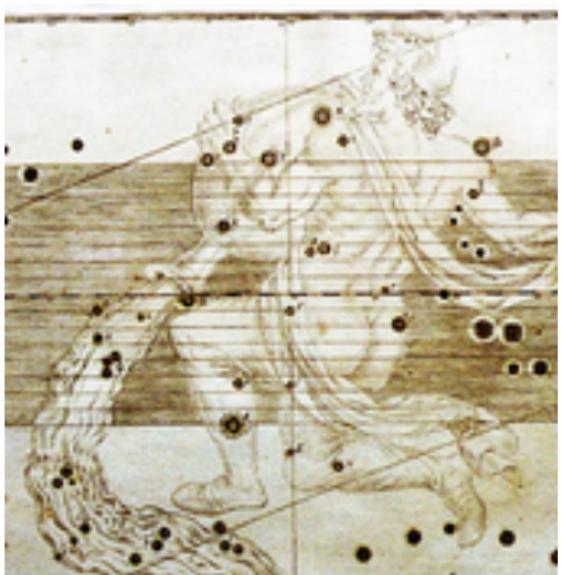


Forms in Nature

Astronomical forms



aquarius (Kumbha) : the water carrier constellation

Astronomical objects or celestial objects

cohesive structures bound together by gravity (and sometimes by electromagnetism), e.g., the asteroids, moons, planets and stars

They may consist of multiple independent astronomical bodies or objects, from single planets to star clusters, nebulae or entire galaxies.

A comet may be described as a body, in reference to the frozen nucleus of ice and dust, or as an object, when describing the nucleus with its diffuse coma and tail.

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The universe can be viewed as having a hierarchical structure.

superclusters of galaxies

clusters of galaxies

galaxy:

variety of morphologies; shapes determined by evolution

distinct features, such as spiral arms, a halo and a nucleus

At the core, most have a supermassive black hole, which may result in an active galactic nucleus.

> can also have satellite dwarf galaxies and globular clusters.

clusters of stars

star: formed out of gaseous matter through gravitational attraction.

planetary system

planet

satellites

comets, asteroids

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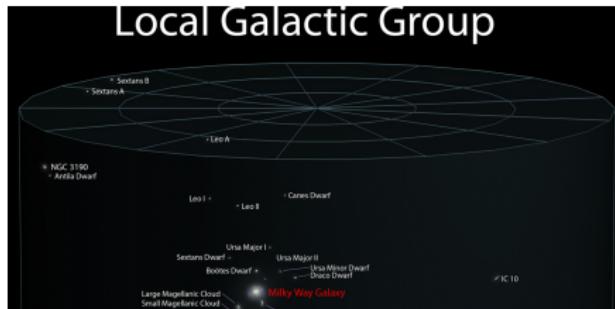
comets, asteroids

largest scales: groups and clusters, often within larger superclusters, of galaxies.

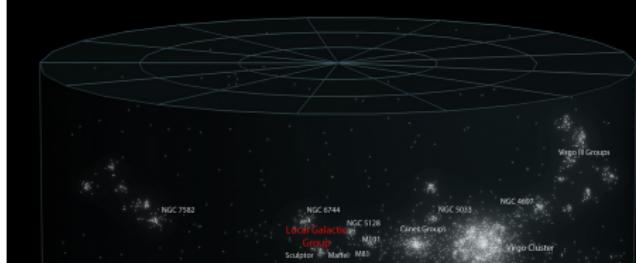


The Abell 901/902 supercluster is located a little over two billion light-years from Earth.

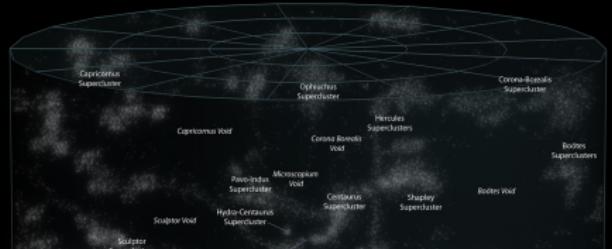
Distance from Earth to Sun: 149.6 million km (1.496×10^{11} m).



