



**VETERINARY BACTERIOLOGY FROM
THE DARK AGES TO THE PRESENT
DAY**

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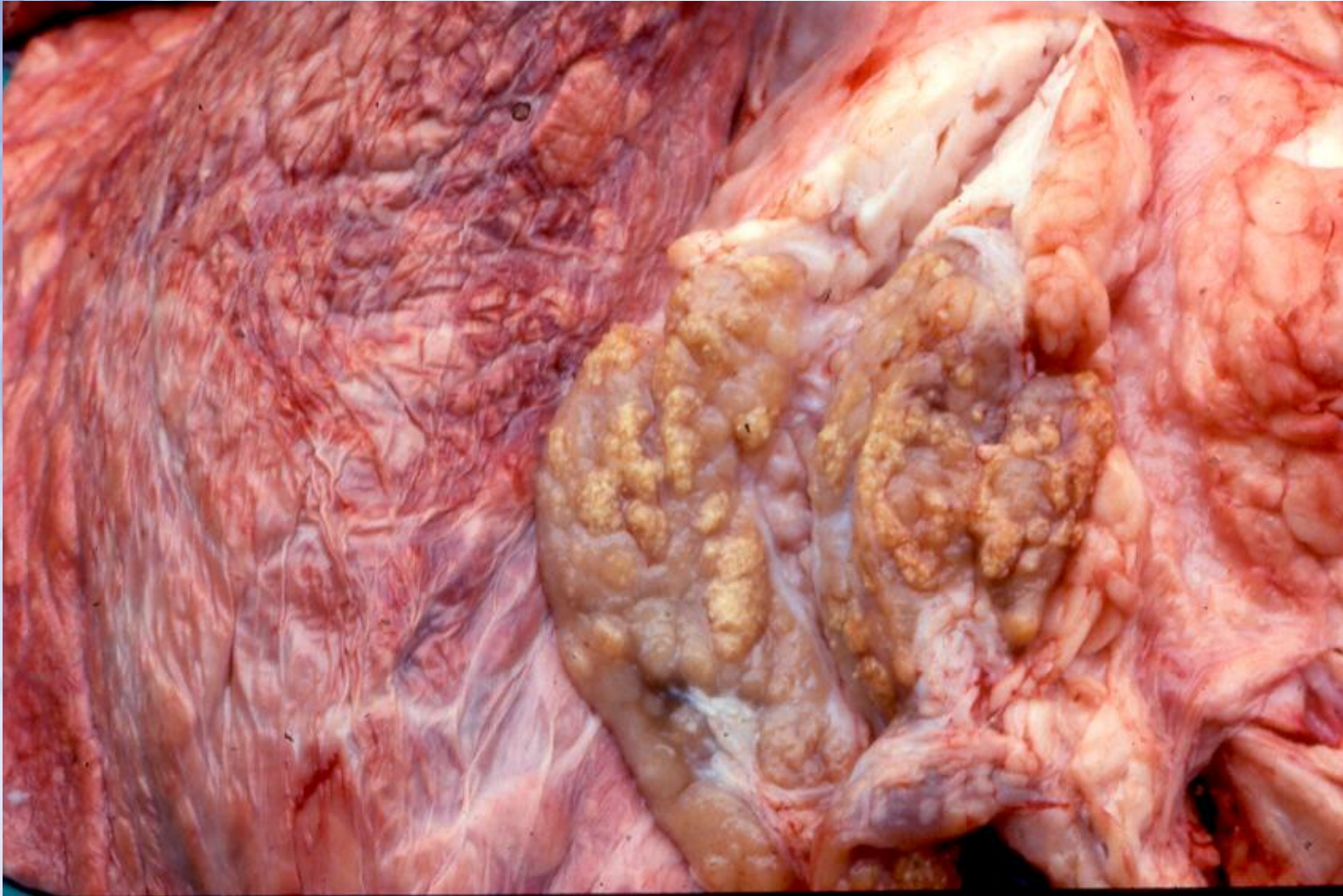
INTRODUCTION

- Veterinary Bacteriology is the investigation of animal disease.
- Clinical reporting, therapy and control can only be carried out by veterinarians
- Investigation into aetiology, techniques and therapy can be carried out by others

EARLY DISEASE INVESTIGATIONS

- Diseases of importance in agriculture, military operations and Public Health
- Anthrax
- Contagious Bovine Pleuropneumonia
- Bovine Tuberculosis
- Glanders

