



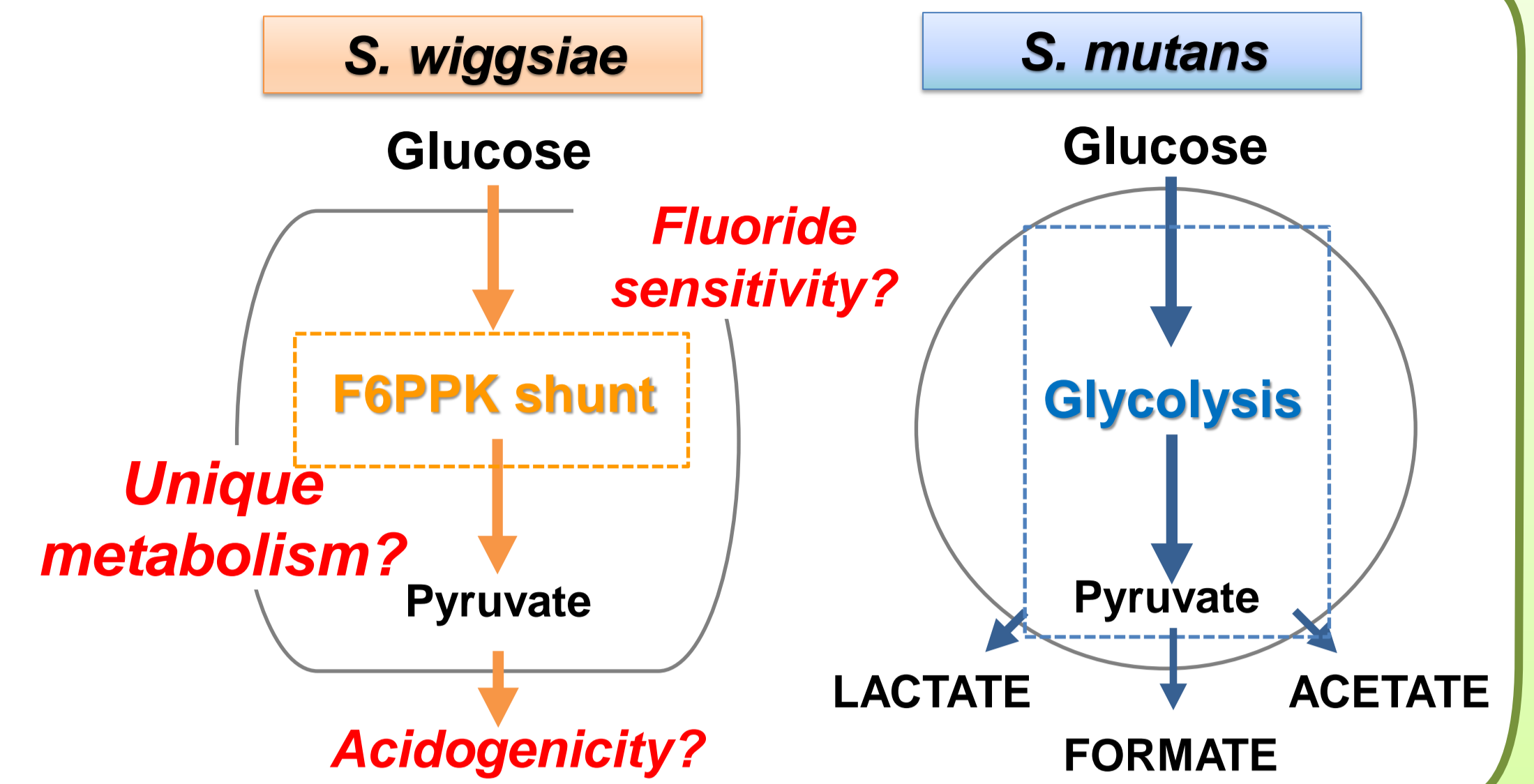
## Introduction

- A new bacterial species, *Scardovia wiggisiae* has been detected frequently from early childhood caries (ECC) and white spot lesions during adolescence.
- Genus *Scardovia* is known to possess a unique metabolic pathway, the fructose-6-phosphate shunt (F6PPK-shunt), which might give *S. wiggisiae* a metabolic characteristic in the aspect of acid production, fluoride sensitivity and cariogenic potential.

