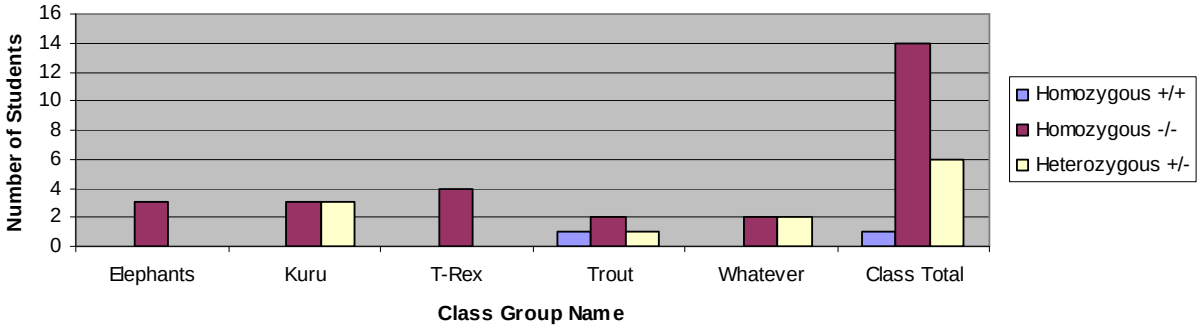
Frequency of PV92 Alu Insertion in Shasta College Biology Students

Summary: My group and I determined the frequency of the 300 base pair insertion within the PV92 Alu locus of chromosome 16 for Shasta College students taking Principles of Biology. We did this by using Polymerase Chain Reaction (PCR) procedures to target and replicate this gene followed by gel electrophoresis. After pooling data with other groups in the class, our results show that the PV92 Alu insertion occurs with about 31% frequency. This is consistent with the knowledge that the insertion occurs most frequently in Amerindians and East Asians *(Comas et al., 2001)*. Similar experiments use the PV92 insertion to determine the migration histories of early human populations, such as the effects of the Mediterranean Sea as a geographical barrier *(Comas et al., 2000)*.

Methods & Results: My group and I prepared a saline solution by mixing 4.5g of NaCl into a 500mL bottle of drinking water. Each person used 10mL as an oral swish for about 30 seconds to collect cheek cells and then return them to a cup. 1mL from each of these samples was transferred into a small cap tube and spun in a microfuge for two minutes. We discarded the supernatant and mixed in chelex resin to remove residual metals that would damage collected DNA. We heated these mixtures in a 56°C water bath for ten minutes and, after this, transferred them to a 100°C water bath for five minutes. We returned the samples to the centrifuge for five minutes and then collected 100µL of the resultant supernatant and placed it within a fresh tube. From this new sample, 20µL was combined with 20µL of PCR master mix in a PCR mini-tube and mixed thoroughly. We delivered our samples for the PCR process.

After retrieving our processed samples, a slab of 1.2% concentrated agarose was cast with ten separate wells for gel electrophoresis. We then mixed 10µL of loading dye into our PCR samples, submerged the gel slab in borax solution, and inserted 20µL of the new mixture into each of the wells. A current was then applied to the solution for 30 minutes, with the positive end being opposite to the wells containing the PCR with dye mixtures. Upon completion, the gel slab was developed under ultraviolet light and pictures were taken. We used these pictures to distinguish between DNA strands 600bp and 900bp in length for the negative and positive presence of the PV92 Alu insertion, respectively. Results were then collected and pooled with the rest of the class, which produced the following graph of data:



Overall, we found a 69% negative occurrence versus 31% positive occurrence. These results are consistent with the general knowledge that the 300bp insertion is more prevalent in East Asian and Native American populations, both of which do not have large populations in Northern California. The population that currently shows the greatest occurrence in North America is the Navajo in the central U.S., with ~82% positive occurrence and ~18 negative occurrence.

References:

Comas, D. & Plaza, S. & Calafell, F. & Sajantila, A. and Bertranpetit, J., 2001. Recent Insertion of an *Alu* Element Within a Polymorphic Human-Specific *Alu* Insertion, *Molecular Biology and Evolution*, 18(1), pp. 85-88.

Comas, D. & Calafell, F. & Benchemsi, N. & Helal, A. & Lefranc, G. & Stoneking, M. & Batzer, M. & Bertranpetit, J. & Sjantila, A., 2000. Alu Insertion polymorphisms in NW Africa and the Iberian Peninsula: Evidence for a Strong Genetic Boundary Through the Gibralter Straits, *Human Genetics*, 107(4), pp. 312-319.