

BAILEY & SCOTT'S

# DIAGNOSTIC MICROBIOLOGY



TWELFTH EDITION



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# Diagnostic Microbiology

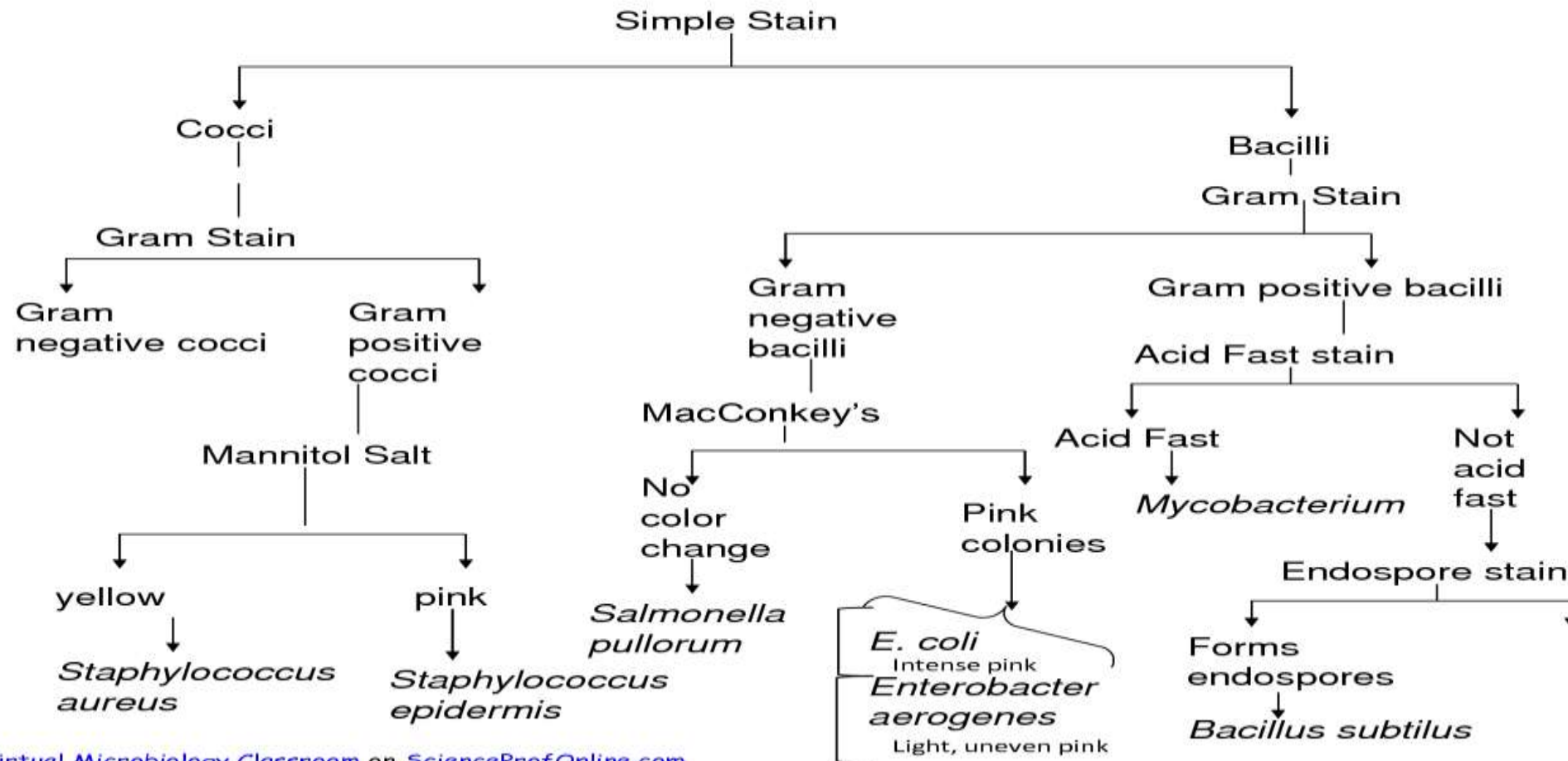
320 MIC

Lecture: 3

Identification of Microbes

# Example of Dichotomous Key to Identify Unknown Bacteria

## Dichotomous Key





# C- Animal pathogenicity

