



Powering the Synthetic Biology and Genomics Revolution

2019



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CEO

@TwistBioscience #SyntheticDNA



**Founded
2013**



San Francisco

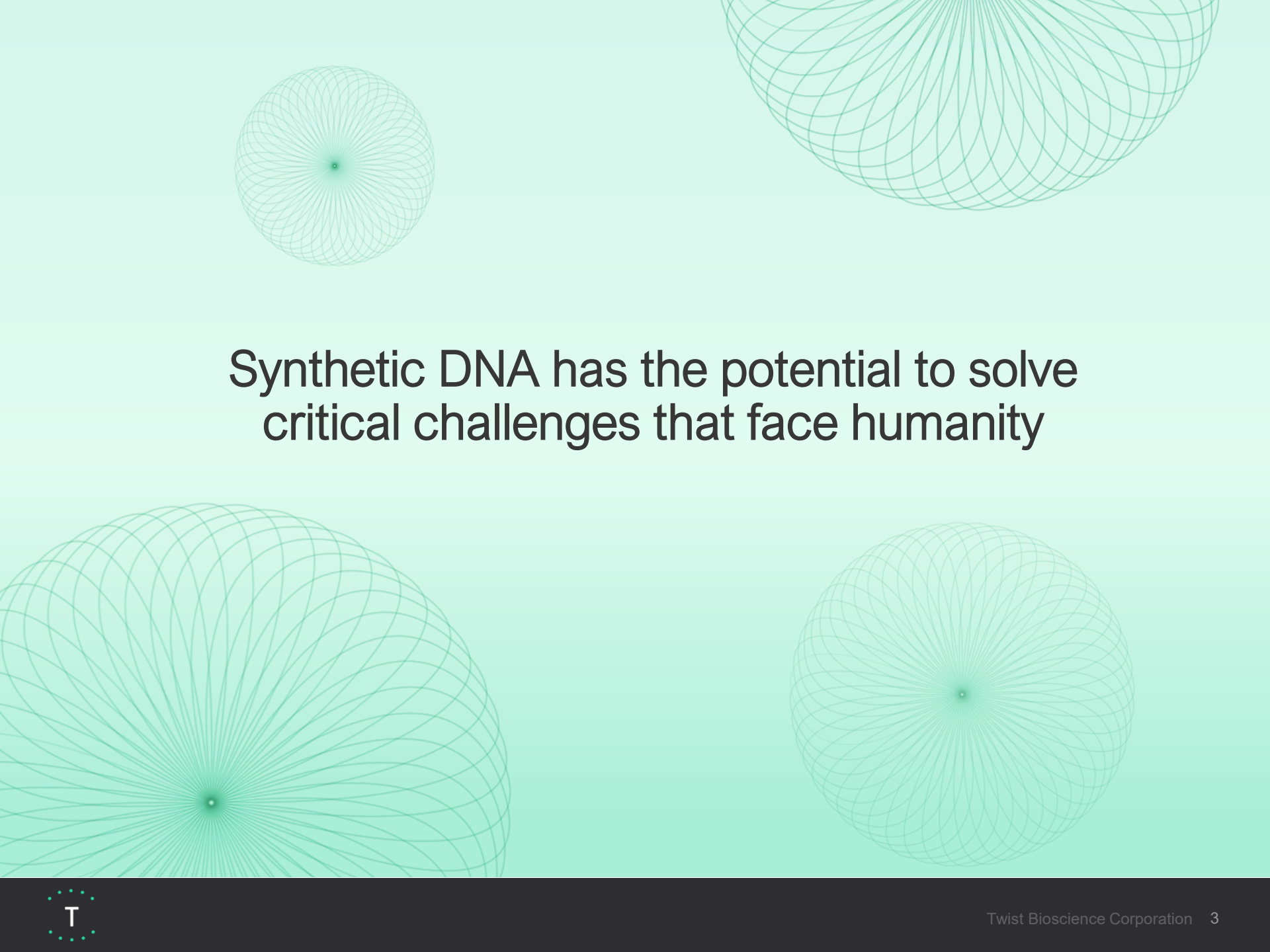
South San Francisco

Tel Aviv

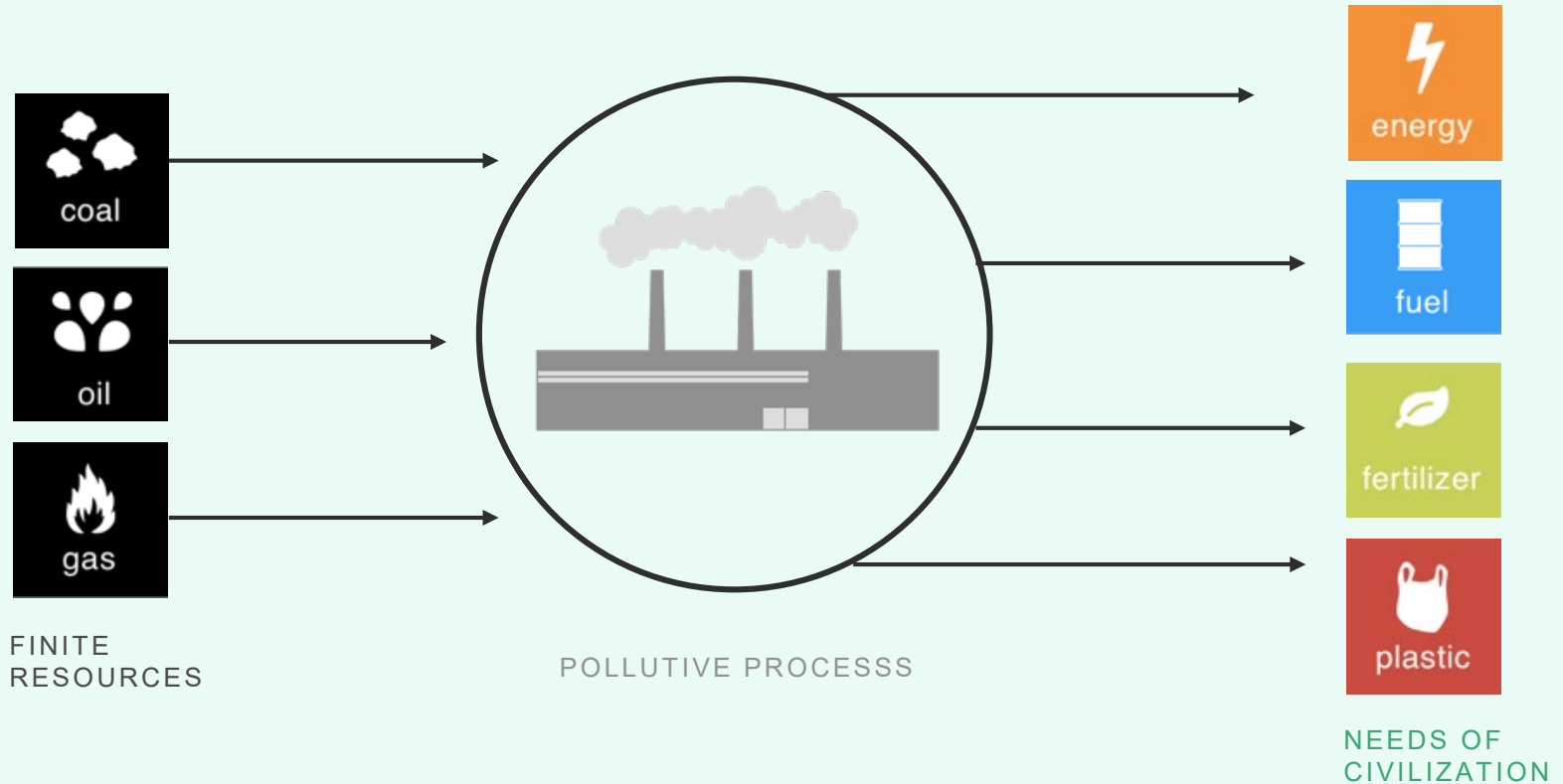
San Diego

Singapore

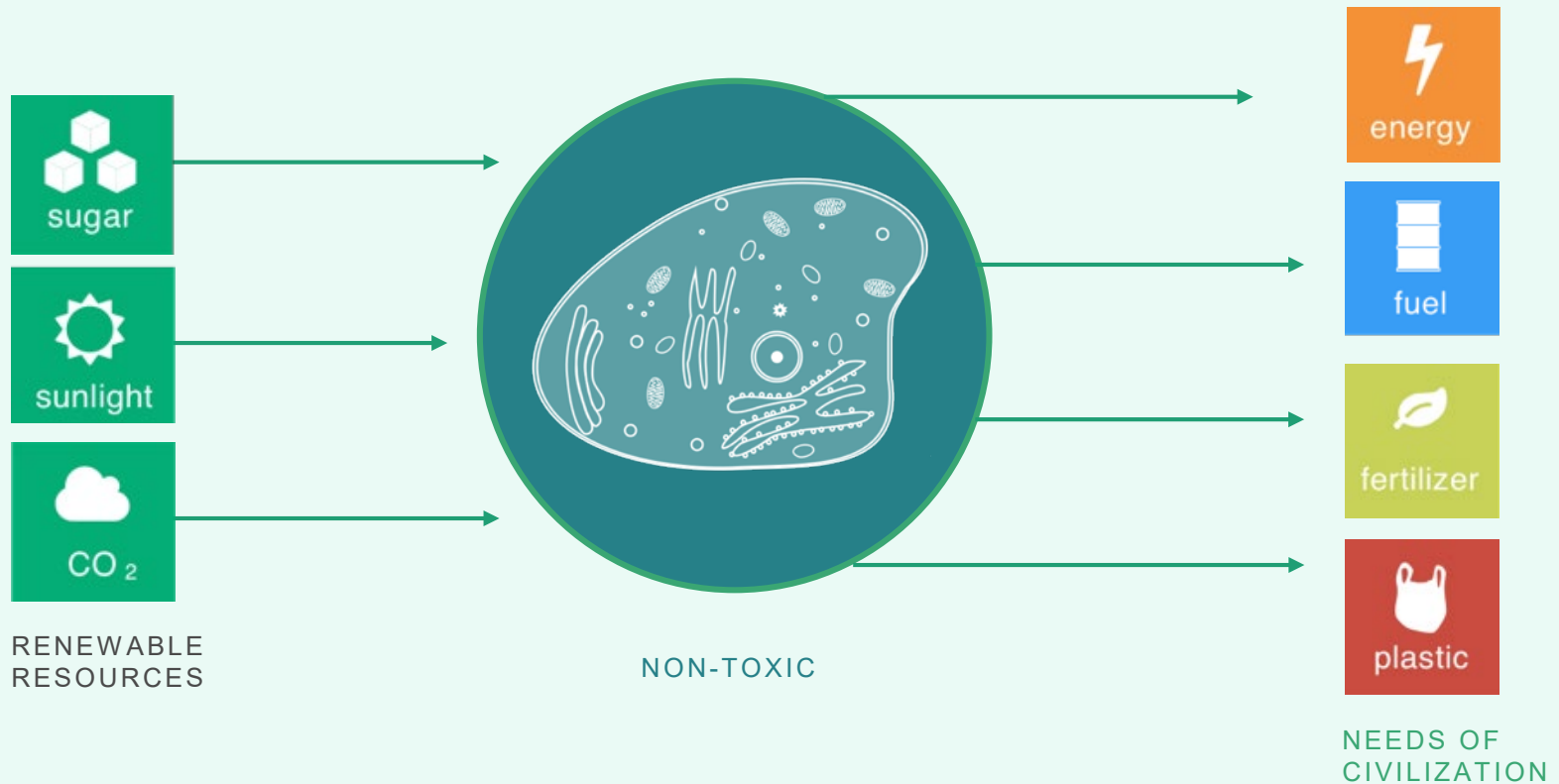




Synthetic DNA has the potential to solve
critical challenges that face humanity



- Our population is rapidly growing but resources are unable to keep up
- Leads to increased industrial production to meet the growing needs of civilization

