



Writing the Future

EMILY LEPROUST, PH.D., CEO and CO-FOUNDER



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DNA is Changing the World



Synthetic DNA Is the Future of Everything



Chemicals
Sustainability



Food
Food Security



Therapeutics
Health



Diagnostic
Precision Medicine



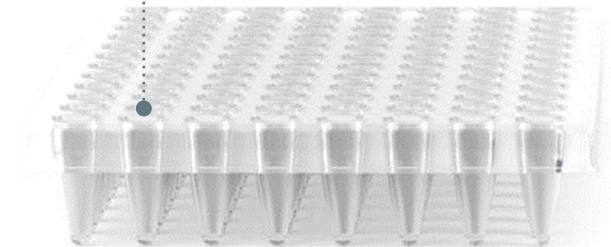
Data Storage
Preserving Heritage



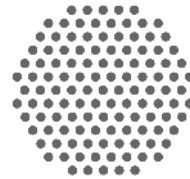
Twist DNA Writing on Silicon Platform

Everyone Else

1 Oligo per well



96 Well Plate
makes 1 gene



1M Oligos per chip



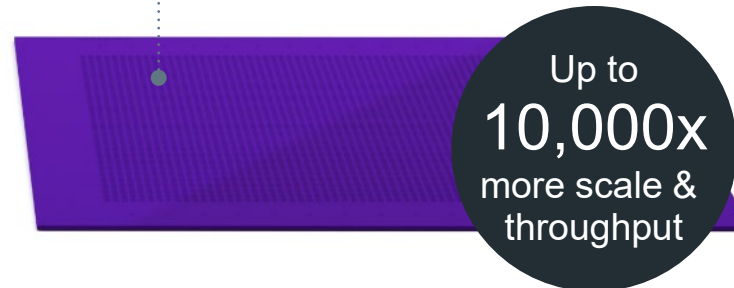
**State of the
art commercial
infrastructure**

Proprietary software

Robotics

Integrated
ecommerce platform

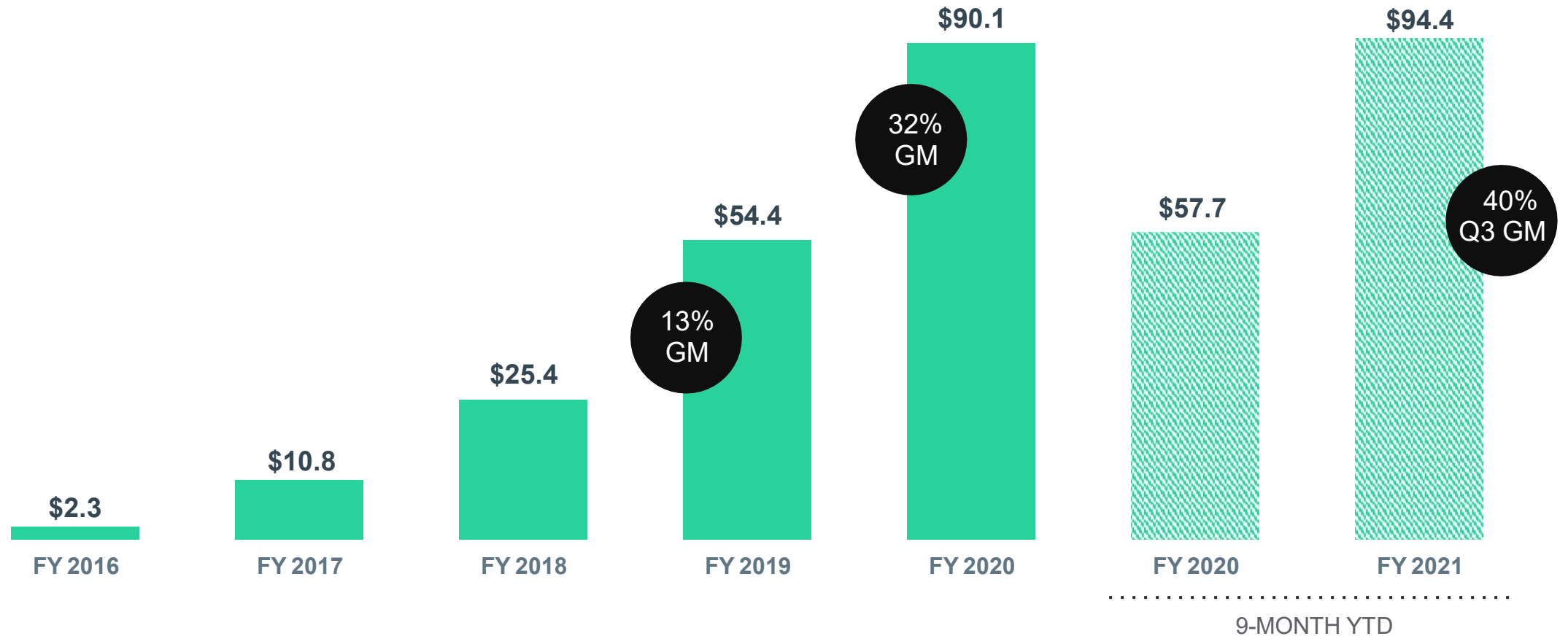
Manufacturing
execution system



Twist Silicon Platform
can make 9,600 genes



Strong Revenue Growth and Increasing Gross Margin





We are Building a Diverse Portfolio of Businesses



Drug
Discovery

Data
Storage

**High-value
solutions**
Future upside

Tools
High-growth
revenue today

Synthetic
Biology

Next-Gen
Sequencing

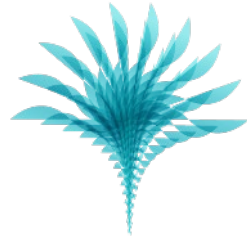


Synthetic Bio: Largest Selection of DNA Offered



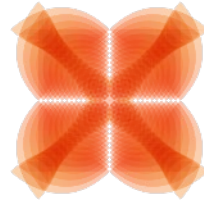
Genes

Clonal
Non-clonal fragments
Clonal-ready gene
fragments



Oligo Pools

sgRNA



Variant Libraries

Site saturation
Combinatorial



Pharma / Biotech Solutions

DNA preps
IgG





Innovative Buying Experience

T

M

CLONAL GENES

My Genes Project

OVERVIEW > GENE IMPORT > PRICING & SCORE

Change Vector + Flanks Optimize + Genes + Custom Vector

Q

#	<input type="checkbox"/>	NAME ↓	SEQUENCE	BP	VECTOR	SCORE ⓘ	PRICE
1	<input type="checkbox"/>	gene-001	ACTCGACTGACTAGC...	1264	Select Vector ▾	●	\$113.76
2	<input type="checkbox"/>	gene-002	ACTCGACTGACTAGC...	1014	Select Vector ▾	●	\$91.26
3	<input type="checkbox"/>	gene-003	ACTCGACTGACTAGC...	978	Select Vector ▾	●	\$88.02
4	<input type="checkbox"/>	gene-004	ACTCGACTGACTAGC...	848	Select Vector ▾	●	Fix it
5	<input type="checkbox"/>	gene-005	ACTCGACTGACTAGC...	1200	Select Vector ▾	●	\$108.00
6	<input type="checkbox"/>	gene-006	ACTCGACTGACTAGC...	1124	Select Vector ▾	●	\$101.16
7	<input type="checkbox"/>	gene-007	ACTCGACTGACTAGC...	1200	Select Vector ▾	●	Fix it
8	<input type="checkbox"/>	gene-008	ACTCGACTGACTAGC...	1087	Select Vector ▾	●	\$97.83
9	<input type="checkbox"/>	gene-009	ACTCGACTGACTAGC...	1200	Select Vector ▾	●	\$108.00

