

# Rapid Identification of Microorganisms by Touch Spray and Paper Spray Ambient Ionization



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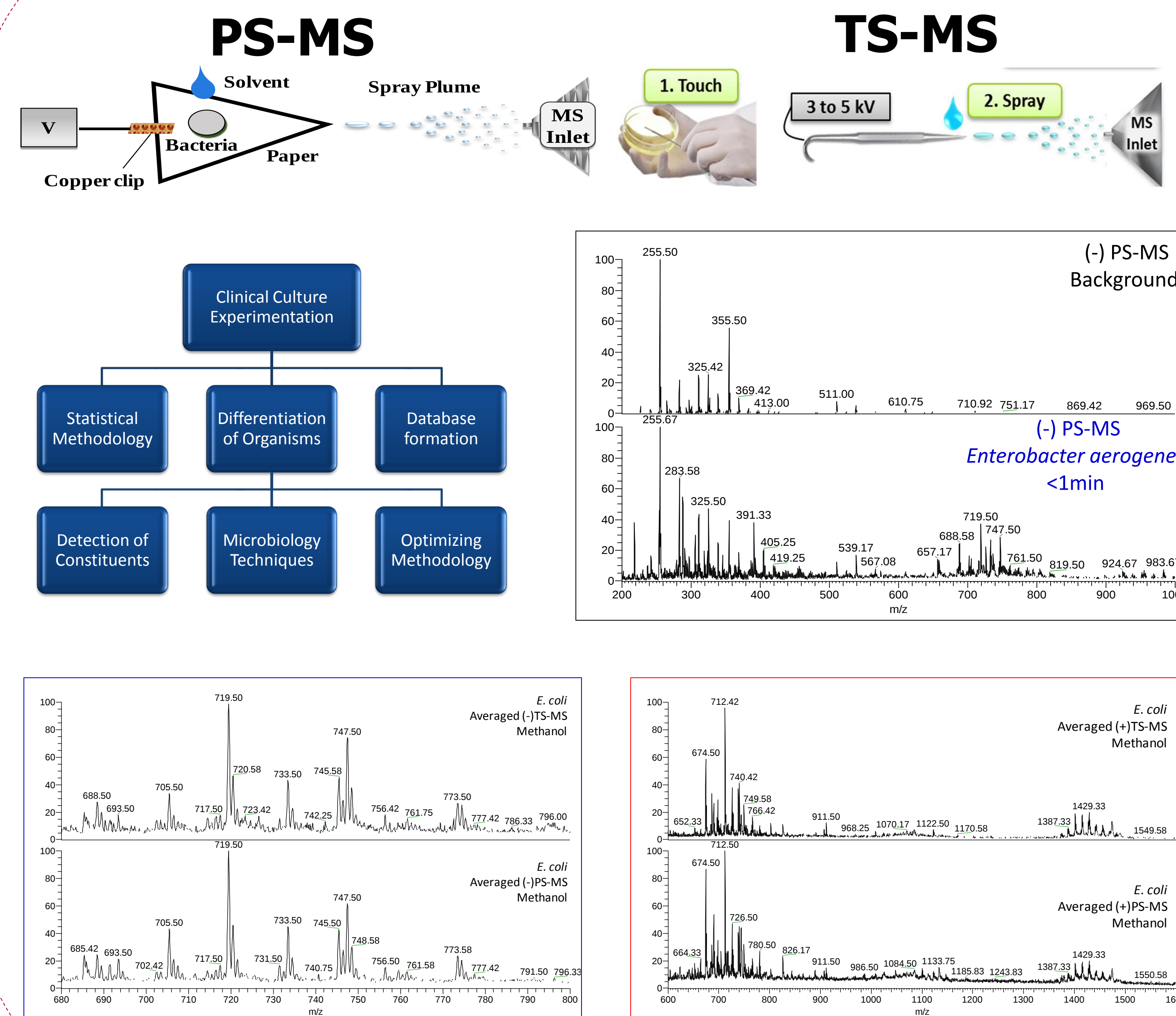


## Introduction

The rapid and accurate identification of microorganisms is necessary in order to improve public health. Molecular-based identification allows for rapid patient treatment and provides more accurate diagnoses, two crucial aspects for successful treatment, yet a great challenge.<sup>1-4</sup> In this work PS-MS<sup>5,6</sup>, an existing ambient method, and TS-MS, a newly developed technique, are being utilized in the rapid discrimination of microorganisms (<2 min).<sup>7</sup>