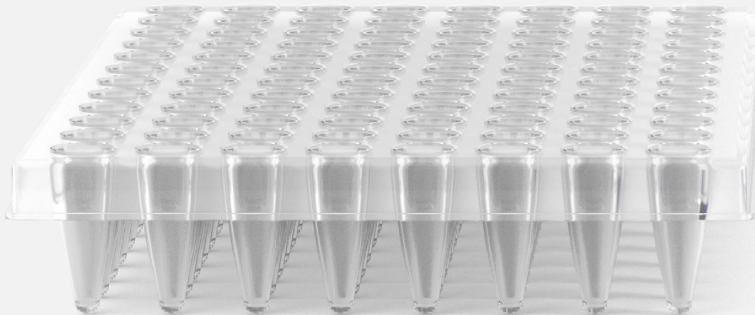


Shifting to renewable resources, **leveraging biology** as sustainable factories

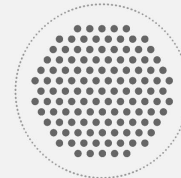
Technology fueling
growth & expansion into
new applications



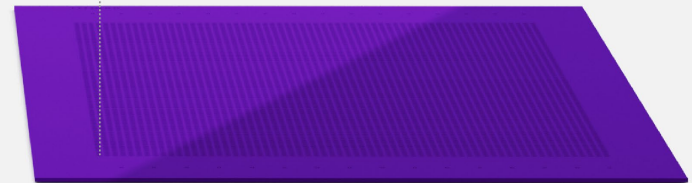
Rewriting DNA with the Power of Silicon



96 WELL PLATE
makes 1 gene



121 devices per cluster



TWIST SILICON PLATFORM
makes 9,600 gene

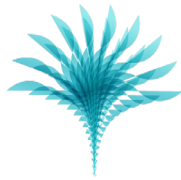
Developing **Game-Changing** Throughput and
Cost through Quality and Speed at Scale

What can Twist do for you?

