Microbiology Flash Cards

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What are the infections caused by S. aureus?

(mechanism is by skin invasion and destruction or from toxins)

folliculitis

cellulitis

Toxic shock syndrome

Scalded skin syndrome

Bullous impetigo

Furuncles vs Carbuncles

TSS & SSS are toxin mediated from exofoliative or epidermolytic toxins and TSS toxin respectively

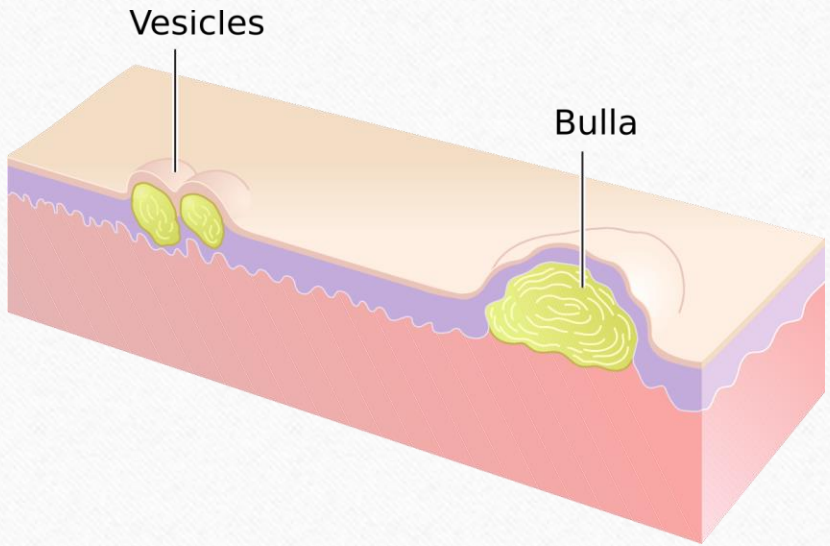
TSS

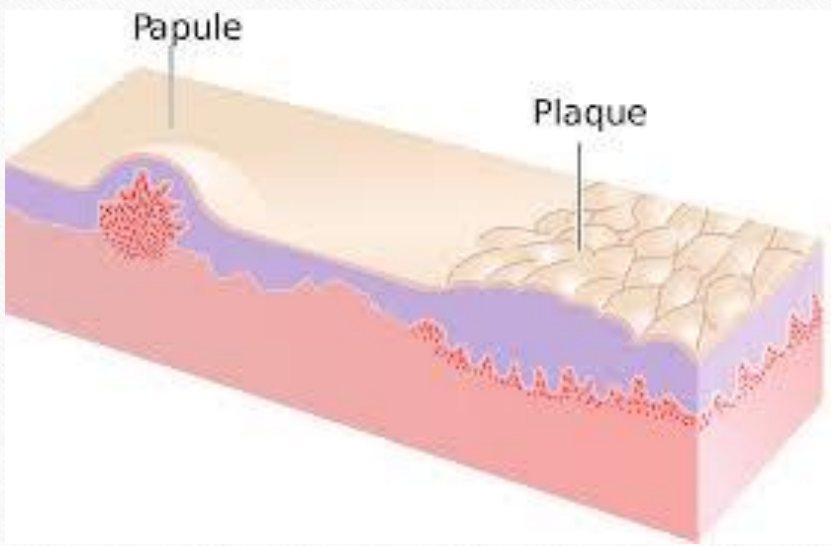
SSS

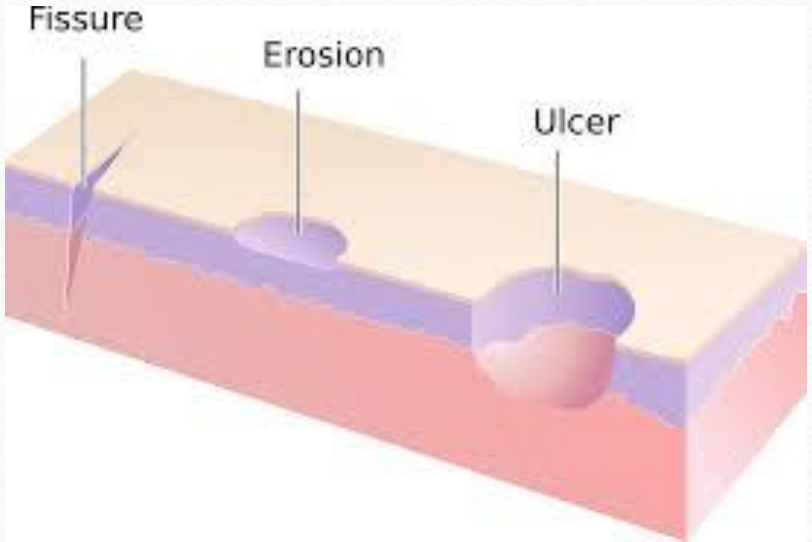
What are the mechanisms of skin infections?

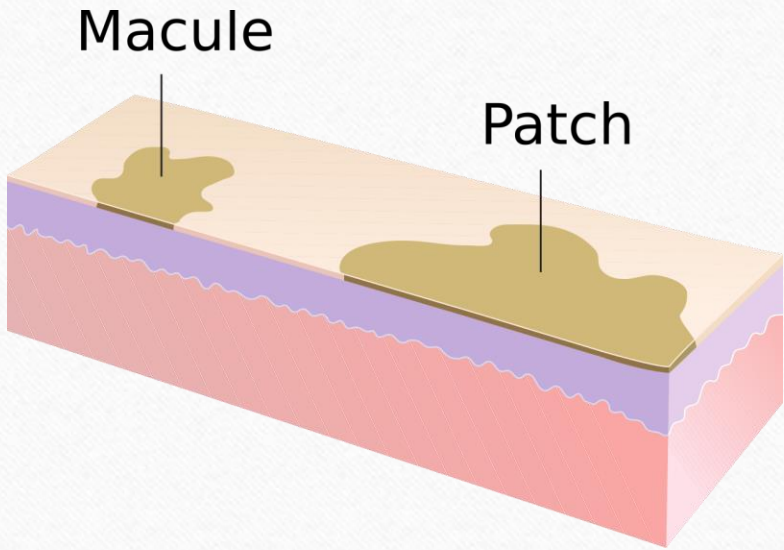
- Causes of skin lesions:
- A) Direct microbial infection of skin.
- B) Toxins produced by microbes.
- C) Inflammatory response to microbial infection.
- Routes of infection:
- A) Breaks in skin outer layer or via hair follicle infections.
- B) Insect or animal bites, human bites, needle sticks, scratches and burns.
- C) Clogged hair follicles (more susceptible to infection).
- Progression of infection:
- - Infections can extend to dermis, and in severe cases to subcutaneous fat, fascia, muscles causing necrotizing fasciitis, myositis and gas gangrene.

