

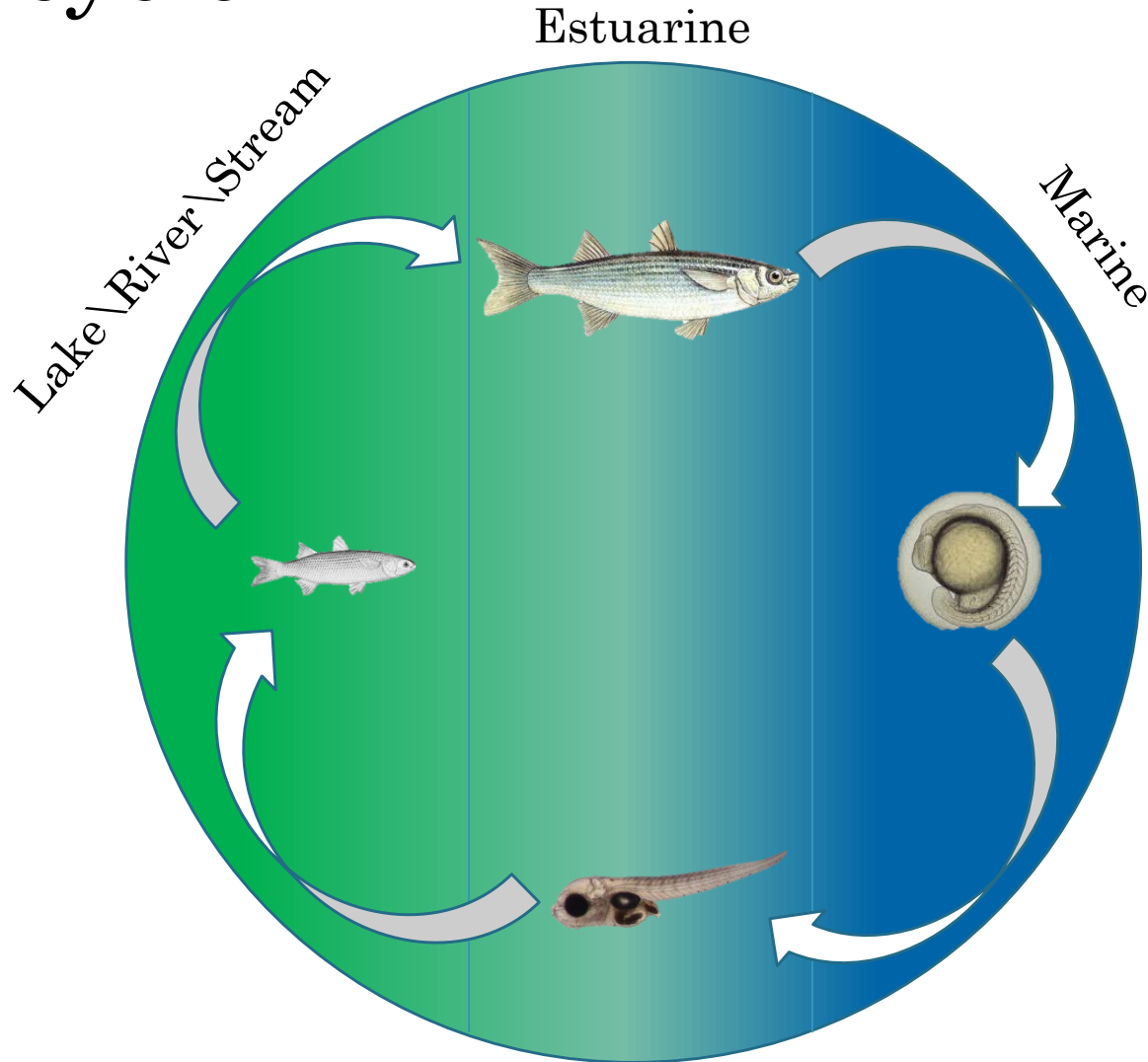
Salinity as the driving force of DHA synthesis in grey mullet juveniles

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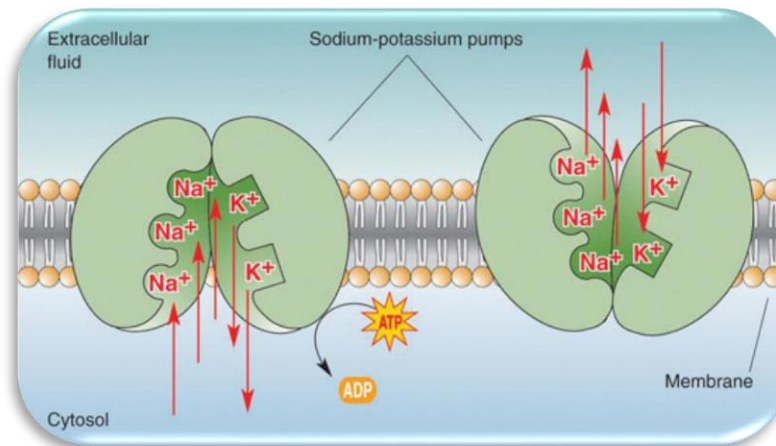
National center for mariculture, Israel

Life cycle



Sodium potassium ATPase - Na^+/K^+ ATPase

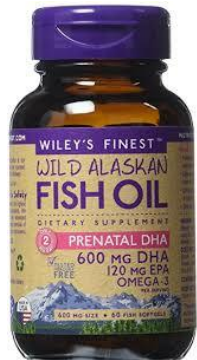
- **Active** uptake and secretion of ions is energy consuming.
- Sodium potassium ATPase pumps are the main ions transporter. **Essential** for fish osmoregulation.
- **70%** of the cell's energy is utilized by Na^+/K^+ ATPase pumps.



