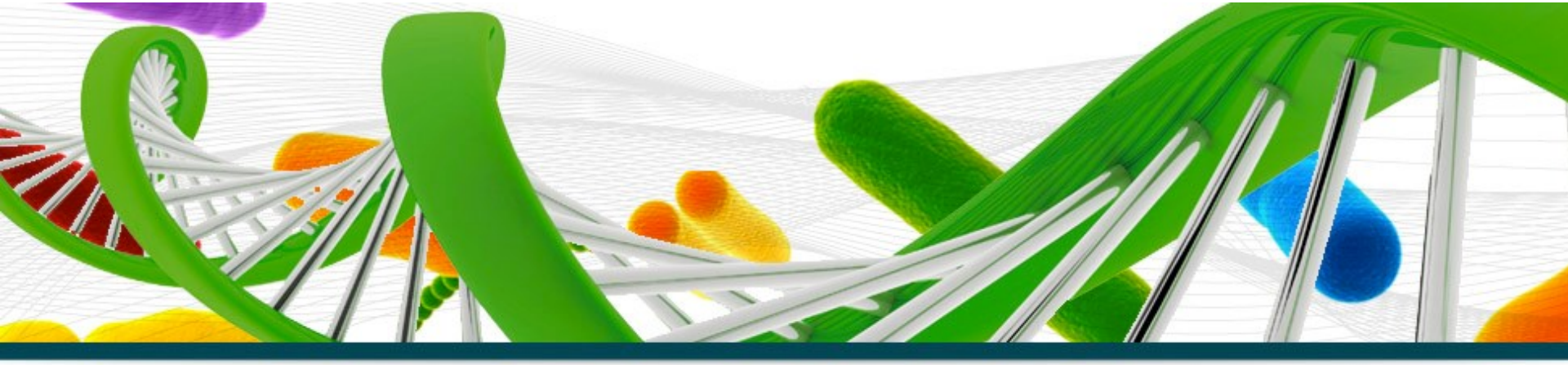
S.A. QUALITY PARTNER N.V

DDA
Département
Sciences des
Denrées alimentaires



Study of the microbial flora of freshwater and seawater fish filets in different packaging conditions by metagenomic analysis targeted on the 16S ribosomal DNA