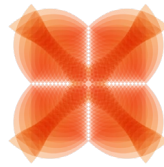
Precision DNA Synthesis at Scale



Genes



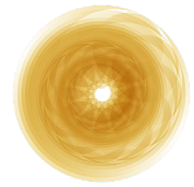
Oligo Pools



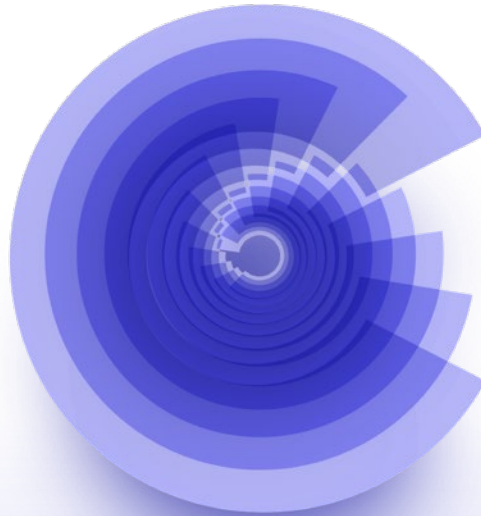
Libraries



NGS



Data Storage



Genes

Why clone? Let Twist Bioscience build genes for you.

Perfect Sequence for 1 or 10,000 Genes, or More



YOUR GENES, YOUR WAY

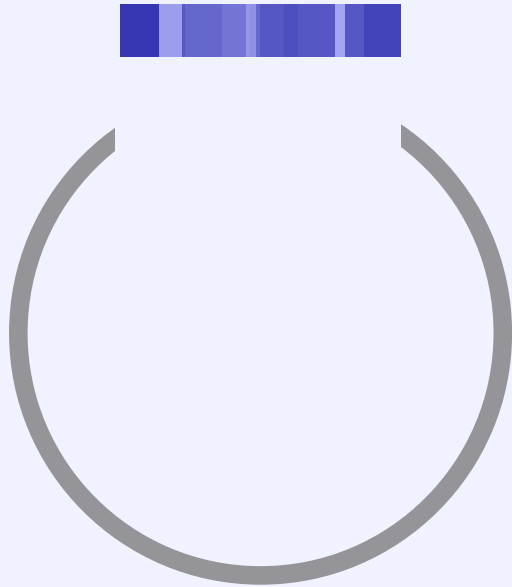


INDUSTRY LEADING PRICE AND TURN AROUND TIME

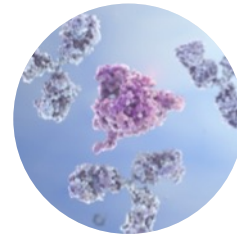


SCALABLE SYNTHESIS

Synthetic Genes at the core of various pipelines



Your Gene + Your Vector



**Antibody-Based
Drug Development**



**Gene Editing:
Donor DNA Synthesis**



Pathway Assemblies



Gene Therapy



Genes

GENE FRAGMENTS

Up to 1.8 kb

7¢ / bp

6 to 9 business days

CLONAL GENES

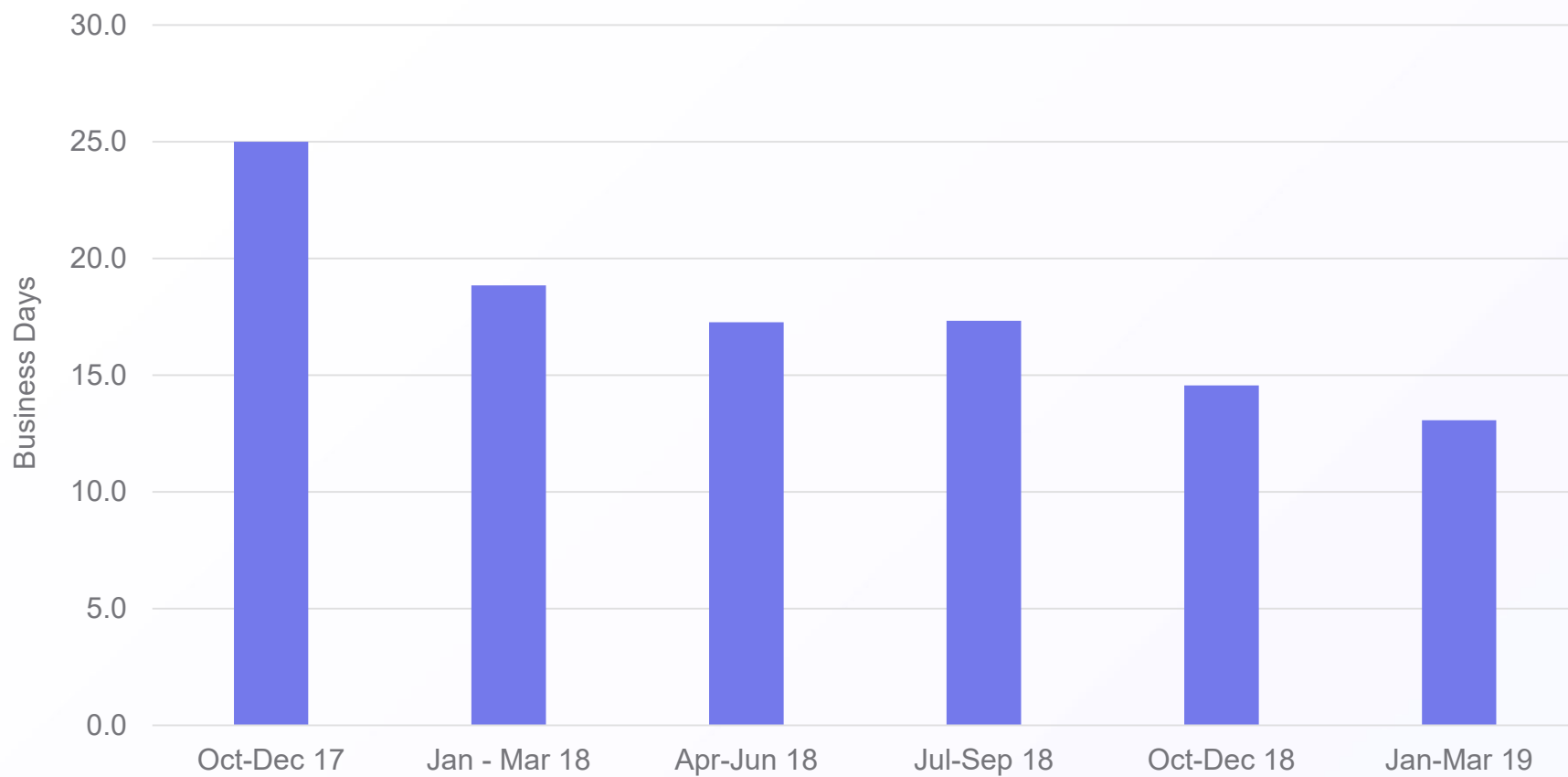
Up to 5.0 kb

From 9¢ / bp

11 to 17 business days

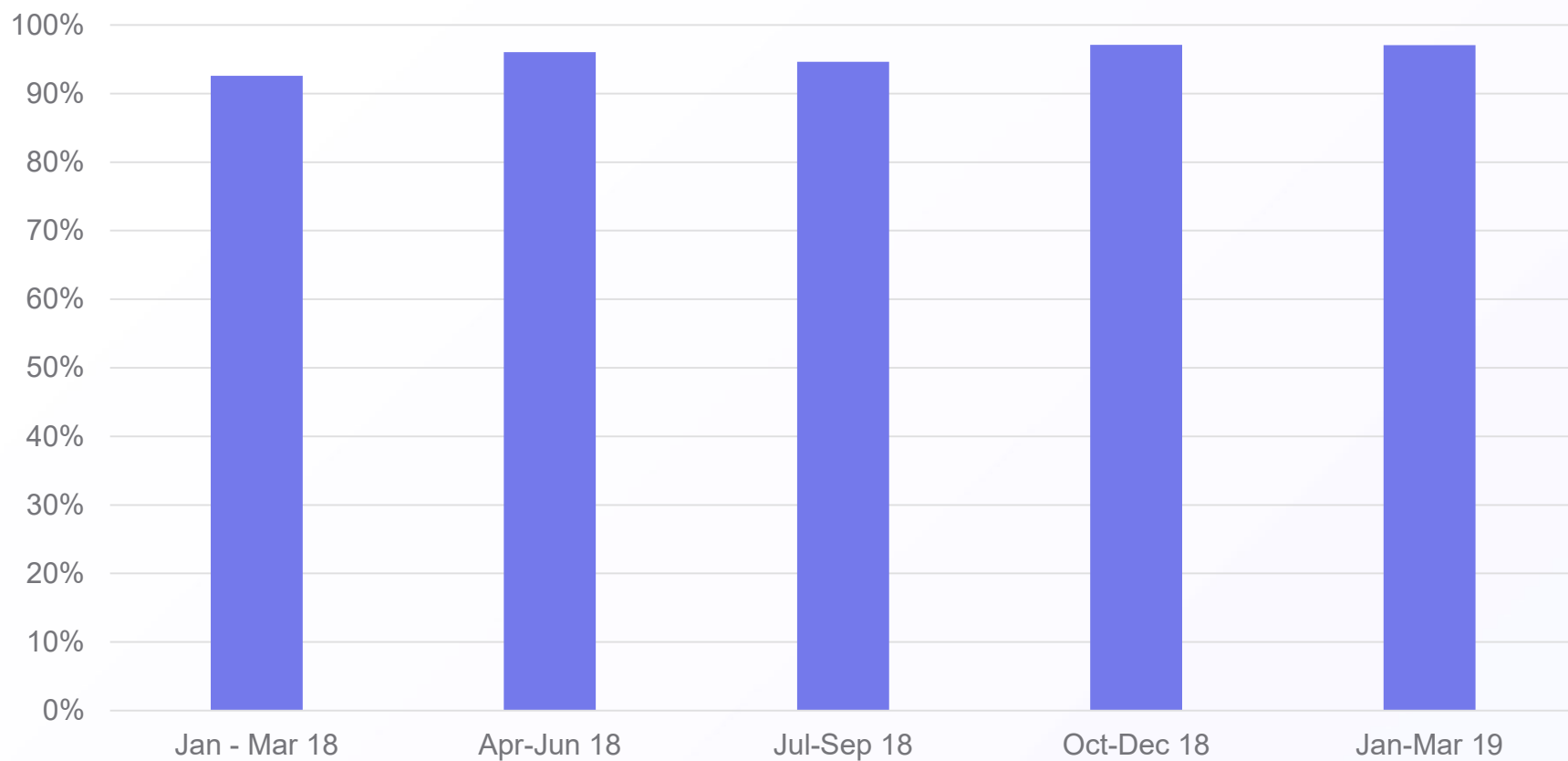


TURNAROUND TIME





SUCCESS RATE



In partnership with



A multitude of possibilities in your gene design