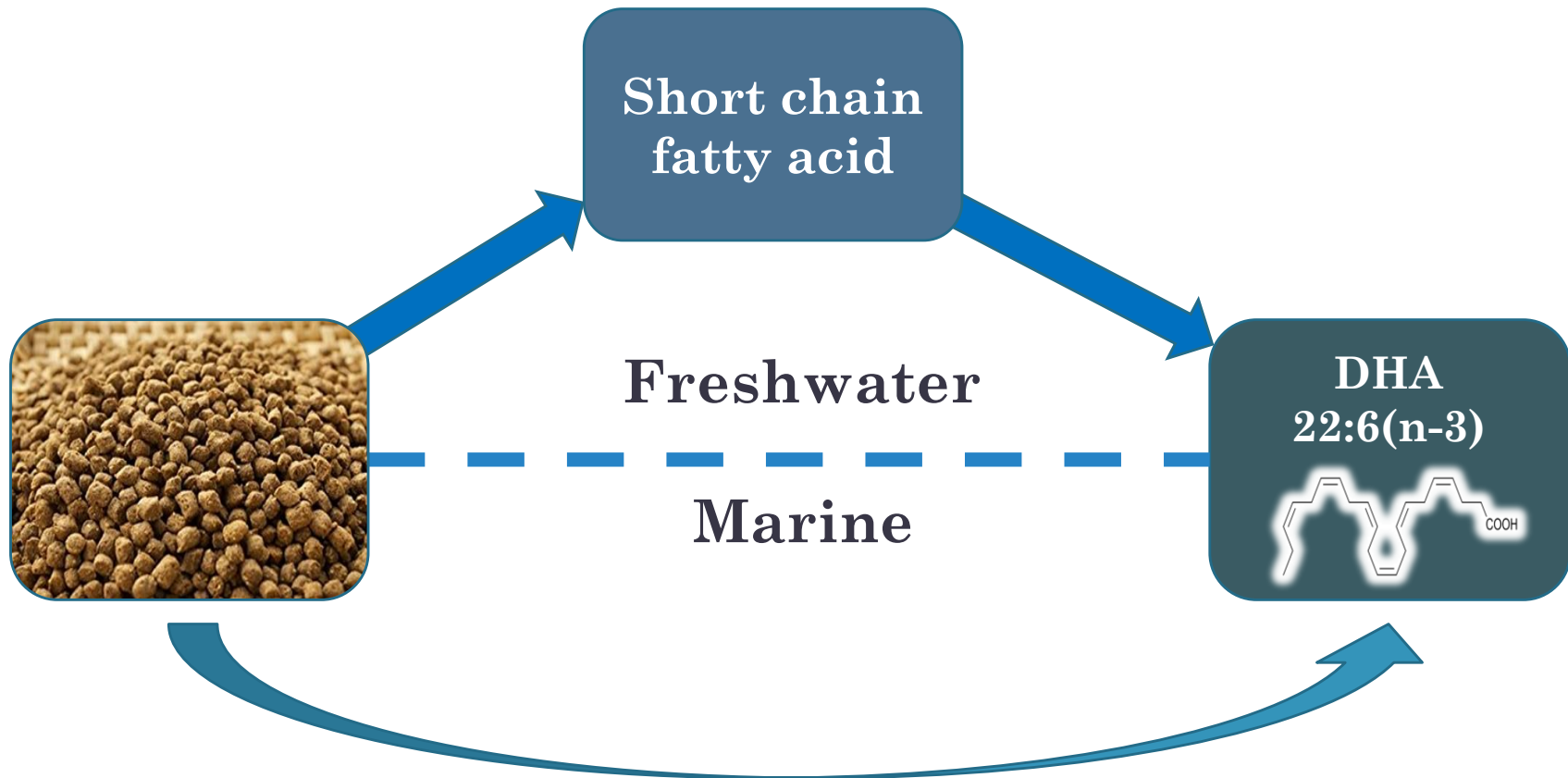
Will efficient
osmoregulation boost
growth?

What we already know

- **Reduced gill Na^+/K^+ ATPase activity, at isosmotic salinities, will lead to reduced energy use thereby higher growth rates** (Gaumet et al., 1995; Imsland et al., 2001).
- **Omega3 fatty acids promotes adaptive physiological responses to hypersalinity** (Carrier et al., 2011).
- **DHA content in cell membranes determines molecular activity of the Na^+/K^+ ATPase** (turner et al 2003).