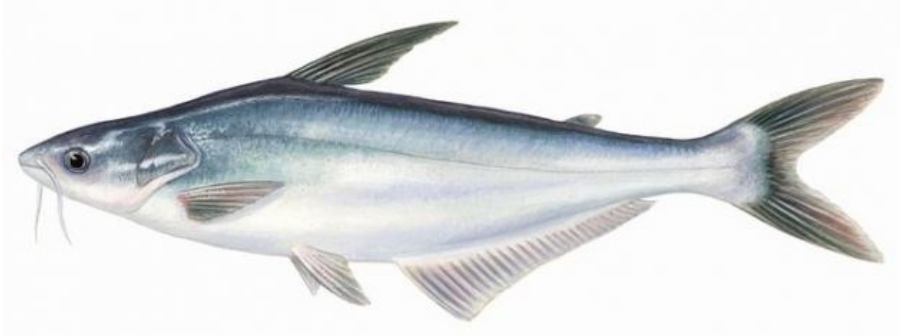
Plan

1. General Context
2. Aim of the study and analyzed samples
3. Results
4. Others samples
5. Conclusions

Context

Fish is spoiling rapidely

⇒caused by bacterial flora



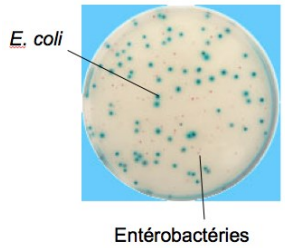
Pangasius

Haddock

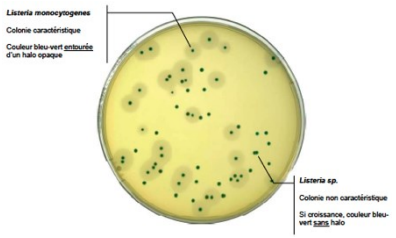
Food microbiological analysis

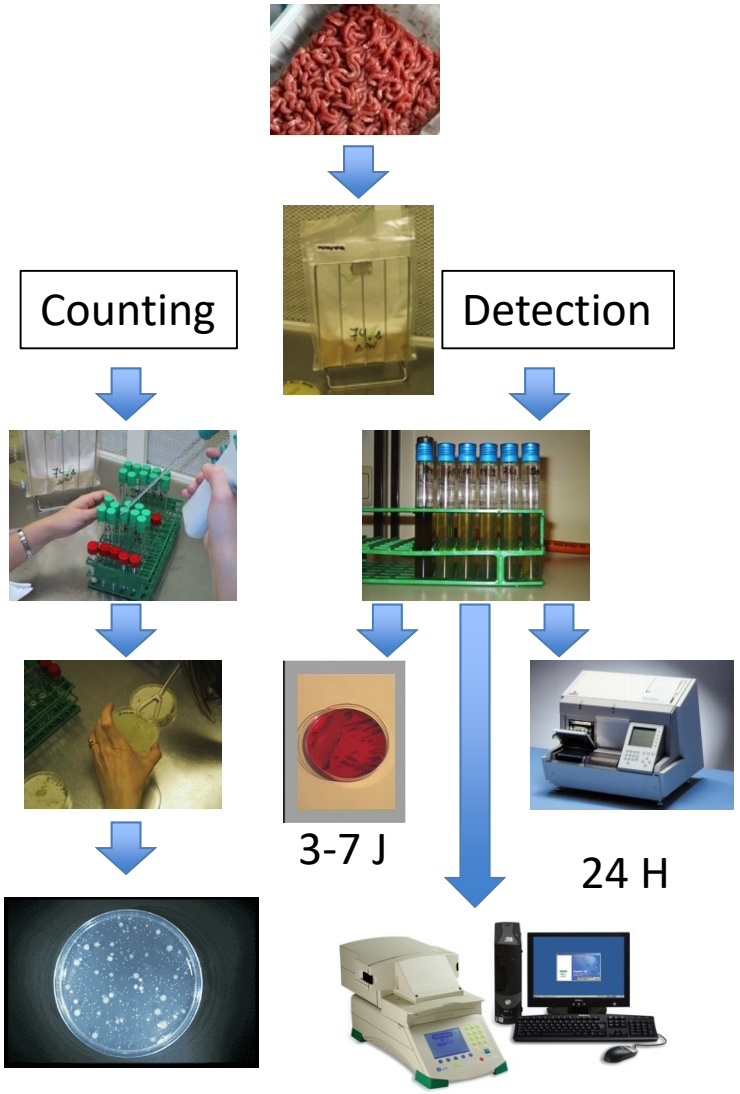
- **Detection methods** (P/A in x g))
  - Only for bacterial pathogens
  - Always enrichment necessary