with our expanded menu of Twist Cloning and Expression Vectors

My Vectors

Start new order

Twist Cloning (8)

Twist Expression (15)

Custom (0)

Twist Expression Vectors (15)

RESISTANCE

All (15)

Ampicilin (12)

Kanamycin (3)

ORGANISM

All (15)

Ecoli (4)

Mammalian (9)

Viral (2)

pET-21(+) (5365 bp)

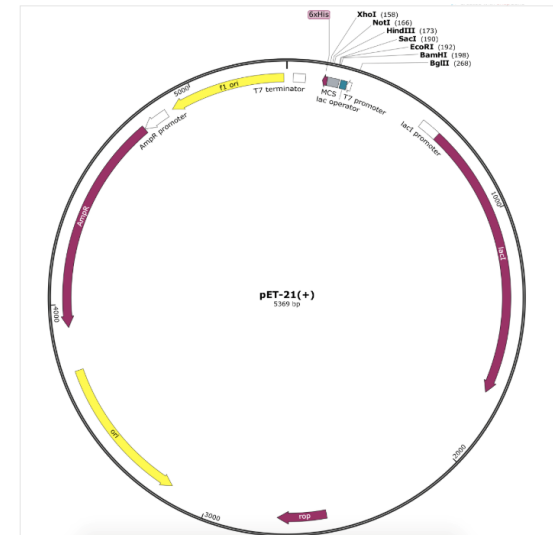
Licensing Info

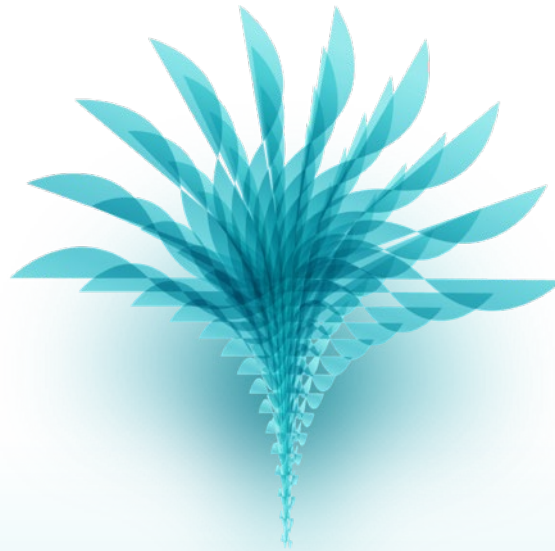
Download

T7 RNA polymerase driven transcription vector for expression in E. coli. The vector, which lacks the ribosome binding site and ATG start codon, is designed for protein expression from translation signals carried by the cloned DNA. Vector features: C-terminal His-Tag® sequence lac repressor / lac operator

INSERTION POINTS

Name	Supported sequence length	Resistance	Copy #	Organism
BglII_XhoI	0.3-5.0 kbp	Ampicilin	Medium	Ecoli
BamHI_HindIII	0.3-5.0 kbp			





Oligo Pools

Think big, screen once. Let Twist build for you.

Industry leading error rates and scalability. From 100 to more than 1 million oligos.



