CAN DNA SOLVE THIS?

Charles Brenner[1], **Rick Staub**[2]
[1]*Consulting in forensic mathematics, Oakland, California USA*
[2]*Orchid Genescreen, Dallas, Texas USA*

Standard forensic panels are designed in part to have sufficient discriminatory power to solve with near certainty the most common identification problems. For example the thirteen (CODIS) or fifteen autosomal markers typically used in the United States are sufficient to decide, for practical purposes, routine paternity problems – and are of course even more discriminatory by far for a standard criminal stain identification scenario. As long as this is true the fact that the evidential strength (the likelihood ratio, LR) varies greatly – easily five orders of magnitude from case to case depending on whether rare or common alleles dominate in the observed profiles – bothers no one.

But more and more, laboratories offer and accept offbeat or advanced kinship problems: Given two children and perhaps their mother(s), do they share a father? A grandfather? Are two given people niece and uncle? These problems are clearly “harder” in the sense that the LRs favoring one alternative over the other tend to be less definitive, but how hard are they? Two lessons one quickly learns when doing non-standard cases is that success is not guaranteed, and that to decide in advance which questions are worth taking on is very difficult, at least without a computer tool. Using such a tool – the DNA·VIEW Kinship Simulation feature – we have examined a variety of second-tier but interesting kinship problems and present data as to the chances of success, however it may be defined, for these problems. For each relationship we studied, a large number of simulated DNA profiles of people with the relationship were generated, and for each such simulation the LR supporting the relationship was computed. The distribution of these LRs is the best information one can hope for in advance of spending money and effort on testing. For example, if half of the distribution lies in the range LR<10, one is forewarned that an unhelpful result will be likely. Unless either extra reference people can be obtained or extended testing be done, the case may not be worth attempting.