- **Counting methods** (cfu/g)
  - Available for some indicator flora



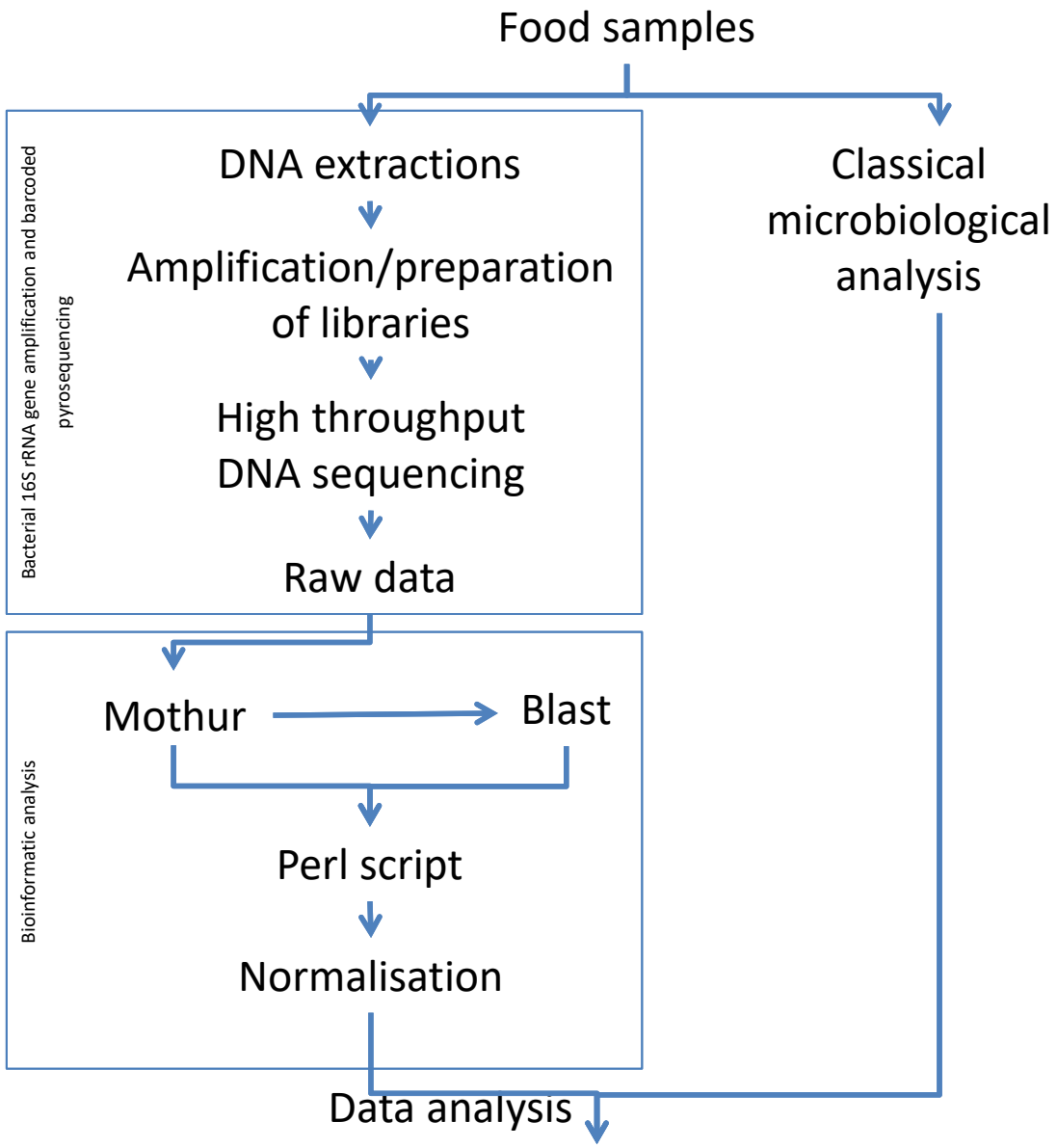
  - Available for some bacterial pathogens