What are the classification of skin lesions in clinical practices

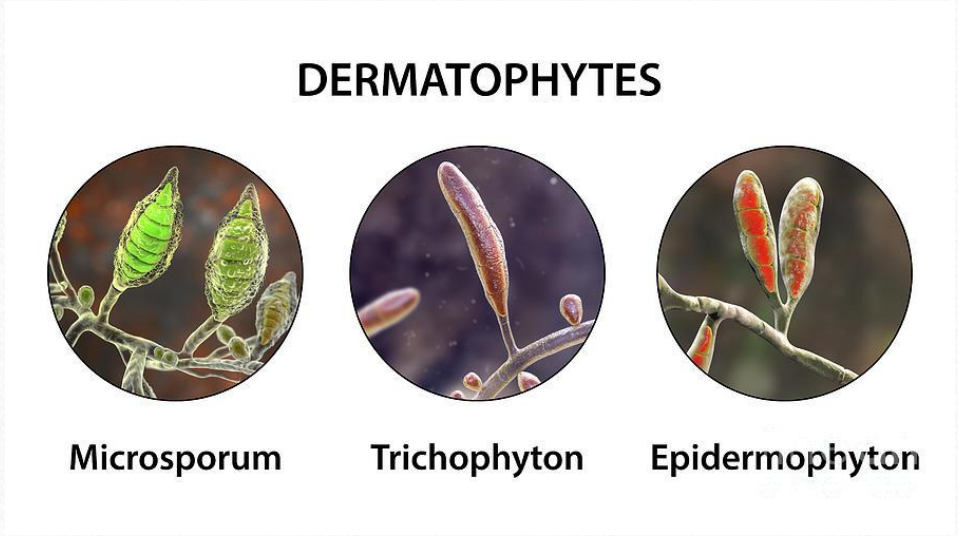

Vesicles
Bulla

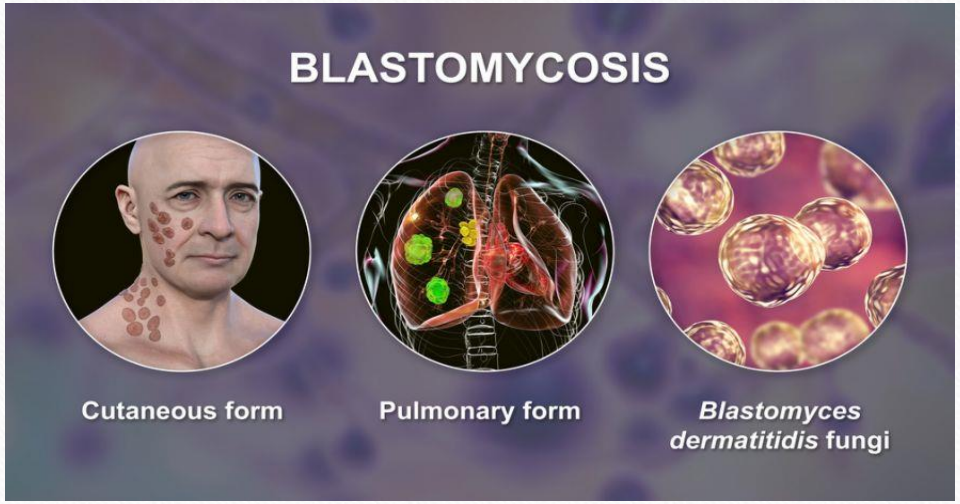

Papule
Plaque


Fissure
Erosion
Ulcer


Macule
Patch

Name some common fungal infections

