Environmental chloride ions trigger the transition to Artemia ingestion in first-feeding Chinese Perch *(Siniperca chuatsi)* larvae by activating the GABAergic Signaling Pathway

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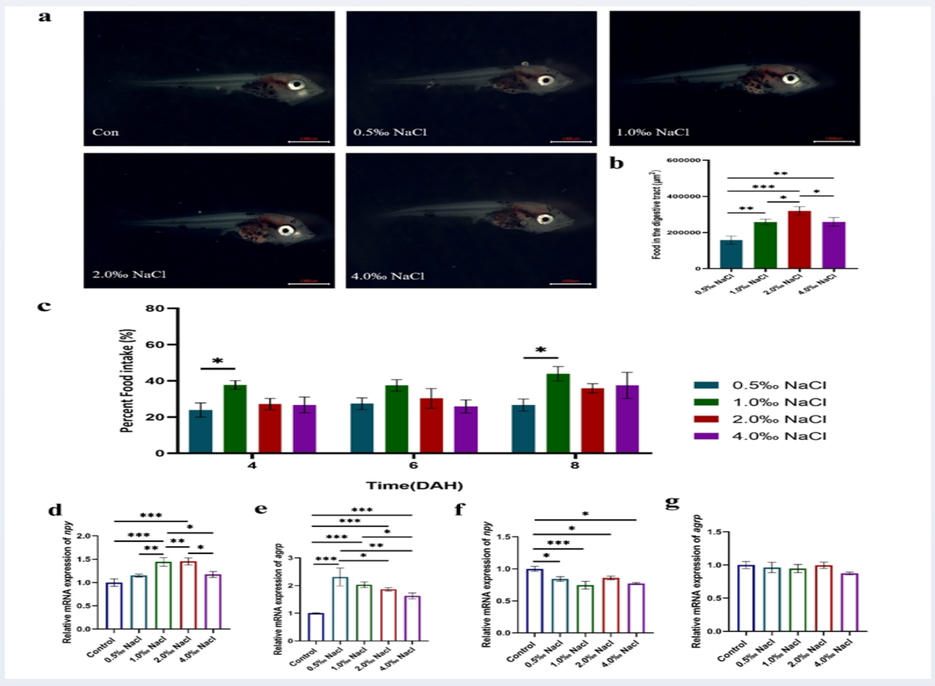
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Introduction

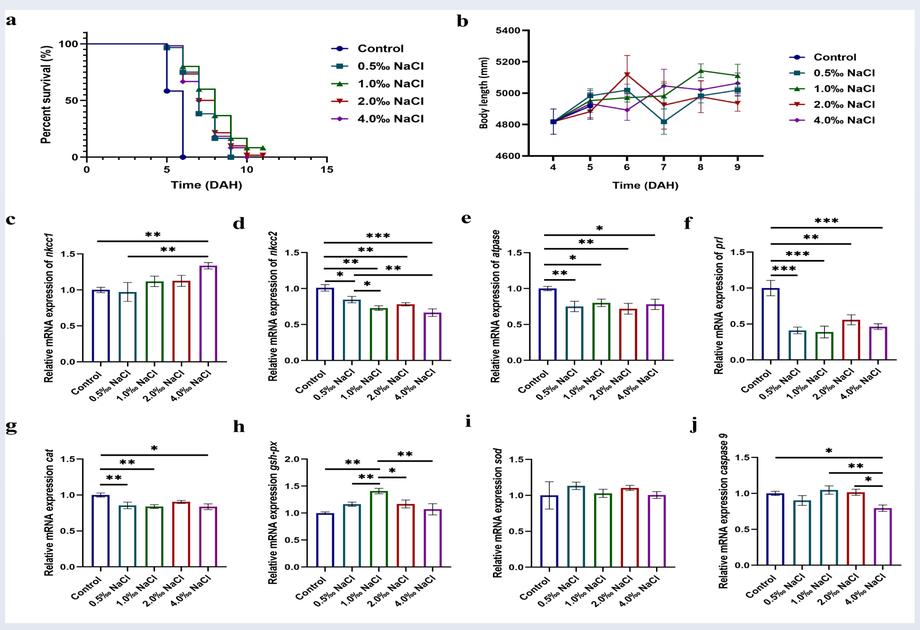
- The Chinese perch (*Siniperca chuatsi*) is one of the most economically significant freshwater fish species in China. However, its unique feeding habit, an obligatory requirement for live prey during the first-feeding stage, presents a critical "bottleneck" issue that severely restricts the sustainable development of the industry. Successfully transitioning larvae from live fish to alternative prey like Artemia remains a significant challenge.
- In the present study, we identified environmental chloride ions (Cl^-) as the essential chemical cue to initiate the Chinese perch larvae to feed Artemia.
- Our findings demonstrate that chloride ions serve as a physiological switch that activates the GABAergic system to reprogram predatory motivation, offering a novel strategy for the dietary plasticity and domestication of specialized carnivorous fish.

