# Nutrition

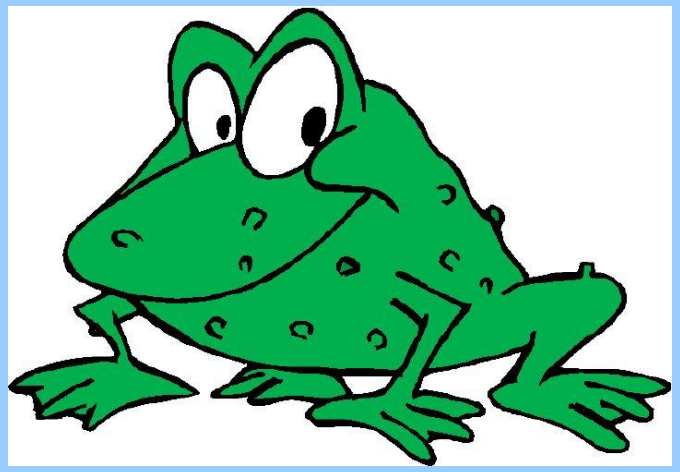
All organisms need the following compounds to survive.

1. Water
2. Oxygen
3. Carbohydrates
4. Proteins
5. Lipids
6. Vitamins and Minerals

# Types of Organisms

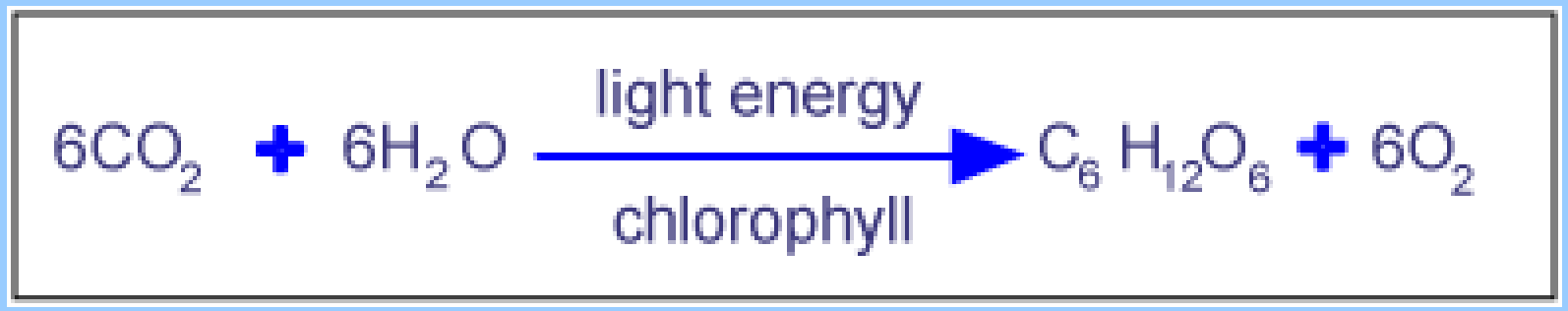
1. Autotrophs (self feeders) – these organisms produce their own organic compounds by photosynthesis. Examples…..

