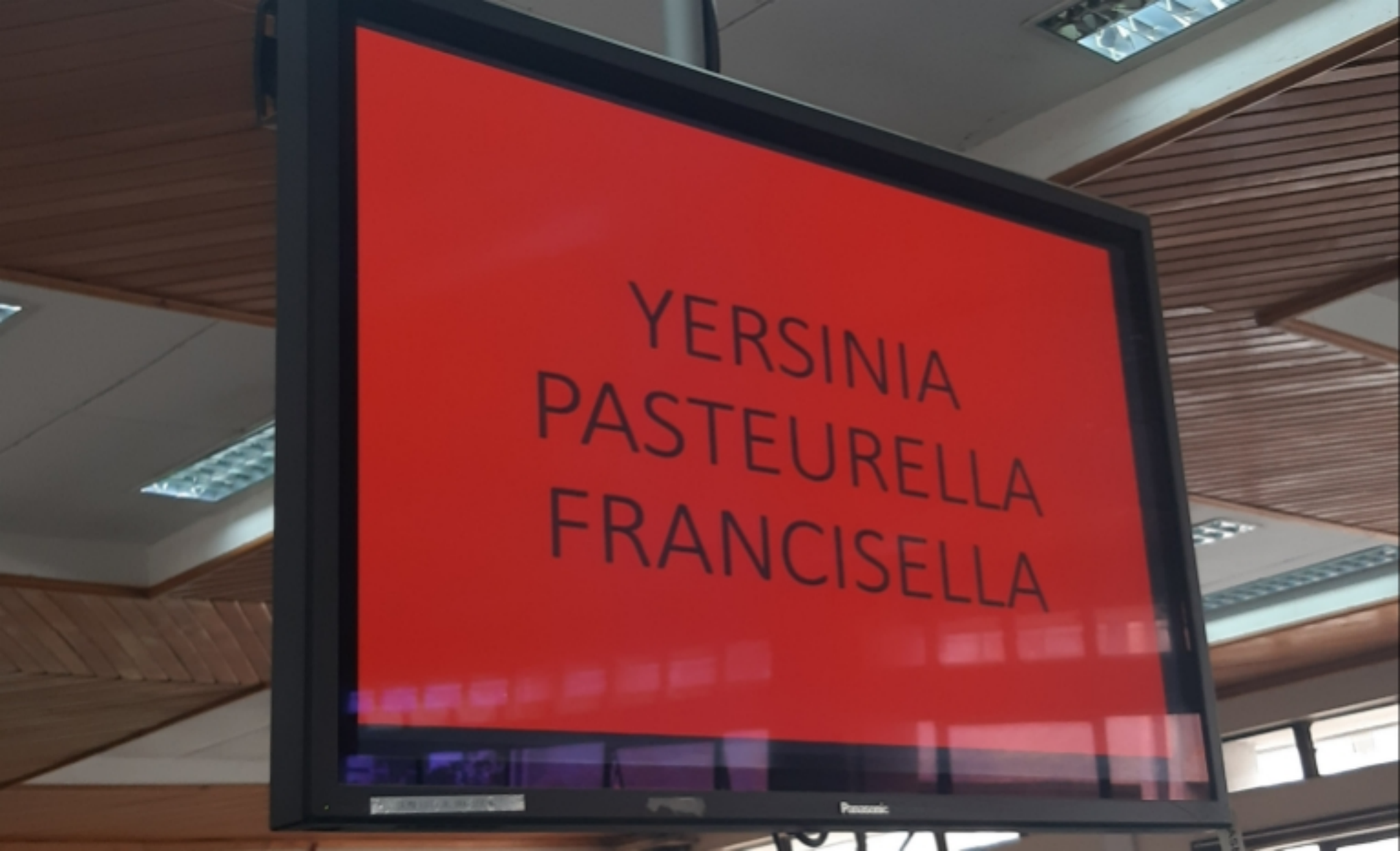
