



STEVEN B ROBERTS
MACKENZIE GAVERY
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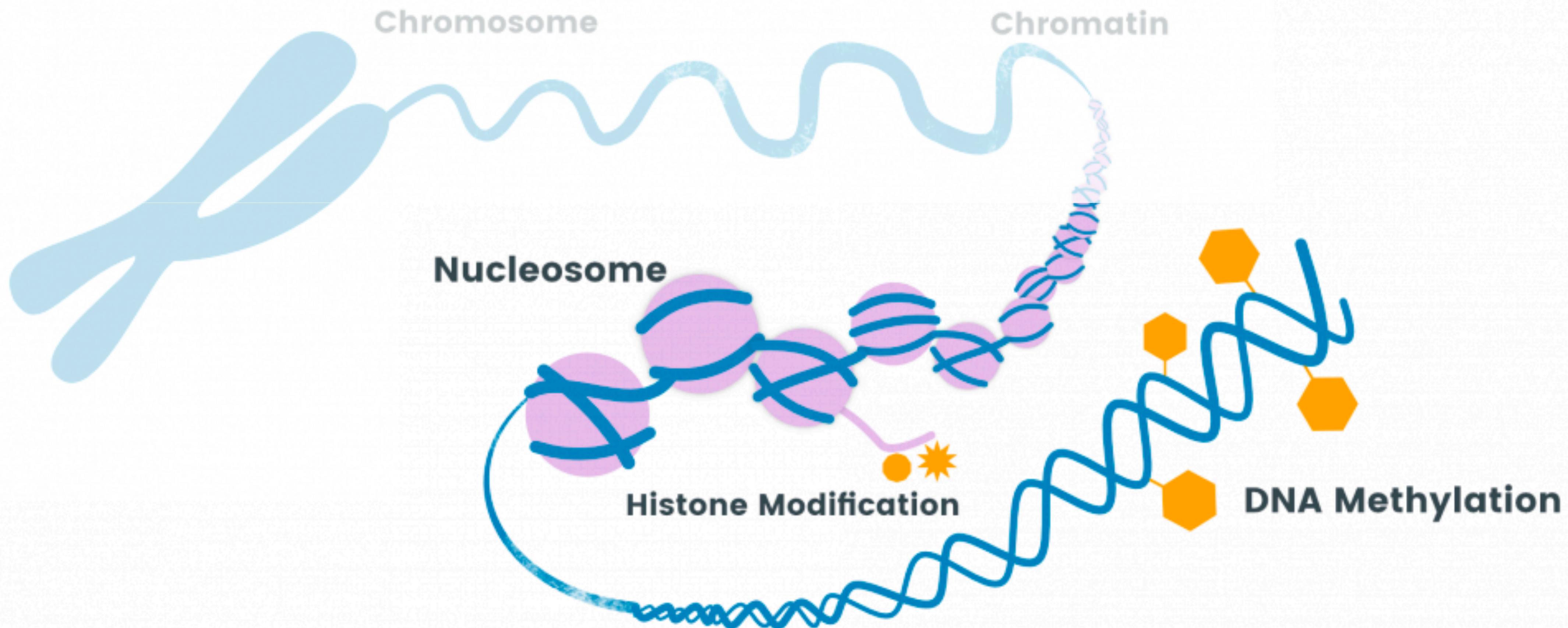


HOLLIE PUTNAM
UNIVERSITY OF RHODE ISLAND

EPIGENETIC VARIATION IN SHELLFISH AND IMPLICATIONS FOR AQUACULTURE

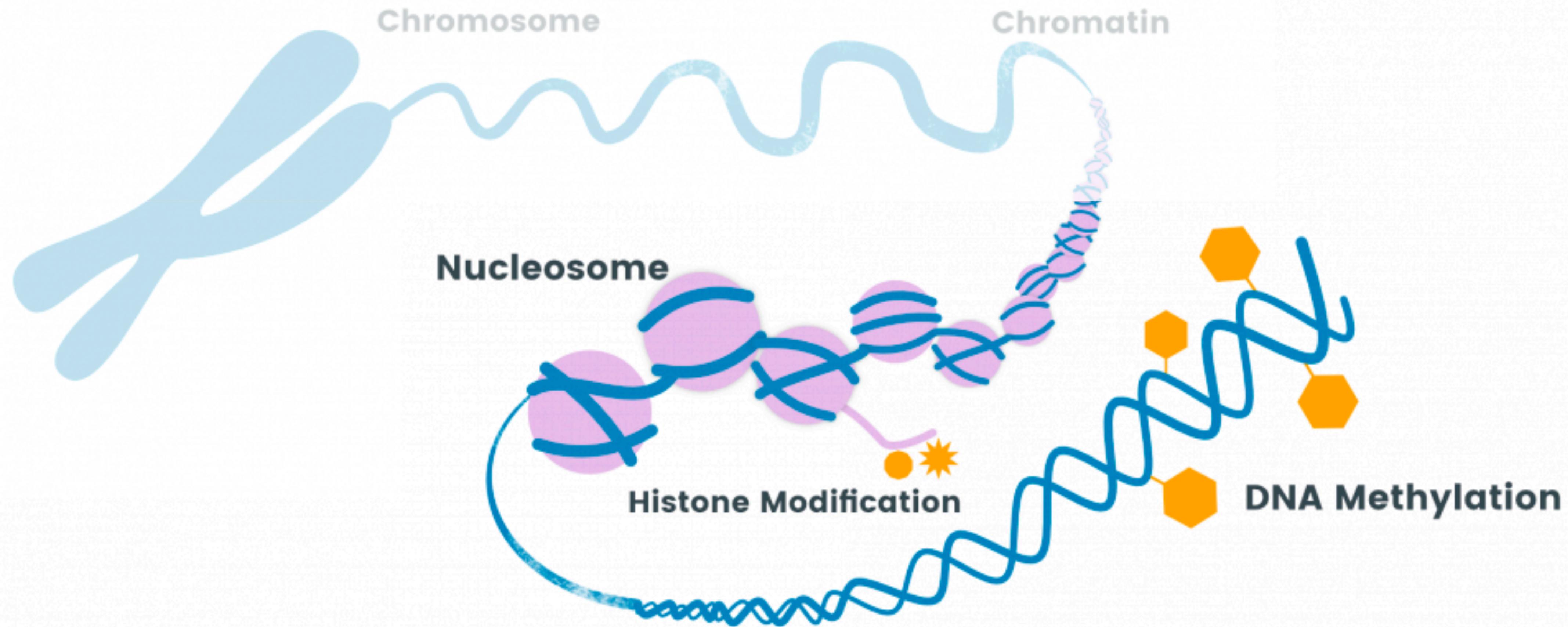
WHAT IS EPIGENETICS?

ALTERS THE PHENOTYPE (WITHOUT CHANGING DNA CODE); HERITABLE



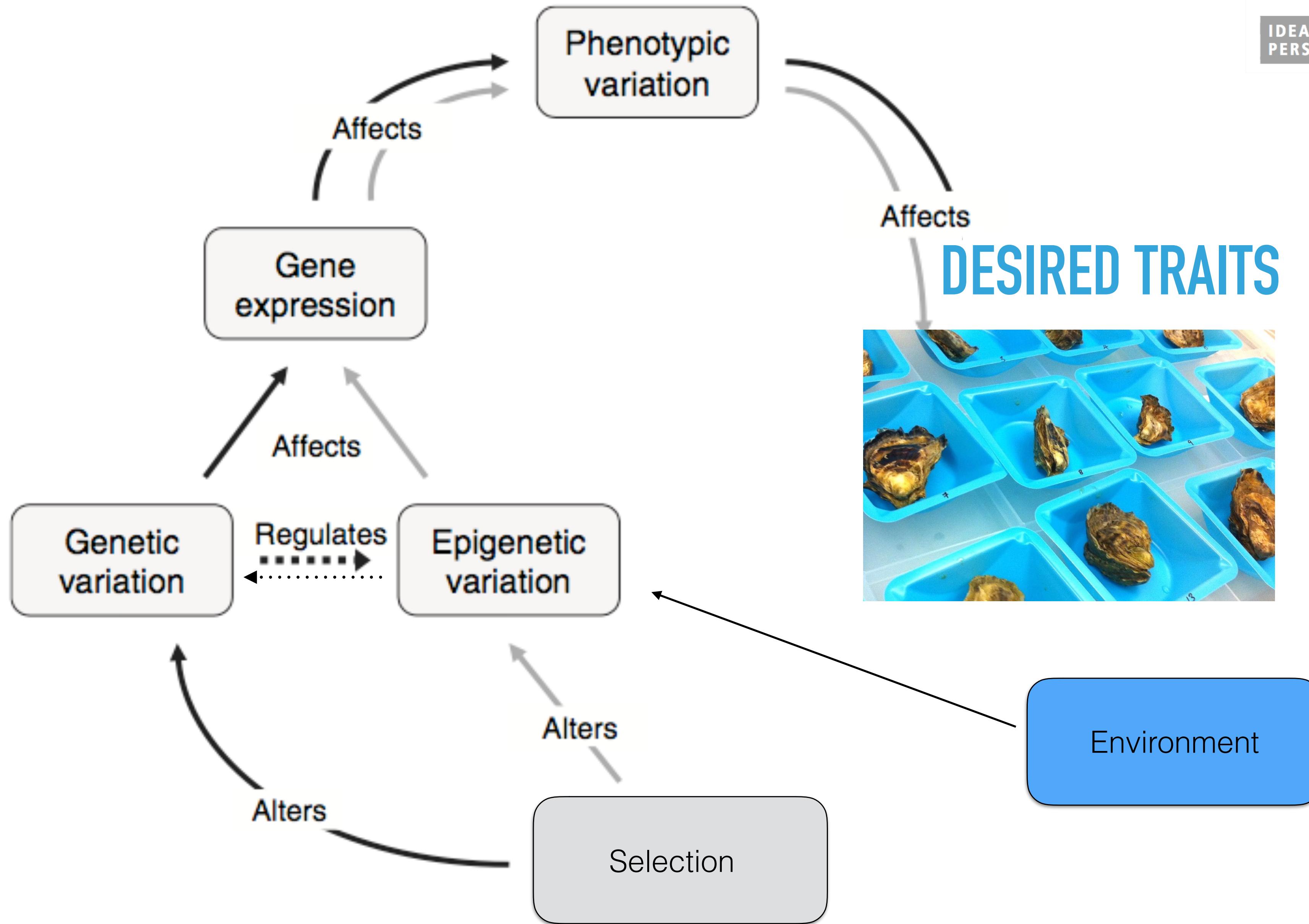
WHAT IS EPIGENETICS?