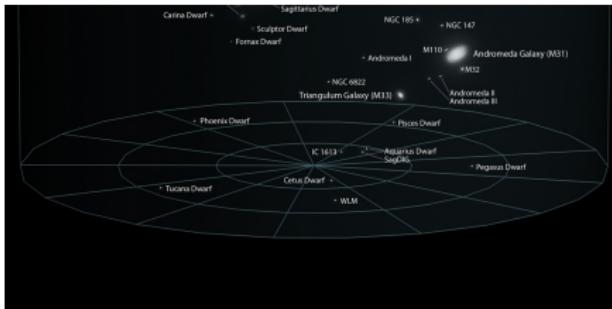
Virgo Supercluster



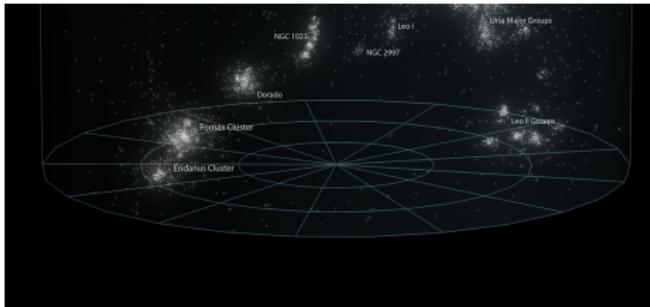
Local Superclusters



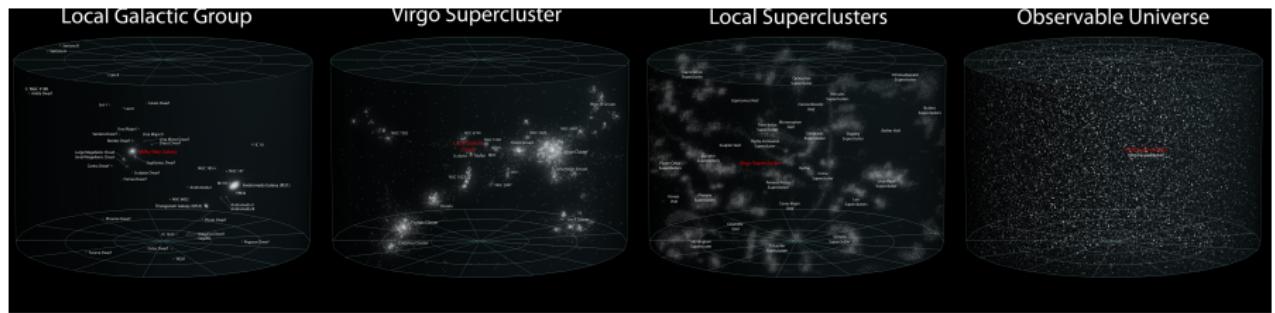
Milky way: 100,000–120,000 light-years in diameter; solar system about 27000 light years away from the centre



Virgo: Group of galaxies within 150 million light years



local group moves at 600 km/h; observable universe: diameter - 8.8×10^{26} m or 93 billion light years



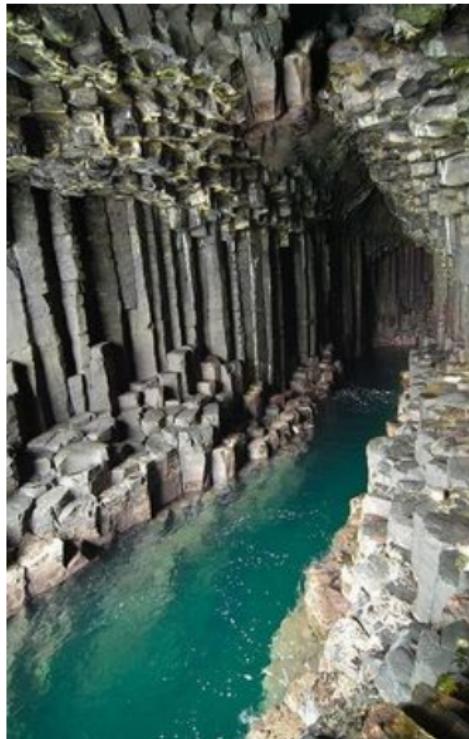


distance between Earth and moon: 384,400 km

Geological forms

cave of melody Scotland (Fingal's cave, island of Staffa)

hexagonal basalt columns that has come to form from the cooling of a lava flow occurred 60 million years ago; size: 227 feet (69 m) long and about 40 feet (12 m) wide. Its roof arch reaches 66 feet above mean sea level, and the floor is covered by water never less than 25 feet deep