2. Heterotrophs (feed on others). These organisms obtain organic matter by eating other organisms. Examples…….



# Autotroph Nutrition

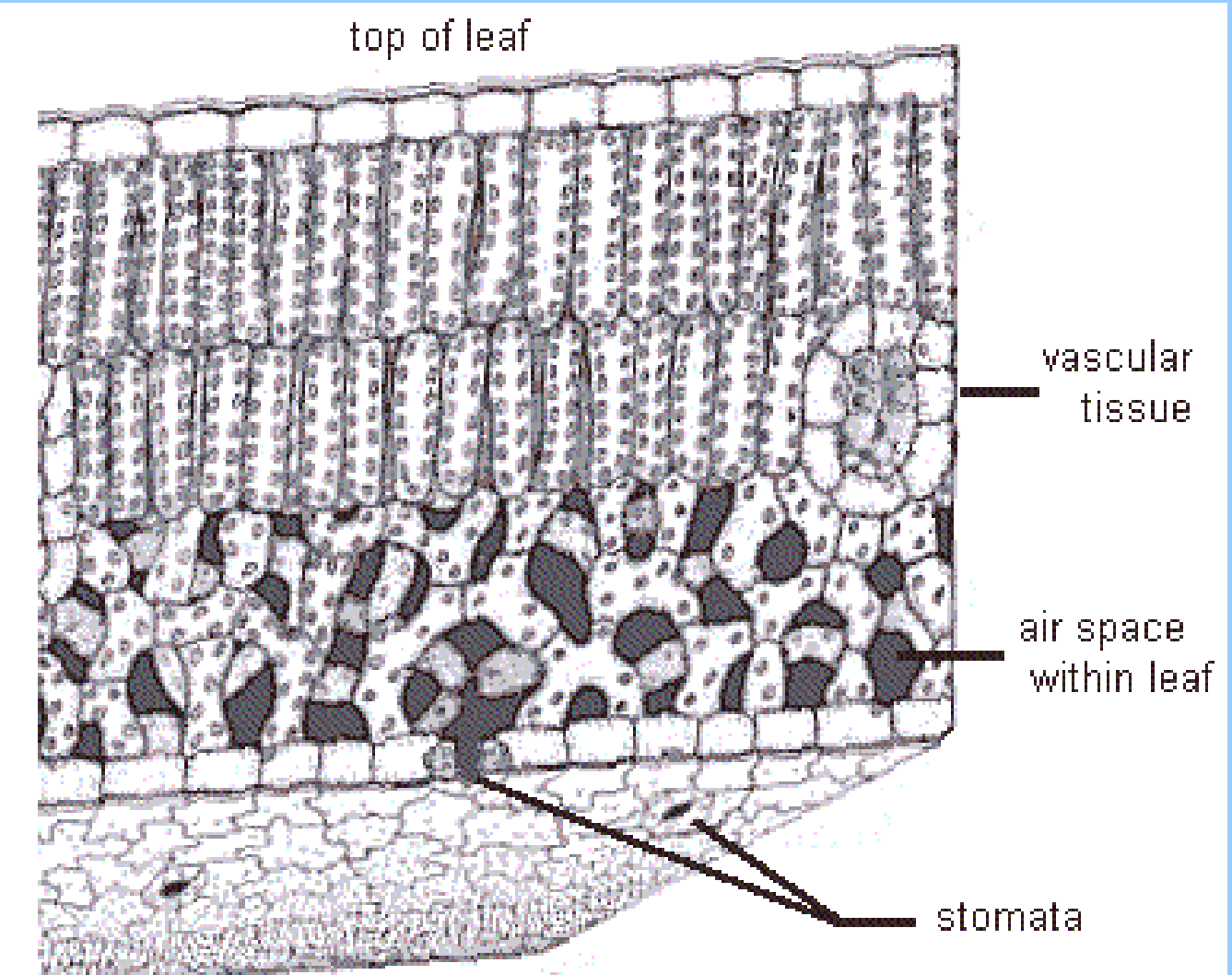
Autotrophs (green plants) obtain carbohydrates through the process of photosynthesis.