32 GENES • 26,400 BP

All (240)

● Easy (24)

● Difficult (4)

● Error (2)

● Not Possible (2)

PRICING SUMMARY ⓘ

NAME	QTY	COST
Easy Genes	24	\$2,376.00
Cloning Fee	24	\$1,300.00

DELIVERY FORMAT

☒ Plate: 96 Well, Horizontal

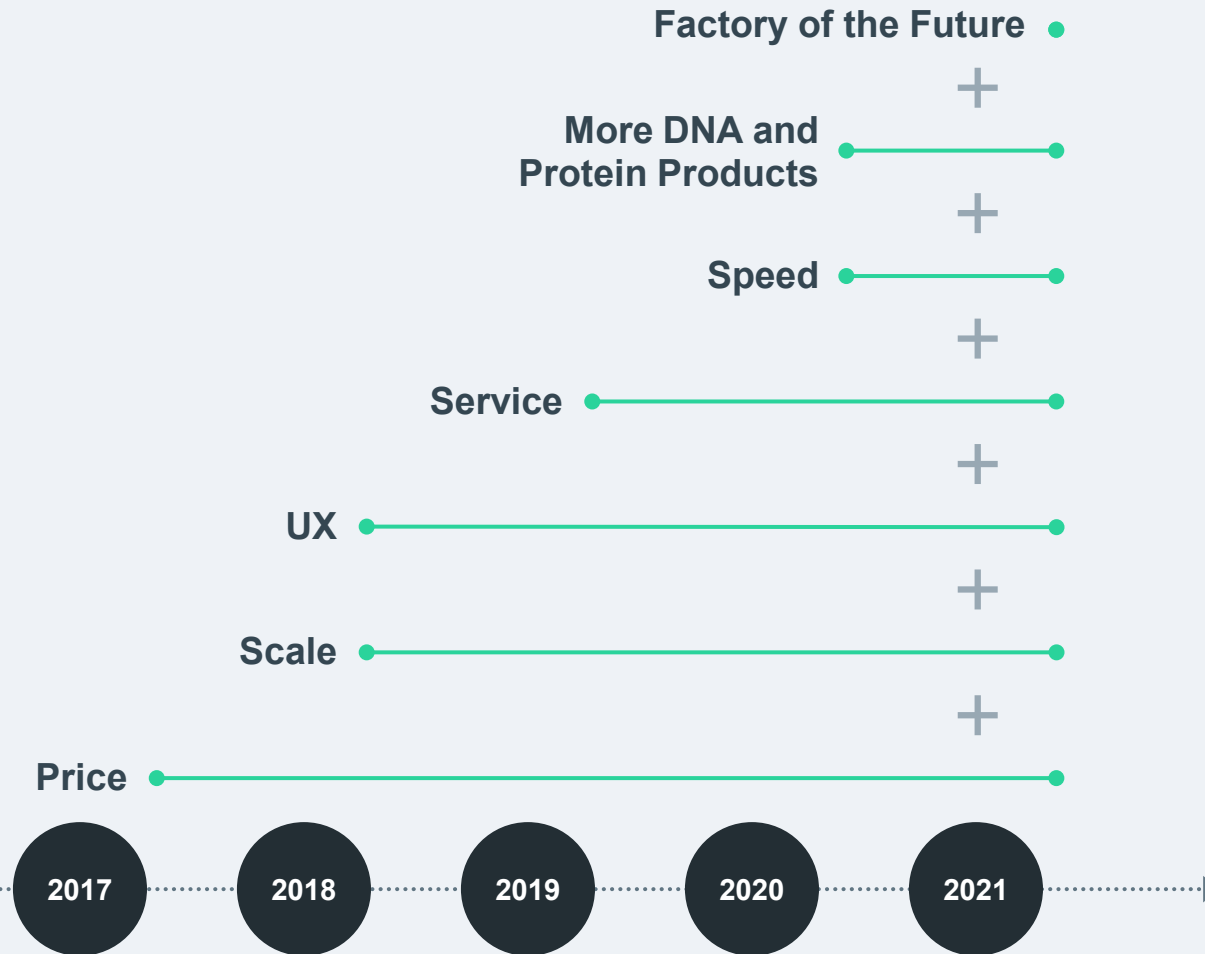
☐ Tube [Edit](#)

Total\$3,676

Checkout



Synthetic Bio: Why We Win



We Deliver

- High-quality DNA
- Competitive turnaround times
- Affordability
- High throughput
- Unique customer experience
- Innovative products and solutions



“ Twist’s very high-throughput platform allowed us to quickly and efficiently examine thousands of possible antibodies in order to select the best results faster than ever before. ”

