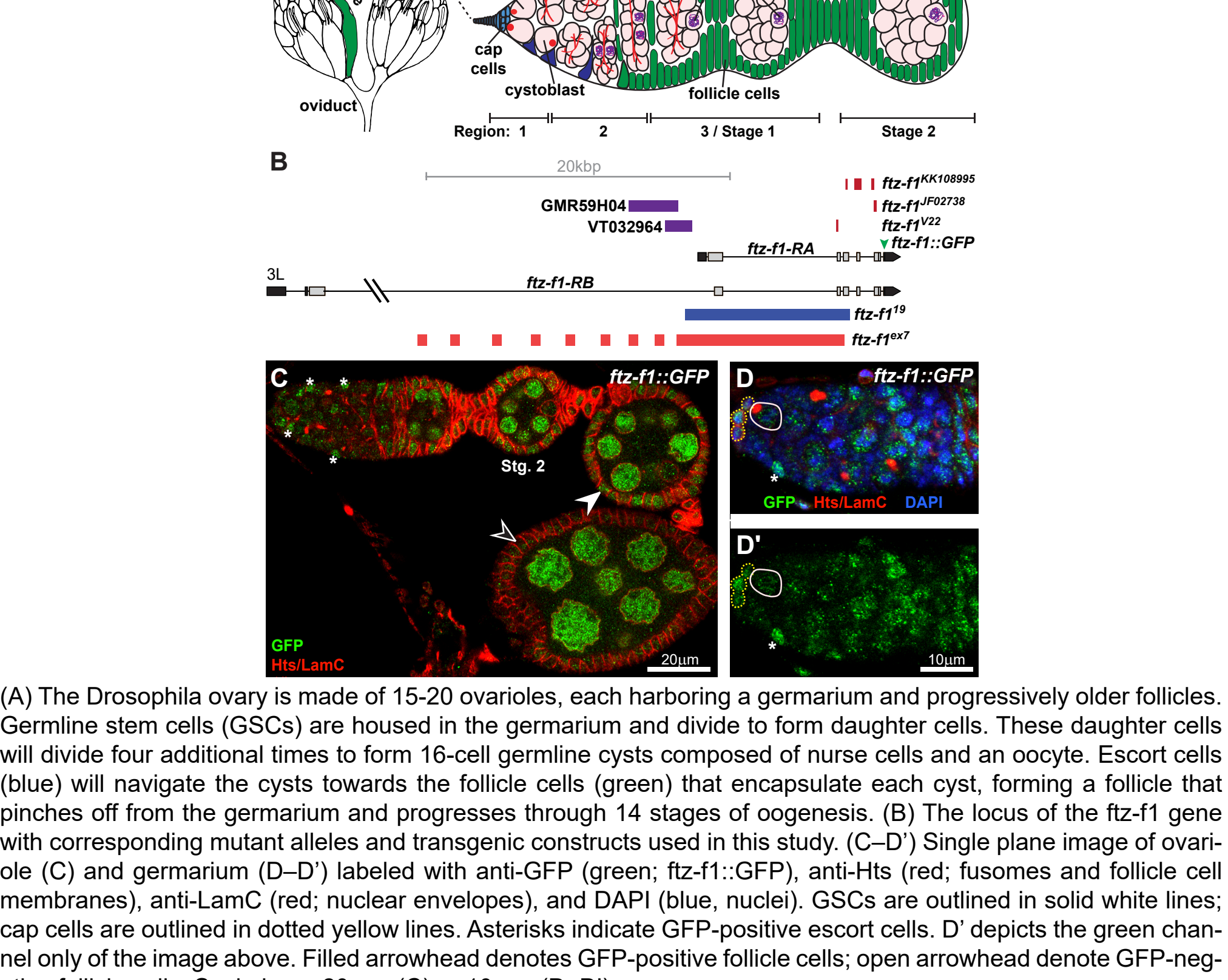


Gamete production in mammals and insects is controlled by cell signaling pathways that facilitate communication between germ cells and somatic cells. Nuclear receptor signaling is a key mediator of many aspects of reproduction, including gametogenesis. For example, the NR5A sub-family of nuclear receptors are essential for gonadogenesis and sex steroid production in mammals. Yet despite the original identification of the NR5A sub-family in the model insect *Drosophila melanogaster*, it has been unclear whether *Drosophila* NR5A receptors directly control oocyte production. Here, we demonstrate that *ftz-f1* (NR5A3) is necessary for multiple aspects of early oocyte development. *Ftz-f1* is expressed throughout the ovary, including in germline stem cells (GSCs), germline cysts, and several populations of somatic cells. *Ftz-f1* is necessary in GSCs and their dividing daughters for timely mitotic cyst divisions and accumulation of oocyte-specific proteins in the presumptive oocyte which dictate oocyte positioning within the cyst. In parallel, *ftz-f1* in somatic escort cells and pre-follicle cells promotes proper cyst division and cyst encapsulation. Interestingly, our data suggest that *ftz-f1* promotes escort cell-dependent cyst encapsulation via a complex genetic interaction with the steroid hormone ecdysone. We propose the model that *Ftz-f1* and ecdysone signaling via the Ecdysone Receptor (NR1H1) interdependently promote communication between escort cells and germ cells. Taken together, these results demonstrate that the reproductive functions of the NR5A sub-family are largely conserved between insects and mammals. Our data underscore the importance of nuclear receptors in the control of reproduction and highlight the utility of *Drosophila* oogenesis as a key model for unraveling the complexity of nuclear receptor signaling in gametogenesis.



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