ALTERS THE PHENOTYPE (WITHOUT CHANGING DNA CODE); HERITABLE



CAN BE INDUCED WITH ENVIRONMENTAL MANIPULATION

ECOLOGICAL EPIGENETICS



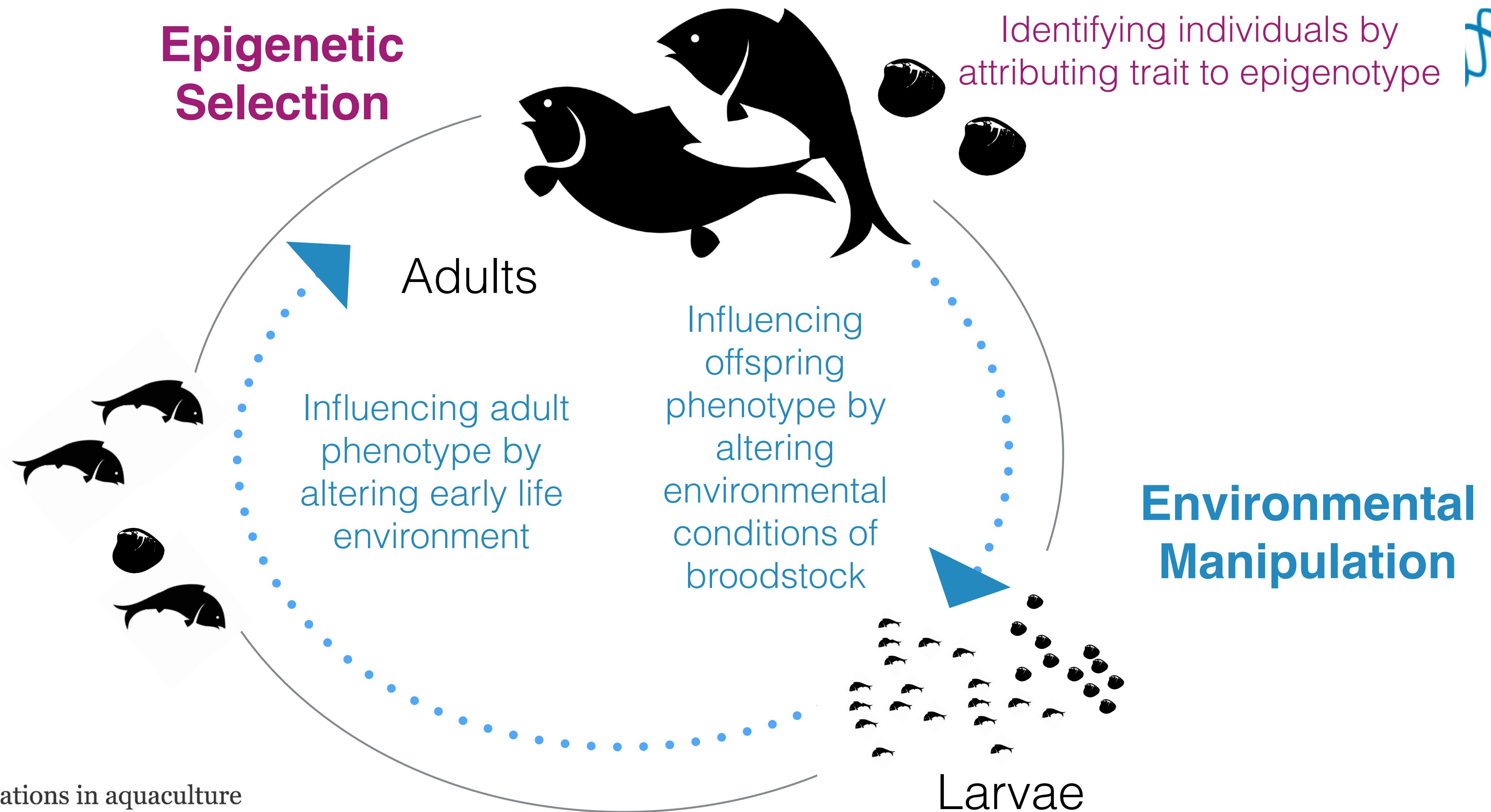
Ecology Letters, (2008) 11: 106–115

doi: 10.1111/j.1461-0248.2007.01130.x

IDEA AND
PERSPECTIVE

Epigenetics for ecologists



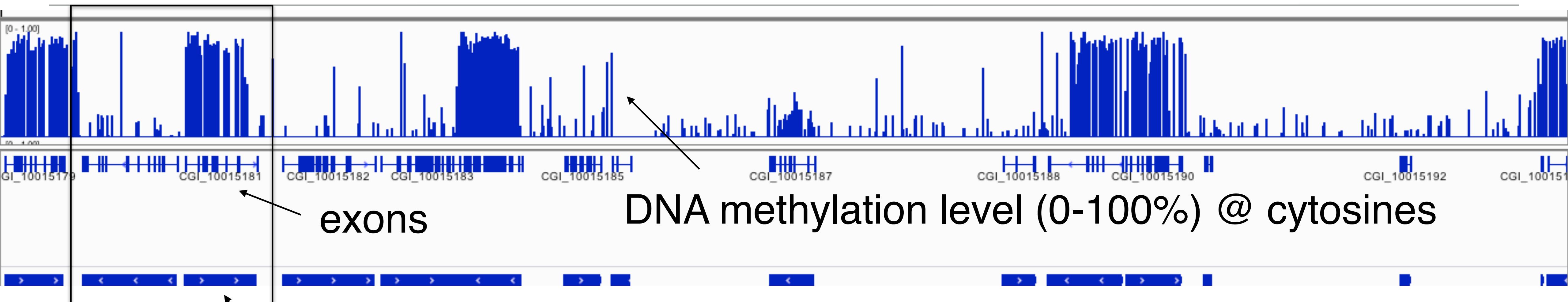


✓ PEER-REVIEWED Aquatic Biology section >

Epigenetic considerations in aquaculture

Literature review Aquaculture, Fisheries and Fish Science Molecular Biology

METHYLATION LANDSCAPE IN SHELLFISH

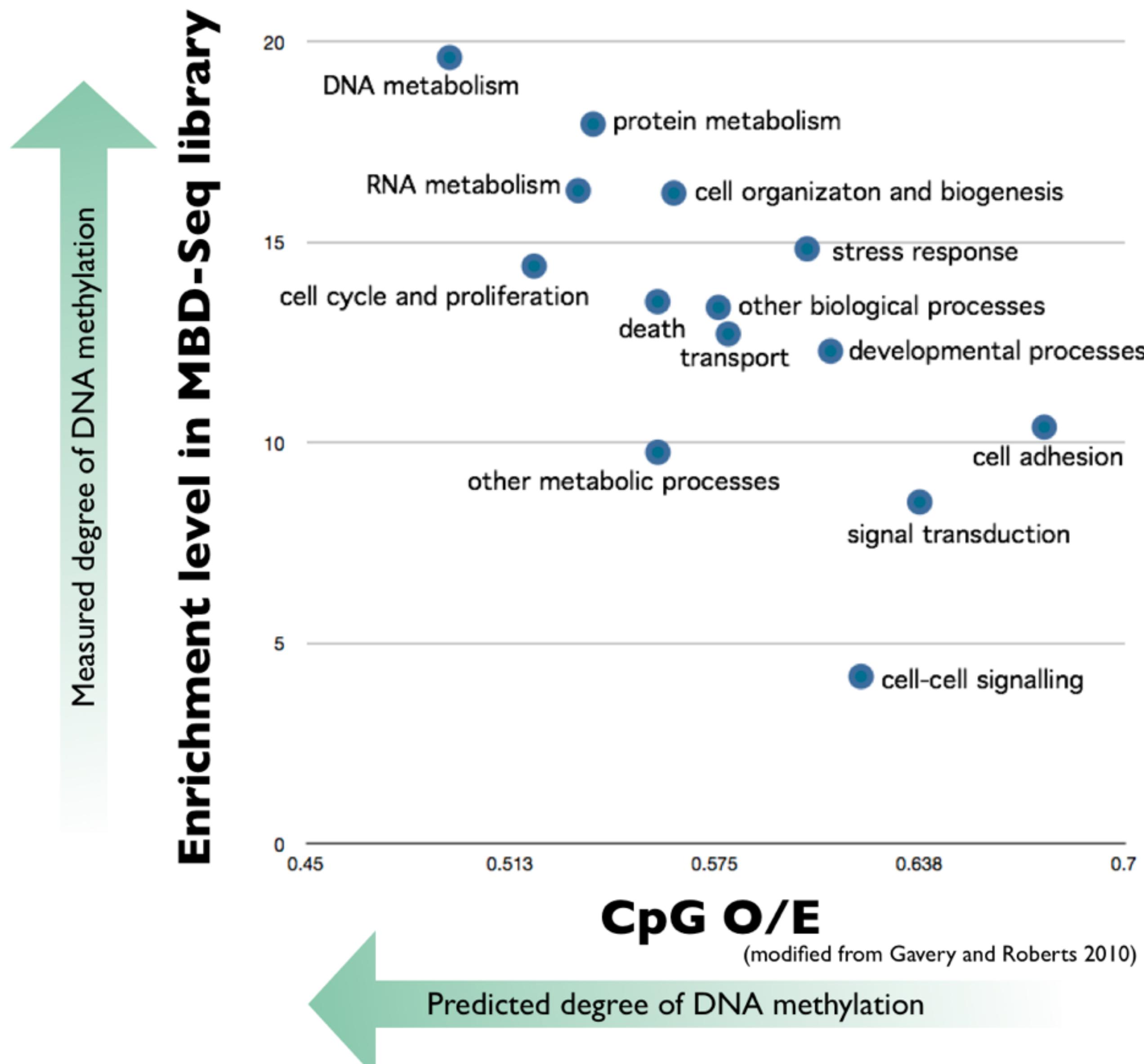


mosaic

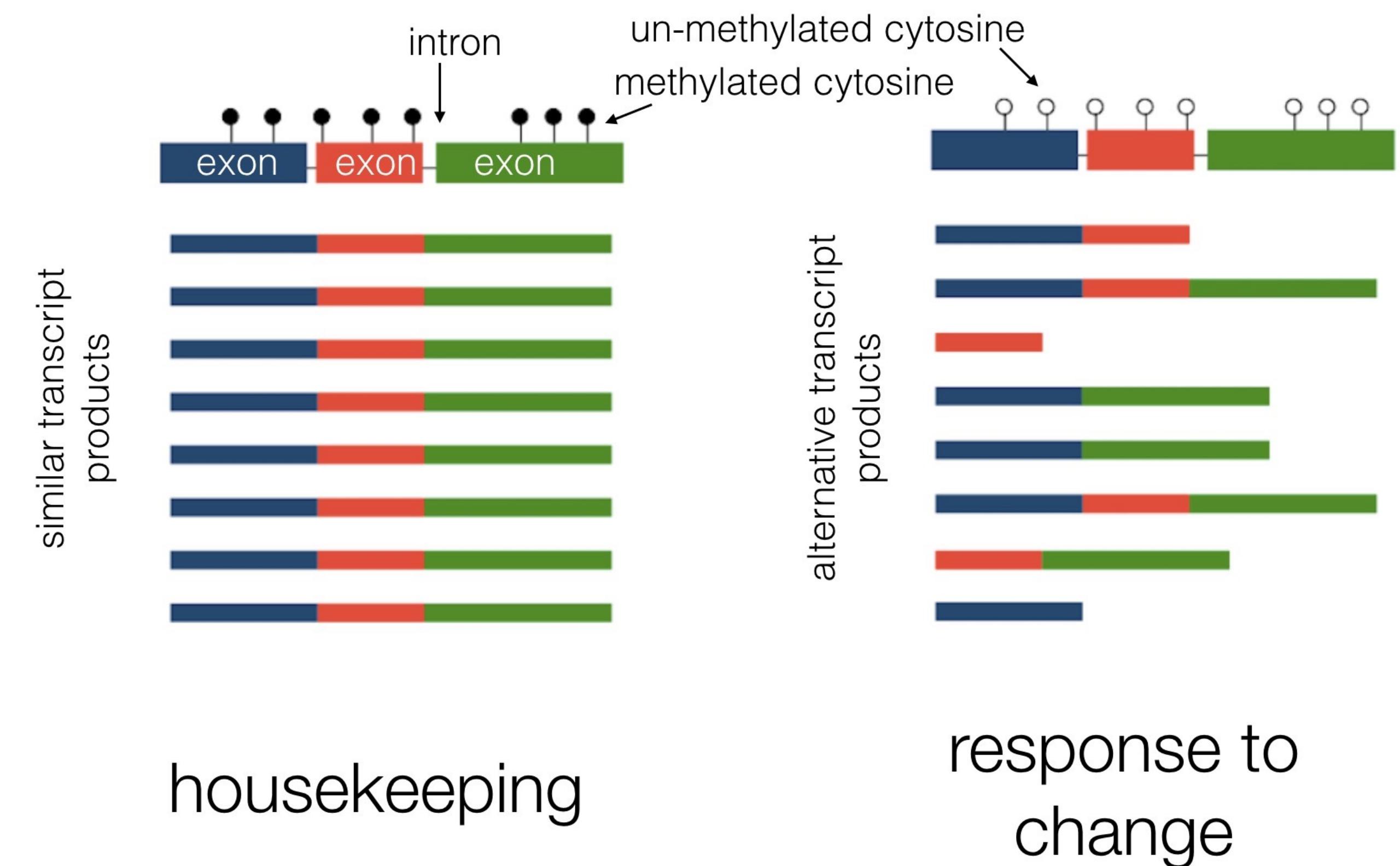
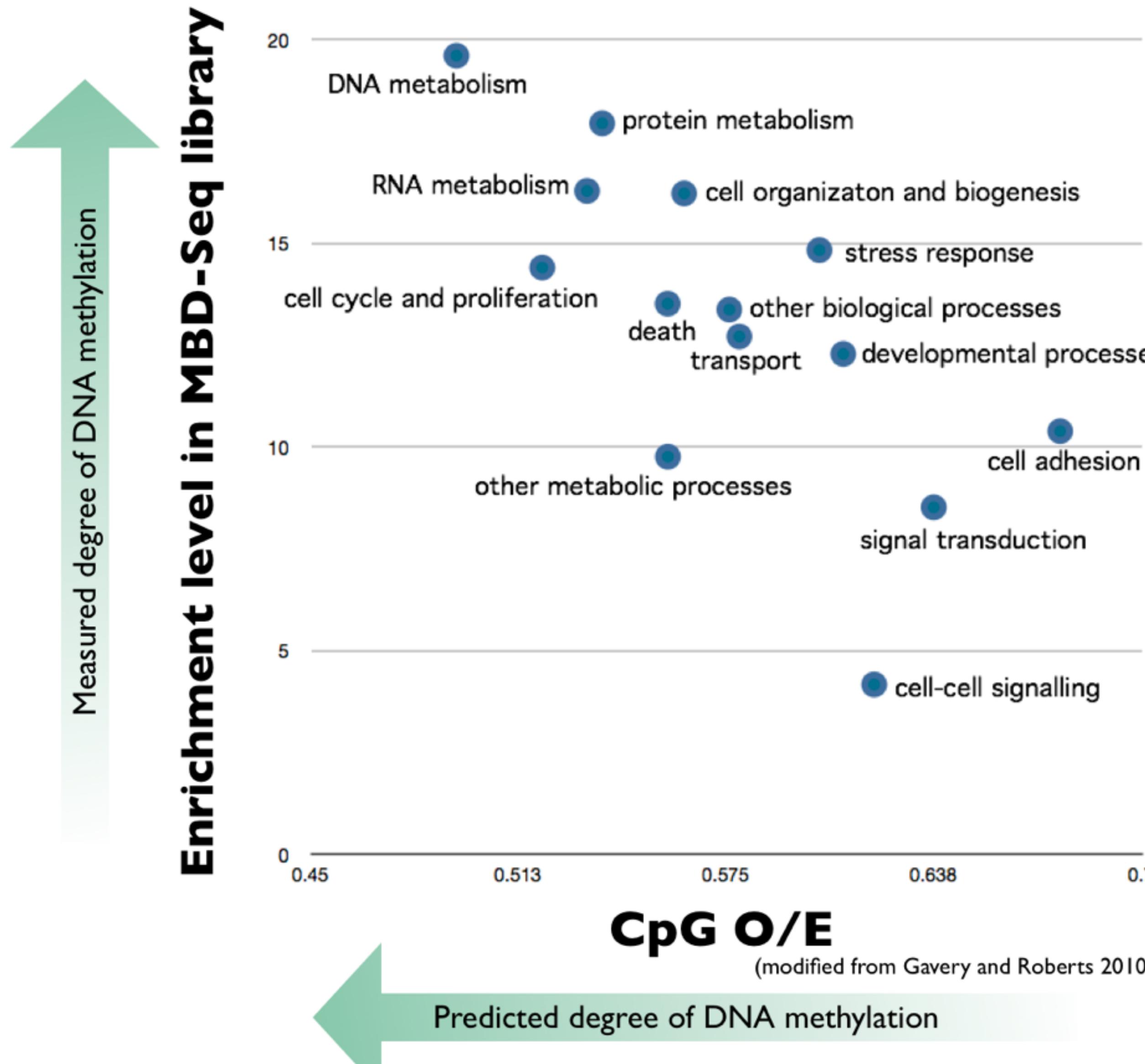
associated with gene bodies

