

Salmonella and *Streptococcus*

Two bacteria which produce a range of common diseases and have specialized invasins

Lecture 2: Objectives

- Understand the virulence determinants of *Salmonella spp*
- Understand the role of invasins and endotoxin in typhoid fever
- Be aware of the diseases cause by *Streptococcus spp*
- Understand the virulence determinants in suppurative and non-suppurative Strep. infections

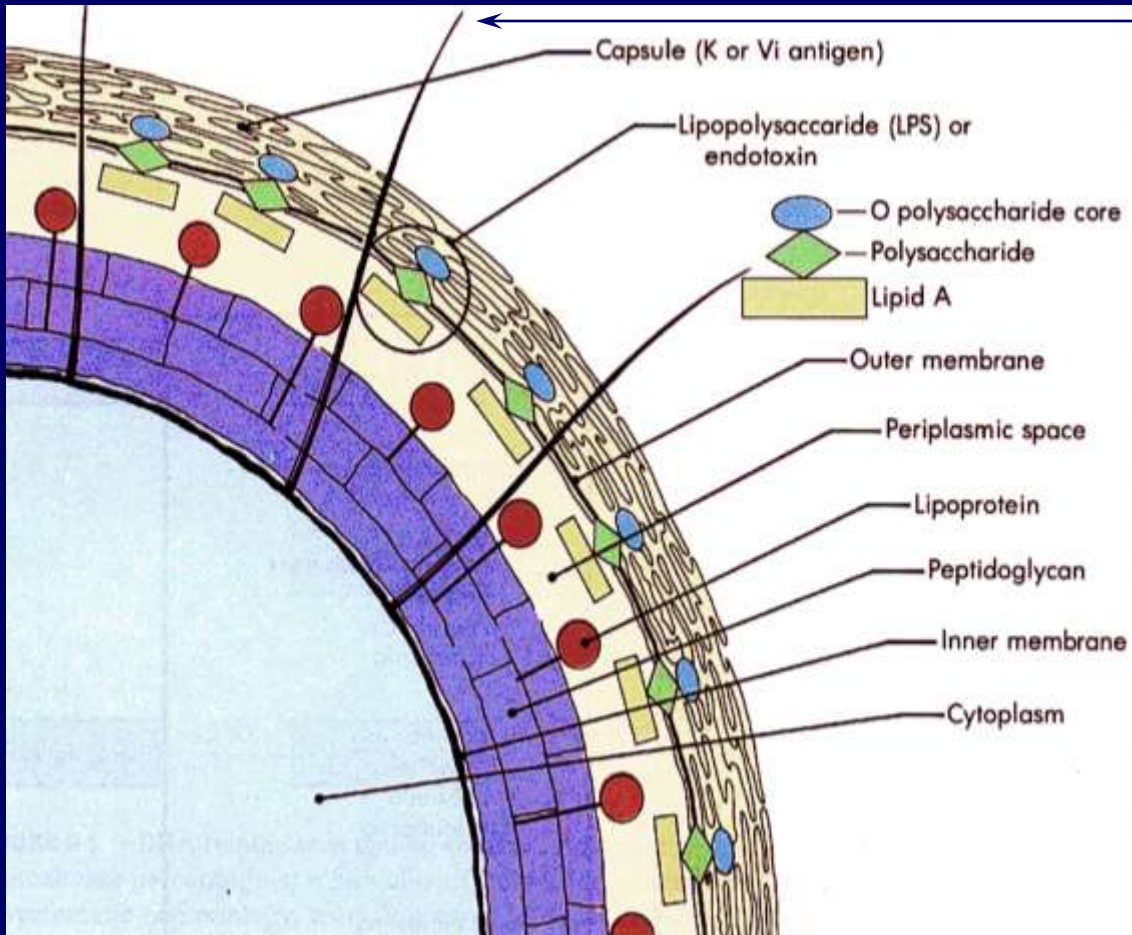
Varieties of Diarrhoea

- Watery diarrhoea: *V cholerae*, EPEC
- Gastroenteritis: *Salmonella spp.* type 3
- Dysentery: *Shigella*, EIEC
- Enteric fever: *Salmonella spp.* type 1

Food poisoning: epidemiology, etc.