Folded gneiss :Disharmonic folds

gneiss: high grade metamorphic rock, meaning that it has been subjected to higher temperatures and pressures. It is formed by the metamorphosis of granite, or sedimentary rock. Gneiss displays distinct foliation, representing alternating layers composed of different minerals - fold shape changes from layer to layer



volcanic craters- Isabela island - Galapagos



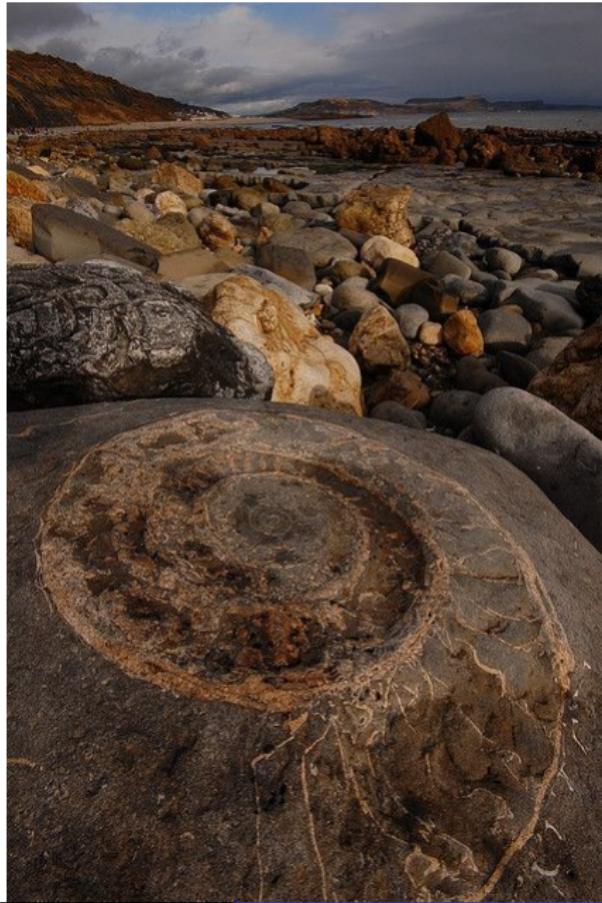
© 1173-4519
Robert Harding World Imagery

Antelope canyon, Arizona, USA

A gorge or canyon (cañon, old spelling occasionally still used) is a deep ravine between pairs of escarpments or cliffs and is the most often carved landscape by the erosive activity of a river over geologic timescales



Lyme Regis ammonite fossils (\approx 300my), England



Zion canyon, Utah





Biological forms

Classification:

- Domain - Archea, Eubacteria, Eukaryote
- Kingdom - Plants, Animals, Fungi, Protists, Eubacteria (Monera), Archaeabacteria
- Phylum
- Class
- Order
- Family
- Genus
- Species