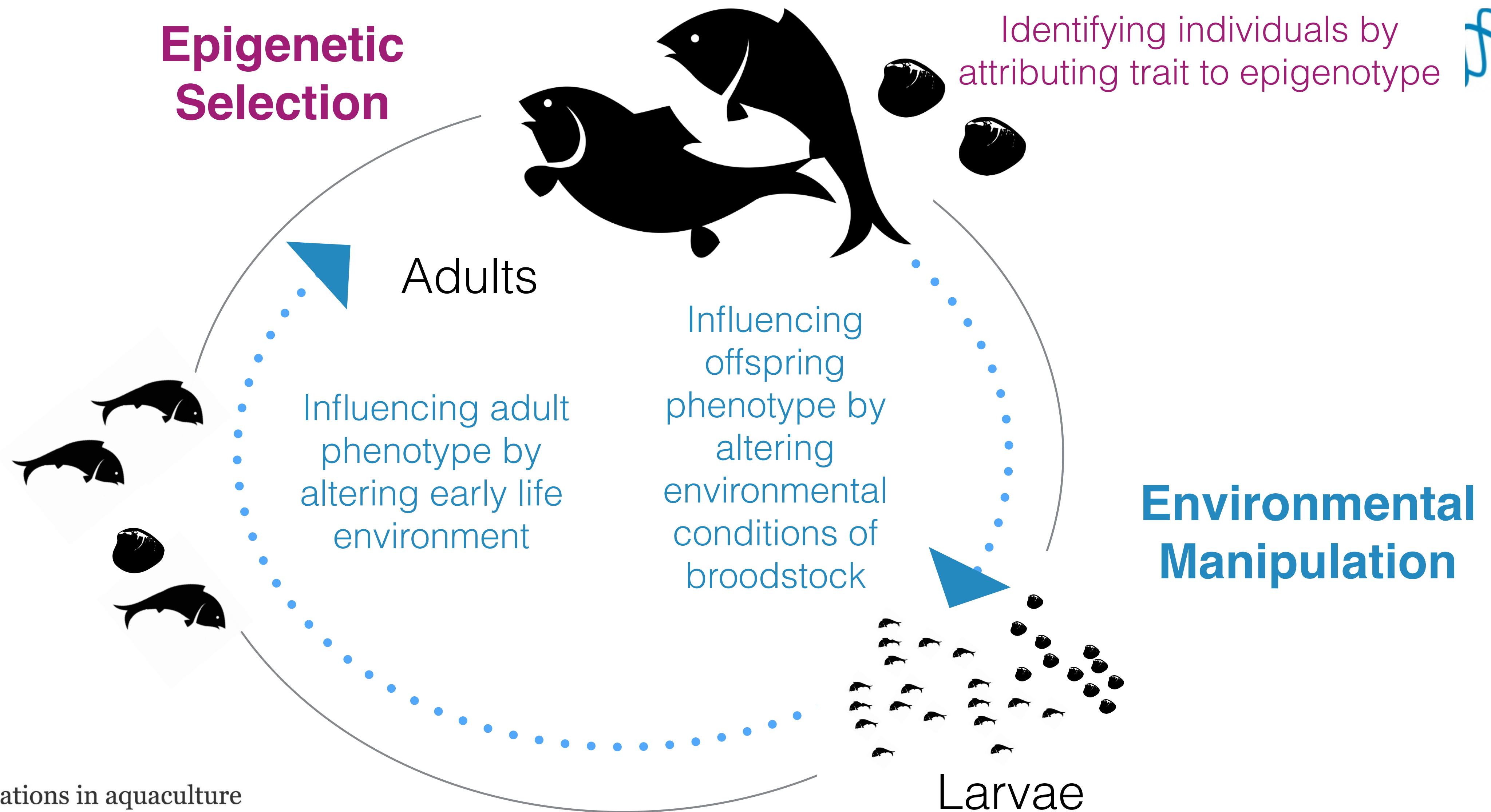
Why are only a subset of genes methylated?

METHYLATION LANDSCAPE IN SHELLFISH



METHYLATION LANDSCAPE IN SHELLFISH

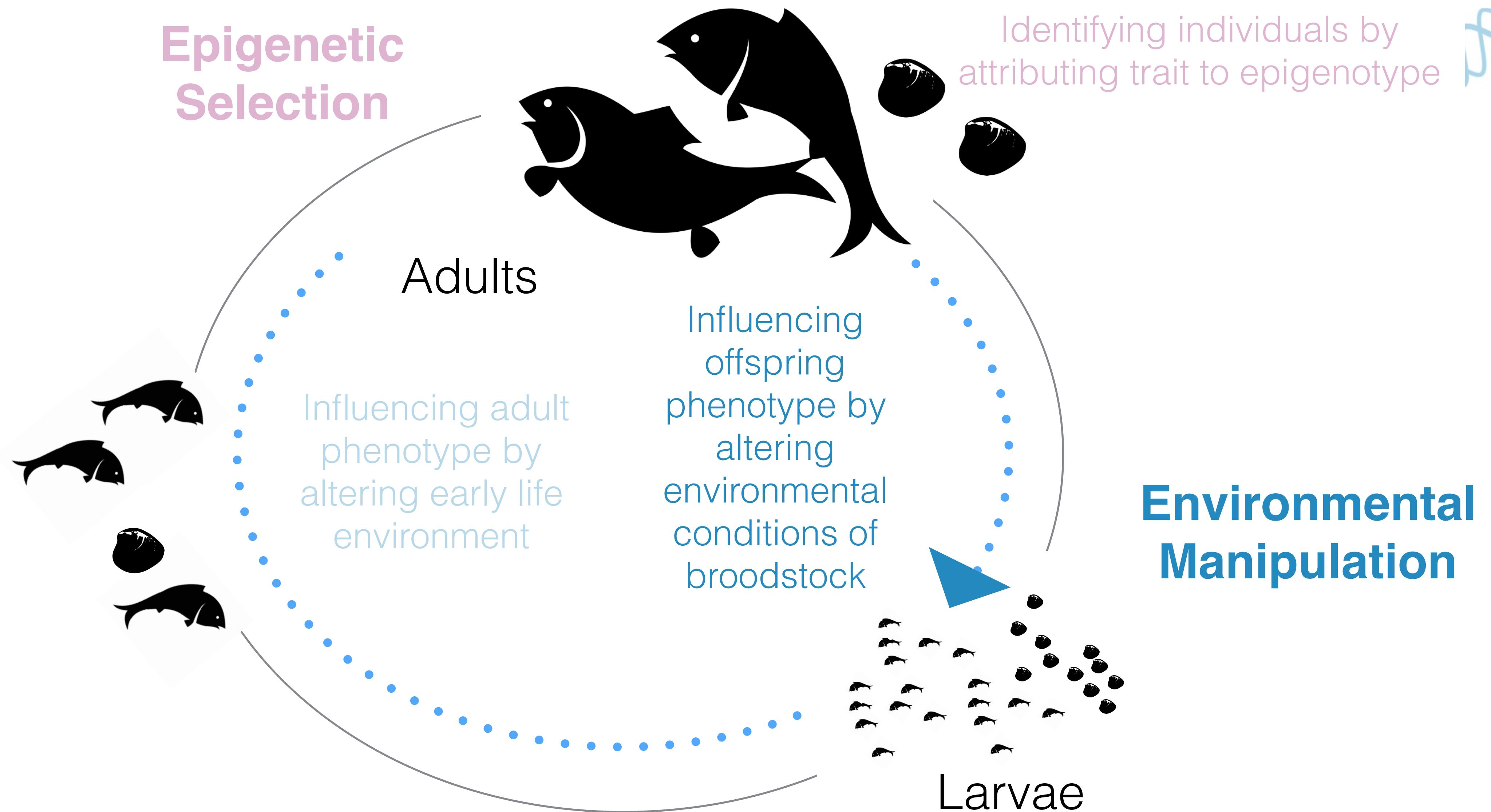




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EFFECTS OF TEMPERATURE AND OA IN OLYMPIA OYSTER POPULATIONS

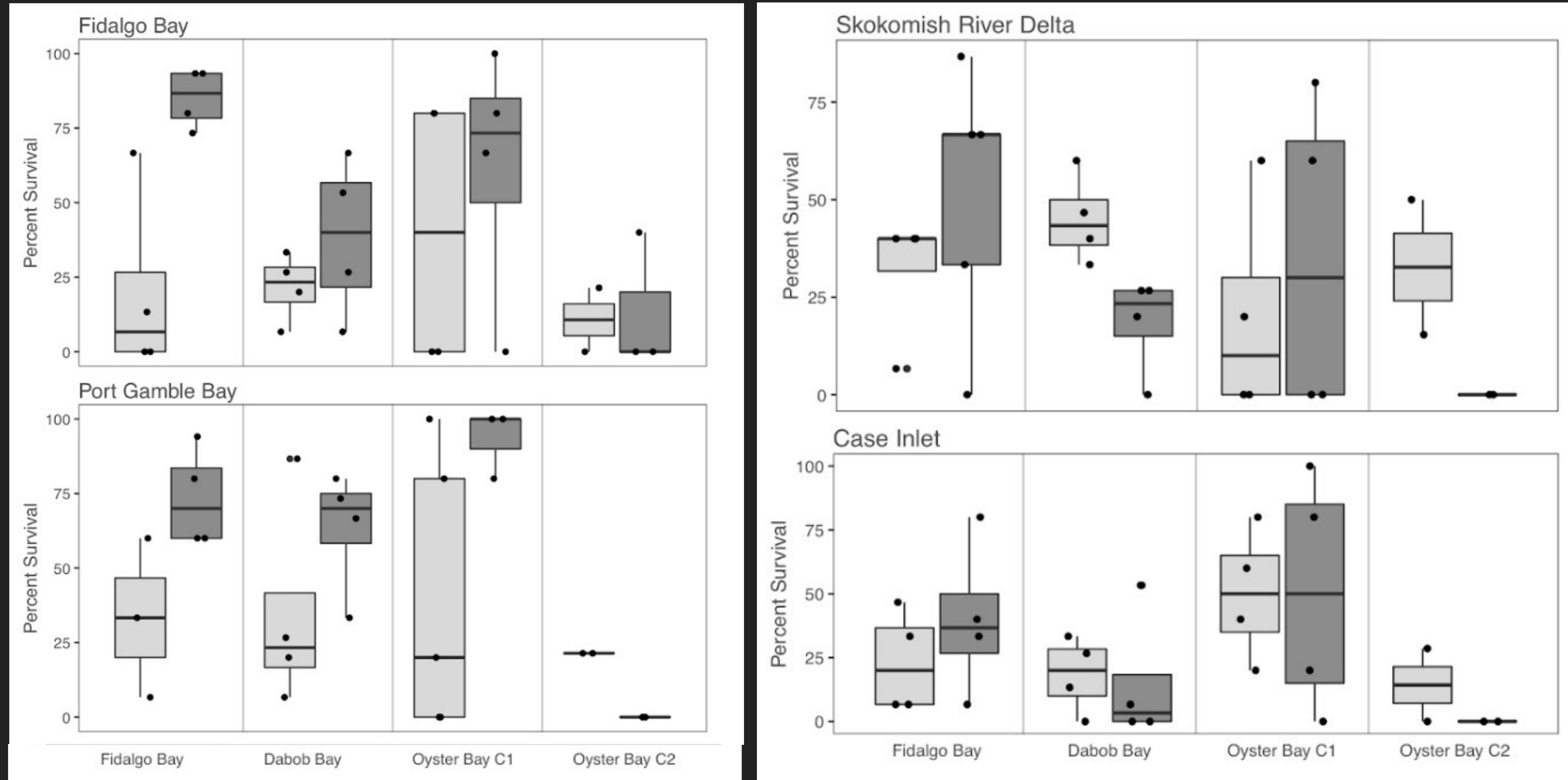


- ▶ Broodstock were held at ambient pCO₂ (841 μatm) or high pCO₂ (3045 μatm) for 52 days, during the Winter.
- ▶ **Juveniles of parents exposed to elevated pCO₂ had higher survival rates in the natural environment**

