

Pseudomonadaceae

Pseudomonas

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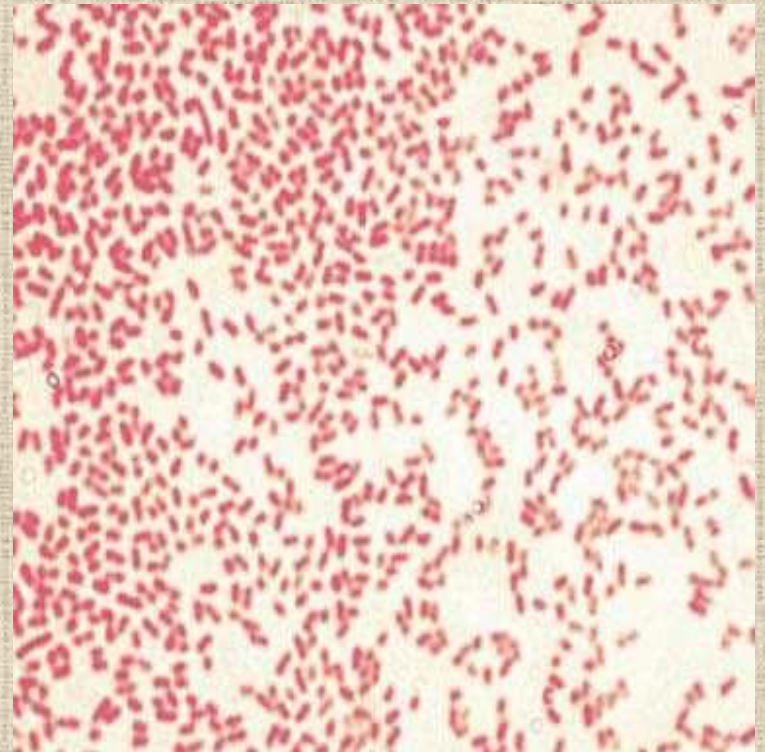
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The genus *Pseudomonas* have worldwide distribution. They are ubiquitous in soil, water, decaying organic matter & vegetation, but are opportunistic pathogens of animals, plants & humans. *P. aeruginosa* is the major human pathogen. *P. aeruginosa* is invasive & toxigenic produces infections in patients with abnormal host defense, & is an important nosocomial pathogen. Other species causing human disease is *P. fluorescens*

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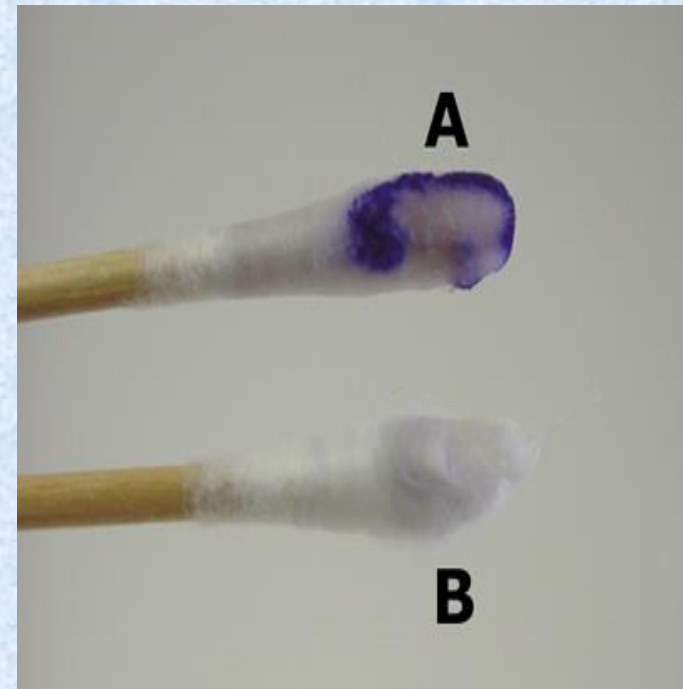


P.aeruginosa is motile, G negative usually occurs as single or pairs.

Culture: It is an obligate aerobe & can readily grow on many types of media. Some strains hemolyze blood. *P.aeruginosa* forms smooth round colonies with a fluorescent greenish color due to production of *pyoverdinin* pigment. It may produce a non-fluorescent bluish pigment (pyocyanin). Some strains produce the dark red pigment pyorubin or the black pigment pyomelanin.