Robert Carnahan, Associate Director,
Vanderbilt Vaccine Center



Synthetic Bio: Scratching the Surface

FY20 Proof Points

1,590

Customers

339K

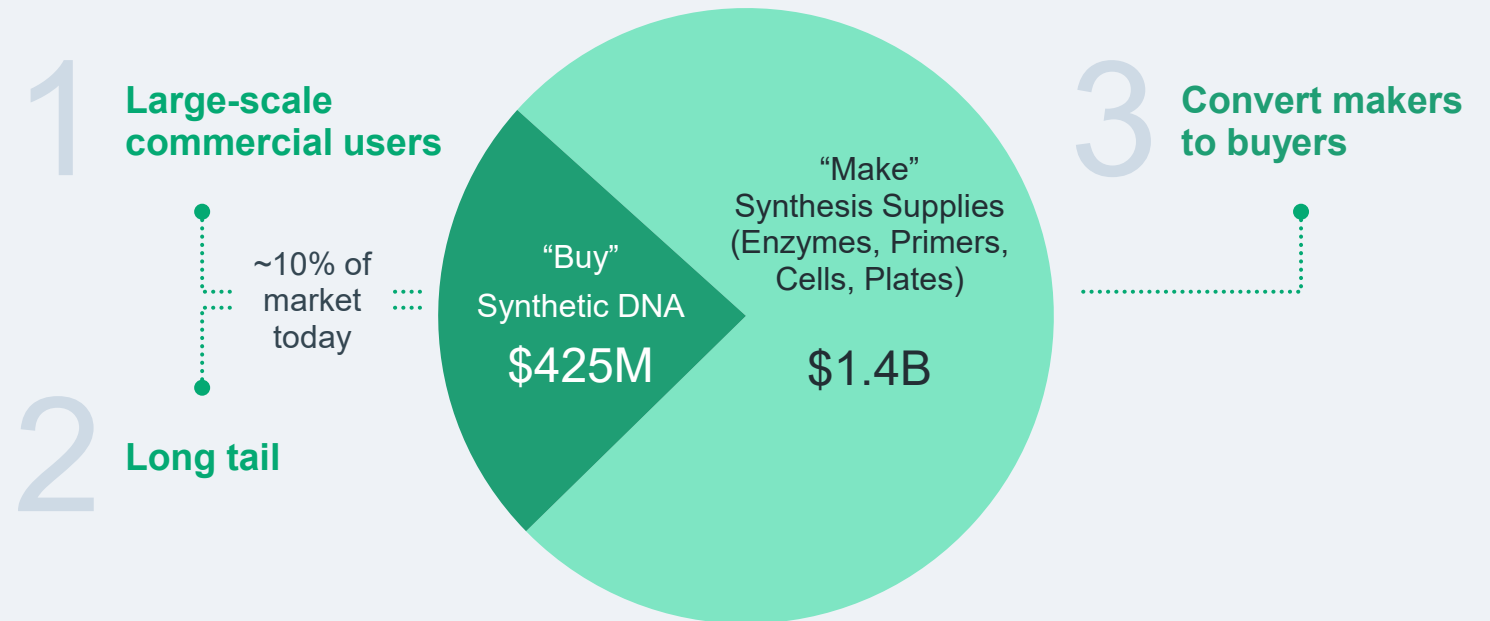
Genes shipped

99%

Orders via ecommerce

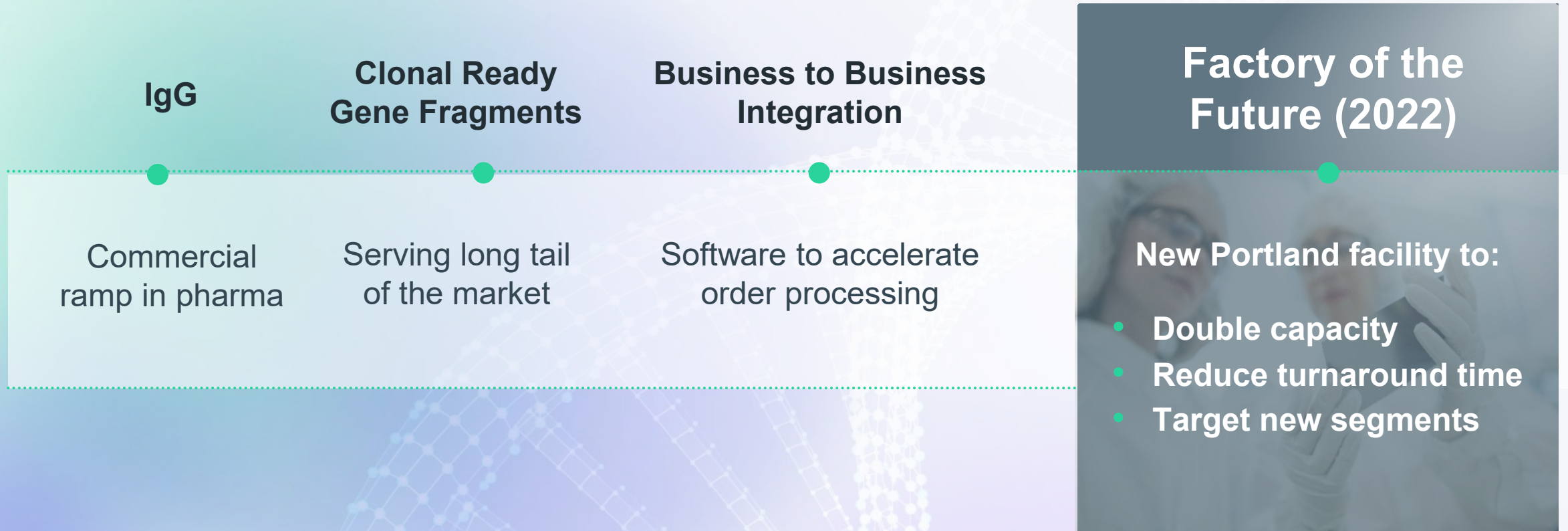
Strategy to Capture Large Market Potential

\$1.8B / year





Synthetic Bio: Roadmap to Expand Our Leadership





NGS: Broad Offering to Meet Expanding Applications

Today



Human Core Exome



Fixed Panels



Custom Panels



Library Preparation



Reagents and Kits



Synthetic Viral Controls



Targeted Methylation



SARS-CoV-2 NGS Assay

Targeted Sequencing

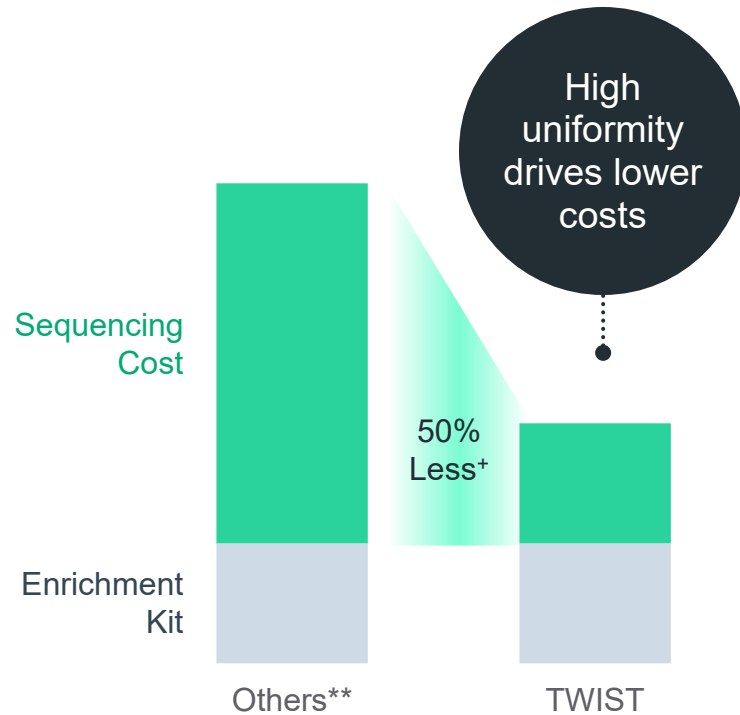
is powering new applications

- Liquid biopsy
- Rare disease
- Oncology
- Population genetics
- Infectious diseases

