

Name \_\_\_\_\_

Date \_\_\_\_\_

# Population Genetics Worksheet

1. In a study of the Hopi, a Native American tribe of central Arizona, Woolf and Dukepoo (1959) found 26 albino individuals in a total population of 6000. This form of albinism is controlled by a single gene with two alleles: albinism is recessive to normal skin coloration.

a. Why can't you calculate the allele frequencies from this information alone?

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b. Calculate the expected allele frequencies and genotype frequencies if the population were in Hardy-Weinberg equilibrium. How many of the Hopi are estimated to be carriers of the recessive albino allele?

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2. A wildflower native to California, the dwarf lupin (*Lupinus nanus*) normally bears blue flowers. Occasionally, plants with pink flowers are observed in wild populations. Flower color is controlled at a single locus, with the pink allele completely recessive to the blue allele. Harding (1970) censused several lupin populations in the California Coast Ranges. In one population of lupins at Spanish Flat, California, he found 25 pink flowers and 3291 blue flowers, for a total of 3316 flowers.

a. Calculate the expected allele frequencies and genotype frequencies if the population were in Hardy-Weinberg equilibrium.

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b. Harding studied the fertility of lupins by counting number of seed pods produced per plant in a subsample of the Spanish Flat population. He found the following:

mean # pods	number of plants examined
blue 19.33	39
pink 13.08	24

Assume that heterozygotes are as fit as homozygous blue lupins, and that seeds from both pink and blue lupins all suffer about the same mortality rate after germinating. Calculate the relative fitness of each genotype.

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c. Predict quantitatively the effect of natural selection on the frequencies of phenotypes in the next generation of lupins.

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