PRECISION EDITING OF TARGET LOCI



MAXIMIZED SCREENING EFFICIENCY

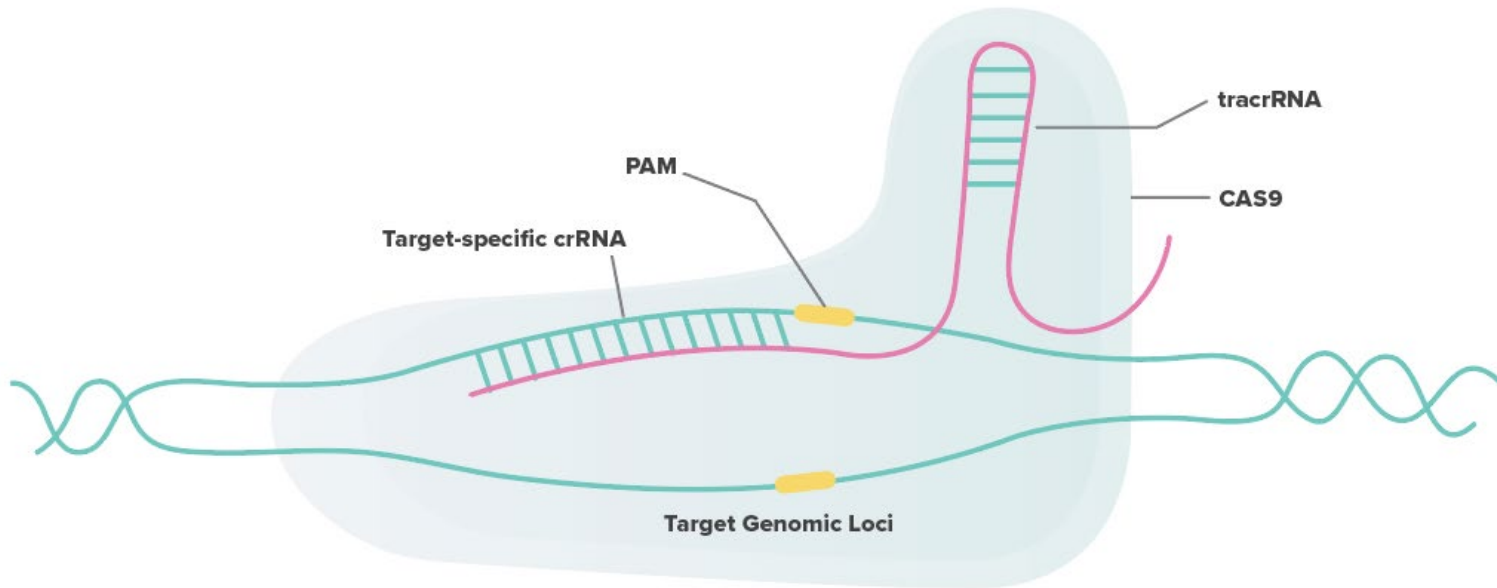


LIBRARY DESIGNS MADE EASY

Fueling Genome-Wide Experiments



CRISPR-CAS9



Editing Outcomes

Gene Silencing

NHEJ

(non-homologous end joining)

Gene disruption – repair to native sequence results in frameshifts or mutations

Gene Correction

HDR

(homology-directed repair
Co-transfect cells with donor DNA)

DNA Insertion

Insert promoter, gene tags, and single or multiple genes

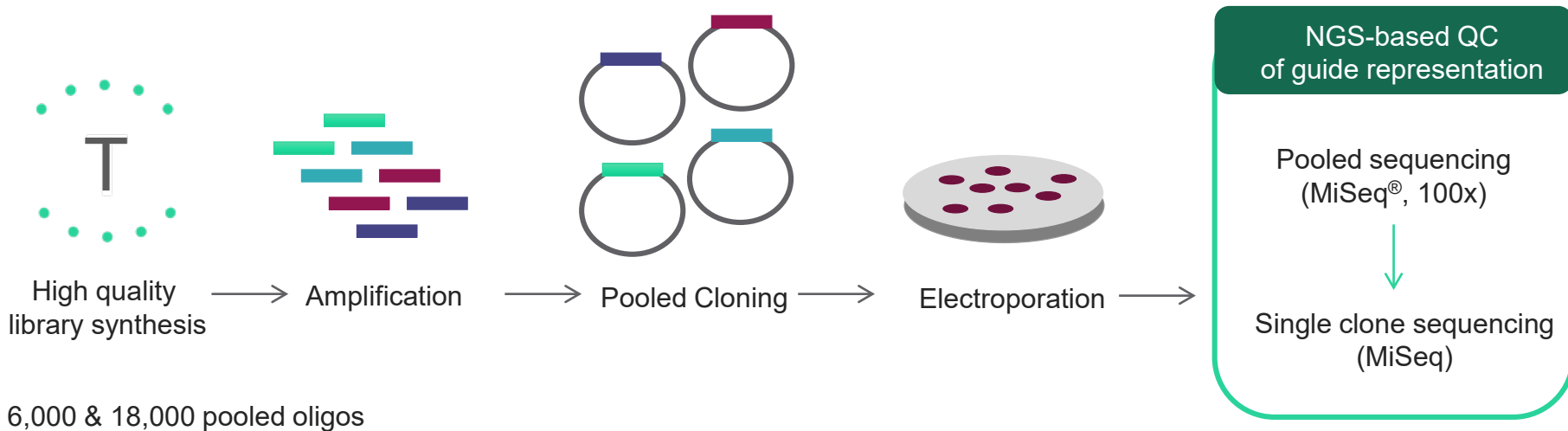
Application: Human Epigenetic CRISPR Screen



Objective: Cancer drug target discovery using CRISPR-Cas9

Experimental Approach: Introduce mutations in exons that encode functional domains using CRISPR-Cas9

The Workflow:



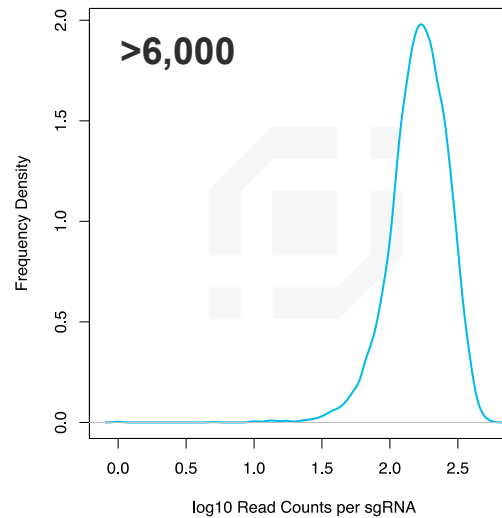
Data from: Oxford Genetics Ltd.