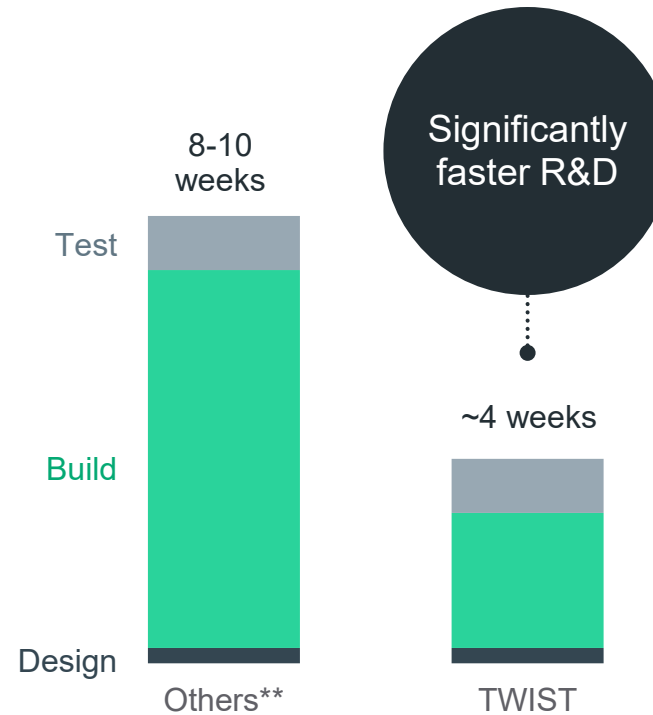


NGS: Why We Win

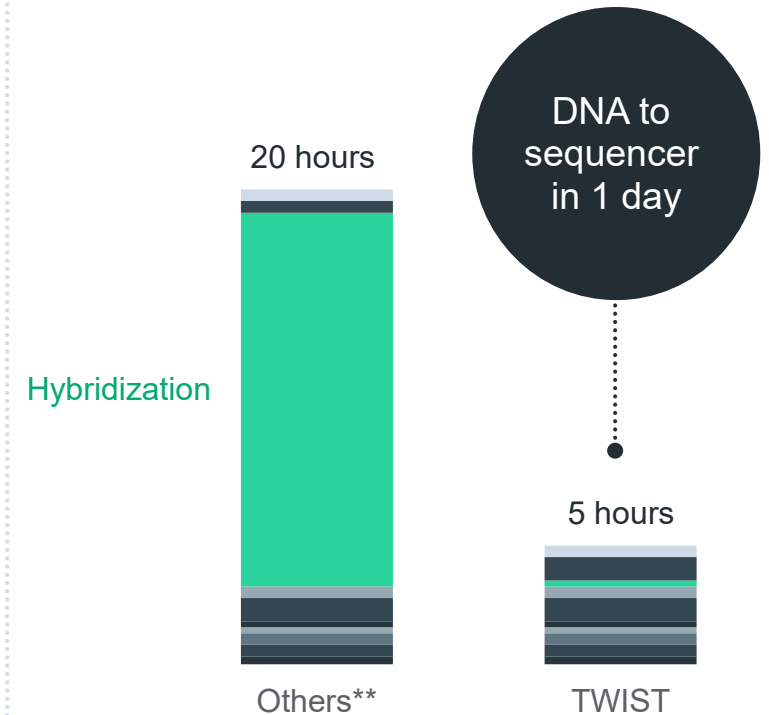
Low Cost per Sample



Rapid Customization



Fast Throughput*



⁺ Based on customer testimonial and Twist's experience

^{*} Includes pooling, pre-hybridization, hybridization, binding, wash steps, amplification, purification, target environment QC, and NGS prep

^{**} Illustrative models based on Twist's knowledge of competing technologies.