- *Salmonella spp.* are commensals of domestic animals
- Infection is the result of poor hygiene
- Multiply-resistant strains increasing (agricultural practice)
- Disease causes £1 billion/yr in UK

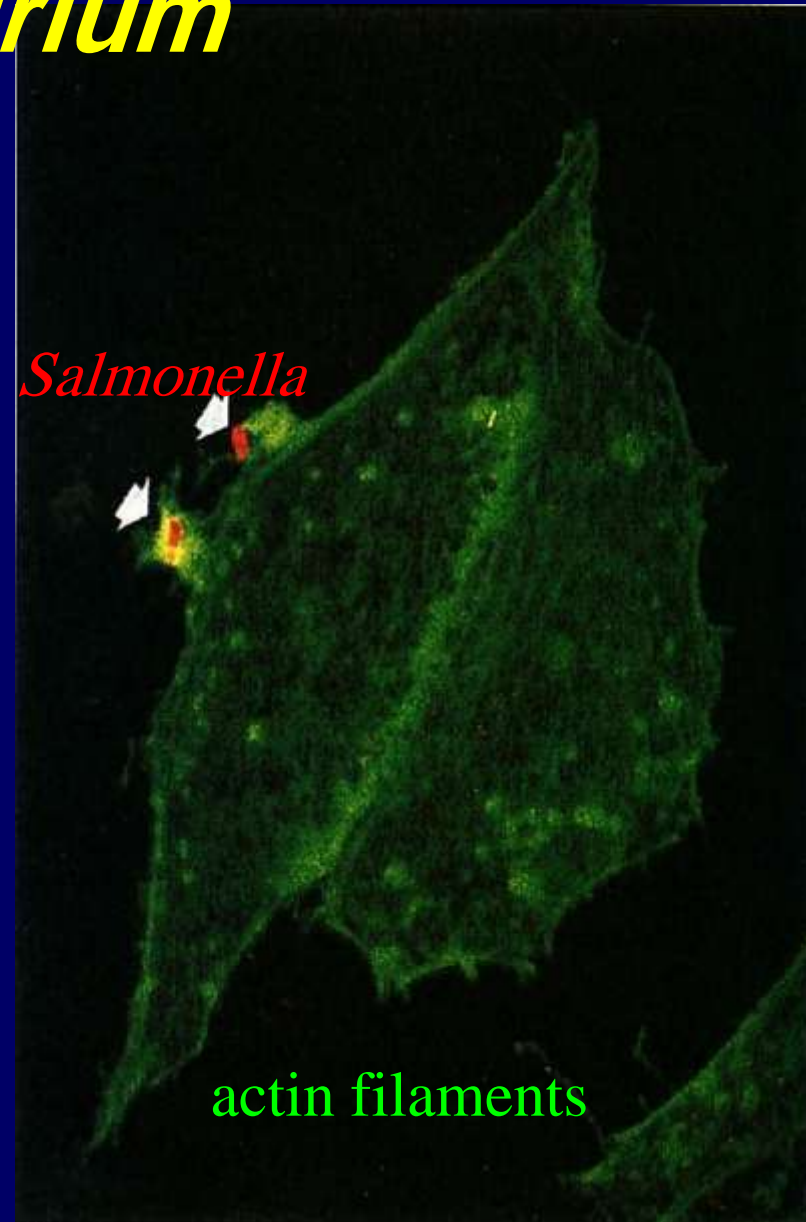
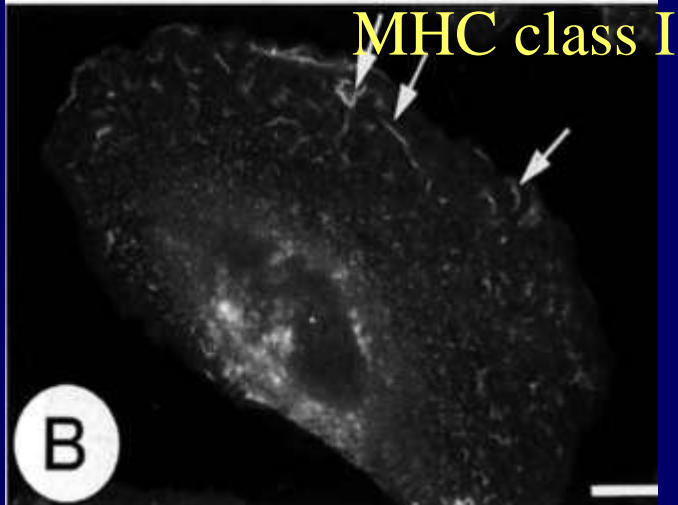
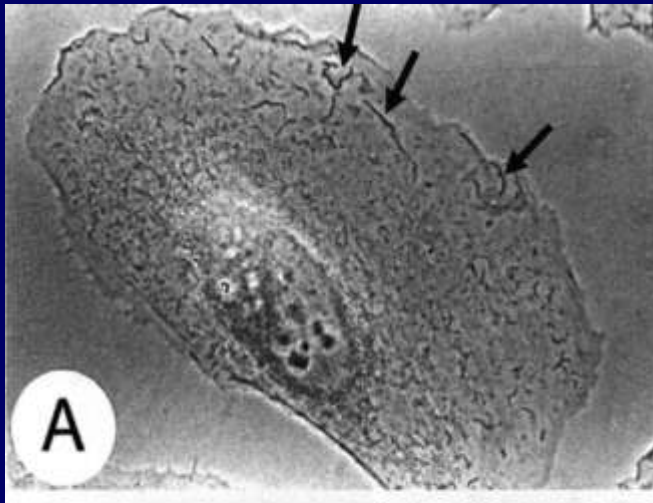
Salmonella virulence determinants



