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Roles of *try* and *amy* in feeding, digestion, growth, and development of the Japanese medaka (*Oryzias latipes*): insight from a comparative gene knockout study

Key words: *try*; *amy*; Japanese medaka; Knockout; Feeding; Digestion

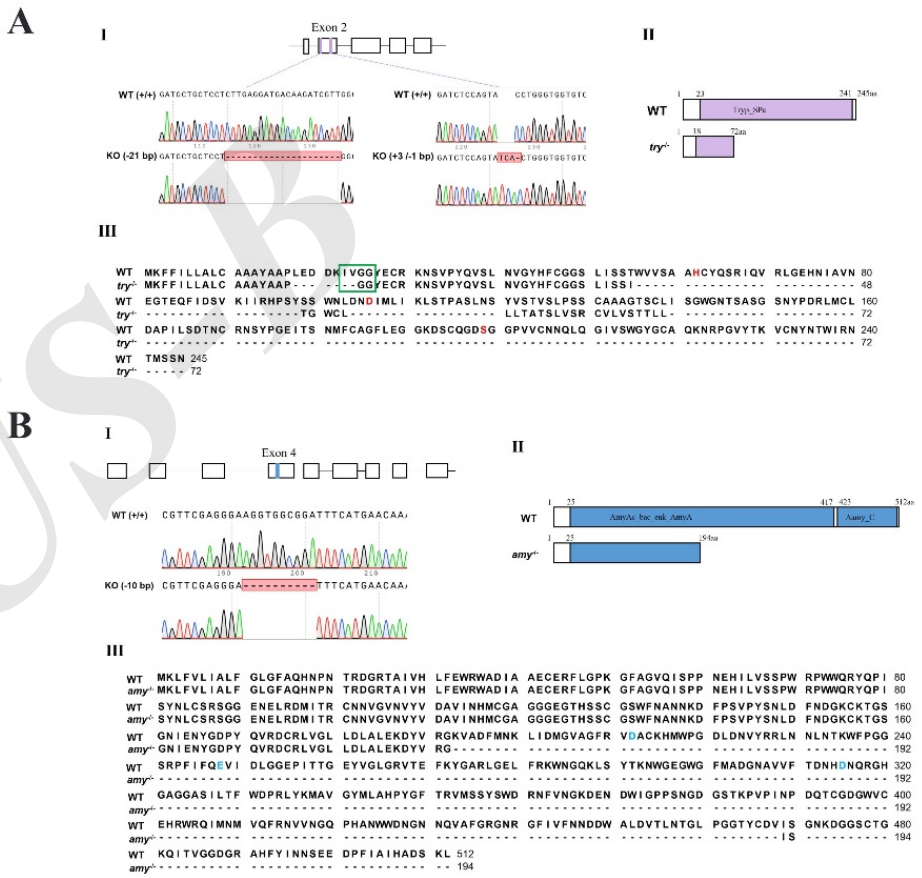
Research article

In this study, we use the Japanese medaka (*Oryzias latipes* to explore the function and necessity of trypsin and amylase for fish after the trypsin gene (*try*) and amylase gene (*amy*) were knockout with the clustered regularly interspaced short palindromic repeat (CRISPR)-CRISPR-associated 9 (Cas9) gene editing.

- **Generating *try* $^{-/-}$ and amy $^{-/-}$ mutants by CRISPR/Cas9 technology**
- **Functional exploration of *try and amy***

Results

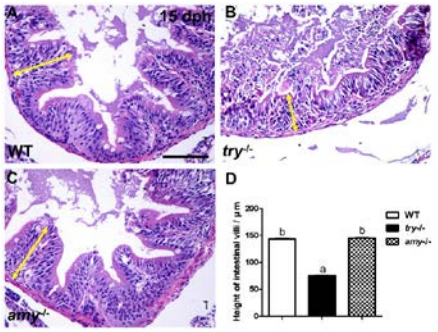
- **Generation of homozygous mutants with the CRISPR/Cas9 system.**