BOVINE TUBERCULOSIS



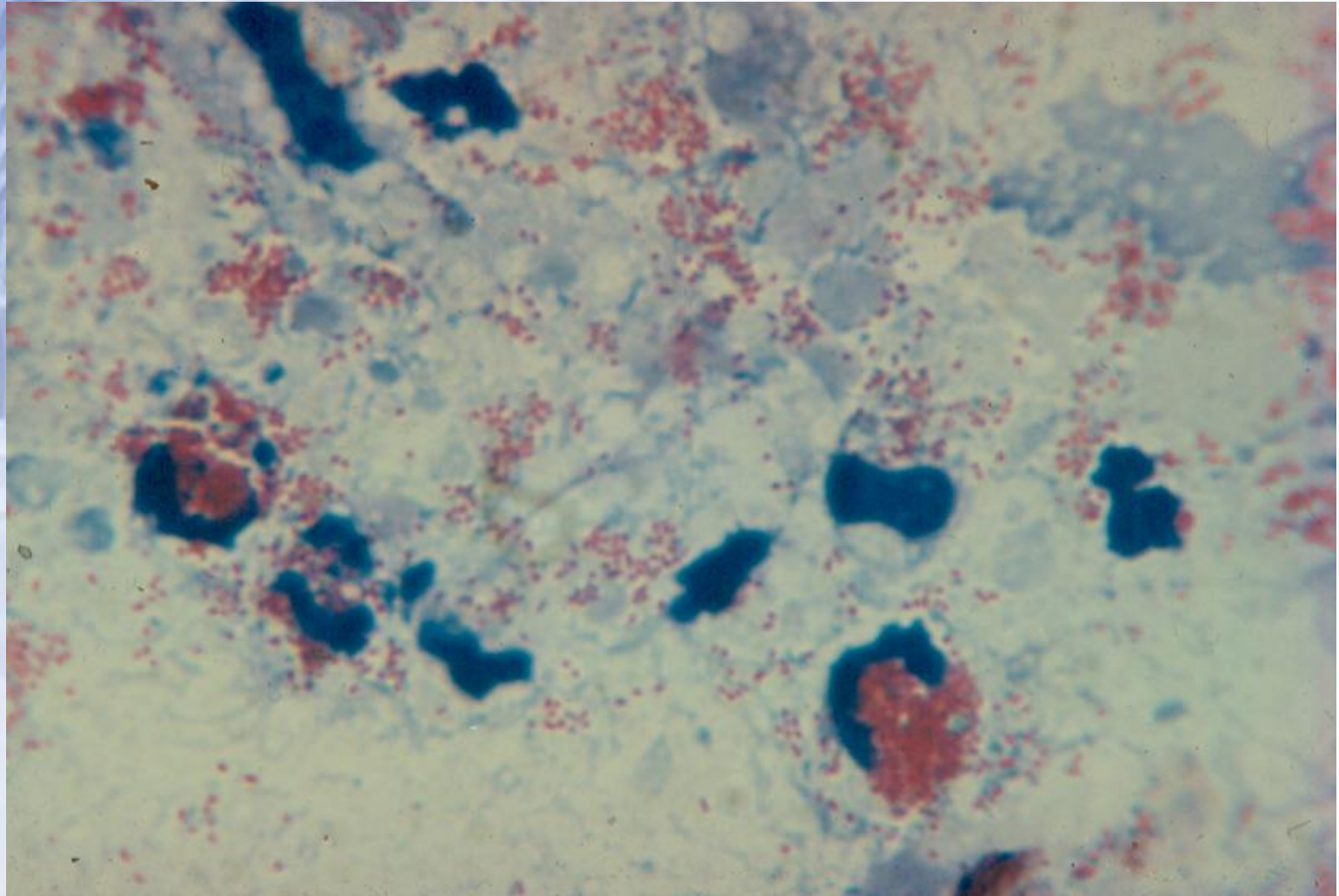
METHODS

- Culture
- Identification on colonial morphology
- Staining
- Sugar fermentation patterns/simple biochemical tests
- Animal infection
- Hyperimmune sera for neutralisation
- Serology

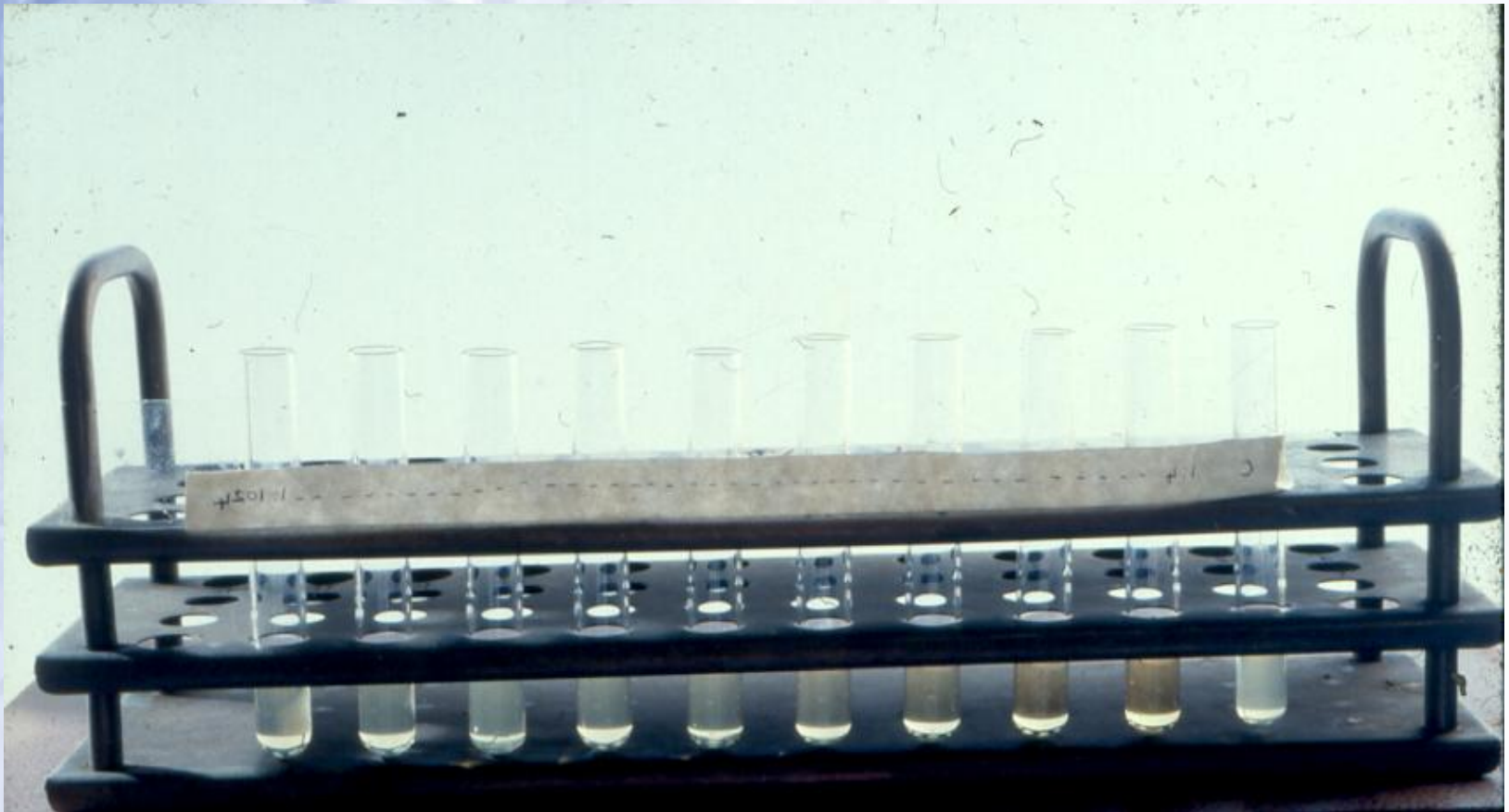
SACCHAROLYTIC AND PROTEOLYTIC CLOSTRIDIA



STAINING – *BRUCELLA* *ABORTUS*, KOSTER'S



SEROLOGY



CULTURE

- Media all home-made
- Minced heart and brain
- Horses and sheep for blood, rabbits and sheep for red cells
- Eggs
- Agar
- Pressure cookers or autoclaves
- Media in glass with cork, rubber or cotton wool closures