NGS: Investing in Growth

FY20 Proof Points

>1,000

Customers shipped

55

in production

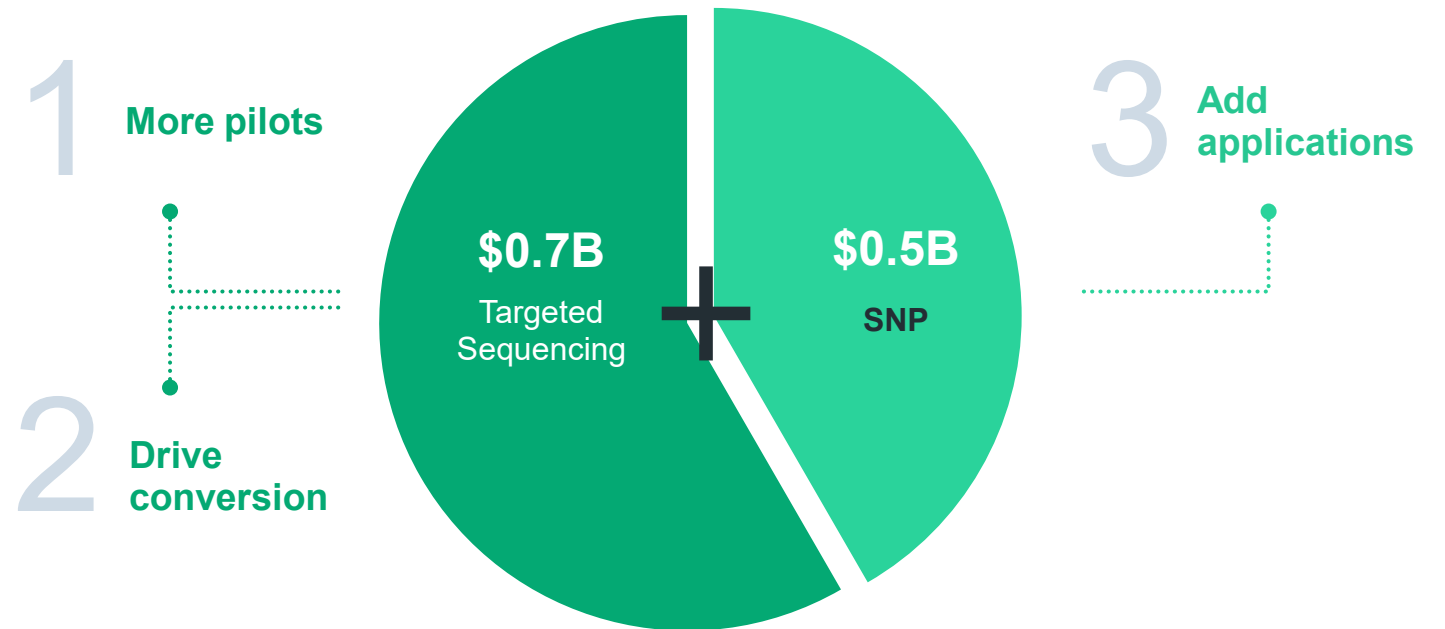
13

OEM partners

3

SNP microarray conversion

Strategy for Expanding Market to >\$1B

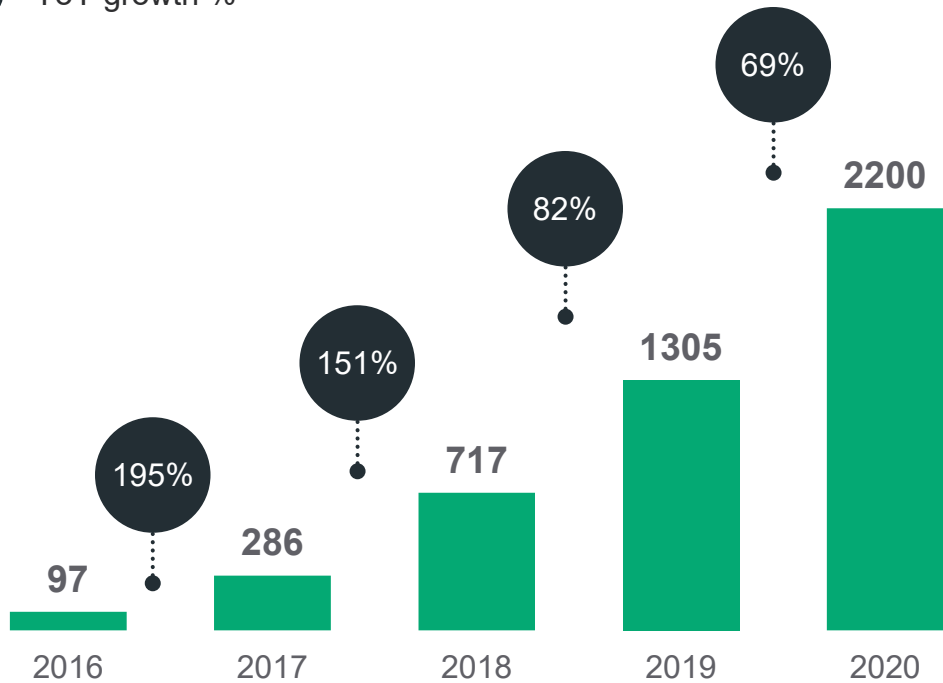




Core Business Growth

Total Customers (SynBio & NGS)

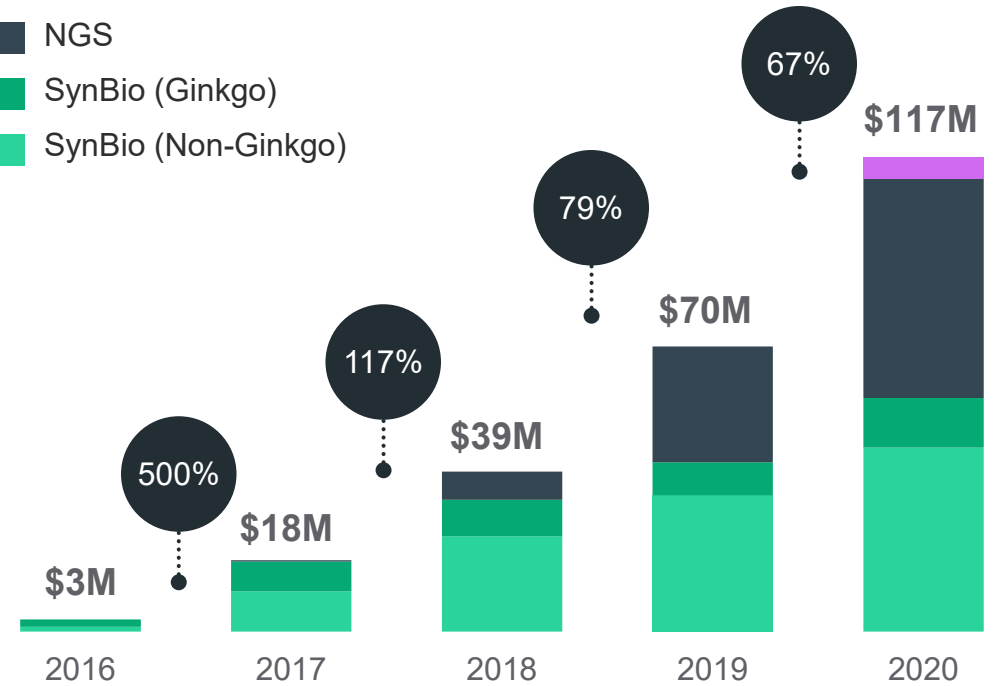
● YoY growth %



FISCAL YEAR

Orders

- Biopharma
- NGS
- SynBio (Ginkgo)
- SynBio (Non-Ginkgo)



