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Survival of ESKAPE pathogen *Acinetobacter baumannii* in water media of different temperature and pH

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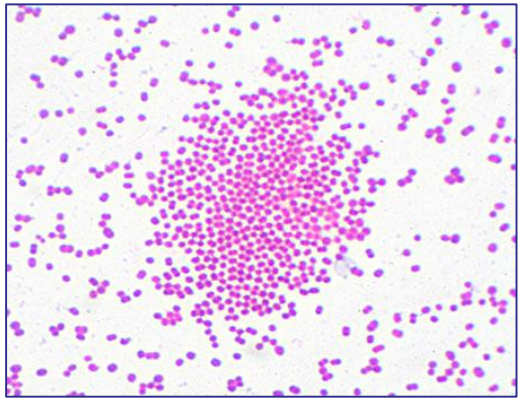
Acinetobacter baumannii

- **Gram negative non-sporogenic coccobacillus**
- **Emerging human opportunistic pathogen**
- **Infections in hospital environment**



Review

Clinical relevance of the ESKAPE pathogens

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Abstract

In recent years, the Infectious Diseases Society of Americ
bacteria (*Enterococcus faecium*, *Staphylococcus aureus*, *Kleb*
Pseudomonas aeruginosa and *Enterobacter* spp.) – acronyn
of 'escaping' the biocidal action of antibiotics and mutuall
transmission and resistance. This review aims to consolic
the ESKAPE pathogens and provide a contemporary sum
microbiological considerations necessary to face the mou

Keywords:: *Acinetobacter*, antibiotics, antimicrobial resista
acquired infection, *Klebsiella*, MRSA, multidrug resistance,