EFFECTS OF OA IN OLYMPIA OYSTER POPULATIONS

Parental pCO₂ ◻ Ambient ◼ High

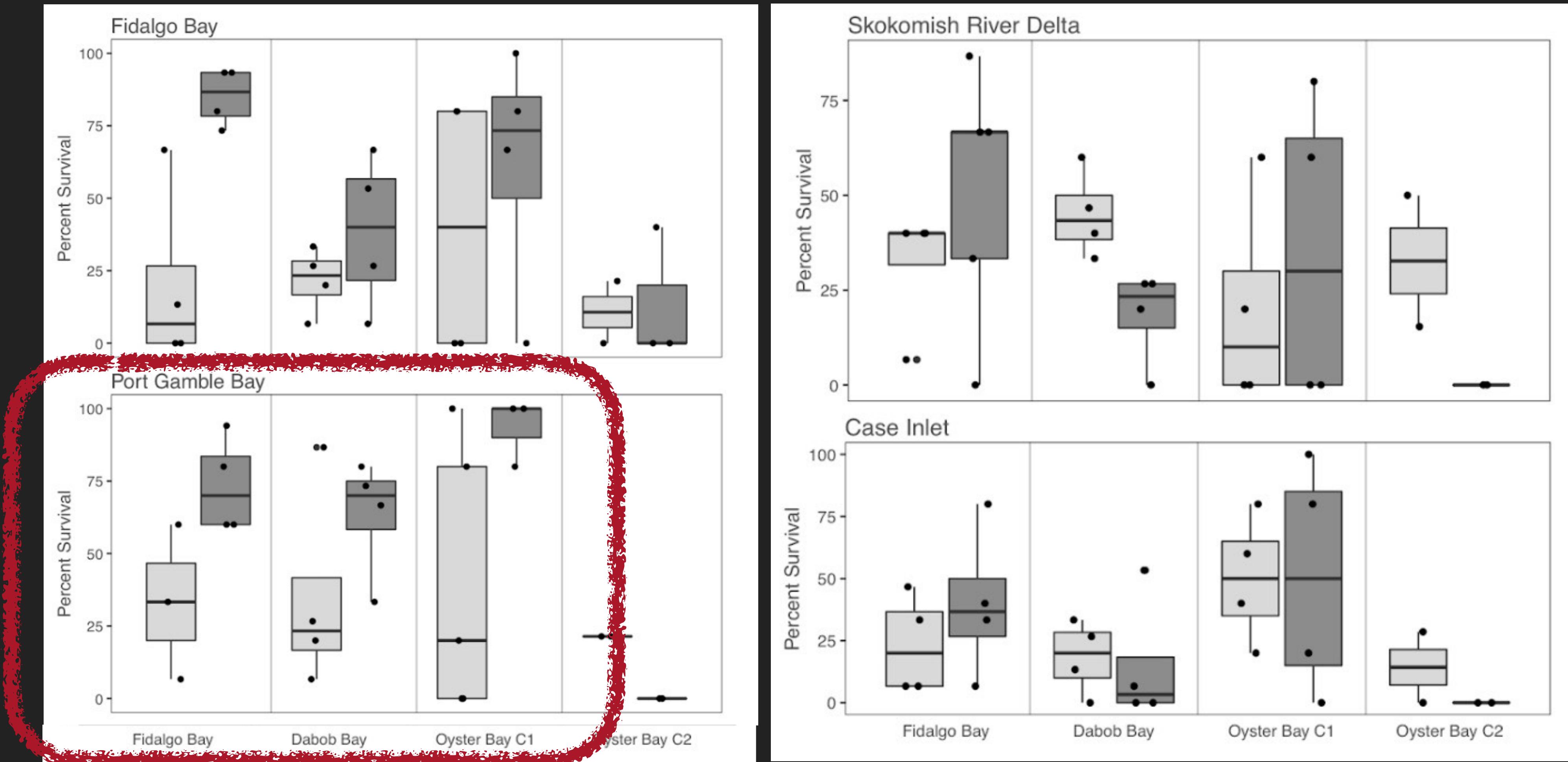
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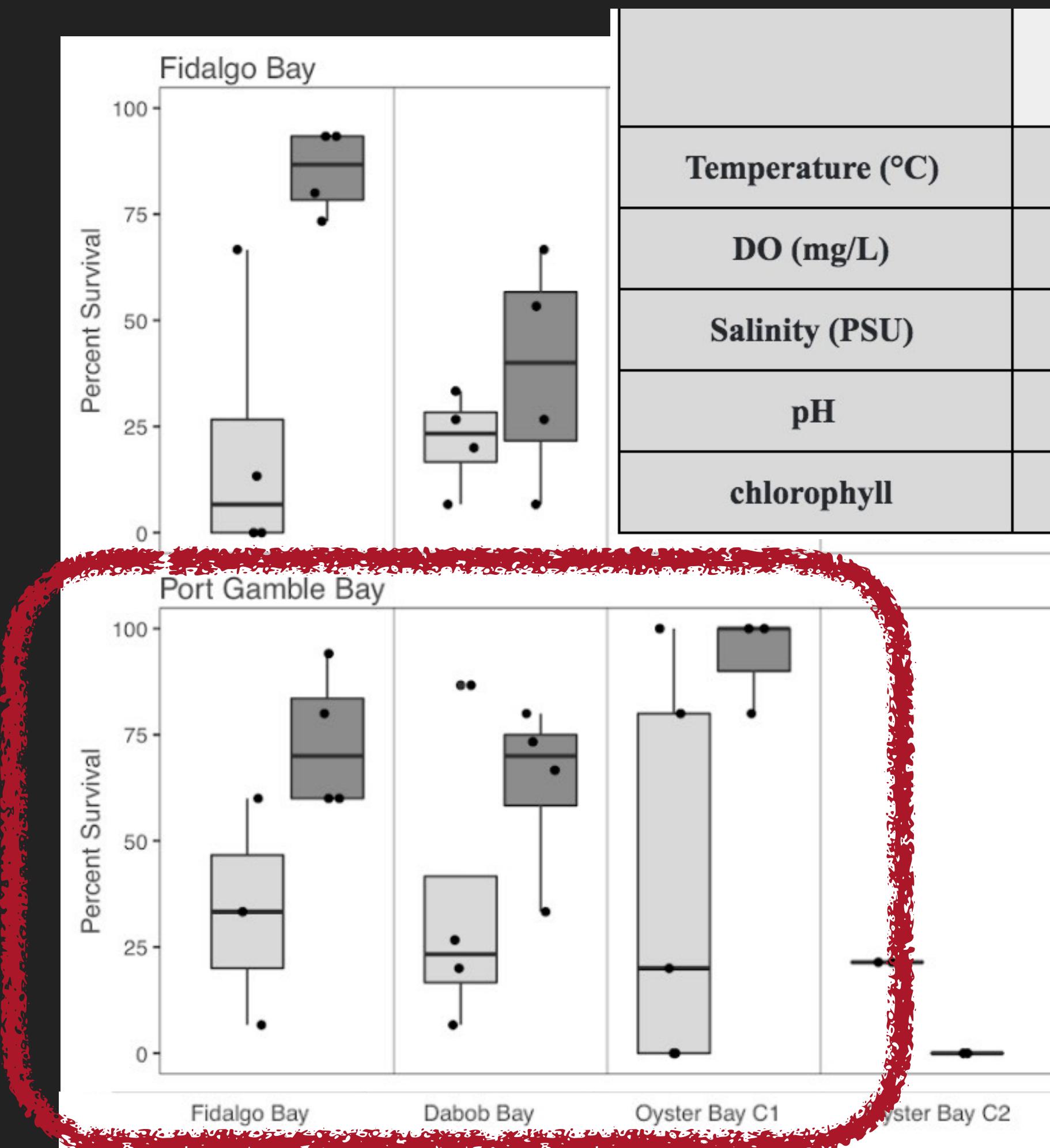
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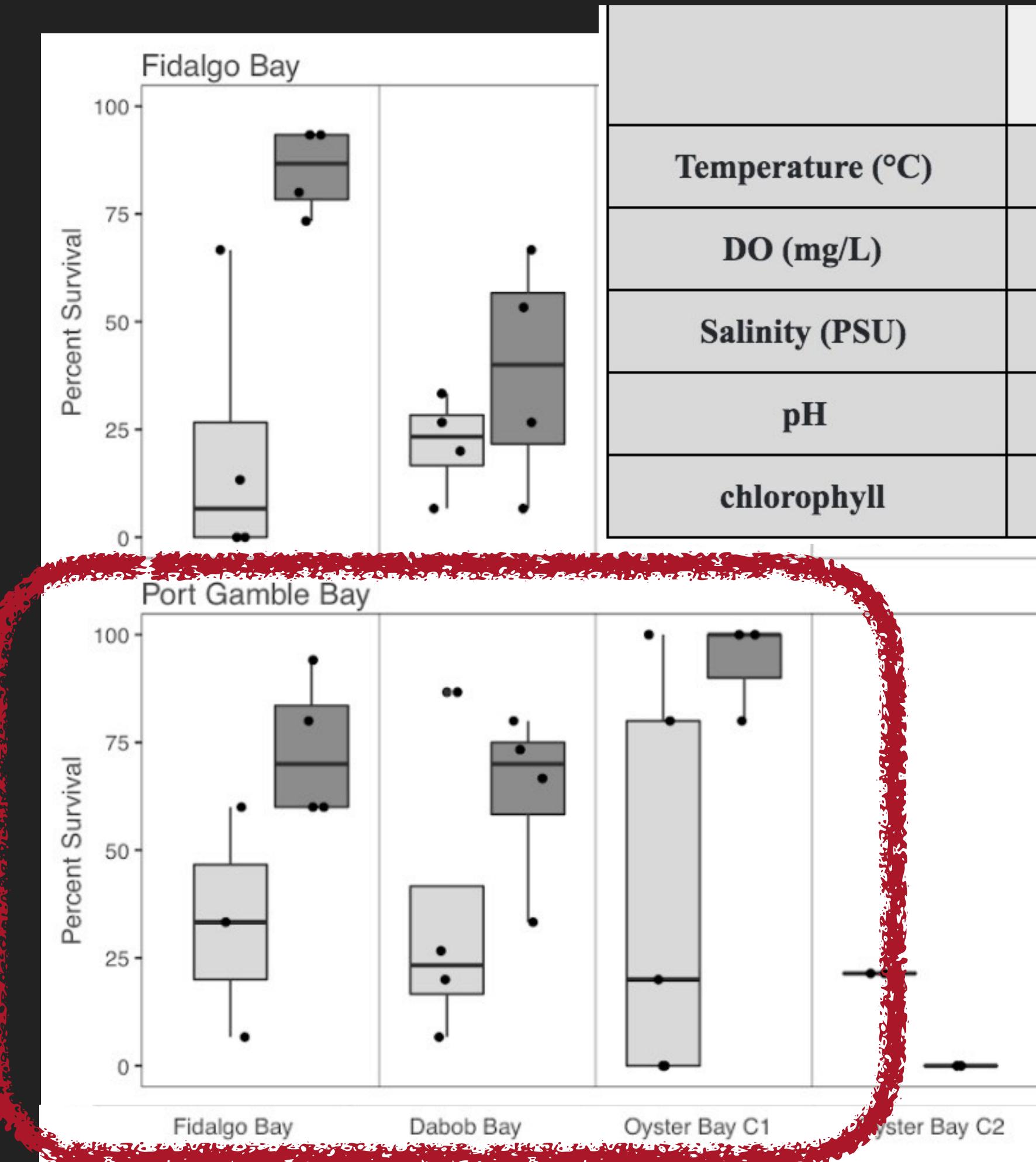
Parental pCO₂ ◻ Ambient ◻ High



