Romanov Project

History:

1) Who were the Romanov's (in Russian History)?
   - The last Russian monarchy

2) Briefly outline the Romanov lineage
   - The main family consisted of Tsar Nicholas II, Alexandra (his wife), and their five children.
   - Ruled over Russia for 300 years

3) Nicholas II was the last Romanov to hold power in Russia. What was his title?
   - Tsar.

4) What happened to Nicholas II? Why (from a geo-political view)? Who then took control?
   - He was executed
   - There was fear of the Russian army attempting to rescue the family. ~~[illegible]~~ To "break" the will of the people loyal to the Tsar they were executed.
   - The Ural Soviets.

5) Describe the family of Nicholas II. What happened to them?
   - Nicholas II = Tsar, Alexandra = ~~Tsaricina~~ Tsarina + their 5 Children (Olga, Tatiana, Maria, Anastasia, and ~~[illegible]~~ Alexei = Tsarevich.
   - They were executed.

Hemophilia:

6) How was Nicholas II ~~[illegible]~~ wife, Alix, related to Queen Victoria of England?
   - Alix is Queen Victoria's granddaughter

7) In a couple sentences, describe the disease hemophilia.

- Hemophilia is a X-linked recessive disorder that causes a defficiency in blood clotting factors. It primarily affects males since they only have one X chromosome whereas females have two X chromosomes, so the recessive disorder is not normally expressed in women.

8) What type of hemophilia (A or B) is (probably) represented in the pedigree chart?

- hemophilia B

9) Using your knowledge from Module 4, on what chromosome is the gene that causes hemophilia?

- X chromosome

10) Describe the mutation that apparently caused hemophilia in Alix, (and probably all of the European family that had hemophilia).

- ~~one~~ causal substitution in the ~~first~~ splice acceptor site of exon 4 in the F9 gene.

11) Using your knowledge from Module 7, describe how the mutation you described in #10 could result in a faulty gene product.

- This mutation can result in a loss of function mutation, meaning that proper clot factors are no longer being produced.
- The substitution ~~can~~ changes the triplet code ultimately changing the amino acid produced.

12) Again, using your knowledge from Module 4, give the genotype for a carrier of hemophilia.

- heterozygous (Aa)

13) The Romanov's son, Alexis, had hemophilia. Describe how Alexis genetically acquired hemophilia. (Use a Punnett square. You can either draw a table or line up the genotypes).

- X' = hemophilia gene

	X'	X
X	X'X	XX
Y	X'Y	XY

↑ Alexis

14) Using a Punnett square (again, draw a table or line up the genotypes), explain why only males in the pedigree chart have hemophilia.

	X'	X
X	X'X ①	XX ②
Y	X'Y ③	XY ④

① Female carrier
② Female Normal
③ Male affected
④ Male normal

- Hemophilia is a X-linked recessive disorder. These act as dominant disorders in males since they only have one X chromosome.

15) Is it possible for a female to inherit hemophilia, and if so, how?

- yes, she would need to uptain 2 copies of the affected/mutated allele. Therefore, the mother must be a carrier + the father must be affected.

16) None of Alexis' sisters are shown to have hemophilia. Usins only the tools available at the time ~~that~~ they lived, how could it have been determined whether they were carriers like their mother.

- Back in their time I would assume that they would have waited to see the characteristics inherited by their children.

17) Usins a Punnett square, what is the probability the daughter of a mother who is a carrier + a father who does not have the disease, will be a carrier?

	X'	X
X	$X'X$	XX
y	$X'y$	Xy

- 50% of daughters will be a carrier.

19 ~~18~~) Usins a punnett square, explain why none of Alexi's sisters had hemophilia.

	X'	X (Alix)
(N. II) X	$X'X$	XX
y	$X'y$	Xy

- Based on the genes of N. II + Alix, their daughters could only be carriers but that's it.

~~Citation~~

~~Molecular Genetics, T. (2008). [Functional characterization~~

18) Using a punnett square, ~~explain~~ what is the probability that 4 daughters of a mother who is a carrier + a father who does not have the disease, will be a carrier?

	X'	X
X	X'X	XX
Y	X'Y	XY

50% = carrier (1/2)

~~50% of 4 = 2~~

1/2 • 1/2 = 1/4 will be a carrier

20) Some Historians speculate that Alexis' hemophilia condition could have ~~lost~~ led to the Russian Revolution. Explain. You probably want to look up the faith healer Rasputin.

- Rasputin, a Faith healer, worked for the Tsar "healing" Alexi's' hemophilia.
- Politicians + Journalists used this to undermine the Family and ultimately led to the Russian Revolution.

Citation

Rasputin Biography. (2017, April 28). Retrieved April 16, 2018, from https://www.biography.com/people/rasputin-9452162

Molecular Analysis of People in a Mass Grave

21) Two "graves" were discovered near Yekaterinberg, Russia. Describe the number of bodies in each grave.

