POPULATION GENETICS and USING HARDY WEINBERG-Practice "Type I" Question ANGELL*BIO 150

NOTE: These questions are not showing you actual images of the people along with their genotypes so that might make it harder!?? Plus the population is much bigger than in our pumas/cougars! I just showed you in class the pictures of the pumas/cougars to help you learn how to approach these questions.

Imagine we head into Northfield and count the number of people with each genotype. (Imagine dumping all these alleles in a bucket.)

- 1460 individuals of type MM
- 2550 of type MN
- 0 individuals of type NN!

What are the allele frequencies of the M and N allele in this population (basically you are "applying the Hardy Weinberg Principle")

Frequency of M (p) =

Frequency of N (q)=

Now calculate the expected genotype frequencies (the frequencies you would expect to see if "nothing" is going on in the population (no selection, no gene flow (or migration), no inbreeding (like mating with like for example if all homozygous recessive NN genotypes only chose to mate with other NNs)). Show your work.

MM =

MN =

NN =

Now calculate the genotype frequencies in the actual population in Northfield using the numbers above.

Is this population in Hardy Weinberg? (In reality this is a statistical question and we are not doing the stats so just make a solid guess.)

Can you come up with a possible scenario as to what is going on in this population-why might it not be in HW?

Check out the back page!

https://www.mun.ca/biology/scarr/MN_bloodgroup.html

Population	Genotype			Allele frequencies	
	ММ	MN	NN	p(M)	q(N)
Eskimo	0.835	0.156	0.009	0.913	0.087
Australian	0.024	0.304	0.672	0.176	0.824
Egyptian	0.278	0.489	0.233	0.523	0.477
German	0.2.97	0.507	0.196	0.550	0.450
Chinese	0.332	0.486	0.182	0.575	0.425
Nigerian	0.301	0.495	0.204	0.548	0.452

Table 26-1Frequencies of Genotypes for Alleles at MNBlood Group Locus in Various Human Populations

SOURCE: W. C. Boyd, Genetics and the Races of Man. D. C. Heath, 1950.

(Griffiths et al. 1996)

MN Blood Group system in Humans

The **MN blood group system** is under the control of an autosomal locus found on chromosome 4, with two alleles designated L^{M} and L^{N} . The bloodtype is due to a glycoprotein present on the surface of red blood cells, which behaves as a native antigen. Phenotypic expression at this locus is **codominant** because an individual may exhibit either one or both antigenic substances. Frequencies of the two alleles vary widely among human populations.