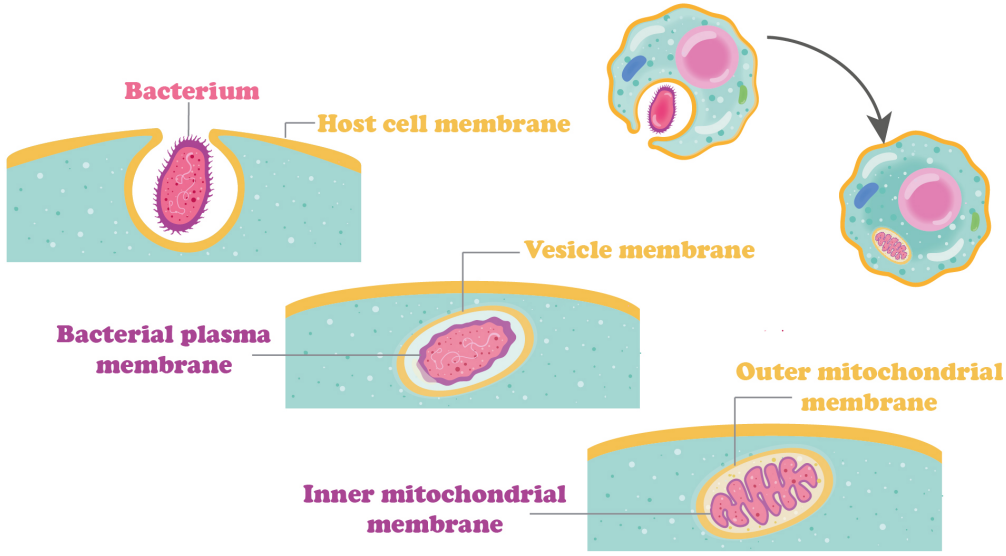
CONCEPT: ORGANELLE DNA

- Mitochondria and chloroplasts both contain their own DNA (**mtDNA** and **cpDNA**)
  - □ Cells are classified based on the _____ of DNA sources they contains
    - **Heteroplasmic** cells contain DNA in the nucleus, and from organelle sources
    - **Homoplasmic** cells contains only DNA from one source
  - □ The **endosymbiont theory** explains how mitochondria and chloroplasts evolved with eukaryotic cells
    - It states that the mito and chloro were free-living bacteria, that were engulfed by early eukaryotic cells
  - □ Mutations in the organelle DNA can cause serious defects
    - Myoclonic epilepsy and ragged-red fiber disease (MERRF) – causes deafness, seizures, and other issues

EXAMPLE: Endosymbiont Theory



- □ The DNA found in these organelles is small, and _____
  - It generally contains few noncoding regions, and no introns
- □ Human mitochondrial DNA has certain properties
  - It has a **heavy chain**, which has more guanines
  - It also has a **light chain,** which has more cytosines
- □ The codon code is not universal in mitochondria and chloroplasts
  - Ex: AGA codes for arginine normally, but in *Drosophilia* mitochondrial DNA it codes for serine

Inheritance

- Inheritance of organelle DNA is different than _____ DNA
  - □ **Uniparental inheritance** is when progeny inherit DNA solely from one parent
    - Mitochondrial DNA is inheritance *maternally*

EXAMPLE:

Mutant Female	X	WT Male	⟶	Progeny all mutant
WT Female	X	Mutant Male	⟶	Progeny all WT

- □ **Cytoplasmic segregation** is when two organelles apportion themselves into different daughter cells
  - Ex: Variegation in plants, slow growing “poky” Neurospora fungi
  - In rare cases, an affected female will produce a healthy offspring

EXAMPLE: Variegation due to cytoplasmic segregation of chloroplasts in plants