DO WE NEED BACTERIAL TAXONOMY IN CLINICAL LABORATORY?

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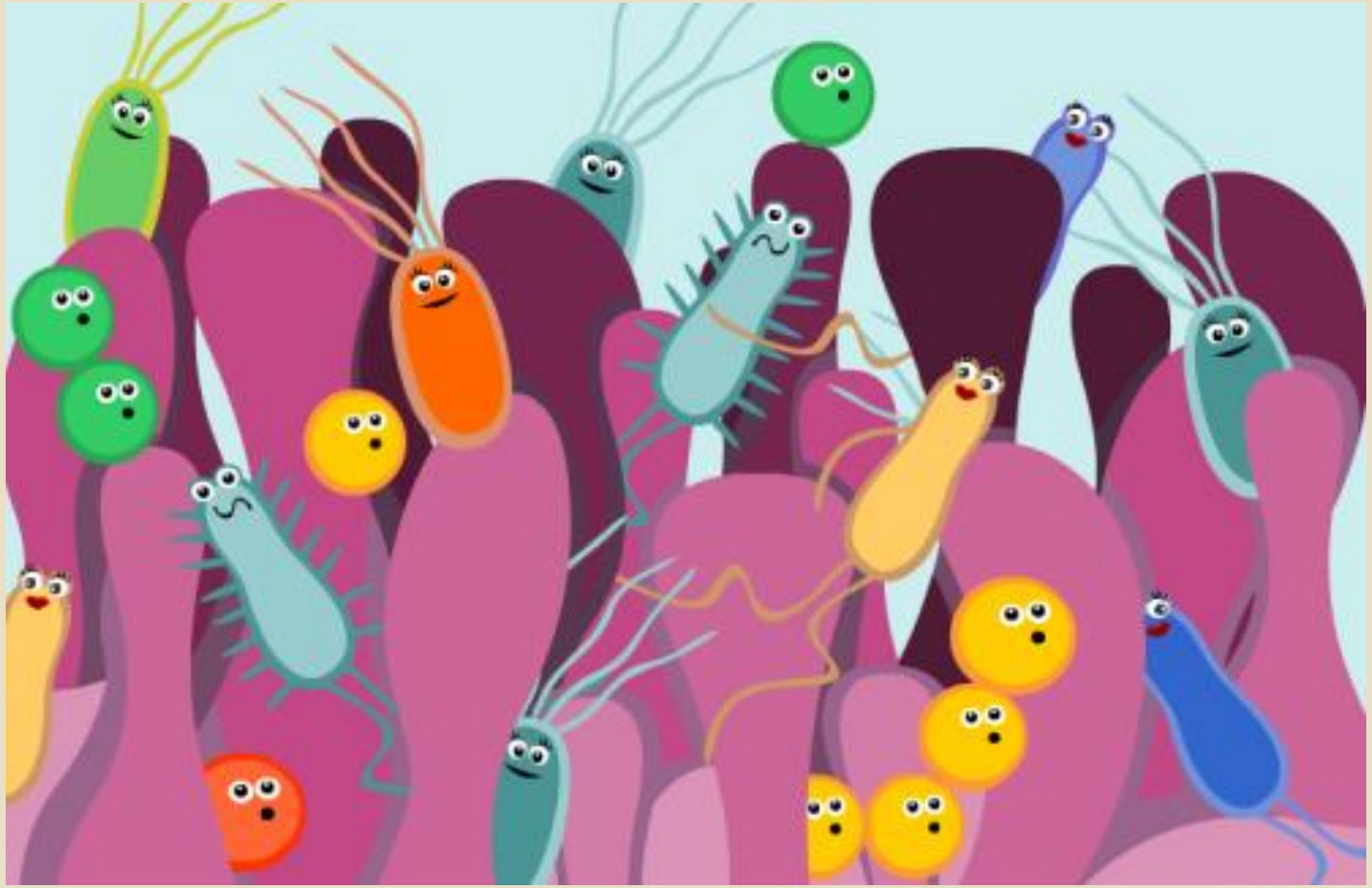
Looking for the microorganism which is causing the disease

Doctor says: Treat or not to treat, that is the question!

Microbiologist has to answer: Pathogenic or not pathogenic?



How to prove the etiological agent of the disease

- Taking probes
- Cultivate samples
- Isolate the suspected causing agent
- Certify with the identification
- Provide antibiogram
- **Decision on the treatment**

CORRECT INCORRECT

Who is the bad guy?

Why could be our result wrong?

