

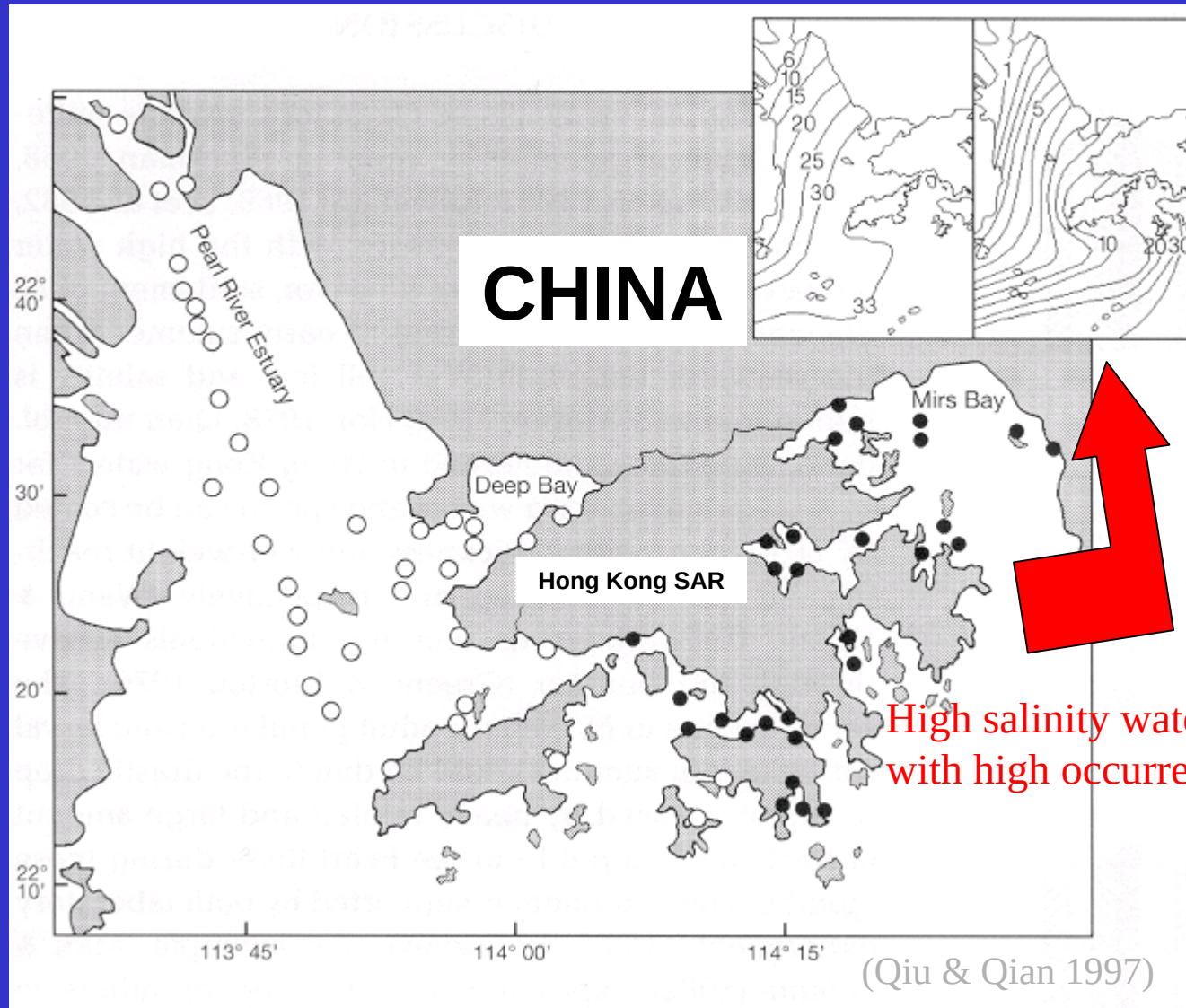
Ionic Control of Settlement and Metamorphosis in Larvae of the Serpulid Polychaete, *Hydroides elegans* (Haswell)