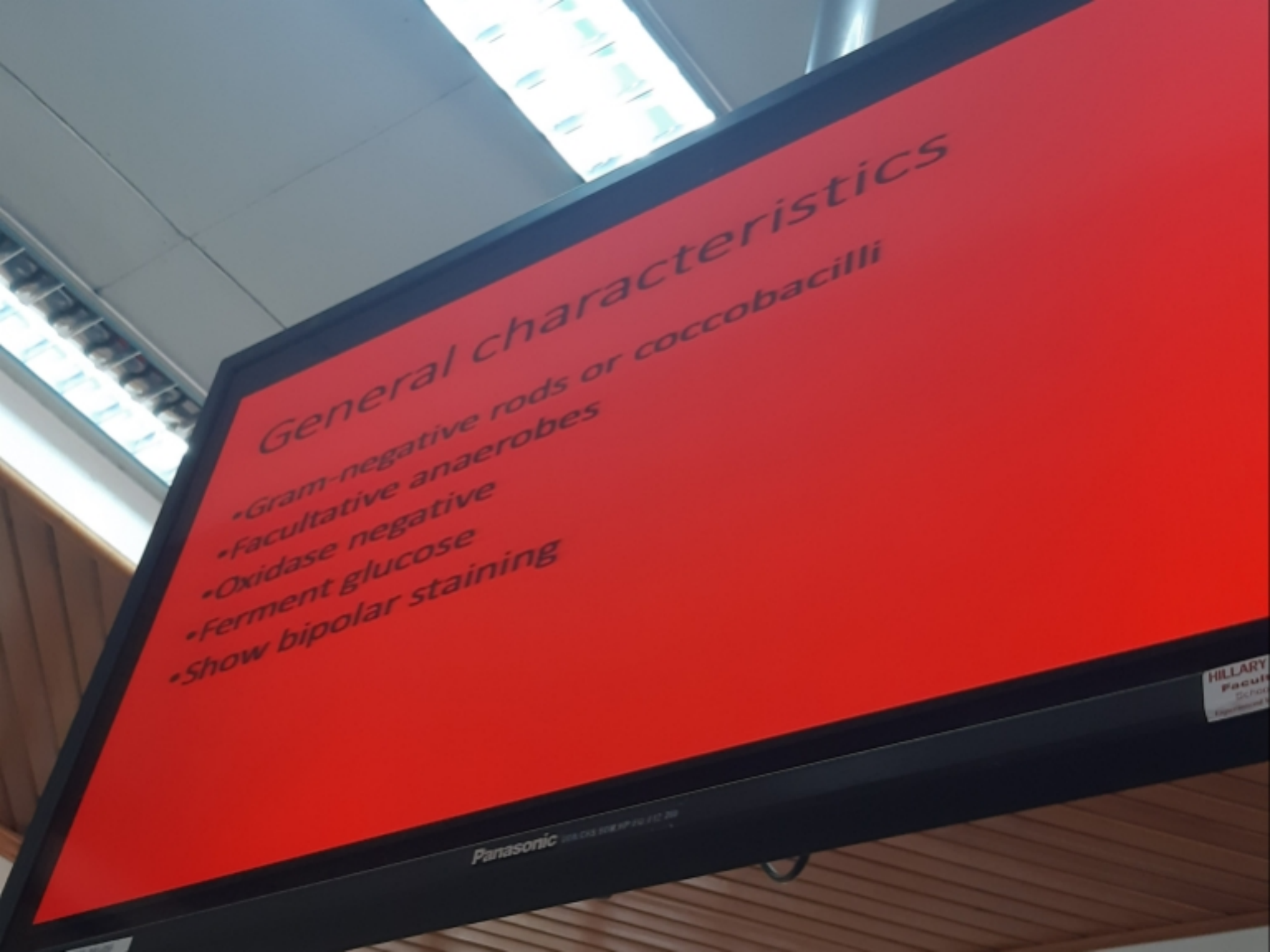