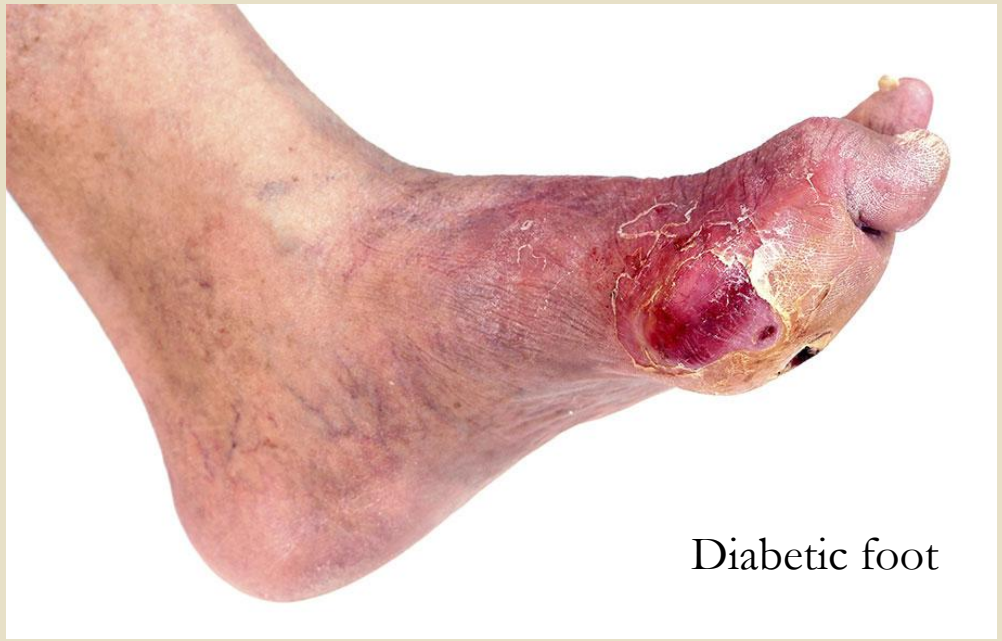
1. Sample taiking failure

2. Cultivation technique failure

3. Identification failure

1. Sample taking failure

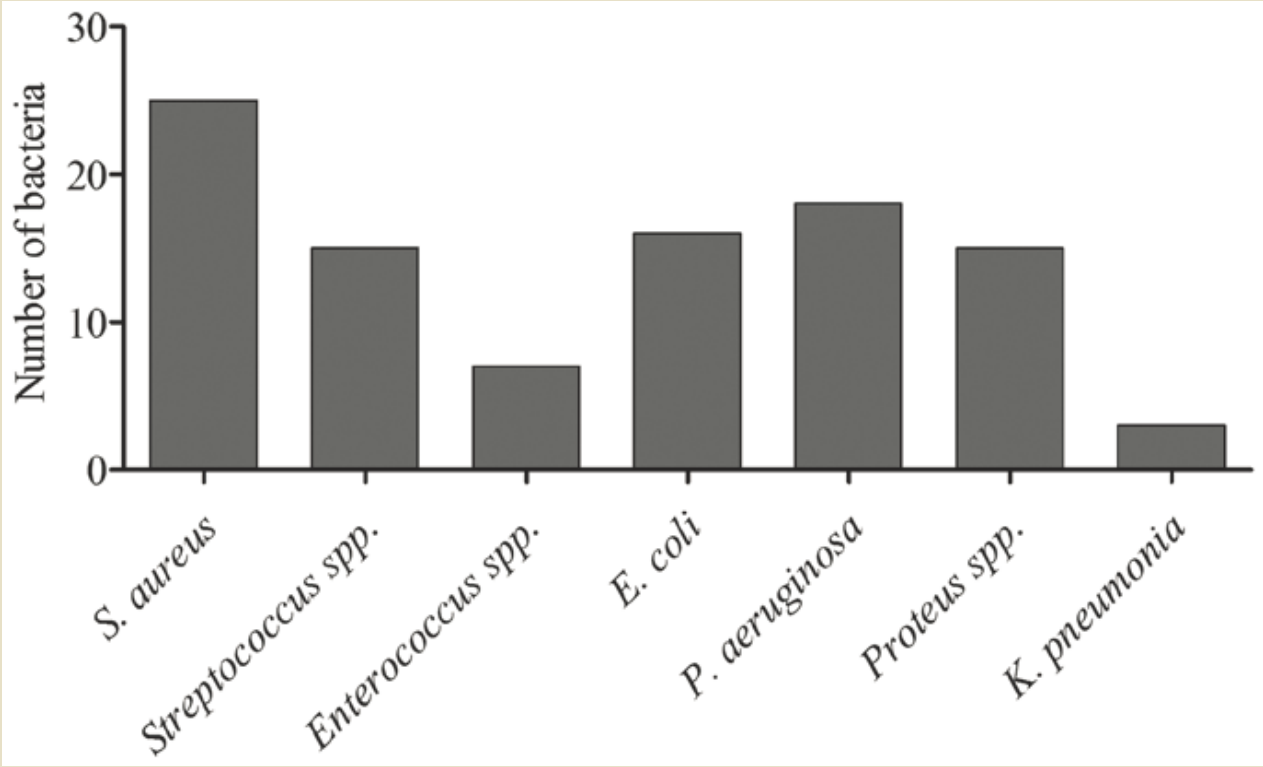
- *Staphylococcus aureus* and diabetic foot story