Highly Efficient Cloning of a 6k & 18k plex CRISPR Library

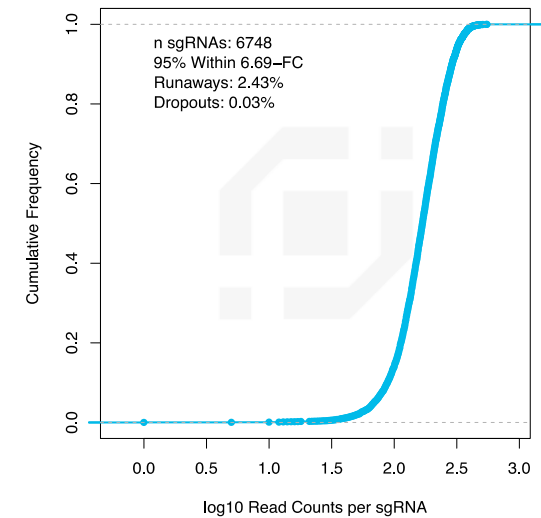


- Cleaner, uniform smaller and larger pools with little bias
- Uniformity is unparalleled: 95% of bases within 4.58 and 6.67 fold count
- Minimal dropouts

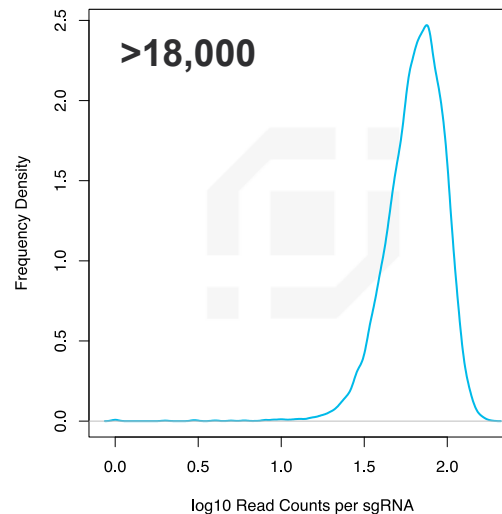
Read Counts per sgRNA



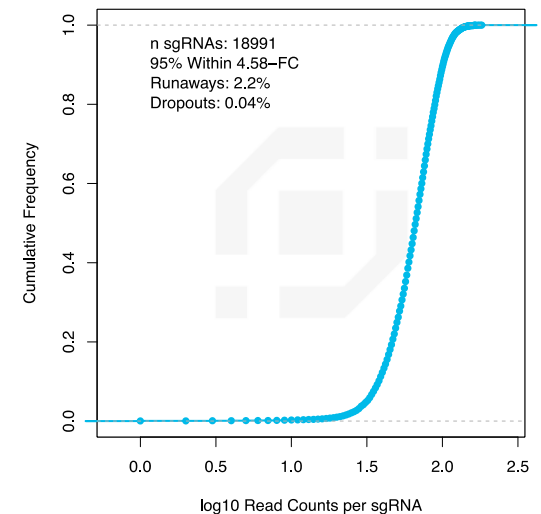
Cumulative Read Counts per sgRNA



Read Counts per sgRNA



Cumulative Read Counts per sgRNA



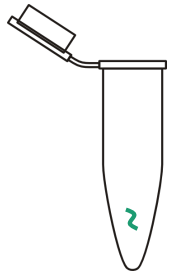
**OXFORD
GENETICS**
BIOLOGY ENGINEERED

Twist Alpha Program



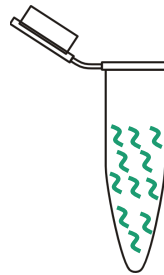
Twist's New Early Access Products

1980

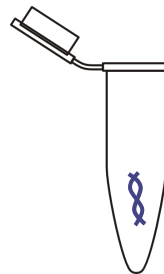


1 oligo : 1 tube

2000

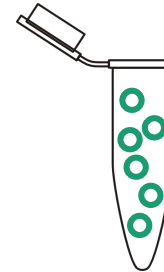


10^5 oligos : 1 tube

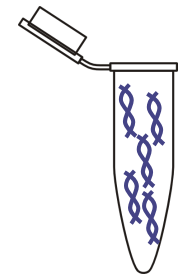


1 gene : 1 tube

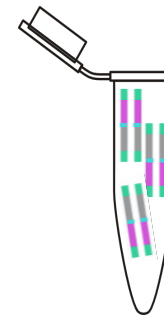
Today



10^5 cloned oligos



10^5 unique genes

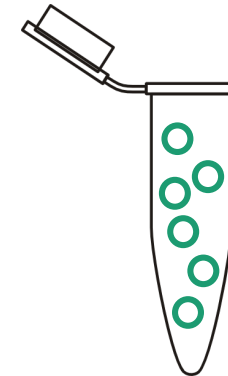
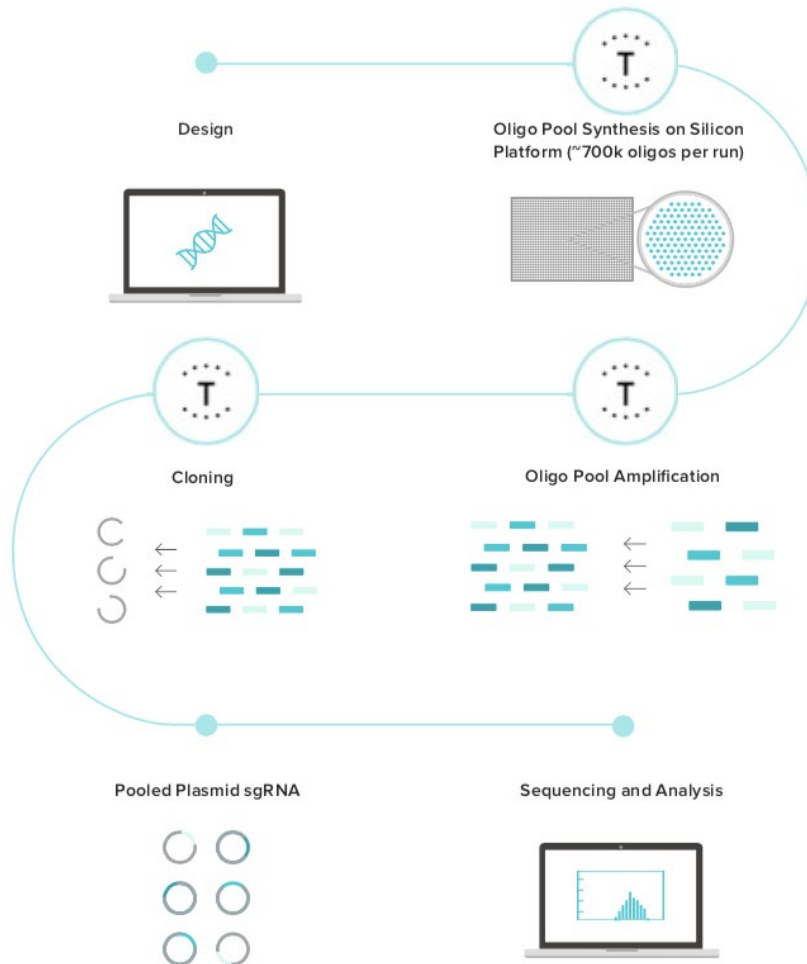


10^5 sequence variants

Cloned Oligo Pools



Simplify your experiments. Don't clone - focus on experiments that matter.