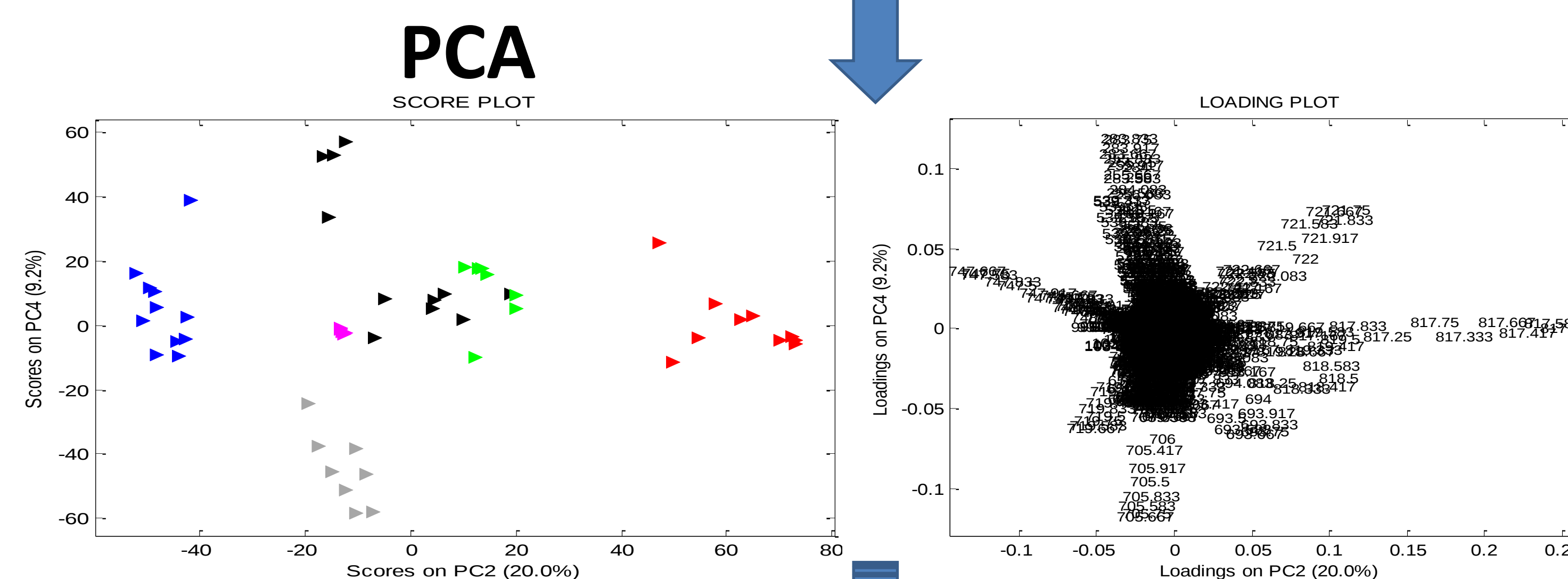
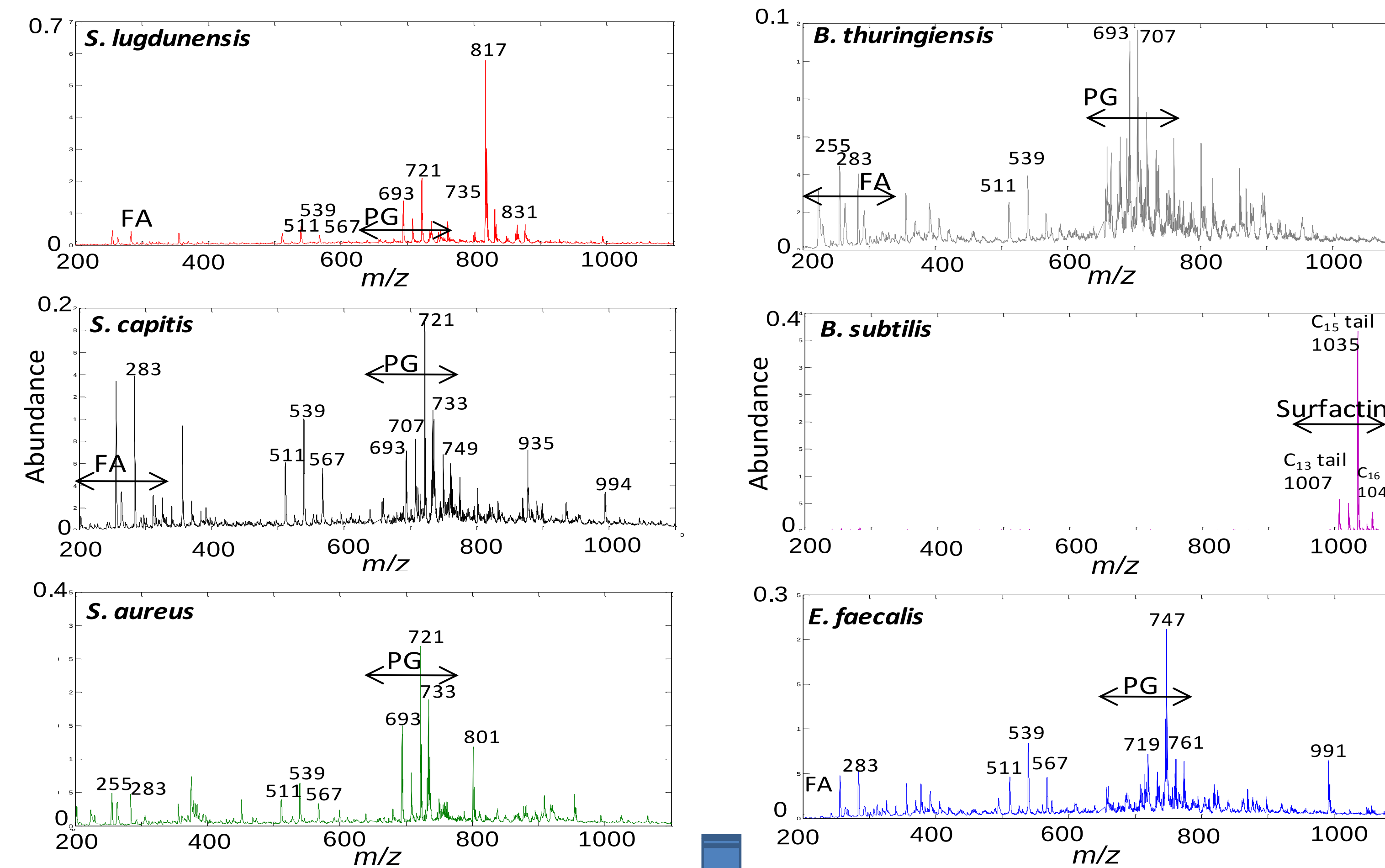
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## Ambient Ionization