Diabetic foot

Staphylococcus aureus

Distribution of microbes isolated from diabetic foot ulcer samples



Chaudry et al., Experim. Therapeutic Medicine 11: 1031-1038, 2016

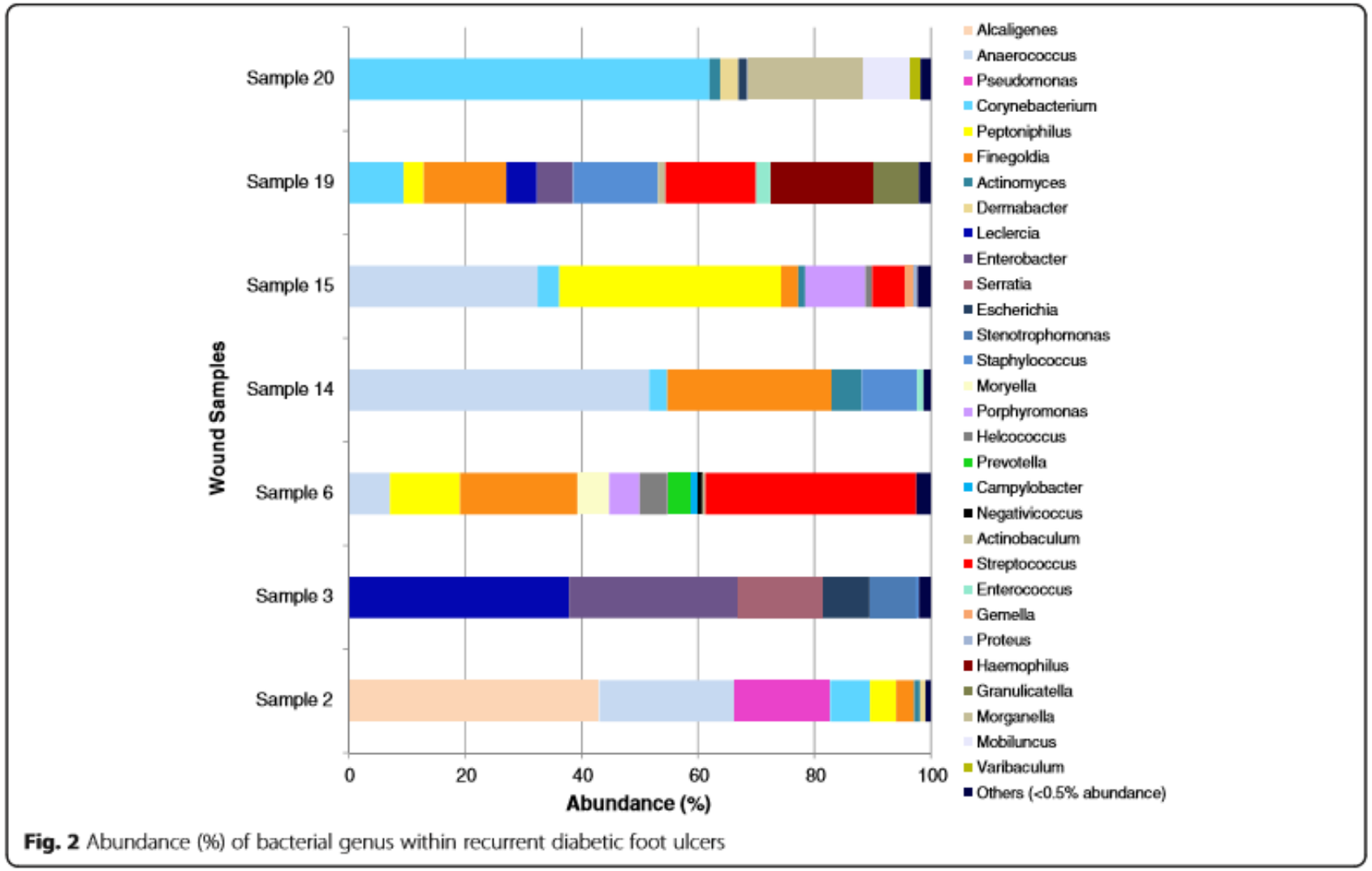
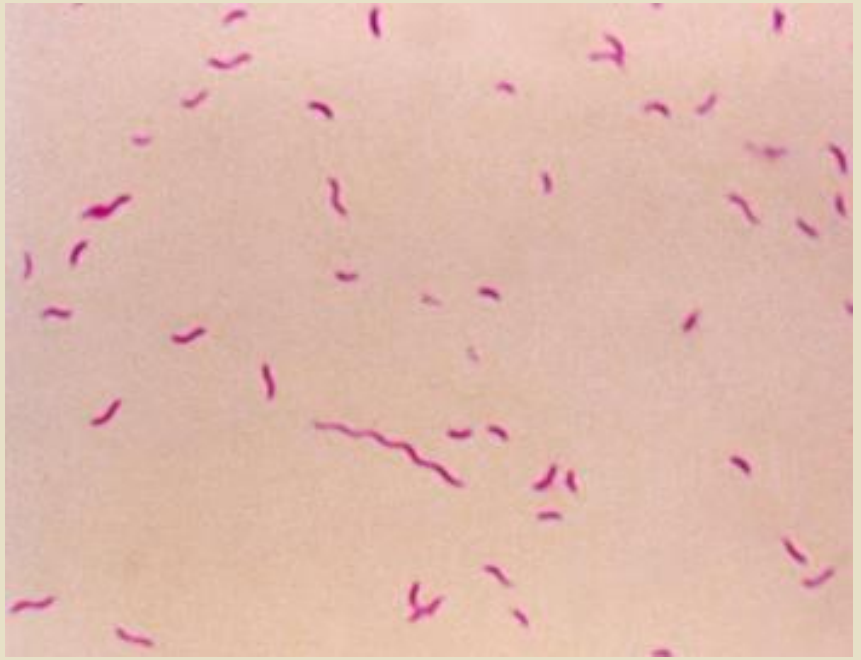