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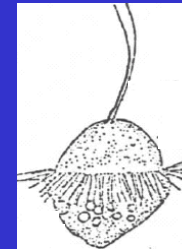
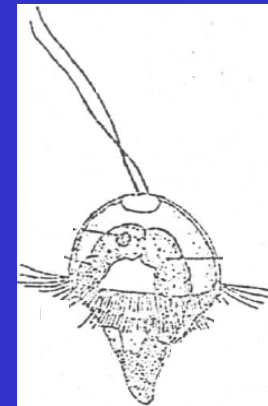
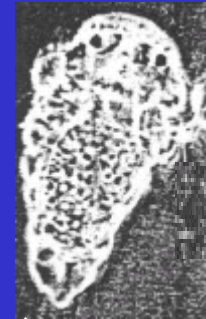
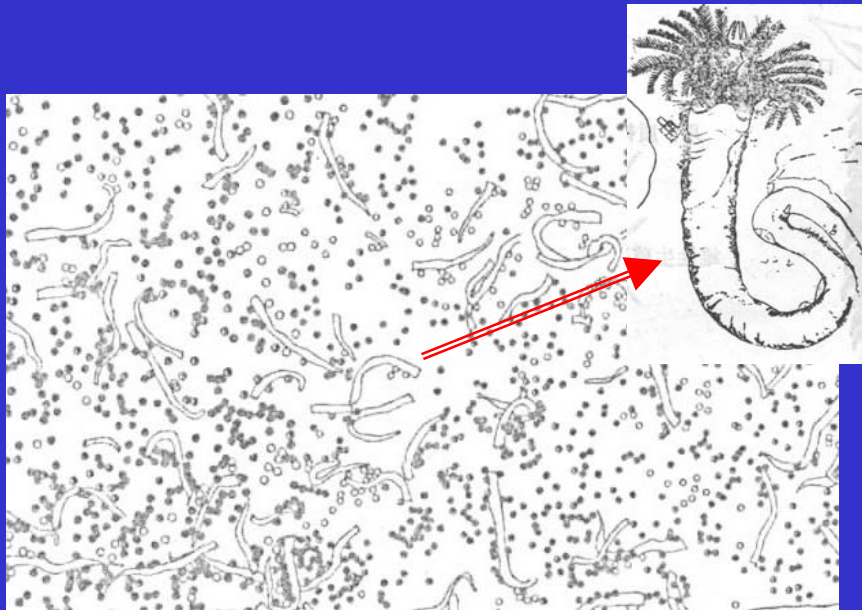
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H. elegans: Adults Distribution around Hong Kong, China

