

1. Hemophilia is X-linked so it's located on the X chromosome.
2. Alix became a carrier of hemophilia due to the fact that her mother Alice was a carrier as well. She received an affected X chromosome from her mother and an unaffected X from her father.
3. A substitution mutation can change the acceptor of the gene. The acceptor would switch to something completely different.
4. The genotype for a carrier of hemophilia is X^hX^H .

Part III

5. Mitochondrial DNA from Alix was used to identify three females because offspring inherit mitochondrial DNA from their mother, not their father.
6. Prince Philip's mitochondrial DNA was used because Prince Philip shared mitochondrial DNA with Queen Victoria's granddaughter which allowed them to identify Alix and her daughters. Prince Philip served in the Royal Navy and British Army, he was the husband of Queen Elizabeth II and was the longest serving royal consort. Yes, he has a number of grandchildren but the "known" ones are Prince Harry and William Prince.
7. There were two missing children from the Romanov grave, Tsarevich Alexei and Anastasia.
8. Yes, it would matter since only princess Xenia would share mito DNA with Nicholas since they had the same mother.
9. What was found in Nicholas's mitochondrial DNA was a single point heteroplasmy which differed from the ones found in Duke and Princess Xenia.
10. The term given to the existence of two or more genetically different mitochondria in the cell is Heteroplasmy