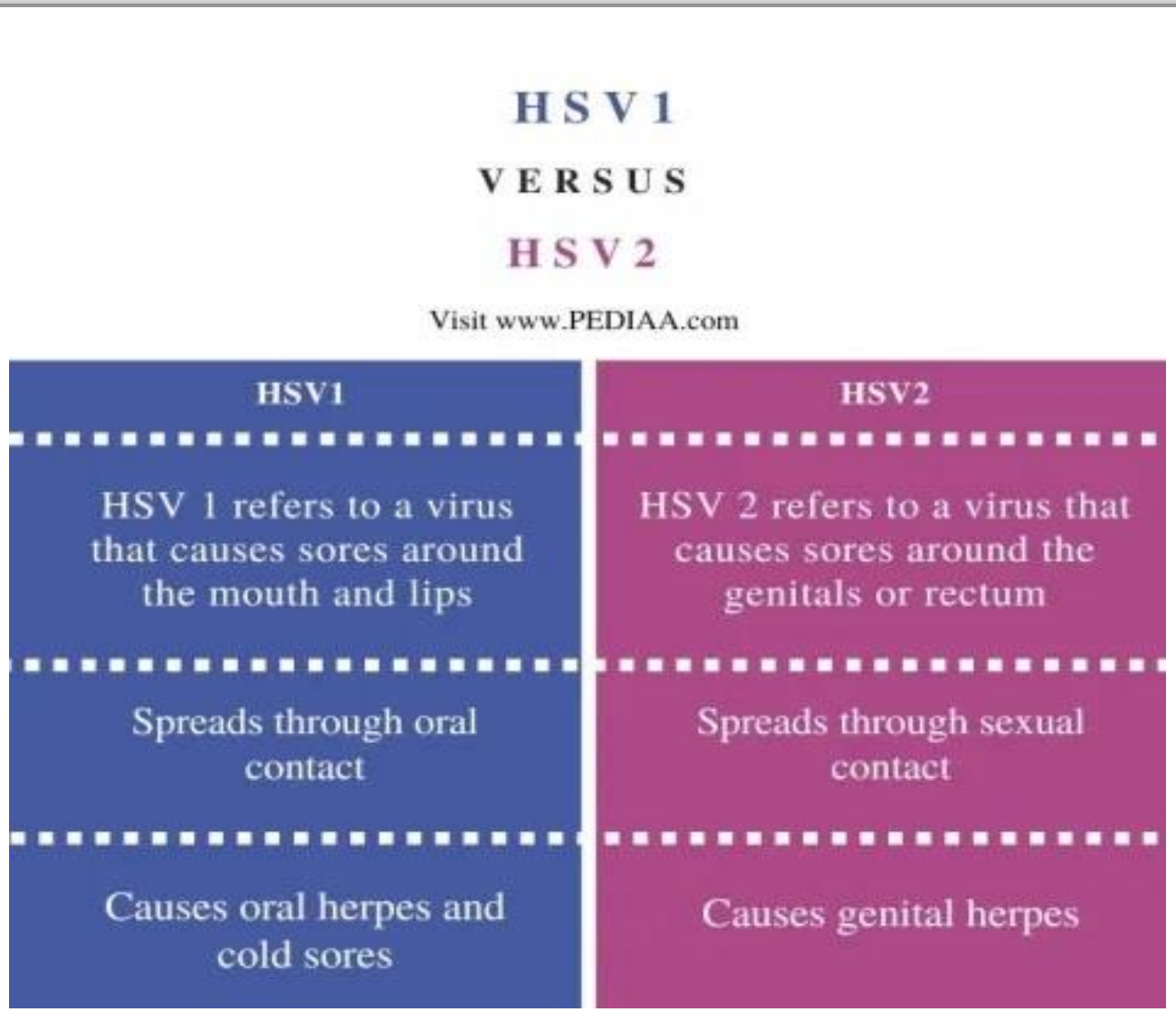




Infection by Candida albicans

Infection by Malassezia furfur

Name some viral skin infections

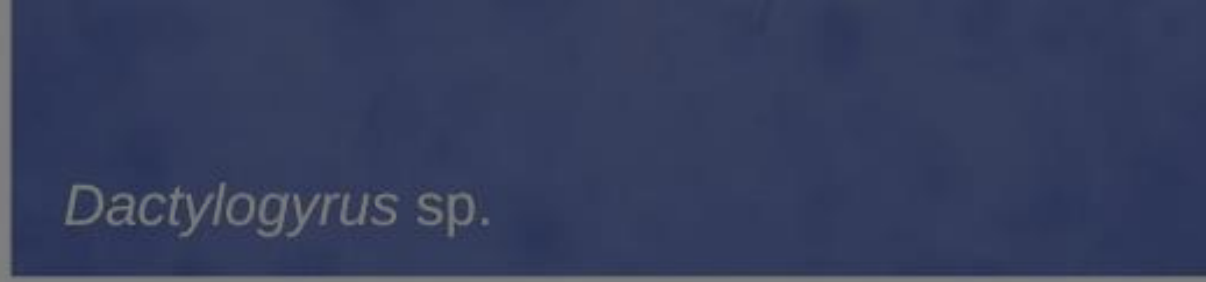


HSV-1 (oral herpes) vs HSV-2 (genital herpes)