DHA's source in freshwater and marine fish



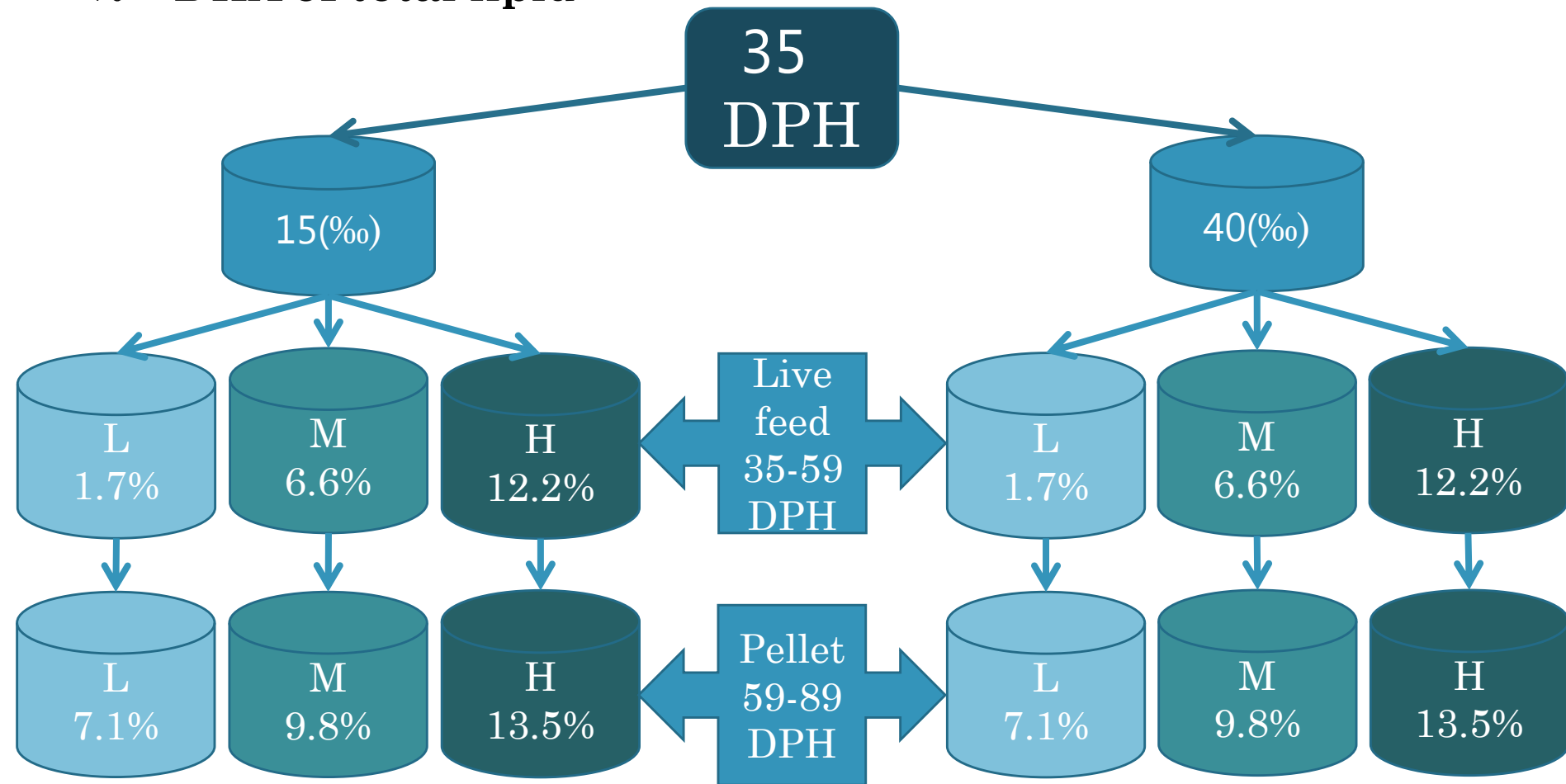
Research aims

- **To determine** the effect of salinity and DHA on grey mullet juvenile growth.
- **To characterize** sodium potassium ATPase pump activity, in gills epithelium.
- **To quantify** expression of genes related to DHA synthesis.
- **To establish** the relationship between the expression of these genes and environmental salinity.

