

The role and function mechanism of *tapP* in modulating the virulence of *Aeromonas hydrophila*

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Introduction

- Aeromonas hydrophila* (*A. hydrophila*) is a widespread pathogen capable of infecting most freshwater fish and causing septicemia. The *tapP* gene is known to be involved in the synthesis of type IV pili of *A. hydrophila*. However, the effect and molecular mechanism of the *tapP* in *A. hydrophila* remain unknown.
- A genetically stable *tapP* deletion mutant strain of *A. hydrophila* ($\Delta tapP$ -AH) was constructed. And the median lethal dose (LD₅₀) value of $\Delta tapP$ -AH in *Carassius auratus gibelio* was 3.1-fold higher than that of the wild-type strain (WT-AH).
- The ability of adhering to gill tissues and biofilm formation was significantly reduced in $\Delta tapP$ -AH. The pili of $\Delta tapP$ -AH were obviously sparser and shorter than those of WT-AH.
- The deletion of the *tapP* gene directly affected the expression of genes related to type IV pili, type II secretion system, type VI secretion system and flagellum.

Results

1. Construction of *A. hydrophila tapP* gene mutant strain

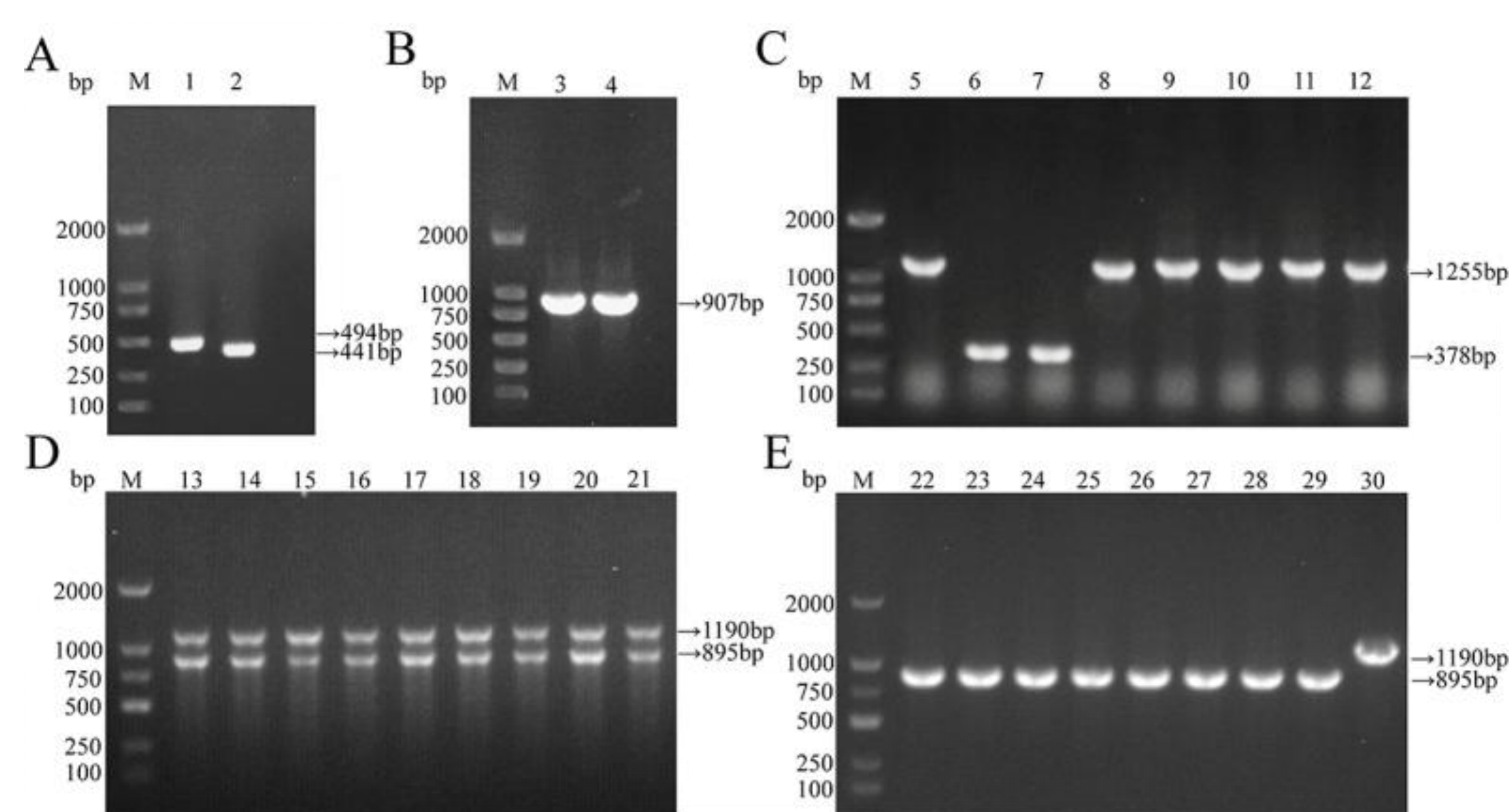


Figure 1. Construction and validation of $\Delta tapP$ -AH.

