

Advantage of whole genome sequencing in characterisation of Staphylococcal Food Poisoning Outbreak

Merda, D., Felten A., Vingadassalon, N., Negrouche, L., Nia, Y., Mistou, M.Y., Hennekinne, J. A.
ANSES, Food Safety Laboratory, Microbiology department, 14 rue Pierre et Marie Curie, F-94706 Maisons-Alfort cedex, France

Scientific context

Staphylococcus aureus in food :

- produce staphylococcal enterotoxins (SE)
- 27 SEs are described
- responsible for foodborne outbreak
- 380 cases in Europe in 2017 (EFSA, 2018)

Investigation of Staphylococcal food Poisoning outbreak (SFPO):

- 5 SEs are detected by immunoenzymatic tests
- 11 SE coding genes are detected by PCR

Objective :

Use of whole genome sequencing to identify strain origin and detect all SE coding genes

Material and Methods

143

strains isolated from SFPO in Europe

**Genome
sequencing**

Illumina
NextSeq technology

Genetic structuration

R package : **adeget** and **dbscan**

SE gene detection

Tool based on Blast approach : **NAuRA**

Results

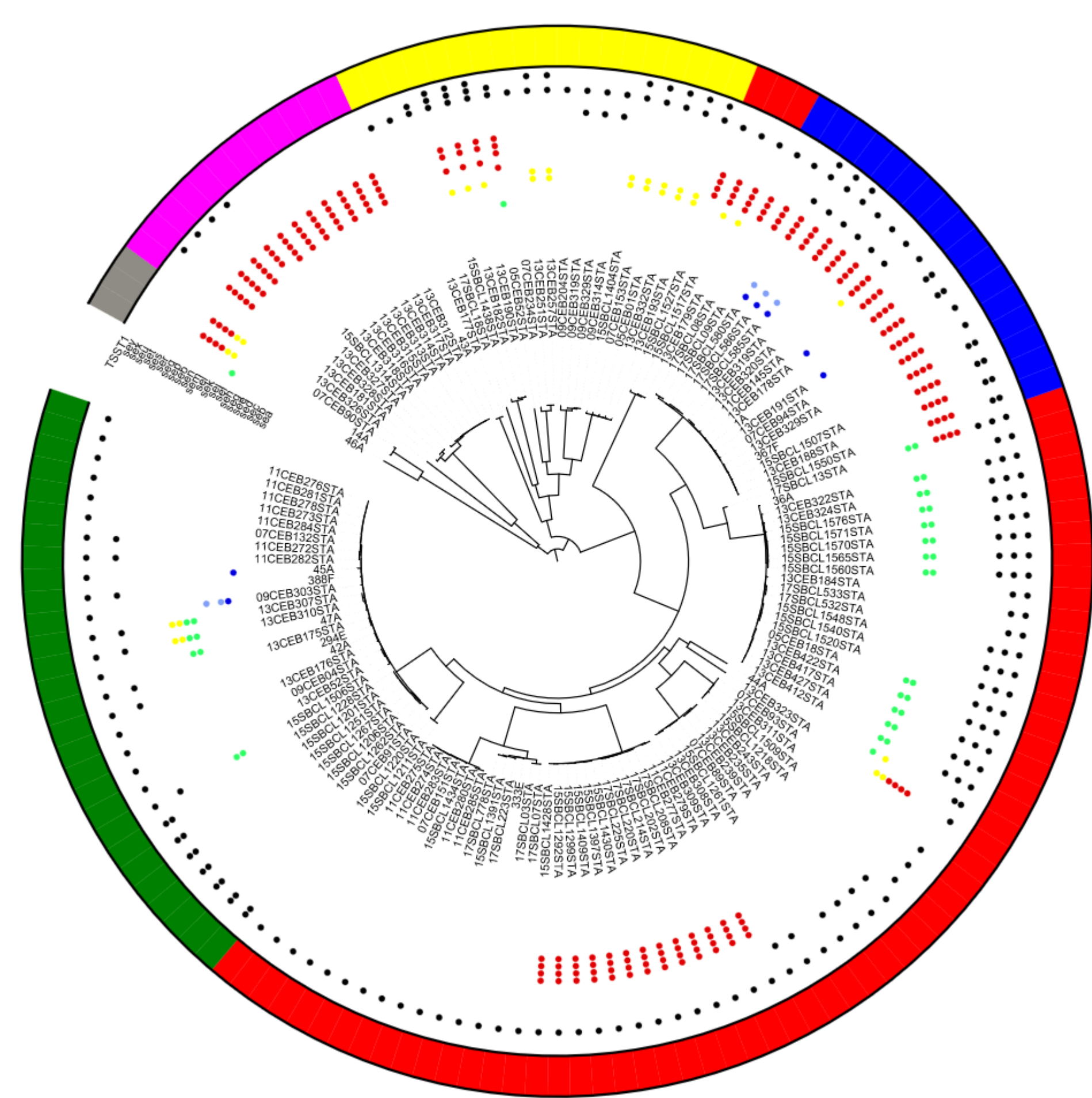


Fig. 1: phylogeny on maximum likelihood based on core genome. From the outside to the inside, the 1st circle represents de genetic structuration results and the 24 other circle represent the presence or absence of SE coding genes

Genetic structuration

- Strains isolated the same year belong to different genetic groups
- Strains isolated from the same country belong to different genetic groups

SE gene detection

- Some strains have numerous SE genes
- Some strains have few SE genes
- *sex* coding gene was found in 90% of strains

Conclusion and Perspectives

6 genetic groups were defined in *S. aureus*

No structuration according : Date of isolation
Geographical origin
Isolation context

- Study the **accessory genome** to determine specific markers of isolation context

SE gene detection by WGS allows :

To access to the whole toxic repertoire

To access to the **all sequence diversity**

- Sequence analysis will be used for the **development of methods of SE toxins detection** in food