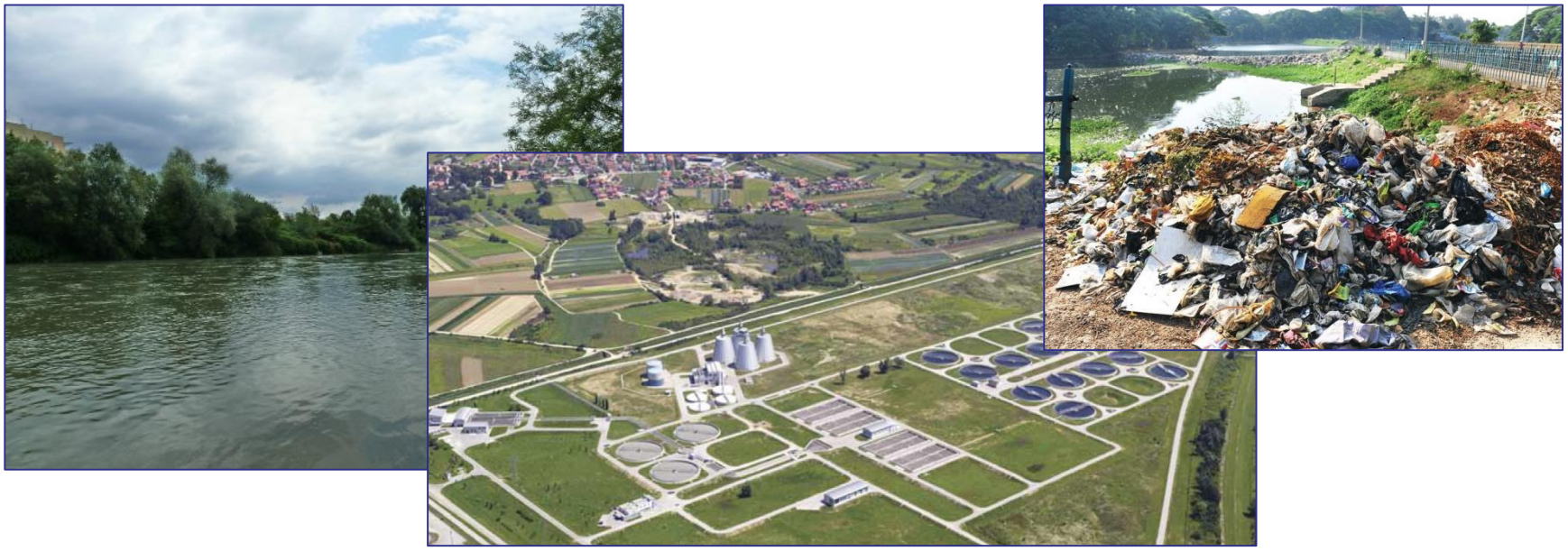
The WHO priority list

PRIORITY: CRITICAL	PRIORITY 2: HIGH	PRIORITY 3: MEDIUM
Acinetobacter baumannii carbapenem-resistant	**Enterococcus faecium** vancomycin-resistant	**Streptococcus pneumoniae** penicillin-non-susceptible
Pseudomonas aeruginosa carbapenem-resistant	**Staphylococcus aureus** methicillin-resistant vancomycin-intermediate and resistant	**Haemophilus influenzae** ampicillin-resistant
Enterobacteriaceae carbapenem-resistant, ESBL-producing	**Helicobacter pylori** clarithromycin-resistant	**Shigella spp.** fluoroquinolone-resistant