P.aeruginosa can produce multiple colony types giving the impression of mixed bacteria growth. Thus it may have different biochemical & enzymatic activity & different antimicrobial susceptibility patterns. Culture from cystic fibrosis may yield *P.aeruginosa* that form mucoid colonies due to overproduction of alginate (exopolysacharride).

Morphology & identification



Growth characteristics:

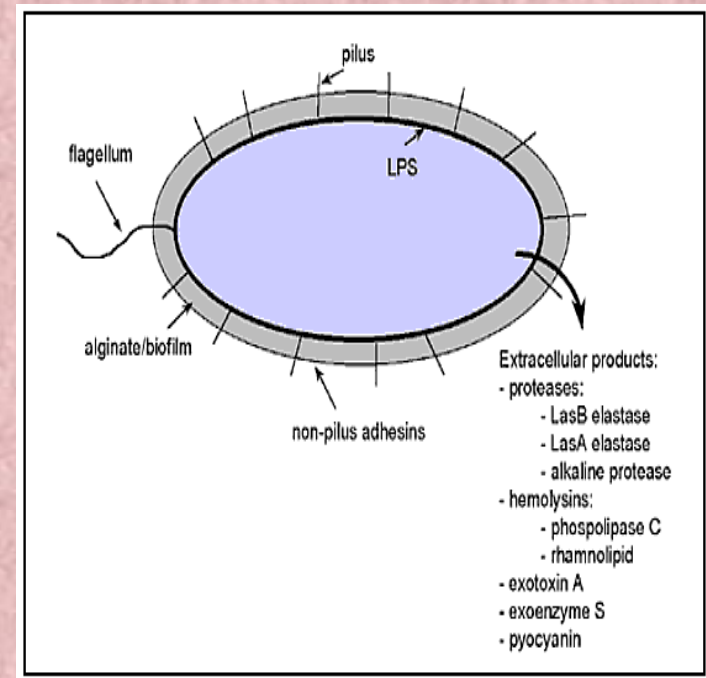
P.aeruginosa grow well at 37-42 C. Growth at 42 C helps differentiate them from other pseudomonads. It is oxidase positive.

Antigenic structure & toxins:

Pili (Fimbriae) extended from the cell surface & promote attachment to host epithelial cells. Polysaccharide capsule is responsible for the mucoid colonies in culture from patients with cystic fibrosis. The LPS is responsible for many of the endotoxic properties of the organism.

Most *P.aeruginosa* isolated from clinical infections produce extracellular enzymes including protease, elastase, hemolysin & heat-labile phospholipase C & heat-stable glycolipid. Many strains of *P.aeruginosa* produce exotoxin that causes tissue damage.

Growth & antigenic structure



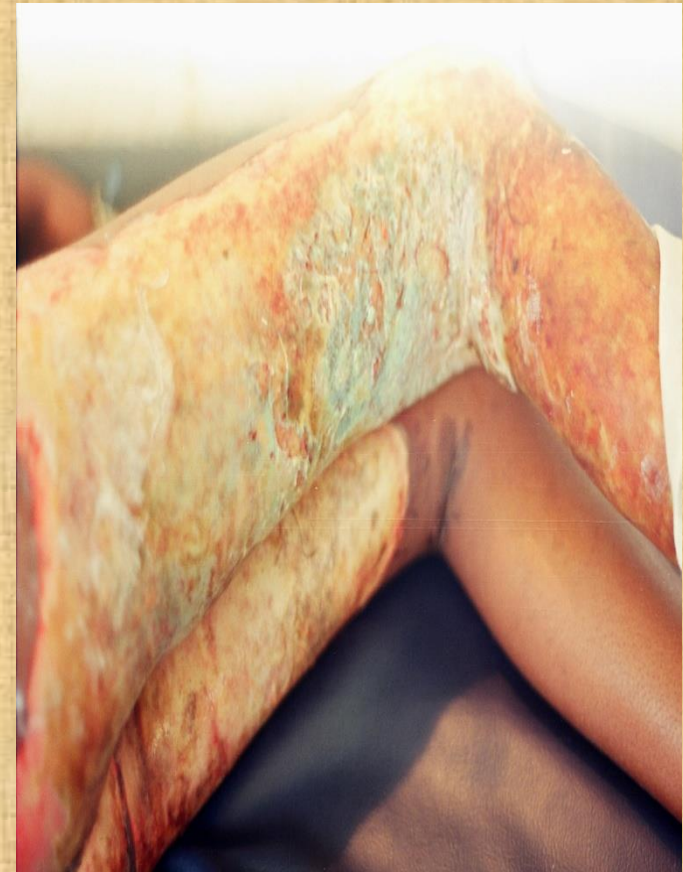
Unlike many environmental bacteria, pseudomonads have a remarkable capacity to adapt to & thrive in diverse ecological niches.