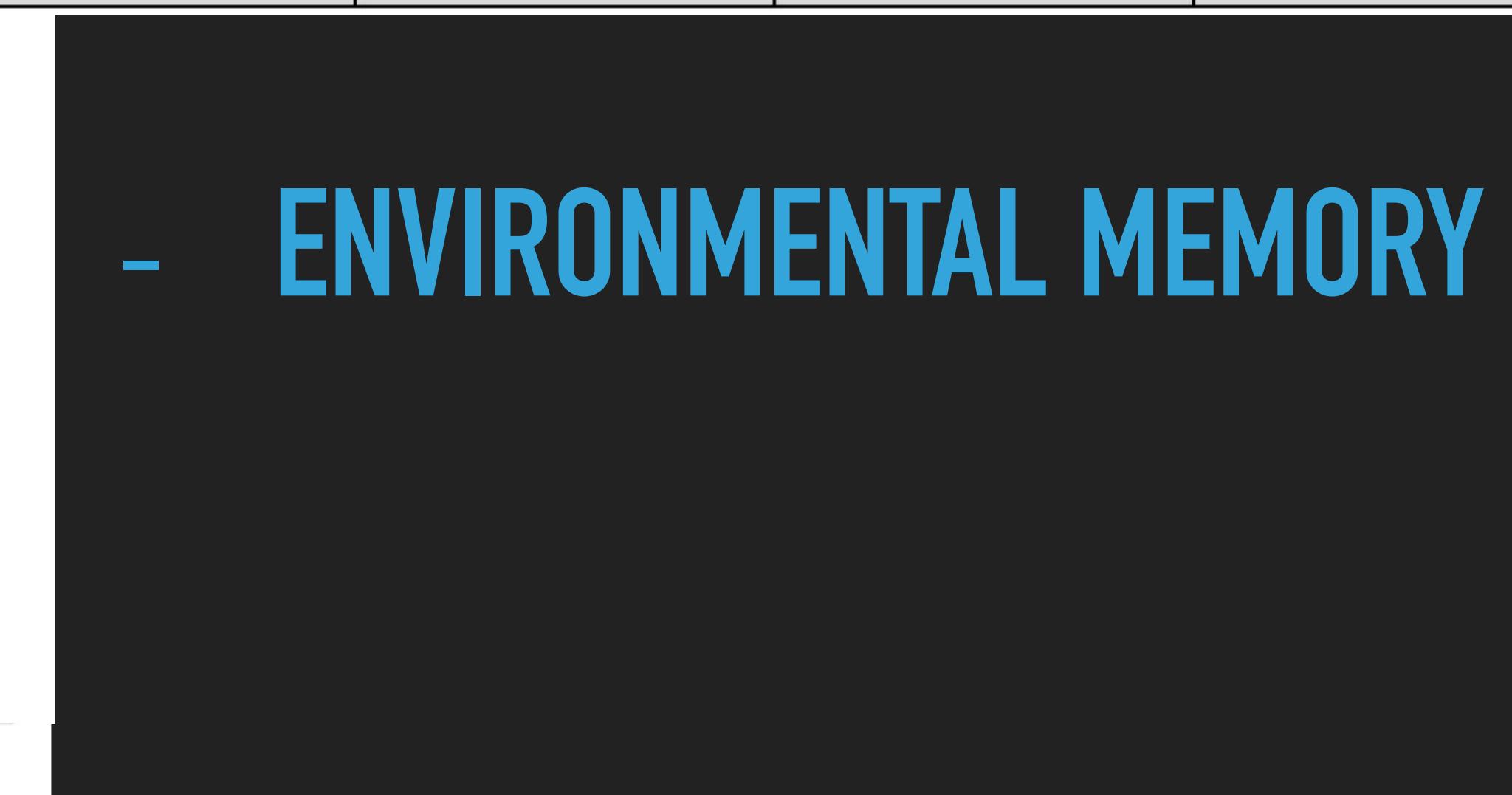
	<i>Fidalgo Bay</i>	<i>Port Gamble Bay</i>	<i>Skokomish River Delta</i>	<i>Case Inlet</i>
Temperature (°C)	15.4±1.5	15.0±1.0	16.2±2.7	16.8±1.7
DO (mg/L)	10.6±2.4	10.5±1.9	10.2±3.9	11.2±2.8
Salinity (PSU)	28.5±3.9	31.9±2.0	29.6±1.3	24.6±1.7
pH	8.07±0.15	7.86±0.17	8.01±0.20	8.01±0.16
chlorophyll	227±409	225±145	572±1536	331±613

EFFECTS OF OA IN OLYMPIA OYSTER POPULATIONS

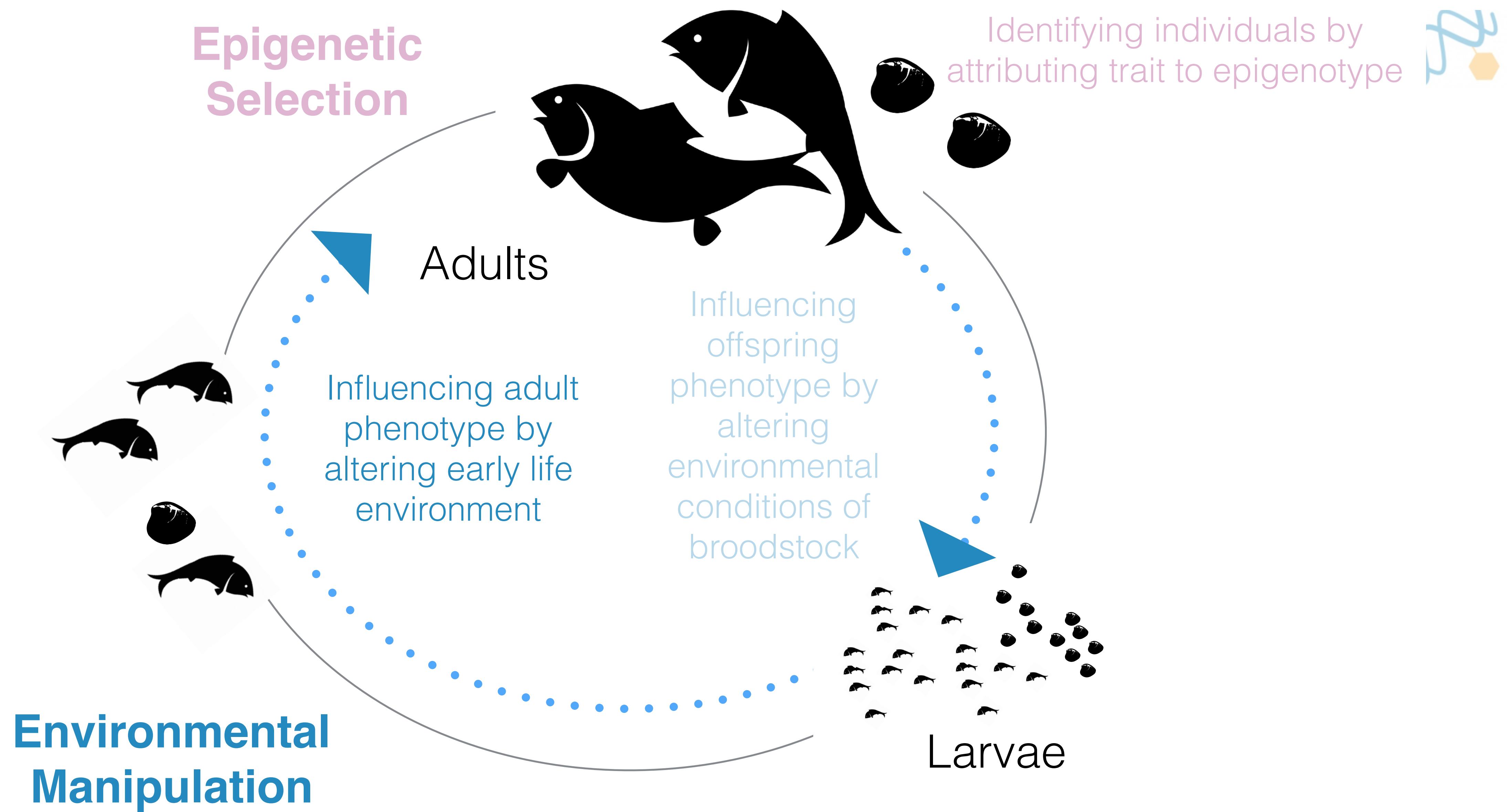
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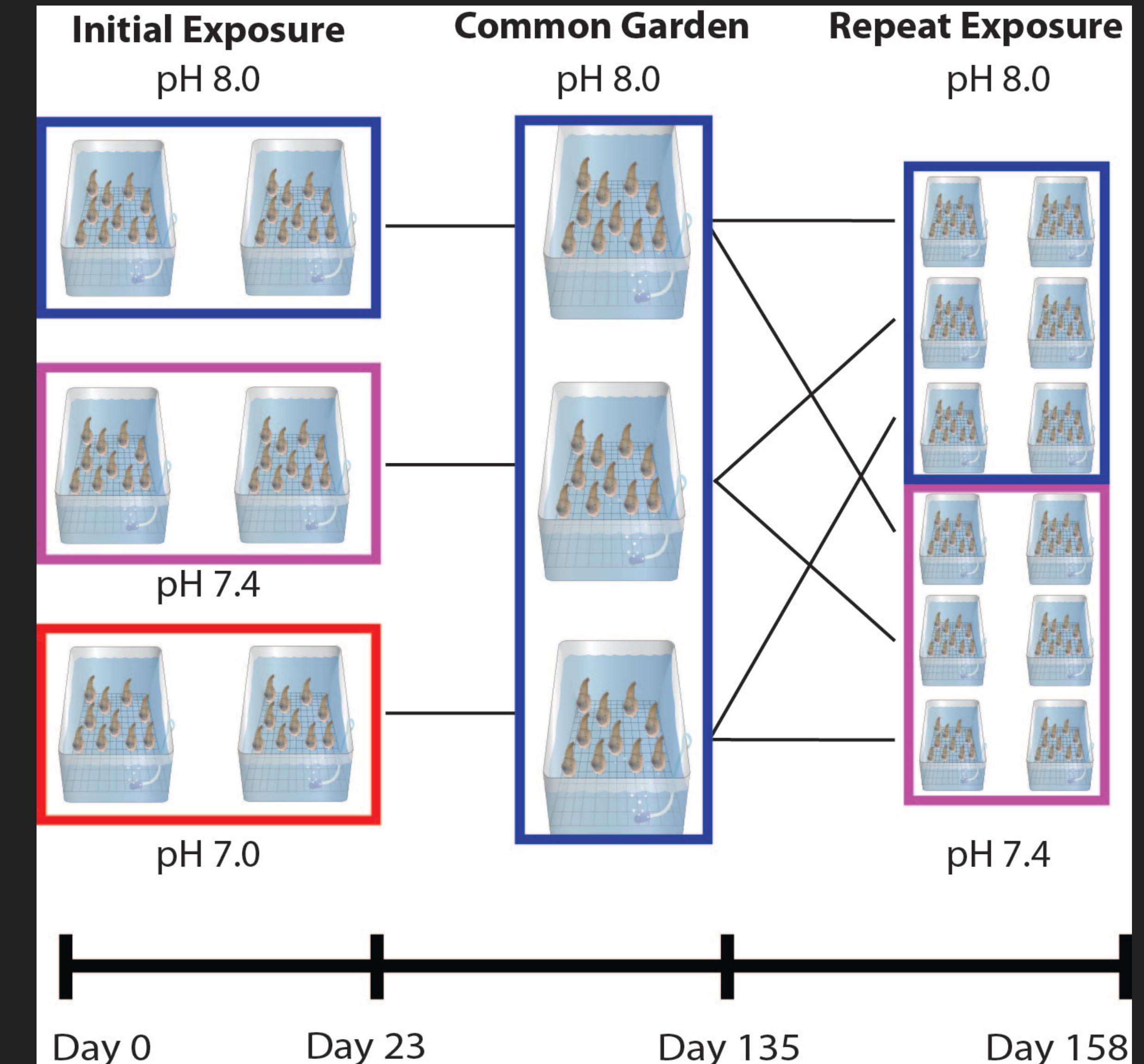
- ENVIRONMENTAL MEMORY