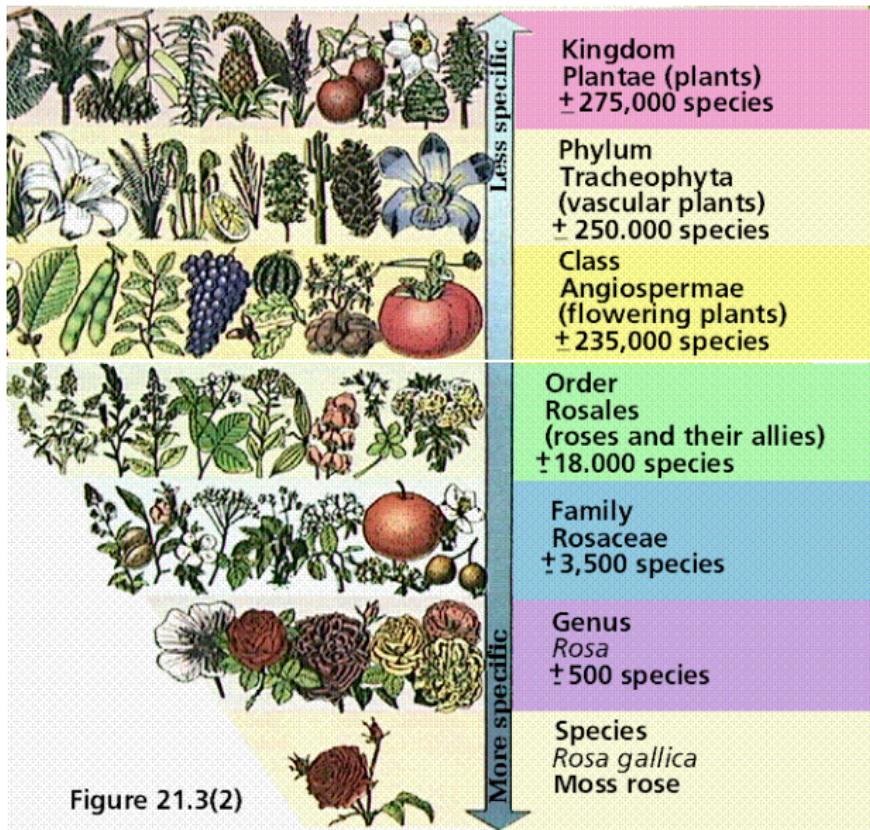


Figure 21.3(2)

Kingdom
Animalia
(animals)
 $>1,000,000$ species



Phylum
Chordata
(chordates)
 $\pm 40,000$ species



Class
Aves
(birds)
8,600 species



Order
Passeriformes
(songbirds)
5,160 species



Family
Parulidae
(wood warblers)
125 species



Genus
Dendroica
28 Species



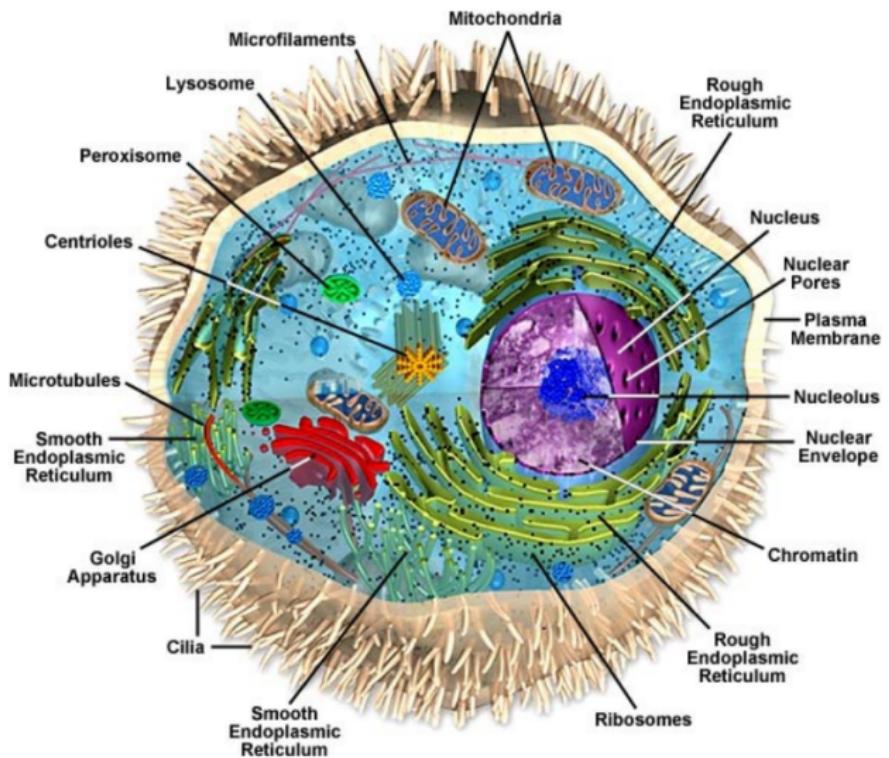
Species
Dendroica fusca
Blackburnian warbler
Figure 21.3(4)