Fig. 2 Abundance (%) of bacterial genus within recurrent diabetic foot ulcers

2. Cultivation technique failure

- The *Campylobacter* story

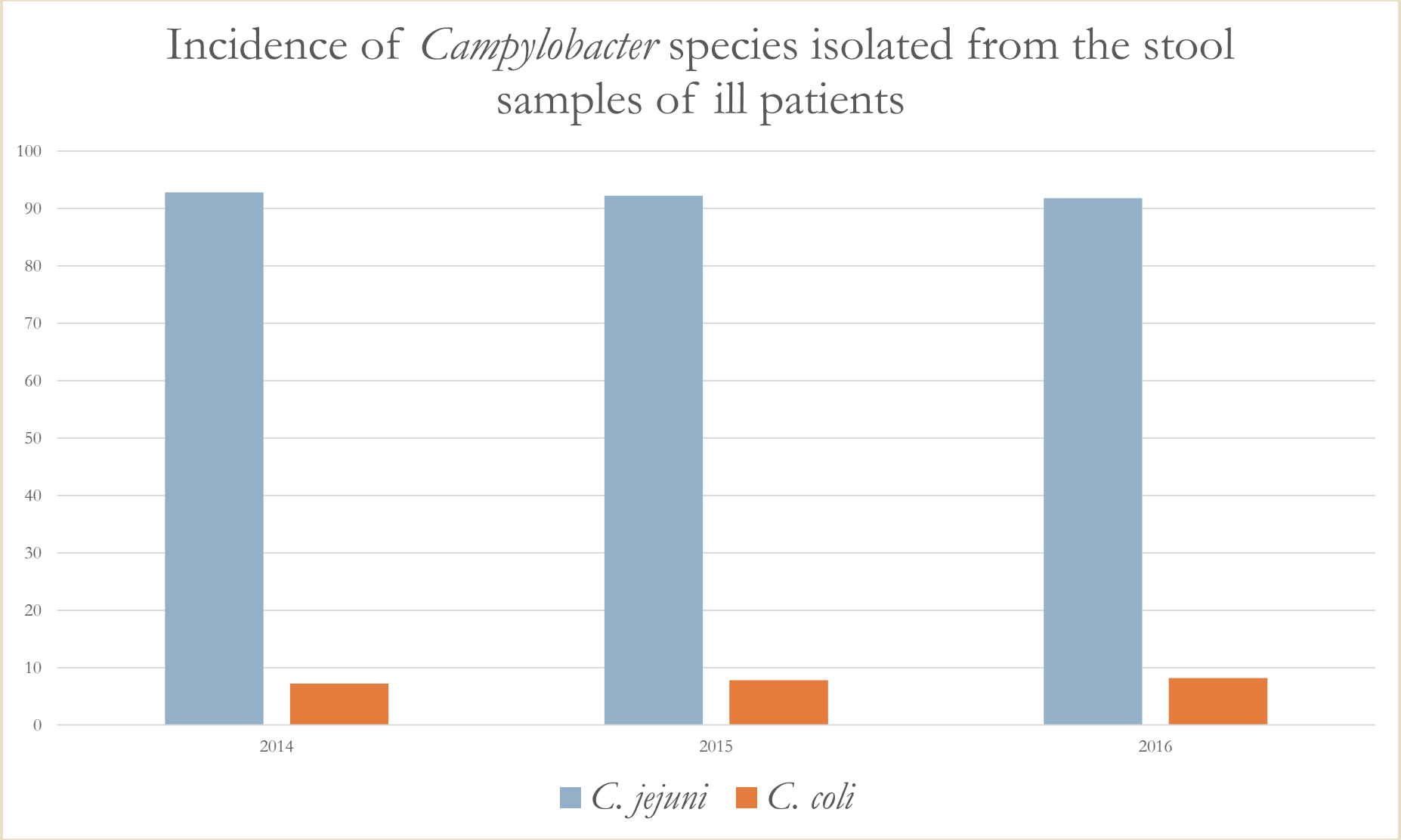


Campylobacter jejuni, Gram stain

Campylobacter species and their MALDI-TOF MS identification

Campylobacter	human	MALDI
C. avium – poultry		+
C. canadensis - crane		+
C. coli	+	+
C. concisus	+	+
C. corcagiensis – macaque		
C. cuniculorum – rabbit		
C. curvus	+	+
C. fetus	+	+
C. gracilis	+	+
C. helveticus – domestic animals		+
C. hominis – human, GIT	+	+
C. hyoilei – pig, enteritis		
C. hyointestinalis – pig and others	+	+
C. iguaniorum - reptilia		

Campylobacter	human	MALDI
C. insulaenigrae – pinnipeds	+	
C. jejuni	+	+
C. lanienae – human (slaughter w.)	+	+
C. lari	+	+
C. mucosalis		
C. peloridis	+	+
C. rectus	+	+
C. showae		+
C. sputorum	+	+
C. subantarcticus		
C. upsaliensis		+
C. ureolyticus	+	+
C. volucris		


Incidence of Campylobacter species isolated from the stool samples of ill patients
100
90
80
70
60
50
40
30
20
10
0
2014
2015
2016
C. jejuni
C. coli

OPEN

Campylobacter Fetus Meningitis in Adults

Report of 2 Cases and Review of the Literature

Anusha van Samkar, MD, Matthijs C. Brouwer, MD, PhD,
Arie van der Ende, PhD, and Diederik van de Beek, MD, PhD

Abstract: The zoonotic pathogen *Campylobacter fetus* is a rare cause of bacterial meningitis. Little is known about the clinical characteristics, predisposing factors and outcome of *C fetus* meningitis in adults.

We report cases of *C fetus* meningitis in a nationwide cohort study of adult bacterial meningitis patients in the Netherlands and performed a review of the literature.

Two patients with *C fetus* meningitis were identified from January 2006 through May 2015. The calculated annual incidence was 0.02 per million adults. Combined with the literature, we identified 22 patients with a median age of 48 years. An immunocompromised state was present in 16 patients (73%), mostly due to alcoholism (41%) and diabetes mellitus (27%). The source of infection was identified in 13 out of 19 patients (68%), consisting of regular contact with domestic animals in 5 and working on a farm in 4. Recurrent fever and illness was reported in 4 patients (18%), requiring prolonged antibiotic treatment. Two patients died (9%) and 3 survivors (15%) had neurological sequelae.

C fetus is a rare cause of bacterial meningitis and is associated with an immunocompromised state. Based on the apparent slow clinical response seen in this limited number of cases, the authors of this study recommend a prolonged course of antimicrobial therapy when *C fetus* is identified as a causative agent of bacterial meningitis. Cases appeared to do best with carbapenem therapy.

(*Medicine* 95(8):e2858)

INTRODUCTION

Bacterial meningitis is a severe infectious disease requiring prompt antibiotic treatment. Most cases are caused by *Neisseria meningitidis* and *Streptococcus pneumoniae*, which are both part of the commensal nasopharyngeal flora in humans.[1] Bacterial meningitis is rarely caused by bacteria having their natural reservoir in animals. One of these so-called zoonotic pathogens is *Campylobacter fetus* (formerly *Vibrio fetus, Spirillum serpens*), which is part of the commensal flora in the gastro-intestinal tracts of sheep and cattle.[2] *C fetus* meningitis occurs worldwide, but little is known about its clinical characteristics, predisposing factors and outcome. We report 2 cases of *C fetus* meningitis from a nationwide cohort of bacterial meningitis patients in the Netherlands. Additionally, we performed a review of the literature on *C fetus* meningitis.

METHODS

We included patients with community-acquired bacterial meningitis in a nationwide prospective cohort study in the Netherlands between January 2006 and May 2015. Methods have been described previously.[1] Patients were listed in the database of the Netherlands Reference Laboratory for Bacterial Meningitis (NRLBM), which receives >90% of the cerebrospinal fluid (CSF) isolates of all adult patients (>16 years) with

