The gut microbiome promotes the growth performance of black soldier fly larvae by detoxifying uric acid

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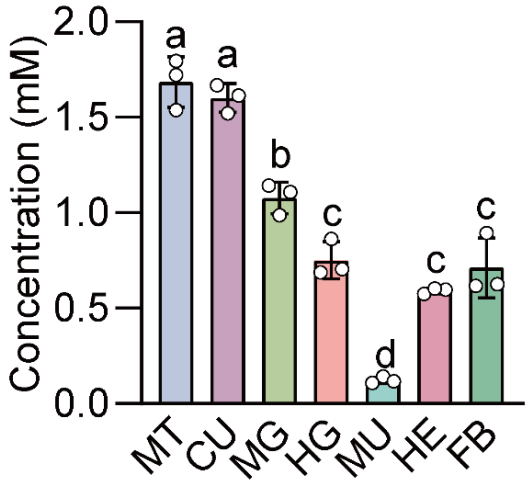
Background

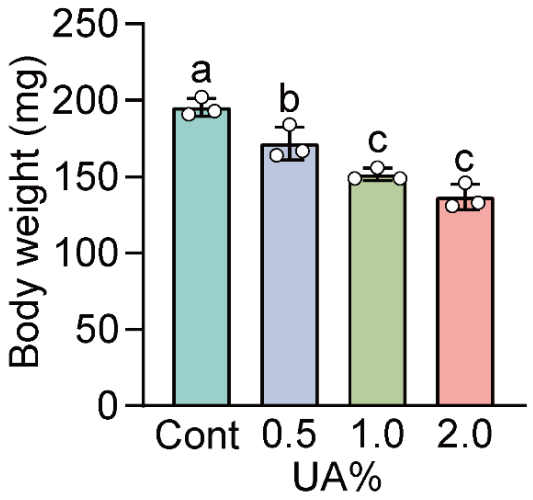
- Black soldier fly (BSF) larvae can convert various organic wastes, including livestock and poultry manure.
- Poultry manure contains high concentrations of uric acid (UA), representing about 50% of its nitrogen compounds, which poses a potential toxic threat to BSF larvae.
- Gut microbiome is crucial for BSF larvae in waste conversion.

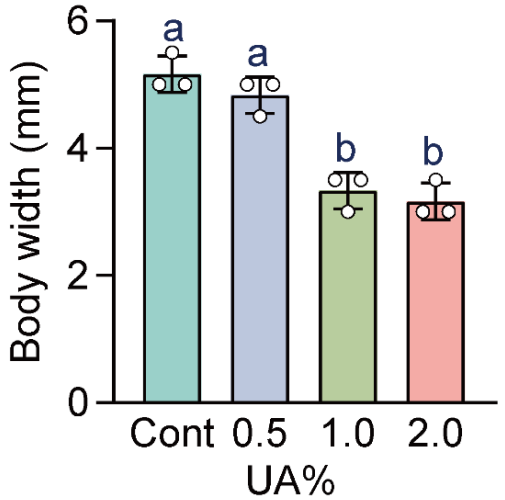


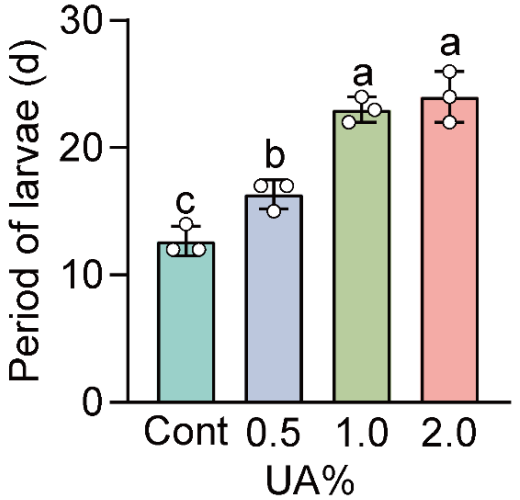
Results

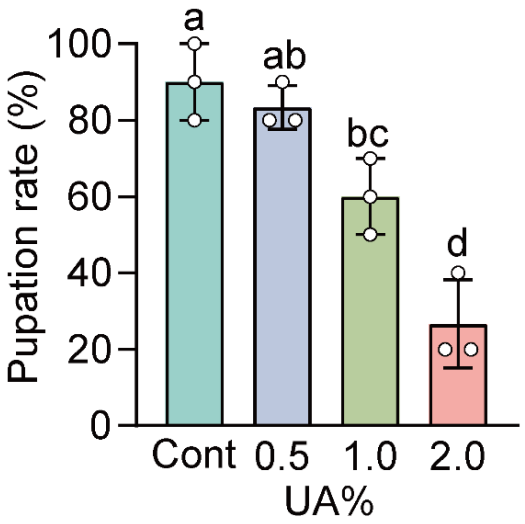
BSF larval growth is negatively affected by UA stress

