

$$Q(j,k,\ell) = egin{cases} 1 - r_\ell + r_\ell/n & ext{no switch} \\ r_\ell/n & ext{switch} \end{cases}$$

from reference — to reference —

— no j or k dependence

## Emission

$$E(j,\ell) = \begin{cases} 1 - \mu_{\ell} & \text{match} \\ \mu_{\ell}/(a_{\ell} - 1) & \text{mismatch} \end{cases}$$

reference copied —

- alleles at site  $\ell$ 