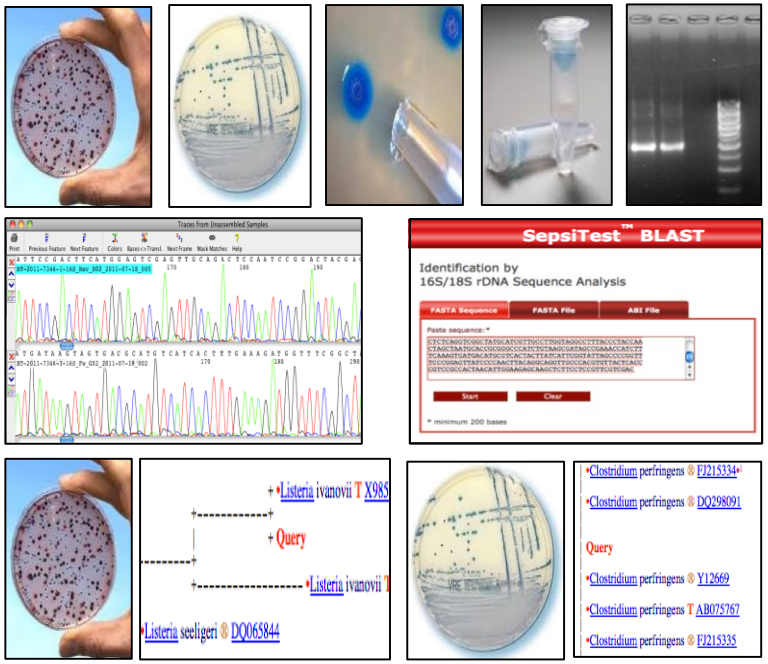
Metagenomics

- 40 Mb data
- 100.000 sequences / run
- 3 days for one run



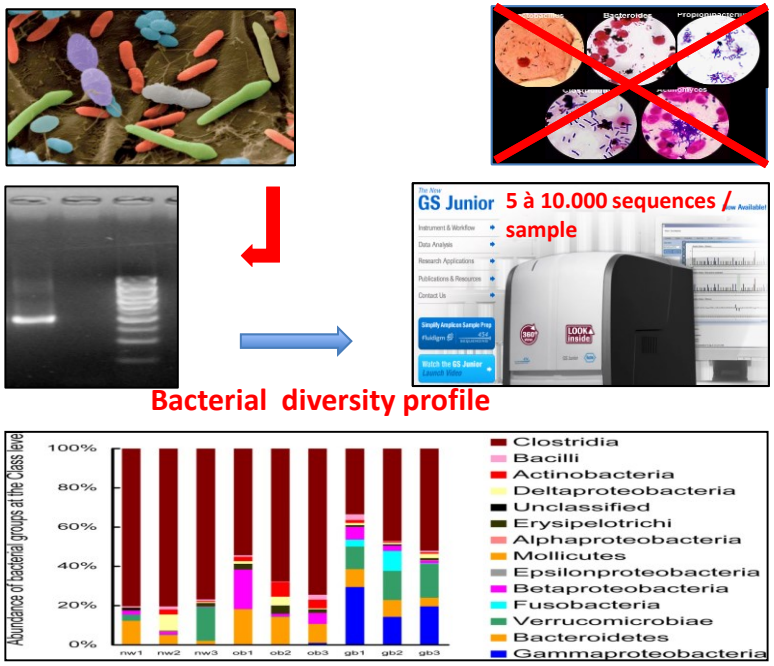
Why metagenomics ?

Classical microbiology



1 colony → 1 analysis → 1 bacterial identification
20 colonies → 20 analysis → 20 bacterial identifications

Metagenomics



1 analysis → 10.000 bacterial identifications

But are they the ones being sought ??

Analyzed samples:

classical microbiology and metagenomic analysis

➡ **Seawater:** Eglefin

Day of packaging — *Day 0*

End of the shelf life — Plastic wrap — *Day 2*

End of the shelf life — MAP — *Day 6*

➡ **Freshwater:** Pangasius

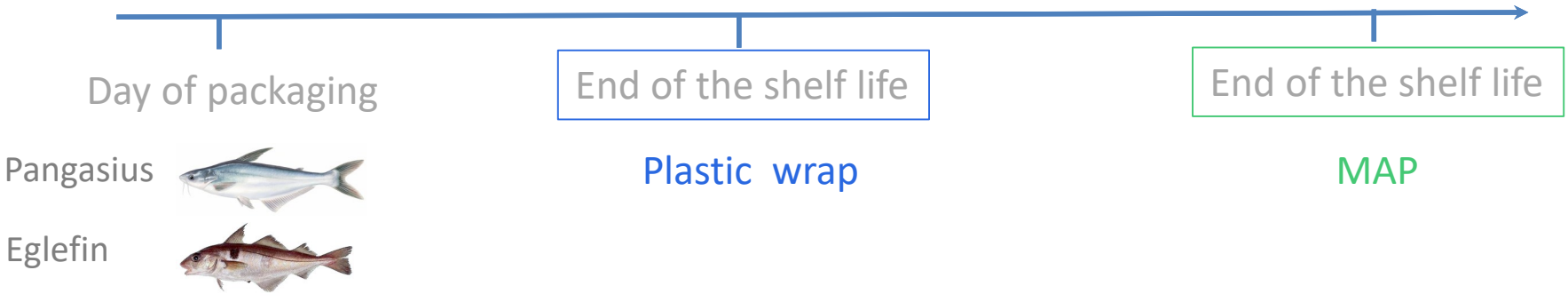
Day of packaging — *Day 0*

End of the shelf life — Plastic wrap — *Day 5*

End of the shelf life — MAP — *Day 8*

The aim of the study

Identification of flora involved in the fish from **freshwater** and **seawater**



➡ ***Validation of the shelf life***

Results

With classical microbiology:

	PACC	LAB	PC	SA.	EC
Pangasius					
Day 0	3.66	<1	<2	1	1.3
under FW (5 days)	7.99	3.64	6.85	<1	3.38
under MAP (8 days)	7.74	6.48	6.32	<1	3.83
Haddock					
Day 0	4.3	1	4.04	<1	1.7
under FW (2 days)	5.96	1	5.95	<1	1.9
under MAP (6 days)	5.66	1.3	5.98	<1	3.26

ACC (Psychotropic Aerobic colony counts), LAB (lactic acid bacteria), PC (*Pseudomonas* counts), SA (Staphylococcus aureus) and EC (*Enterobacteriaceae* counts). FW: Food Wrap; MAP: Modified Air Packaging