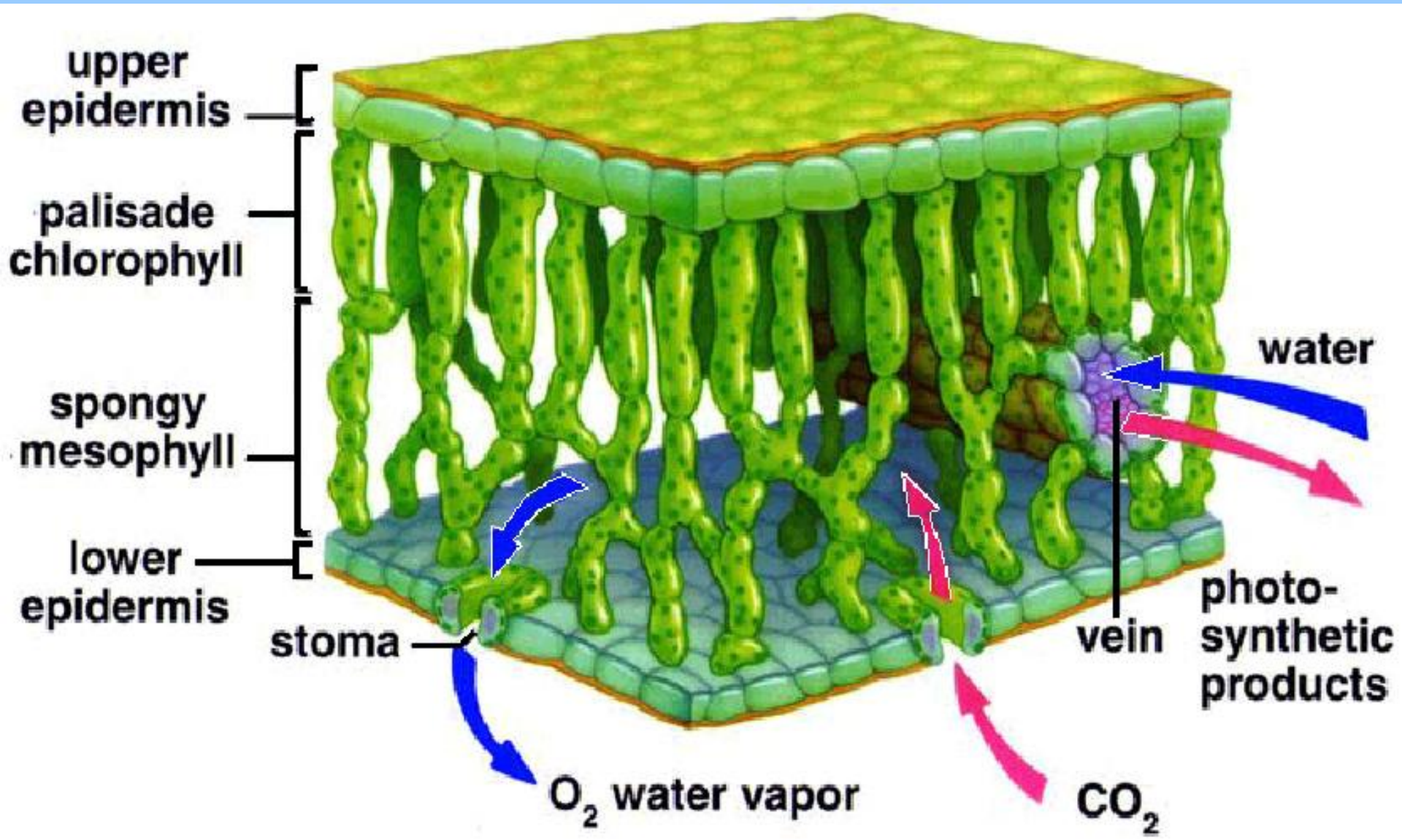


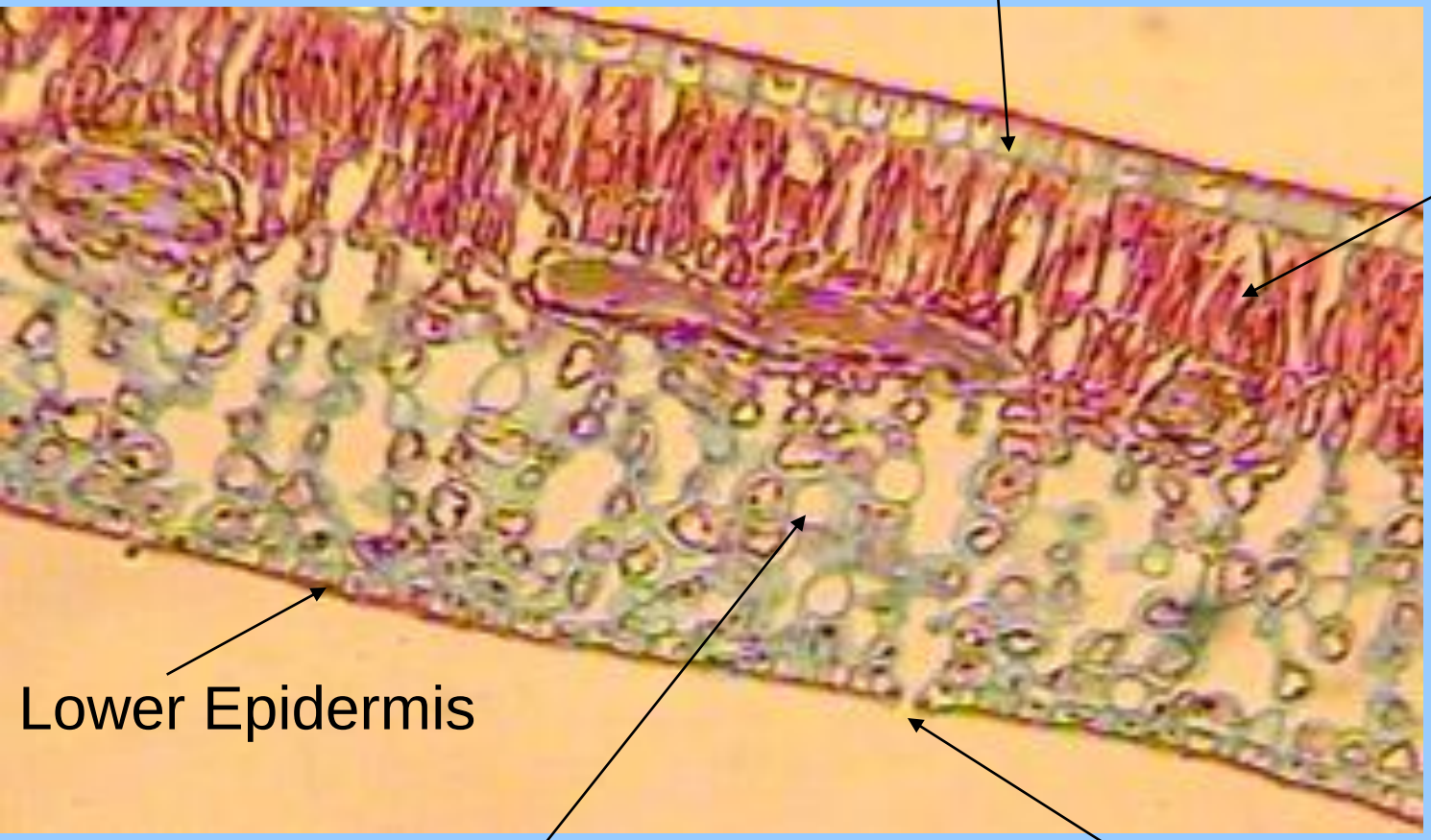
# What is the main plant organ that carries out photosynthesis??

Answer:  The Leaf

# How is a leaf adapted to carry out photosynthesis?




upper epidermis
palisade chlorophyll
spongy mesophyll
lower epidermis
stoma
water
vein
photo-synthetic products
$O_2$ water vapor
$CO_2$


Upper Epidermis
Palisade mesophyll
Lower Epidermis
Spongy mesophyll
Stoma with two guard cells

When the plant is well watered, the guard cells swell (become turgid) and the stoma opens to let in carbon dioxide.

This, however, lets water vapour escape from the leaf.

If the plant loses too much water vapour, the guard cells lose their turgidity and become flaccid.

This causes the stoma to close, preventing further water loss from the plant.

