

# Brief Article

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	A	C	G	T
A	$\mathbf{P_X.P_Y}$	$P_{X.}(1 - P_Y)/3$	$P_{X.}(1 - P_Y)/3$	$P_{X.}(1 - P_Y)/3$
C	$P_{Y.}(1 - P_X)/3$	$(\mathbf{1 - P_X})/3.(\mathbf{1 - P_Y})/3$	$(1 - P_X)/3.(1 - P_Y)/3$	$(1 - P_X)/3.(1 - P_Y)/3$
G	$P_{Y.}(1 - P_X)/3$	$(1 - P_X)/3.(1 - P_Y)/3$	$(\mathbf{1 - P_X})/3.(\mathbf{1 - P_Y})/3$	$(1 - P_X)/3.(1 - P_Y)/3$
T	$P_{Y.}(1 - P_X)/3$	$(1 - P_X)/3.(1 - P_Y)/3$	$(1 - P_X)/3.(1 - P_Y)/3$	$(\mathbf{1 - P_X})/3.(\mathbf{1 - P_Y})/3$

Table 1: default

$$\begin{aligned}
 S'_{(X=Y)} = & S_{match} \left\{ \begin{aligned} & P_X P_Y \\ & + 3 \frac{(1-P_X)}{3} \frac{(1-P_Y)}{3} \end{aligned} \right\} \\
 & + S_{mismatch} \left\{ \begin{aligned} & 3 P_Y \frac{(1-P_X)}{3} \\ & + 3 P_X \frac{(1-P_Y)}{3} \\ & + 6 \frac{(1-P_X)}{3} \frac{(1-P_Y)}{3} \end{aligned} \right\} \quad (1)
 \end{aligned}$$

$$\begin{aligned}
 S'_{(X=Y)} = & S_{match} \left\{ \begin{aligned} & P_X P_Y + \frac{(1-P_X)(1-P_Y)}{3} \end{aligned} \right\} \\
 & + S_{mismatch} \left\{ \begin{aligned} & P_Y(1 - P_X) \\ & + P_X(1 - P_Y) \\ & + \frac{2}{3}(1 - P_X)(1 - P_Y) \end{aligned} \right\} \quad (2)
 \end{aligned}$$

$$\begin{aligned}
 S'_{(X=Y)} = & S_{match} \left\{ \begin{aligned} & \frac{4P_X P_Y - P_Y - P_X + 1}{3} \end{aligned} \right\} \\
 & + S_{mismatch} \left\{ \begin{aligned} & - \frac{4P_X P_Y - P_Y - P_X - 2}{3} \end{aligned} \right\} \quad (3)
 \end{aligned}$$

$$S'_{(X=Y)} = \frac{1}{3}((4P_X P_Y - P_X - P_Y)(S_{match} - S_{mismatch}) + (S_{match} + 2S_{mismatch})) \quad (4)$$

$$S'_{(X=Y)} = \frac{1}{3}((4\frac{1}{4}P_Y - \frac{1}{4} - P_Y)(S_{match} - S_{mismatch}) + (S_{match} + 2S_{mismatch})) \quad (5)$$

	A	C	G	T
A	$\mathbf{P_X} \cdot (\mathbf{1} - \mathbf{P_Y}) / \mathbf{3}$	$P_X \cdot P_Y$	$P_X \cdot (1 - P_Y) / 3$	$P_X \cdot (1 - P_Y) / 3$
C	$(1 - P_X) / 3 \cdot (1 - P_Y) / 3$	$\mathbf{P_Y} \cdot (\mathbf{1} - \mathbf{P_X}) / \mathbf{3}$	$(1 - P_X) / 3 \cdot (1 - P_Y) / 3$	$(1 - P_X) / 3 \cdot (1 - P_Y) / 3$
G	$(1 - P_X) / 3 \cdot (1 - P_Y) / 3$	$P_Y \cdot (1 - P_X) / 3$	$(\mathbf{1} - \mathbf{P_X}) / \mathbf{3} \cdot (\mathbf{1} - \mathbf{P_Y}) / \mathbf{3}$	$(1 - P_X) / 3 \cdot (1 - P_Y) / 3$
T	$(1 - P_X) / 3 \cdot (1 - P_Y) / 3$	$P_Y \cdot (1 - P_X) / 3$	$(1 - P_X) / 3 \cdot (1 - P_Y) / 3$	$(\mathbf{1} - \mathbf{P_X}) / \mathbf{3} \cdot (\mathbf{1} - \mathbf{P_Y}) / \mathbf{3}$

Table 2: default

$$S'_{(X=Y)} = \frac{S_{match} + S_{mismatch}}{4} \quad (6)$$

$$\begin{aligned}
S'_{(X \neq Y)} = & S_{match} \left\{ \begin{aligned} & P_Y \frac{(1-P_X)}{3} \\ & + P_X \frac{(1-P_Y)}{3} \\ & + 2 \frac{(1-P_X)}{3} \frac{(1-P_Y)}{3} \end{aligned} \right\} \\
& + S_{mismatch} \left\{ \begin{aligned} & P_X P_Y \\ & + 2 P_Y \frac{(1-P_X)}{3} \\ & + 2 P_X \frac{(1-P_Y)}{3} \\ & + 7 \frac{(1-P_X)}{3} \frac{(1-P_Y)}{3} \end{aligned} \right\} \quad (7)
\end{aligned}$$

$$S'_{(X \neq Y)} = \frac{1}{9}((P_Y + P_X - 4P_X P_Y)(S_{match} - S_{mismatch}) + 2S_{match} + 7S_{mismatch}) \quad (8)$$

$$S'_{(X \neq Y)} = \frac{1}{9}((S_{match} - S_{mismatch})(P_Y + \frac{1}{4} - 4\frac{1}{4}P_Y) + 7S_{mismatch} + 2S_{match}) \quad (9)$$

$$S'_{(X \neq Y)} = \frac{1}{4}(S_{match} + 3S_{mismatch}) \quad (10)$$

$$S'_{(X=Y)} = \frac{1}{3}((4P_X P_Y - P_X - P_Y)(S_{match} - S_{mismatch}) + (S_{match} + 2S_{mismatch})) \quad (11)$$

$$S'_{(X \neq Y)} = \frac{1}{9}((P_Y + P_X - 4P_X P_Y)(S_{match} - S_{mismatch}) + 2S_{match} + 7S_{mismatch}) \quad (12)$$