The purpose of this study is reveal the following :

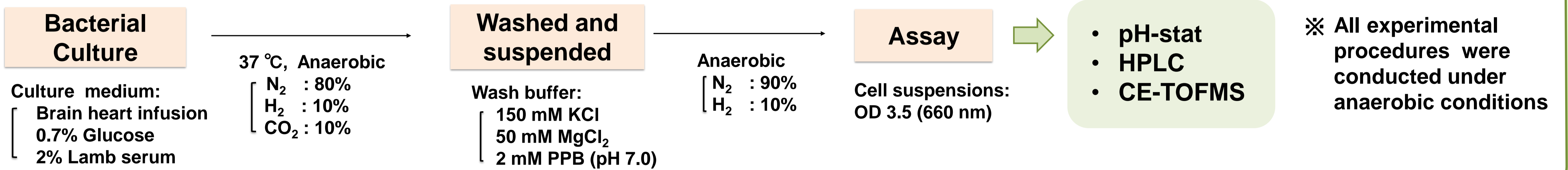
- The acid production by carbohydrate metabolism
- The fluoride sensitivity of carbohydrate metabolism

Cariogenic potential of *S. wiggisiae*



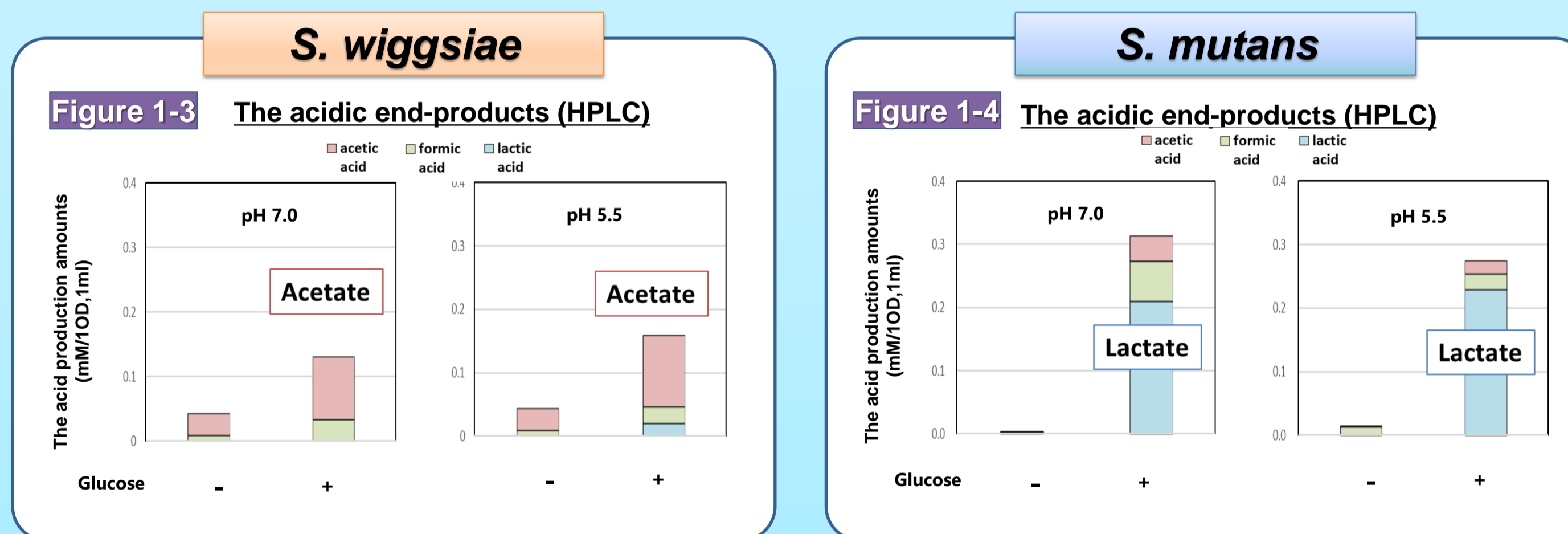
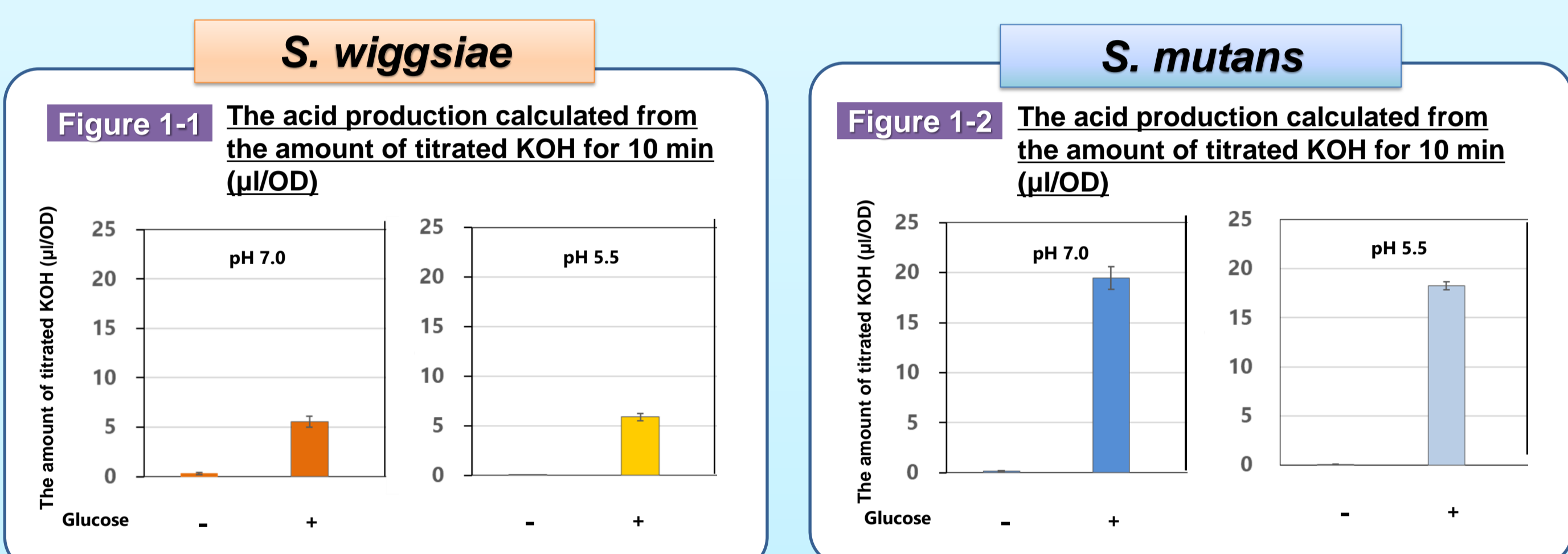
## Methods