## \* Animal pathogenicity test:

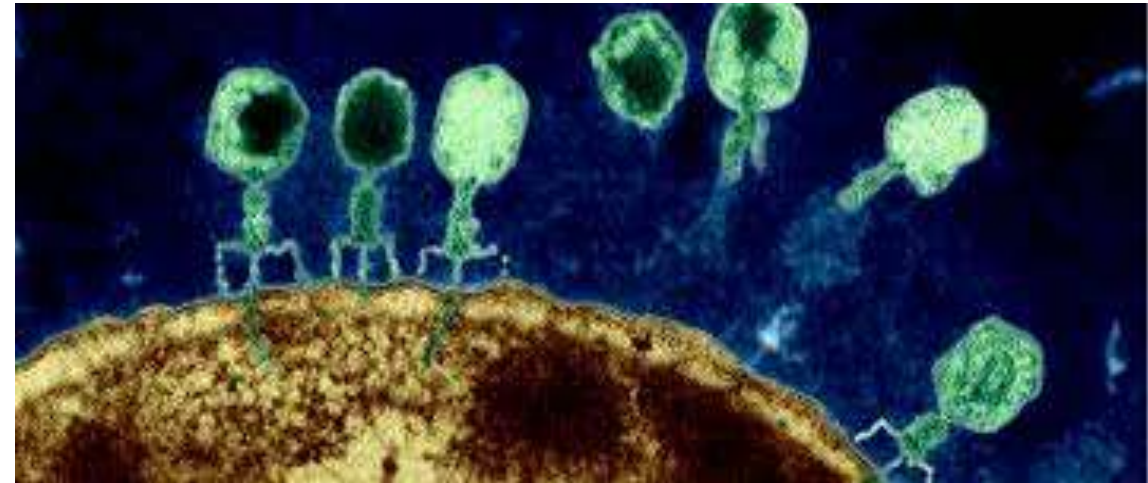
Animals commonly used are guinea pigs, rabbits, mice, ...etc.

## \* Importance of pathogenicity test:

- Differentiate pathogenic and non pathogenic.
- Isolation organism in pure form.
- To test ability of toxin production.
- Evaluation of vaccines and antibiotics.