FISCAL YEAR



We are Building a Diverse Portfolio of Businesses



Drug
Discovery

Data
Storage

**High-value
solutions**
Future upside

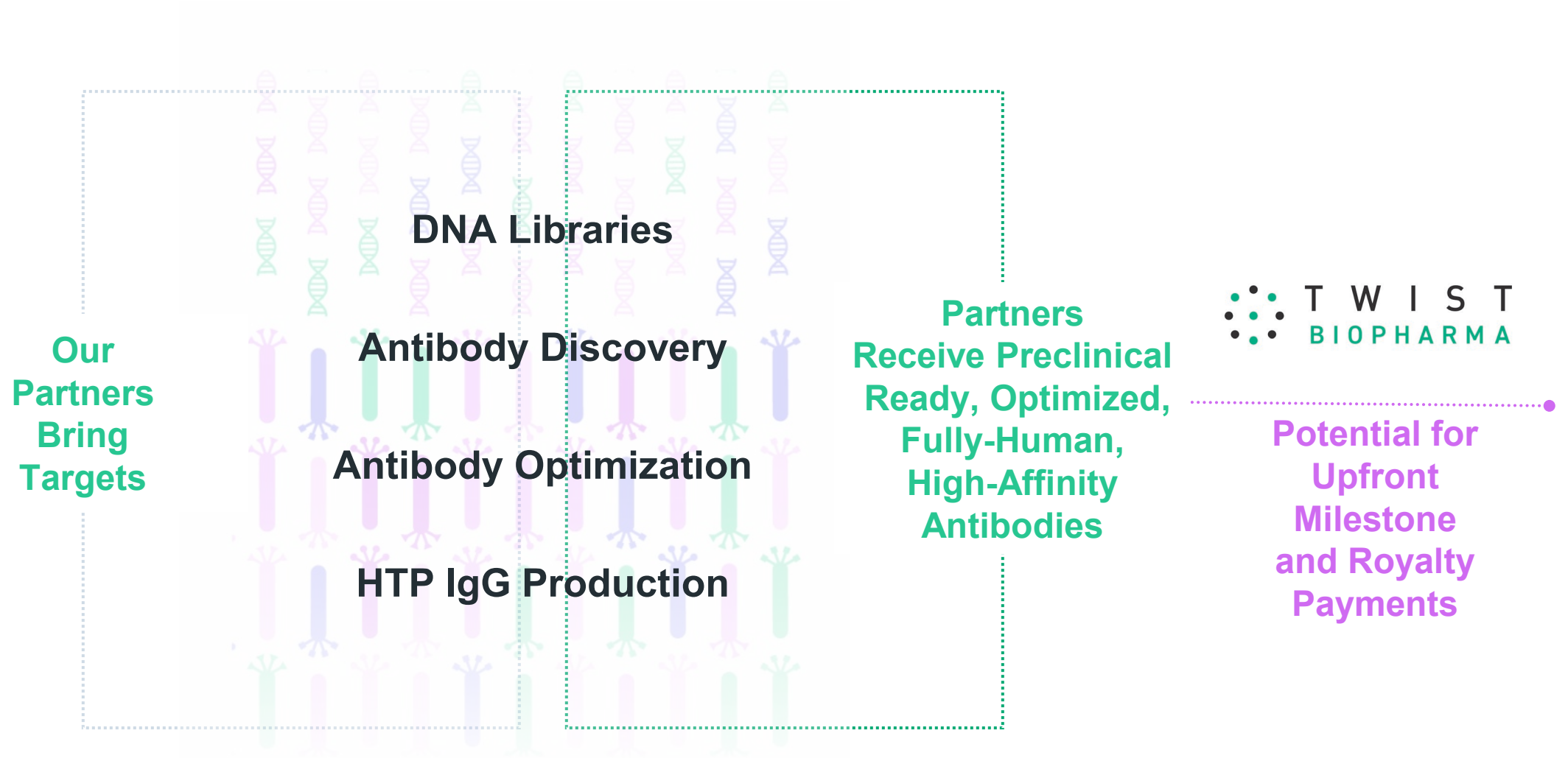
Tools
High-growth
revenue today

Synthetic
Biology

Next-Gen
Sequencing



Biopharma: Validated and Expanding Offering





Biopharma: Why We Win

Everyone Else



TWIST

Library of
libraries
fully validated
libraries

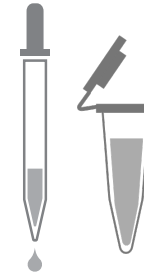
Everyone Else



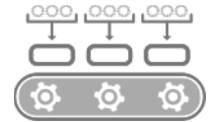
TWIST



Everyone Else



TWIST



Broad “DNA” Buffet

Allowing us more shots on
goal with more diversity

Every Sequence Always Explicitly Synthesized

Never random —
All our DNA is human-derived
and higher quality,
following human repertoire rules

Automation and Miniaturization

Most of our process, including
library production, screening,
reformatting, affinity and functional
testing increasing
efficiency and speed



Biopharma Partnerships by the Numbers

Broad

Disease Indications

Cancer, Neurology, Immuno-oncology,
Infectious Disease, Canine / Feline, Other

19

Completed Programs

31

Partners

43

Active Programs

26

Milestones/
Royalties

Varied

Modalities

mAbs, Bispecific Antibodies, VHH, ADC,
Protein Engineering, More



Biopharma: Pipeline of Preclinical-Ready Functional Monoclonal Antibodies

TARGET	INDICATION
GLP1R	Diabetes & rare metabolic diseases
PD1	Immuno-oncology
TIGIT	Immuno-oncology
CD3	Immuno-oncology
ADORA2A	Immuno-oncology
CXCR4	Oncology
ACE2	COVID-19
SARS-CoV-2 S1	COVID-19
SARS-CoV-2 N	COVID-19

**Leveraging
Twist platform to discover
functional monoclonal
antibodies against high value
targets**

Pursuing opportunities to
maximize value for these assets





Biopharma: Immuno-oncology Target ADORA2A

Checkpoint Inhibitor Market is Growing Rapidly

This market is expected to reach \$40 billion by 2025

Significant Unmet Needs Remain

Only ~20-30% of eligible cancer patients benefit from first generation checkpoint inhibitors

Large Opportunity for Novel Immunotherapies

Twist can rapidly discover and optimize antibody-based immunotherapy leads across oncology indications

Adenosine A2a Receptor (ADORA2A)

Adenosine pathway is a **master checkpoint** in the tumor microenvironment

Highly expressed in:

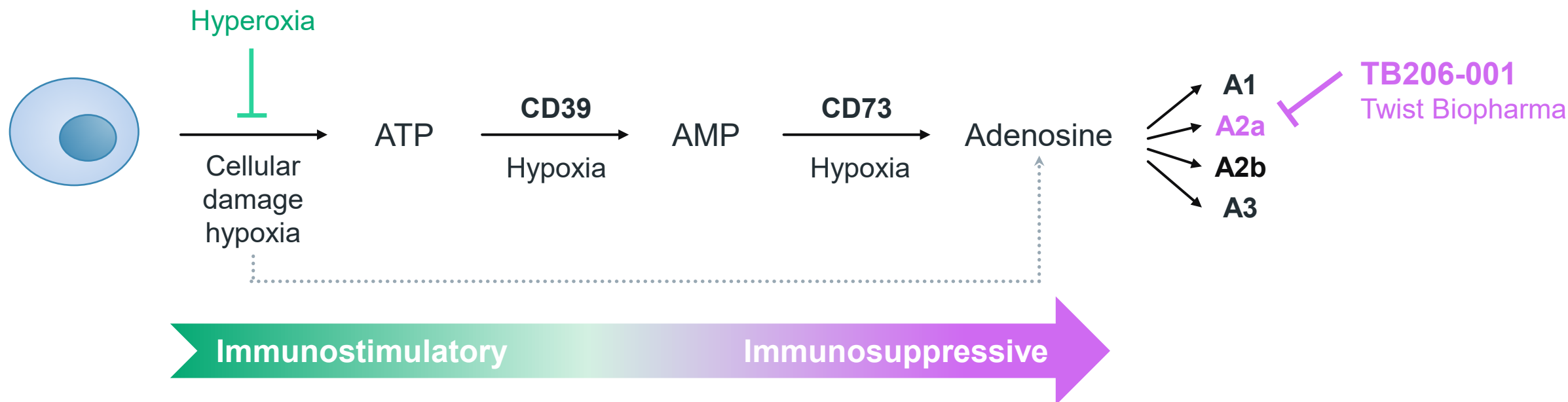
Lung
Colorectal
Prostate cancer

A2a antibody antagonist has the potential to have high potency and specificity, improved dosing, and low CNS permeability

Twist's TB206-001 is a Potent A2a Antibody Antagonist Candidate



Biopharma: Adenosine Pathway Targets Master Checkpoint in TME



Tumors can evade immune responses from first generation checkpoint inhibitors by usurping the adenosine pathway

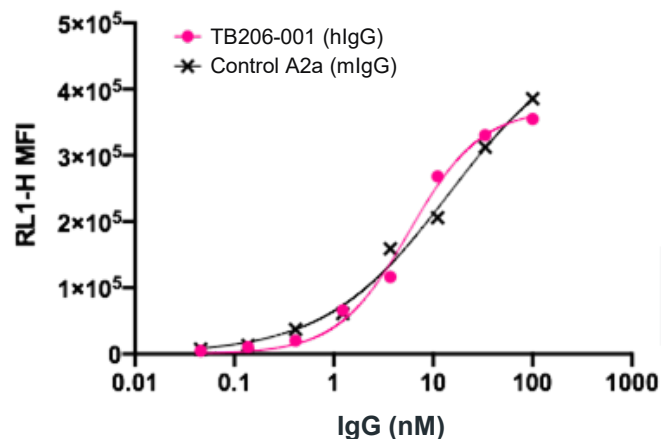
Incomplete inhibition of upstream enzymes in this pathway would still produce adenosine and thus drive immunosuppressive signaling