# Stoma (pore) open and closed

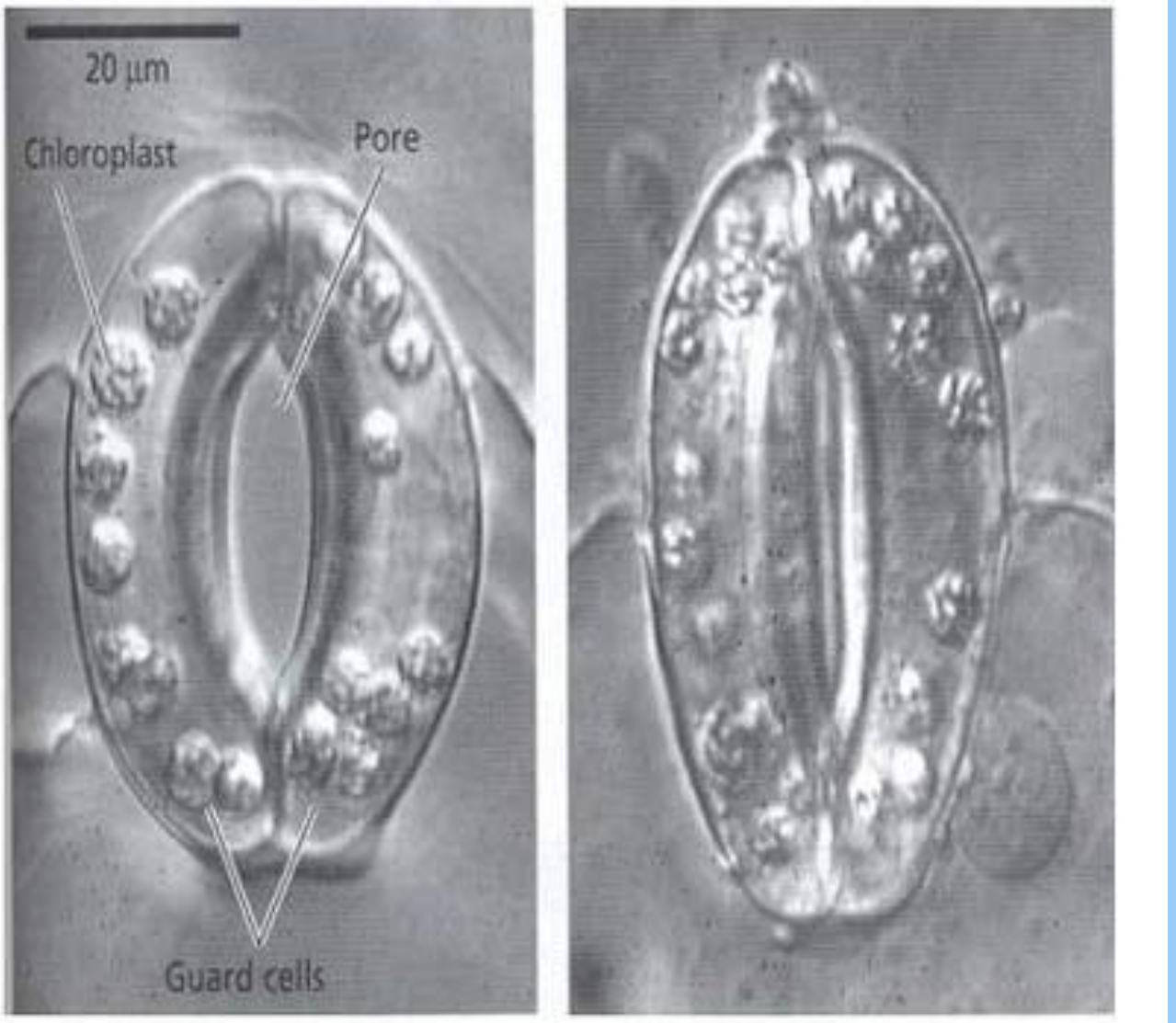



Image reproduced from Plant Physiology, Eds: L. Taiz and E. Zeiger, 2nd edition, Sinauer Associates, Inc. Publisher, Sunderland MA, USA. p. 523