Bacteria strains: *Scardovia wiggisiae* C1A-55, and *Streptococcus mutans* NCTC10449



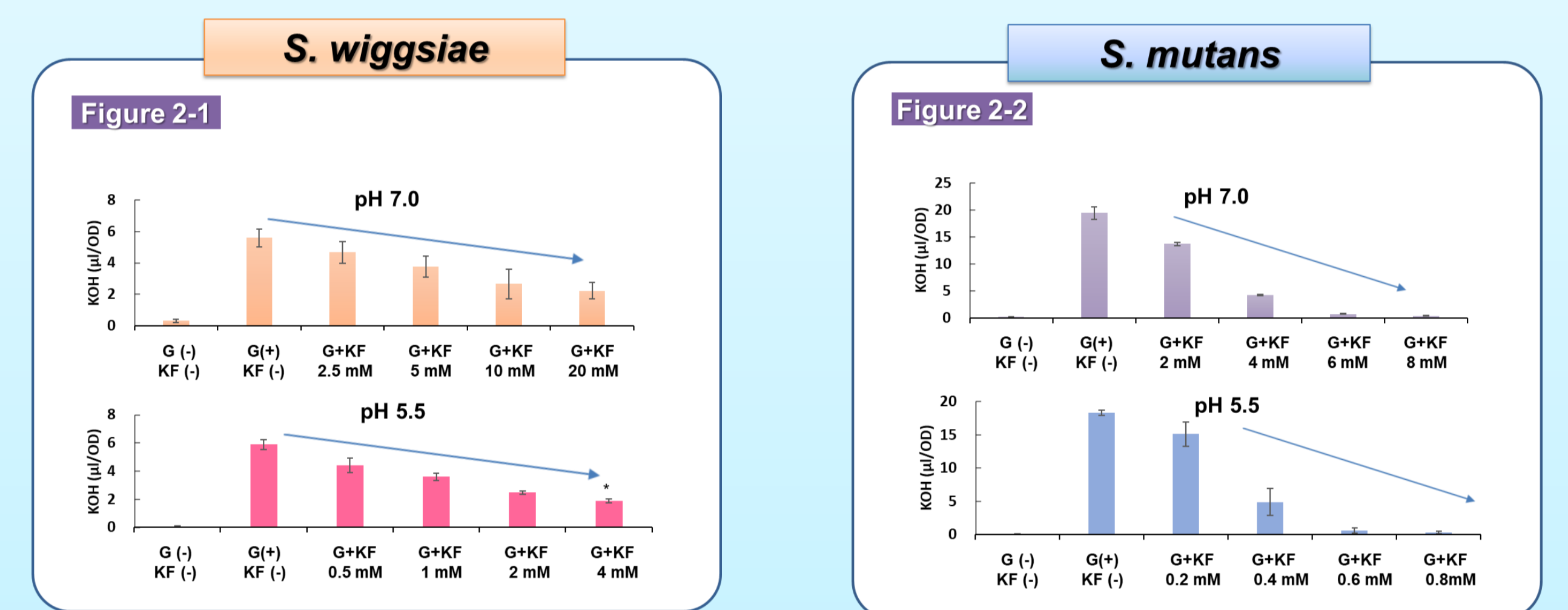
## Results

### 1. The acid production by carbohydrate metabolism



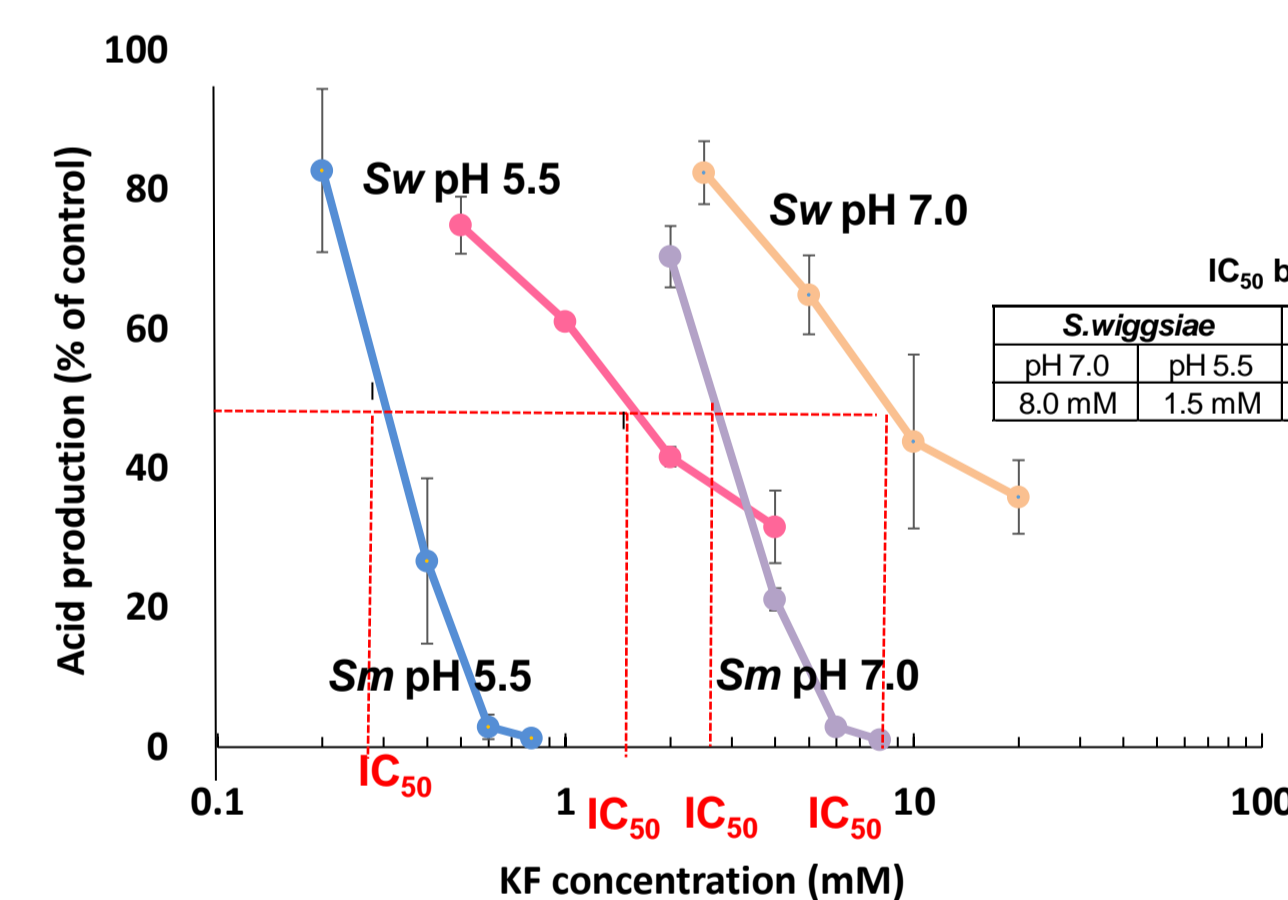
- Both *S. wiggisiae* and *S. mutans* continued to produce acid even at pH 5.5 (Fig. 1-1, 1-2).
- S. wiggisiae* produced acetate from glucose at the ratio of 8 : 2 : 0.
- S. mutans* produced lactate mainly.

