

Description of Additional Supplementary Files

File name: Supplementary Data 1

Description: Size distribution of germ cell nests and oocytes. Measured and estimated volumes and sizes during *P. miniata* oogenesis

File name: Supplementary Data 2

Description: Molecular signature of *P. miniata* single cell clusters. Marker genes of the *P. miniata* single cell atlas.

File name: Supplementary Data 3

Description: Reported expression patterns of genes used as additional markers. Information on genes used to generate the dotplot in Figure 2 panel b.

File name: Supplementary Data 4

Description: Molecular signature of germ cell nests and oocytes. Differential gene expression analysis of germ cell nests versus oocytes.

File name: Supplementary Data 5

Description: Mapping Data of adult sea star versus adult sea urchin ovarian clusters. Output file from SAMap analysis used to make panel a in Fig.3.

File name: Supplementary Data 6

Description: Mapping Data of adult sea star versus adult zebrafish ovarian clusters. Output file from SAMap analysis used to make panel b in Fig.3.

File name: Supplementary Data 7

Description: Mapping Data of adult sea star versus fetal human ovarian clusters. Output file from SAMap analysis used to make panel c in Fig.3.

File name: Supplementary Data 8

Description: Mapping Data of adult sea star versus adult fruit fly ovarian clusters. Output file from SAMap analysis used to make panel a in Fig.S4.

File name: Supplementary Data 9

Description: Mapping Data of adult sea star versus adult mouse ovarian clusters. Output file from SAMap analysis used to make panel b in Fig.S4.

File name: Supplementary Data 10

Description: Mapping Data of adult sea star ovary versus sea urchin larva clusters. Output file from SAMap analysis used to make panel c in Fig.S4.

File name: Supplementary Data 11

Description: Mapping Data of adult sea star ovary versus mouse pituitary gland clusters. Output file from SAMap analysis used to make panel i in Fig.7.

File name: Supplementary Data 12

Description: Spatial gene expression. Additional information on HCR and FISH probes.

File name: Supplementary Movie 1

Description: Live imaging of *P. miniata* ovary ciliary beating. Brightfield video of an ovary fragment placed in a glass-bottom petri dish in FSW. Specimen imaged with a LEICA DMI8 Inverted Microscope (Flexacam C3).