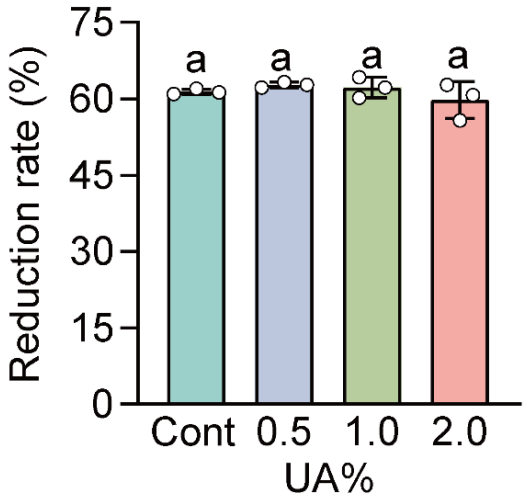


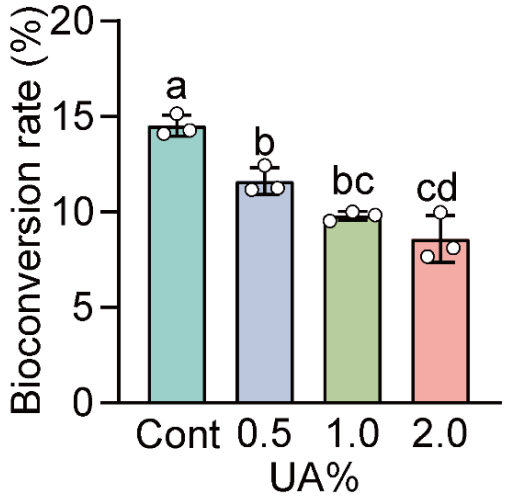


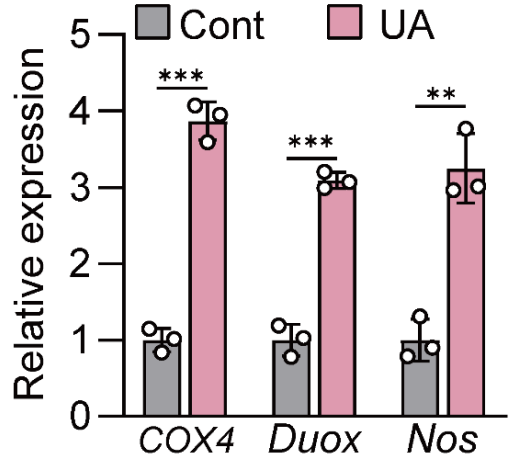






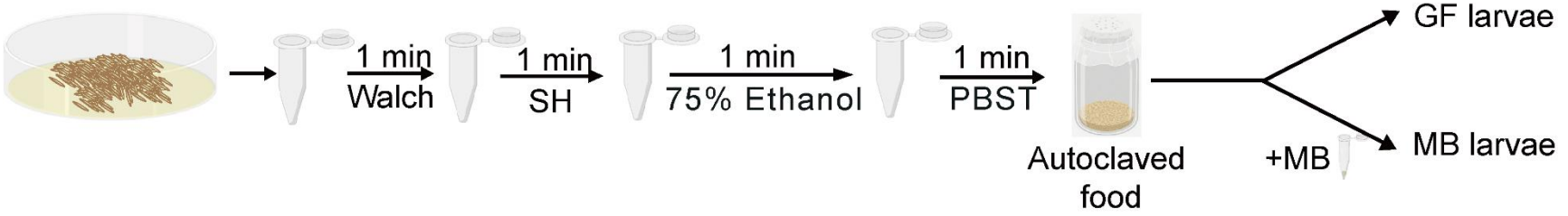


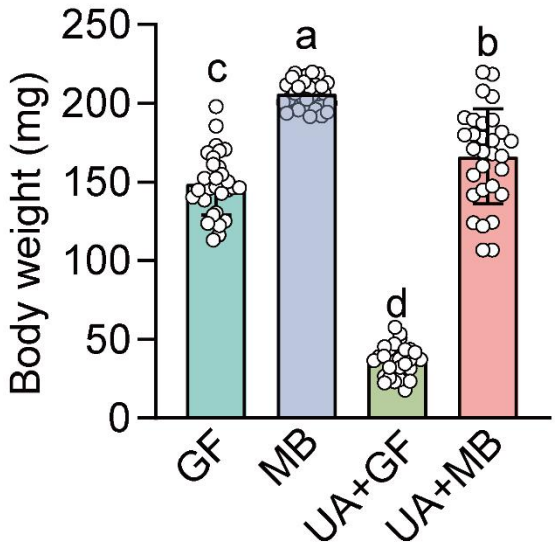