GEODUCKS AND OA

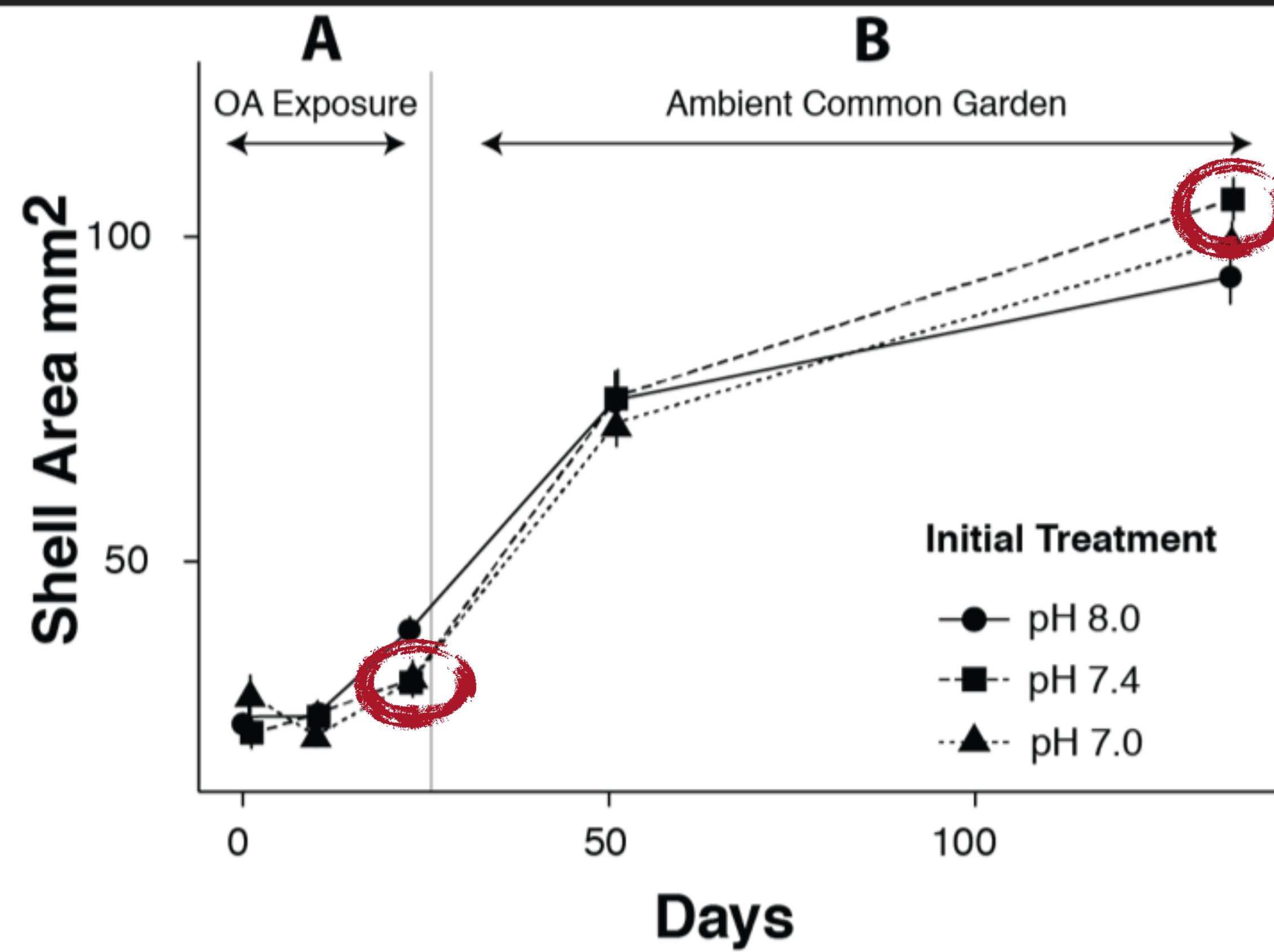


- ▶ Does conditioning to low pH confer tolerance within a generation?



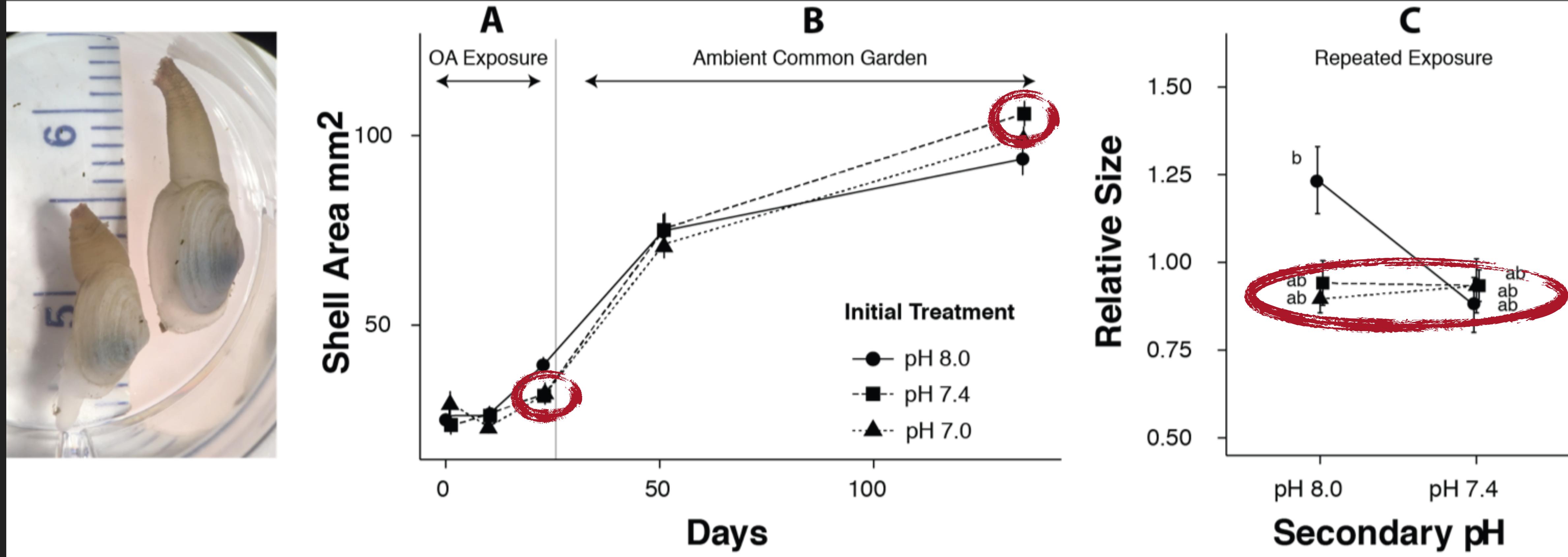
GEODUCKS AND OA

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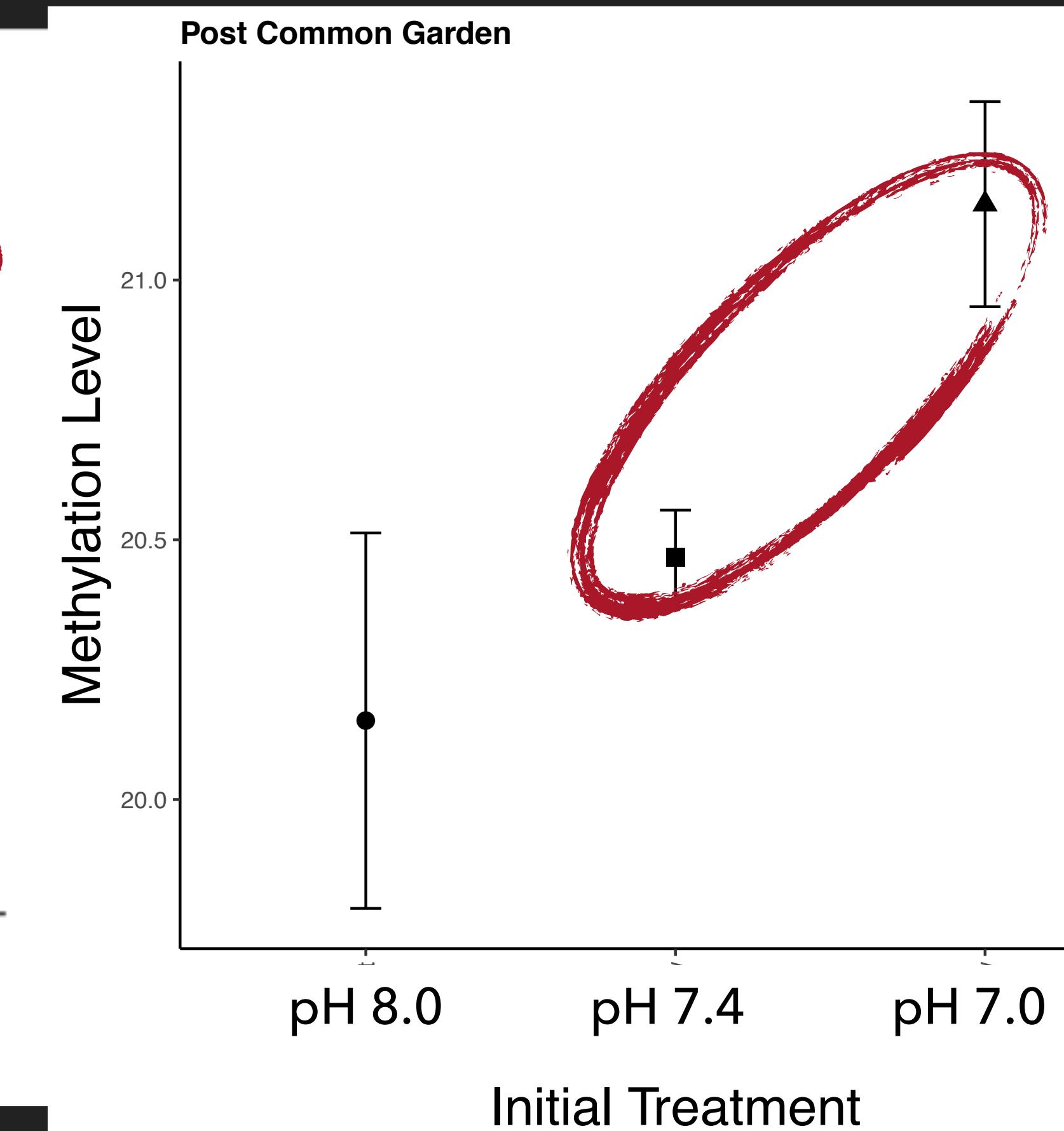
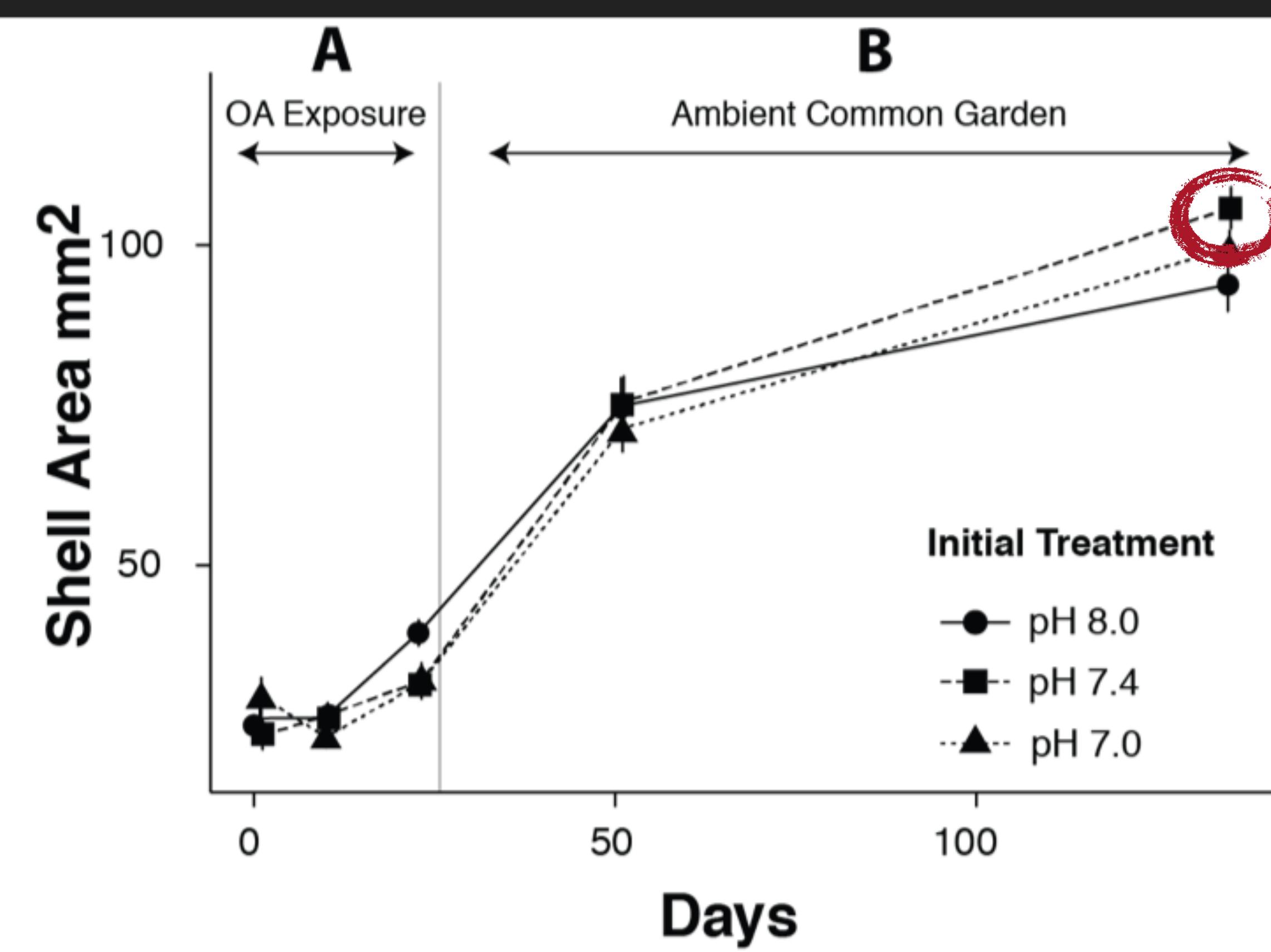
GEODUCKS AND OA