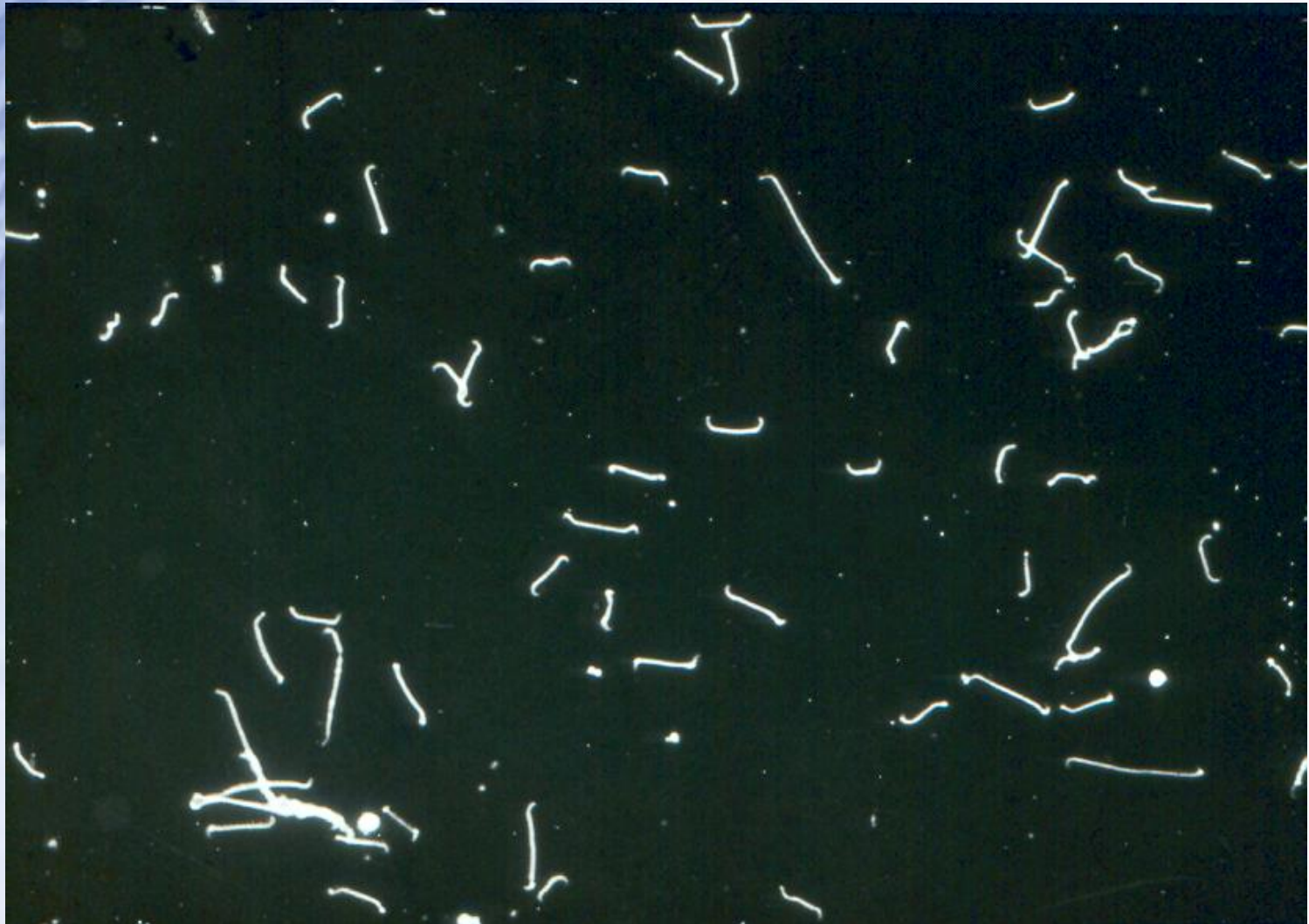
LABORATORY FACILITIES

- Benches
- Loops and wires
- Bunsens or spirit lamps
- Pressure cookers or autoclaves
- Wash up for recycling glassware
- Incubators
- Microscopes with mirrors
- Taps and sinks