Results

2. virulence

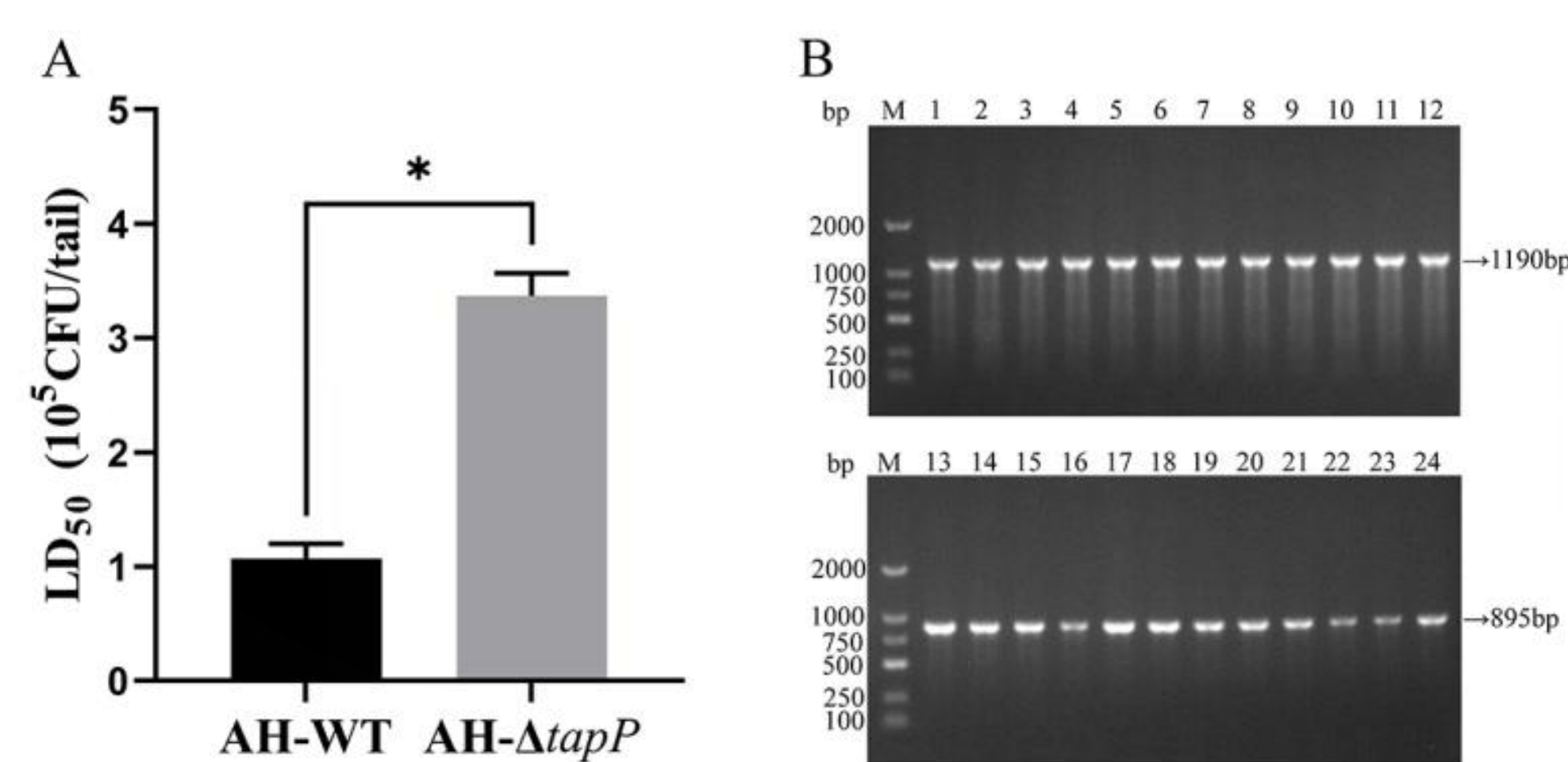


Figure 2. Pathogenicity of WT-AH and $\Delta tapP$ -AH in crucian carp