	Campylobacter spp. fluoroquinolone-resistant	
	Salmonellae fluoroquinolone-resistant	
	Neisseria gonorrhoeae cephalosporin-resistant fluoroquinolone-resistant	

Source: WHO

Acinetobacter baumannii in the environment

- **Hospital and municipal wastewater**
- **Wastewater treatment plants**
- **Natural waters (Seine, Sava)**
- **Soil contaminated with human solid waste**



Aim

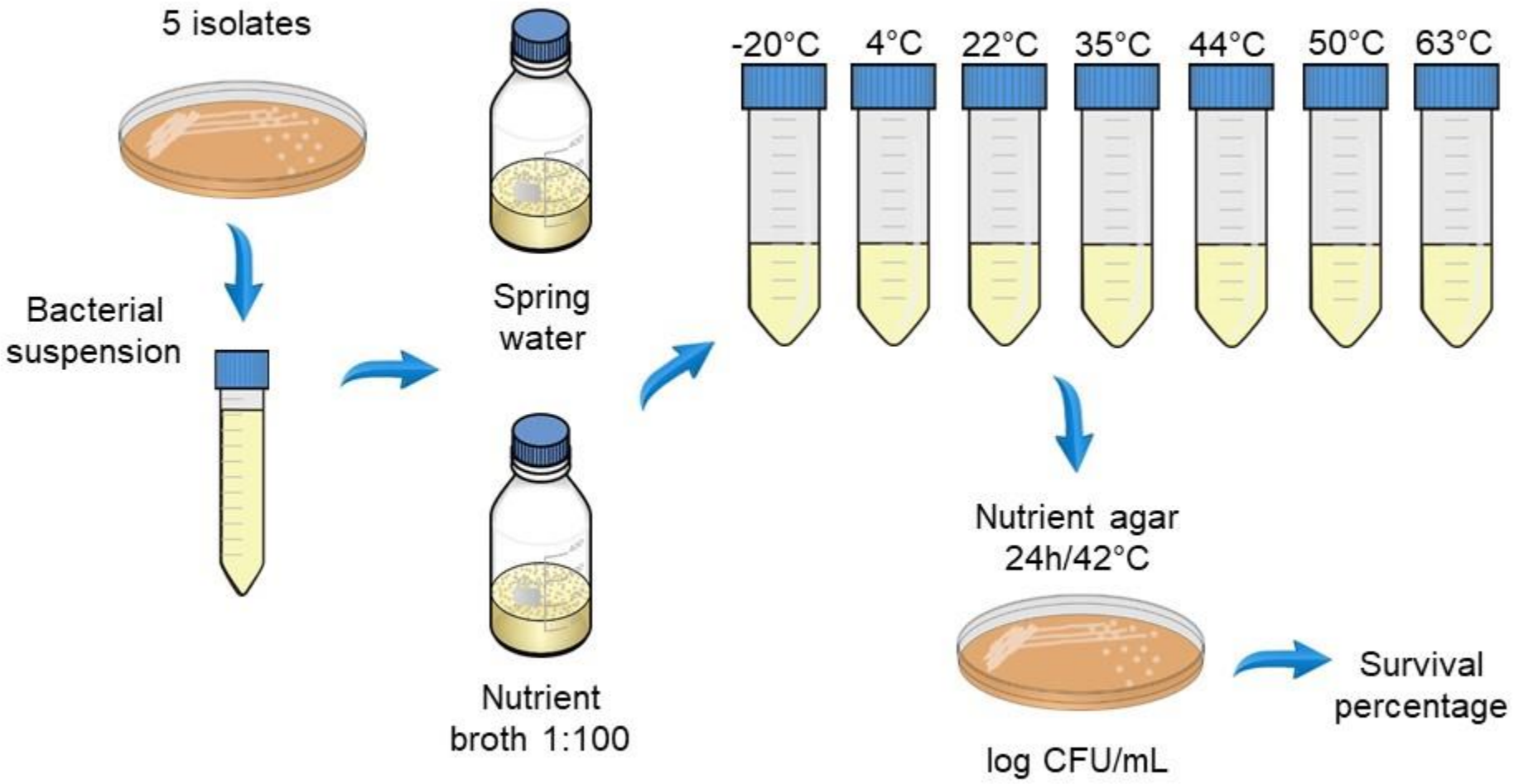
- **Examine the survival of *A. baumannii* in different temperature and pH conditions in order to predict the behavior of this pathogen inside and outside hospital setting**