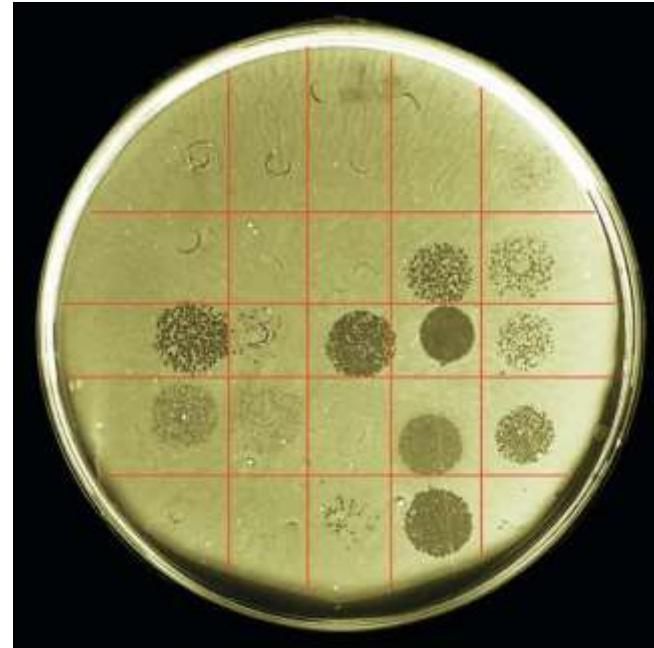
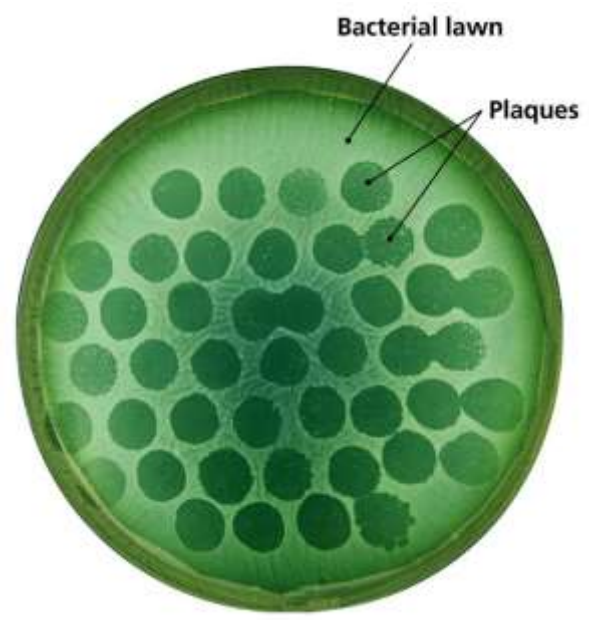
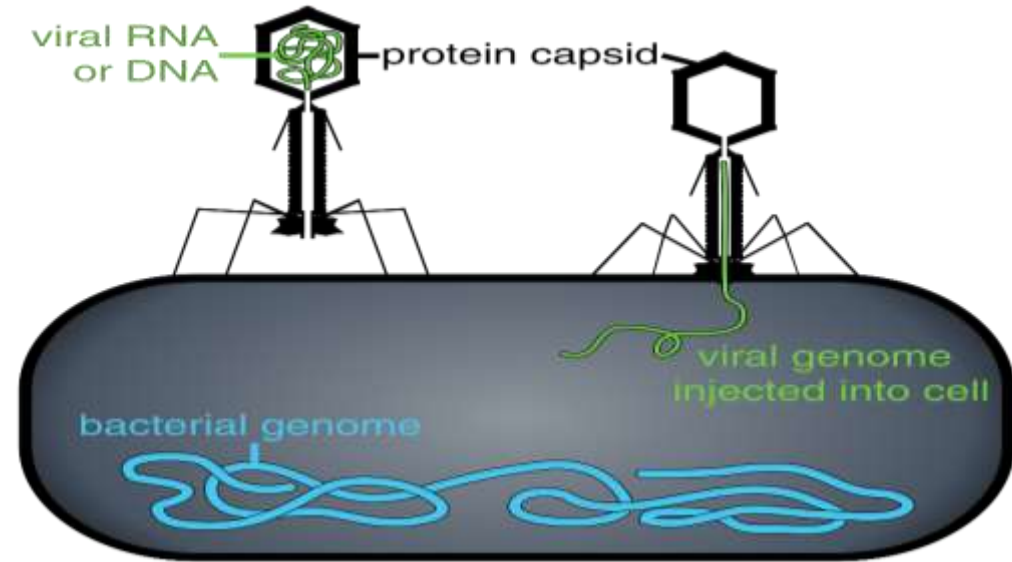
# D- Practical applications using phages

- Phages are important as a research tools.
- Phages are used as vectors in DNA recombinant technology.
- **Phage typing of bacteria**  
is important in tracing source of infection for epidemiologic purposes



# Phage typing:

the identification of bacterial species and strains by determining their susceptibility to various phages.



# E- Immunological Methods

- Immunological methods involves the interaction of a microbial antigen with antibody (produced by host immune system)
- Testing for microbial antigen or the production of antibodies is often easier than test for the microbe itself.
- Lab kits based on this technique is available for the identification of many microorganisms.