YERSINIA
PASTEURELLA
FRANCISELLA
Panasonic

Classification

- Family:Enterobacteriaceae
- Genus: Yersinia
- Species:
  - Yersinia pestis
  - Yersinia pseudotuberculosis
  - Yersinia enterocolitica


General characteristics
•Gram-negative rods or coccobacilli
•Facultative anaerobes
•Oxidase negative
•Ferment glucose
•Show bipolar staining
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General characteristics

- Plague bacillus
- Classic rodent zoonosis
- Pleomorphic Gram-negative bacilli or coccobacilli
- Exhibits bipolar staining with Giemsa, Wright's, or Wayson staining= **safety pin appearance**
- Facultative anaerobe

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General characteristics

- Non-motile
- Non spore-forming
- Facultative intracellular pathogen
- One serotype: 3 biovars(Antiqua, Medievalis and Orientalis)

Epidemiology

- 3 historical plague pandemics
  - Justinian plague (541 AD)
  - Black death (1334)
  - Modern plague (1860s)
- A re-emerging disease
- Endemic plague foci persist in many countries in Africa; the former Soviet Union; the Americas, including the southwestern United States; and parts of Asia.

Epidemiology

- **Wild rodents**- rats and squirrels
- **Other animals** together with rodents act as **chronic carriers** and **reservoirs of infection**
- **Fleas** acquire *Y.pestis* by feeding on the blood of infected animals
- Fleas then transmit the organism to **susceptible animals and humans**

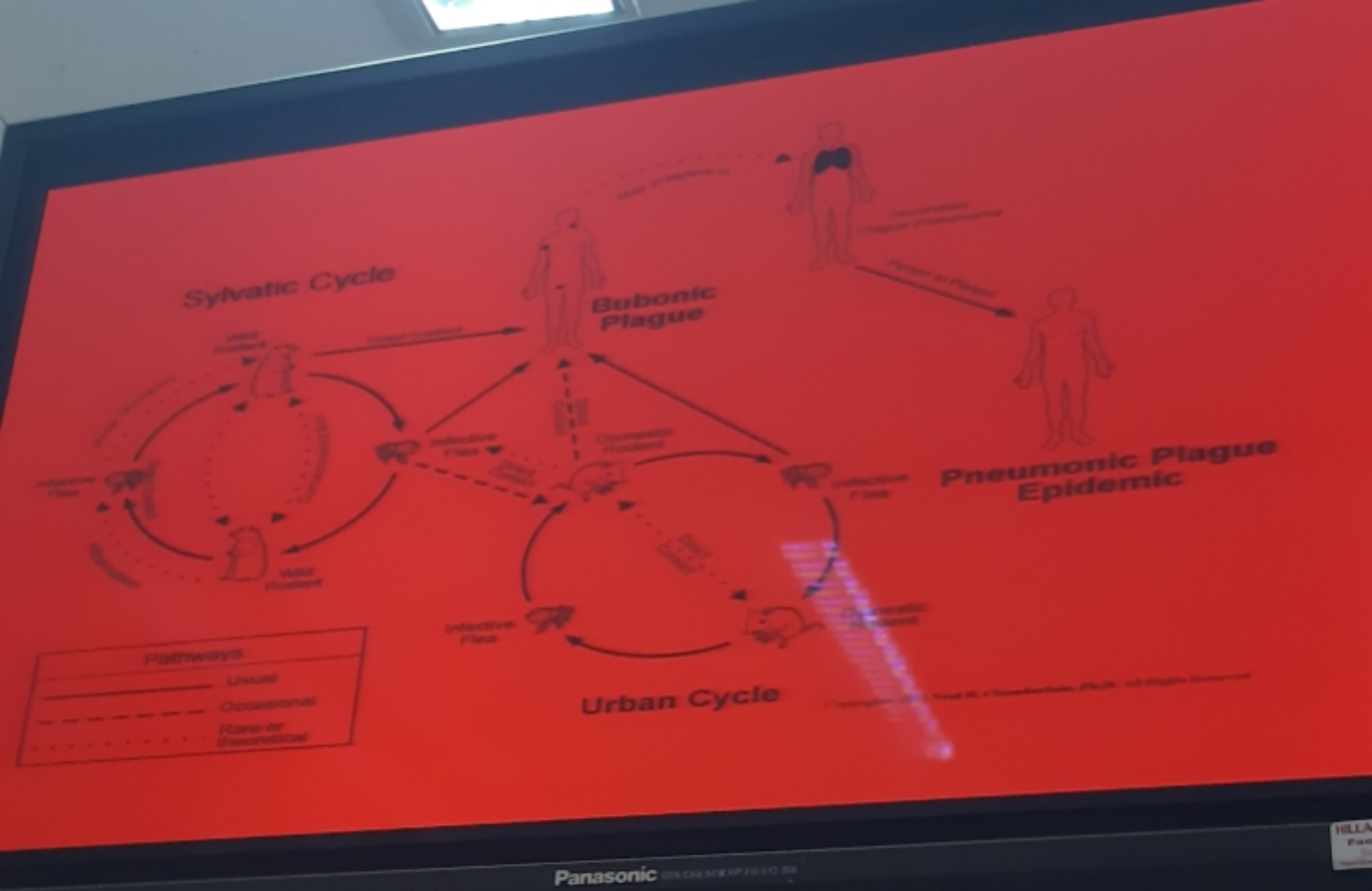
Epidemiology

- Modes of transmission

1. Flea bite
2. Aerosols
3. Contact with secretions

Main vectors: *Xenopsylla cheopis* and *Xenopsylla brasiliensis*- **from rodents to humans**