pili for cellular attachment

Induction of “ruffles” by *S. typhimurium*

“ruffles” induced by EGF



Sal. typhi and enteric fever



Streptococcus



β -haemolysis (*Strep. Pyogenes*)

Cellular morphology of *streptococcus*



Pharyngitis (*Strep. Pyogenes*)

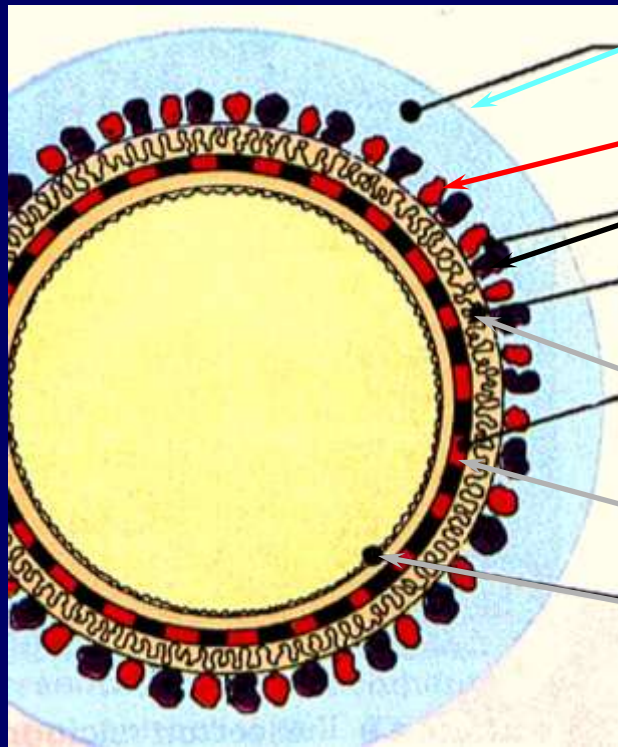


Pyoderma



Virulence determinants of group A *Streptococcus*

(the major subset of β -hemolytic streps)



capsule (hyaluronic acid)

protein F (*ptrF*) binds fibronectin

protein M (*emm*), antiphagocytic,
complement-protective

lipoteichoic acid (epidermis binding)

