



DNA Mini Exercise: Interpret the DNA

Borchert, Konak, Dr. Schapranow
Data Management for Digital Health
Winter 2020

Build your own DNA

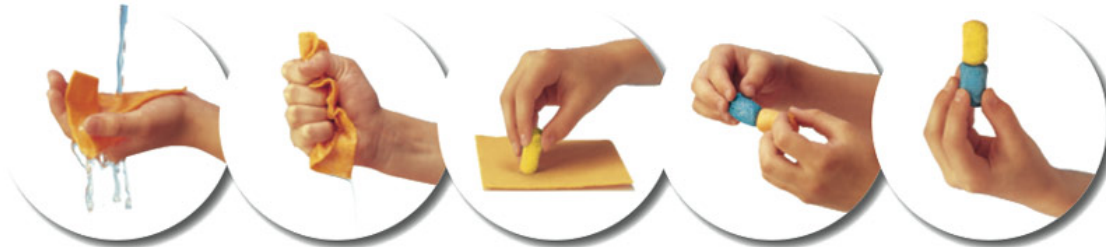
Getting creative with PlayMais

A 3D-DNA Molecule Made of PlayMais

Massimo Caine, Ninon Horié, Sandrine Zuchuat, Aurélia Weber, Verena Ducret, Patrick Linder & Karl Perron

To cite this article: Massimo Caine, Ninon Horié, Sandrine Zuchuat, Aurélia Weber, Verena Ducret, Patrick Linder & Karl Perron (2015) A 3D-DNA Molecule Made of PlayMais, *Science Activities: Classroom Projects and Curriculum Ideas*, 52:2, 31-44, DOI: [10.1080/00368121.2015.1029427](https://doi.org/10.1080/00368121.2015.1029427)

To link to this article: <http://dx.doi.org/10.1080/00368121.2015.1029427>



Biology Recap

Data Management for
Digital Health, Winter
2020
2

Read the DNA

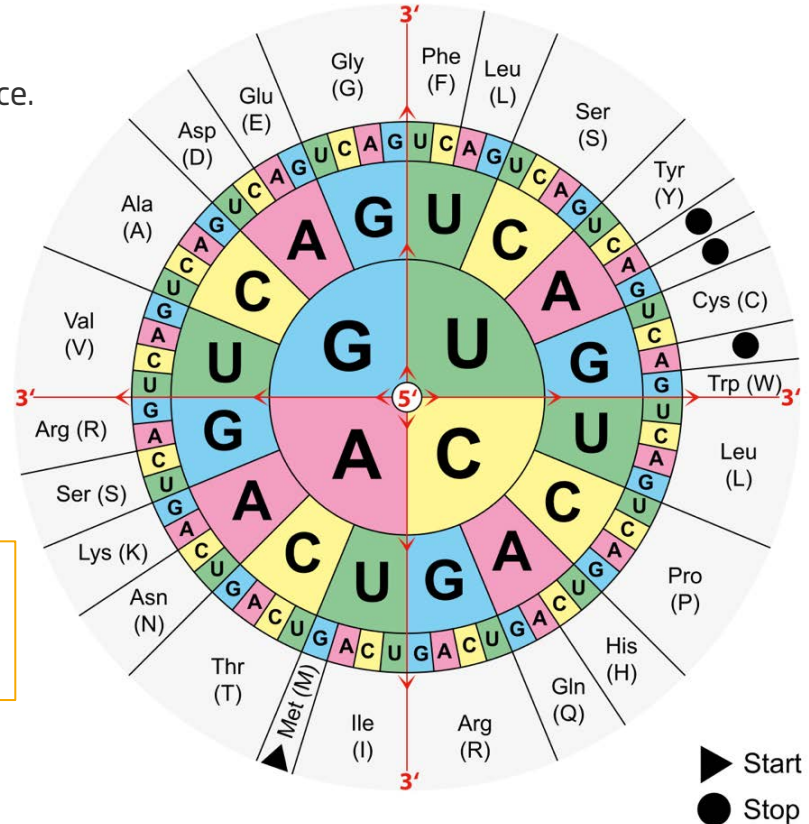
<< Breakout Session >>

1. Transcribe the DNA strand to RNA and translate it to its AA sequence.
2. Introduce selected genetic changes and assess their impact.