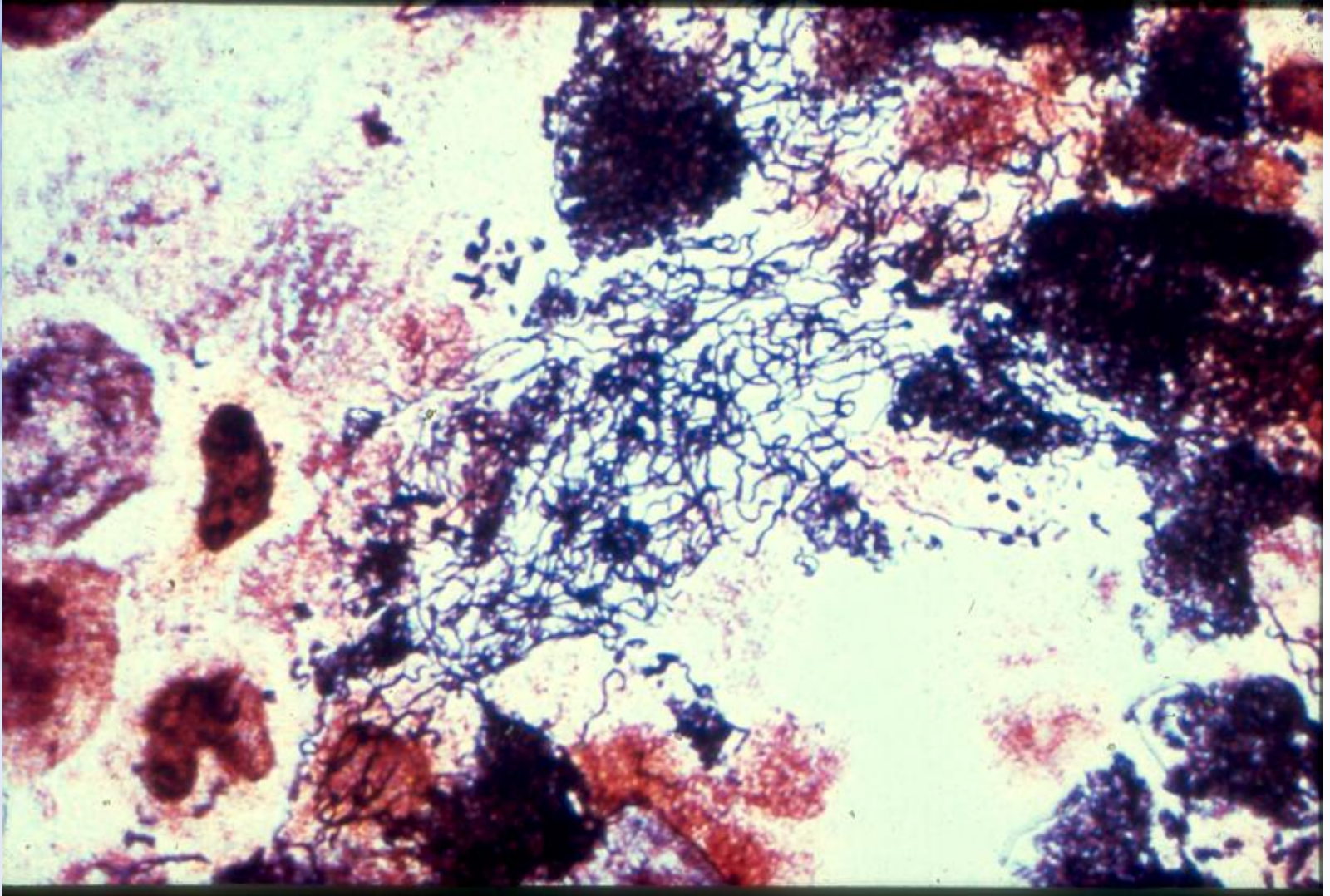
DEVELOPMENTS 1914-1960

- Growing literature (in national languages)
- Improved bacterial nomenclature
- Some dehydrated media
- Diagnostic sera
- Medical and veterinary reference labs
- Phage typing
- Wider range of vaccines

DARK GROUND MICROSCOPY



SILVER STAINS



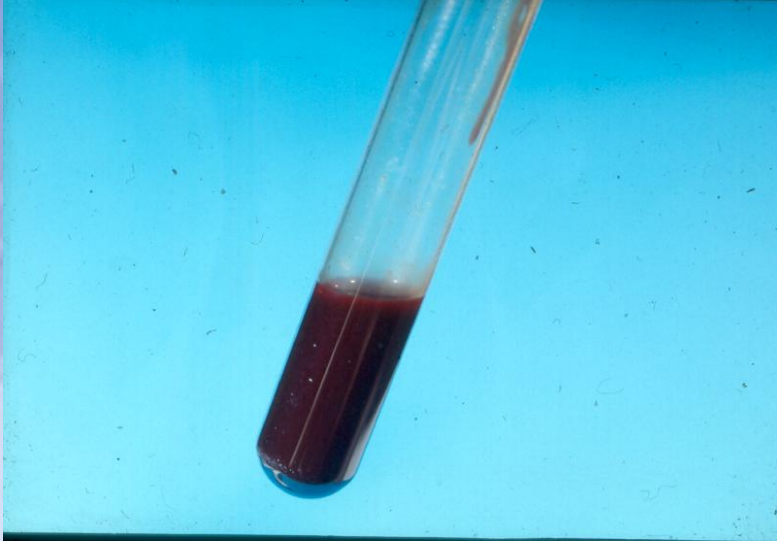
BACKGROUND TO THE TRANSITION TO THE PRESENT DAY (1960-2016)

- 1960 – Fortnight in Vet Diagnostic Lab
- 1961-1962 School biology lab monitor
- 1964-1966 University medical pathology course, project *P aeruginosa* infection
- 1966-1967 Vet Bacteriology course
- 1969-1972 PhD on Swine Dysentery
- 1972-2009 Vet Bacteriology at Glasgow
- 2016 – Case reporting again!

SAFETY PROCEDURES RELIED ON TERROR

- Anthrax samples from the field
- Blood
- Smears (fixed?)
- Swabs
- Tissue
- Cultures

ANTHRAX



AFFECTED ANIMAL TO EXPERIMENT

- Clinical cases
- Non-immune groups
- Kill cases
- Isolate candidate causes
- Experimental infections
- Confirmation of cause
- Study of pathogenesis

CANINE *BORDETELLA* INFECTION (CLINICAL CASE)



CULTURE



EXPERIMENTAL REPRODUCTION (ANIMAL)



EXPERIMENTAL REPRODUCTION LESIONS



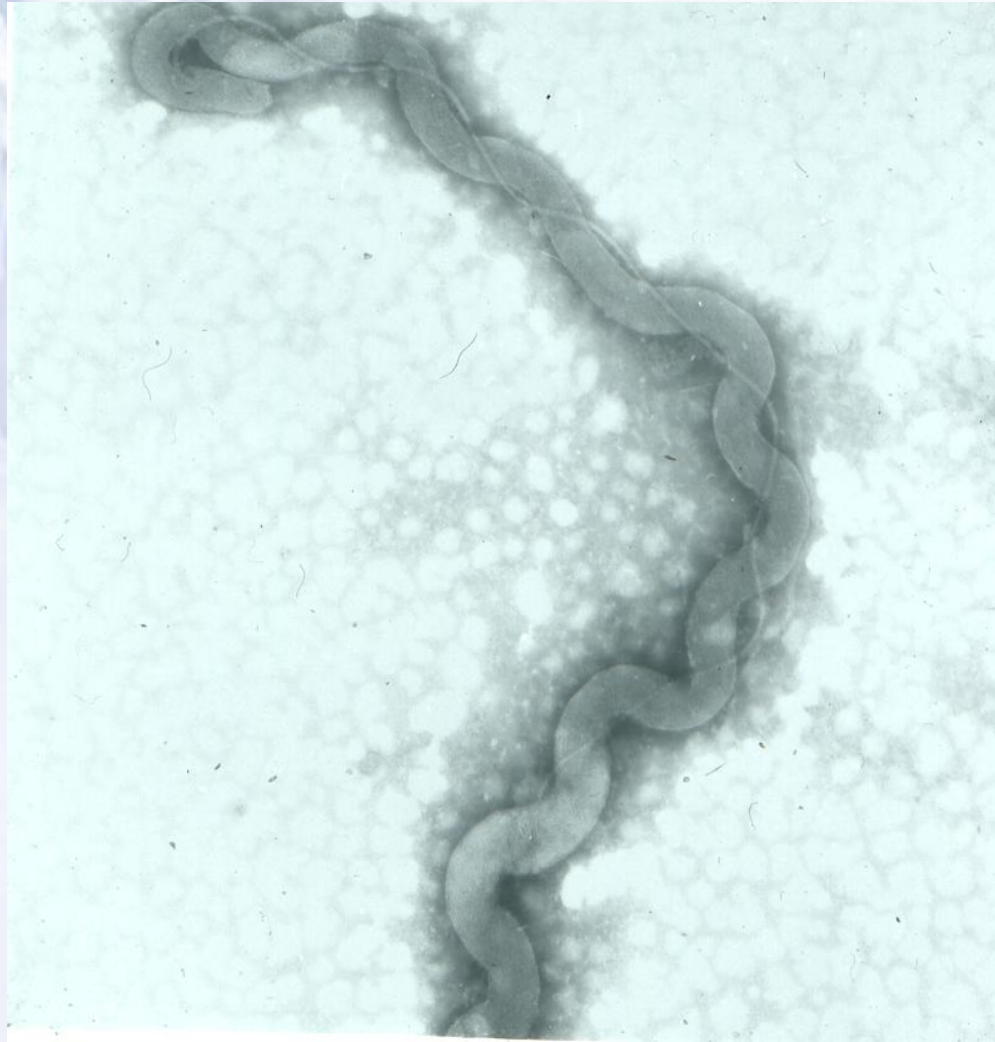
NOVEL PATHOGENS 1960-2016

- *Brachyspira hyodysenteriae*
- *B. pilosicoli*
- *Treponema pedis*
- *Lawsonia intracellulare*
- *Helicobacter suis*
- *Mycoplasma hyopneumoniae*
- *M. felis*