# Immune Testing

- Uses serology-study and diagnostic use of antigen-antibody interactions in blood serum.
  - Use immunological processes in two general diagnostic ways:
    - Use known antibodies to detect antigens associated with an infectious agent.
    - Use antigens to detect specific antibodies in a patient's blood to determine exposure to a specific pathogen.
  - Test chosen based on the suspected diagnosis, cost to perform the test, and the speed with which a result can be obtained.
- ❖ Detection of antigen or antibody in specimen is useful when cultural methods are unavailable or impractical or antimicrobial therapy has been started.**

## **Immunological technique advantages:**

- Easy to use.
- Mostly give rapid reaction.
- Sensitive and specific.



# Diagnostic Applications of Serologic Reactions

## 1- Diagnosis of infectious diseases:

known antigen preparations are used to detect circulating antibodies in patient's serum as evidence of a current or previous infection with that agent

**OR**

known antibodies are used to detect antigens associated with an infectious agent directly in body fluids.

## 2- Identification of unknown cultures:

known antibodies are used to detect their homologous antigens in cultures.

# Methods for Detecting an Ag-Ab Reaction

**1. Precipitation reactions (Ag is soluble) → precipitation.**

**2. Agglutination reactions (Ag is particles) → clumping.**

**3. Complement fixation reactions.**

**4. Labelling methods:**

**a- Immuno-fluorescence reactions.**

**b- ELISA.**

# Serology

**Serology:** in vitro diagnostic testing of serum.

Proteins and polysaccharides of some bacteria can function as identifying markers

Generally molecules on surface structures e.g., Cell wall, glycocalyx, flagella, pili

Detection is based upon the specific interaction between **antibodies** & these **antigens**.

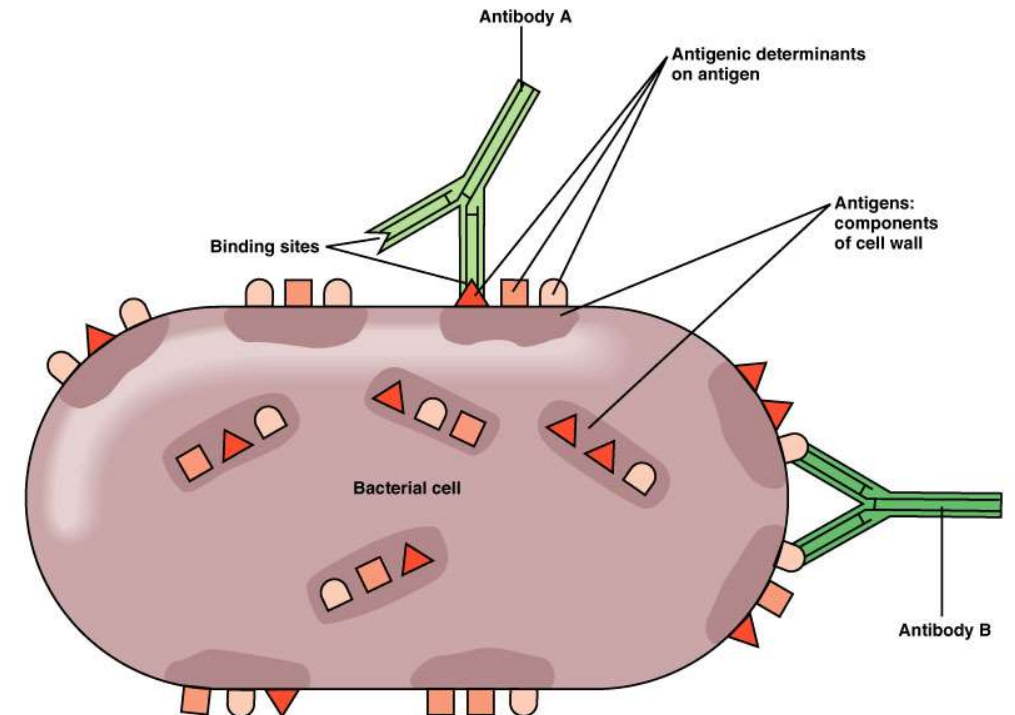
e.g., Rapid detection of *Streptococcus pyogenes*.