#	DNA (3' → 5')	Codons	Mutations
1	ACCTCCGGTCC	01-04	Nonsense
2	CGGTACCGGTCG	05-08	Conservative missense
3	TTCTCGTGGCGG	09-12	Nonsense
4	ATGTCGCGG	13-15	Insertion
5	AAGCTCCGG	16-18	Deletion
6	TTGCTGGTG	19-21	Non-conservative
7	CTCCGGGAC	22-24	Non-functional
8	TGGGTGATGACT	25-28	Nonstop

Please use the one-letter representation of the AA.

Group	DNA non-coding strand 3' → 5'	DNA coding strand 5' → 3'	Transcribed RNA	Translated Amino Acid
0	ATC	TAG	UAG	.



▶ Start
● Stop

Read the DNA

<< Breakout Session >>

1. Transcribe the DNA strand to RNA and translate it to its AA sequence.
2. Introduce selected genetic changes and assess their impact.

Your results from the shared notes table:



Please complete the following table.

#	DNA non-coding strand (3' -> 5')	DNA coding strand (5' -> 3')	Transcribed RNA	Translated AA (one-letter representation)	Mutation
0	ATC	TAG	UAG	.	
1	ACCCTCCGGTCC	TGG GAG GCC AGG	UGG GAG GCC AGG	Trp (W) - Glu (E) - Ala (A) - Arg (R)	nonsense mutation: UGA GAG GCC AGG -> StopCodon-Glu (E)-Ala(A)-Arg(R)
2	CGGTACCGGTCC	GCC ATG GCC AGC	GCC AUG GCC AGC	A M A S	conservative missense: GCC AUG GCC AAC -> A M A N
3	TTCTCGTGGCGG	AAGAGCACCGCC	AAG AGC ACC GCC	K S T A	Point Mutation: TTATCGTGGCGG -> AAU AGC ACC GCC -> N S T A
4	ATG TCG CGG	TAC AGC GCC	UAC AGC GCC	Y S A	Insertion: GAT GTC GCG G -> CTA CAG CGC C -> GUA CAG CGC C -> V-Q-R
(completely different from intended AAs)					
5	AAGCTCCGG	TTC GAG GCC	UUC GAG GCC	Phe(F)-Glu(E)-Ala(A)	Deletion: AAG CTC CG -> TTC GAG GC -> UUC GAG GC -> Phe-Glu
6	TTG CTG GTG	AAC GAC CAC	AAC GAC CAC	N D H	Non-conservative missense AAC GAC CAC -> AAC GAG CAC -> N-E-H
7	CTCCGGGAC	GAG GCC CTG	GAG GCC CUG	Glu (E) Ala (A) Leu (L)	non-functional: CTT CGG GAT (Transcribed RNA: GAA GCC CUA, Translated: Gly-Ala-Leu)
8	TGGGTGATGACT	ACC CAC TAC TGA	ACC CAC UAC UGA	Thr (T) His (H) Tyr (Y) .	nonstop (convert stop to another triplet: -STOP) => Thr-His-Tyr-Cys

Read the DNA

<< Breakout Session >>

1. Transcribe the DNA strand to RNA and translate it to its AA sequence.
2. Introduce selected genetic changes and assess their impact.

#	DNA non-coding strand 3' → 5'	DNA coding strand 5' → 3'	Transcribed RNA	Translated AA	Codons
1	ACCCTCCGGTCC	TGGGAGGCCAGG	UGGGAGGCCAGG	WEAR	1-4
2	CGGTACCGGTCG	GCCATGGCCAGC	GCCAUGGCCAGC	AMAS	5-8
3	TTCTCGTGGCGG	AAGAGCACCGCC	AAGAGCACCGCC	KSTA	9-12
4	ATGTCGCGG	TACAGCGCC	UACAGCGCC	YSA	13-15
5	AAGCTCCGG	TTCGAGGCC	UUCGAGGCC	FEA	16-18
6	TTGCTGGTG	AACGACCAC	AACGACCAC	NDH	19-21
7	CTCCGGGAC	GAGGCCCTG	GAGGCCUG	EAL	22-24
8	TGGGTGATGACT	ACCCACTACTAG	ACCCACUACUAG	THY.	25-28

WEAR A MASK STAY SAFE AND HEALTHY.



Biology Recap

Data Management for
Digital Health, Winter
2020