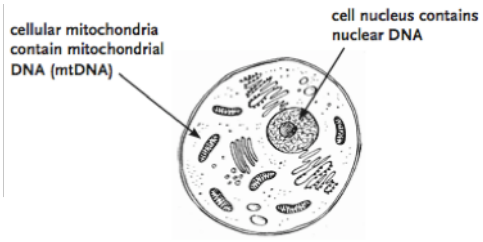
Extra Credit Assignment

The Hunt for mtDNA

You are a forensic scientist recruited to help solve a long-standing missing persons case. Mitochondrial DNA, or mtDNA for short, is the key to your success.



Procedure

1. Read the Guidelines for mtDNA Inheritance:

Guidelines for mtDNA Inheritance

Mitochondrial DNA (mtDNA) is found in each cell's mitochondria, structures that produce ATP, the cell's main energy source. Here are some guidelines about how mtDNA is inherited:

- mtDNA can only be inherited from a woman.
- A man can inherit mtDNA from a woman.
- A man cannot pass mtDNA on to any children.

2. Read the Case of the Missing Dung Beetle Biologist:

> An anthropologist has found a few human bones at a site in South Africa. Investigators think they might belong to a Nobel Prize-winning dung beetle biologist who disappeared in Africa. Since the bones have been exposed to severe weather for many years, the only DNA that may be salvageable is mtDNA. Investigators have compiled a pedigree chart that lists all the missing person's relatives. But investigators are having problems identifying his maternal relatives. Mitochondrial DNA can be retrieved from exhumed remains, but this is a costly process and can be emotionally difficult for families. When possible, it is always best to retrieve mtDNA from a living relative. Mitochondrial DNA cannot be retrieved from cremated remains. All deceased individuals have been cremated. The missing person is labeled with a question mark in the pedigree chart.

Use the pedigree chart on the next page and a colored pencil to complete steps 3 & 4.

3. Connect individuals who share mtDNA from the great-great grandmother by darkening the lines that link them to one another.

4. Of the individuals connected by dark lines, circle the living relatives who are eligible to be tested for mtDNA.

Name: _____

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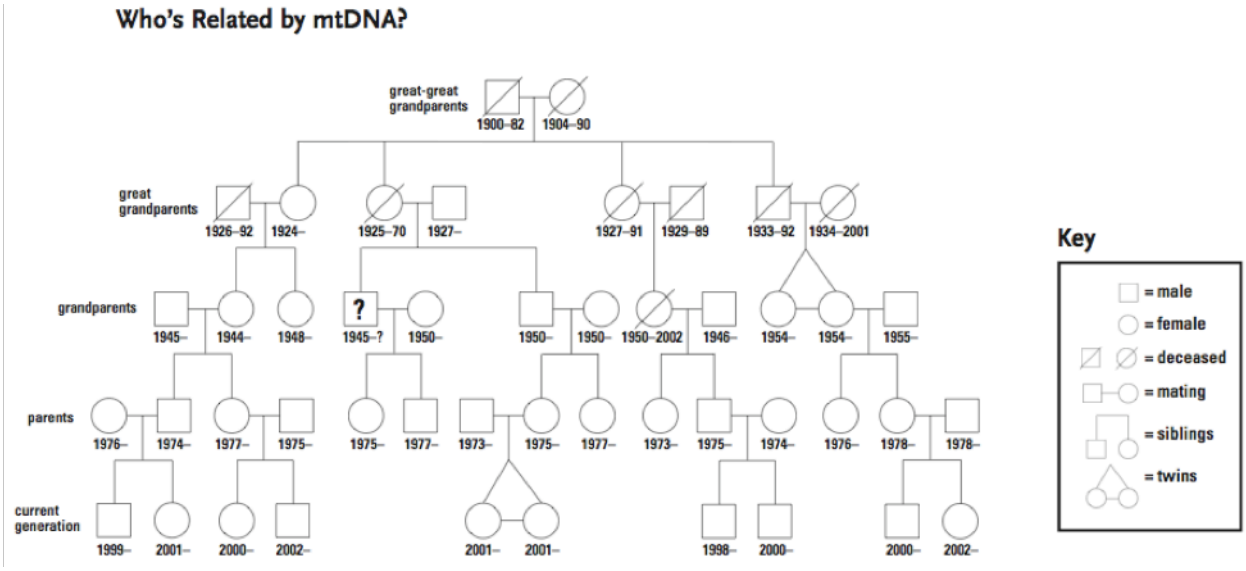
30 Points

Procedure 3 & 4 (5 Points Each)



Questions (4 Points Each)

1. How many living relatives could provide mtDNA to test against the mtDNA of the discovered remains that are believed to belong to the missing person shown by a question mark in the pedigree chart?

2. Describe the inheritance pattern of mtDNA.

3. If two brothers died in a crash, could you use mtDNA to distinguish their remains one from the other? Why or why not?

4. Why aren't the dung beetle biologist's children eligible for testing?

5. How far back could you trace a lineage of mtDNA?