Human Papilloma Virus

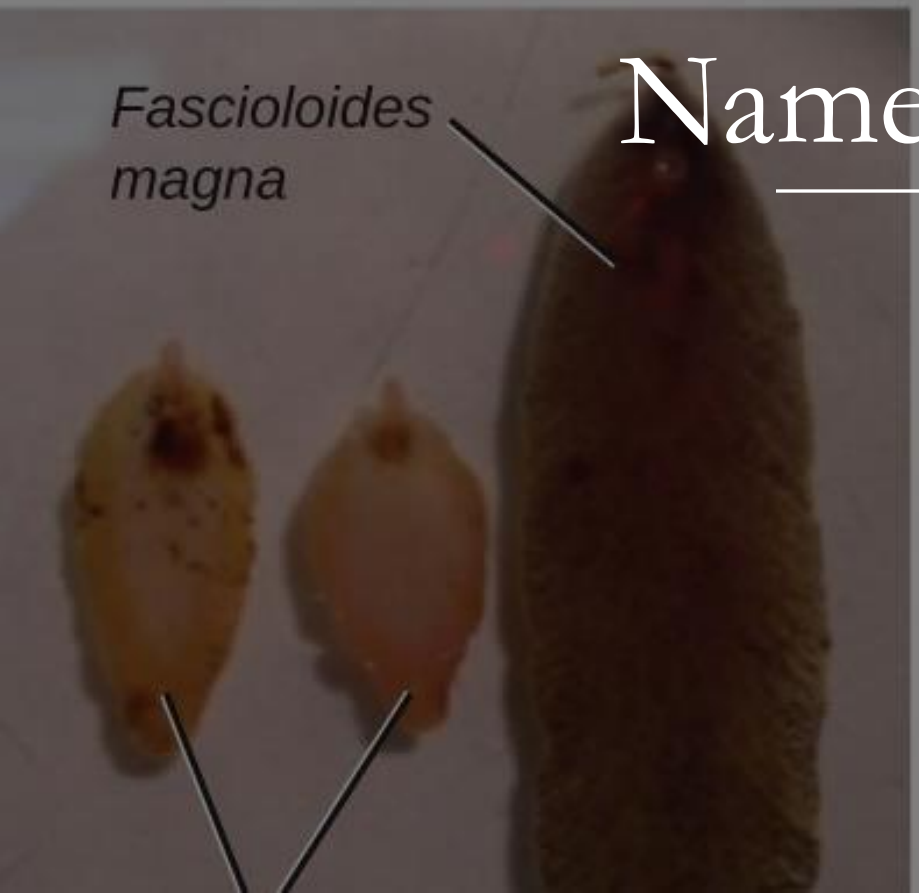
Viral Rash (Parvovirus B19)

(a) Class Turbellaria



(b) Class Monogenea

Name some parasitic skin infections



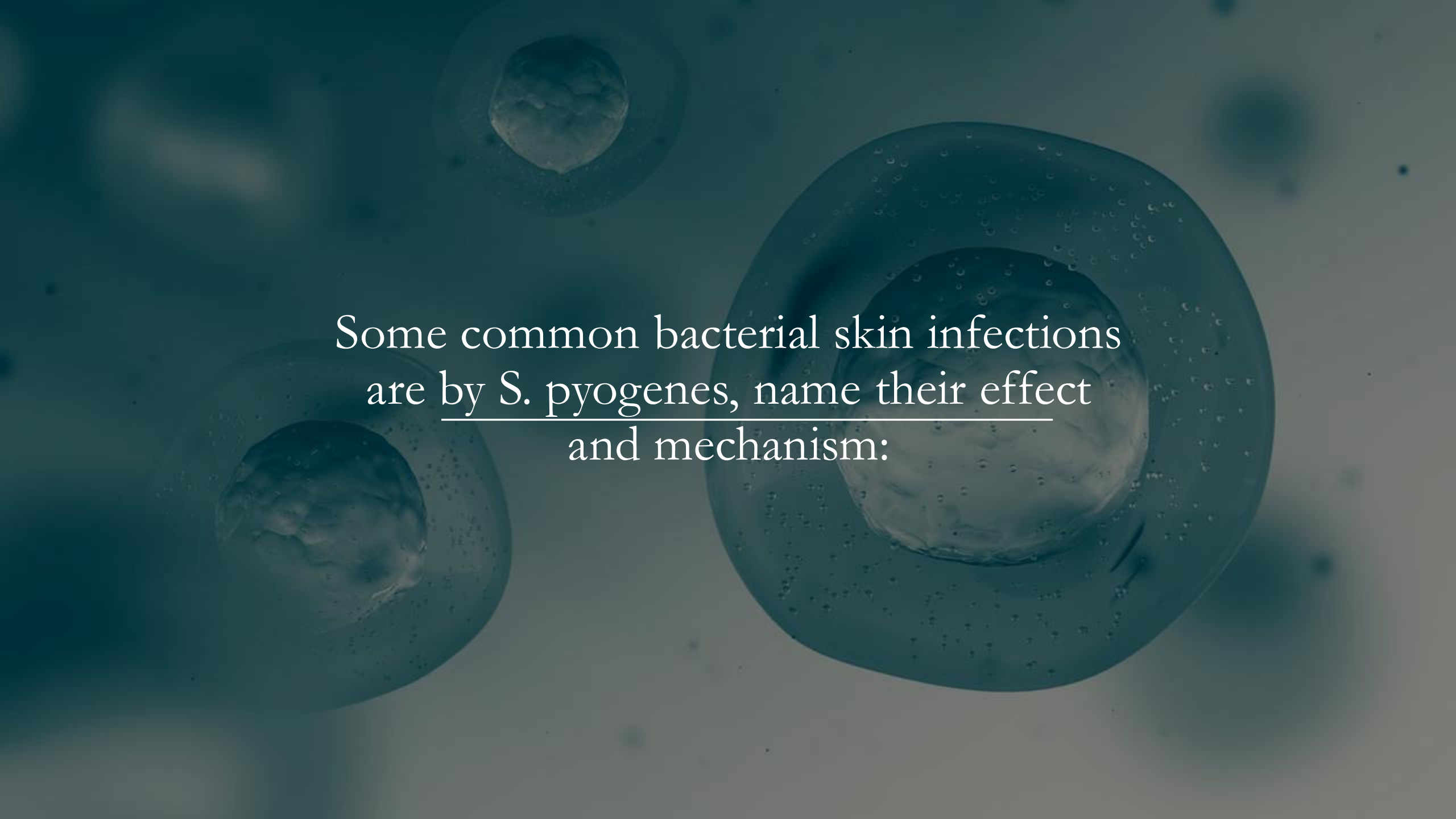
- Arthropods: The most frequent parasites. Eg: Sarcoptes scabiei which causes scabies / Pediculosis capitis,corporis,pubis caused by lice (pediculosis humanus and Pthirus pubis). / Cimex lectularius (bed bugs) feeds nocturnally on human blood causing skin rashes and blisters.