- Human flea=*Pulex irritans*


Sylvatic Cycle
Bubonic Plague
Pneumonic Plague Epidemic
Urban Cycle
Pathways
Usual
Occasional
Rare or Theoretical

Virulence factors

1. Capsule- antiphagocytic
2. Somatic antigen complex-
   - contains somatic antigens including V and W.
   - Enable bacteria to resist phagocytosis
3. LPS- endotoxin activity
4. Ability to absorb iron
5. Other factors e,g fibrinolysin which enable *Y.pestis* to spread in tissues

Clinical implications

- Causative agent of **Plague/Black death**

1. Bubonic plague
2. Septicaemic plague
3. Pneumonic plague

Bubonic plague

- Classic form of the disease
- Symptoms develop within 2 to 6 days of contact with the organism
  - Fever, headache, chills, swollen extremely tender lymph nodes(buboes)
  - GI symptoms: nausea, vomiting, diarrhoea
- Buboes in the inguinal and femoral regions
- *Bacteraemia or secondary plague septicaemia may occur

Case fatalities of untreated bubonic plague=40-60%

Septicaemic plague

- Primary septicaemic plague-
  - **positive blood cultures but no palpable lymphadenopathy**
- Seconday septicaemic plague-
  - **complication of both bubonic plague and pneumonic plague**
- Symptoms:
  - Fever, chills, headache, malaise, GI disturbances
- Mortality rate 30-50%(without treatment-100%)

Pneumonic plague

- Rare but deadly form of the disease
- Spread via respiratory droplets through close contact
- Progresses rapidly from febrile flu-like illness to an overwhelming pneumonia with coughing and production of bloody sputum
- If septicaemic plague is left untreated, it may progress to secondary pneumonic plague

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Laboratory investigations

- Suggestive history (bubonic plague)- exposure to fleas, rodents
- *Y.pestis* is a highly infectious pathogen(Hazard Risk Group 3). Minimize the creation of aerosols

Specimen:

- Blood
- Bubo aspirates
- Sputum
- CSF
- Scraping from skin lesions

Laboratory diagnosis

1. Gram stain
   Gram-negative coccobacilli
2. Culture for isolation and identification
   - BA, MacConkey, *Yersinia* selective medium(CIN=Cefsulodin-Irgasan-Novobiocin)
   - Incubate at 35-37˚C(optimum growth at 27˚C);24-48h

Colonial morphology:

- **BA**: small shiny non-haemolytic colonies
- **MAC**: very small translucent pink colonies

