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Supplemental Information

Collective Growth in a Small Cell Network

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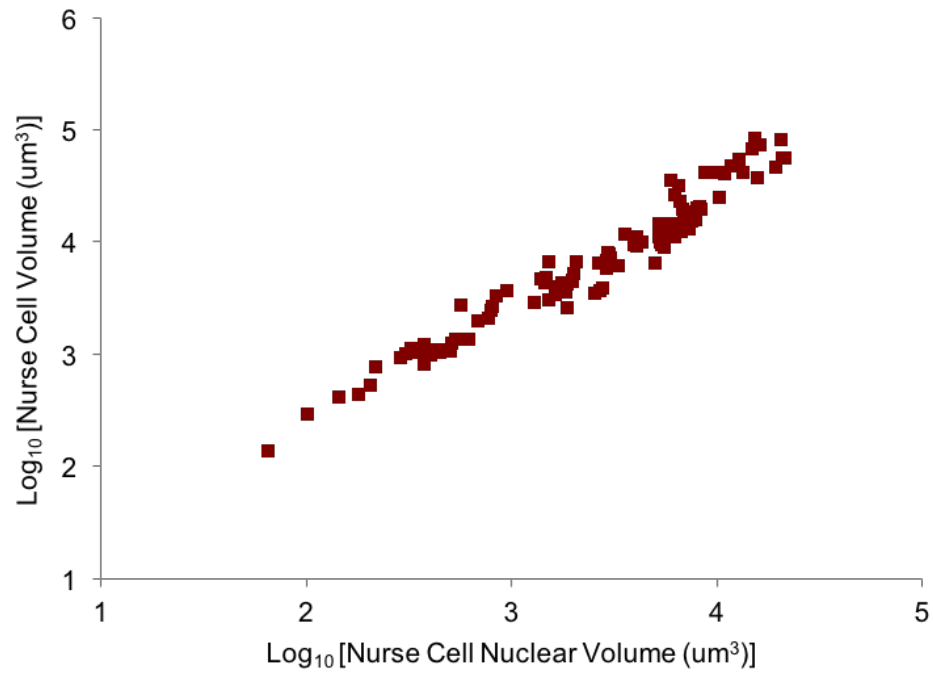


Figure S1. Nuclear and nurse cell volume correlate strongly. Related to STAR Methods.

A log-10 transformed plot of nurse cell versus nuclear volume as measured from 3D surface reconstructions, showing a strong correlation between cell and nuclear size in nurse cells, and that nuclear volume is a good proxy for nurse cell volume.