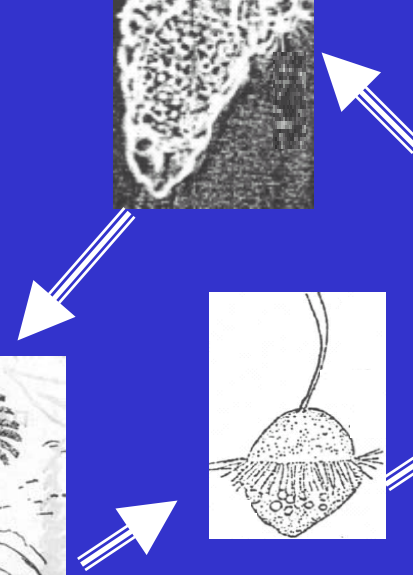


H. elegans Life Cycle

Adults
tube dwelling benthic foulers

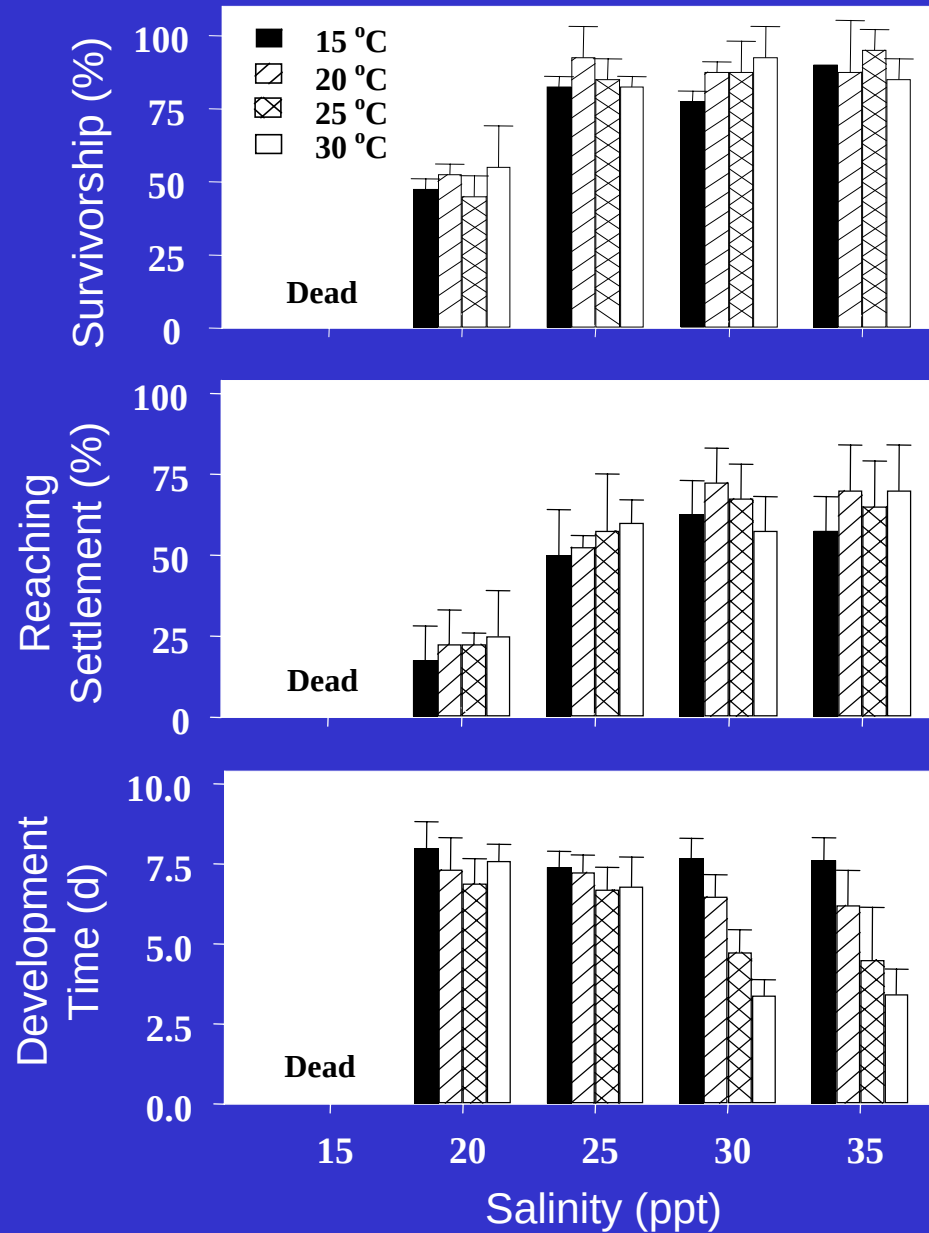


Larvae
meroplankton



H. elegans Larval development at different salinities

(Qiu & Qian 1997)



Question/hypothesis

Does any ion(s) in high salinity seawater facilitate settlement & metamorphosis of *H. elegans* larvae?