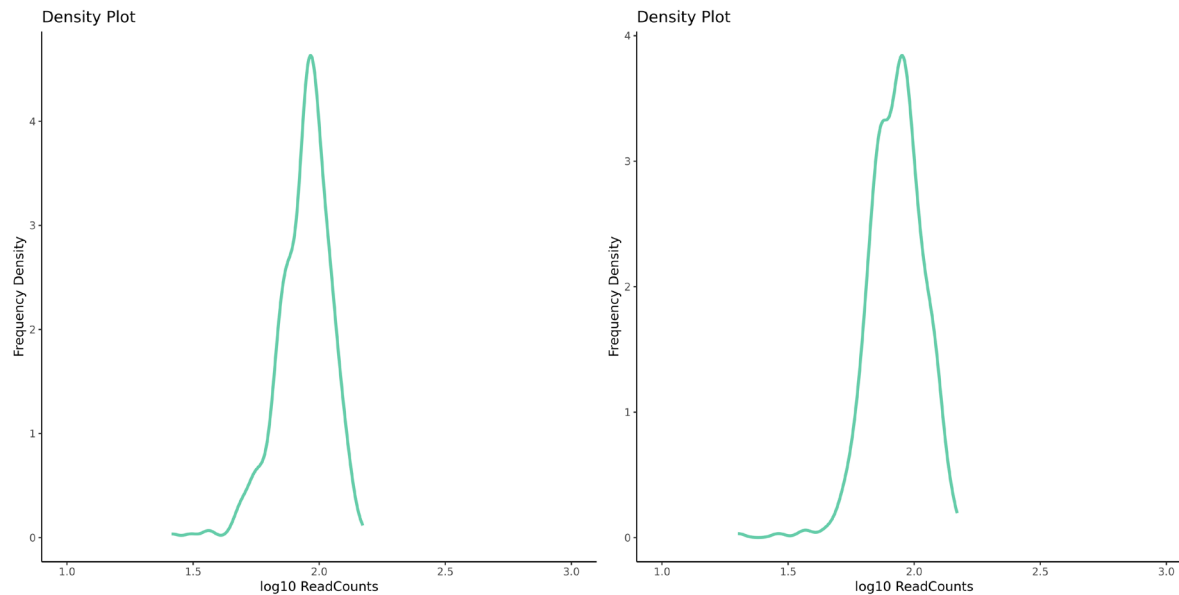
Cloned oligo pool
 10^5 oligos cloned into
your vector

Cloned Oligo Pools



Cloned oligo pools maximize experimental efficiency, maintain diversity and ensure uniformity

Sequence Distribution

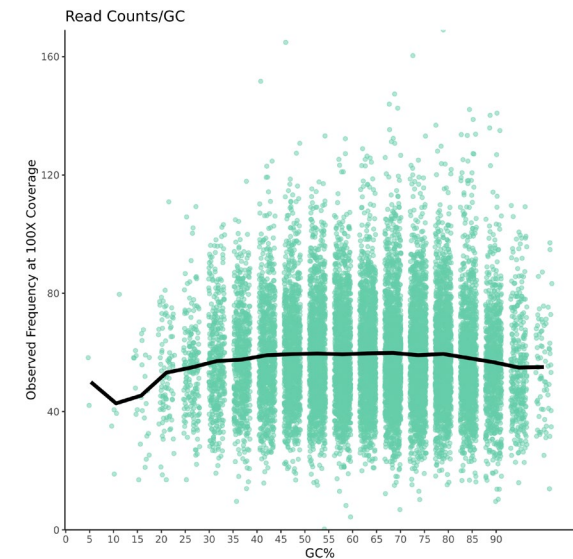


Before Cloning

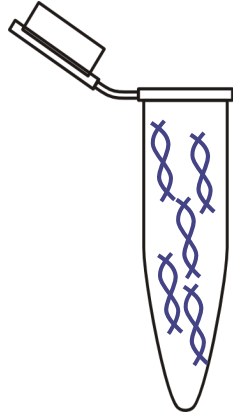
After Cloning

Uniformity is maintained after cloning

GC Uniformity



GC% does not effect
uniformity



Gene pool:
 10^5 gene fragments in a
single tube

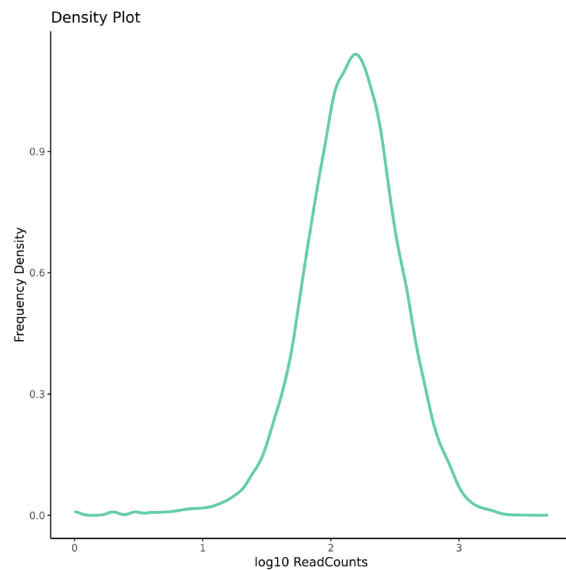
GENE POOLS
Up to 450 bp

<1¢ / bp

Do more with synthetic DNA for less

High quality gene pools minimize wasted time and resources in high throughput screens

Sequence Distribution



Sequence Quality

%Indel Free Sequences of 400bp Gene Pool

Gene Count



The trend of count of Gene for Indel Free % (bin). The data is filtered on Type, which keeps Pass and Runaway.