Species	Catalase	Nitrate reduction	Nitrite reduction	H_2S production (TSI)	Hippurate hydrolysis	Indoxyl acetate hydrolysis	Growth at:		Growth in 1% glycine	Alkaline phosphatase*	Susceptibility to:†		G+C content (mol %)
							25 °C	42 °C			NA	C	
Campylobacter lanienae	+	+	+	−	−	−	−	+	−	+	R	R	36
Campylobacter hyointestinalis subsp. *hyointestinalis*	+	+	−	+	−	−	v	+	+	v	R	S	33–36
Campylobacter fetus subsp. *venerealis*	+	+	−	−	−	−	+	−	−	−	R	S	33–34
Campylobacter fetus subsp. *fetus*	+	+	−	−	−	−	+	−	+	−	R	S	33–35
Campylobacter mucosalis	−	+	+	+	−	−	−	+	+	v	R	S	36–38
Campylobacter concisus	−	+	+	+	−	−	−	+	+	v	R	R	37–41
Campylobacter curvus	−	+	+	+	−	+	−	+	+	ND	S	ND	45–46
Campylobacter sputorum bv. bubulus	−	+	+	+	−	−	−	+	+	−	R	S	29–30
Campylobacter sputorum bv. fecalis	+	+	+	+	−	−	−	+	+	v	R	S	30–32
Campylobacter sputorum bv. sputorum	−	+	+	+	−	−	−	+	+	ND	S	S	30–31
Campylobacter gracilis	−	+	+	ND	ND	ND	ND	ND	ND	ND	R	ND	44–46
Campylobacter rectus	−	+	+	+	−	+	−	w	+	ND	S	ND	45–46
Campylobacter showae	+	+	+	+	−	+	−	+	v	−	R	S	44–46
Campylobacter upsaliensis	w/−	+	−	−	−	+	−	+	v	v	S	S	32–36
Campylobacter helveticus	−	+	ND	−	−	+	−	+	+	−	S	S	34
Campylobacter coli	+	+	−	−	−	+	−	+	+	v	S	R	30–33
Campylobacter lari	+	+	−	−	−	−	−	+	+	−	R	R	30–32
Campylobacter hyoilei (*C. coli*)	+	+	+	+	−	ND	ND	v	+	ND	S	R	35
Campylobacter jejuni subsp. *doylei*	+	−	−	−	v	+	−	−	+	+	S	S	30–31
Campylobacter jejuni subsp. *jejuni*	+	+	−	−	+	+	−	+	+	+	S	R	30–33

EDITORIAL 10.1111/j.1469-0691.2004.01028.x

Campylobacter infections of the pericardium and myocardium

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ABSTRACT

Members of the genus *Campylobacter* are notorious for their ability to cause gastroenteritis. However, increasing numbers of case reports now suggest that they may have a wider pathogenic repertoire. Pericarditis and myocarditis are increasingly being recognised as sequelae of *Campylobacter* infection. Although rare, these presentations are important, as misdiagnosis may result in inappropriate thrombolysis or angioplasty, with potential accompanying complications. Extraintestinal *Campylobacter* infections, and the resulting pathogenesis, remain an important challenge for the 21st century, particularly as immunocompromised patients are likely to become increasingly common.

Keywords *Campylobacter* spp., myocarditis, pericarditis

Clin Microbiol Infect 2005; 11: 253–255

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Fatal Case of *Campylobacter lari* Prosthetic Joint Infection and Bacteremia in an Immunocompetent Patient

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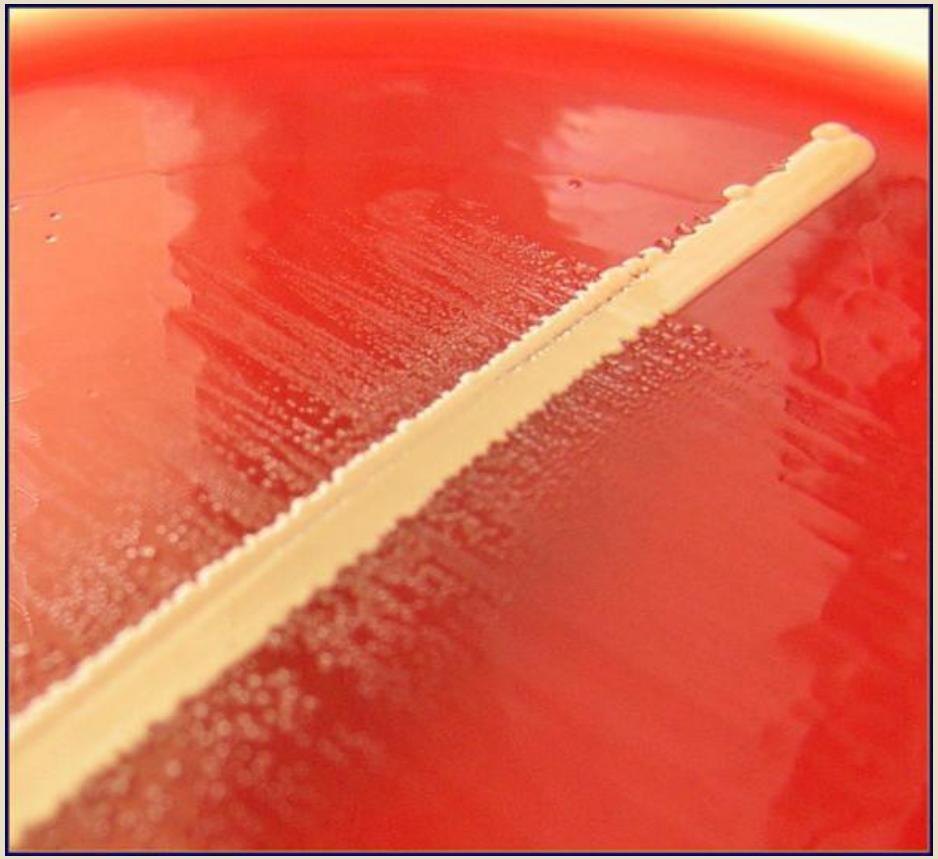
***Campylobacter lari* is an infrequent cause of intestinal and extraintestinal infection in humans. We report a case of *C. lari* prosthetic joint infection and bacteremia in an 81-year-old immunocompetent man. The infection was associated with septic shock and fatal outcome. *C. lari* may cause severe disease, even in an immunocompetent host.**