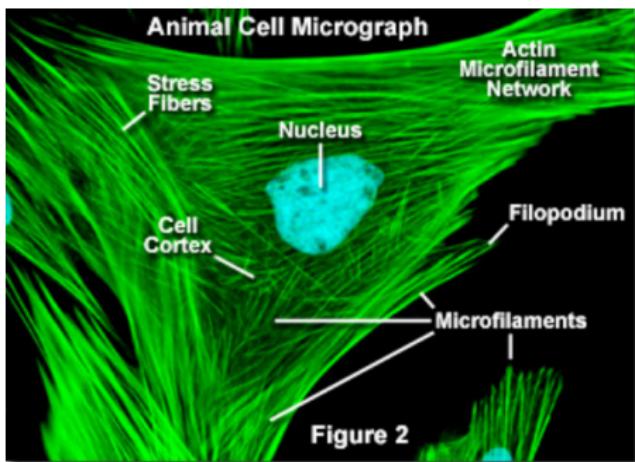
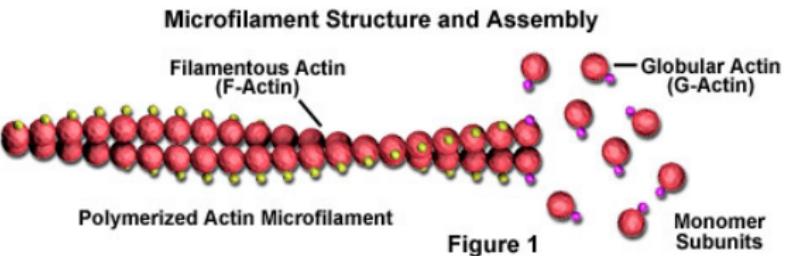
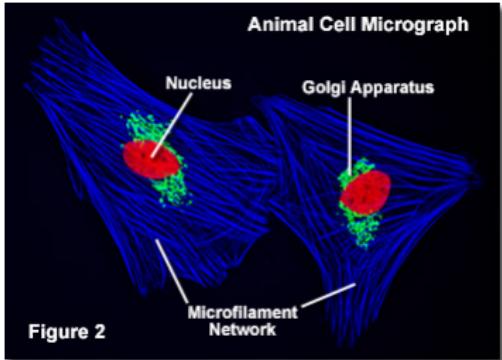


