

Estimating the Evolutionary Impact of Seed Banks

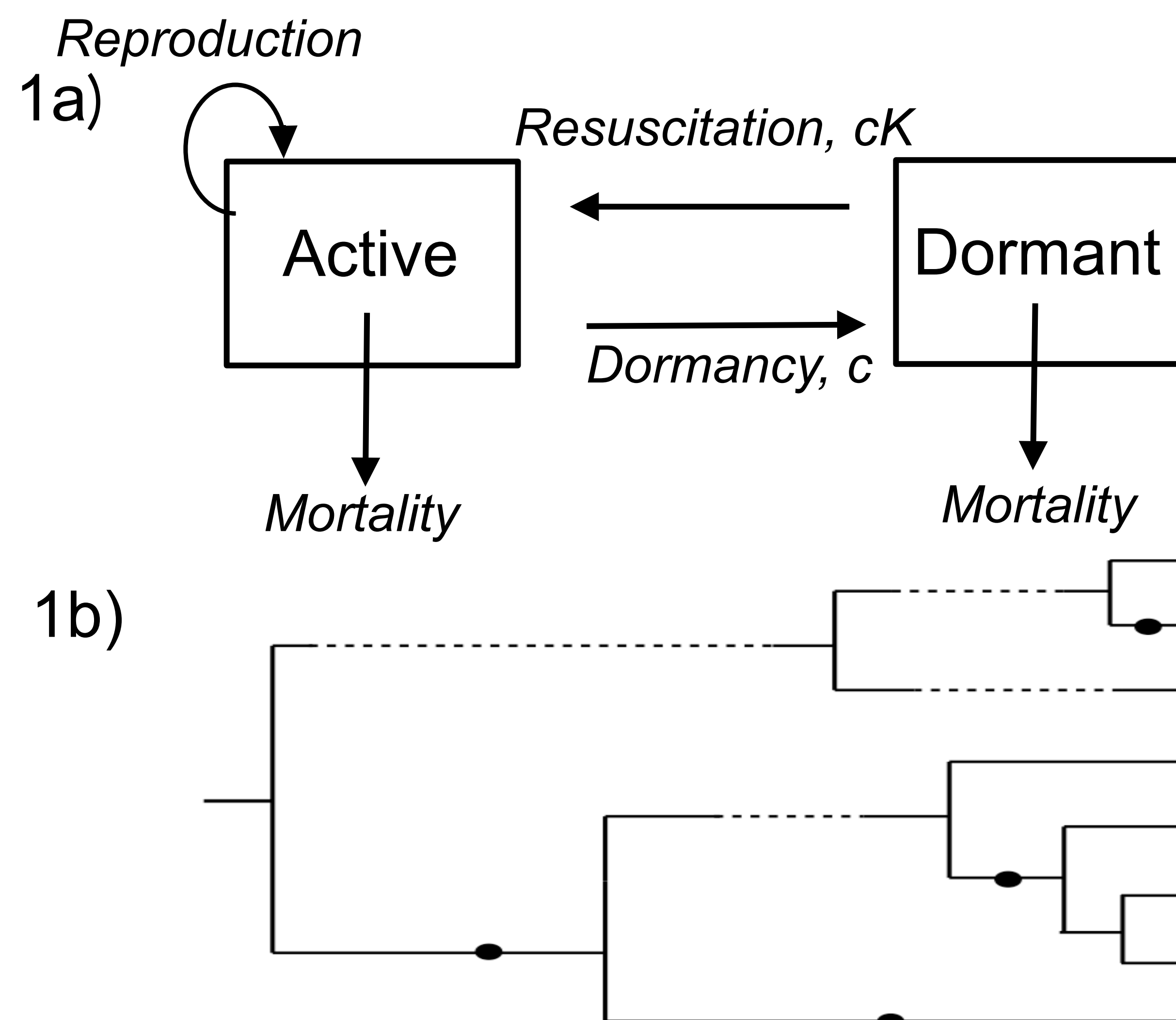
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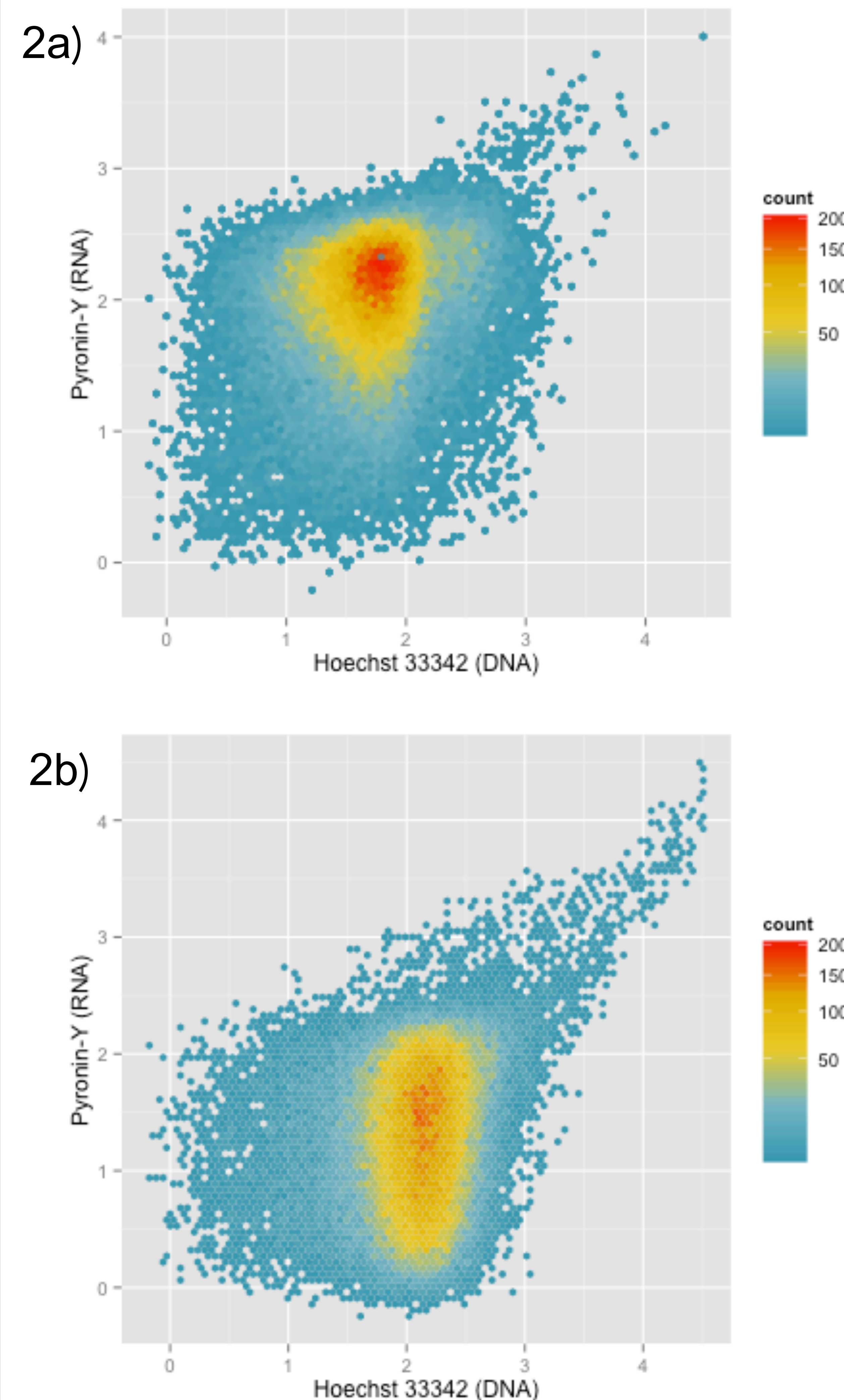
Background