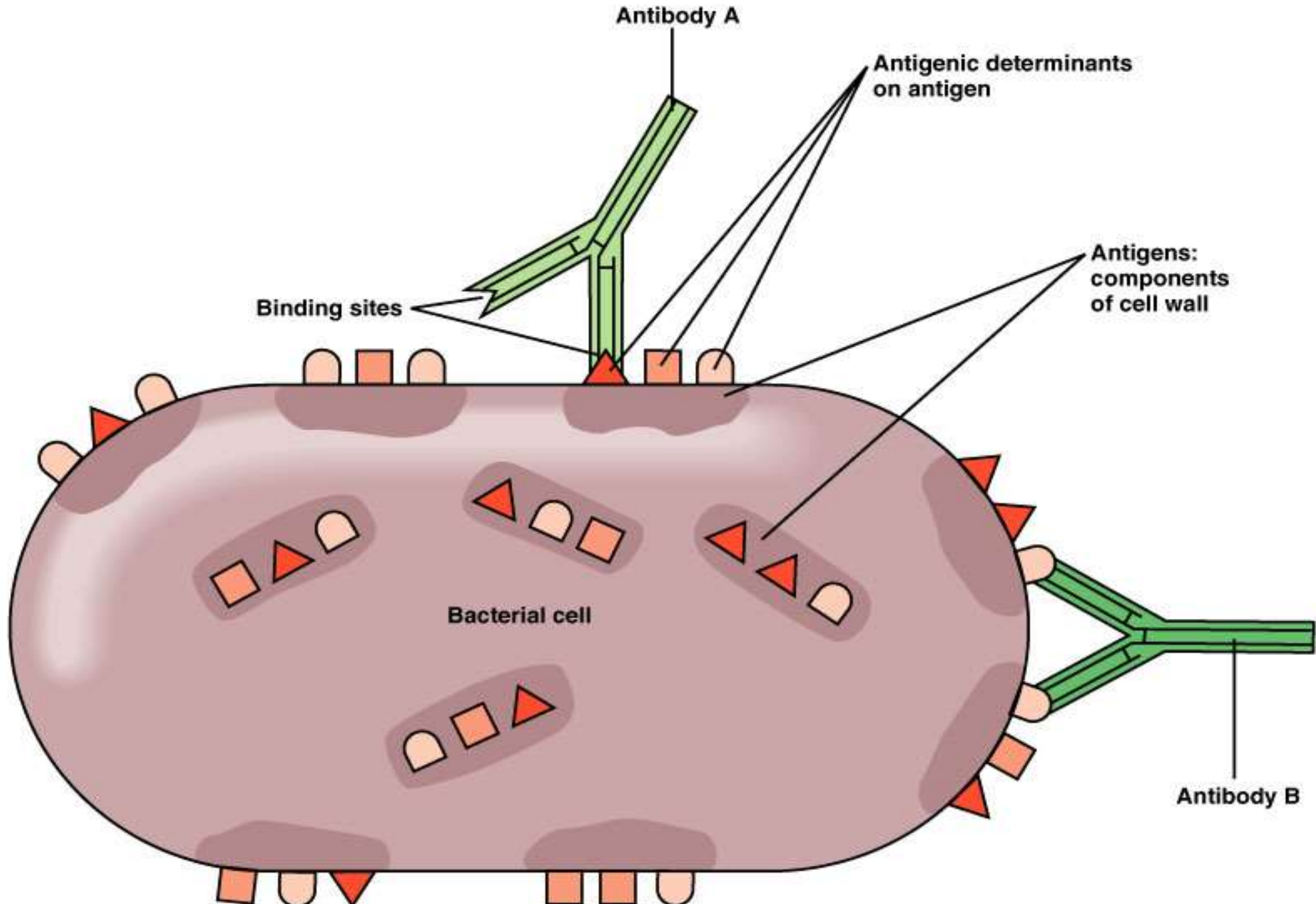
Antibodies have extreme specificity

for antigens

–Visible reactions include precipitates,  
color changes, or the release of radioactivity