### 2. The effect of fluoride for carbohydrate metabolism



- The acid production of both bacteria was inhibited by fluoride (Fig. 2-1, 2-2).

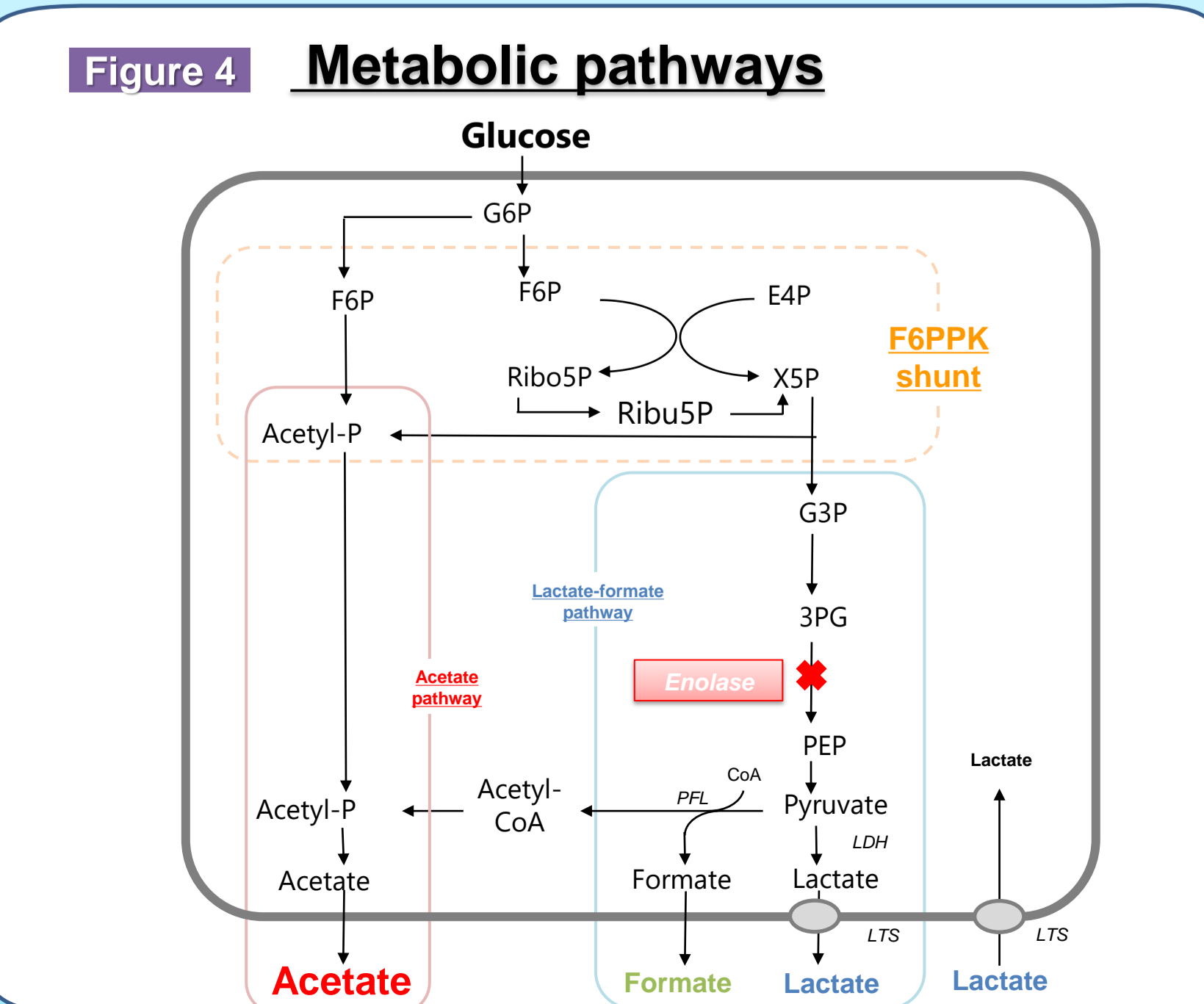
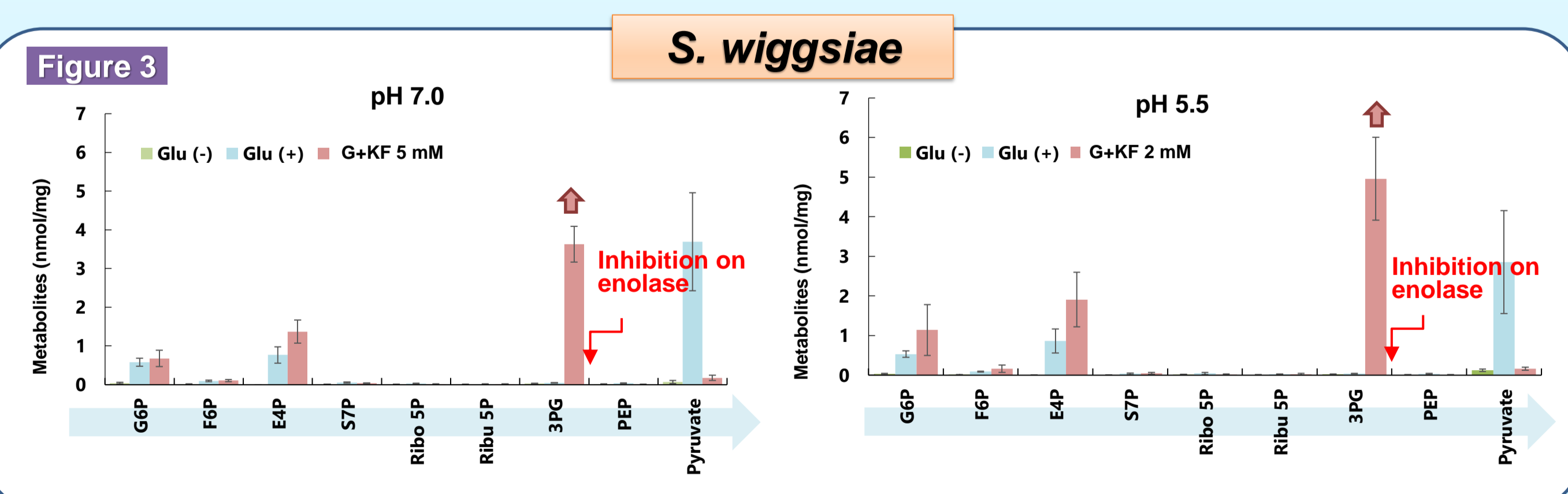
Figure 2-3 The inhibitory effect of fluoride (IC<sub>50</sub>) on the acid production (%)



- However, *S. wiggisiae* was 3.4 times more resistant to fluoride at pH 7.0 and 5 times at pH 5.5 than *S. mutans* (based on IC<sub>50</sub> of fluoride) (Fig. 2-3).