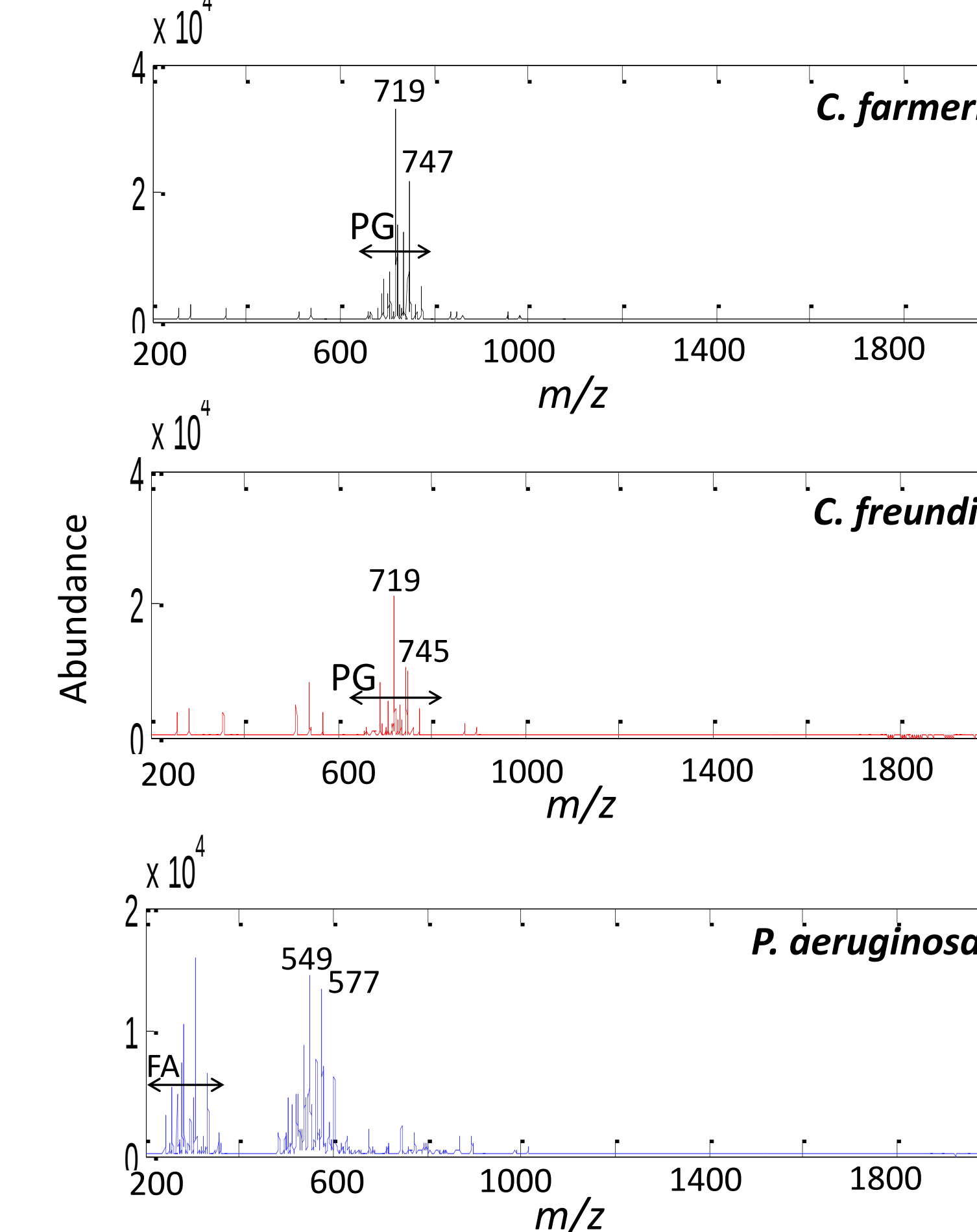
## Paper Spray Mass Spectrometry

### Gram-Positive Bacteria (-) PS-MS

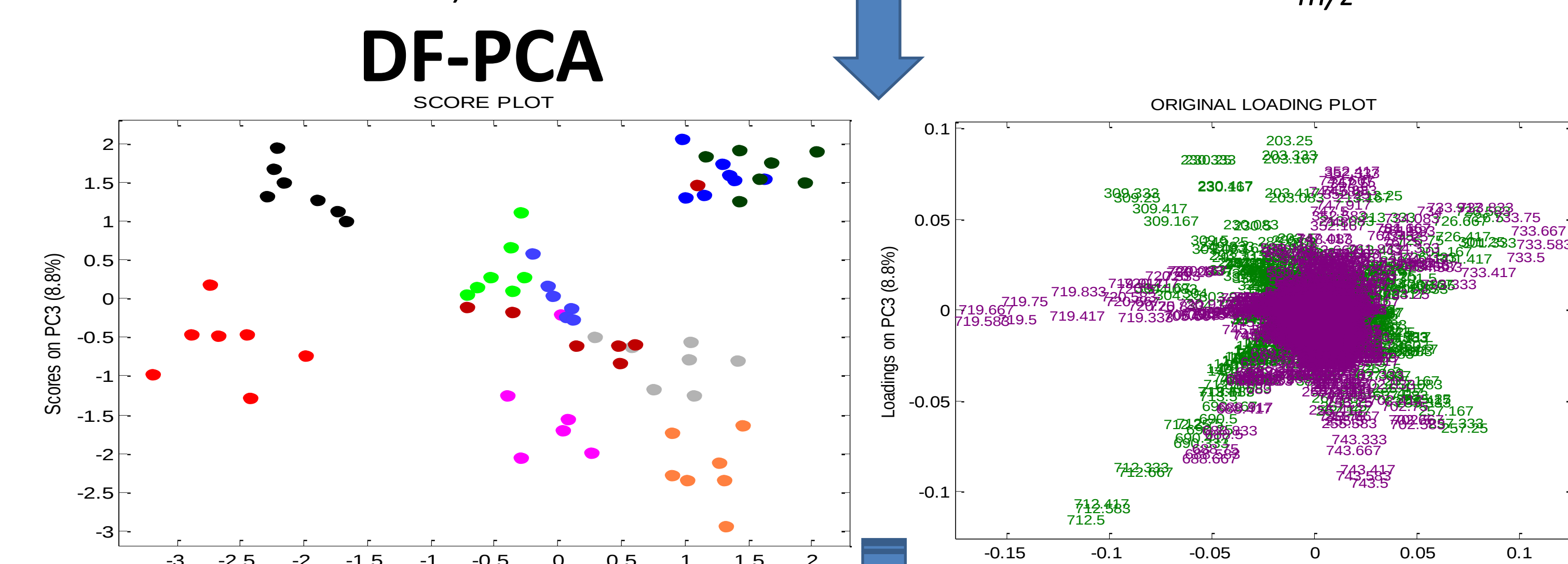
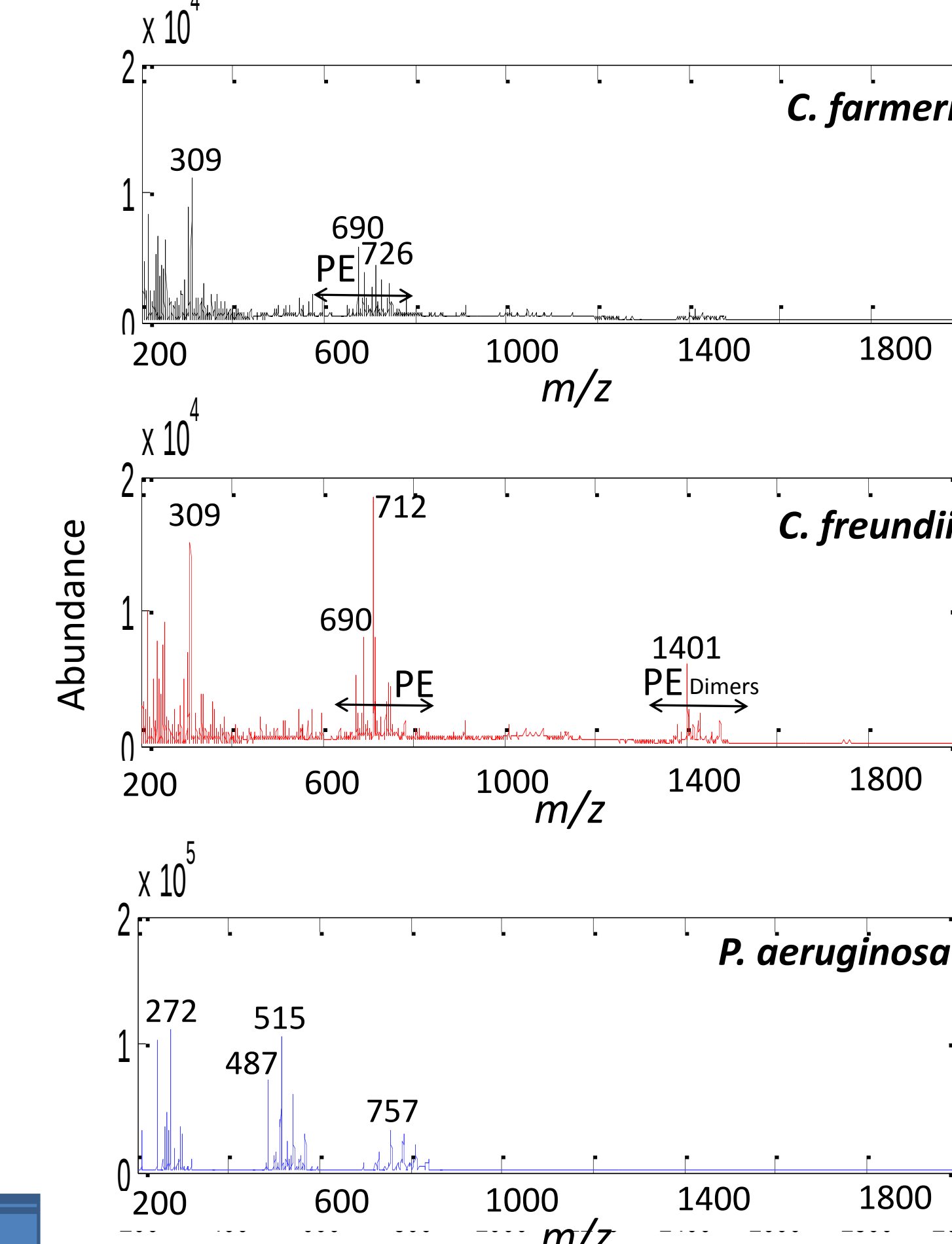