3. Identification failure

- The *Haemophilus* story

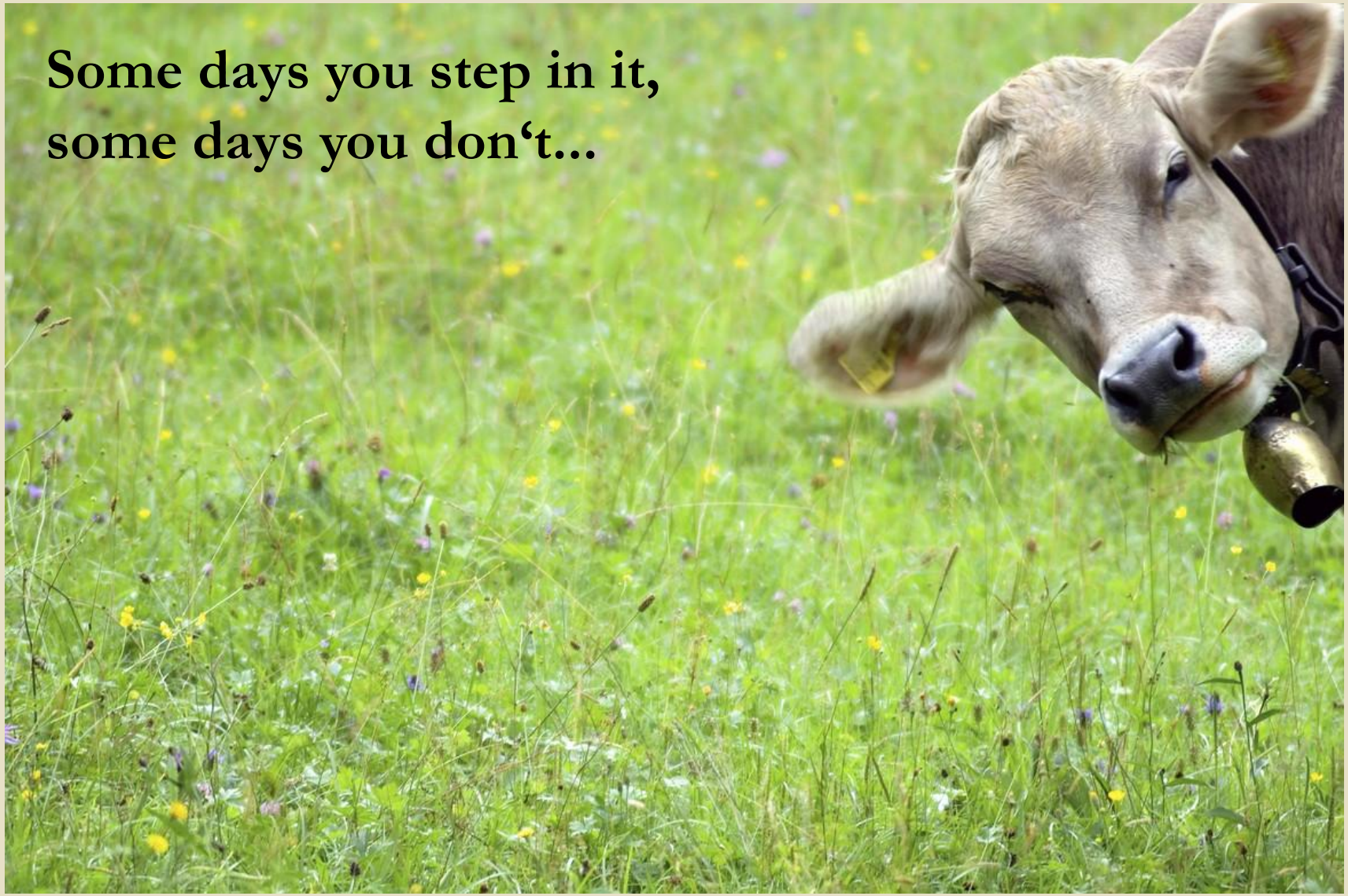


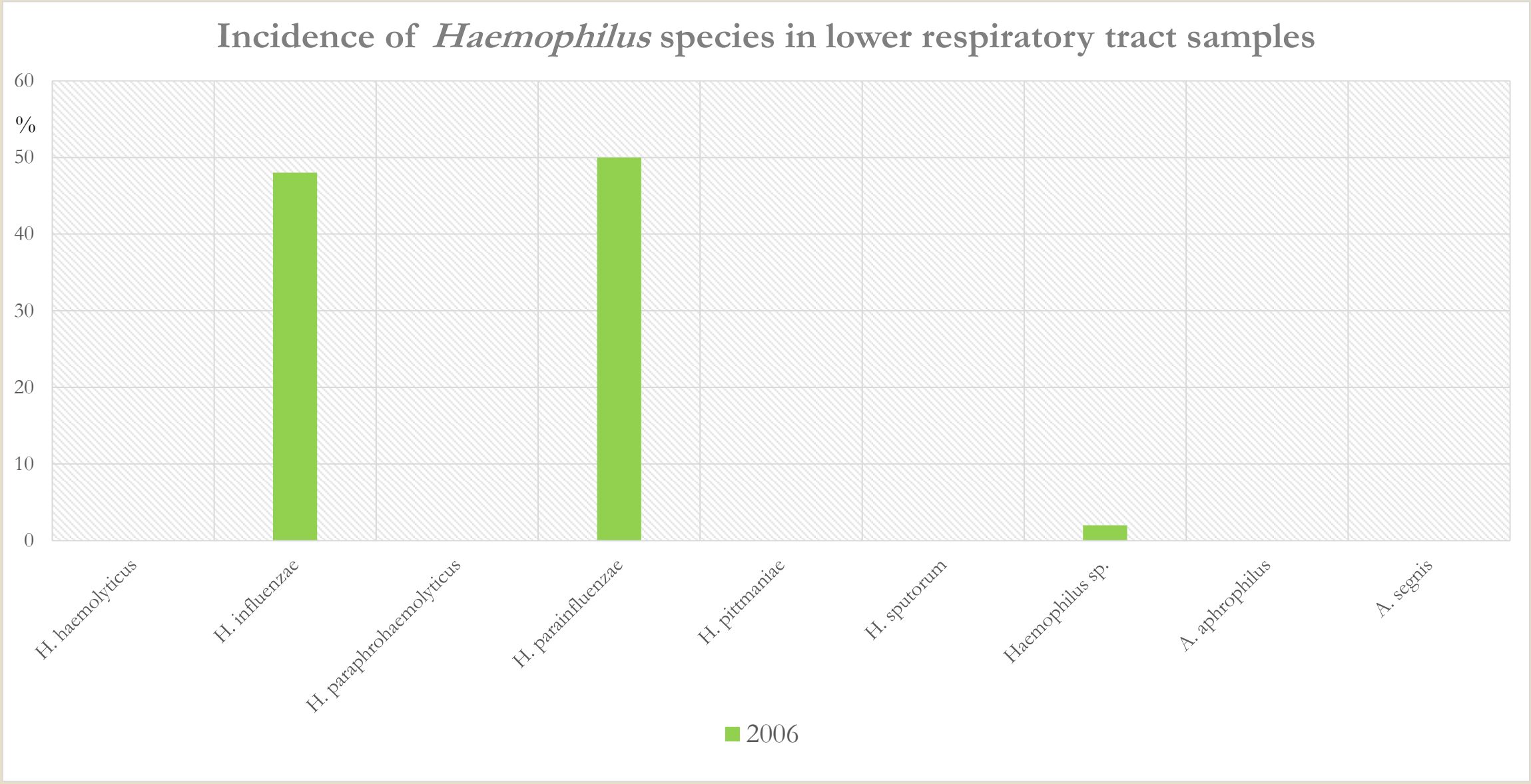
Changes in taxonomy of the genus *Haemophilus*

