

The SMALTIS'tory – episode #2



The armistice celebrates its 101st anniversary, but the war continues against antibiotic resistance...

This is the story of a British soldier, Ernest Cable, whose name is written down in history thanks to the curiosity of the genomist Nicholas Thomson...

It all began in early 1915, at the Wimereux hospital in France. It has been 8 months since the Great War began when soldier Cable is hospitalized. He died anonymously from dysentery caused by *Shigella flexneri*, as did nearly 10% of the soldiers involved in the conflict.

But in 2011, Nicholas Thomson learns that the first bacterial isolate deposited in NCTC biobank was isolated from Cable and thus discovers the story of this soldier. He quickly has the intuition that this strain contains genetic clues related to the evolution of the bacterial species which nowadays shows high levels of resistance to several antibiotics.

Comparative sequencing published in 2014 in the journal "The Lancet", will later demonstrate in particular that the strain that killed Cable was resistant to erythromycin thanks to the MdtEF-ToIC efflux system and had mutations in the *bl1-ec* gene encoding a β -lactamase, making it resistant to penicillin. These results made Thomson say that "even if penicillin had been available to treat him, Cable would still have died because the bacterium that made him sick was already resistant to the world's first antibiotic long before it was discovered in 1928".

Thus, thanks to soldier Ernest Cable and Nicholas Thomson's team, the "war to end all wars" delivered the first signs of a global epidemic: antibiotic resistance.

See you soon for a next episode of the SMALTIS'tory.

Genus & Species <i>Shigella flexneri</i> , Type 2a		Strain Cable		Cat. No. 1	
MORPHOLOGY Medium... N.A. pH... 7.37	O.T. 22 30 37	METABOLIC Aerobic, facultative anaerobic, anaerobic, microaerophilic	FERMENTATION Blood agar... haemolysis	Growth inhibited by	
SHAPE Spherical, short rods, long rods, filaments, comas, spirals	22 30 37	...% CO ₂ required for growth	Glucose... +	Growth stimulated by	
SIZE 1.5-2.5 μ . AXIS Straight, curved.	+	...range 22 to 37. Optimum 37	Arabinose... +	Essential growth factors	
STAINING Paraffin, indigo, concave, irregular.	+	pH range ... to ... Optimum ...	Xylose... +	Trehalose... A	
EMBI Terminal, truncate, concave, pointed.	+	Soluble in water, ether, alcohol, CHCl ₃	Sucrose... +	ANTIBIOTIC SENSITIVITY	
ARRANGEMENT Single, pairs, fours, chains, groups, clusters, bundles, cubical packets, Chinese letters.	+	Penicillin	Maltose... +	Penicillin... S	
REGULARITY Monomorphic, pleomorphic: Club, filaments, long, short, coccoid, rod-like, fusiform, comma, shadow.	+	Utilisation of simple sugars	Starch... A	Erythromycin... S	
MOTILITY ... Flagella Mono, amphi, loph, peritrichate.	+	... (C-9) ... (A-7)	Inulin... +	Ampicillin... S	
SPORES Spherical, oval, reniform, sub, terminal, no bulging.	+	BIOCHEMICAL Final pH in glucose broth ... at ... d.	Glycogen... +	Chloramphenicol... S	
STAINING Gram... Not acid-fast; even, irregular bipolar, barbed, beaded. Staining variable. Metachromatic granules.	+	Indole ... Cholesterin red	Mucin... +	Tetracycline... S	
CAPSI ...	+	M.R. ... V.P. ... NH ₃ ... H ₂ S ...	Mannitol... +	Erythromycin... S	
COLONY Medium... N.A. pH... 7.37	+	M.P. ... Catalase ...	Dulcitol... +	Ampicillin... S	
SIZE 1-2 μ diam. SHAPE Circular, irregular, radiate, rhomboid.	+	INDOLE Milk: acid ... Alkaline ...	Sorbitol... +	Tetracycline... S	
ELEVATION Effuse, raised, low convex, domed, umbonate.	+	neutral ... Acid clot	Inositol... +	Erythromycin... S	
TEXTURE Smooth, fine, medium or coarsely granular; rough; striated, beaded, cupped; ringed; papillary; dull; shining.	+	Rennet clot ... Digestion ...	Selenite... +	Ampicillin... S	
EDGE Entirely entire, lobate, serrated, erose, imbricate, curled, effuse, beaded.	+	Litmus decolorized ...	Saline... +	Erythromycin... S	
COLOR ... Fluorescent, iridescent, opalescent, self-luminous.	+	Gelatin liquefied ...	Acetate... +	Erythromycin... S	
OPACITY Transparent, translucent, opaque.	+	Digestion of sperm, egg, meat ...	Mucic acid... +	Erythromycin... S	
CONSISTENCY ...	+	METABOLIC PRODUCTS Haemolysis for ... r.b.c.s	Glycerol ...	Erythromycin... S	
EMERGENTABILITY ...	+	Leucidin for ...	Mannitol ...	Erythromycin... S	
DIFFERENTIATION ...	+	Toxin ... Filterable ... Antigenic ...	Dulcitol ...	Erythromycin... S	
VARIATION ...	+	Acid ...	Sorbitol ...	Erythromycin... S	
PERITH Medium... N.A. pH... 7.37	+	RESISTANCE ...	Inositol ...	Erythromycin... S	
GROWTH None, scanty, moderate, abundant, profuse.	+	... Tetracycline ...	Selenite ...	Erythromycin... S	
TEXTURE ...	+	... Chloramphenicol ...	Saline ...	Erythromycin... S	
DIFFERENTIATION ...	+	... Erythromycin ...	Acetate ...	Erythromycin... S	
DEPOSIT ...	+	... Ampicillin ...	Mucic acid ...	Erythromycin... S	
ODOUR ...	+		Glycerol ...	Erythromycin... S	

Shigella flexneri, Type 2a

Cable