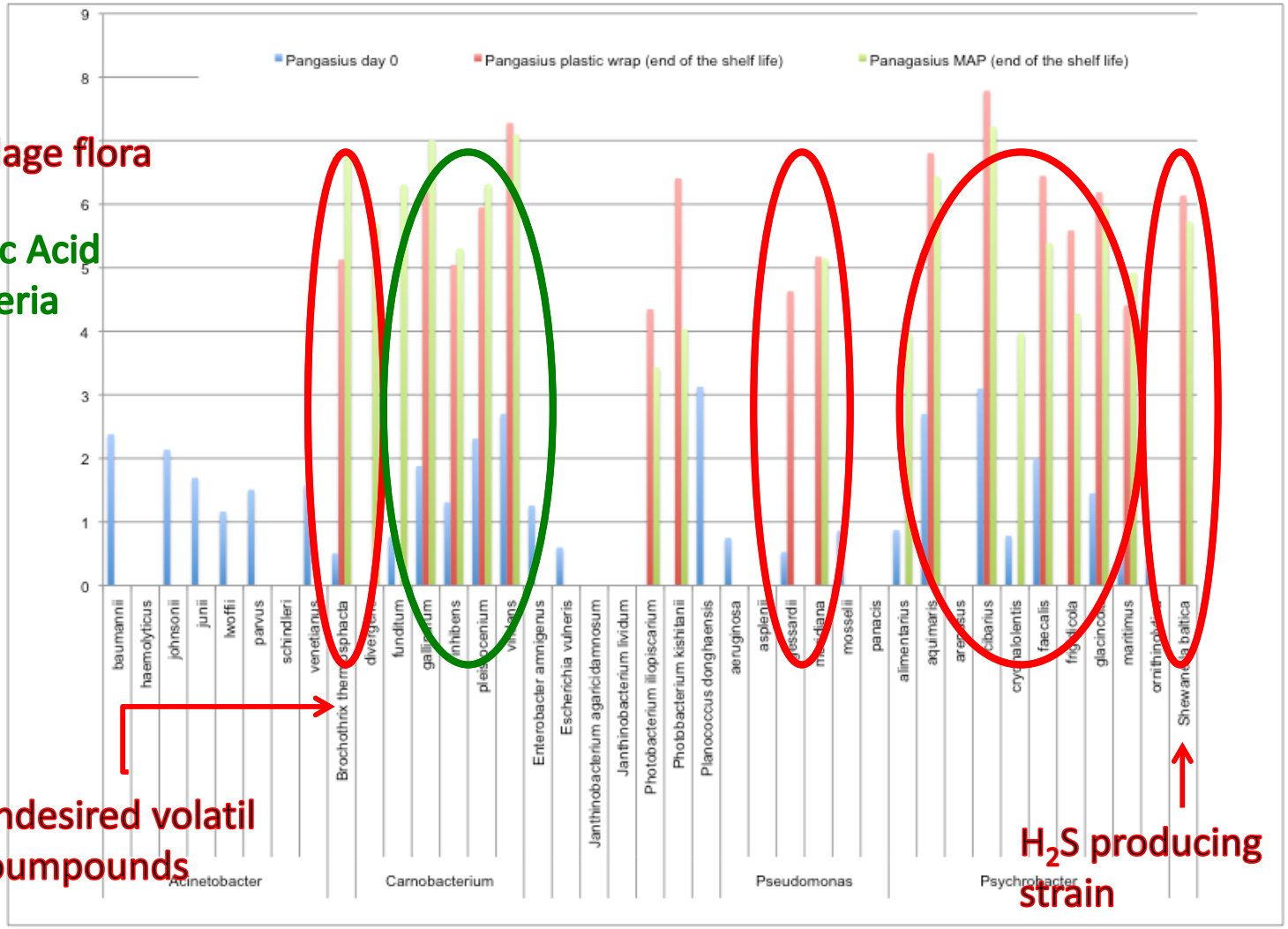
- And that's it...

Results

With metagenomics :

- 45 different bacteria species identified for the pangasius
- 43 different bacteria species identified for the haddock
- Significant variations of the initial flora at the end of the shelf life depending of the fish and packaging
- Relation between spoilage and the activity of some bacterial species