CV-Prediction Rate=98%

### Gram-Negative Bacteria (-) PS-MS



### (+) PS-MS

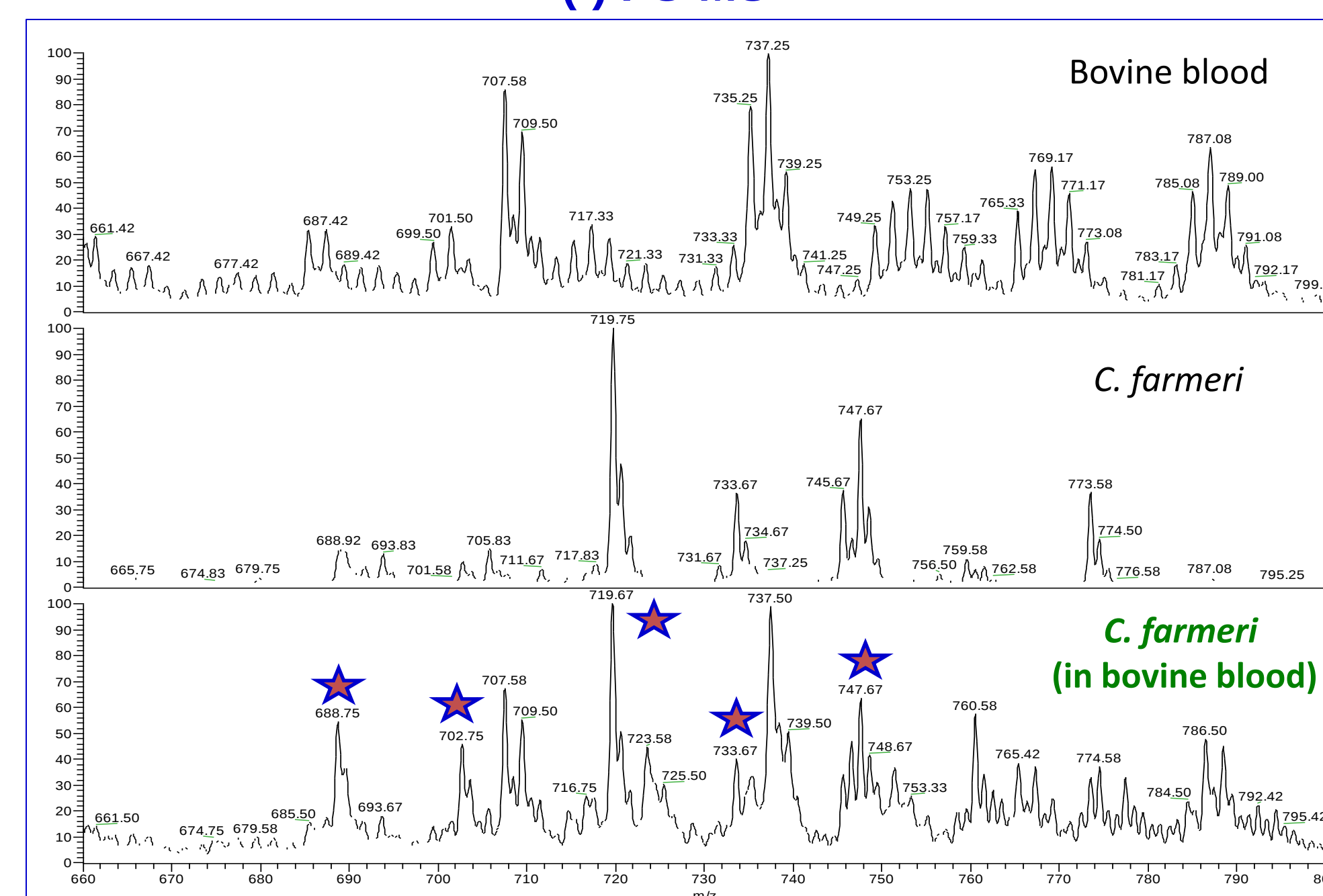