To identify inhibitory steps by fluoride, we obtained the metabolome profiles by CE-TOFMS and reconstructed it to the metabolic map (Fig. 3, 4).

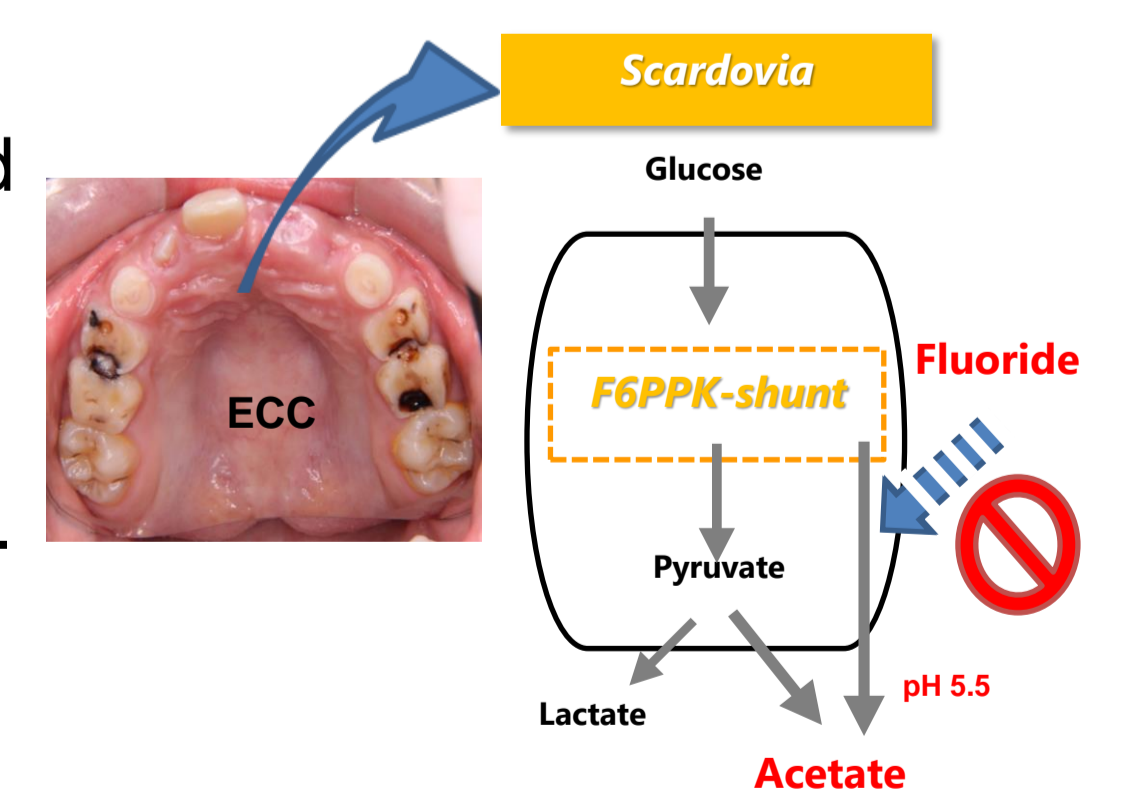
### 3. Metabolome profile and metabolic pathway



- The metabolome analysis suggests that fluoride inhibits the metabolic step which is catalyzed by enolase. (Fig. 3, 4).
- S. wiggisiae* can utilize the acetate pathway instead of the lactate-formate pathway, and then escape from fluoride inhibition. (Fig. 4).

## Summary and Conclusion

- F6PPK-shunt allowed *S. wiggisiae* to predominantly produce acetate from sugars, and that its acid production was resistant to fluoride.
- The enolase activity of *S. wiggisiae* was much more resistant to fluoride than that of *S. mutans*.



The present study revealed that a novel caries-associated bacterium *S. wiggisiae* has unique metabolic properties, which could give a high acidogenic potential and a high fluoride resistance.

## Acknowledgments:

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