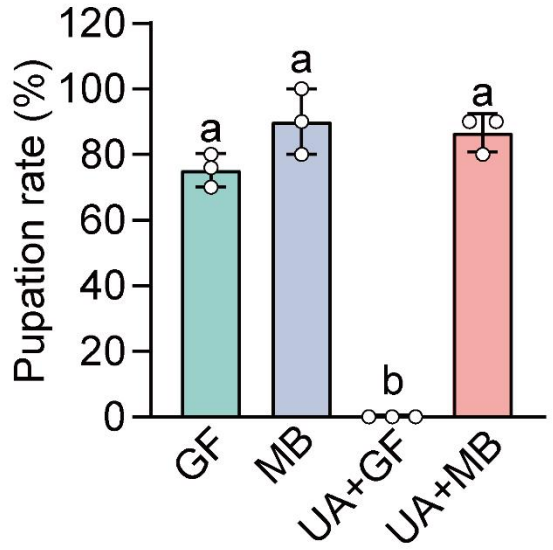


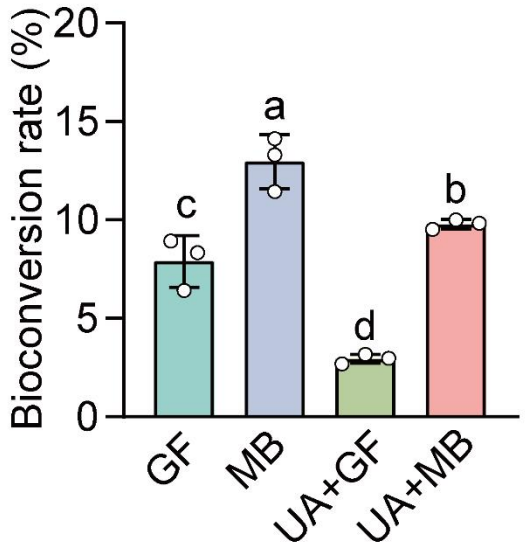
Results

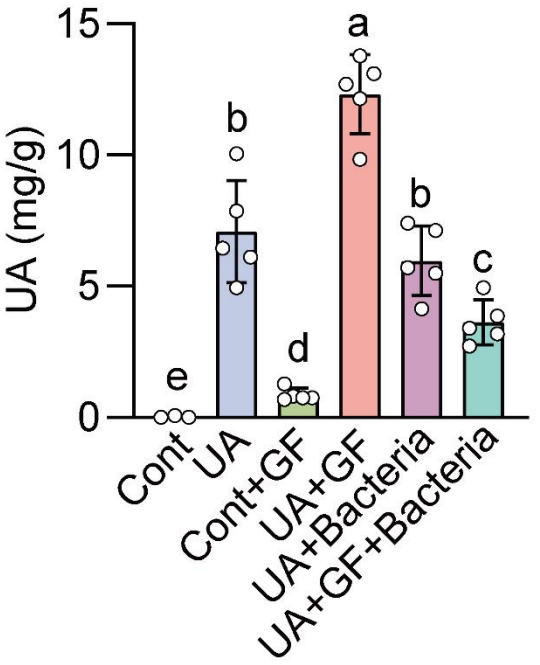
The microbiome mitigates UA toxicity to larval growth performance