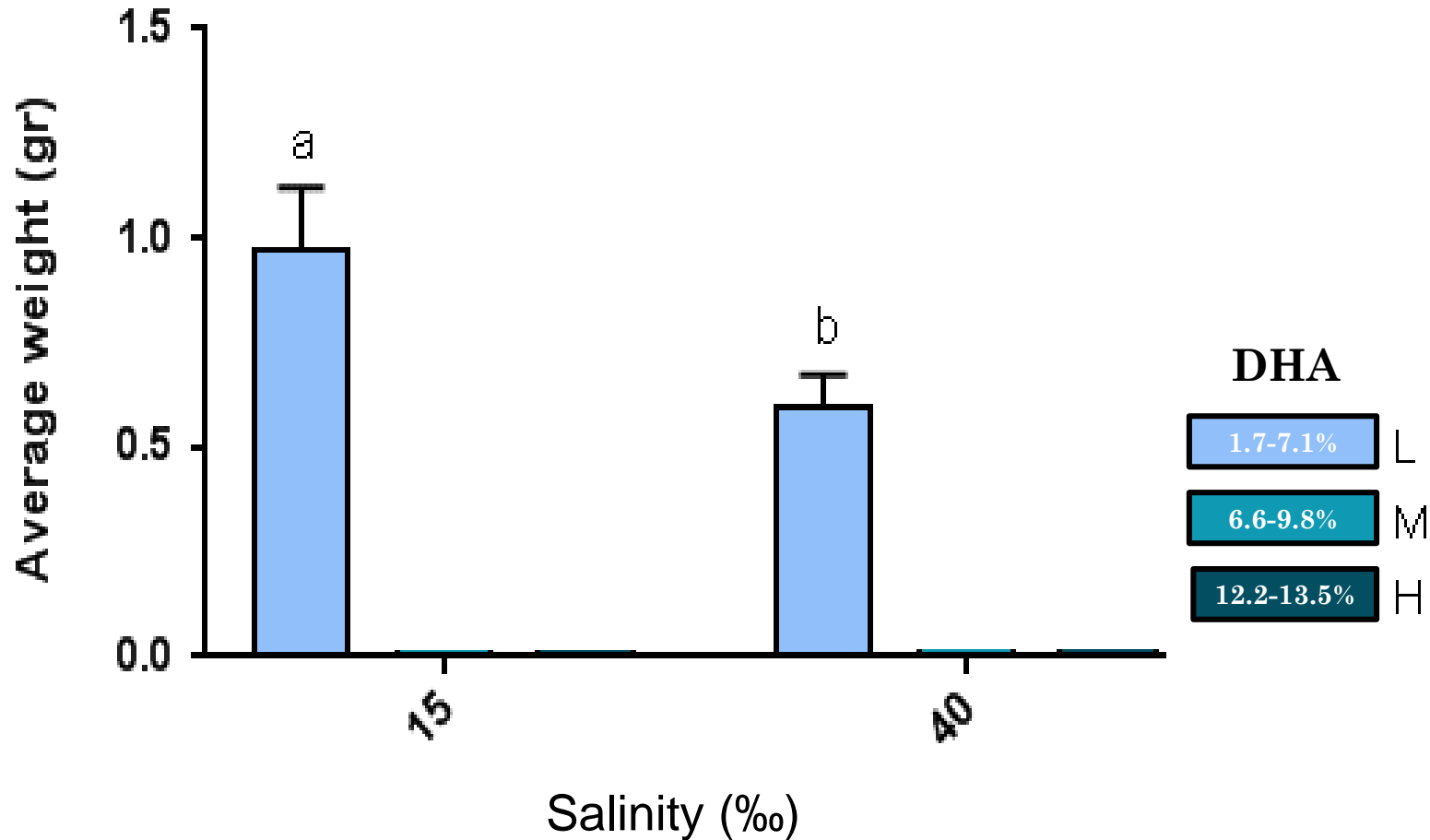
Experimental design

* DPH – Days post hatch

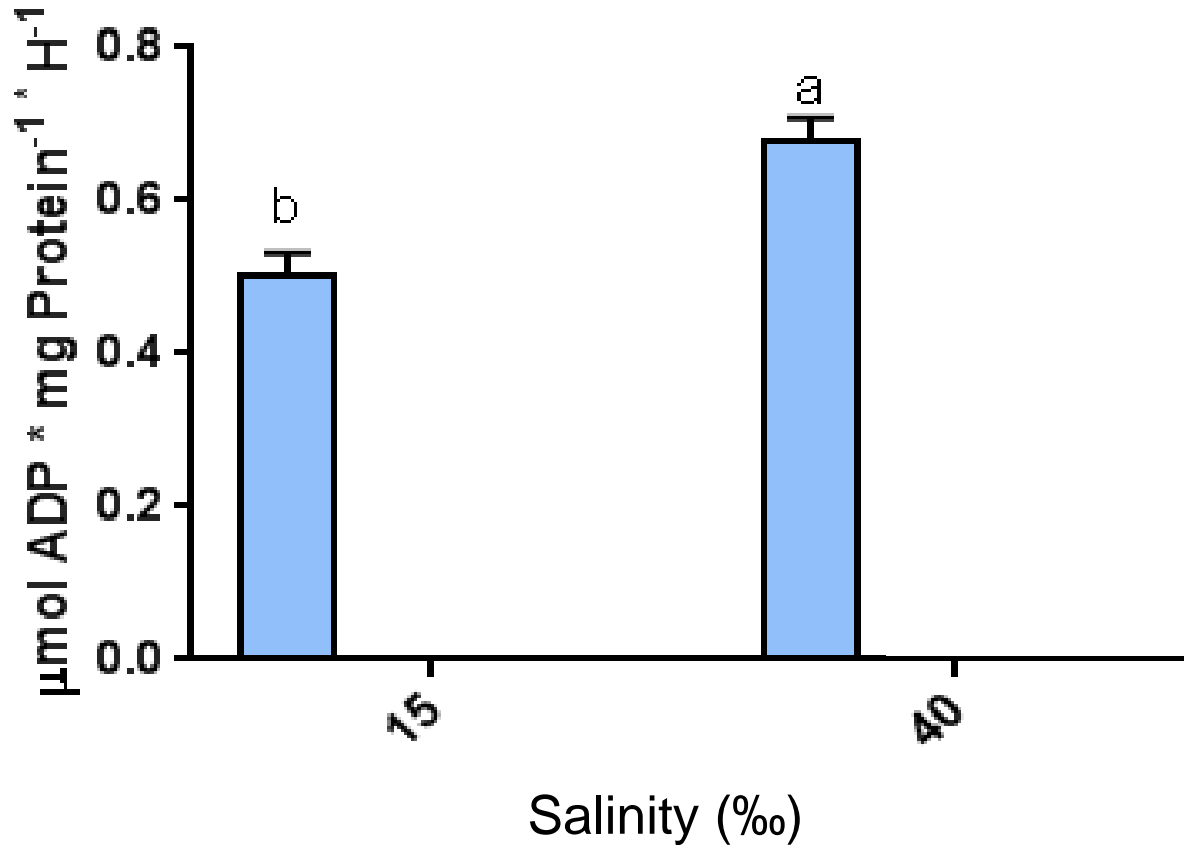
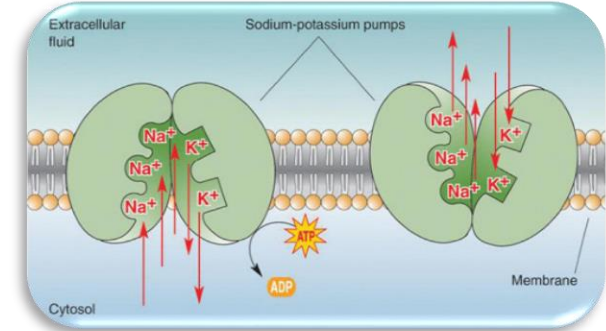
* % – DHA of total lipid



Growth Performance (89DPH)



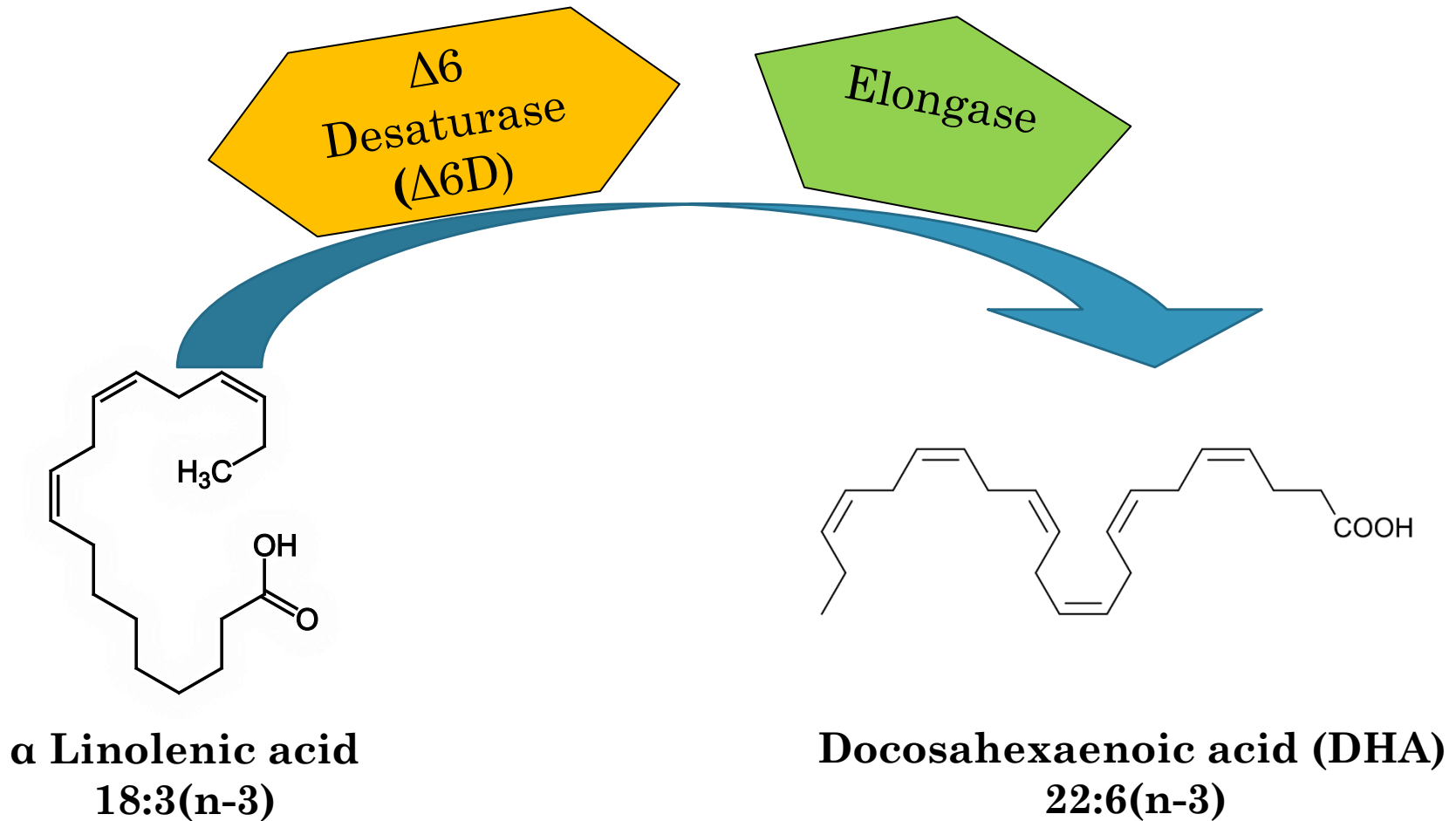
Does DHA affect osmoregulation?