Results

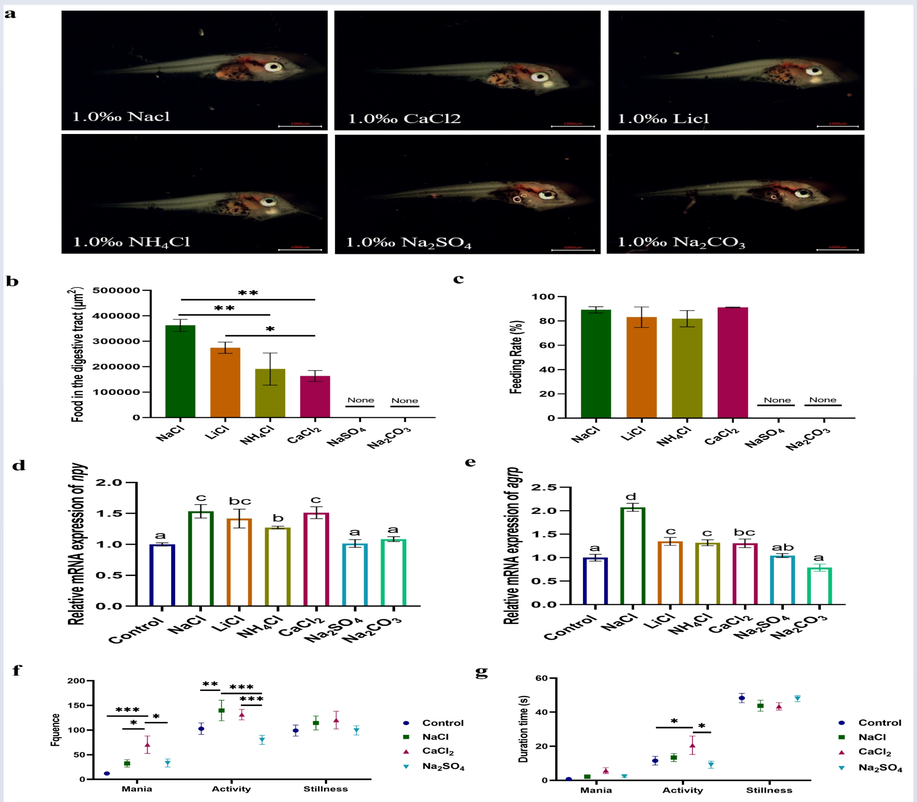
➢ Salinity-induced dietary transition promotes Artemia consumption in Chinses perch larvae during their first feeding stage