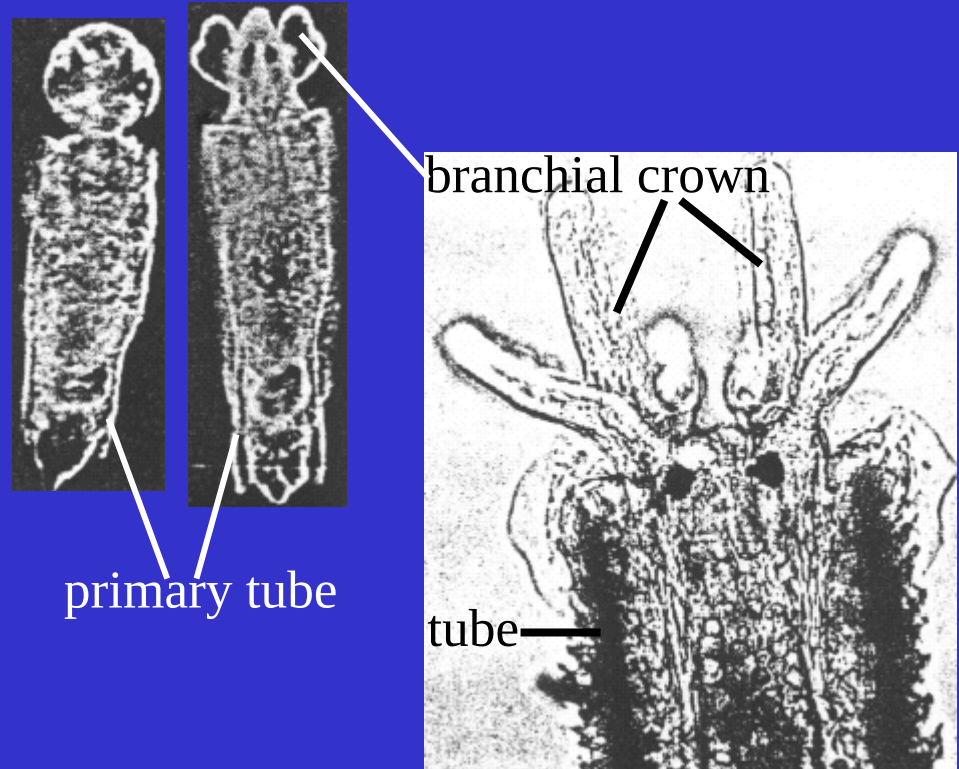
Ionic Composition (mM) in Different Seawaters

	Normal SW (MBL ingredient)	High salinity SW	Max conc. tested	Way to increase
Salinity	30	> +5		
Na ⁺	423	> +71	+200	+NaCl
K ⁺	9	> +1.5	+40	+KCl
Ca ²⁺	9.27	> +1.55	+20	+CaCl ₂ or – MgCl ₂
Mg ²⁺	48.44	> +8.07	+20	+MgCl ₂ or – CaCl ₂
Cl ⁻	497.42	> +83	+200	+NaCl or – SO ₄ ²⁻
SO ₄ ²⁻	25.5	> +4.25	+20	+NaSO ₄ & – NaCl