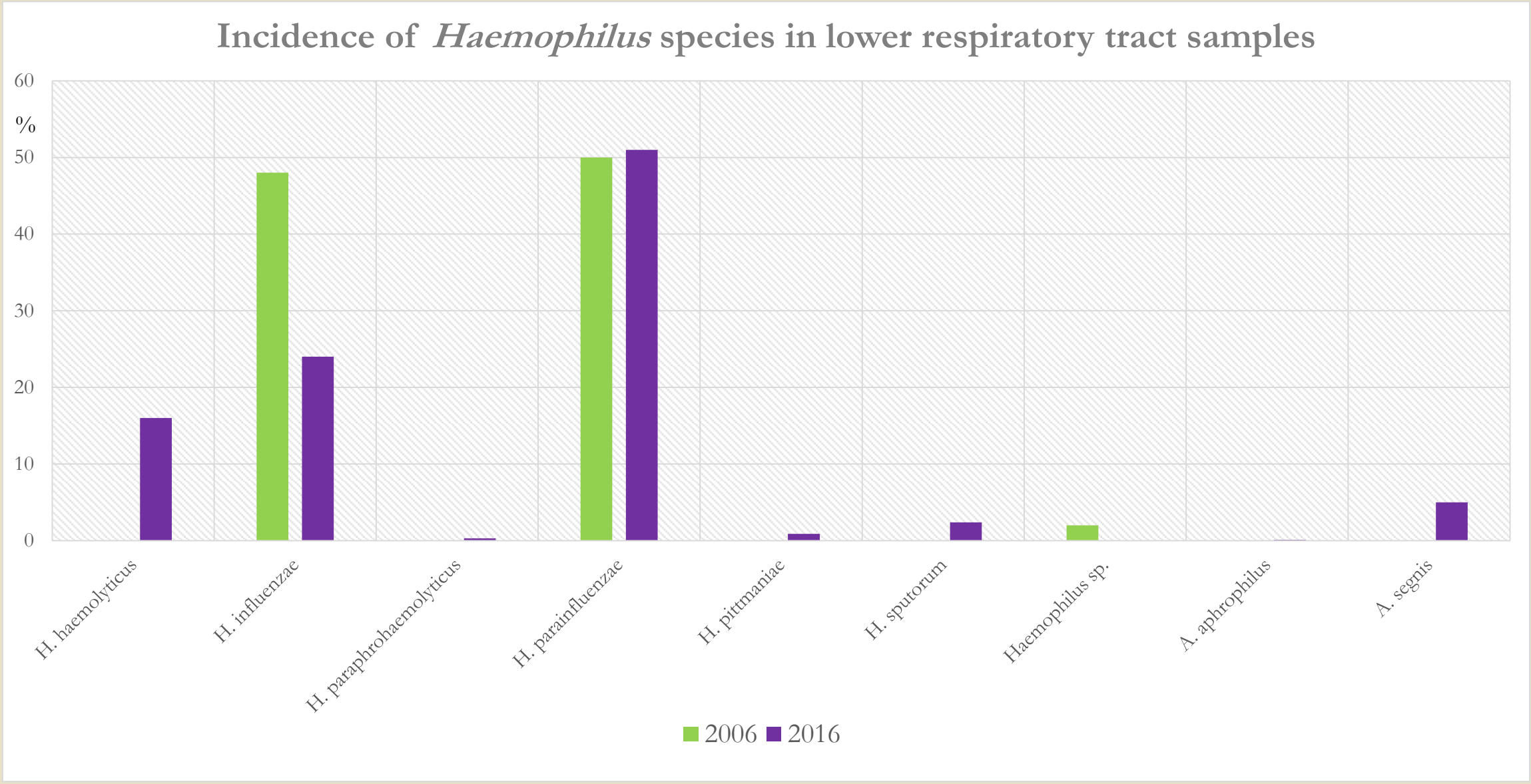
1917	*Haemophilus*	MALDI	2006	*Aggregatibacter*	MALDI
1912	*actinomycetemcomitans*	--->	2006	*actinomycetemcomitans* comb. nov.	+
1889	*aegyptius*				
1940	*aphrophilus*	--->	2006	*aphrophilus* comb. nov.	+
1921	*ducreyi*	+			
1999	*felis*				
1907	*haemoglobinophilus*	+			
1923	*haemolyticus*	+			
1896	*influenzae*	+			
1984	*paracuniculus*				
1953	*parahaemolyticus*	+			
1922	*parainfluenzae*	+			
1971	*paraphrohaemolyticus*	+			
1969	*parasuis*	+			
1950	*piscium*				
2005	*pittmaniae*	+			
1977	*segnis*	--->	2006	*segnis* comb. nov.	+
2012	*sputorum*	+			

TABLE 2 Biotypes of *Haemophilus influenzae* and *H. parainfluenzae*

Species	Biotype	Production of:		
		Indole	Ornithine decarboxylase	Urease
H. influenzae	I	+	+	+
	II	+	+	−
	III	−	+	−
	IV	−	+	+
	V	+	−	+
	VI	−	−	+
	VII	+	−	−
	VIII	−	−	−
H. parainfluenzae	I	−	−	+
	II	−	+	+
	III	−	+	−
	IV	+	+	+
	V	−	−	−
	VI	+	−	+
	VII	+	+	−
	VIII	+	−	−


Some days you step in it,
some days you don‘t...