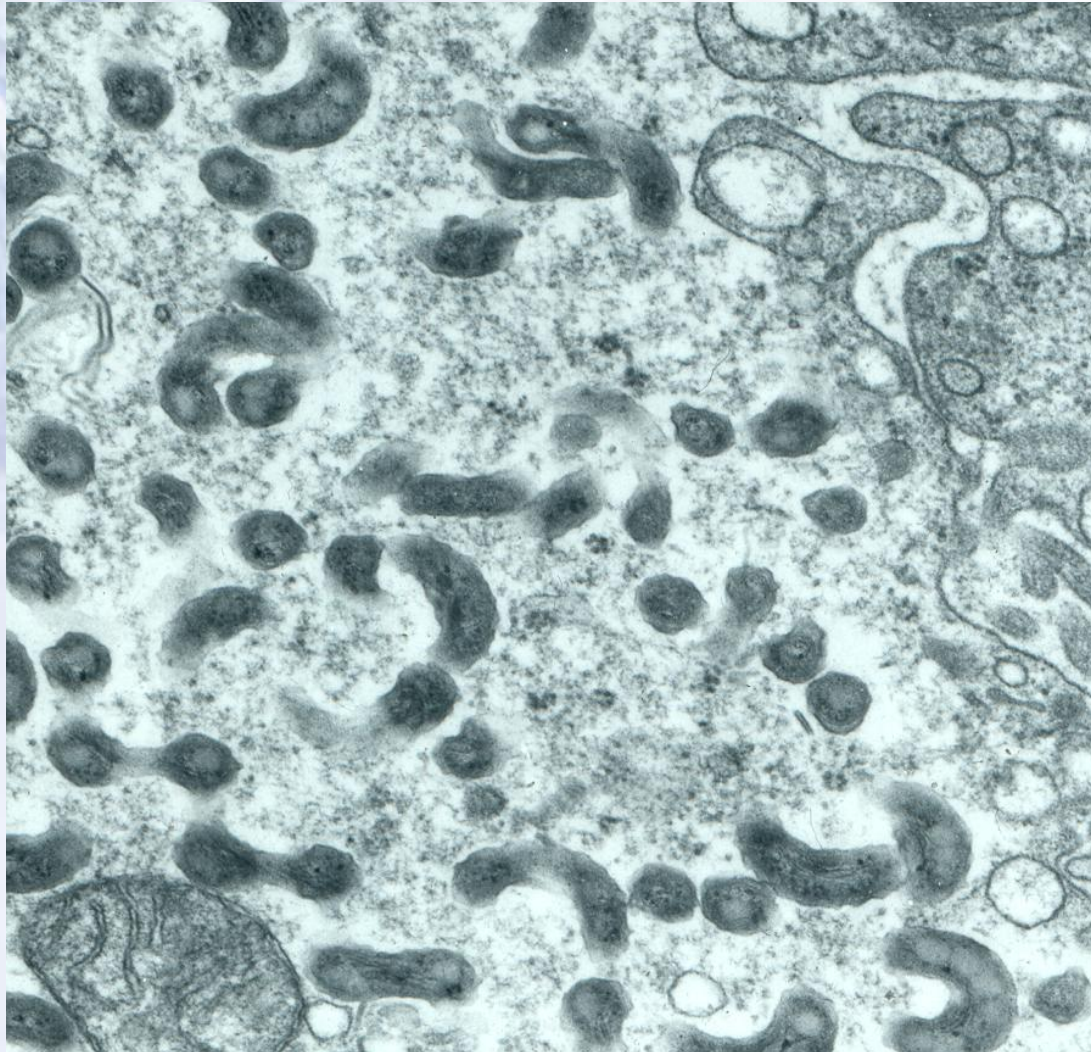
NEW TECHNIQUES INTRODUCED

- EM
- SEM
- Tagged antibodies for location in tissue
- Anaerobic techniques (Hungate)
- Probes
- PCR
- Sequencing