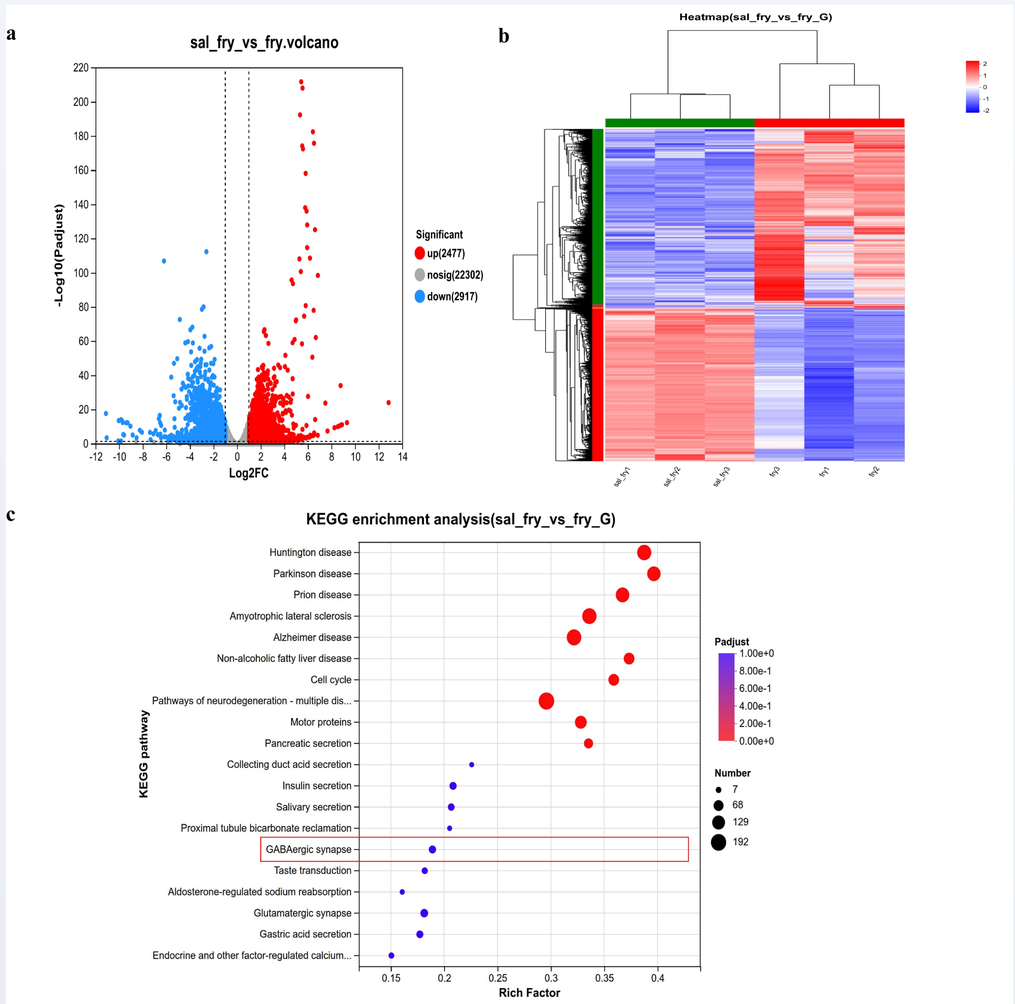
➢ Optimal salinity enhances survival and physiological homeostasis in Chinese perch larvae fed with Artemia