peptidoglycan

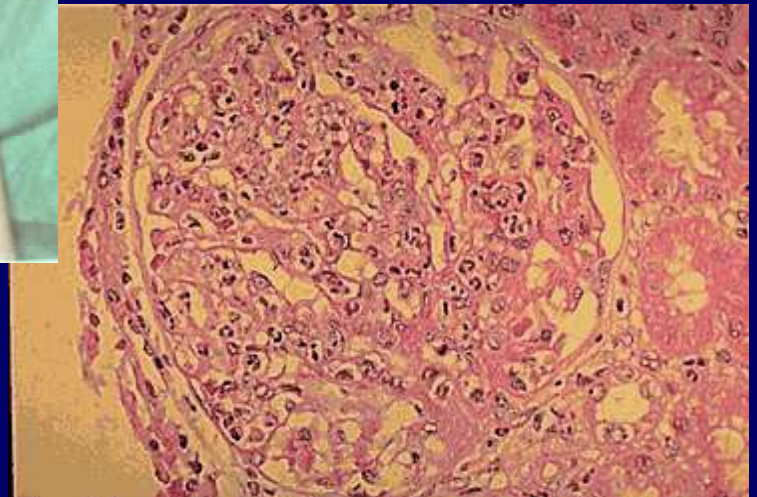
cytoplasmic membrane

Non-suppurative sequelae

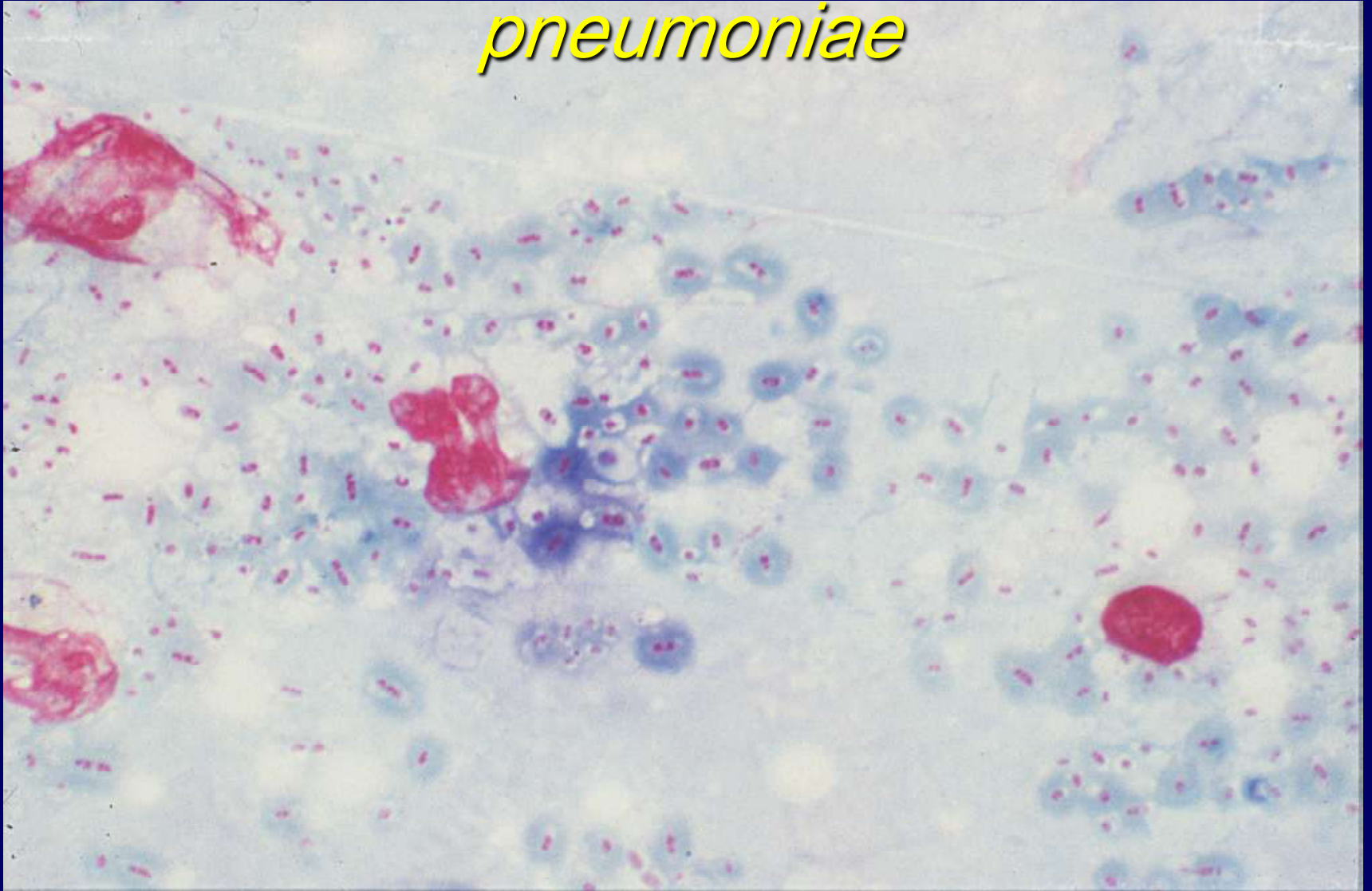


Scarlet fever

glomerulonephritis



Cellular morphology of *Strep. pneumoniae*



APPLIED MICROBIOLOGY SEWAGE TREATMENT

Aquatic Microorganisms

The microbiology of water is the study of microorganisms and their activities in natural waters, such as ponds, streams, rivers, estuaries, and the sea. Numbers of microorganisms in a body of water usually indicate high nutrient levels in the water. Water contaminated by inflows from sewage systems or biodegradable industrial organic wastes is relatively high in bacterial counts. Similarly, ocean estuaries (formed by rivers) have higher nutrient levels and higher microbial counts than other shorelines.