3. Biological characteristics test

• Adhesion ability

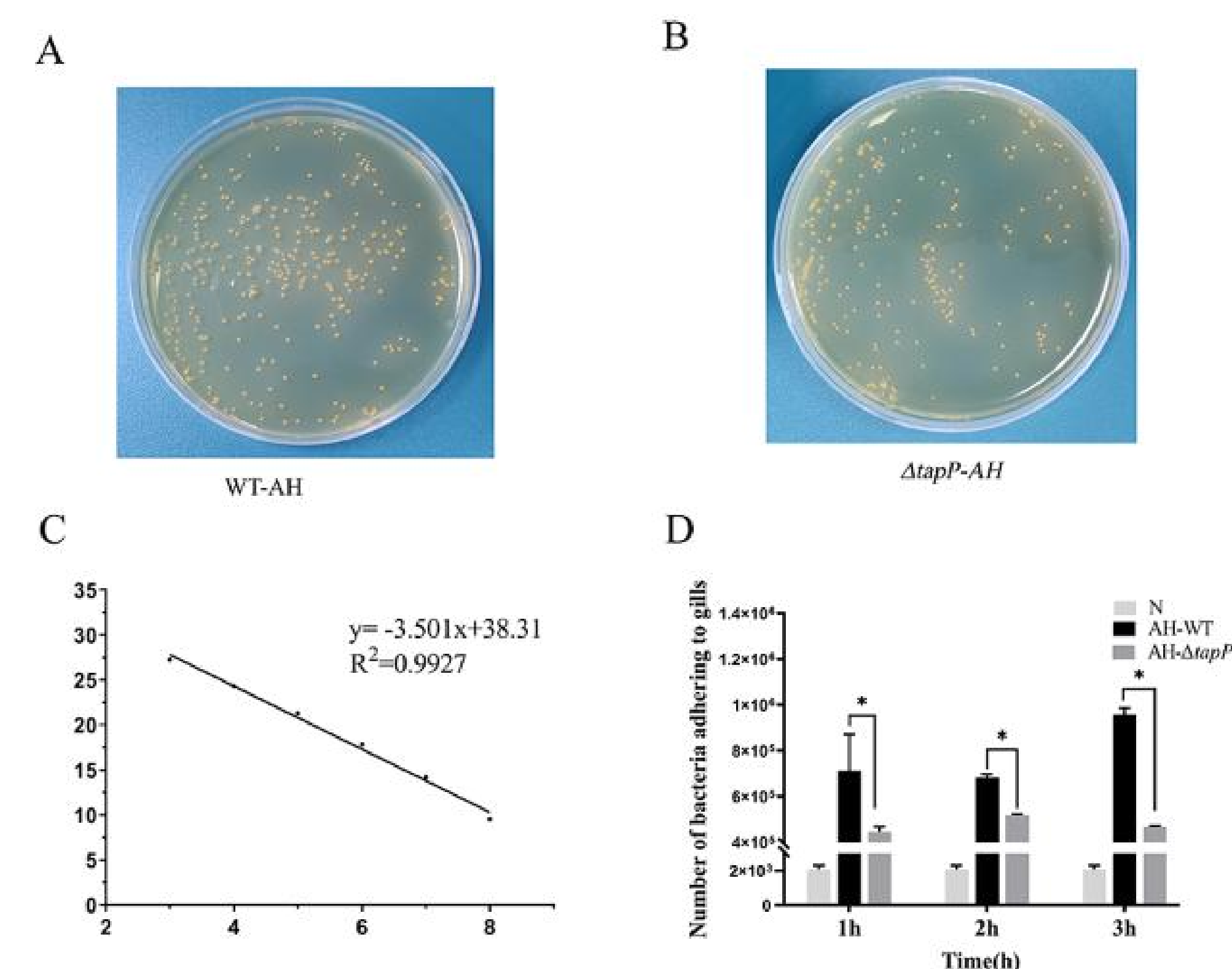


Figure 3. Adhesion of WT-AH and $\Delta tapP$ -AH.