- grave #1 (largest) had Nine bodies which included the Tsar, Tsarina, + 3 of their daughters. (1991)
- grave #2 (smaller) had 2 bodies: Alexis' and one of his sisters. (2007)

22) ~~When~~ When were these graves discovered?

- grave #1 : 1991
- grave #2 : 2007

23) One of the reasons that the family of N. II was executed was because there fear that the White Russian Army would save them. Who was the White Russian Army?

- It was the army that fought against the Bolsheviks

24) what type of testing was done to confirm the sex + familial relationships among the remains found in the mass grave?

- Mitochondrial DNA testing
- ~~Sciatic notch Dimensions (sex)~~ Nuclear DNA
- ~~Autosomal STR + Y-STR testing~~ STR Markers

25) Genetically, what does STR "stand" for

- Short Tandem Repeat

26) Mitochondrial DNA ~~testing~~ was also done on both N. II + Alix. Why was info. from Alix's, but not N. II, mitochondrial DNA used to Identify 3 females as belonging to Alix?

- ~~Both~~ mtDNA is inherited from the mother. To identify whether the individuals belonged to the family they could use mtDNA to see if they matched.

~~Citation~~

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27) HRH Prince Philip, the Duke of Edinburgh, Provided mitochondrial DNA used to identify Alix + her 3 daughters.

- why was his mtDNA used?
  - Prince Philip shared a material relationship therefore, they both would have (very similar) the same mtDNA.
- Who is HRH Prince Philip, the Duke of Edinburgh in today's world? Do you ever hear of his grandchildren or great-grandchildren?
  - Prince Philip is the son of Queen Victoria.

[redacted]

He married Queen Elizabeth II + had 4 children [redacted] + [redacted] has two grandchildren (Harry + William). [He actually has 8 grandchildren but only Harry + William are Charles'] → (Charles, Anne, Andrew, + Edward)

28) Who was missing from the mass grave?
- Alexis + Anastasia or Maria (Depends on who you ask)

29) The Duke of Fife + Princess Xenia provided mtDNA used to identify N.II. One of these is a female + another is a male. Does that matter? What general statement can you make about their genetic relationship w/ N.II.
- No this does not matter
- They were most likely siblings or cousins.

30) What was discovered in the mtDNA of Nicholas that was not identified in either the Duke of Fife or Princess Xenia?

- A single Point heteroplasmy at position 16169 (C/T = "Y")

31) What is the term given to the existence of 2 (or more) genetically different mtDNA in the cell?

- haplotype

32) What three types of DNA were used to test the second grave?

- Mitochondrial DNA
- Autosomal STR
- Y-STR

33) Of the 3 types of DNA you listed in 32, which one would have been used specifically to identify Alexis?

- Y-STR

34) What was the source of the DNA used to identify Alexis?

- Prince Andrew Andreevich Romanov (living relative was used to compare Alexis' + N. II's Y-STR).

35) Was Anastasia in the grave in which Alexis was found?

- Scientists are unsure. They cannot conclude w/ just DNA that the female is Anastasia or Maria. All children were located though.

Who wants to be Anastasia?

36) Give a brief history (2-3 sentences) of Anna Anderson - both her claims + what is thought to be true.

- Anna Anderson claimed to be the missing Anastasia. However, she was admitted to 2 mental hospitals (a little suspicious). It is believed that she may be related to Carl Maucher, but cannot be the daughter of the Tsarina (proven through mtDNA).

37) Where in the US did Anna Anderson eventually settle?

- Charlottesville, Virginia

38) Whom did she eventually marry?

- Jack Manahan

Citation:

Anna Anderson. (n.d.). Retrieved April 19, 2018, from http://unsolved mysteries.wikia.com/wiki/Anna_Anderson

39) What were the sources of Anna Anderson's DNA?

- Bowel samples + Hair

40) What were the sources of N.II's + Alix's DNA?

- Bones

41) What type of analysis was done on DNA from Anna, Nicholas, + Alix?
- STR test's
- mt DNA

42) Anna Anderson's mtDNA was compared to the mtDNA of what two people?
- Duke of Edinburgh (ultimately to ~~Alex~~ Alix)
- C. Maucher

43) A hyper variable region of the mtDNA was analyzed. Define a hyper variable region.
- regions of DNA that do not code for proteins. Often contain many mutations which can help with deriving ancestry.

44) What were the conclusions from the mtDNA comparisons?
- Anna was not related to ~~Alex~~ Alix (proven through mtDNA); therefore, she could not be Anastasia.

45) The article which describes the analysis of Anna's DNA was published in 1995. When were all of N. II's + Alix's children finally accounted for?
- They were found in 2007 in a separate grave not far from the first.