

Continuing Genetics Education Program.

Each student was required to submit a total of five genetics problems to remain in “good standing.” These consisted of a variety of different problem types (e.g., pedigrees and gel analysis) and were submitted in accordance to the directions given below. Please note that only three of the five problems that were given to students are presented here. The instructor should feel free to add any type of question to this section to help address the specific curricular goals he or she is attempting to satisfy.

The Royal Society for the Advancement of Genetic Analysis



Veritas Per Explorationem

3001 Queen Victoria Rd. SE1
London, England

Continuing Genetics Education Program theoretical problems (3 CGE Credits)

In addition to your review of the work, *The Lost King of France: How DNA Solved the Mystery of the Murdered Son of Louise XVI and Marie-Antoinette*, the Royal Society for the Advancement of Genetic Analysis is also asking that you submit your answers to the following hypothetical problems in order to satisfy the CGE credits required to remain a member “in good standing.”

Your responses to these problems are to be submitted on a separate, typed sheet of paper (not to be included within the same document as your article review) at the same time as you send your article review. Please be sure that answers to these problems are prefaced by your full name and degree (if you are a fellow of RSAGA, please include these letters after your degree), your official academic rank (e.g., adjunct professor, assistant professor, associate professor, full professor) and the address of your current academic

institution. Your answers will be retained by RSAGA and included in your official dossier.

1. On a separate sheet of paper, please design an accurate pedigree (in terms of symbolism, mating pairs, and generations) based on the following description of a hypothetical royal genealogy:

The king of Holland had four siblings, two of which were boys and two of which were of an unknown gender. The mother of the king was a carrier of an X-linked recessive disease. The father of the king did not have the disease. The king, himself, had the disease, but his siblings did not.

The queen (who did not have the disease) also had four siblings, two of which were males and a set of maternal twins (both female). The father of the queen had the sex-linked recessive disorder but the queen's mother did not (although she was later found to be a carrier of the disease).

The king and queen had nine children. Of these children, five were girls (one of which died in early childhood) and the other four were males. All of the children had the sex-linked disease.

Two of the affected female children (Mary and Elizabeth) both married archdukes who were not related to the royal family. Both of the archdukes did not have the disease. Elizabeth and her husband had a total of five children (two boys and three girls). Only the boys were afflicted with the sex-linked disease. One of Elizabeth's daughters then married a prince from another royal house. This prince also had the sex-linked disease, and he and his wife had three normal girls.

Mary and her husband had a total of four children (two boys who had the disease, a normal girl, and a child of unknown gender). One of Mary's afflicted sons married a princess from another royal house who did not have the sex-linked disease. They had two sons, one of whom was afflicted with the disease.

One of Elizabeth's granddaughters then married Mary's unaffected grandson. They had two sons and a daughter, all of whom were unaffected.

2. Based upon the pedigree that you have designed in response to question 1, please answer the following: What would be the most likely genotype of Mary's daughter-in-law who married the affected son?

3. If you were told that the 3'-5' sequence of a single stranded piece of DNA was 3'-CGACCTATTG-5', which of the following accurately depicts the dideoxy sequencing gel that would be obtained from sequencing this piece of DNA? (Please place only the letter of the correct gel on your answer sheet.)

(Editor's note: Question 3 is taken from Raineri, D. 2001. *Introduction to Molecular Biology [11th Hour Guide]*. Malden, Massachusetts: Blackwell Science. Reprinted with permission of John Wiley and Sons, Inc.)