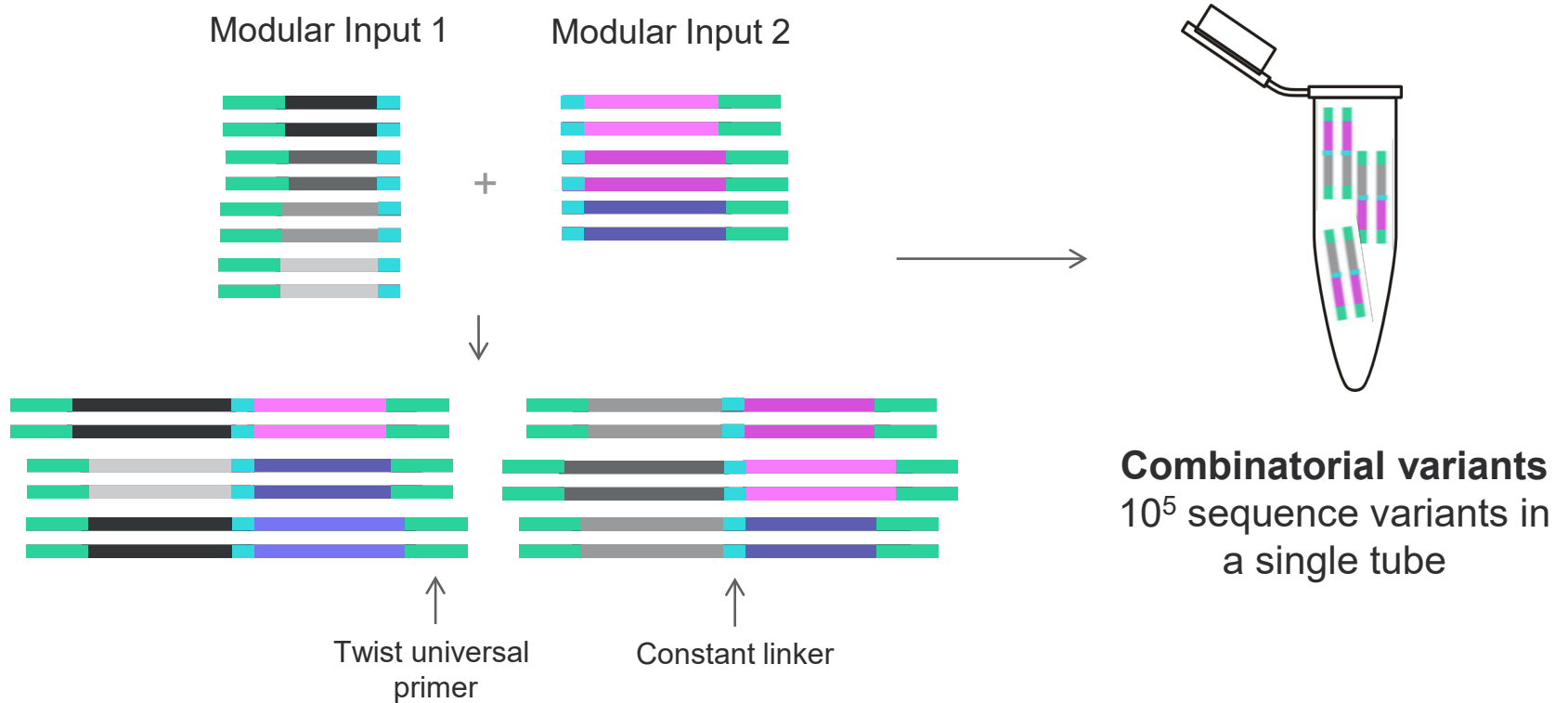
Maximize screening efficiency

Access every sequence

Combinatorial variants



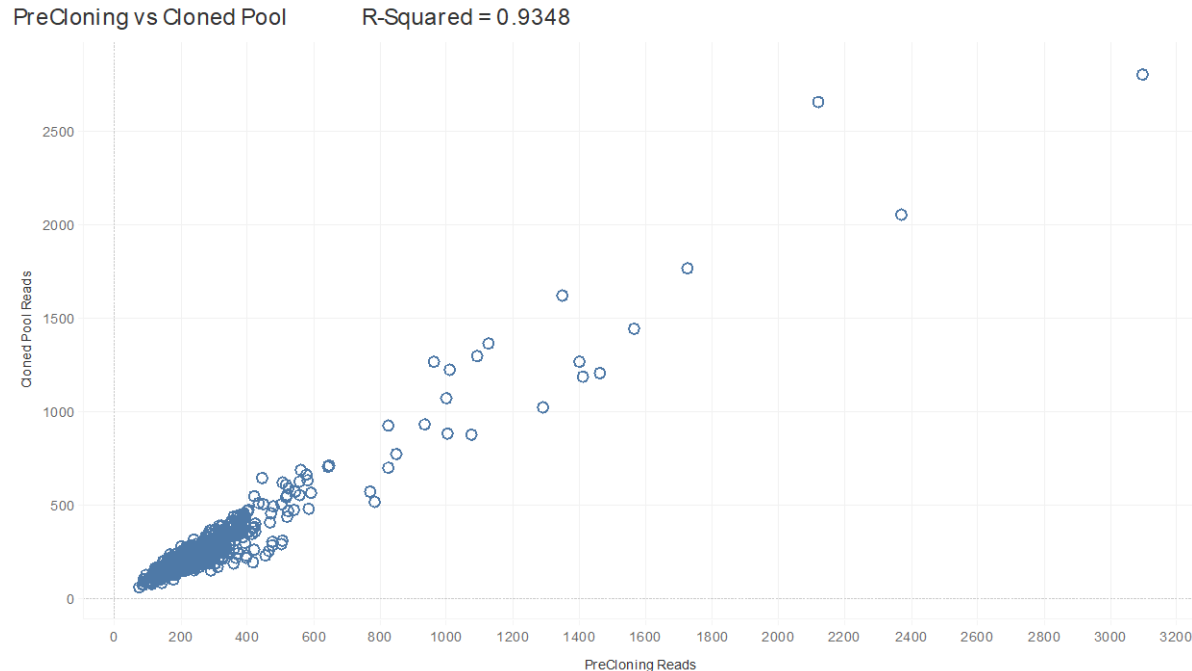
Save time and money by accessing complete combinatorial sequence diversity



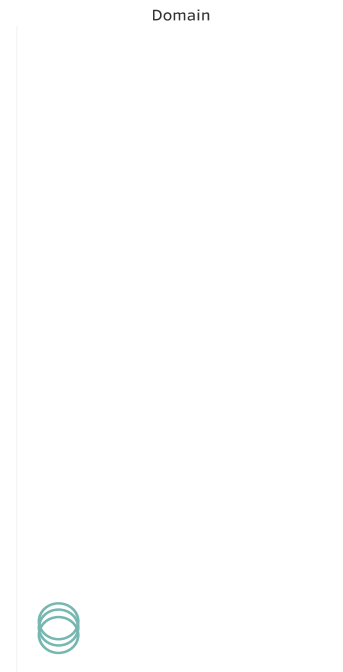
Combinatorial Variants



Combinatorial assembly with 4 input pools and a final diversity of ~150,000 combinations



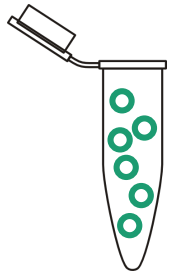
Uniformity of full length sequences are seen before and after cloning



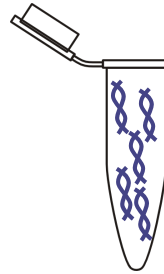
Uniform variant frequency

Twist's experience in combinatorial DNA assembly results in little bias.

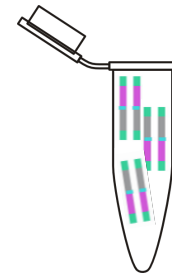
Twist Bioscience's Early Access Program



Cloned oligo pools



Gene pools

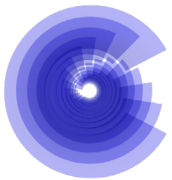


Combinatorial variants

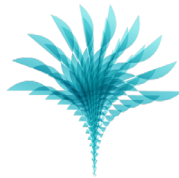
Comprehensive **screening solutions** at all scales

What can Twist do for you?

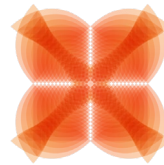
Precision DNA Synthesis at Scale



Genes



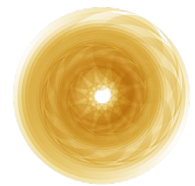
Oligo Pools



Libraries



NGS



Data Storage

Powering the Synthetic Biology & Genomics Revolution



Thank you!