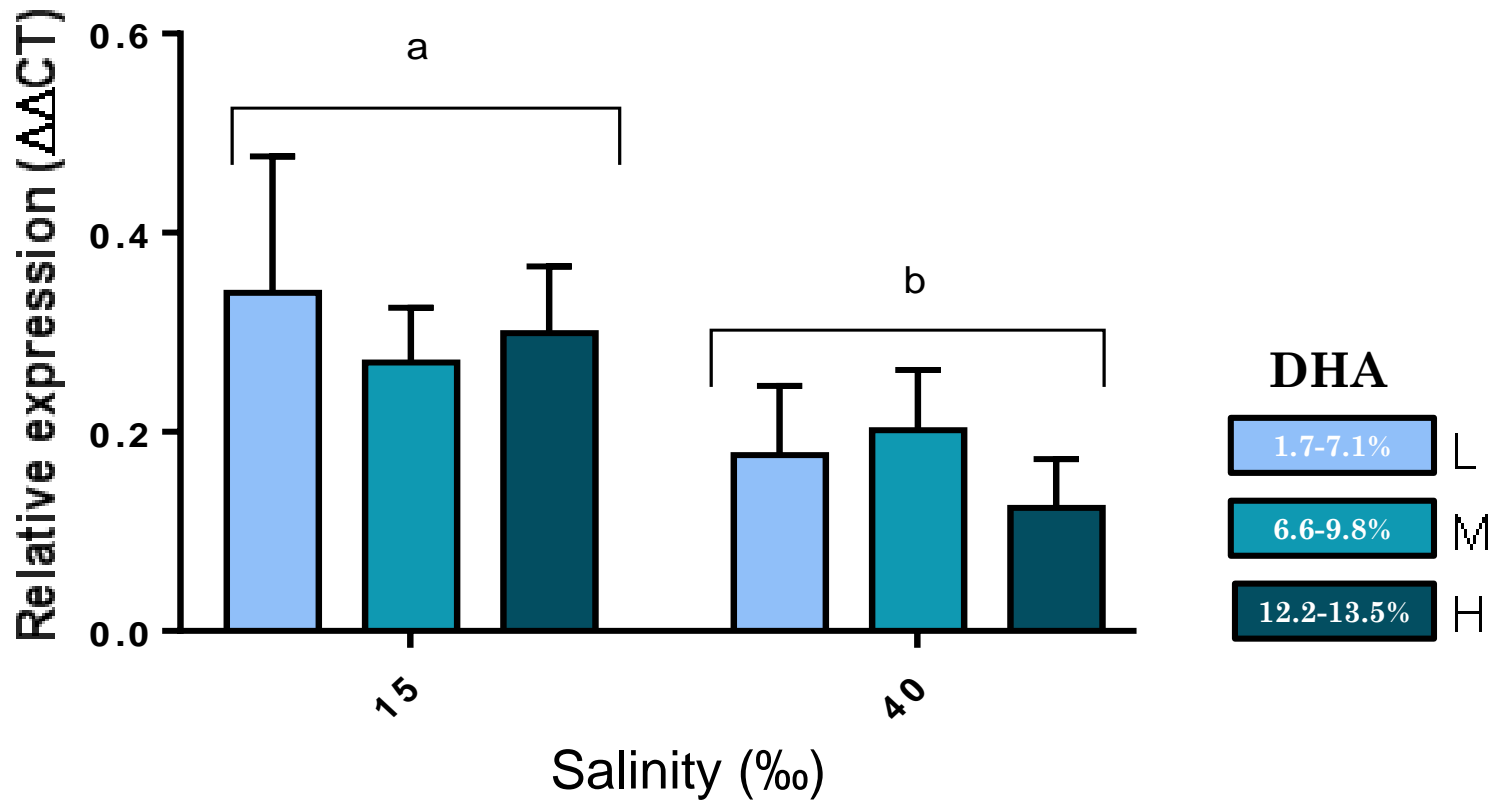
DHA	
1.7-7.1%	L
6.6-9.8%	M
12.2-13.5%	H

Can mullets synthesize
DHA?