TRANSMISSION ELECTRON MICROSCOPY NEGATIVE STAINING



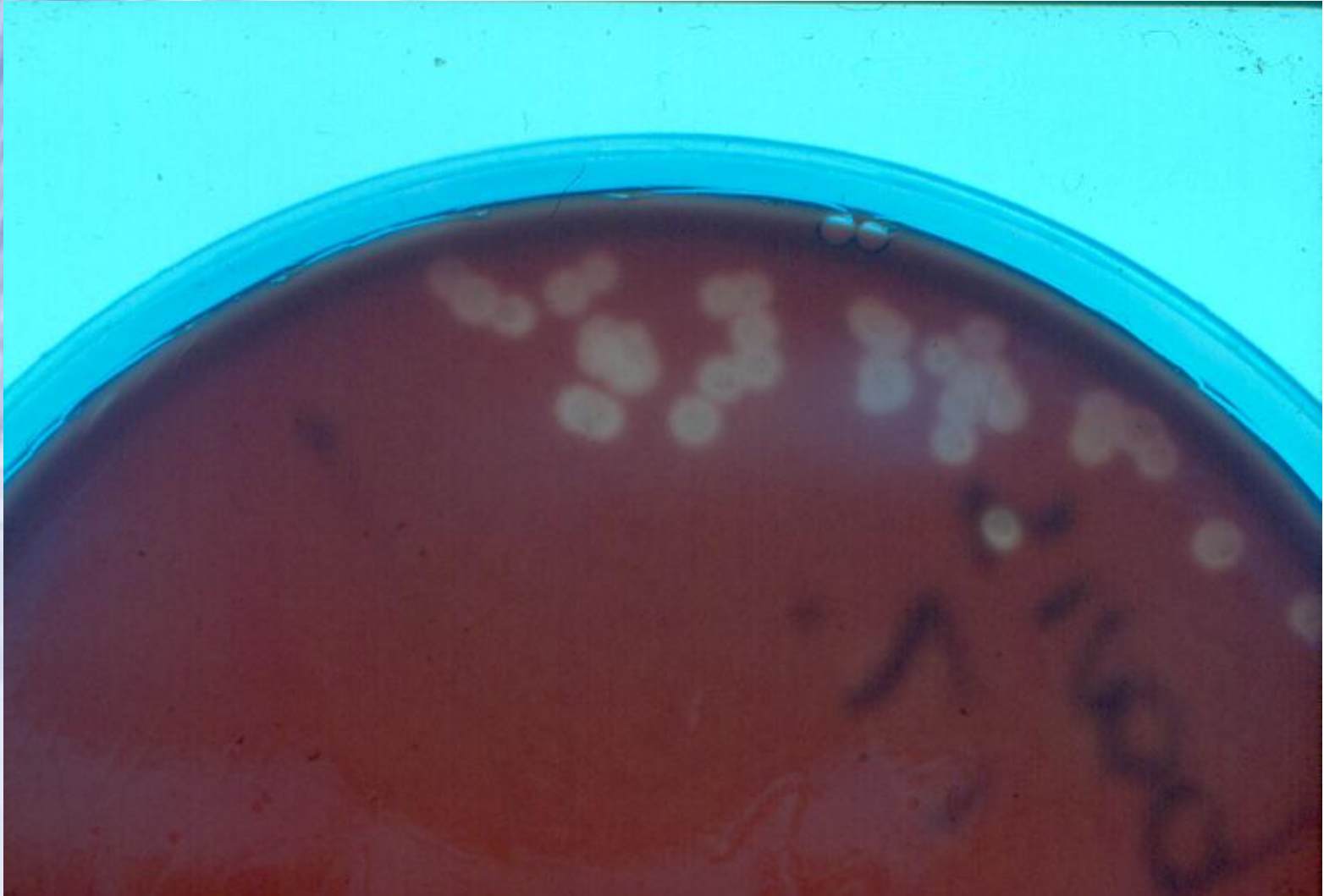
TRANSMISSION ELECTRON MICROSCOPY - SECTIONS