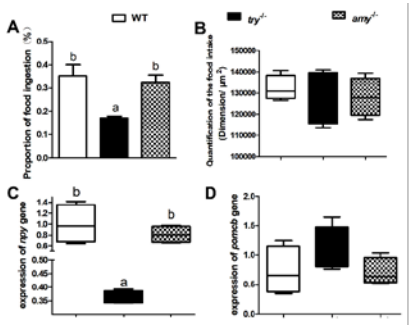


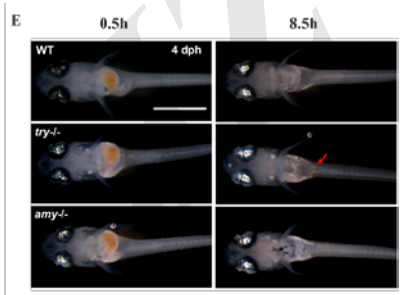
Results

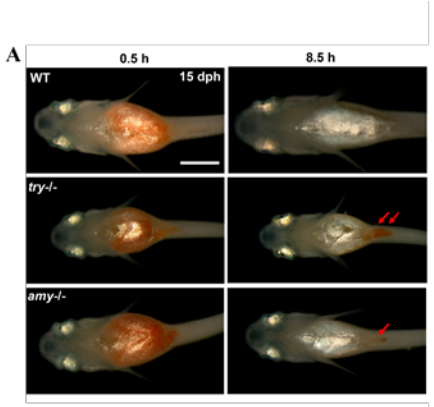
- First-feeding and digestion of three genotypes medaka larvae in 4 dph medaka larvae.

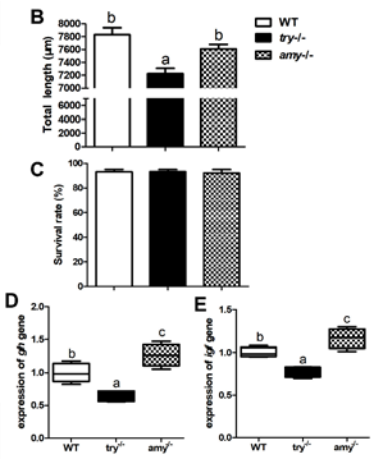
- Analysis of digestive capacity, total length, survival rate and expression of growth performance related genes in 15 dph medaka larvae.