Less specific

More specific

Cellular





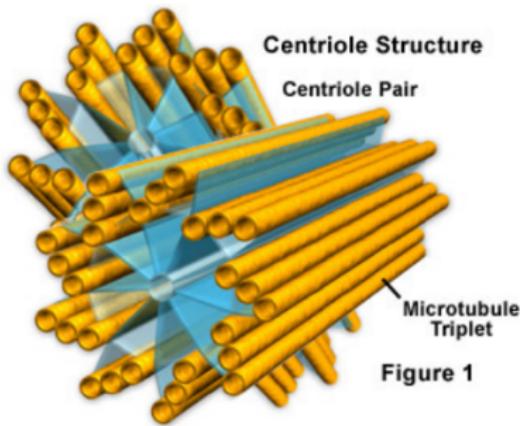


Figure 1

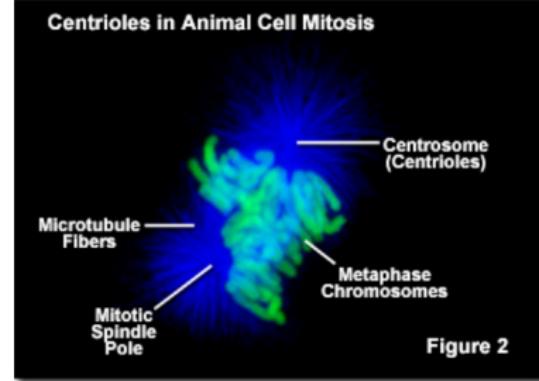
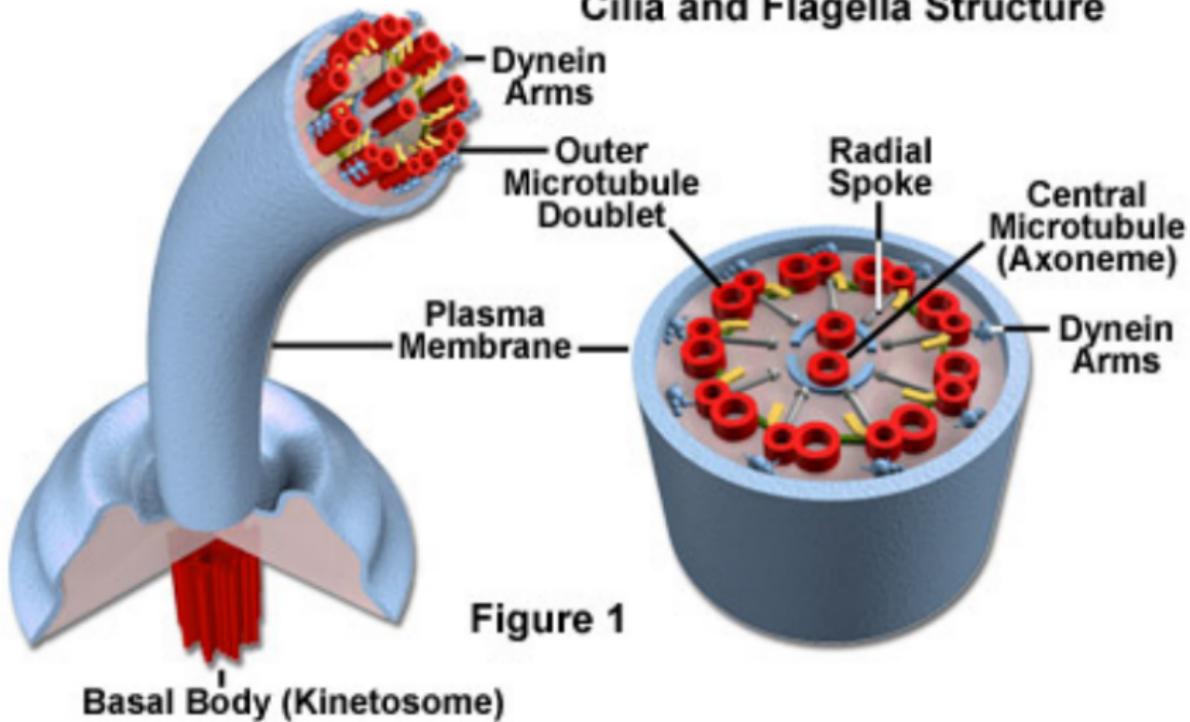