• Biofilm formation ability

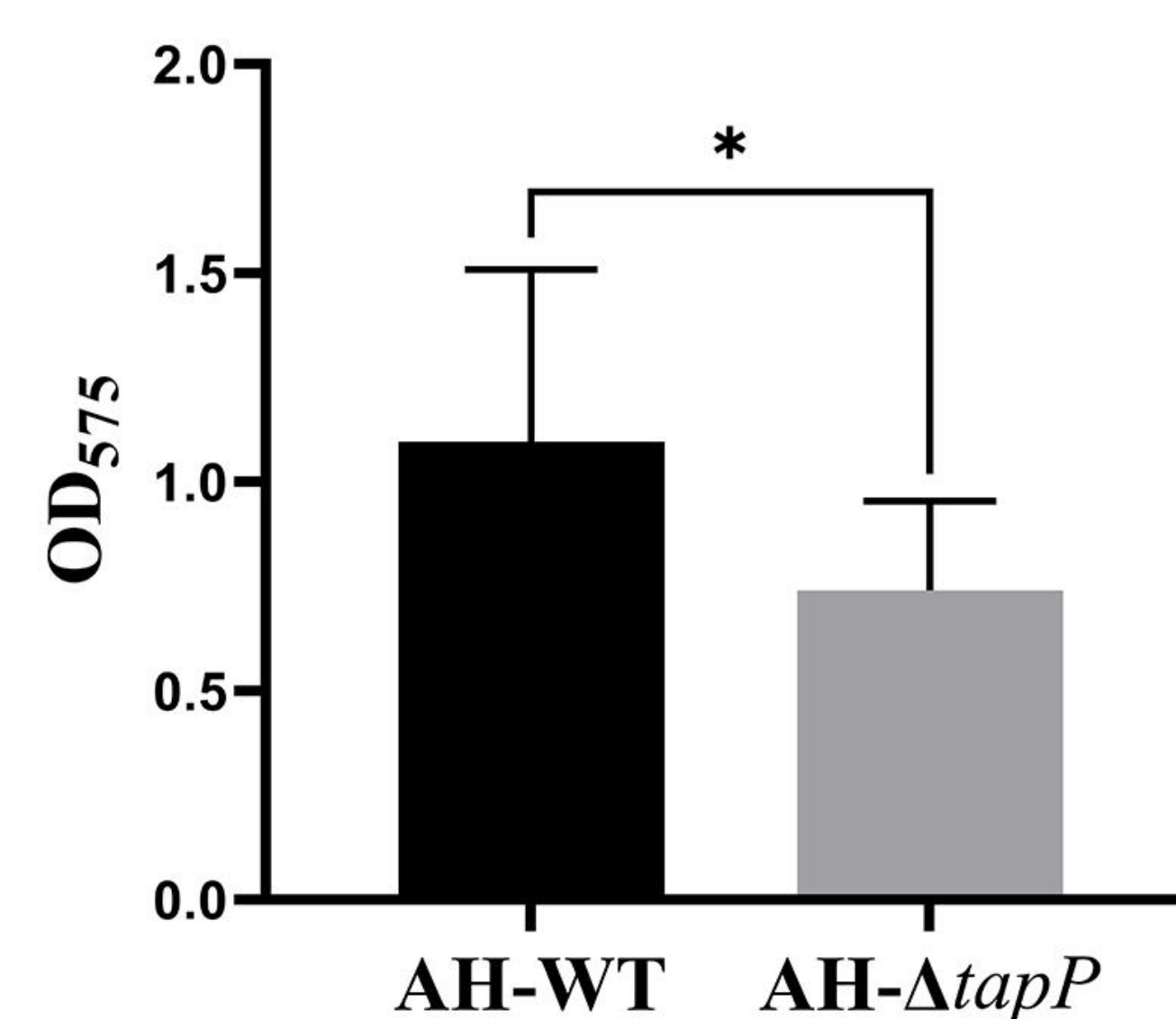


Figure 4. Biofilm formation of WT-AH and $\Delta tapP$ -AH.