Laboratory diagnosis

Biochemical tests
- Catalase positive
- Oxidase negative

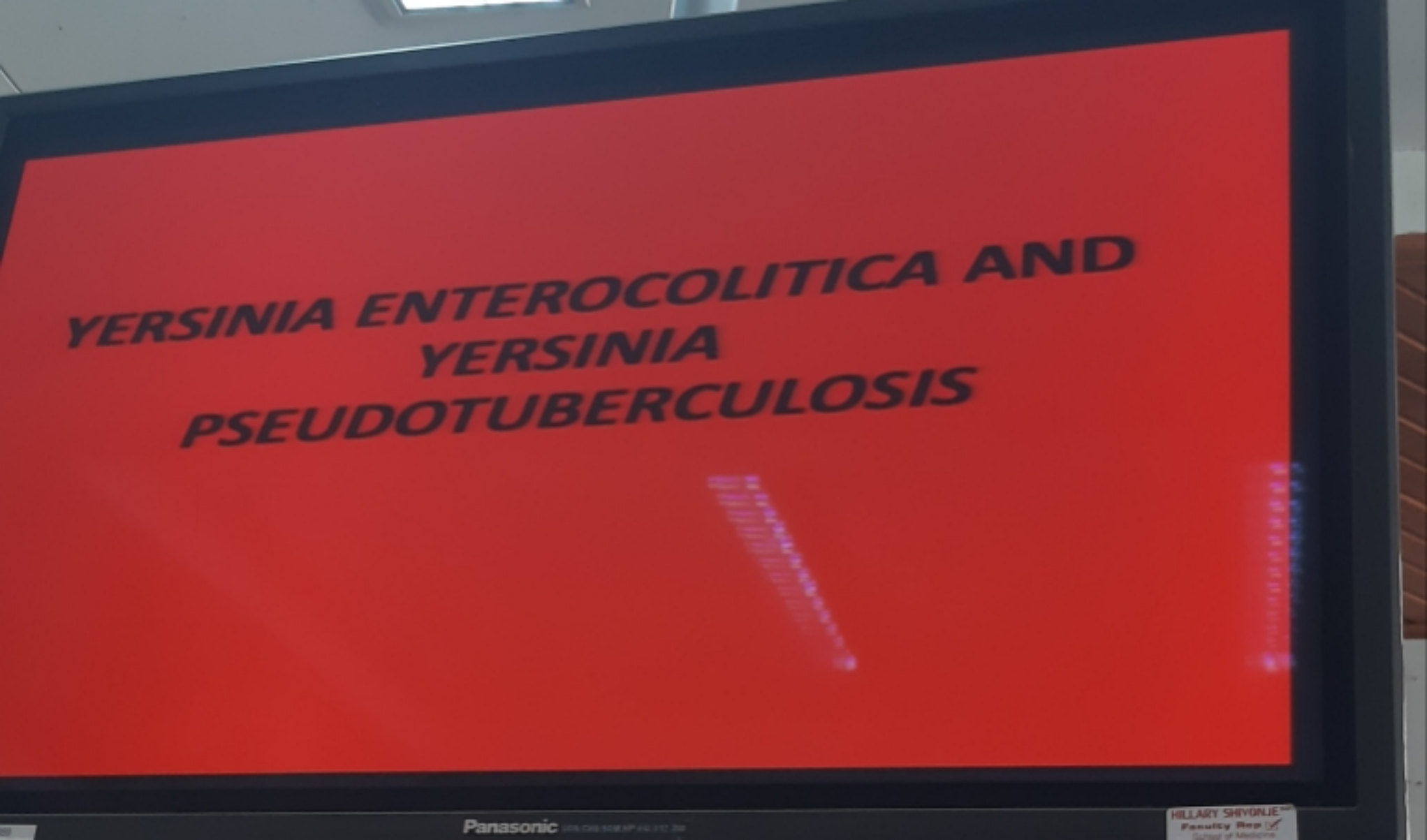
3. Flourescent antibody test
4. Rapid immunoassays
5. PCR

Treatment

- Early treatment, survival ~100%
- Supportive care
- Treatment
  - Streptomycin/gentamicin
  - Tetracycline
  - Chloramphenical
- Prophylaxis
  - Sulphonamides
  - Tetracycline

Prevention and control

1. Control of rats and fleas
2. Control of infection from patients
   - Isolate
   - Handling patients with care


YERSINIA ENTEROCOLITICA AND
YERSINIA
PSEUDOTUBERCULOSIS
Panasonic
HILLARY SHIYONJE
Faculty Rep

Epidemiology

- *Y. psedotuberculosis*
  - primary pathogen of animals and fowl
- *Y.enterocolitica*
  - infects swine, goats, cattle, horses, rodents and household pets
  - more commonly found in temperate countries
  - can multiply in food refrigerated at 4-8°C

Clinical significance

- Causative agents of illnesses with varying manifestations often complicated by septicaemia
- *Y.pseudotuberculosis* –
  - associated with enterocolitis and acute mesenteric lymphadenitis
- *Y.enterocolitica*
  - causes gastroenteritis, mainly in infants and young children
- Bacteria enter the lower intestinal tract and are transported with the macrophages into the mesenteric lymph nodes

Clinical manifestations

1. **Intestinal yersiniosis** :
   - dominant symptom is enteritis+ mesenteric lymphadenitis; ileitis ,colotis
2. **Extraintestinal yersiniosis**:
   - sepsis, lymphadenopathy, rarely hepatitis and various local manifestations(pleuritis, endocarditis, OM, cholecystitis, localised abscesses)
3. **Other sequelae**:
   - immunopathological complications-reactive arthritis, erythema nodosum

Laboratory diagnosis

- *Specimen:*
  - *Blood*
  - *Stool*
  - *Lymph node aspirate*

***Y.pseudotuberculosis* is stained by modified Z-N stain and is slightly acid fast**

***Both are motile when grown at 22°C(*Y.pestis* is immotile when grown at 22°C)**

Laboratory diagnosis

- Media, incubation and colonies are similar to *Y.pestis*
- A selective medium e.g. Mac, CIN(cefsulodin-Irgasan-Novobiocin) agar, or SS agar required to isolate from faecal specimen
- After 24-48h, incubation at 20-28 °C produces small NLF colonies

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Treatment
•Chloramphenical
•Ciprofloxacin
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