Figure 2

Cilia and Flagella Structure



The Golgi Apparatus

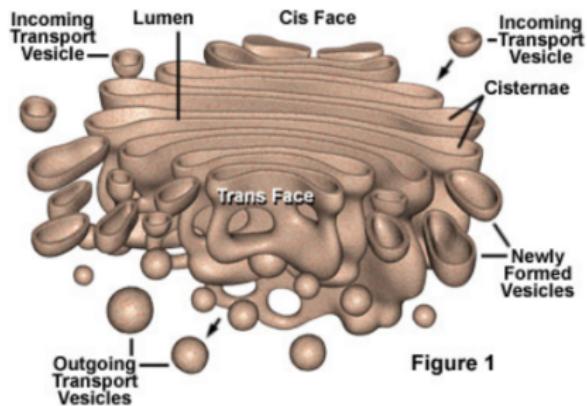


Figure 1

Animal Cell Micrograph

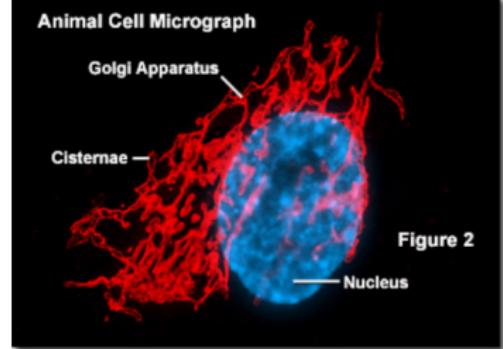


Figure 2

Microtubule Helical Structure

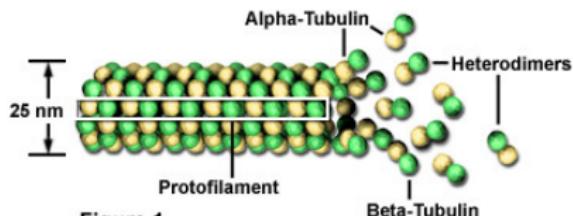


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Animal Cell Micrograph

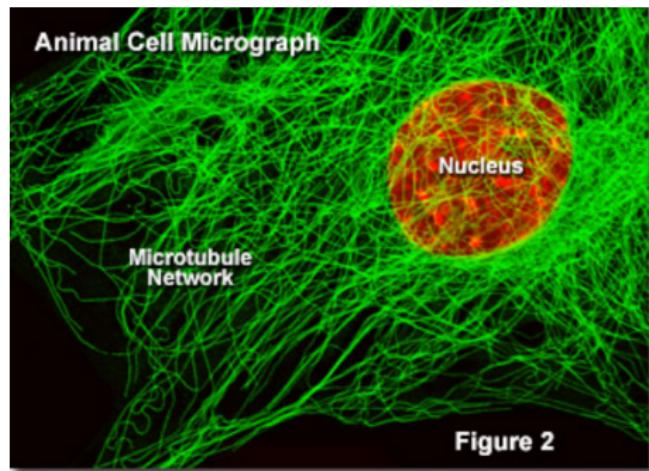
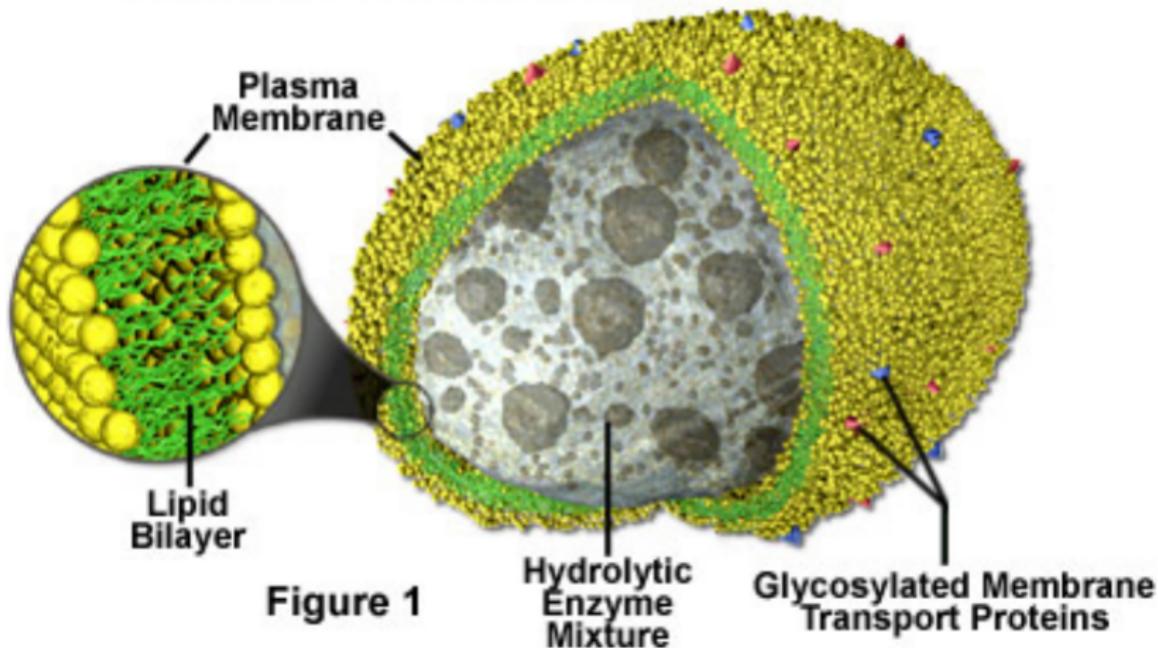
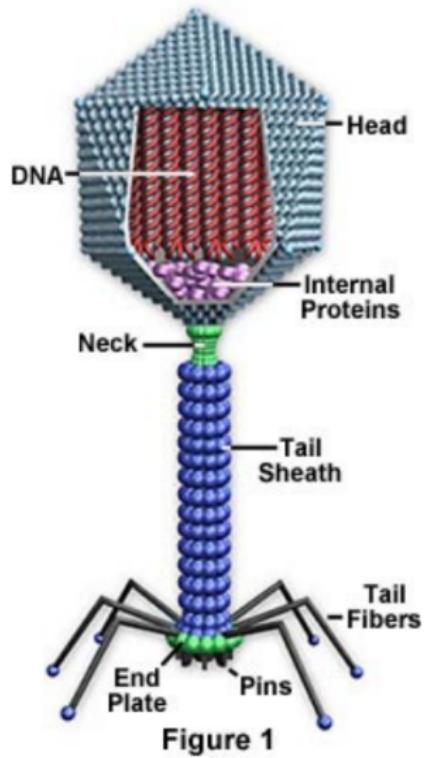