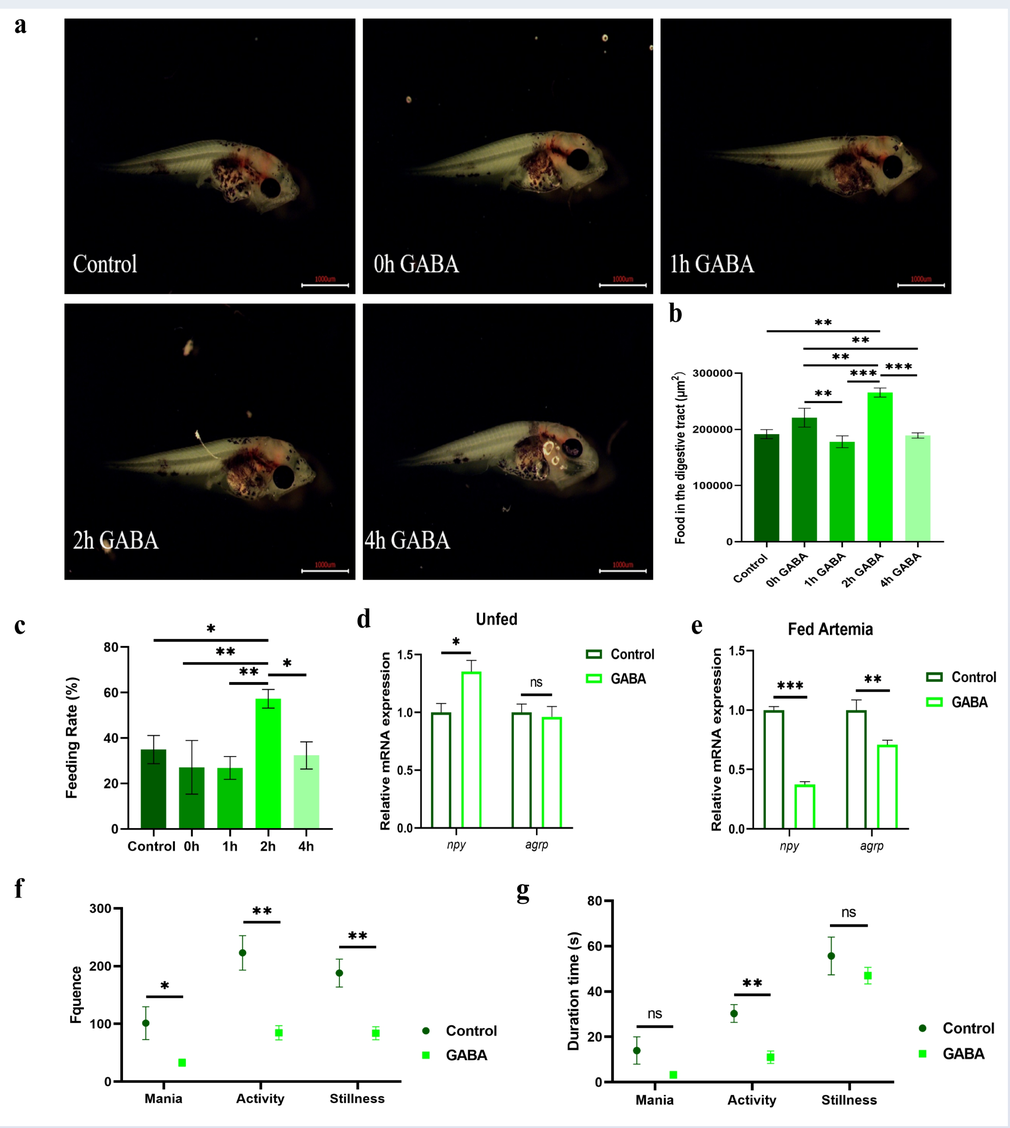
➢ Chloride Ions Mediate the Salinity-Induced Dietary Transition



➢ Comparative transcriptomic profiling identifies the GABAergic synapse as a primary target of chloride ion stimulation



➢ Exogenous GABA Potentiates Artemia ingestion specifically under chloride stimulation in Chinese perch larvae



Conclusion

The present study demonstrates that environmental chloride ions (Cl^-) act as a critical chemical trigger to initiate the transition from live fish prey to Artemia ingestion in first-feeding Chinese perch *(Siniperca chuatsi)* larvae. Our results reveal that this ion-induced behavioral plasticity is mediated by the activation of the GABAergic signaling pathway, which effectively "unlocks" the larvae's predatory drive and modulates the expression of hypothalamic orexigenic genes (*npy* and *agrp*). Furthermore, pharmacological intervention confirmed that the $GABA_A$ receptor, functioning as a ligand-gated Cl^- channel, serves as the primary molecular bridge connecting external ionic stimuli to internal feeding motivation. These findings not only provide a novel neuro-ecological framework for understanding the sensory basis of dietary specialization in carnivorous teleosts but also offer a practical, ion-based strategy to overcome the "dietary bottleneck" in the domestication of *S. chuatsi.*