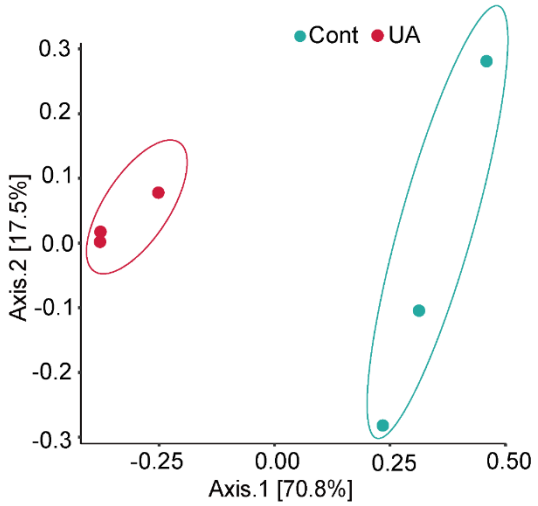


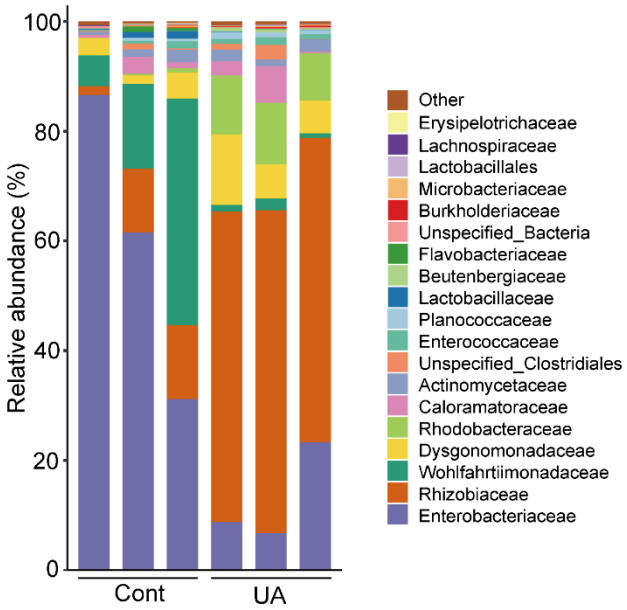


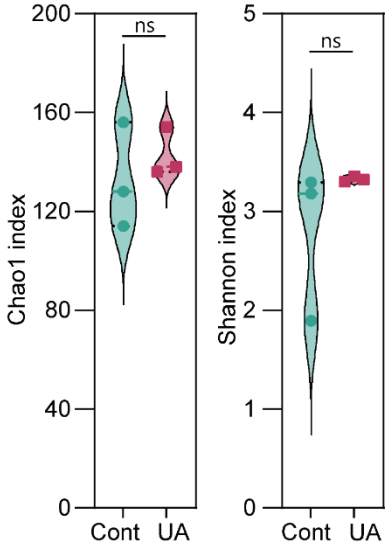


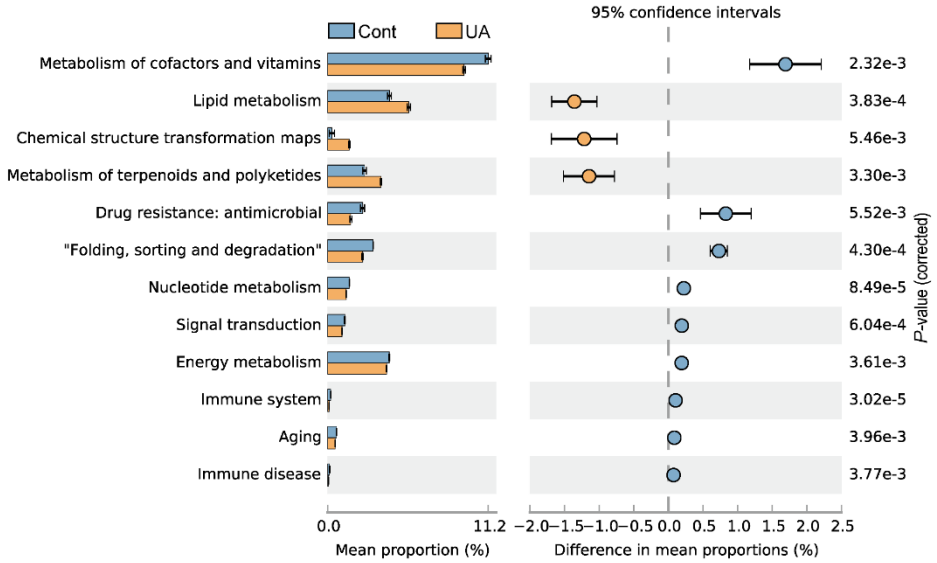
Results

