The promise of using genetics to help solve cases where there is no reference genotype has been with us for a number of years. For example, ancestry informative markers, although available for twenty years, are infrequently used. I'll review some examples of early successes in solving cases using molecular photofitting, discuss the state-of-the-art today, and what we can expect to see happening in this arena over the next few years. Through this I will emphasize the critical importance of modeling both genomic ancestry and functional genes in phenotypic predictive modeling.