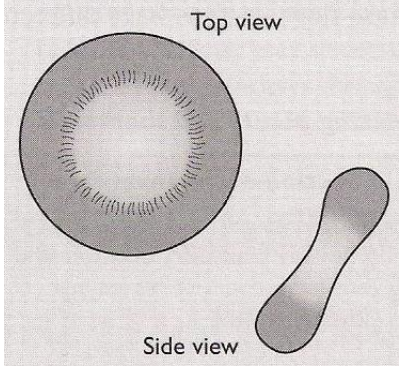
The absorptive surfaces in flowering plants and animals - cut and stick jumble:

Erythrocytes (red blood cells)

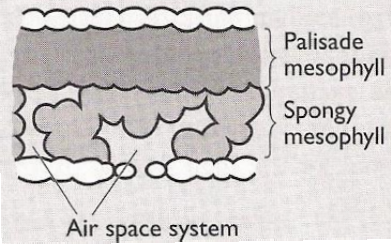


The leaf is a flattened structure (its thinness ensures a short diffusion distance) with a tightly packed upper palisade mesophyll layer and a loosely packed lower spongy mesophyll layer

Extensive networks throughout the body represent a huge surface area for the exchange of molecules between the blood and the body tissues; the number and distribution of capillaries is such that no cell is further away than 50 µm from a capillary, i.e. the diffusion distance is minute

Huge, moist surface area provides for efficient gas exchange; the alveolar walls are thin (0.1–1.0 µm), so the diffusion distance is short

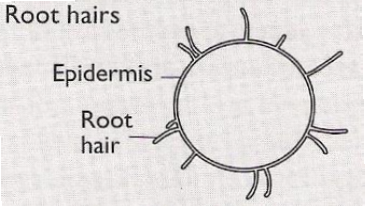
Leaf mesophyll



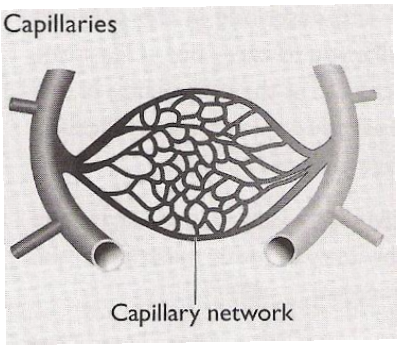
The biconcave disc shape greatly increases the surface area-to-volume ratio for efficient uptake of oxygen; the thinness of the cell, particularly where it is depressed in the centre, allows oxygen to diffuse to all the haemoglobin packed into the cell

Small (diameter 0.2 mm) sacs, occurring in clusters and in vast numbers within the mammalian lung; in human lungs there are 700 million, providing a total surface area of 70 m^2

Root hairs



Capillaries

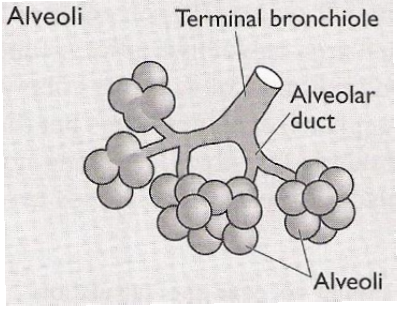


Small (diameter 8 µm) flexible biconcave discs, flattened and depressed in the centre, with a dumbbell-shaped cross section

Wide expanse of palisade tissue is efficient at trapping light; the loose arrangement of the spongy layer provides an air space system through the leaf and creates a huge surface for gas exchange

Increase greatly the surface area of the root for the uptake of oxygen, water and ions

Alveoli



Small (diameter 5–10 µm), thin-walled blood vessels, with a total length of 100 000 km and surface area of 1000 m^2 in the human body

Tubular extensions of the epidermal cells of the young root