UA alters microbial composition in larval intestines



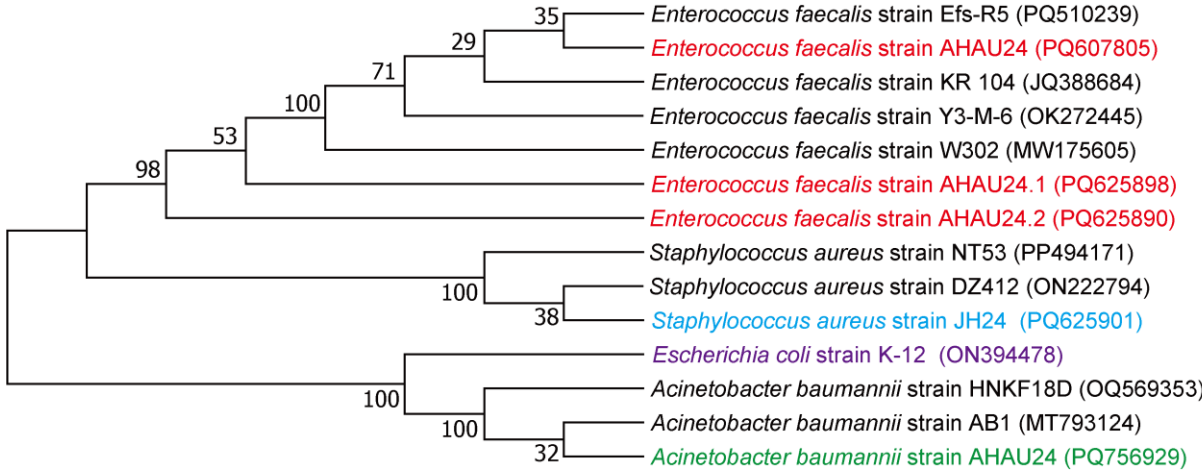


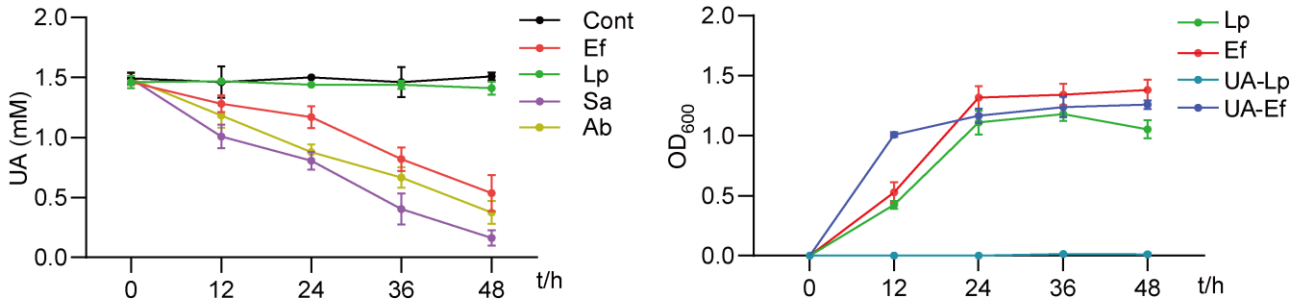


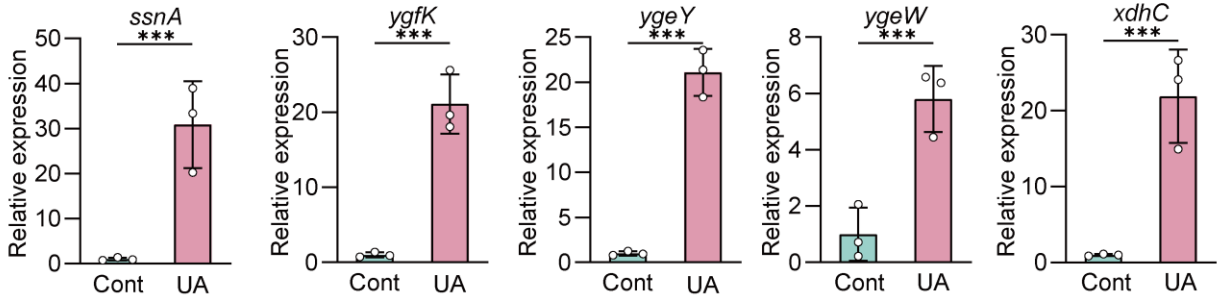