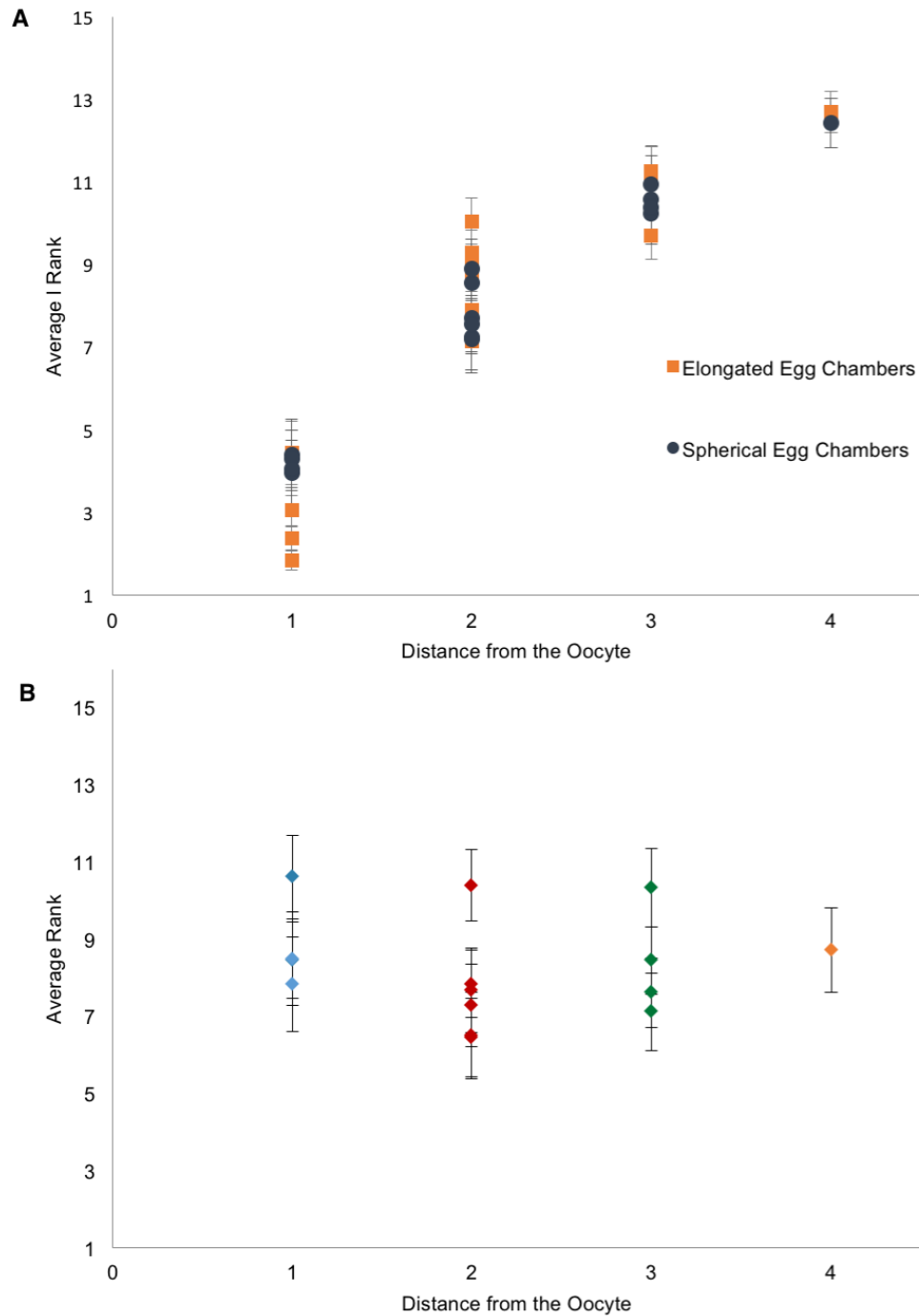


Figure S2. A pattern of cell sizes emerges and persists throughout egg chamber development. Related to Figure 2.

A) A plot of the average rank for each labeled germline cell within a 16-cell cluster, in both young (spherical, prior to Stage 6, n=21) and older (ellipsoidal, post Stage 6, n=20) egg chambers. The error bars show standard errors.

B) A plot of each cell's average rank (1 = largest) in a cluster of 16 germline cells prior to complete encapsulation by a follicular epithelium, versus distance from the oocyte. Starting from uniform initial conditions, groups of

different cell sizes thus emerge only during growth once the 16-cell cyst is fully encapsulated. The error bars show standard errors (n=18).