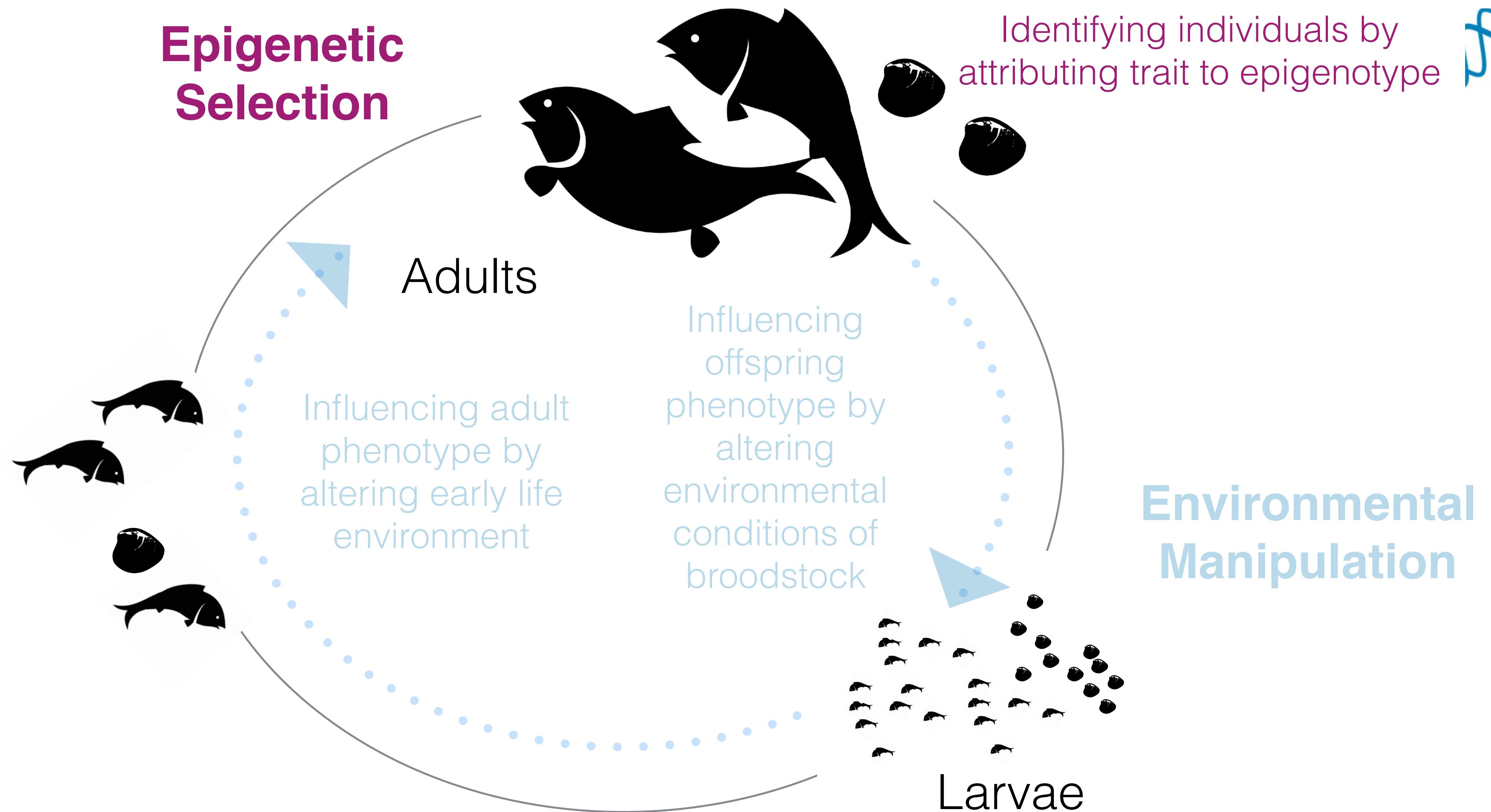
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GEODUCKS AND OA