- Protozoa: Common in certain regions. E.g: Leishmania spp. Transmitted by sand fly causing leishmaniasis.

- Helminthes: Less commonly encountered. E.g: Shistosoma spp.

Scabies

Bed Bugs rash



Some common bacterial skin infections are by S. pyogenes, name their effect and mechanism:

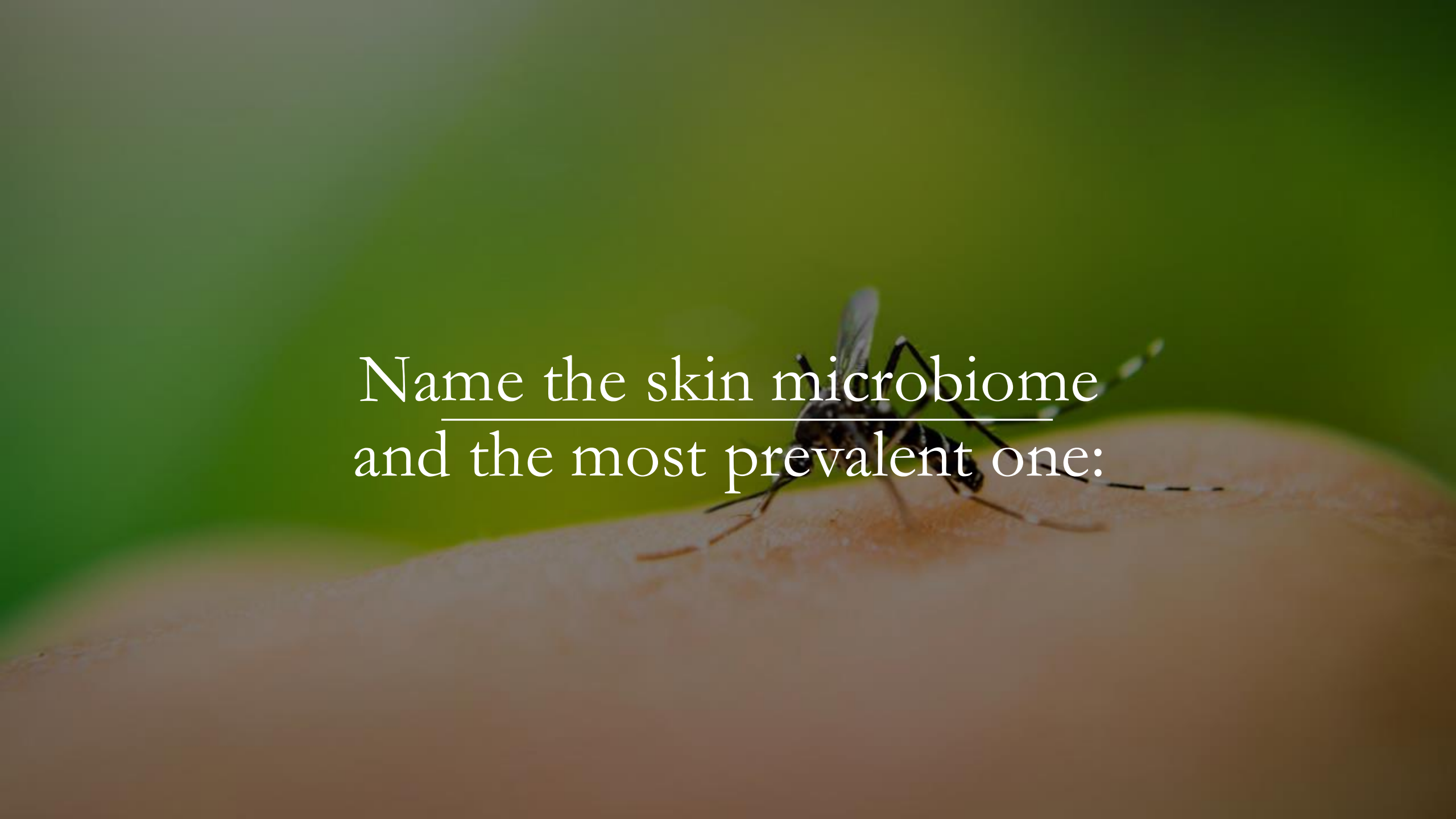
Impetigo by skin colonization or invasion

Erysipelas by skin colonization or invasion

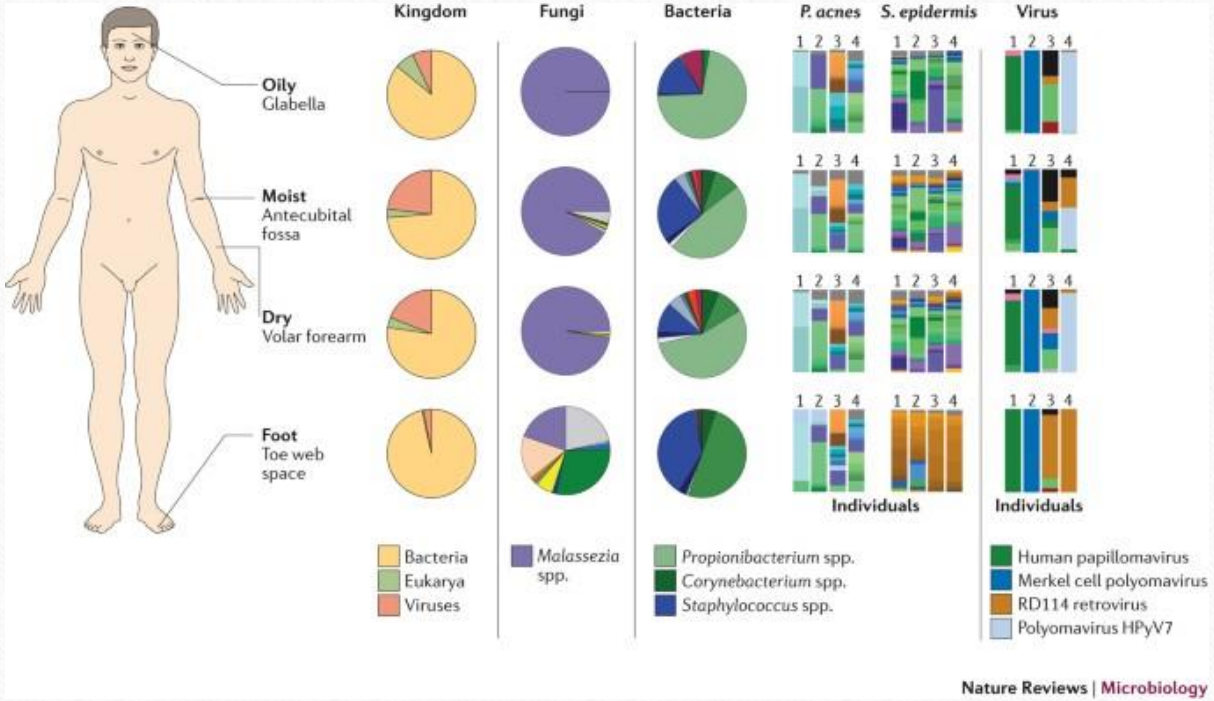
Necrotizing fasciitis by skin colonization or invasion

