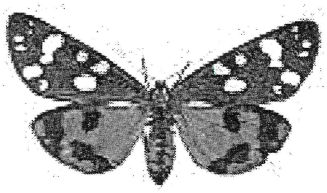

6. This is a classic data set on wing coloration in the scarlet tiger moth (*Panaxia dominula*). Coloration in this species had been previously shown to behave as a single-locus, two-allele system with incomplete dominance. Data for 1612 individuals are given below:

White-spotted (AA) =1469 Intermediate (Aa) = 138 Little spotting (aa) =5

Calculate the allele frequencies (p and q)

OR

$q^2 = \frac{5}{1612} = \sqrt{.0031} = q = .0557 = .056$

$p = .944$

$q = \frac{148}{3224} = .05$

$p = 1 - .05 = .95$

Free Response

In a population of ants, large mandibles (M) is dominant to small mandibles (m). You painstakingly go through an ant hill of 1000 individuals and count 231 ants with small mandibles.

a. What are the genotype frequencies in this population?

MM= $.27 = p^2$

Mm= $.50 = 2pq$ $\quad 2(.48)(.52)$

mm= $\frac{231}{1000} = q^2 = .23$ $\quad \frac{231}{1000} = \sqrt{q^2} = \sqrt{.23} = q$

$q = .48$

$p = .52$

b. You come back next year and see that the population of ants has grown to 3000. You observe that 420 of these ants have small mandibles. **Using a Chi-Square analysis, justify if this population is in Hardy-Weinberg equilibrium**. If it is not in Hardy-Weinberg equilibrium, suggest a reason as to why. SHOW ALL WORK on your scantron.

Expected

Dom MM = .27(3000) = 810 2310

Mm = 1500

Rec. mm = .23(3000) = 690

	O	E	$(O-E)^2/e$
Large	3000 − 420 = 2580	2310	$\frac{(2580-2310)^2}{2310} = 31.56$
Small	420	690	$\frac{(420-690)^2}{690} = 105.65$

reject

Nat. Sele is occuring df = 1 $X^2 = 137.21$

$3.84 <$