H. elegans: Morphology Change upon Settlement & Metamorphosis



Competent larva

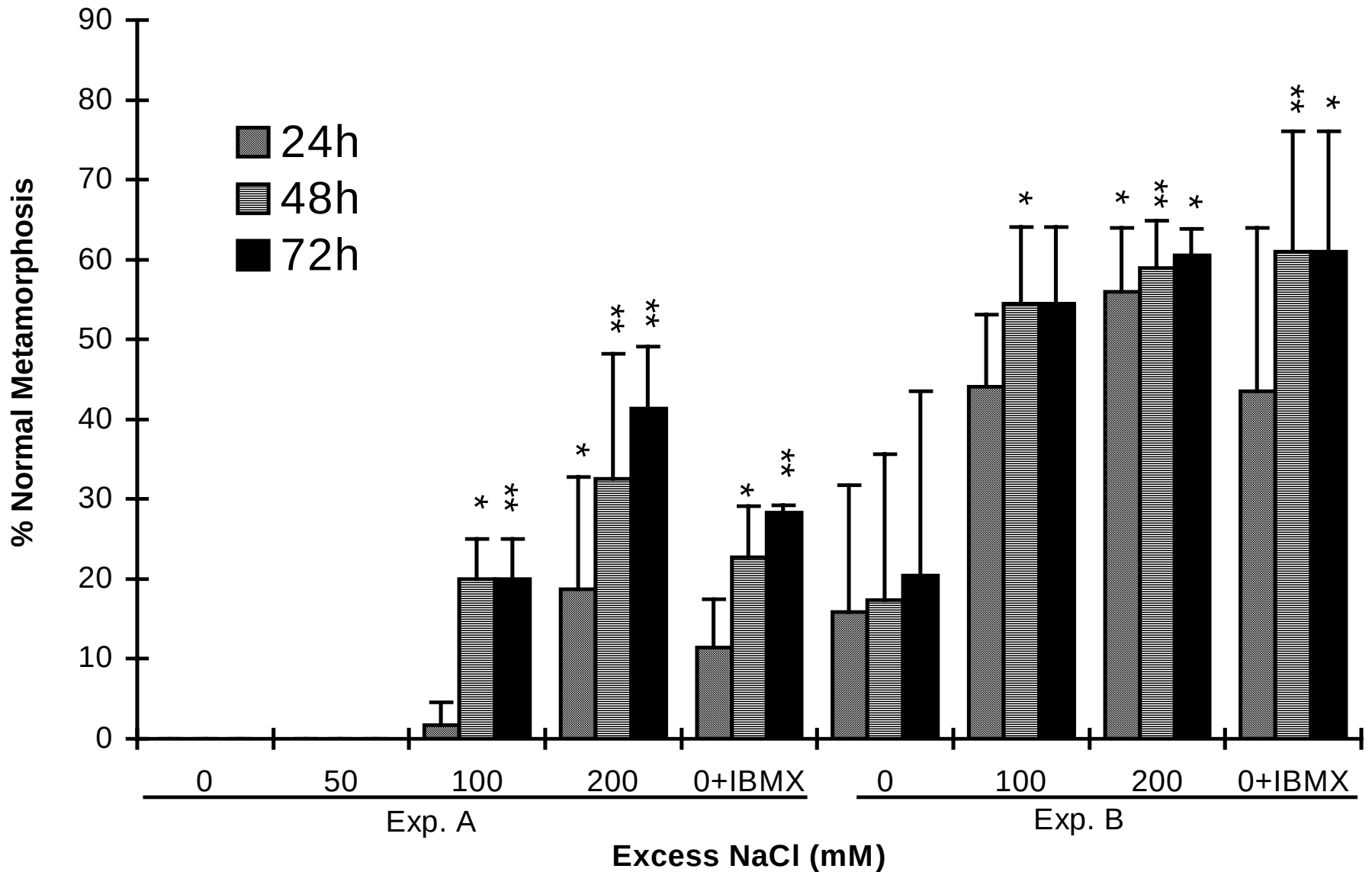


Juvenile



(Carpizo-Ituarte & Hardfield 1998)