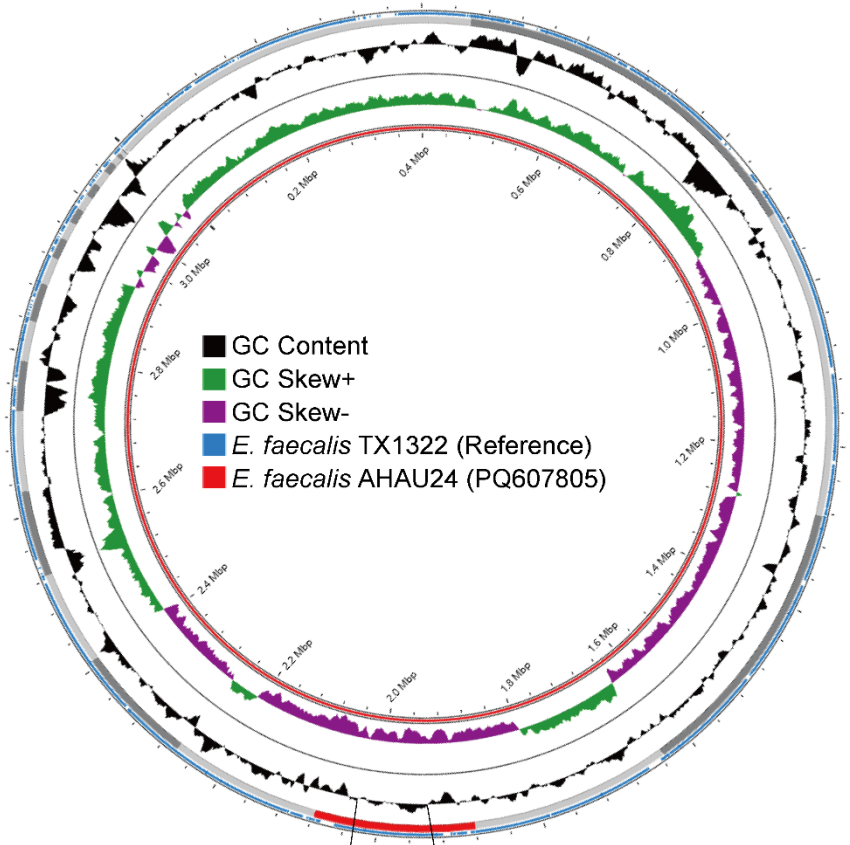
Results

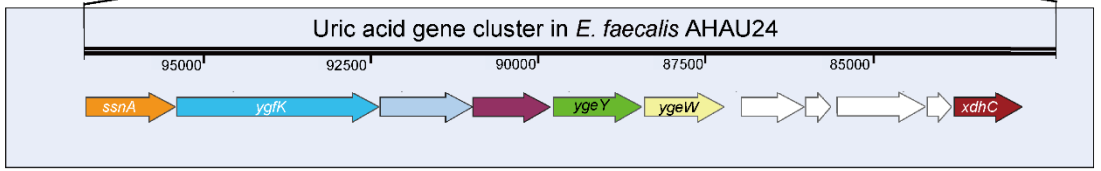
Characterization of UA-degrading bacteria and genomic insights into UA catabolism