Material and methods

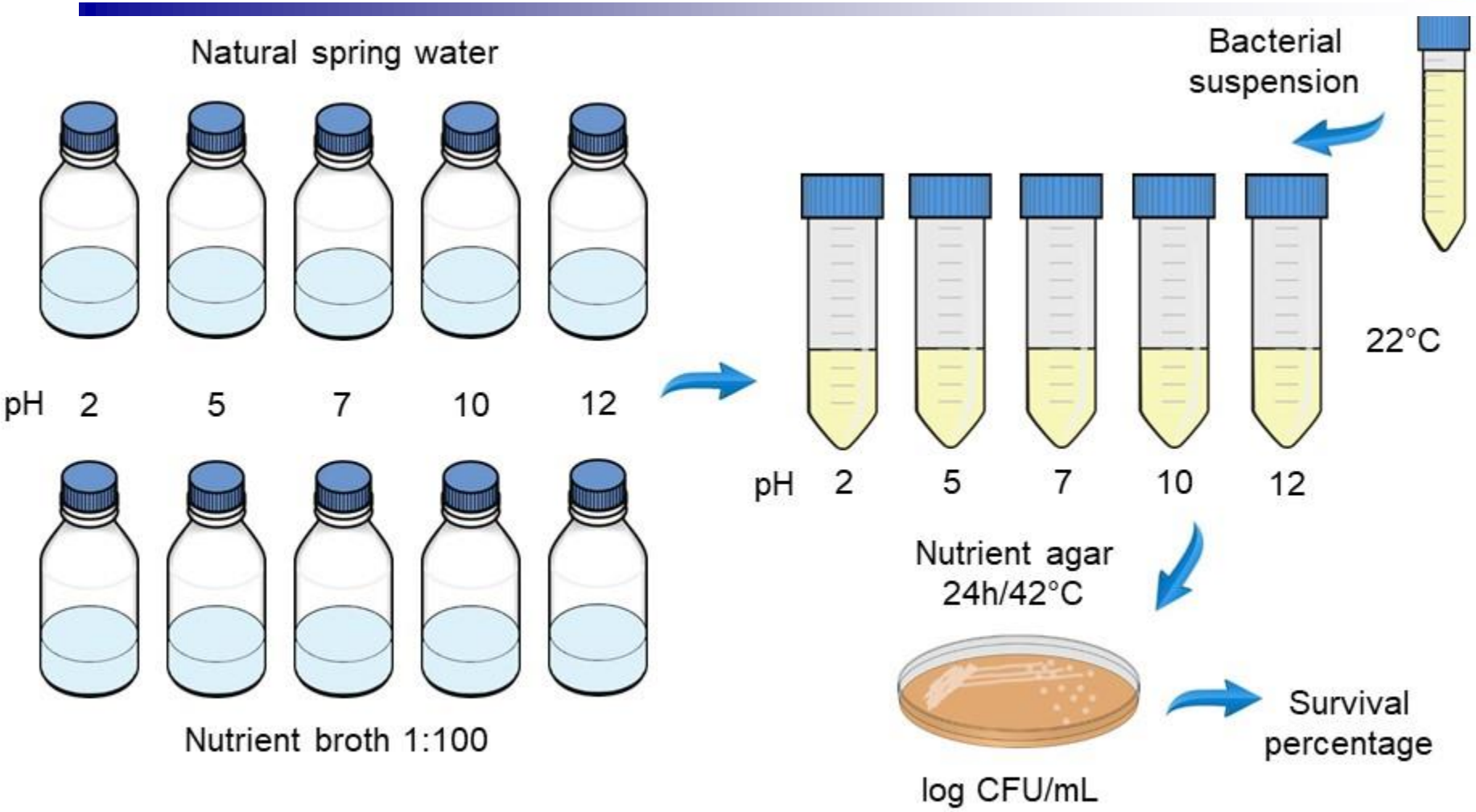
- **4 environmental and 1 clinical isolate selected according to their antibiotic resistance profile during 7 weeks**

