

# A flexible platform for enzymatic synthesis of mRNA

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## Introduction

Synthetic nucleic acids are rapidly becoming a key molecule for a range of therapeutic applications, from development of cells lines, production of antibodies to direct use as mRNA vaccines against viruses or for cancer treatment. One major advantage of synthetic nucleic acids is flexibility in design, providing an ideal platform for targeting different viruses, engineering proteins, or introducing sequences such as untranslated regions which improve or modify translation.

BASE nucleic acid production facility uses these principles to establish a platform for enzymatic synthesis of high-quality mRNA for any gene or sequence of interest, providing an end-to-end service, from initial sequence design, through to scalable manufacture and final analytics. BASE, in partnership with TIA, PEF and NBF, supports the production and use of synthetic nucleic-acids for translational use, including pre-clinical and early clinical leads.



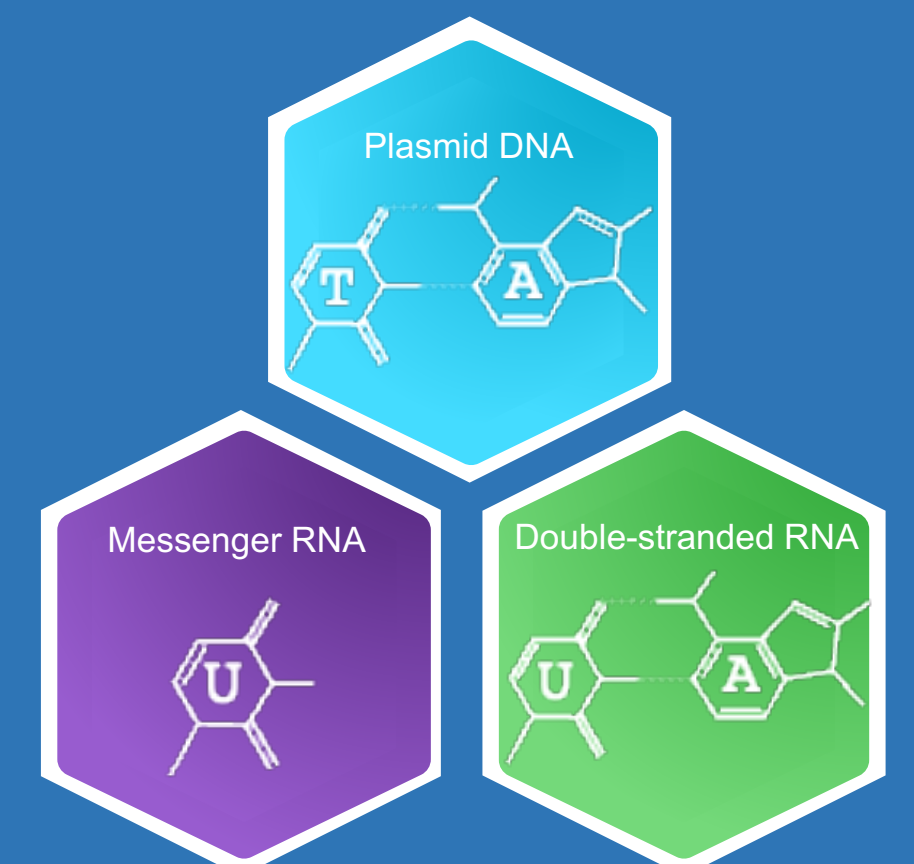
RNA | DNA  
Biomanufacture Facility.

