Notes on migration

Symbols used

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>$N$</td>
<td>number of individuals in the population (= 100)</td>
</tr>
<tr>
<td>$N_m$</td>
<td>number of migrants into the populations (= 10)</td>
</tr>
<tr>
<td>$p$</td>
<td>allele frequency in the population before migration (= 0.2)</td>
</tr>
<tr>
<td>$p'$</td>
<td>allele frequency in the population after migration</td>
</tr>
<tr>
<td>$p_m$</td>
<td>allele frequency in the migrants (= 0.9)</td>
</tr>
<tr>
<td>$m$</td>
<td>migration rate</td>
</tr>
</tbody>
</table>

number of residents $= N - N_m = 90$

Calculations

\[
m = \frac{10}{100} = 0.1
\]

No. of $A$ alleles after migration

\[
= \text{(Fraction of residents) (Population size) (Frequency of } A \text{ allele in residents)} + \text{(Fraction of migrants) (Population size) (Frequency of } A \text{ allele in migrants)} \\
= (1 - 0.1)(100)(0.2) + (0.1)(100)(0.9) \\
= 18 + 9 \\
= 27
\]

Note: $(1 - 0.1)(100) = 90$ is the number of residents, and $(0.1)(100) = 10$ is the number of migrants. The allele frequency in the population in the next generation, $p'$ is $27/100 = 0.27$. Here’s another way to calculate it:

\[
p' = (1 - m)p + mp_m \\
= (0.9)(0.2) + (0.1)(0.9) \\
= 0.27
\]