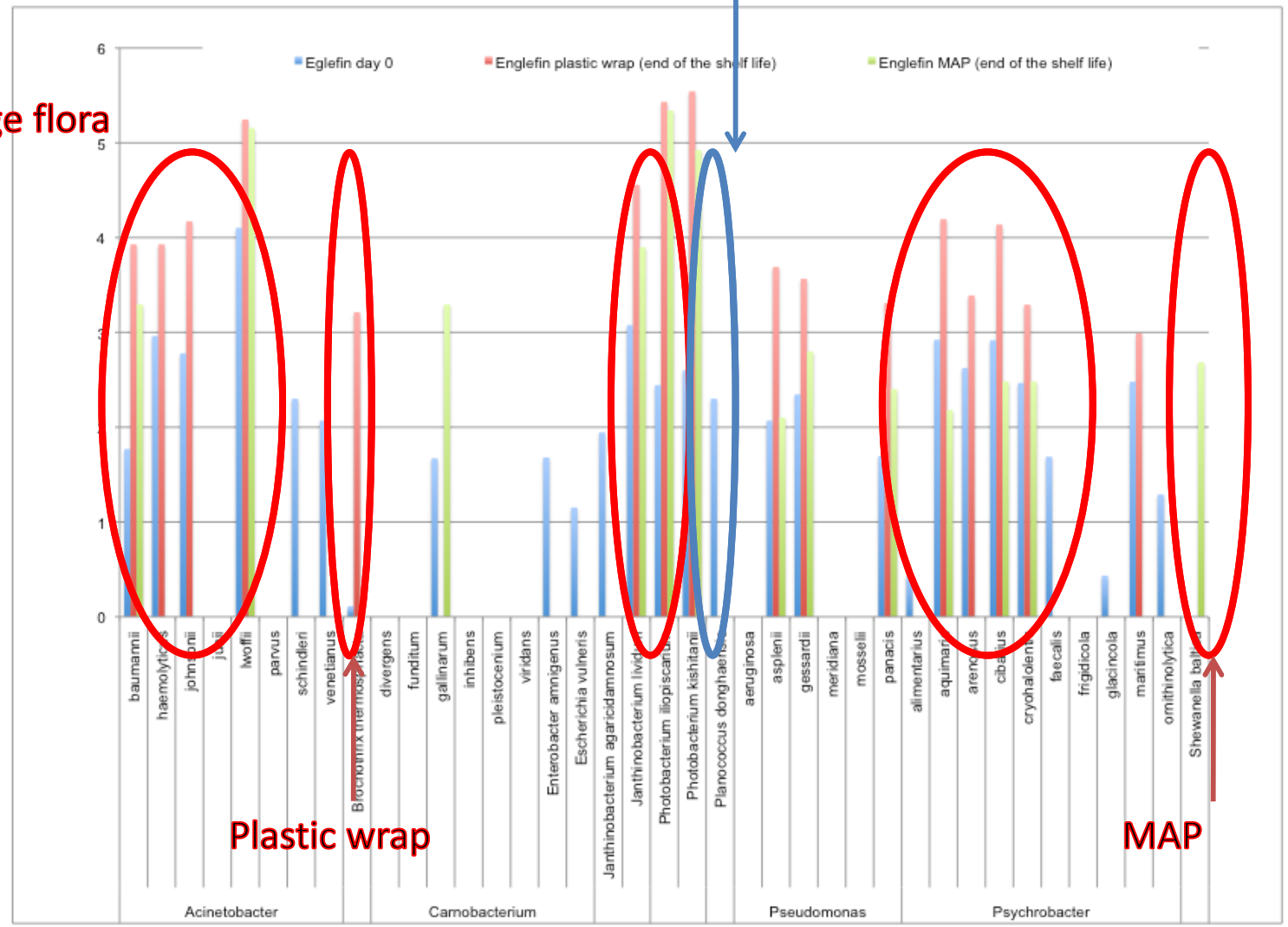
Pangasius (freshwater)



Haddock (seawater)

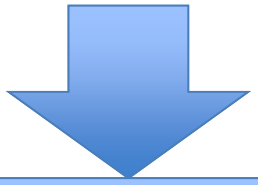
Freshness indicator

Spoilage flora



Conclusions

- Few informations with classical microbiology
- Identification and quantification of all bacteria species is now possible with metagenomics
- Evaluation of specific function of micro organisms on food products => expertise



Metagenomic tools could adequately determine the duration of shelf-life

Perspectives

Knowing and controlling the total supply chain who can influence the total shelflife

- *Raw material biology (wild catch – farmed)*
- *Hygiene (PR programs)*
- *Temperature (PR programs)*
- *Carnobacterium* strains could be added on such lightly preserved product
- Environmental factors could be modified (pH, lactic acid, packaging)

-> A NEW APPROACH OF FOOD QUALITY

Others samples

- Food samples
- Sillages
- Intestinal flora from guts of animals
- Sea water
- Seeds
- Virus
- …

Acknowledgments

- Pr Georges Daube
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Thank you