Forensic Genetics

Module 16 – Section 8 Exercises

Exercise 1a: LR − Relatives

Consider a simple single-source crime scene sample with genotype $G_C = AA$, and a suspect that matches at that locus. Calculate the LR, using $p_A = 4\%$, and alternative hypotheses:

- The DNA in the sample came from a brother of the suspect;

Exercise 1b: LR – Relatives

Consider a simple single-source crime scene sample with genotype $G_C = AA$, and a suspect that matches at that locus. Calculate the LR, using $p_A = 4\%$, and alternative hypotheses:

- The DNA in the sample came from a brother of the suspect;

- The DNA in the sample came from an identical twin of the suspect.

Exercise 2a: Paternity Index

Suppose a child has genotype $G_C = AB$. What are the LR values when:

- $G_M = AA$ and $G_{AF} = BB$;

- $G_M = AA$ and $G_{AF} = CD$;

- $G_M = AA$ and $G_{AF} = BC$;

- $G_M = AB$ and $G_{AF} = AA$.

Exercise 2b: Paternity Index

Calculate the weight of the evidence for the following data:

Locus	G_C	G_M	G_{AF}
TPOX	(6,9)	(6,12)	(8,9)
vWA	(17,17)	(17,16)	(17,17)
TH01	(7,9)	(9,10)	(7,9)

Locus	Allele	Frequency
TPOX	6	0.006
	8	0.506
	9	0.094
	12	0.038
vWA	16	0.276
	17	0.300
TH01	7	0.147
	9	0.232
	10	0.116

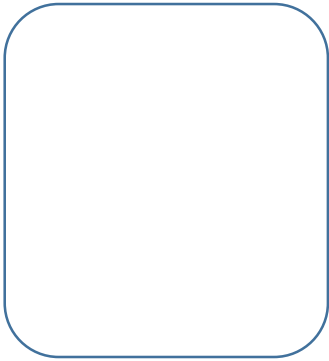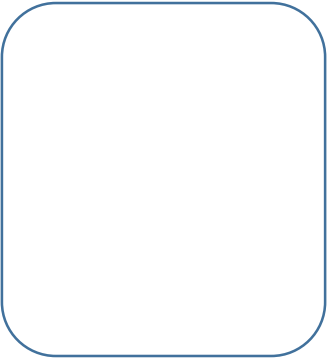Source: Introduction to Statistics for Forensic Scientist (Lucy, 2005).

Exercise 3a: Missing Persons

For a missing person case, the two propositions could be:

H_p: The sample is from the missing person.

H_d: The sample is from some unknown person.

The following likelihood ratios are obtained for a sample with alleged mother (AM) and alleged father (AF), compared to the paternity index, for $p_A = p_B = 0.1$:
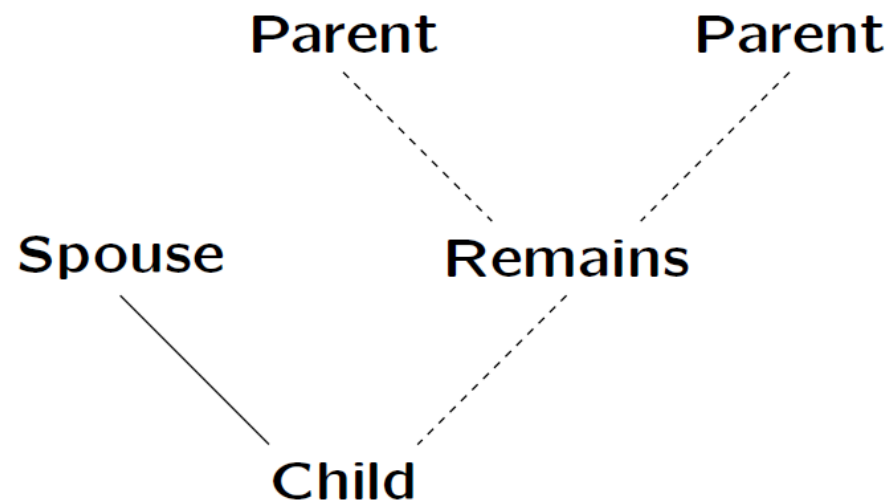
(A)M	AF	Sample	LR	Value	PI	Value
AA	BB	AB				
AA	BC	AB				
AB	AA	AB				

Source: Interpreting DNA Evidence (Evett & Weir, 1998).

Exercise 3b: Missing Persons

It may be the case that people apart from the spouse and child of the missing person are typed. The general procedure is the same: the probabilities of the set of observed genotypes under two explanations are compared.

Suppose the parents P and Q as well as the child C and spouse S of the missing person are typed, and that a sample is available that has come from some person X thought under H_p to be the missing person.

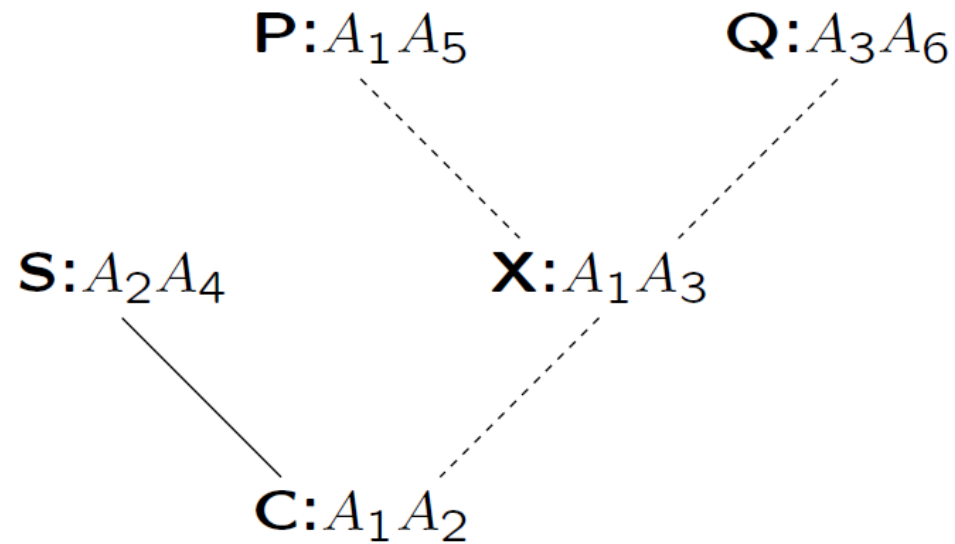# Exercise 3b: Missing Persons

LR =

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Exercise 3b: Missing Persons

P:$A_1 A_5$ Q:$A_3 A_6$

S:$A_2 A_4$ X:$A_1 A_3$

C:$A_1 A_2$

LR =