# Stomata on the undersurface of a leaf


# How do plants make proteins and other organic compounds

- A plant must also obtain mineral ions from the soil, such as

Nitrates $NO_3^-$

Phosphates $PO_4^{3-}$

Magnesium $Mg^{2+}$

Sulphates $SO_4^{2-}$

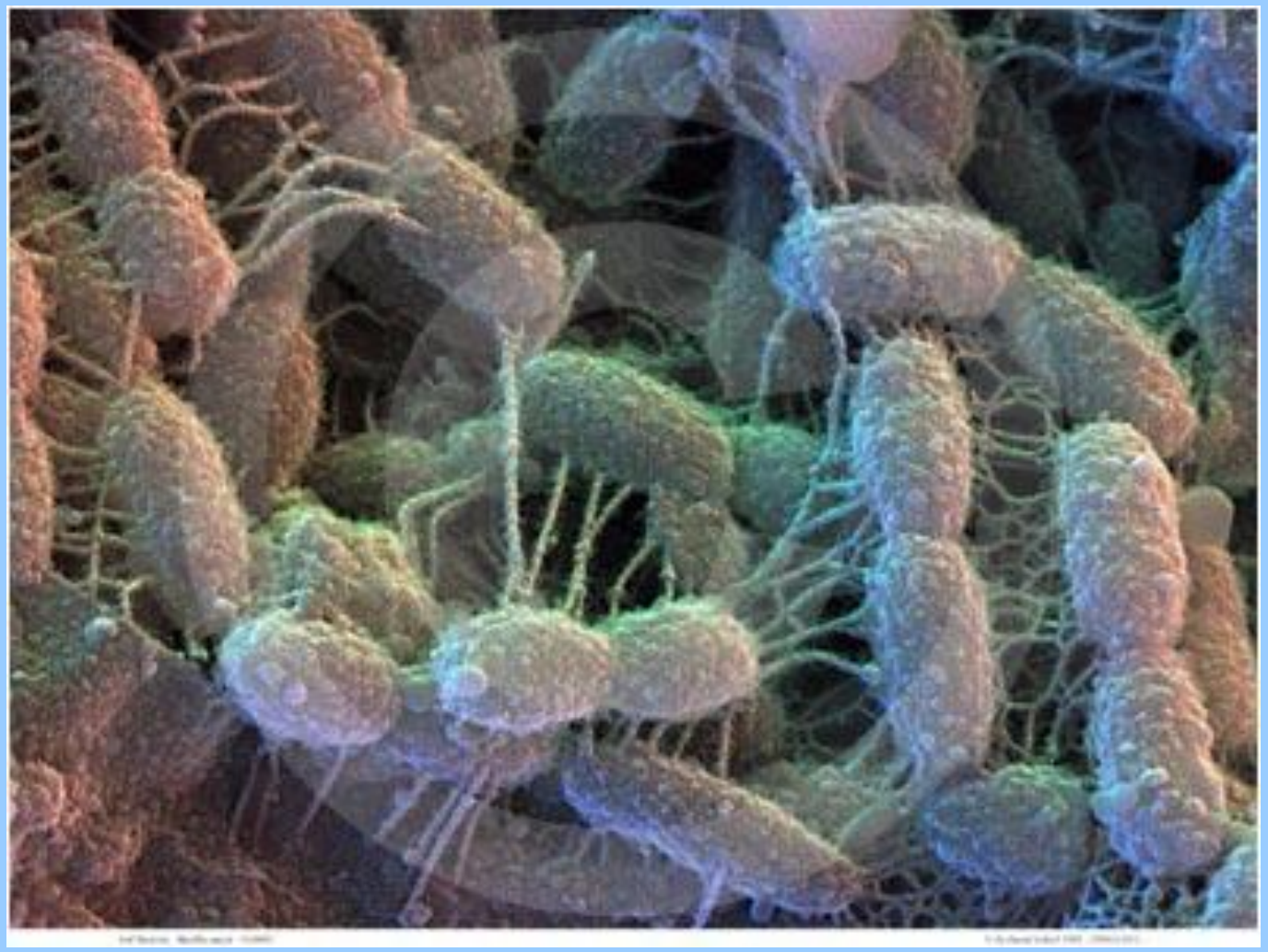
- When plants combine carbohydrates with these ions, they can then make all the other organic compounds it needs.

# Fertilizing a plant

- When plants are given a “feed” by a gardener, he or she is applying mineral ions so that the plant’s roots can absorb these from the soil.
- In the wild, plants obtain these mineral from the soil. Bacteria and fungi are essential in the soil for recycling dead organic matter back into mineral ions.

# Bacteria and Fungi from soil grown on agar

# Soil Bacteria



# Soil Fungi