P. aeruginosa & *P. fluorescens* have been found in a variety of aqueous solutions & on equipment, including fluids, antiseptics, hydrotherapy bath & endotracheal tubes. *P. aeruginosa* is found infrequently as normal flora of skin & intestine of some healthy individuals.

Pathogenesis:

P. aeruginosa is pathogenic only when introduced into areas devoid of normal defenses e.g. when mucous mm & skin are disrupted by direct tissue damage, when I/V or urinary catheters are used, or when neutropenia is present as in catheter therapy. It attaches to & colonizes the mm or skin, invades locally, & produces systemic disease. These processes are promoted by pilli, enzymes & toxins. LPS plays a direct role in causing fever, shock, oligouria, leukocytosis & leukopenia, & adult respiratory distress syndrome. *P. aeruginosa* & other species are resistant to many antimicrobial agents.

Pathogenesis & epidemiology



P.aeruginosa produces infection of the wounds & burns giving rise to blue-green pus; meningitis when introduced by lumbar puncture, and UTI when introduced by catheter or irrigation solutions. Involvement of respiratory tract from contaminated respirator results in necrotizing pneumonia. It is often cause otitis externa in swimmers. Infection of the eye may lead to rapid destruction of the eye commonly after injury or surgical procedures. In infants and ICPs it may invade the bloodstream causing fatal sepsis. This may also occurs in patients with severe burns. In most *P.aeruginosa* infections the signs and symptoms are nonspecific and related to the organ involved.

Hemorrhagic necrosis of the skin occurs often in sepsis, the lesion called erythema gangrenosum & often do not contain pus.

P.aeruginosa is considered as a particular problem when isolated from surgical or maternity wards

Clinical Findings

Soft tissue & burn infection



Soft tissue infection



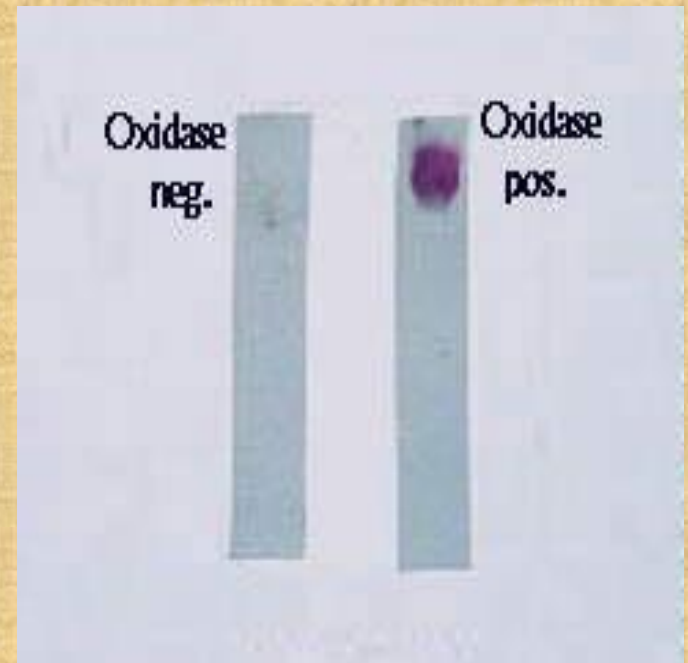
Specimens: skin lesion materials, pus, urine, blood, CSF, sputum & other materials.

Smears stained with gram's stain revealed G negative bacilli.

Culture: On blood agar & differential media commonly used for enteric G negative rods. *P.aeruginosa* is non-lactose fermentor. Culture is the specific test for diagnosis of *P. aeruginosa*.

P. aeruginosa is differentiated from *P.fluorescens* by its grapelike odor, growth at 42 C, production of pyocyanin pigment & resistance to Kanamycin

Laboratory diagnosis



Pigment production & oxidase test