TB206-001 directly targets the A2a receptor, the primary adenosine receptor on immune cells, to block immunosuppression



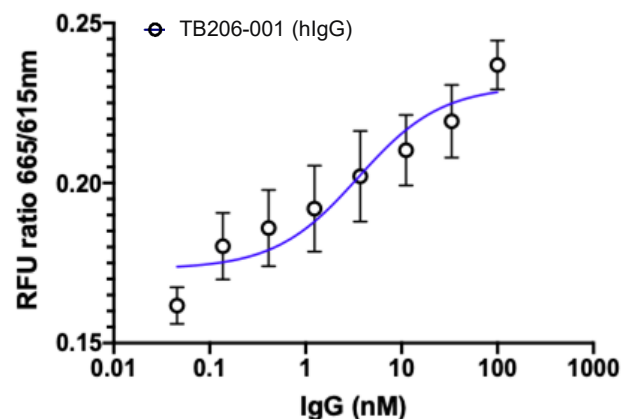
Biopharma: TB206-001 Potent A2a Antibody Antagonist Candidate

TB206-001 is a high affinity binder to hA2a receptor



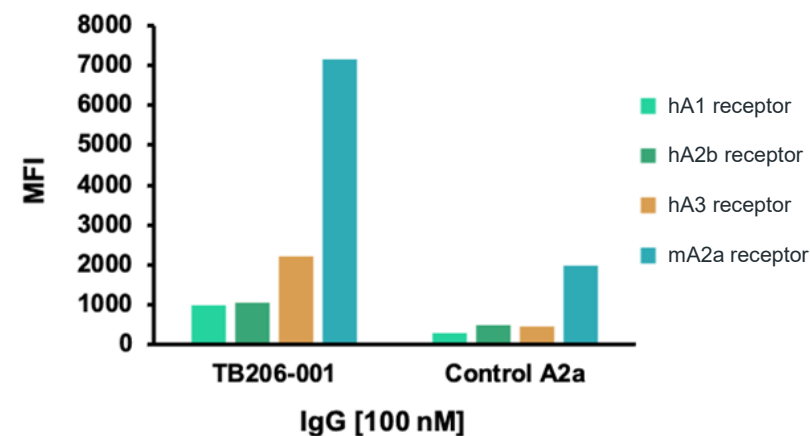
	TB206-001	R&D A2a
EC50	5.76	14.35

TB206-001 is a functional antagonist *in vitro*



	TB206-001
IC50	3.52

In vitro specificity with TB206-001 in cross reactivity study



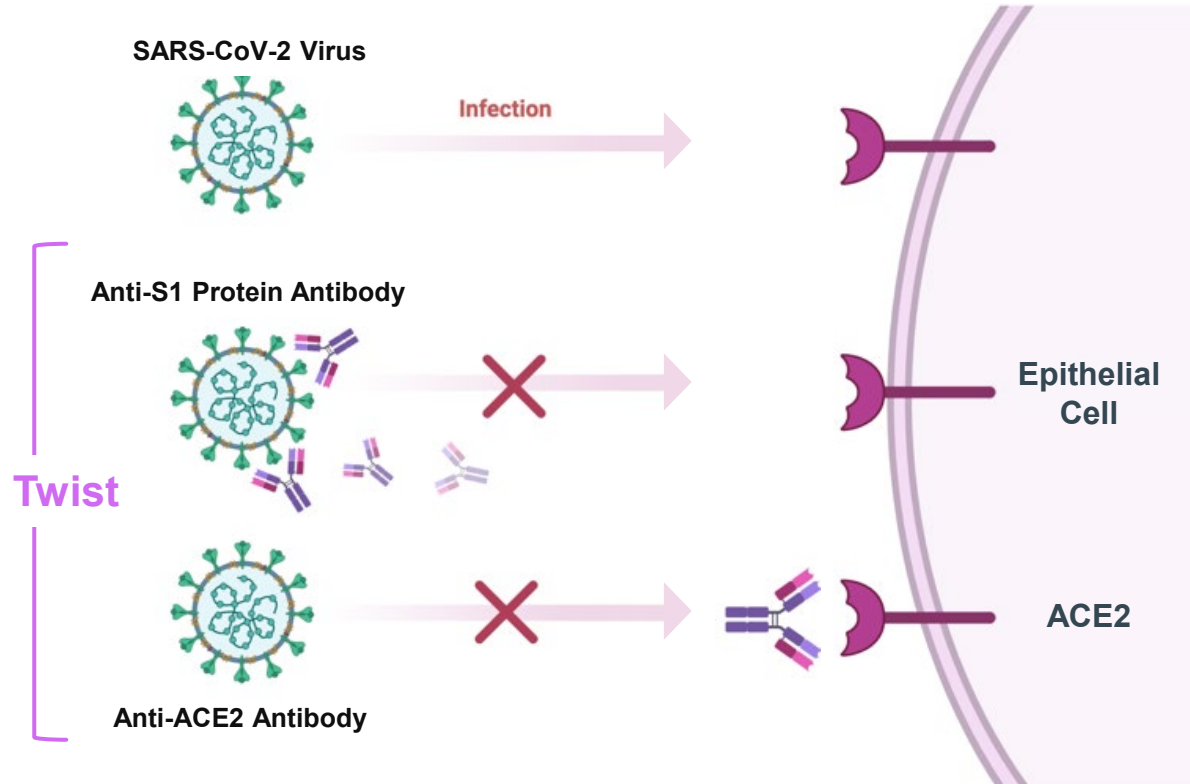
TB206-001 was screened against cells expressing each of the adenosine receptors. This lead is specific to A2a and is a human/mouse cross-reactive antibody.