Figure 2

Anatomy of the Lysosome



Bacteriophage Structure



Animal Virus Structure

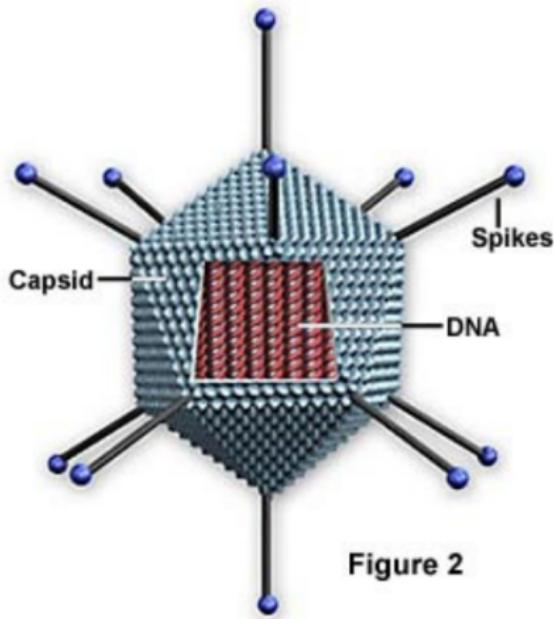
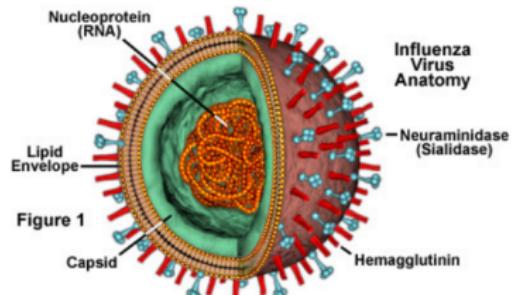
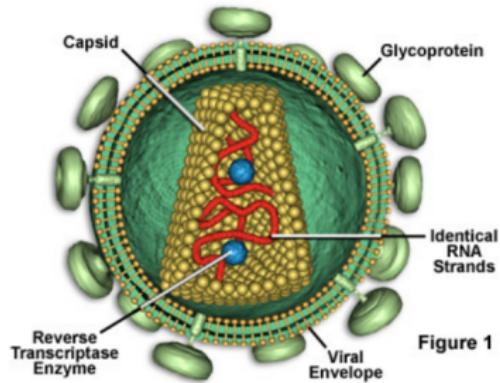


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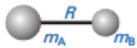


Human Immunodeficiency Virus (HIV) Anatomy

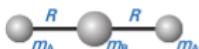


Molecular world

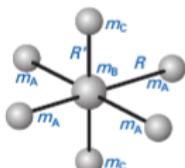
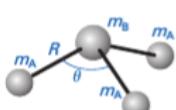
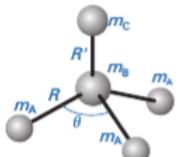
1. Diatomic molecules



2. Triatomic linear rotors



3. Symmetric rotors



4. Spherical rotors