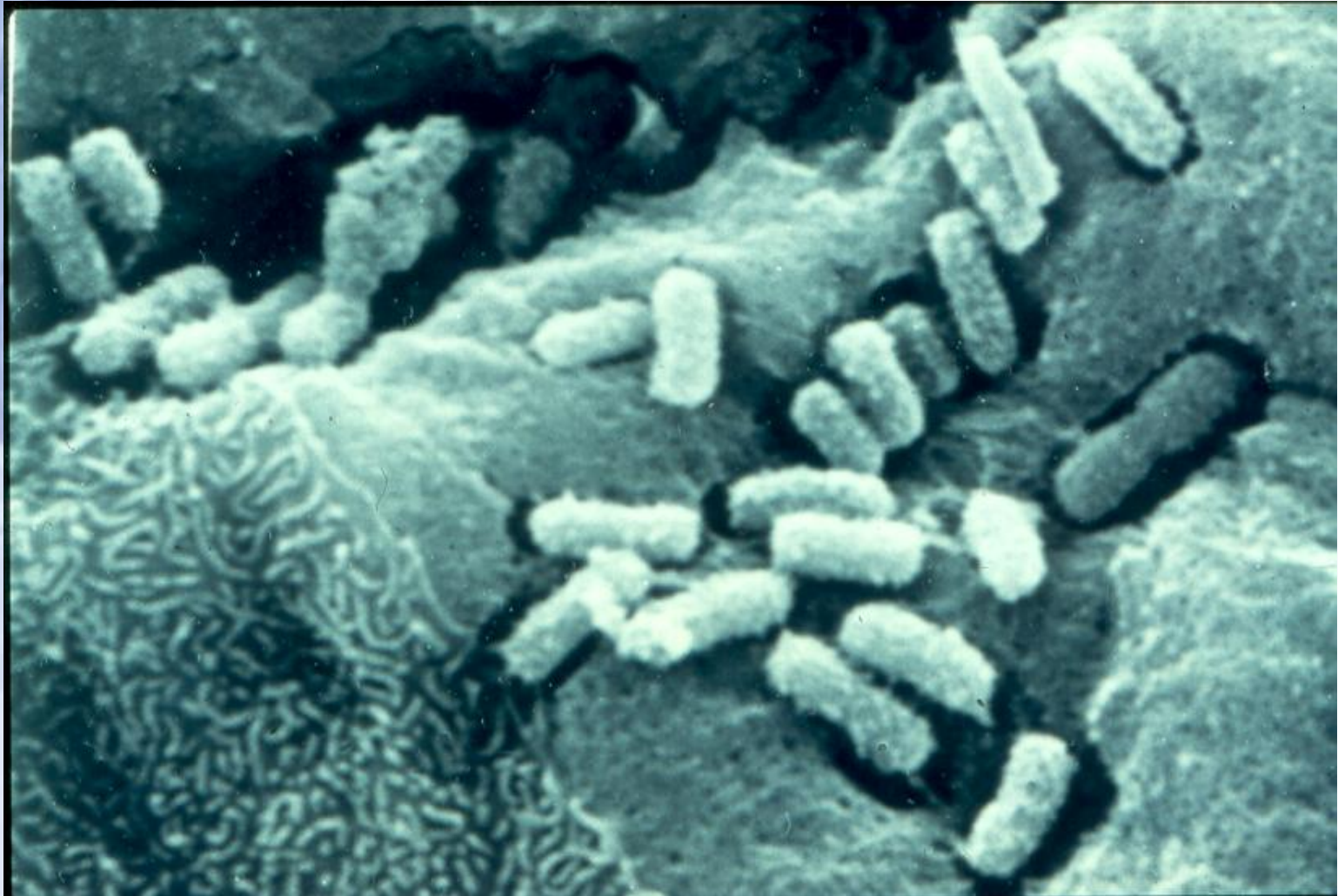
INFECTIOUS BOVINE KERATITIS



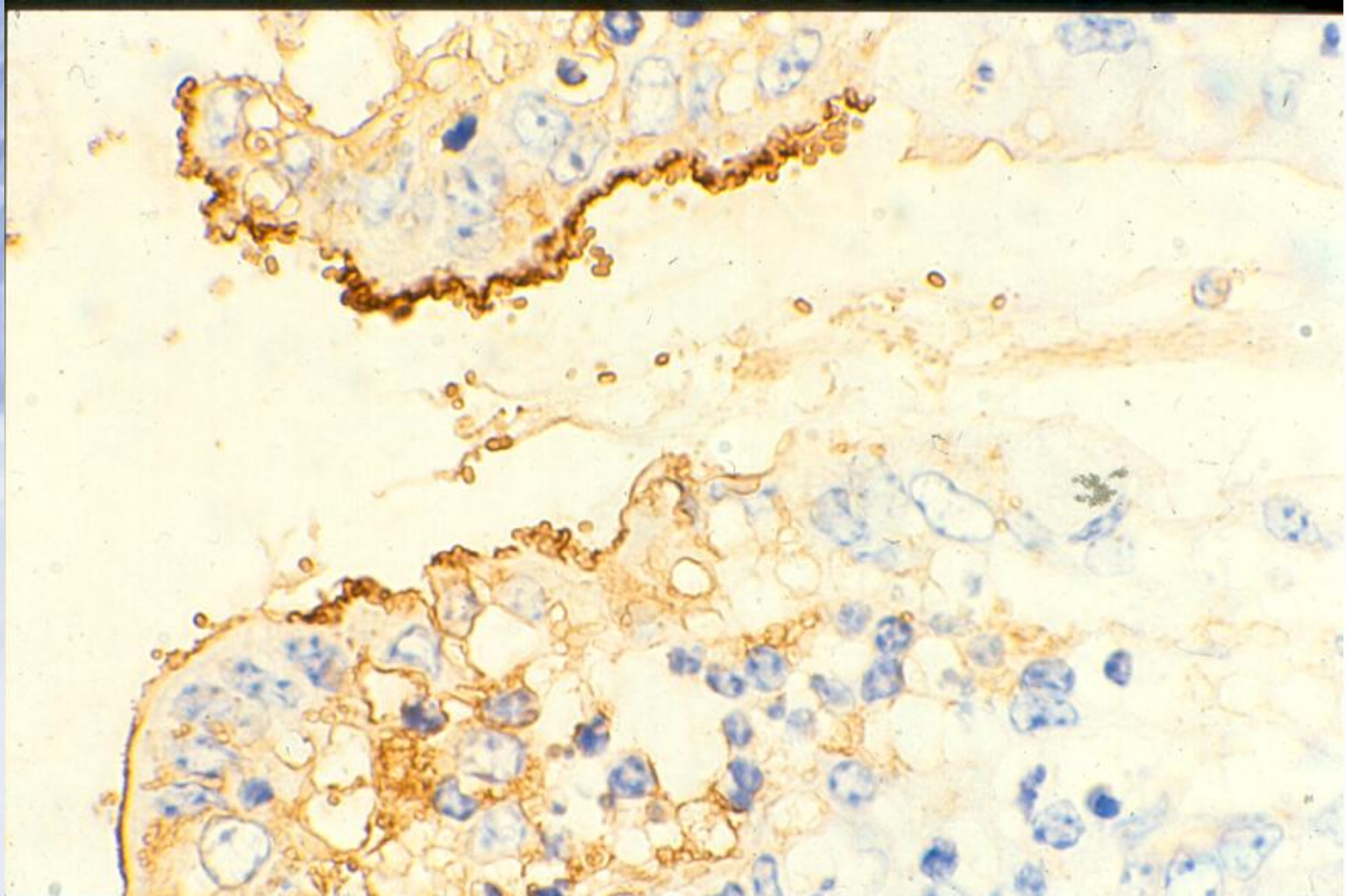
MORAXELLA BOVIS



SEM OF CONJUNCTIVA



TAGGED ANTIBODIES TO *E. COLI* O157 BOVINE COLON



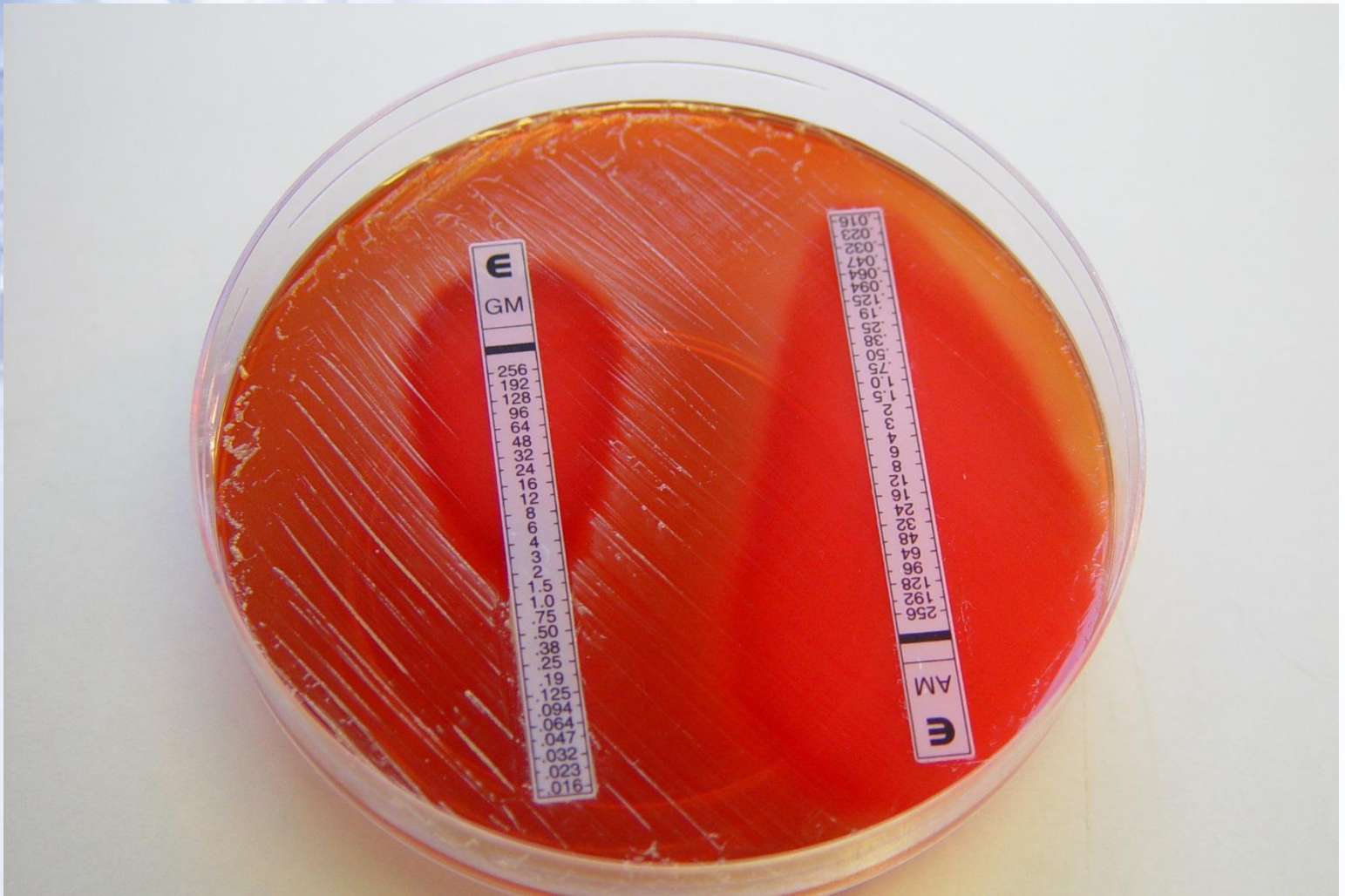
EARLY ANAEROBIC INCUBATOR



ANTIMICROBIAL RESISTANCE

- Growth promoters came and went
- Resistance appeared in veterinary organisms
- Sensitivity results routine
- Disc/E-test/MIC
- Some animal pathogens resistant
- Many eg MRSA caught from humans.

E – TEST USED FOR MICs BUT NOT ALL VET THERAPEUTICS AVAILABLE



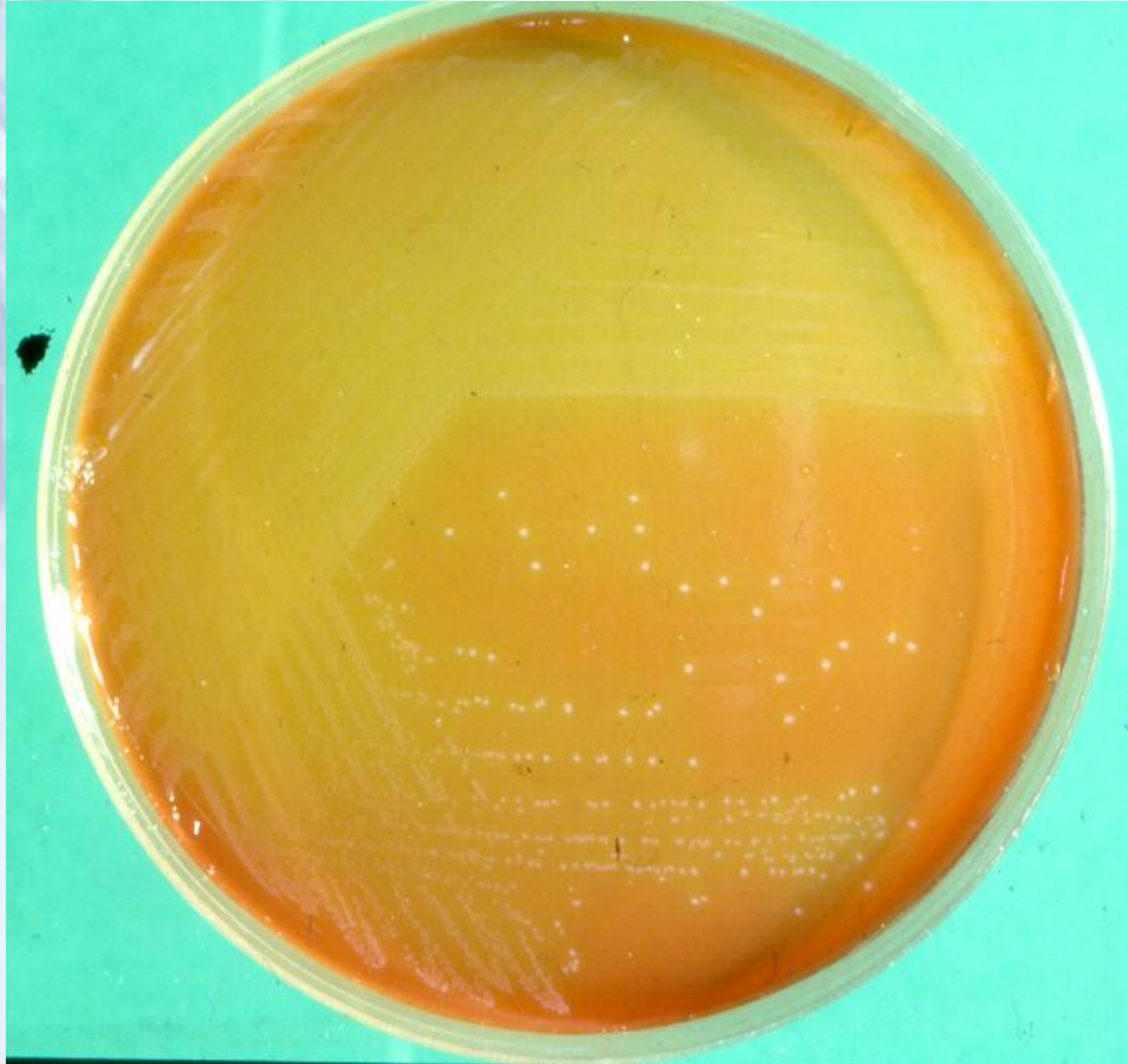
ZOONOSES

- Classics – anthrax, Brucella, Bovine TB
- Less common – *Chlamydia abortus*, *Leptospira hardjo*, *Brachyspira pilosicoli*
- Recently identified – *E. coli* O157 and other enteropathogenic *E. coli*, *Helicobacters*, *C. difficile*, MRSA
- Probable – *C. tertium*, Bacteroides, *Enterococcus durans*

CLOSTRIDIUM TERTIUM

- Fattening cattle on barley sprouts developed diarrhoea and died
- Colonies of a facultative anaerobic sporulating rod
- *Clostridium tertium*
- Pure cultures fed to cattle reroduced the disease
- *C. tertium* found in human diarrhoeas

CLOSTRIDIUM TERTIUM



EXPERIMENTAL *C. TERTIUM* INFECTION, BOVINE



MODERN VETERINARY BACTERIOLOGY

- Low throughput diagnostics
- Range of host species
- General application of modern techniques
- Reagents may not be readily available
- Veterinary and human bacteriology can inform each other
- Vaccines
- **COSTING!!!!**

NEXT STEPS

- Repopulation of remaining labs with veterinary bacteriologists
- Training PhD students, some from related areas such as Epidemiology and Public Health where funding exists
- Foundation of European College of Veterinary Microbiology to provide training and recognition.