In water, particularly in water with low nutrient concentrations, microorganisms tend to grow on stationary surfaces and on particulate matter. In this way, a microorganism has contact with more nutrients than if it were randomly suspended and floating freely in the current. Many bacteria whose main habitat is water have appendages and holdfasts that attach to various surfaces. One example is *Caulobacter* (see Figure 11.15a). Some bacteria also have gas vesicles that they can fill and empty to adjust buoyancy.

FRESHWATER MICROBIAL FLORA

Figure 27.6 shows a typical lake or pond that serves as an example to represent the various zones and the kinds of microbial flora found in a body of fresh water. The littoral zone along the shore has considerable

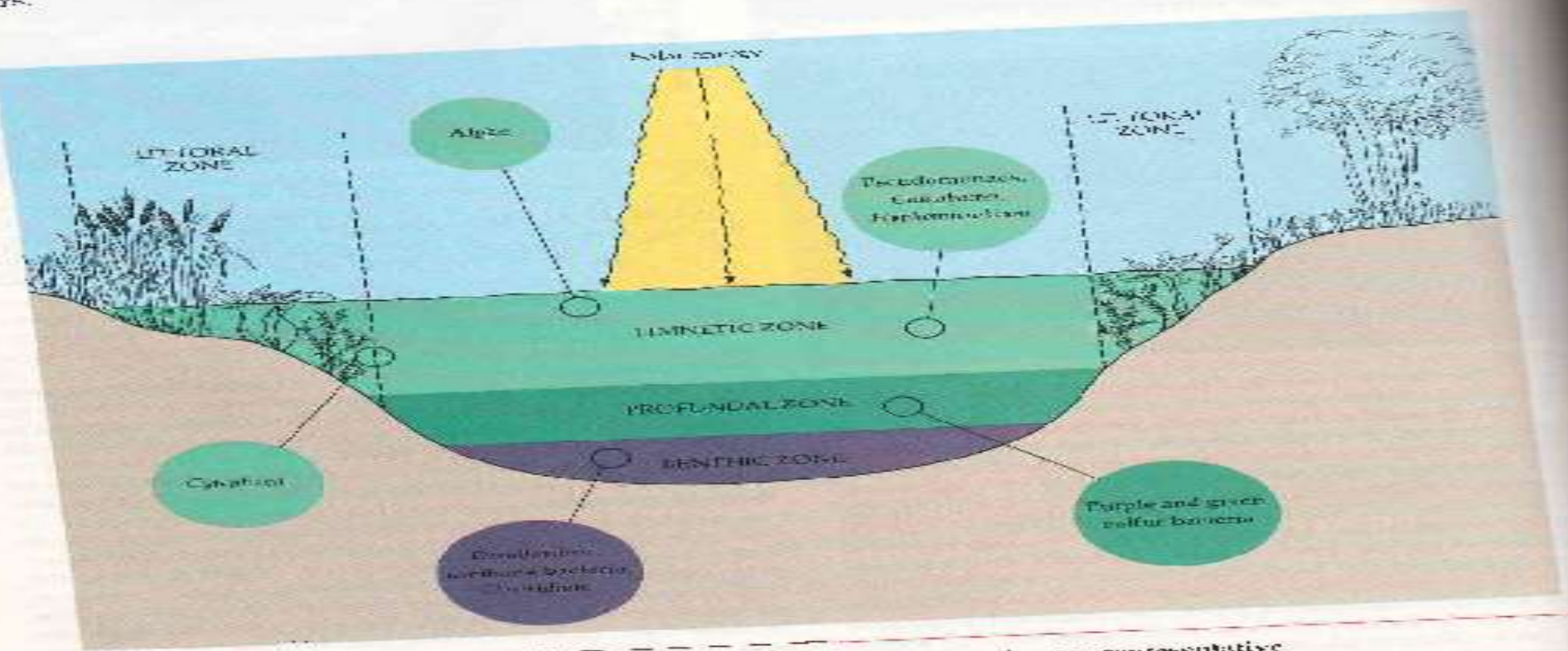


FIGURE 27.6 The zones of a typical lake or pond and some representative microorganisms of each zone. The microorganisms fill niches that vary in light, nutrients, and oxygen availability.