CV-Prediction Rate=87%

## Future Work

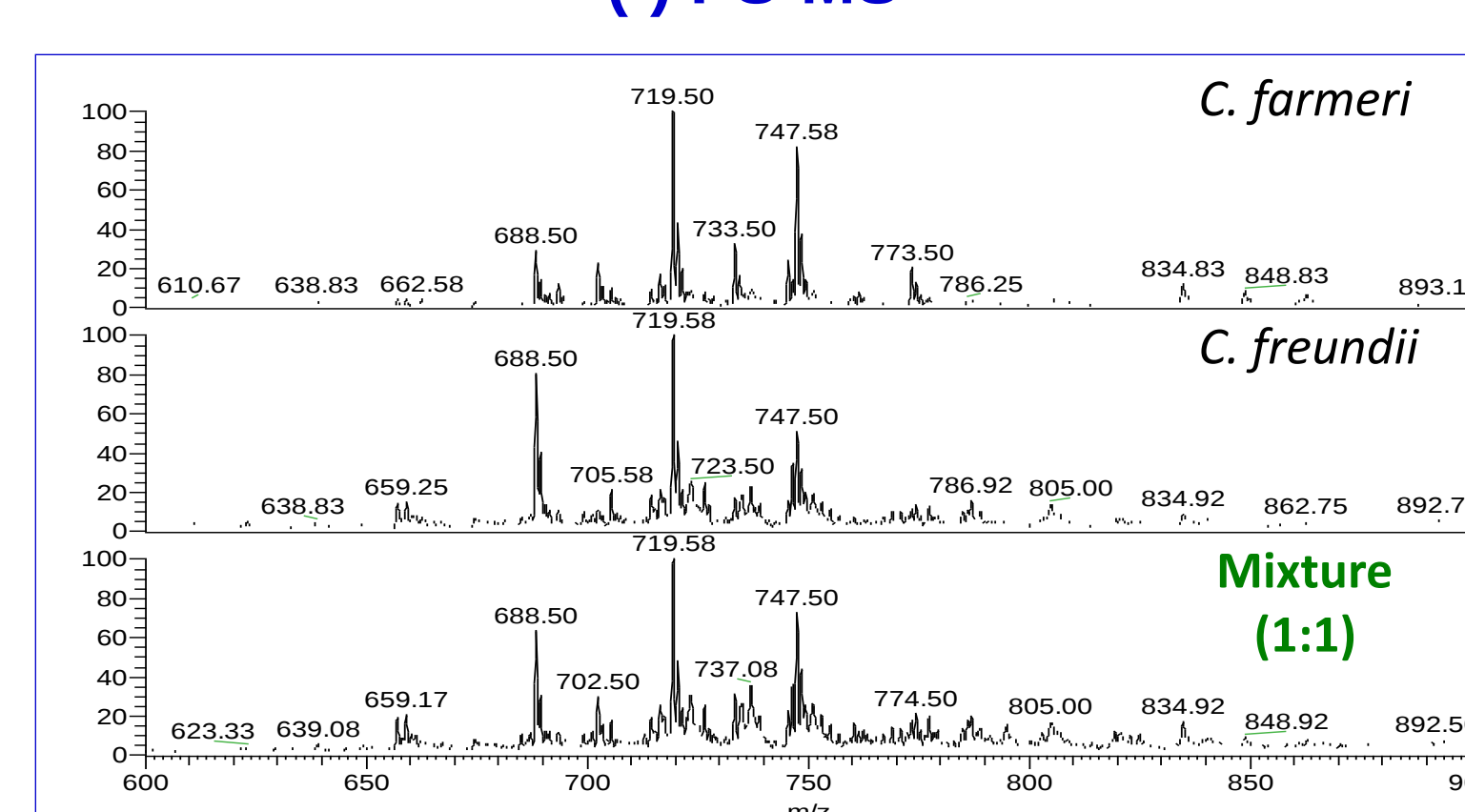
### Direct Detection of Bacteria in Blood