Isolate	Clonal origin	Acquired carbapenemase	Antibiotic susceptibility profile
OB4138	IC2	OXA-23	XDR
IN39	IC2	OXA-23	MDR
EF7	IC2	OXA-23	PDR
EF8	IC2	OXA-23	XDR
EF11	unclustered	no	S

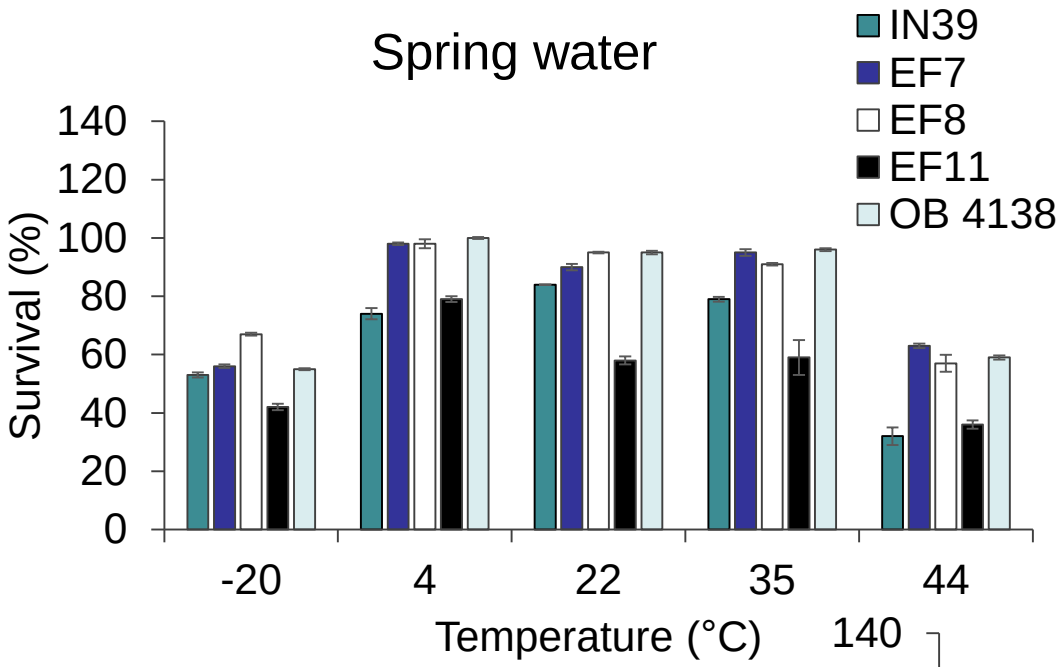
Temperature



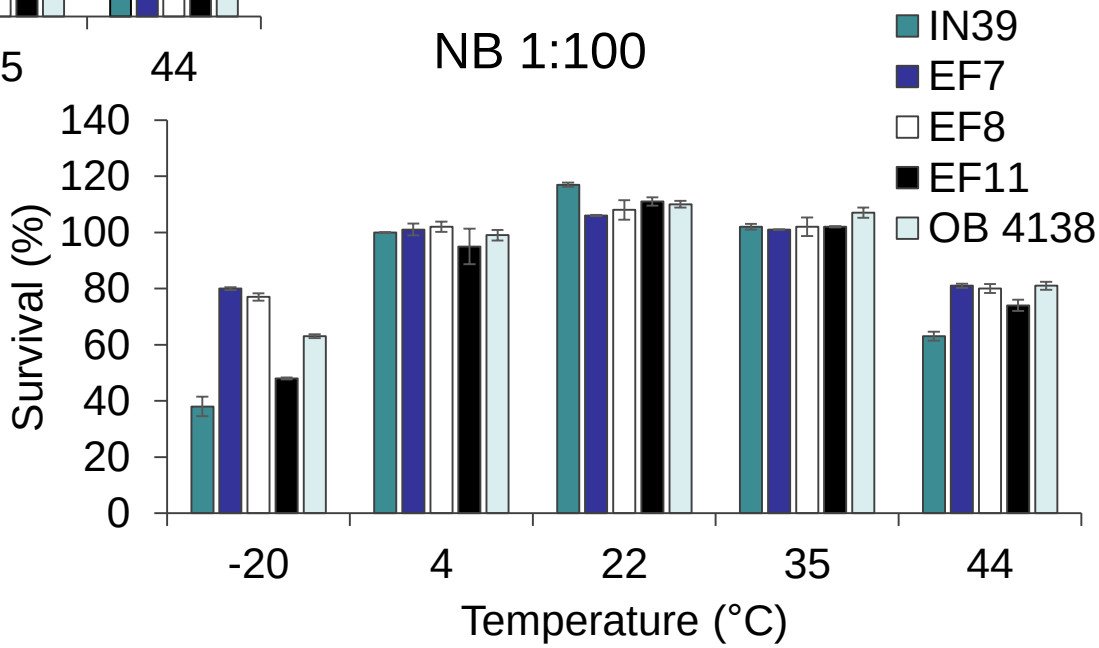
pH


Natural spring water
pH 2 5 7 10 12
Nutrient broth 1:100
Bacterial suspension
22°C
pH 2 5 7 10 12
Nutrient agar 24h/42°C
log CFU/mL
Survival percentage