Results

• Transmission electron microscopy (TEM)

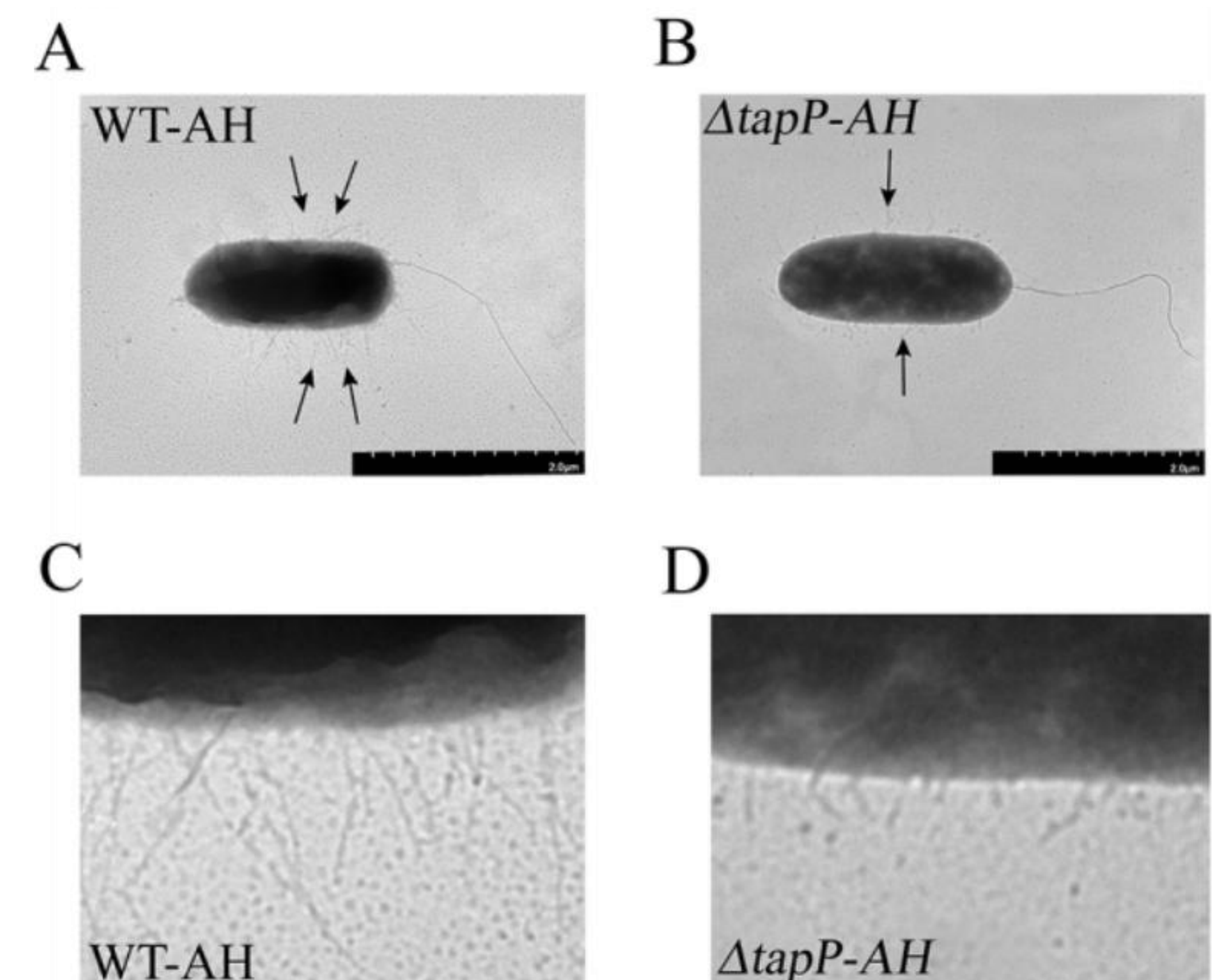


Figure 5. Morphology of WT-AH and $\Delta tapP$ -AH pili

4. Effect of *tapP* gene deletion on the relative expression of related genes

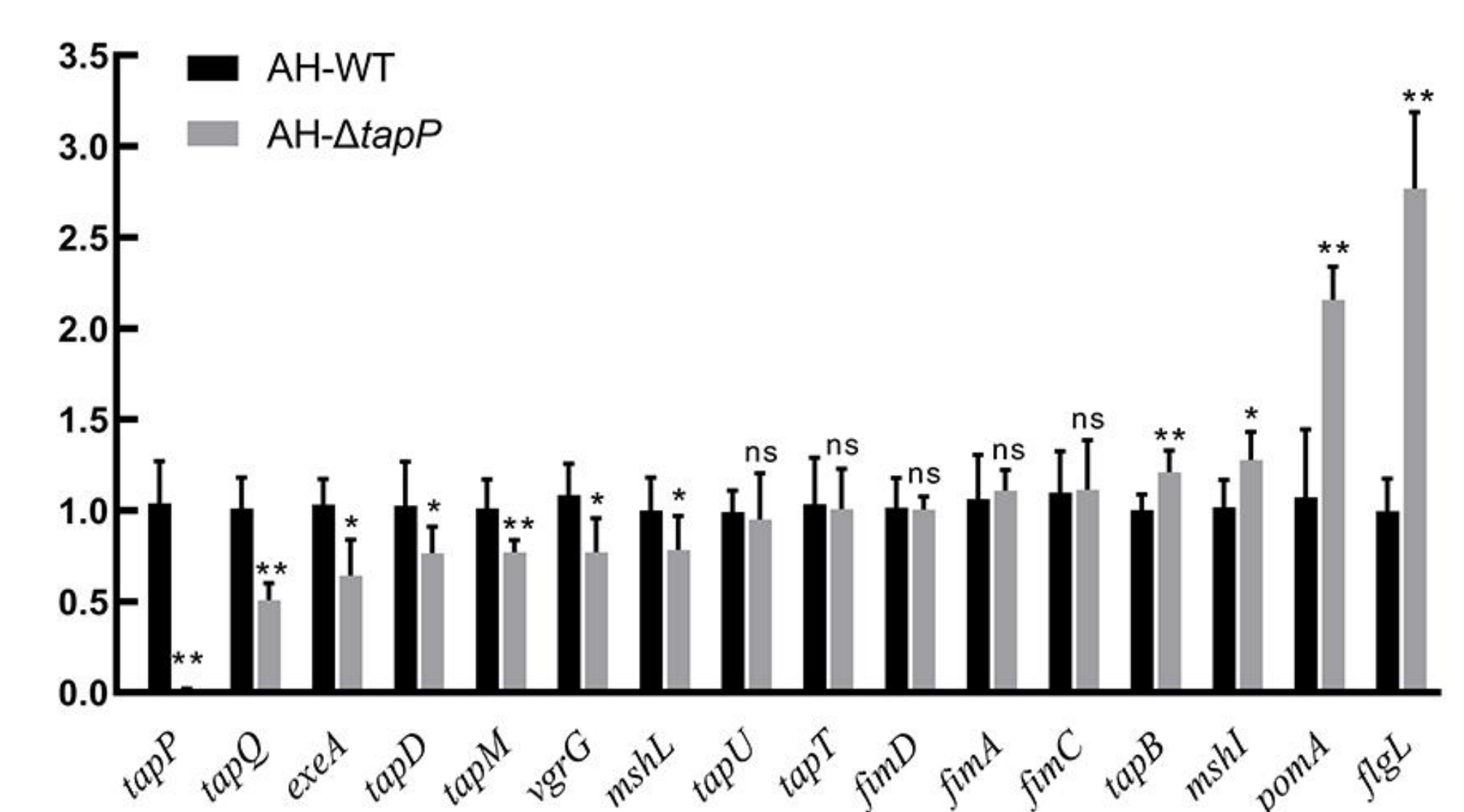


Figure 6. Relative expression of related genes for WT-AH and $\Delta tapP$ -AH by qRT-PCR

Conclusion

- In summary, a genetically stable *tapP* mutant strain of *A. hydrophila* with significantly reduced pathogenicity was constructed in this study.
- The sparser pili, reduced adhesion and biofilm formation ability may be the main factors for the decline of pathogenicity of $\Delta tapP$ -AH

- The molecular mechanism of altered biological characteristics was related to the expression changes of genes related to Tap pili, MSHA pili, T2SS, T6SS and flagellum.
- In conclusion, these findings suggest that *tapP* plays a crucial role in the virulence of *A. hydrophila*.

References

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