Result 1: Exposure to excess Na⁺

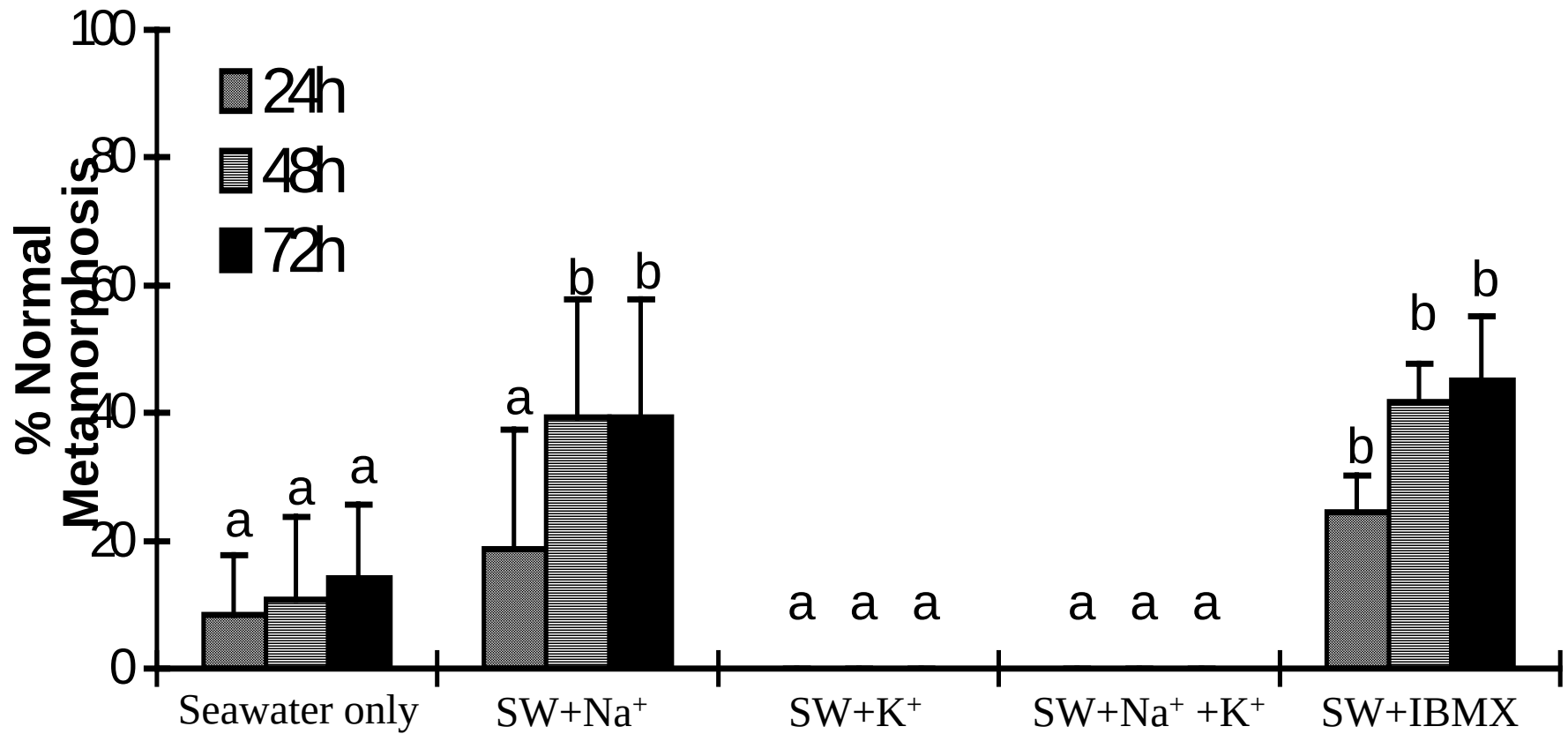


IBMX: a cAMP effector & metamorphic stimuli

Result 2: Exposure to Other Ionic Increases

Excess Ions	Metamorphic Induction	Note
K^+	+ abnormal	+KCl
Ca^{2+}	no	+CaCl ₂ or – MgCl ₂
Mg^{2+}	no	+MgCl ₂ or – CaCl ₂
Cl^-	+	+NaCl
	+ (insignificant)	– SO ₄ ²⁻
SO ₄ ²⁻	no	+NaSO ₄ & – NaCl

Result 3: Antagonization between Na⁺ & K⁺



Conclusions

- ❖ Excess Na^+ to normal seawater stimulates settlement & metamorphosis of *H. elegans* larvae
- ❖ Excess K^+ to normal seawater inhibits the metamorphosis that would be induced by excess Na^+
- ❖ High salinity seawater might facilitate but does not induce settlement and metamorphosis of *H. elegans* larvae