base@uq.edu.au

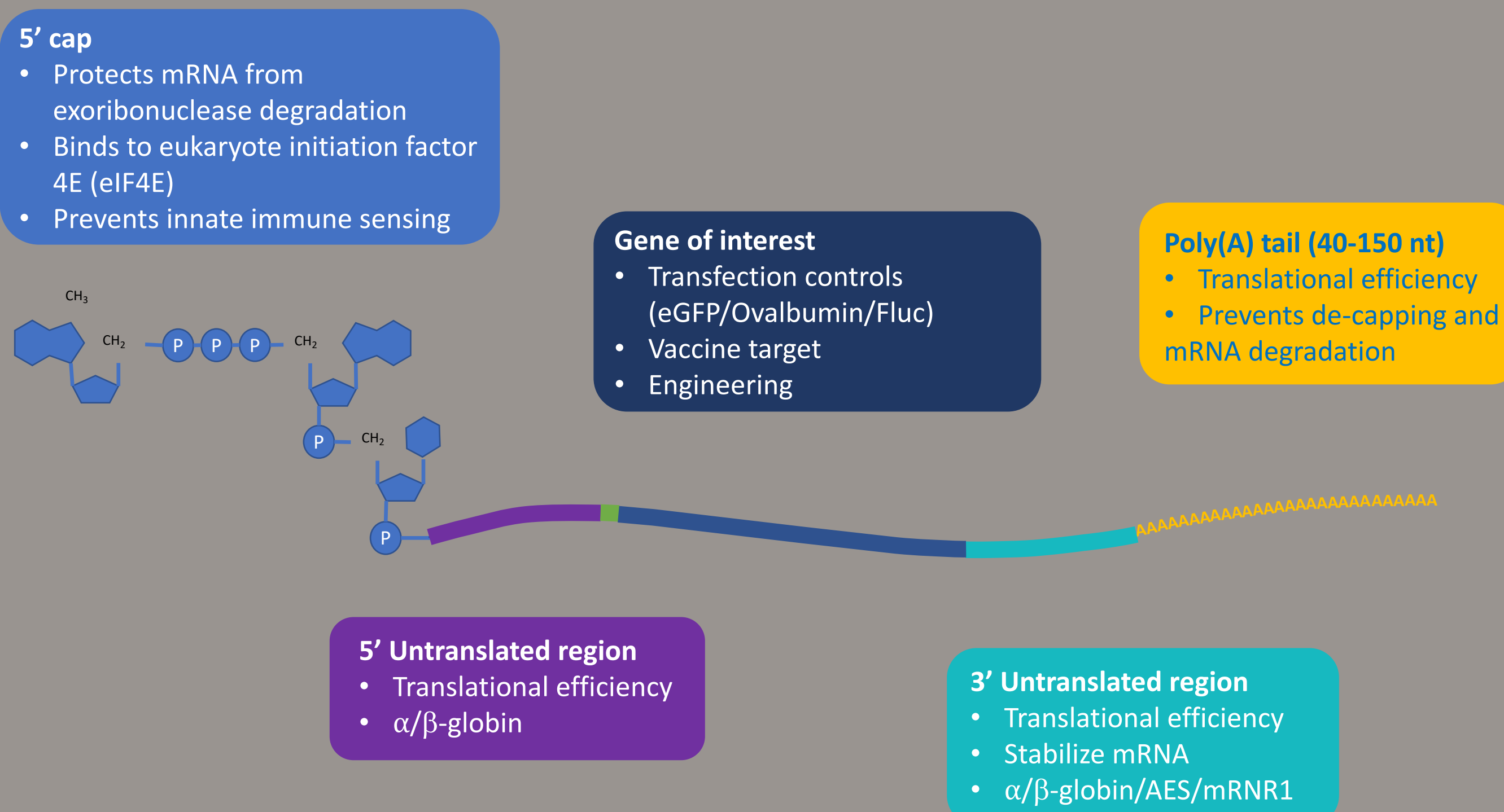
basefacility.org.au

@BaseDNA

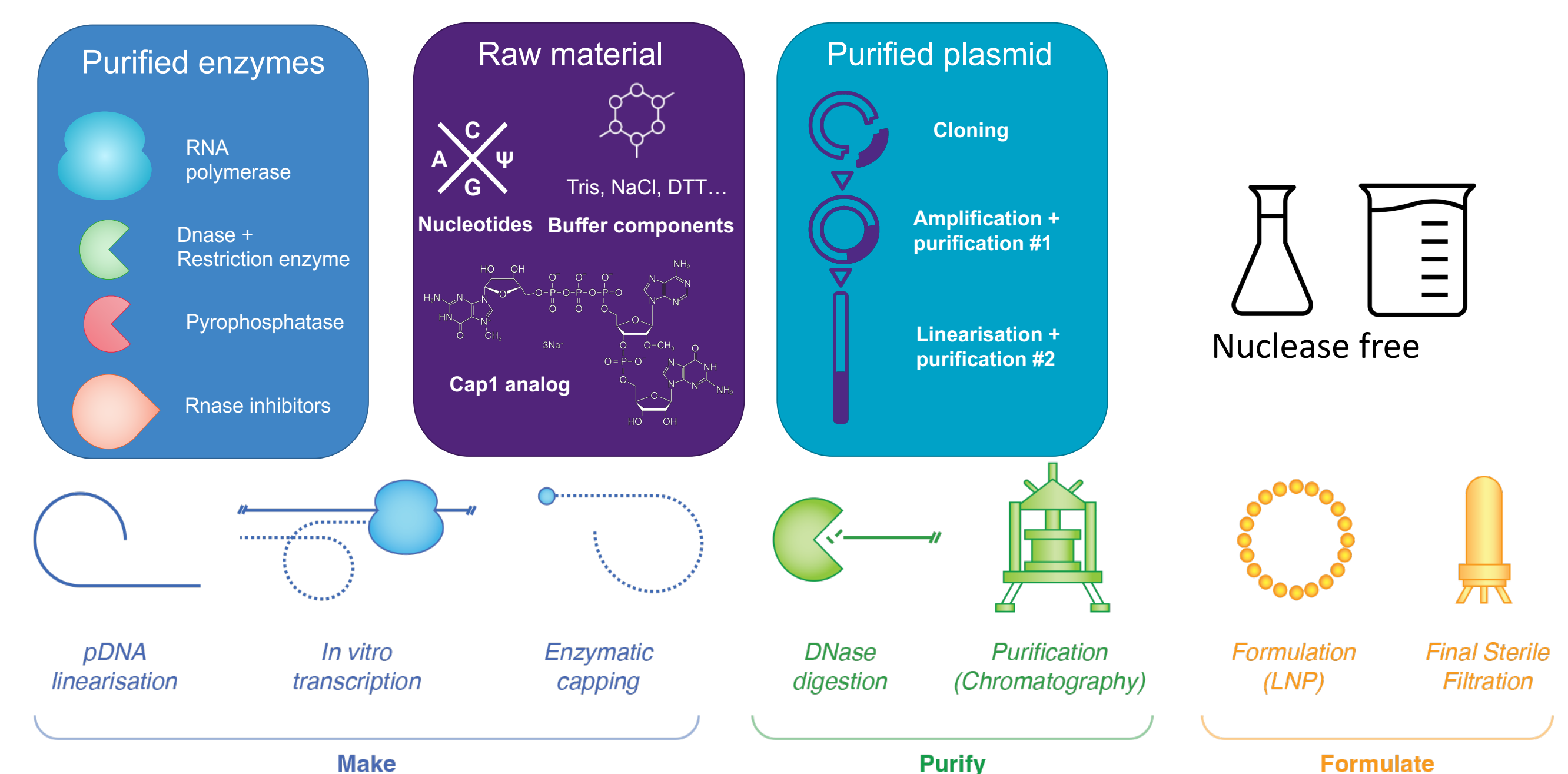
Location AIBN, University of Queensland



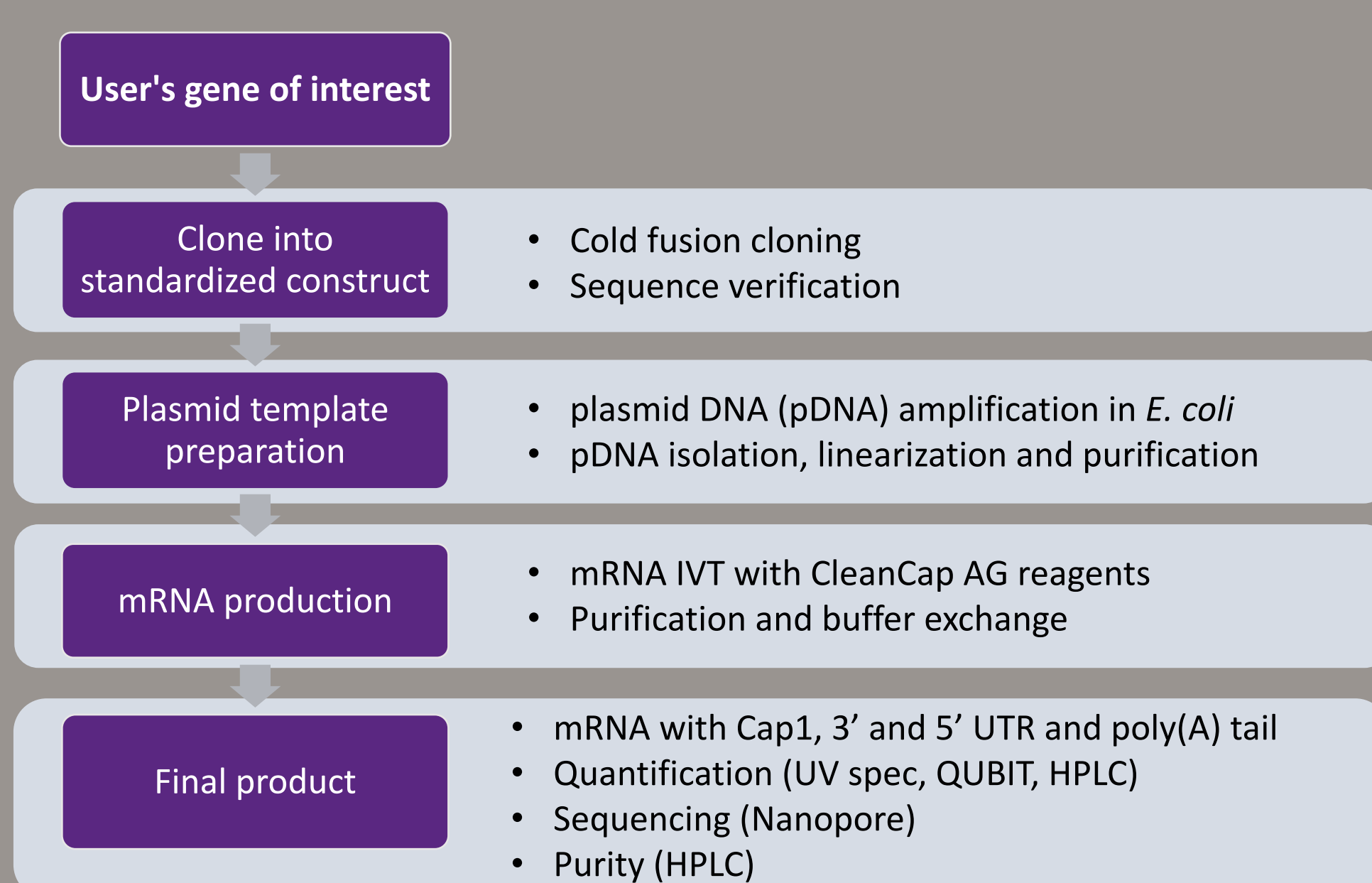
## Anatomy of a functional mRNA



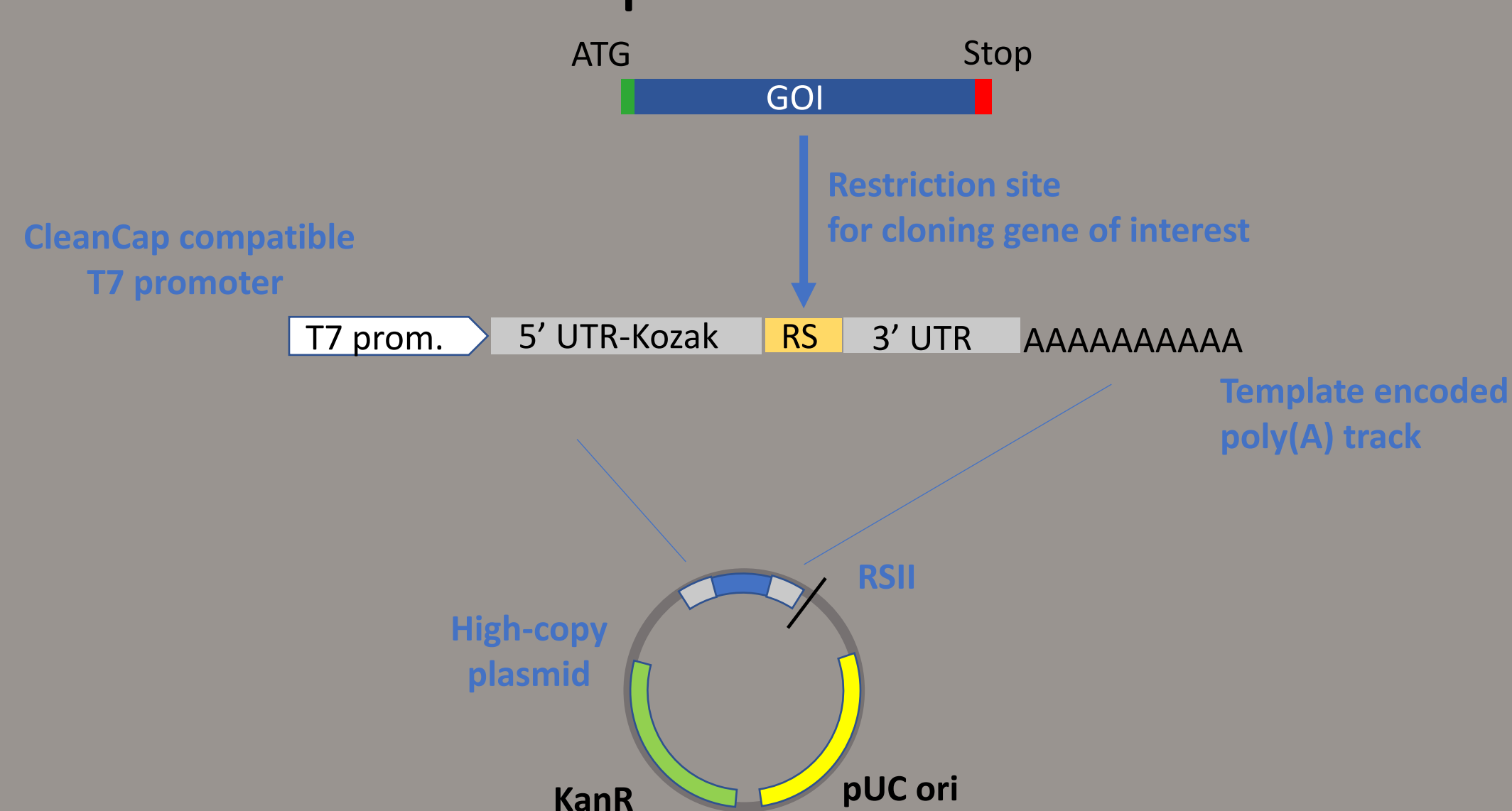
## Fundamental of mRNA [vaccine] production



## BASE mRNA platform technology workflow



## BASE mRNA platform construct



## eGFP mRNA reporter IVT optimisation and scale up production

- Linear scalability of mRNA IVT from 20 $\mu$ L to 540  $\mu$ L reaction volume

Predicted size mRNA 2021-8\_B1 = 1187 nt

Lane	Nucleotide	Incubation temperature	Enzyme	Tapestation size (nt)	Yield (mg/mL) UV spec.	Size difference	Reaction scale ( $\mu$ L)
1	UTP	32°C	BASE T7	1189	6.4	2	20
2			NEB T7	1212	6.1	25	
3		37°C	BASE T7	1160	5.2	-27	
4			NEB T7	1164	5.9	-23	
5	1-Methylpseudo-UTP	32°C	BASE T7	1109	3.9	-78	20
6			NEB T7	1129	4.6	-58	
7		37°C	BASE T7	1090	4.4	-97	
8			NEB T7	1100	4.1	-87	
9		32°C	BASE T7	1106	4.5	-81	540

