

# Integumentary Systems

If an animal in the wild is exposed to ultraviolet (UV) rays, how do they protect themselves from UV exposure?





# Integument and UV Rays



# Integumentary System

- A external system that protects the internal organs and structures of animals



# The Importance of the Integument

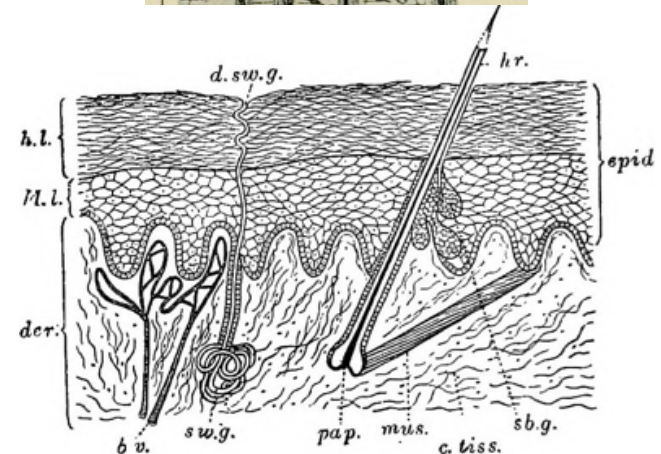
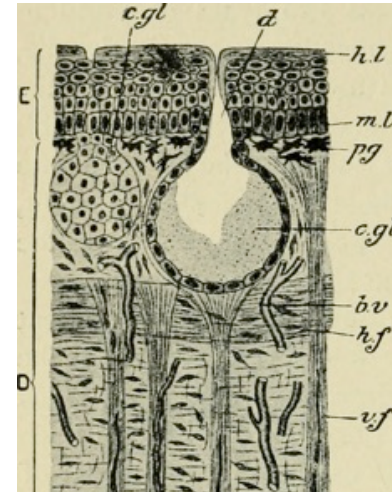
Protection from

- Abrasion
- Puncture
- Invasive bacteria
- desiccation
- water saturation
- UV rays



# Key organ of the human integumentary system:

- The skin; made up of:
  - epidermis: a single-layered outermost tissue
  - dermis- the inner layer that contains follicles, sweat glands, muscles, nerves, and blood vessels

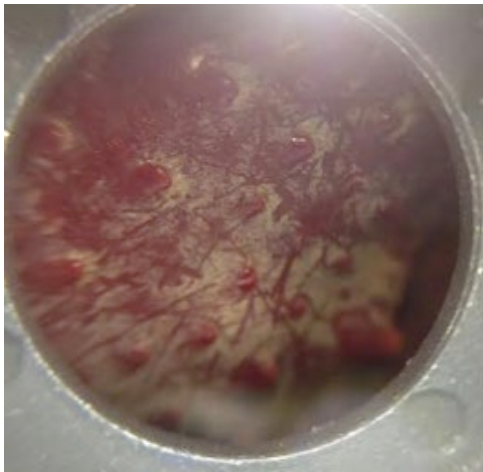


The integumentary system may also provide additional protection in the form of:

- Exoskeleton (found in arthropods)
- Hair or fur
- Feathers
- Scales (in reptiles and fish)
- Pigments
- Structural Coloration

# Exoskeleton

- Found in arthropods such as insects and crustaceans
- A two-layered complex cuticle
- A non-cellular material secreted by the epidermis



# Hair or fur

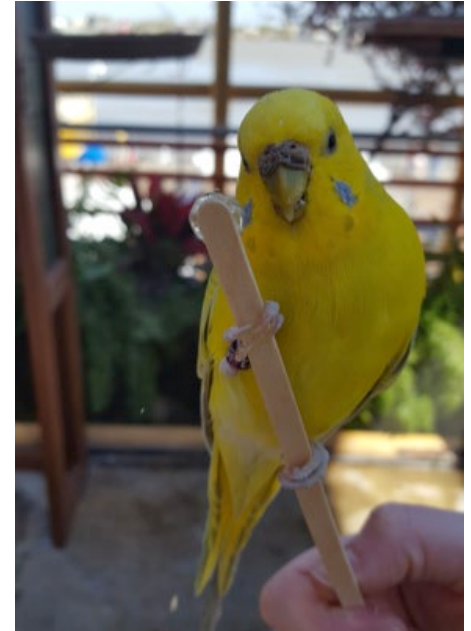
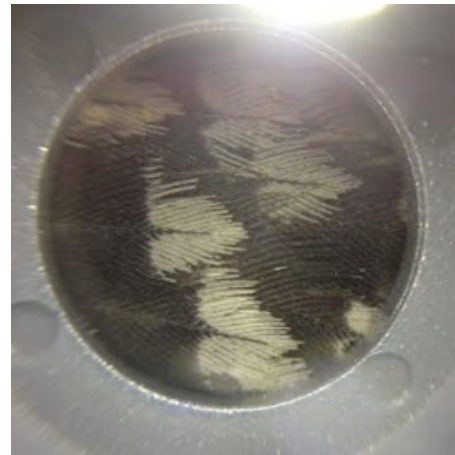
- Found in mammals
- Originates from the epidermis
- A thread-like protein composed of keratin
- Found in a range of earth-tone colors (brown, black, red, or yellow)





# Feathers

- Found in birds
- Originates from the epidermis
- A highly branched structure composed of keratin
- One of the most complex integumentary systems in the biological world



# Scales

- Found in reptiles, fish, butterflies and moths wings, the feet of birds
- Originates from the epidermis
- Small rigid plates of protein composed of keratin
- Found in a range of sizes and colors



# Pigment

- Large molecules that reflect light
- The most common melanin is a group of black or brown colors
- Melanin can range from yellow and to red in color
- Produced by special cells in the epidermis



# Structural Coloration

- Found in butterflies, certain beetles, and a few fish
- They can reflect light
- They give off iridescent and metallic hues
- Found in the cuticle or scale
- Composed of several stacks of plate-like structures



# Why is UV protection important?

Sunlight plays a key role in synthesizing vitamin D in the human body; however, overexposure to UV rays over time can:

- Age the skin prematurely
- Cause the skin to become dry and leathery
- In high doses, it can cause genetic mutations
- Cause skin cancer
  - 1 million new cases of skin cancer occur in humans each year