- Microorganisms contend with finite levels of resources.
- A common strategy is to enter a state of reduced metabolic activity (i.e. *dormancy*)¹.
- A persistent pool of dormant individuals can greatly alter a population's evolutionary trajectory
 - Known as the **seed bank effect**².
- Model organism: *Janthinobacterium*
 - Exhibits population dynamics expected of taxa with a dormant pool³.
 - Harbors genes that may allow it to contend with environmental stress⁴.



- Fig.1 a: Dynamics of microbial dormancy. $K = N_A/N_D$, c = rate at which the population enters dormancy^{1,3}. b: Genealogical representation of the effect of a seed bank on inferring ancestry³.

Estimating the Dormant Pool



- Fig.2: 2-D plots depicting events with the fluorescence excitation/emission spectra associated with DNA (Hoechst 33342, x-axis) and RNA (Pyronin-Y, y-axis) of (a) a one-day old homogenous culture and a (b) a 10-day old culture of *Janthinobacterium* sp. KBS0711.

Review

- No clear clustering of active and dormant subpopulations
- Currently measuring change in respiration using CTC (5-cyano-2,3-ditolyl tetrazolium chloride), SYTOX green, and Hoechst 33342
 - Preliminary analysis with CTC shows clear subpopulation-level differentiation.

Future Work

- Complete analysis of starved populations using CTC and SYTOX green.
- Estimate size of subpopulations using clustering techniques.
- Use subpopulation-level data to inform estimates of resuscitation rates.
- Model eco-evolutionary dynamics of a microbial population with a seed-bank component.

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References

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