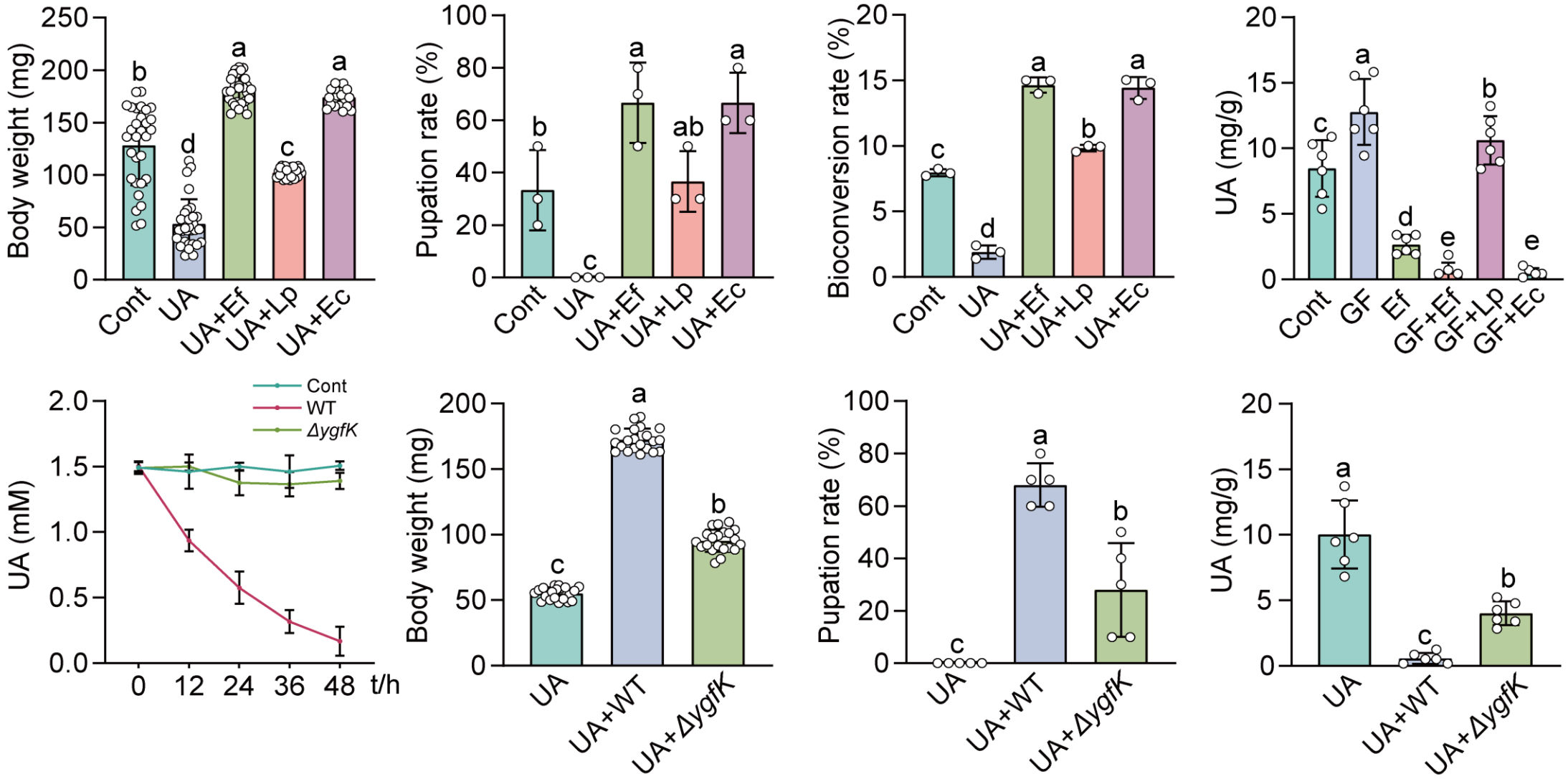




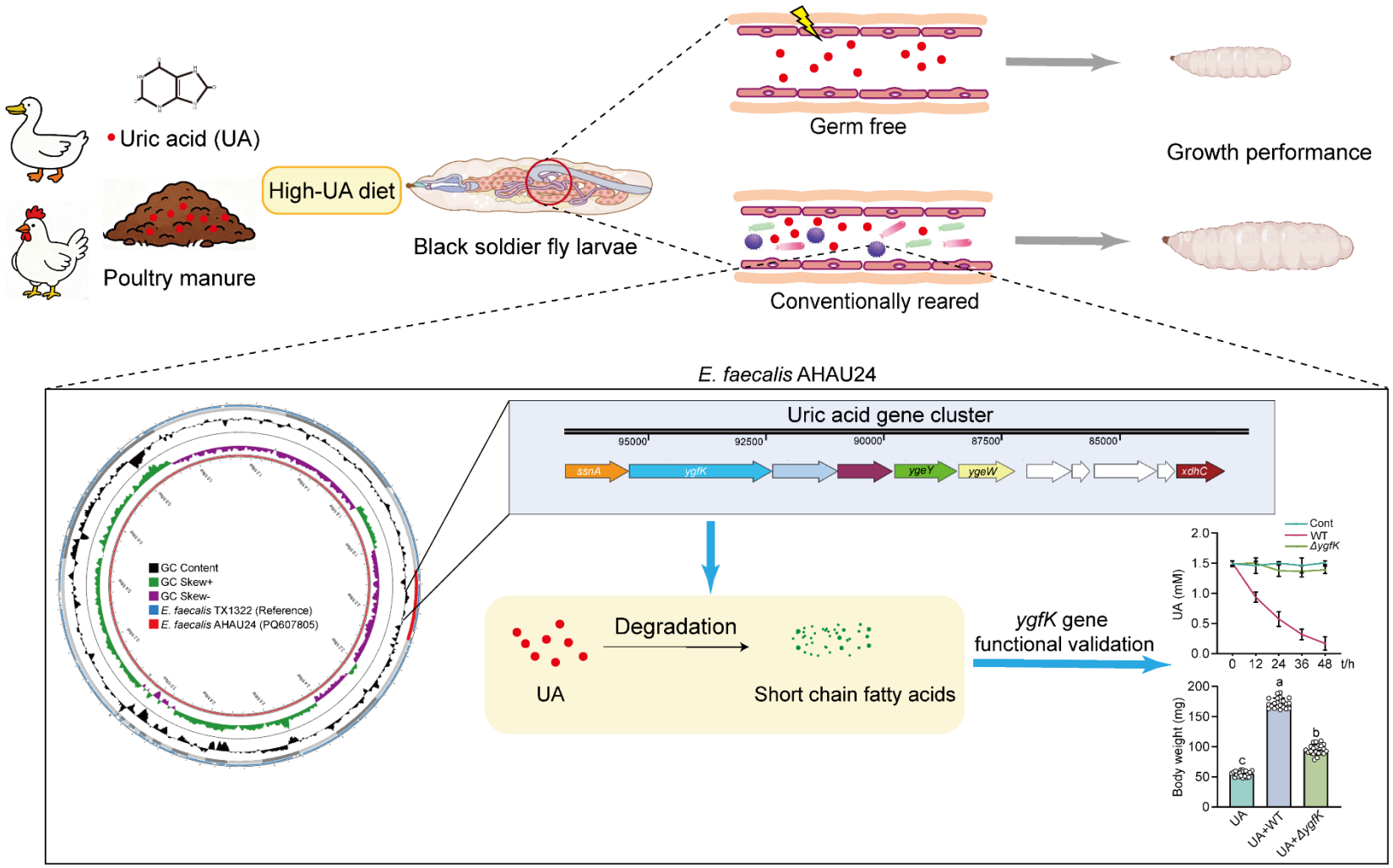


Results

E. faecalis alleviates larval growth arrest under UA stress



Conclusion



- UA stress impaired the growth performance of black soldier fly larvae and reduced bioconversion rate.
- The gut microbiome mitigated these detrimental effects on the host by degrading uric acid, thereby providing a protective role.