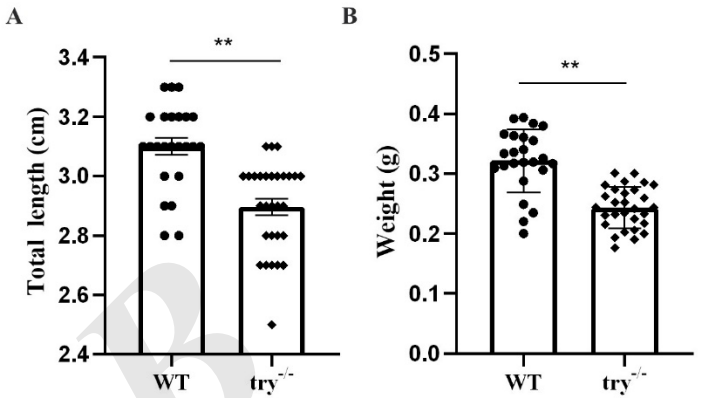


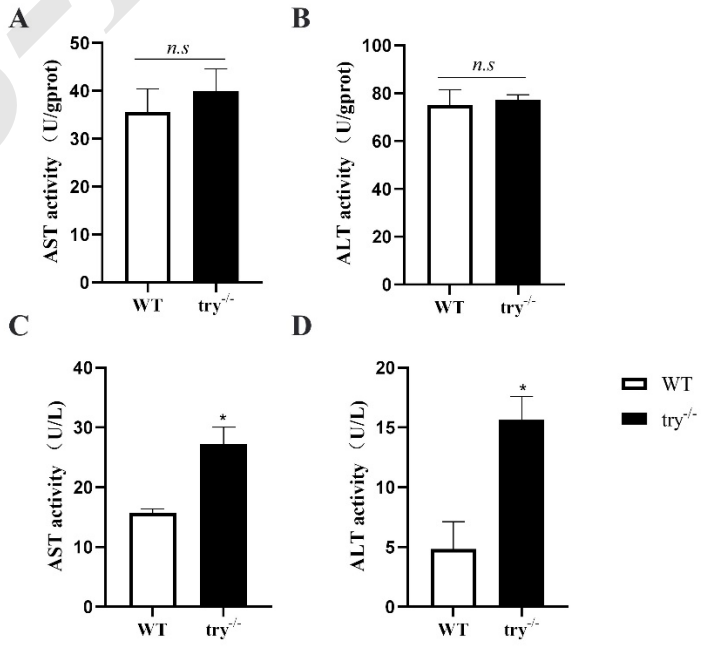


Results

- **Total length and body weight of medaka at 4 months of *try* $^{-/-}$ adult medaka**

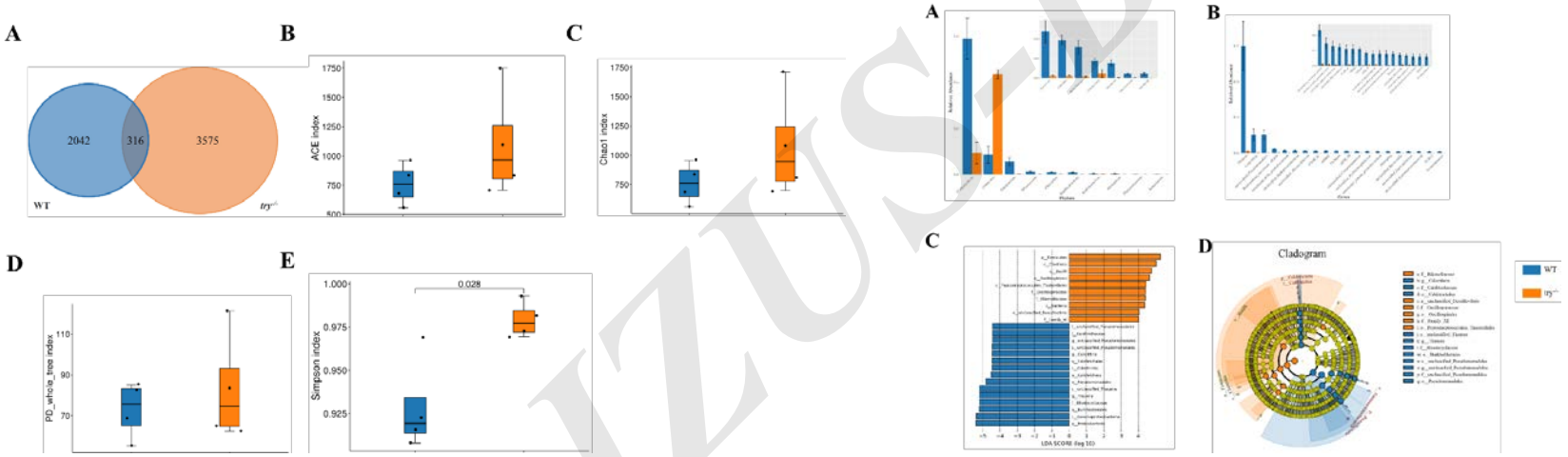
- **Nitrogen metabolizing enzyme activity in the liver and blood of *try* $^{-/-}$ adult medaka.**





Results

- **Effects of *try* knockout on intestinal microbial diversity of medaka**



Conclusion: In this study, we established try and amy knockout medaka using CRISPR/Cas9 system. Our results demonstrated the try was indispensable for medaka larvae, which also continuously affects the growth, nitrogen metabolism and intestinal development of medaka.