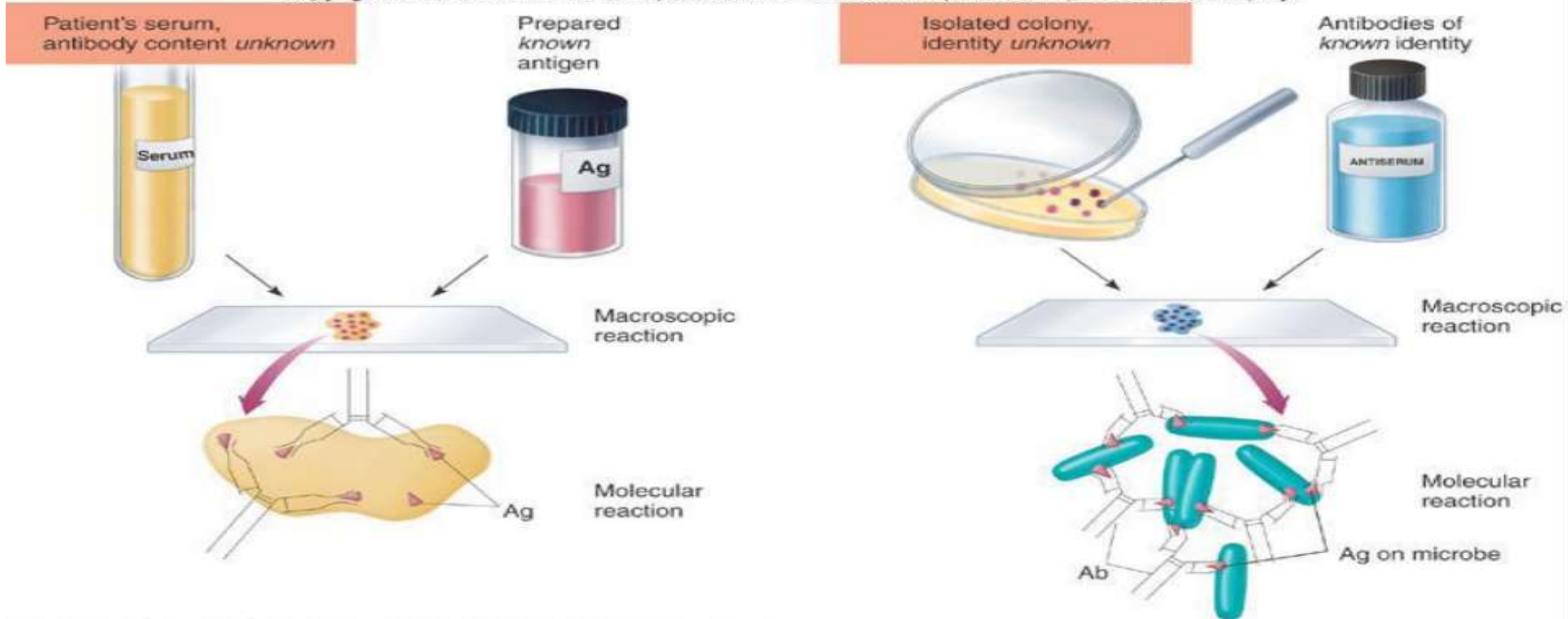
- Tests can be used to identify  
and to determine the amount of antibody  
in serum Titer





# Basic principles of serological testing using antibodies and antigens

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(a) In serological diagnosis of disease, a blood sample is scanned for the presence of antibody using an antigen of known specificity. A positive reaction is usually evident as some visible sign, such as color change or clumping, that indicates a specific interaction between antibody and antigen. (The reaction at the molecular level is rarely observed.)

(b) An unknown microbe is mixed with serum containing antibodies of known specificity, a procedure known as serotyping. Microscopically or macroscopically observable reactions indicate a correct match between antibody and antigen and permit identification of the microbe.