- We isolated uric acid-degrading bacterial strains from the BSF larval gut and identified a specific gene cluster responsible for uric acid degradation that conferred a protective effect on the host.

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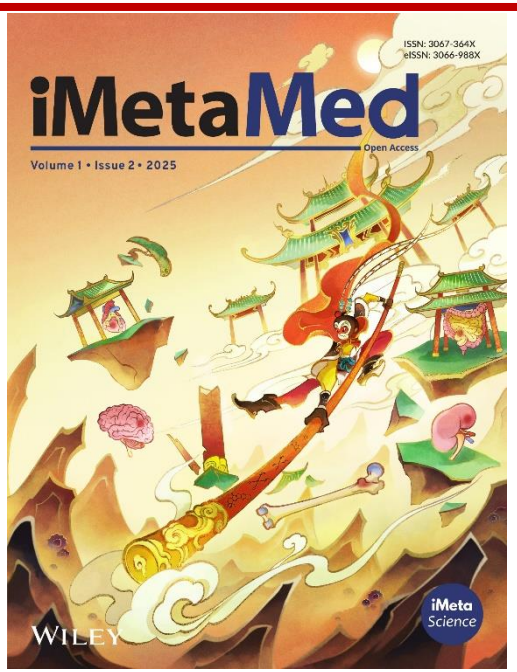

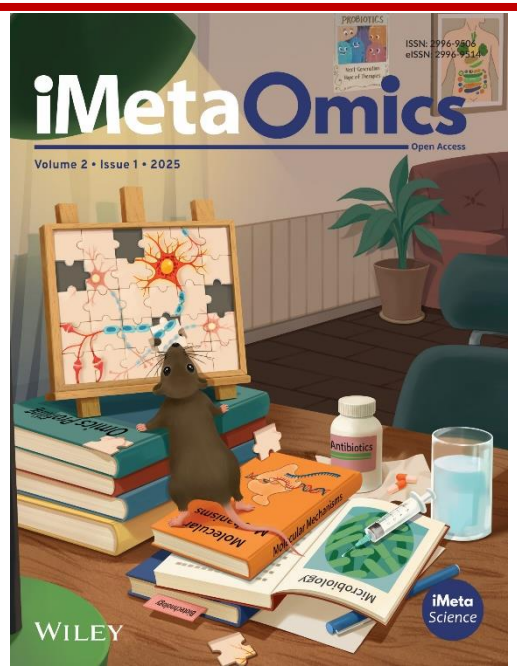

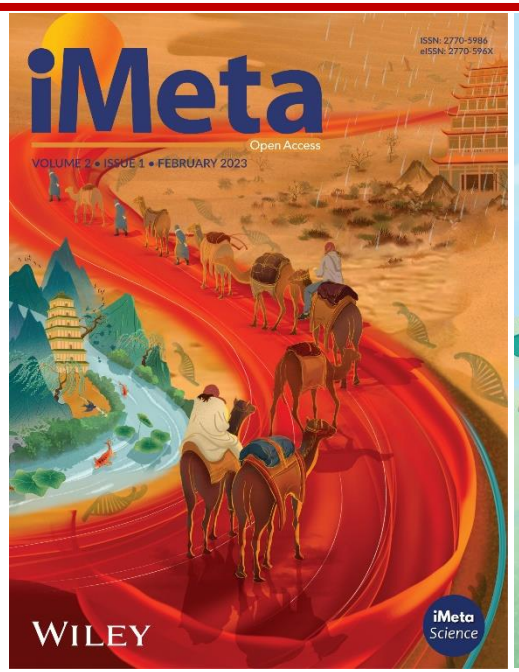

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