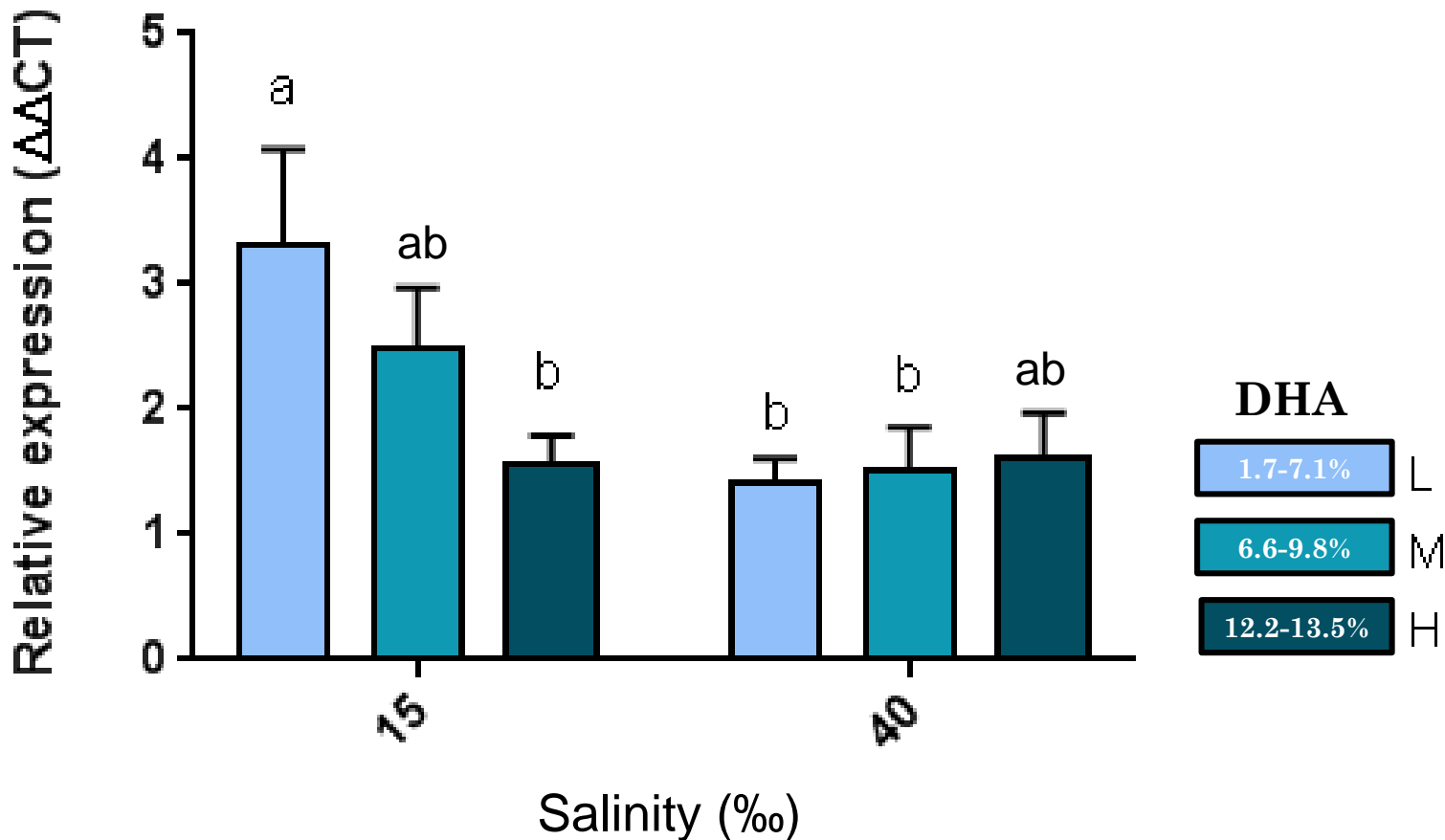
DHA's metabolic pathway



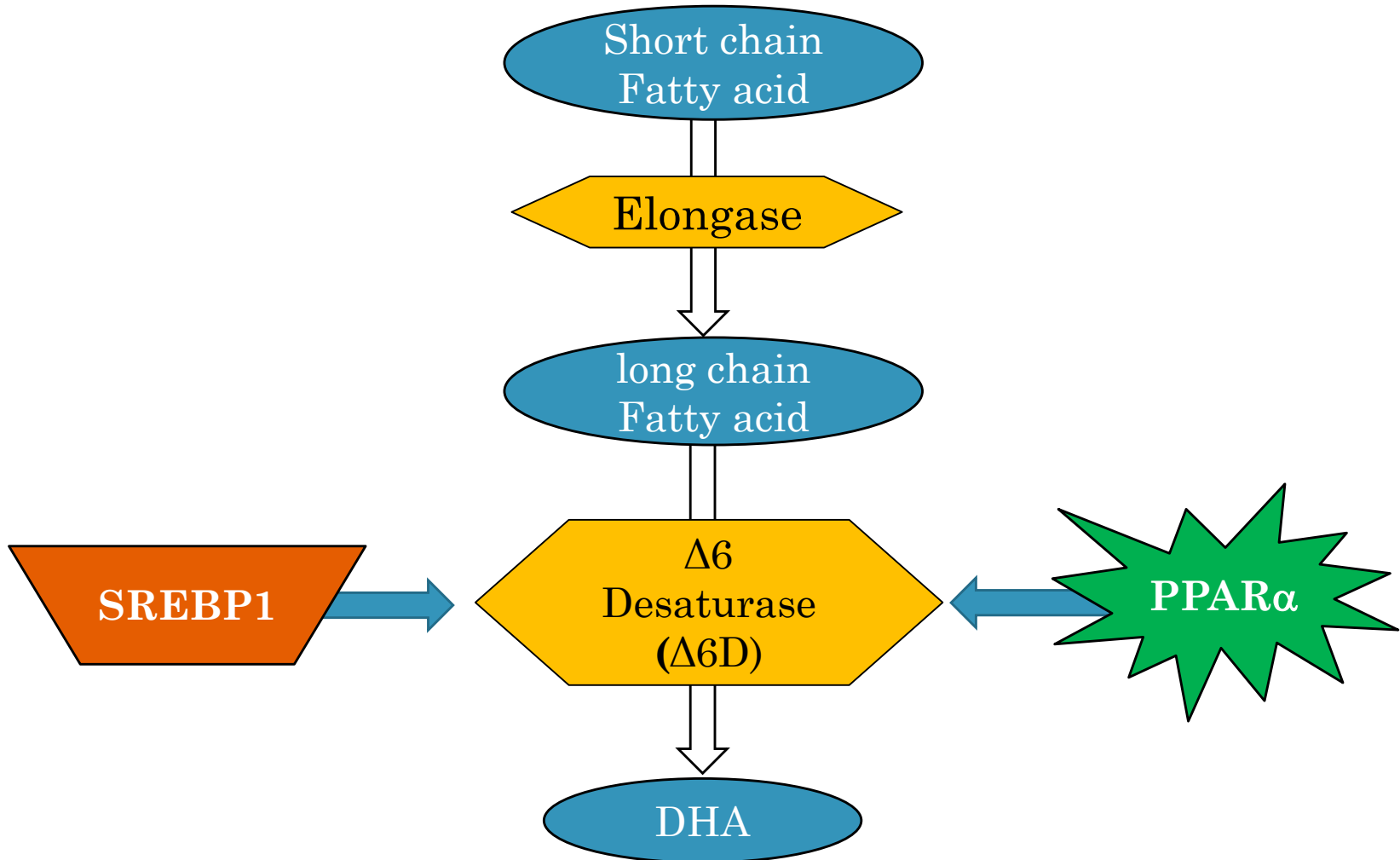
$\Delta 6$ Desaturase ($\Delta 6D$) expression in the liver