(-) PS-MS

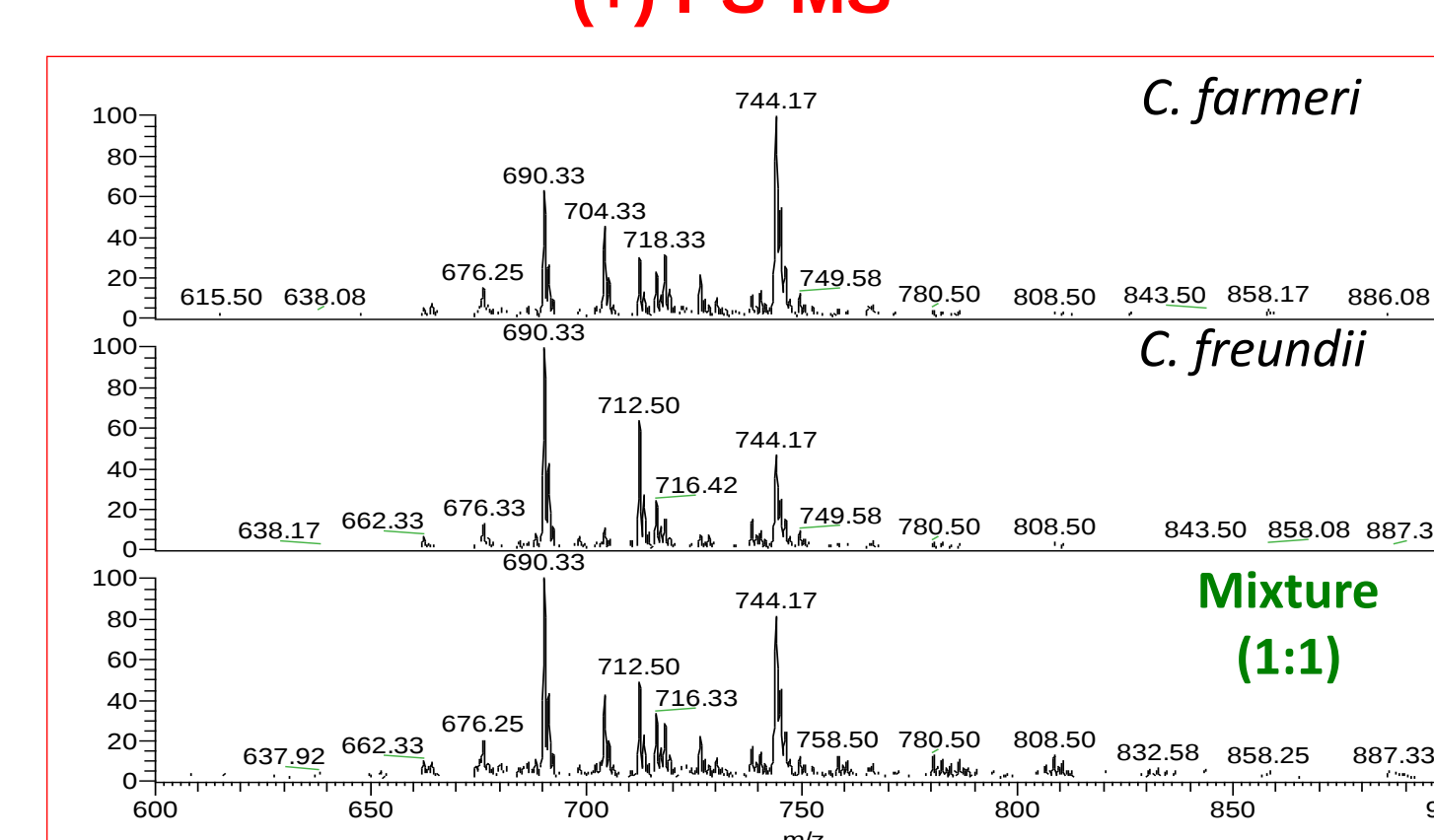


### Mixture Characterization

(-) PS-MS



(+) PS-MS



- Investigate the growth media effects
- Quantitatively investigate bacterial solutions
- Determine and strive for lower detection limits
- Implement the ambient ionization methods using a handheld miniature mass spectrometer

## Conclusions

- A major aim of this study, the identification of bacteria, seems now within reach using a simple and very rapid method of acquiring mass spectra, provided that libraries of such spectra are acquired to allow comparisons with experimental data
- Bacteria can be differentiated at the species level by PS-MS ambient ionization method
- Multivariate statistics, such as principle component analysis (PCA) and Linear discriminant analysis (LDA) have been implemented to confirm visual pattern differences
- Data fusion strategy of negative and positive ion modes PS-MS spectra was used to enhance the prediction rate of Gram-negative bacteria
- PS-MS has proven to have potential in bacterial identification in biofluids such as blood and urine. Also, bacterial mixtures can be characterized

## Acknowledgment

