1. Paramecium (heterotroph)
- Surrounded by small hairs called cilia which allow it to move (responsiveness)
- Engulf food via a specialized membranous feeding groove called a cytostome (nutrition)
- Food particles are enclosed within a small vacuoles that contain enzymes for digestion (metabolism)
- solid wastes are removed via an anal pore, while clique wastes are pumped out via contractile vacuoles (excretion)
- Essential gases enter (e.g. O2) and exit (e.g. CO2) the cell via diffusion (homeostasis)
- Divide asexually (fission) although horizontal gene transfer can occur via conjugation (reproduction)

2. Scendesmus (autotroph)
- exchange gases and other essential materials via diffusion (nutrition/excretion)
- chlorophyll pigments allow organic molecules to be produced via photosynthesis (metabolism)
- daughter cells form as non-motile nautospores via the internal asexual division of the parent cell (reproduction)
- may exist as unicells or form colonies for protection (responsiveness)

SA:Vol Ratio

Cells need to produce chemical energy (via metabolism) to survive and this requires the exchange of materials with the environment
- the rate of metabolism of a cell is a function of its mass/volume (larger cells need more energy to sustain essential functions)
- the rate of material exchange is a function of its surface area (large membrane surface equates to more material movement)

As a cell grows, volume (units3) increases faster than surface area (units 2) leading to a decreased SA:Vol ratio
- if metabolic rate exceeds the rate of change
- growing cells tend to divide and remain small in order to maintain a high SA:Vol ratio suitable for survival

Increasing SA:Vol Ratio

Cells and tissues are specialized for gas or material exchanges will increase their surface area to optimize material transfer
- intestinal tissue of the digestive tract may form a ruffled structure (villi) to increase the surface area of the inner lining
- alveoli within the lungs have membranous extensions called microvilli, which function to increase the total membrane surface

Magnification

Calculation of Magnification:

To calculate the linear magnification of a drawing or image, the following equation should be used:
- **M**agnification = **I**mage size (with ruler) / **A**ctual Size (according to the scale bar)

Light microscopes use visible light and a combination of lenses to magnify images of mounted specimens
- living specimens can be view in their natural color but stains can be applied to pick out specific structures