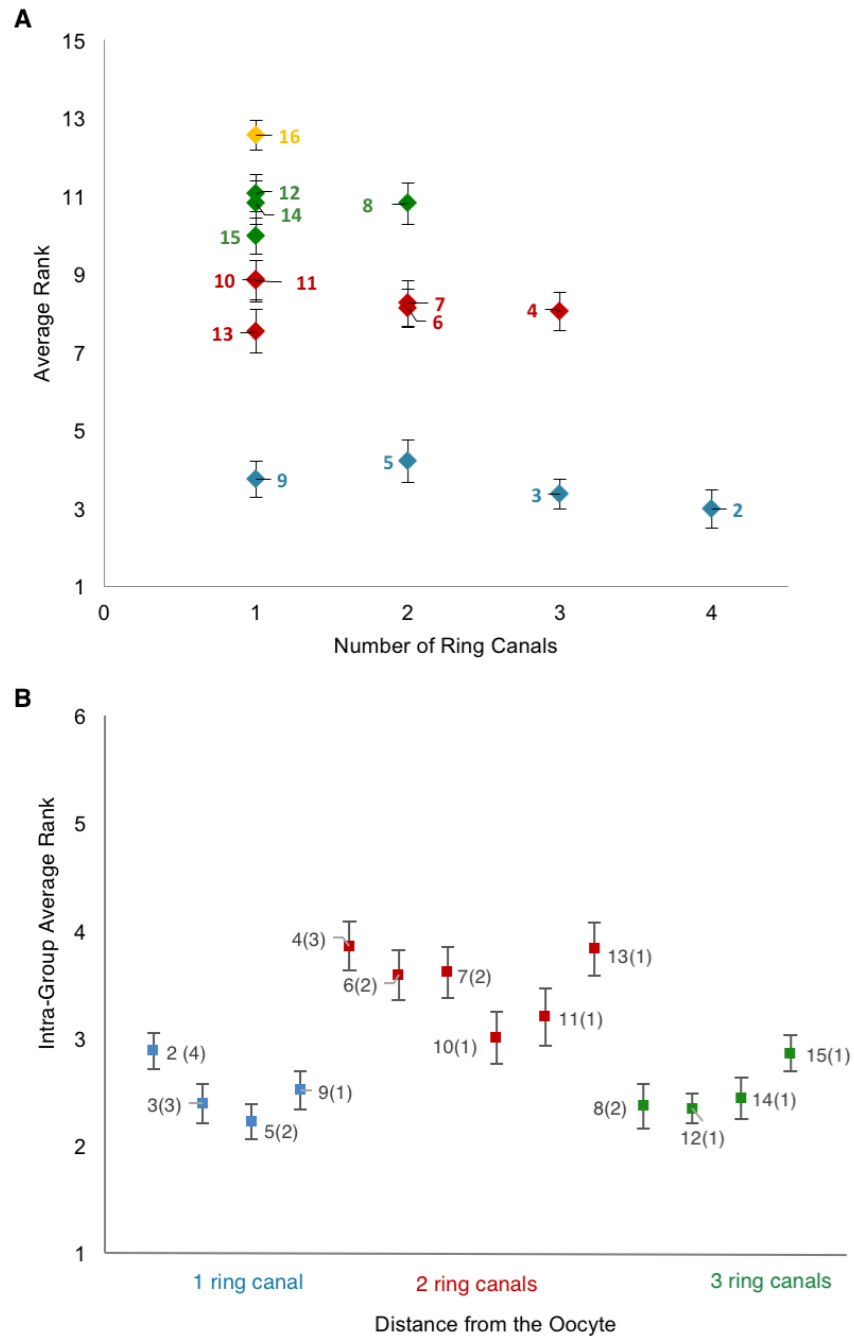


Figure S3. Ring canal number does not explain observed size distribution. Related to Figure 2.

A) A plot of each cell's average rank as a function its ring canal number. The error bars show standard errors (n=41).

B) A plot of intra-group average rank for each of the 16 germline cells; cells within a group were ranked relative to each other. There is no specific nurse cell nuclear volume distribution within a group that can be explained by the number of ring canals each cell has (indicated in parenthesis). The error bars show standard errors (n=41).

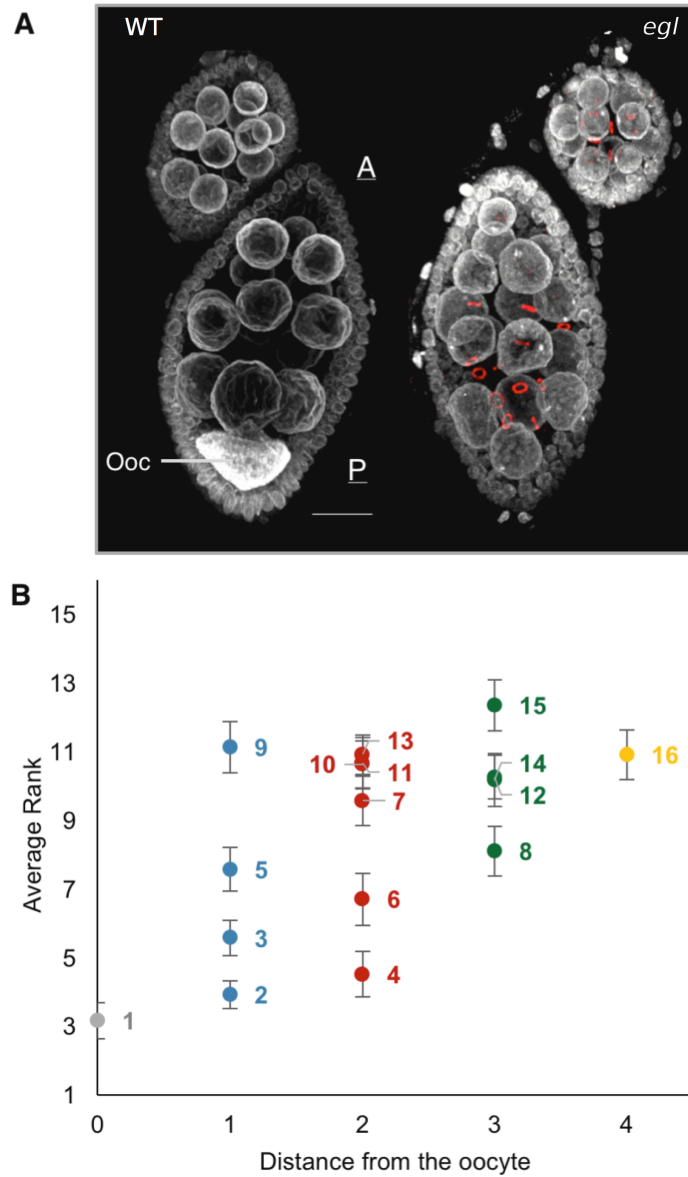


Figure S4. Pattern of cell sizes in *egalitarian* (*egl*). Related to Figure 2.

A) Volume renderings of two connected egg chambers from wild type (left) and *egl* (right) egg chambers. Nuclear envelopes (gray) and ring canals (red) are fluorescently labeled. The specified oocyte ('Ooc') in the wild type egg chamber lies correctly at the posterior location (A = anterior, P = posterior). Although no oocyte is specified and maintained in *egl* egg chambers, no gross morphological defects are observed and no apparent diminution in the total size of egg chambers when compared to wild type egg chambers at similar developmental stages. Scale bar: 20 μm .

B) A plot of each cell's average rank as a function its ring canal number in *egl* egg chambers. Contrary to what is observed in wild type egg chambers, the spatial pattern of distinct hierarchical groups of cell sizes is absent, and the average ranks of cells from virtually all groups overlap. Because *egl* egg chambers fail to specify and maintain an

oocyte, cells 1 and 2 are indistinguishable; the same plot under the alternative labeling scheme in which labels 1 and 2 are switched conveys the same point. The error bars show standard errors (n=31).