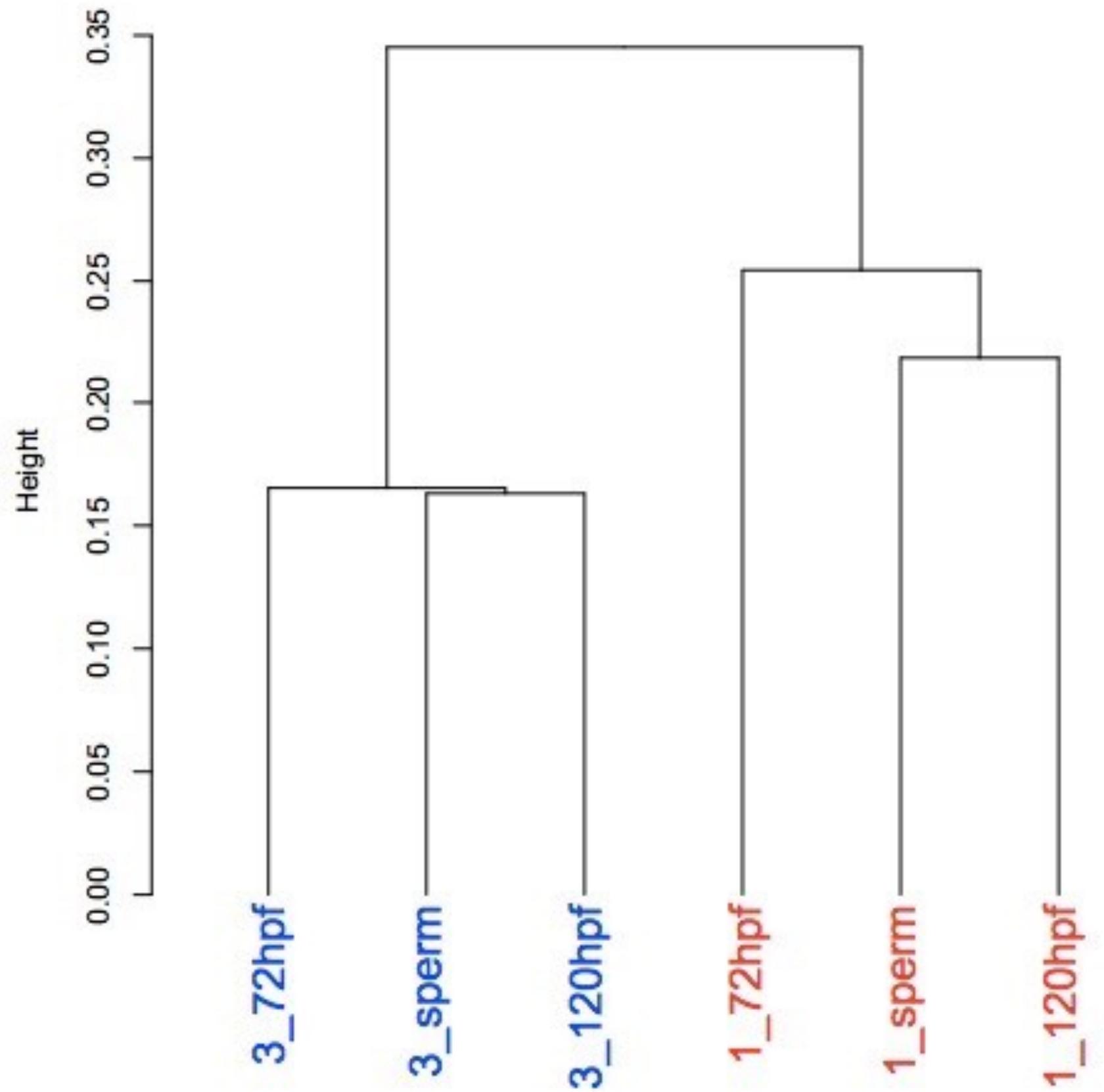
DNA METHYLATION





SELECTION POTENTIAL

CpG methylation clustering



New Results

Indication of family-specific DNA methylation patterns in developing oysters

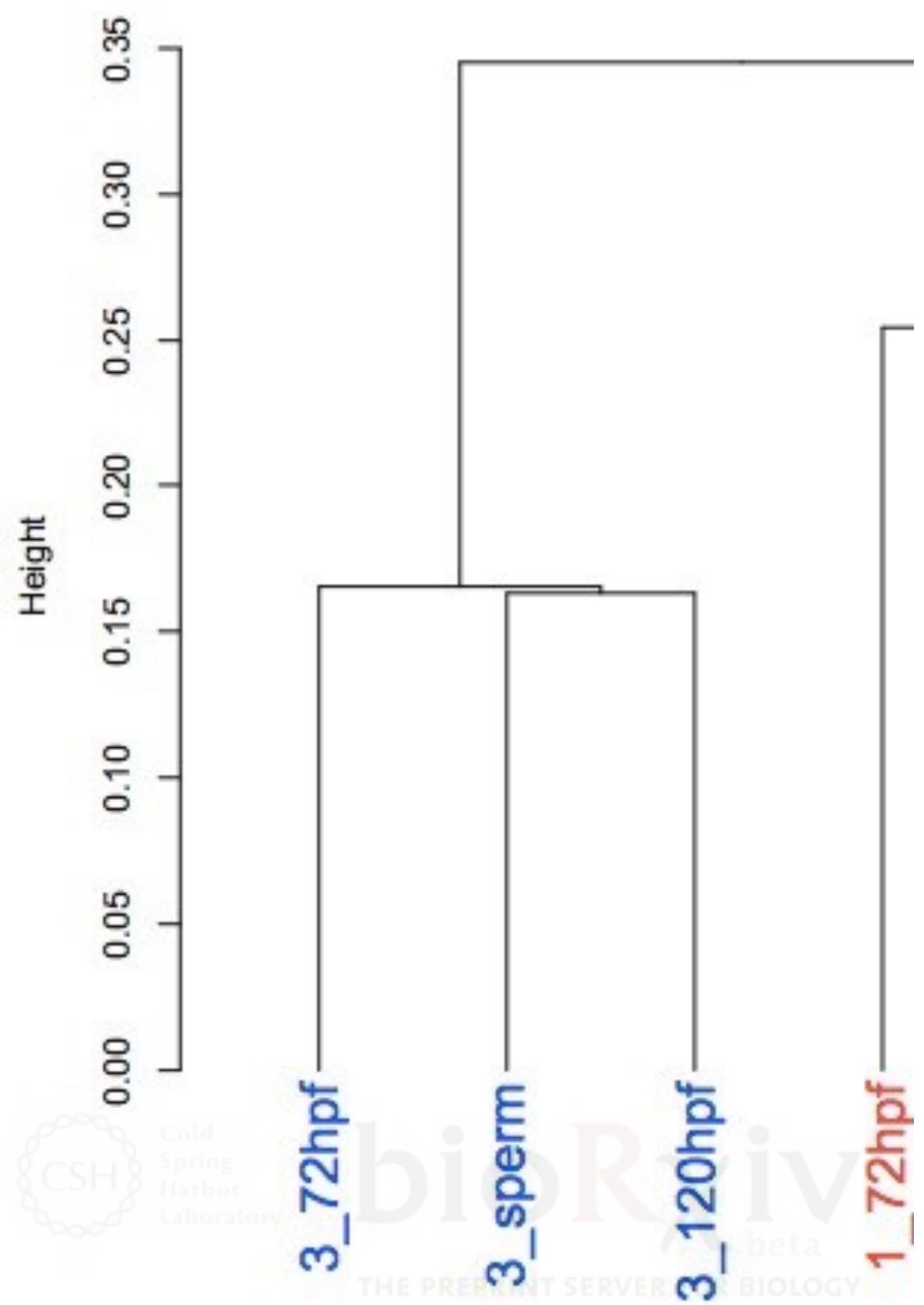
Claire E. Olson , Steven B. Roberts

doi: <http://dx.doi.org/10.1101/012831>

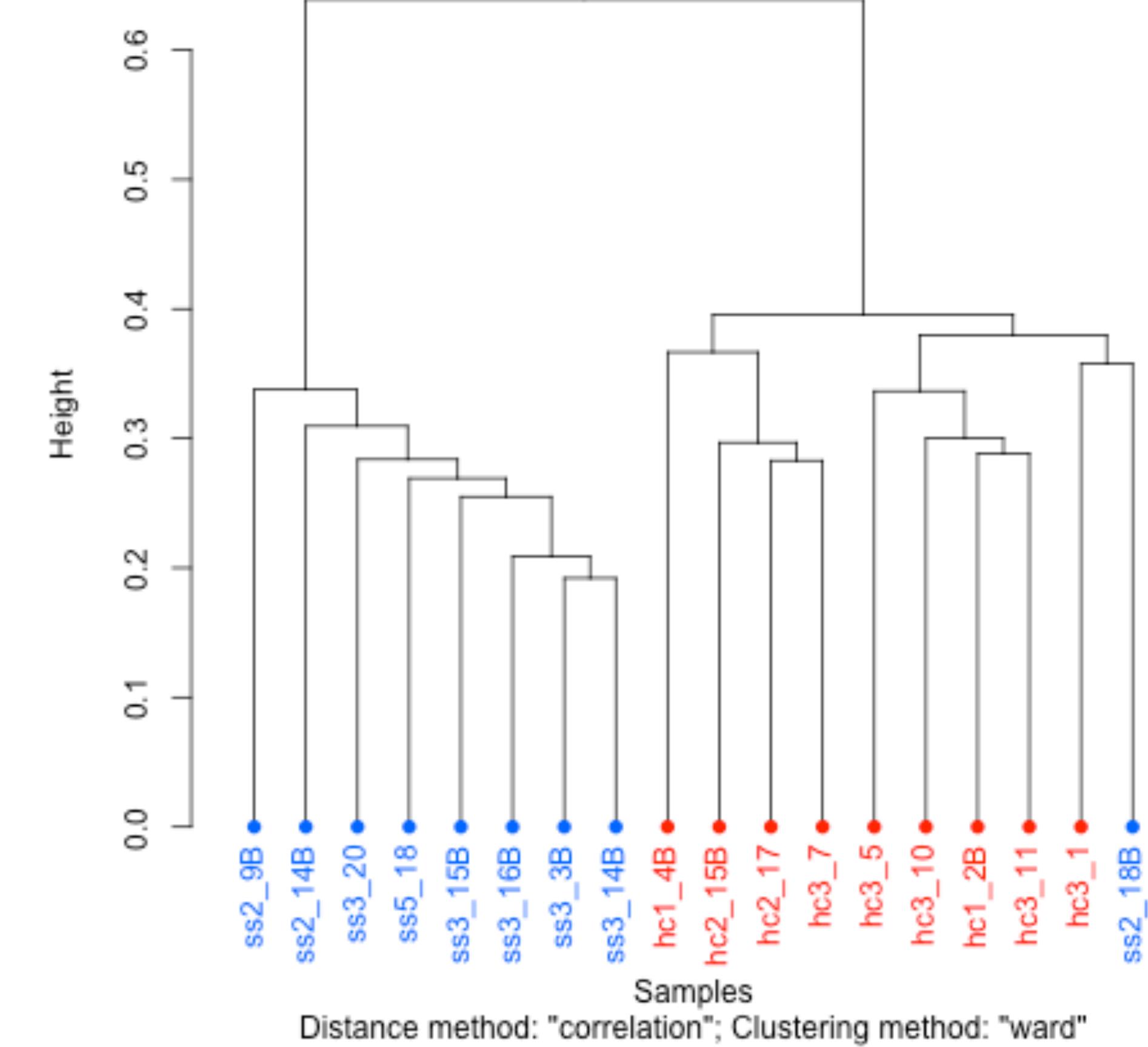


SELECTION POTENTIAL

CpG methylation clu



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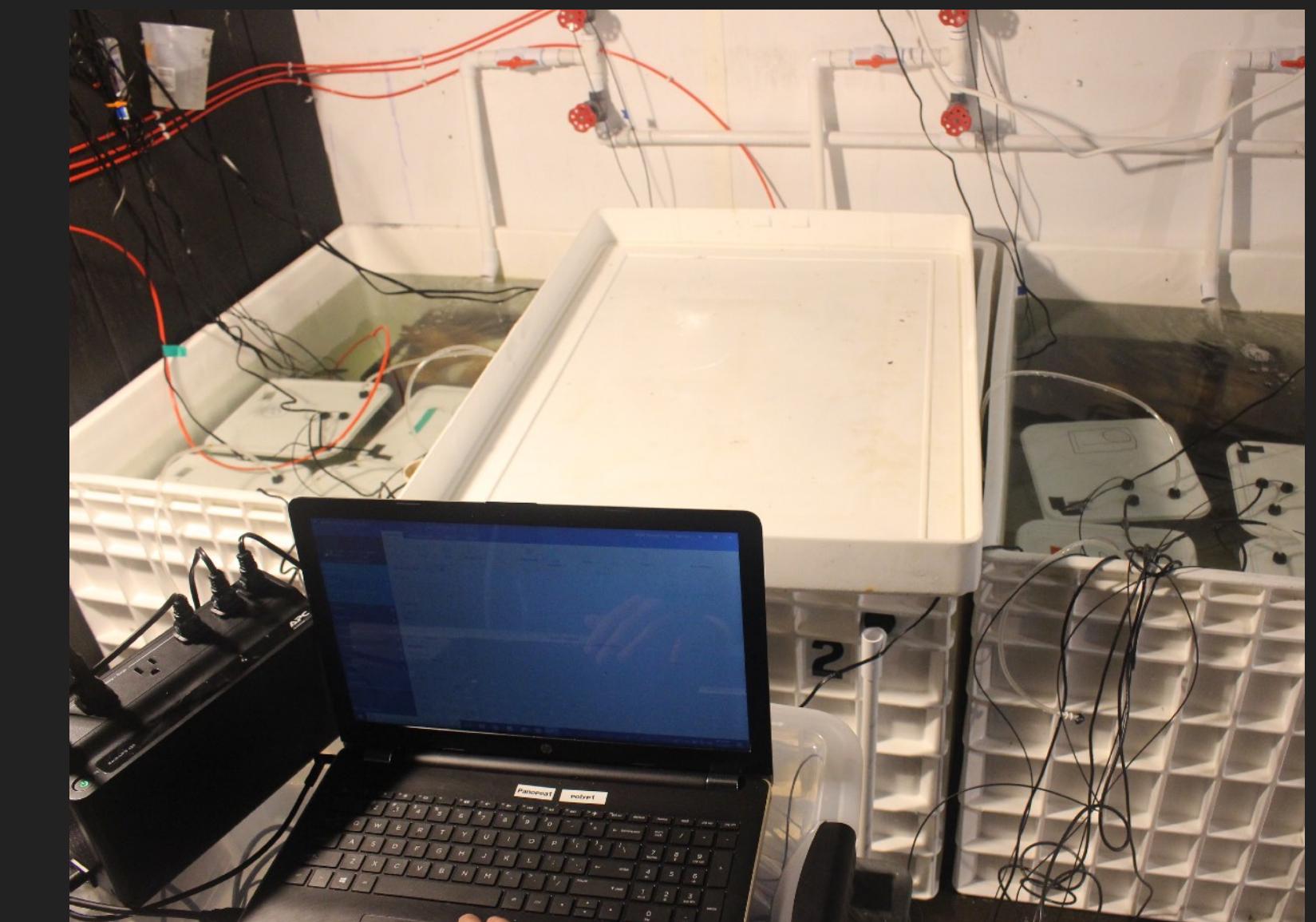
Indication of family-specific DNA methylation developing oysters

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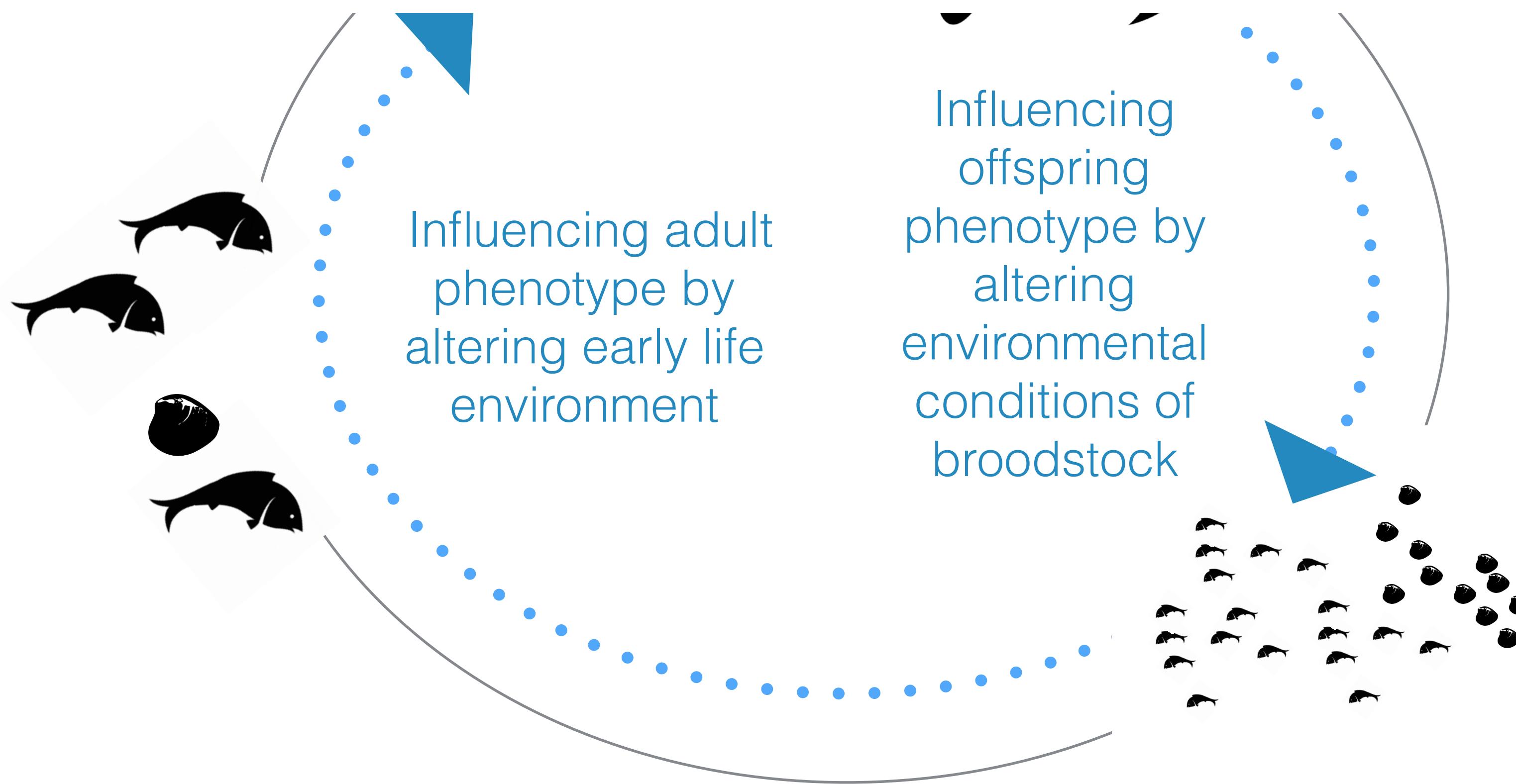
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HOLLIE PUTNAM, SAM GURR, BRENT VADOPALAS, SHELLY TRIGG, JAMESTOWN S'KLALLAM TRIBE

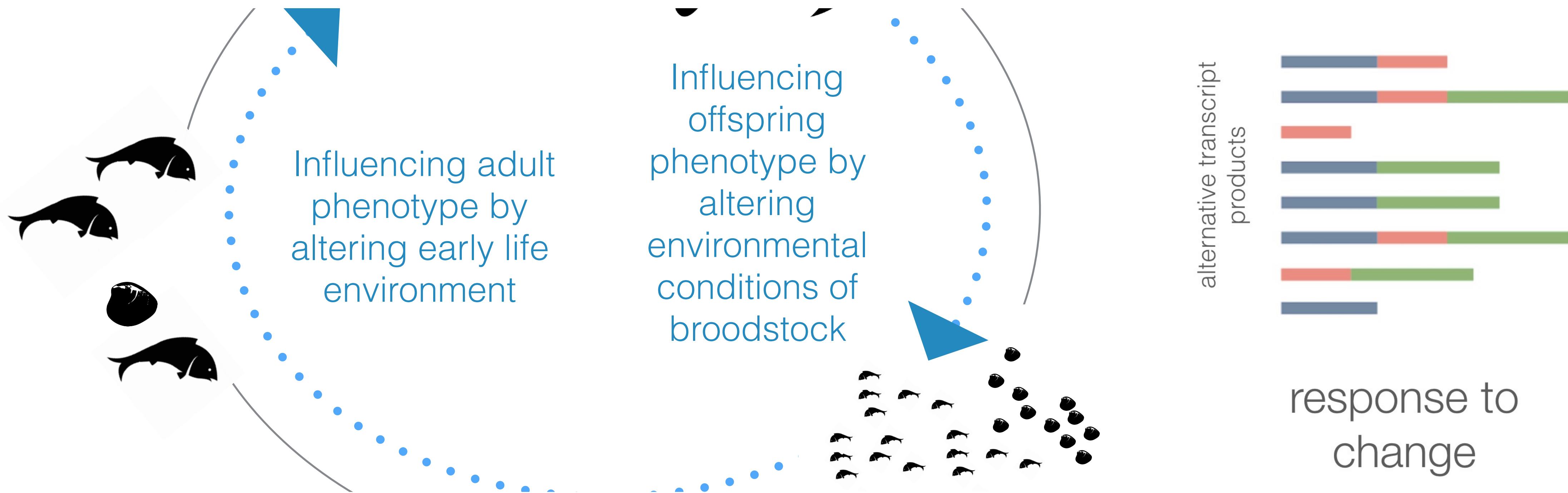
GEODUCKS AND OA



Epigenetics is an attractive lens through which to consider manipulation of traits through environmental memory or selection.



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Epigenetics may also function to disrupt predictable phenotypes through the creation of unexpected variation

ACKNOWLEDGEMENTS

- ▶ Sam White, Brent Vadopalas, Kaitlyn Mitchell, Sam Gurr, Shelly Trigg
- ▶ Kenneth K. Chew Center for Shellfish Research and Restoration
- ▶ Jamestown S'Klallam Tribe
- ▶ Puget Sound Restoration Fund



[GITHUB.COM/SR320/TALK-AC-2019](https://github.com/sr320/talk-ac-2019)



FFAR