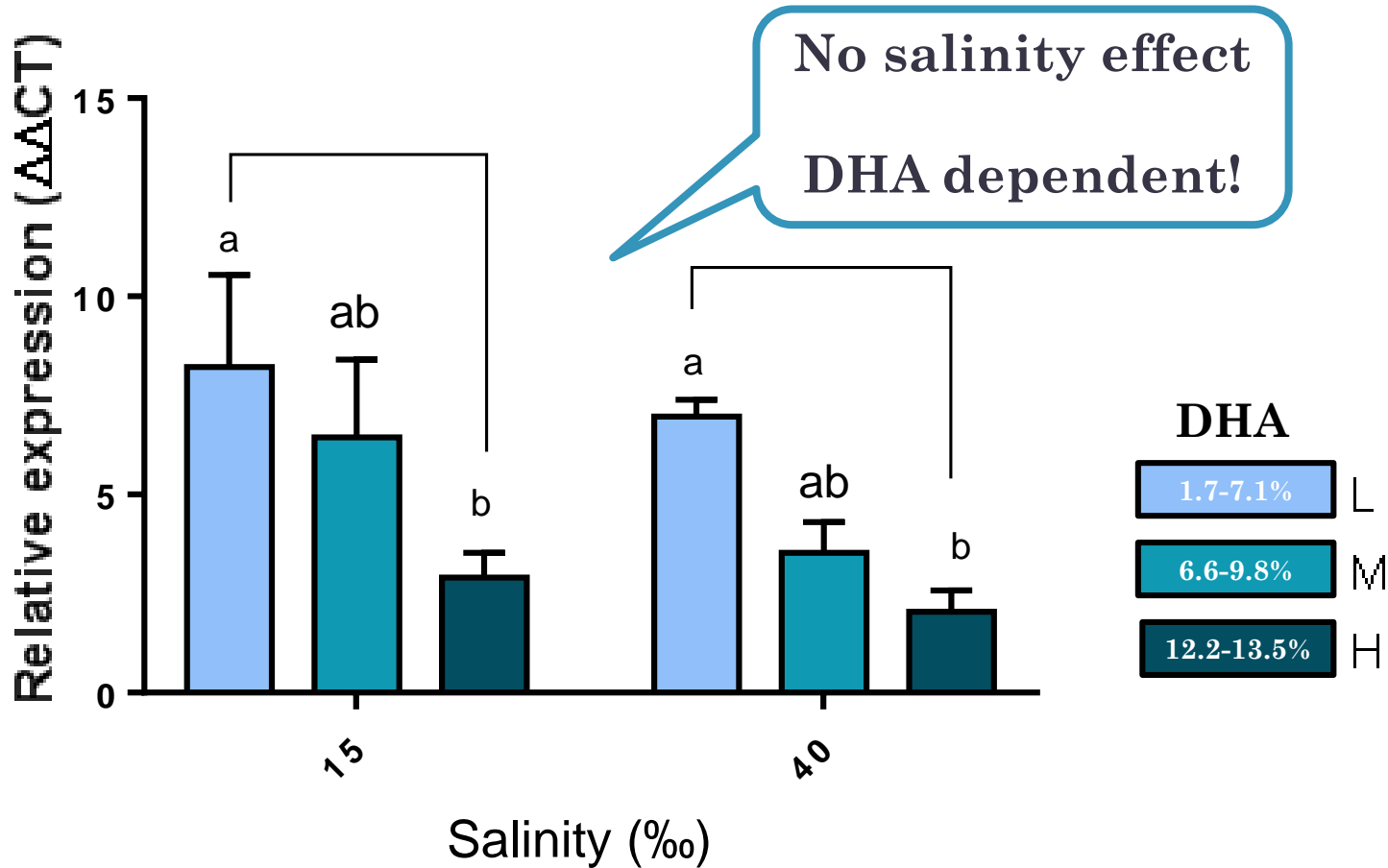
Elongase expression in the liver



How does the liver detect the change in the environment?