Results - temperature

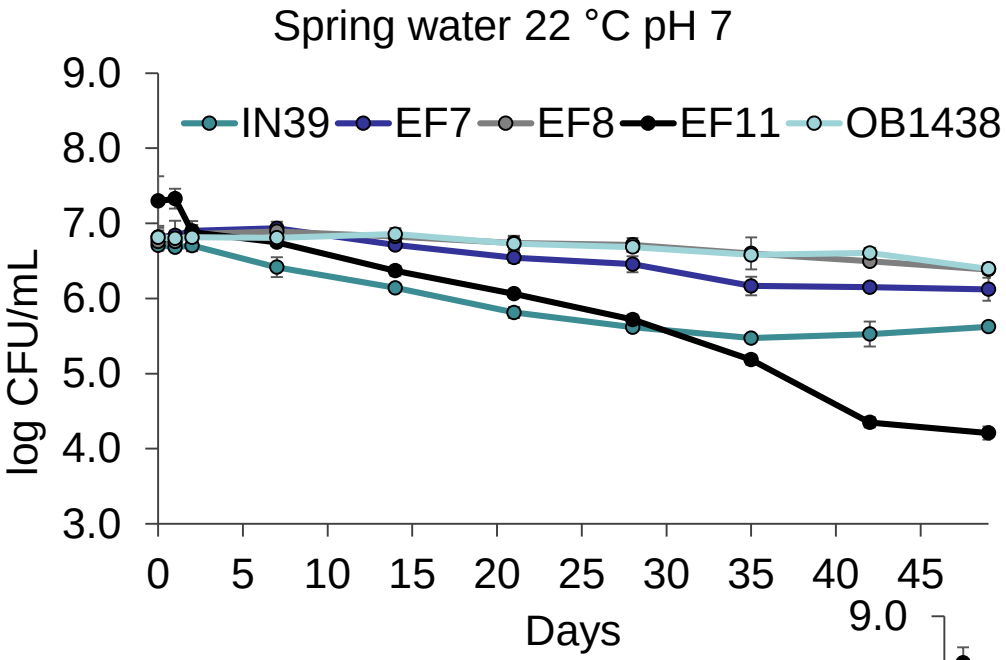


- **50°C survival 2 days in SW, 5 days in NB**

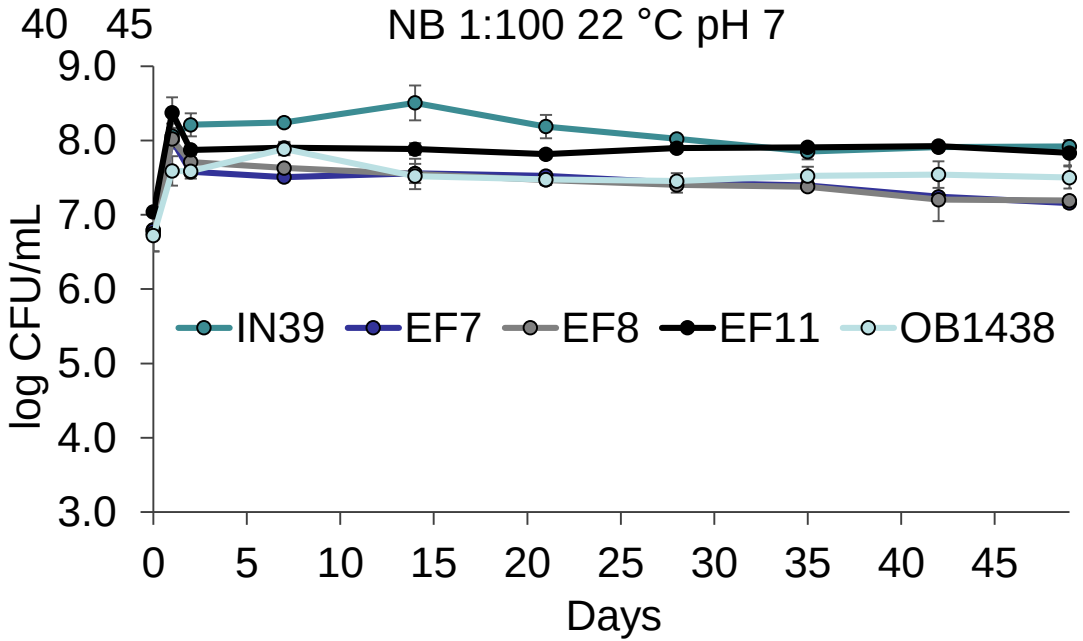


- **63°C survival 1 hour in SW, 2 hours in NB (pasteurization procedure 63°C/30min)**

Results pH



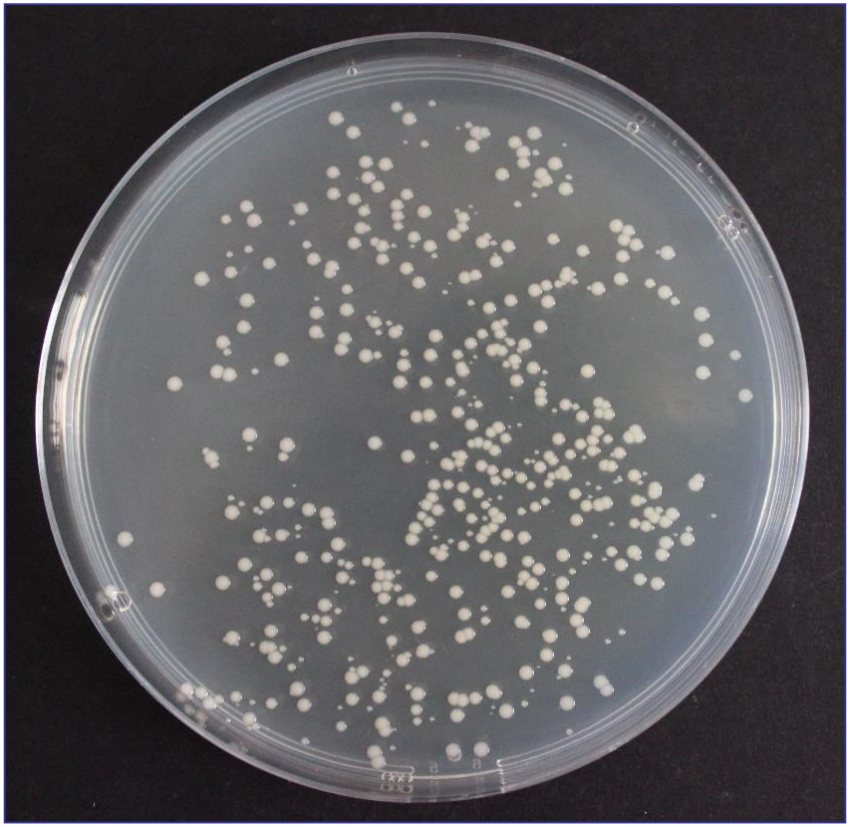
- **pH 5 and 10 no multiplication and no drop**



- **pH 2 survival up to 3 hours**
- **pH 12 up to 5 hours in SW, 24 hours in NB**

Acinetobacter baumannii

- ***A. baumannii*** **forms smaller translucent colonies together with larger opaque variants**



Conclusion

- ***A. baumannii*** **prefers nutrient-rich environment**
- **Optimal conditions for the survival of** ***A. baumannii*** **are room temperature and neutral pH**
- ***A. baumannii*** **survives a wide range of temperature and pH values that are unfavorable to most other mesophilic non-sporogenic bacteria**
- **Multi-drug resistant** ***A. baumannii*** **isolates could survive better in harsh environmental conditions**

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https://www.pmf.unizg.hr/naturaci