Incidence of *Haemophilus* species in lower respiratory tract samples
60
%
50
40
30
20
10
0
H. haemolyticus
H. influenzae
H. paraphrohaemolyticus
H. parainfluenzae
H. pittmaniae
H. sputorum
Haemophilus sp.
A. aphrophilus
A. segnis
2006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H. pittmaniae
H. sputorum
Haemophilus sp.
A. aphrophilus
A. segnis
2006
2016

Pathogenity of the genus *Haemophilus*

1990‘s

- ***H. influenzae***
  - type B strains - **epiglottitis**, meningitis, orbital cellulitis, other strains - sinusitis, otitis, exacerbation of chronic bronchitis, pneumonia, conjunctivitis…
- ***H. paraninfluenzae***
  - cause of the **pharyngitis, tracheitis, sinusitis**…
- **Other *Haemophilus* species**
  - **routinely not identified**

Nowadays

- ***H. influenzae***
  - other strains– sinusitis, otitis, exacerbation of chronic bronchitis, pneumonia, conjunctivitis
- ***H. paraninfluenzae***
  - accounting for fully 75% of the *Haemophilus* **biota in the oral cavity**
- **Other *Haemophilus* species**
  - **rarely implicated as the cause of the infection**

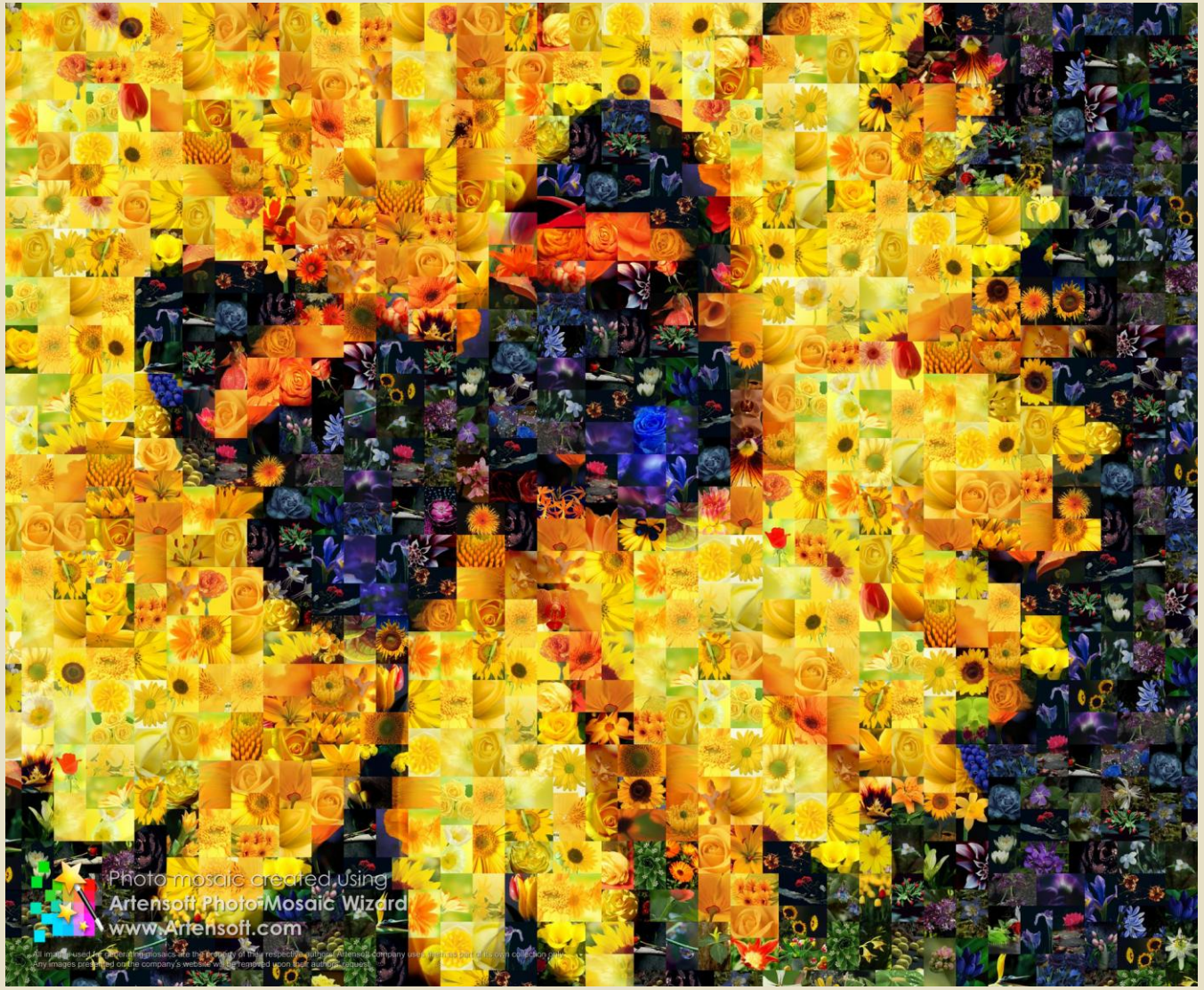
Do we need bacterial taxonomy in routine?

- Yes, we need
- The taxonomy is changing, so the pathogenicity of the each species could change

Recommendation for good routine identification

- To know, how the species descriptions are created
- To have good reference material from the real infections
- MALDI profile should be the part of the species description rules

Thank you…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