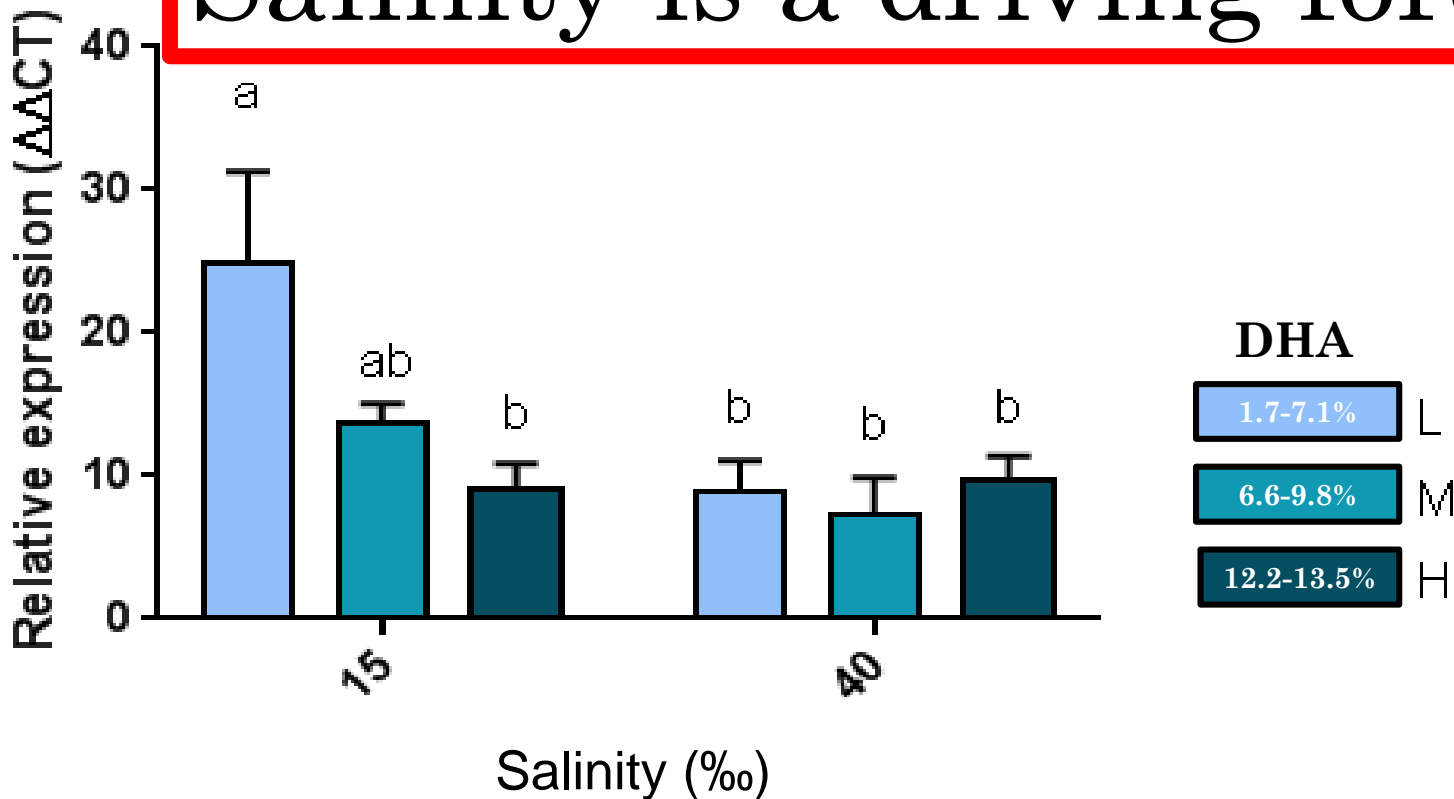


DHA regulates PPAR α expression

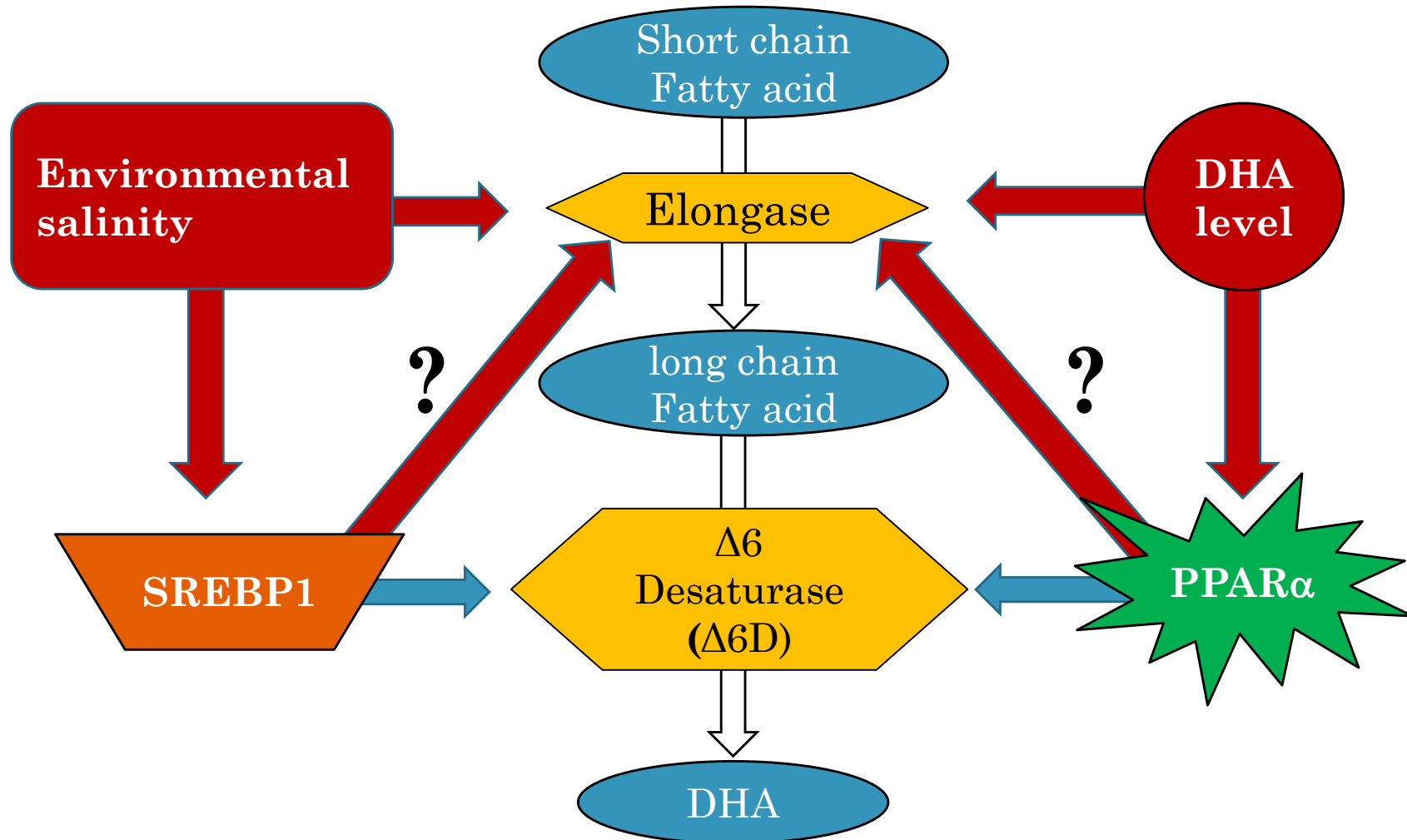


Salinity regulates SREBP-1 expression

Salinity is a driving force!



Suggested model for DHA synthesis



Practical take home message

For improved and cost effective grow-out of mullet

- Lower (ca 7% TFA) dietary DHA (expensive dietary component) is sufficient under low salinity (e.g. 15 ‰) rearing conditions.
- Provided there is a source of linolenic acid (18:3n-3) in the dietary oil (e.g. soybean oil) which will serve as a precursor for elongation and desaturation enzymes to synthesize DHA.

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Research team

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National center for mariculture team

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