Scarlet fever (S. pyogenes endotoxin) or erythrogenic toxin

Streptococcal toxic shock syndrome (S. pyogenes toxin or erythrogenic toxin)


Name the skin microbiome
and the most prevalent one:

Key colonizers: Predom. G+ve bacteria like coagulase –ve Staph, Corynebacterium and Propionibacterium (Propionibacterium acne colonizes hair follicles and develops acne vulgaris). Staph epidermidis is the most prevalent skin microorganism. Candida and Malassezia are the main fungi on skin. Moist areas have: G-ve bacilli like Enterobacter, Pseudomonas, Klebsiella,
E. coli and Proteus.



What are the two primary skin layers and what are the types of infections?

Two Primary Layers
&
Two Levels of Infection

- 1- Epidermis: outermost, has protective stratum corneum made of keratinocytes.
- 2- Dermis: Denser, thicker with connective tissue, has blood vessels, nerve endings, sebaceous glands and hair follicles.

- 1- Surface-level: Dermatophyte infections (tinea or ringworm), primarily affects the epidermis especially stratum corneum.
- 2- Deeper skin conditions: Infections like furuncles, carbuncles, erysipelas invade the dermis when epidermis is compromised.

How does the skin prevent infections?

How our skin prevents infections

- **Dry environment:** Limits colonization by certain microorganisms, including Gram-negative bacteria.
- **Renewal of the epidermis:** Regular shedding of keratinocytes prevents overgrowth of potential pathogens.
- **Protective barrier:** The keratinocytes form a waterproof barrier, blocking the entry of infectious agents.
- Skin secretions include **beta defensins**, peptides that destroy microorganisms by disrupting their cell membranes.
- **Skin-resident immune cells:** Langerhans cells, dermal dendritic cells, macrophages, mast cells, and eosinophils.
- **Skin pH:** Sebaceous glands secrete sebum rich in fatty acids and lactic acid;
- ○ Fatty acids are effective against most gram-positive bacteria and gram-negative cocci (e.g., *Neisseria*)
- ○ Lactic acid lowers skin pH, inhibiting many microorganisms.

- • **Sweat glands** produce sweat containing lysozyme and high levels of
- sodium chloride.
  - ○ **Lysozyme** breaks down bacterial **cell walls**.
  - ○ Sodium chloride concentration can inhibit bacterial growth.


What is a resident microorganism?
How does the skin normal flora prevent pathogen colonization?
What are the type of habitats on skin?

Answer:

- **Resident microorganisms:** Despite a hostile environment, skin is colonized by specific microbes, including Diphtheroids, *Propionibacterium acnes*, *Staphylococcus*, and *Malassezia*.
- • Skin normal flora help to prevent pathogen colonization by:
- ○ Blocking attachment to the skin surface.
  ○ Producing substances that inhibit the growth of other microbes.
- • Habitats on skin:
- ○ Most reside in the superficial stratum corneum and upper hair follicles.
- ○ **Moist areas** (e.g., scalp, axilla, perineum) have higher colonization than drier regions (e.g., arms, legs, chest, back).