Guidelines for the Use of Popstats for the Calculation of Frequency Data for Mixtures

Once an evidentiary sample is declared to be a probative match to a reference standard, a statistical frequency of this profile must be determined for the general population. While this is straightforward for neat stains and items containing a predominant profile, frequencies can not be determined as directly.

Popstats will allow for the calculation of likelihood ratio data for both single DNA profiles and those involved in mixtures. It is the purpose of this document to assist analysts in the use of Popstats to calculate population frequency data in cases where there appears to be a mixture of DNA from two or more sources.

1   Upon entering the Popstats program, click on the *Forensic Mixture* option on the Case Type drop down menu, or click on the paint palette button at the top of the screen.

2   A screen similar to the one shown in Appendix One will appear.

3   Mixture Column: In the column labeled "Mixture", enter all of the alleles from the questioned mixture sample.

4   C1 Combined Unknown Column: "Prosecution Theory"

      4.1   Enter the number of unknown individuals proposed by the prosecutor's theory (if any) into the box under the column title. If no unknown individuals are proposed, then the number should remain "0".

      4.2   Enter the alleles (if any) from the questioned mixture that are proposed by the prosecutor's theory to be from an unknown individual(s).

5   C2 Combined Unknown Column: "Defense Theory"

      5.1   Enter the number of unknown individuals proposed by the defense's theory into the box under the column title.

      5.2   Enter the alleles (if any) from the questioned mixture that are proposed by the defense's theory to be from an unknown individual(s).

      NOTE: The alleles that are be entered in the C1 and C2 columns can be clicked on (by using the computer mouse) in the "Mixture" column and dragged to the appropriate column.

6   Examples: Below are examples of how certain mixtures may be entered into Popstats.

Evidence Profile Description	C1 column (Prosecutor's Theory)	C2 column (Defense Theory)
4 bands - V1, V2, S1, S2	0 unknowns, leave blank	1 unknown, enter S1 & S2
3 bands - V1, S1, S2	0 unknowns, leave blank	1 unknown, enter S1 & S2
3 bands - V1, V2, S1	0 unknowns, leave blank	1 unknown, enter S1
2 bands - V & S share both	0 unknowns, leave blank	1 unknown, leave blank
2 bands - V1, V2, S1 (V2 and S1 are shared)	0 unknowns, leave blank	1 unknown, leave blank
*1 band - V & S share one	0 unknowns, leave blank	1 unknown, leave blank
2 bands - S1, S2, V1 share one	0 unknowns, leave blank	1 unknown, enter S2
2 bands - V1, S2 share none	0 unknowns, leave blank	1 unknown, enter S2
3 bands- V1, V2, S1, S2 (V2 and S1 are shared)	0 unknowns, leave blank	1 unknown, enter S2
4 bands - S1, S2, U1, U2	1 unknown, enter U1& U2	2 unknowns, enter S1, S2, U1& U2
3 bands - S1, S2, U1, U2	1 unknown, enter U1	2 unknowns, enter S1, S2, U1& U2

7.   If allele dropout occurs at any locus for any reason (allele dropout, degradation, etc.), exclude the alleles for that locus in the calculations by clicking off the "X" in the box next to the locus' name.

8.   If masking occurs in the mixture (i.e. victim and suspect share bands), exclude the alleles for that locus in the calculations by clicking off the "X" in the box next to the locus' name.

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