We are optimizing and developing this preclinical lead candidate (TB206-001)



Biopharma: Rapid Discovery of SARS CoV-2 Antibodies

Our Focus



Novel Therapeutic Antibody Leads

IgG (TB181-8, 28, 36)
VHH (TB201-202)

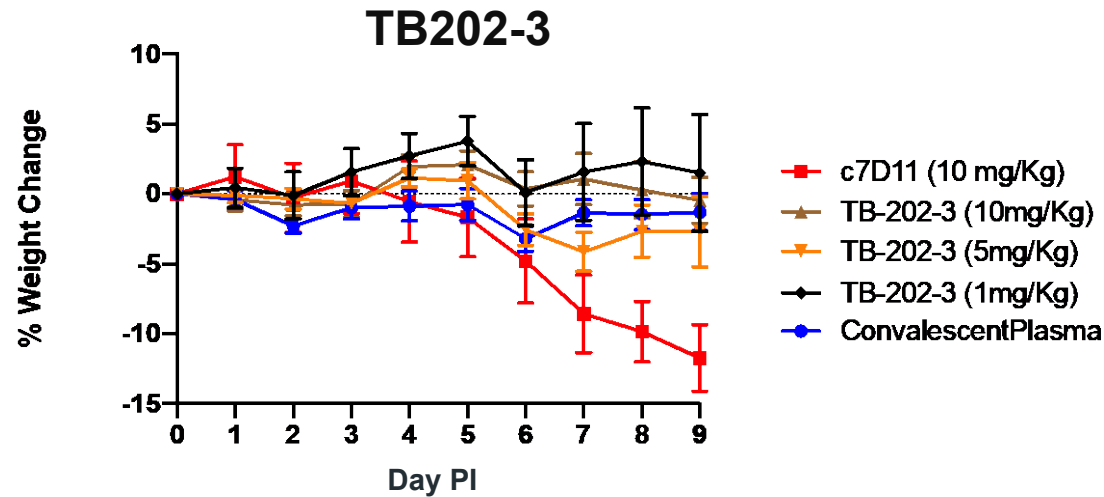
Well-Characterized and Well-Validated

High-affinity and unbiased, with extensive pseudovirus and live virus, preclinical animal data



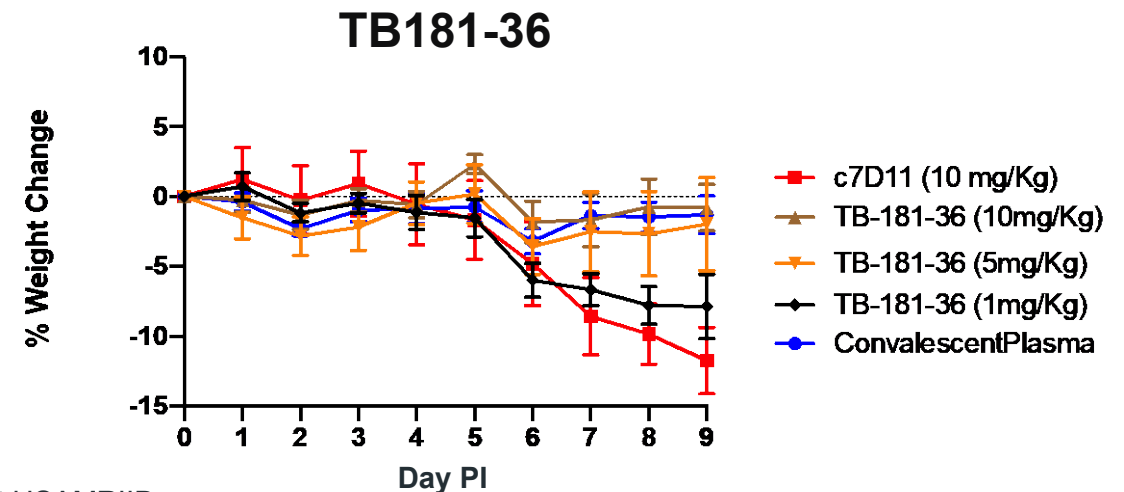
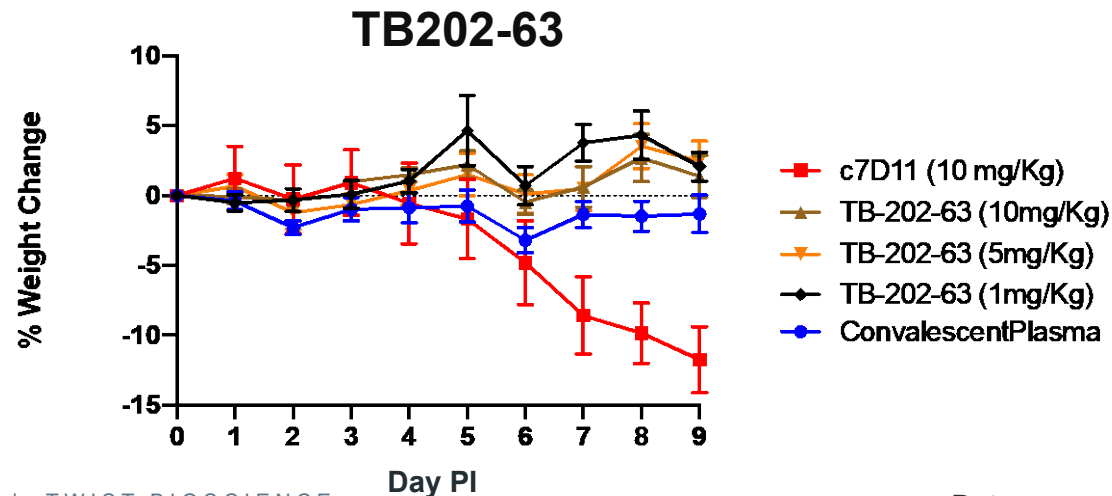
Biopharma: VHH Single Domain Leads (TB202-3, 63) and IgG Lead (TB181-36) Show Potent *In Vivo* Activity in Hamster Model

TB202-3 and TB202-63 Protect Against Weight Loss at the Lowest Dose of 1 mg/kg



c7D11 = Negative control mAb

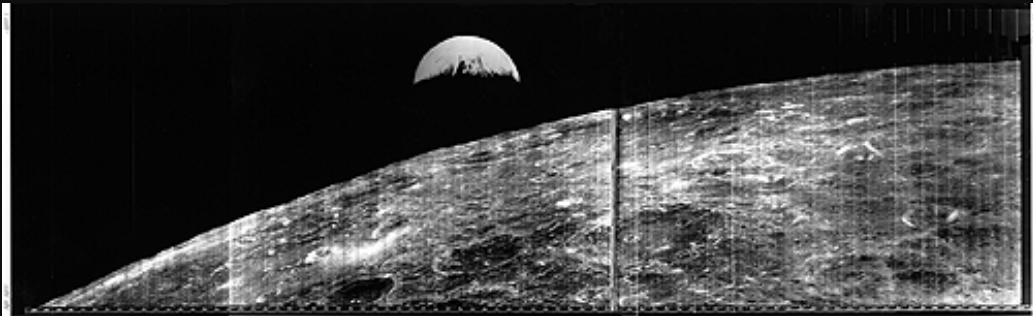
ConvalescentPlasma = Positive control





Data Storage in DNA

Recovered from Lunar Orbiter 1 Tapes



**DNA for
Archival Storage of
Digital Information**

**Permanence
Density
Random access
Universal format**



Data Storage: How It Works

1 Coding

00 → A
01 → G
10 → C
11 → T

2 Synthesis



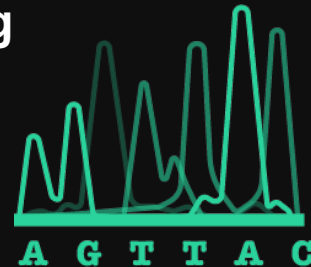
3 Storage



4 Retrieval



5 Sequencing

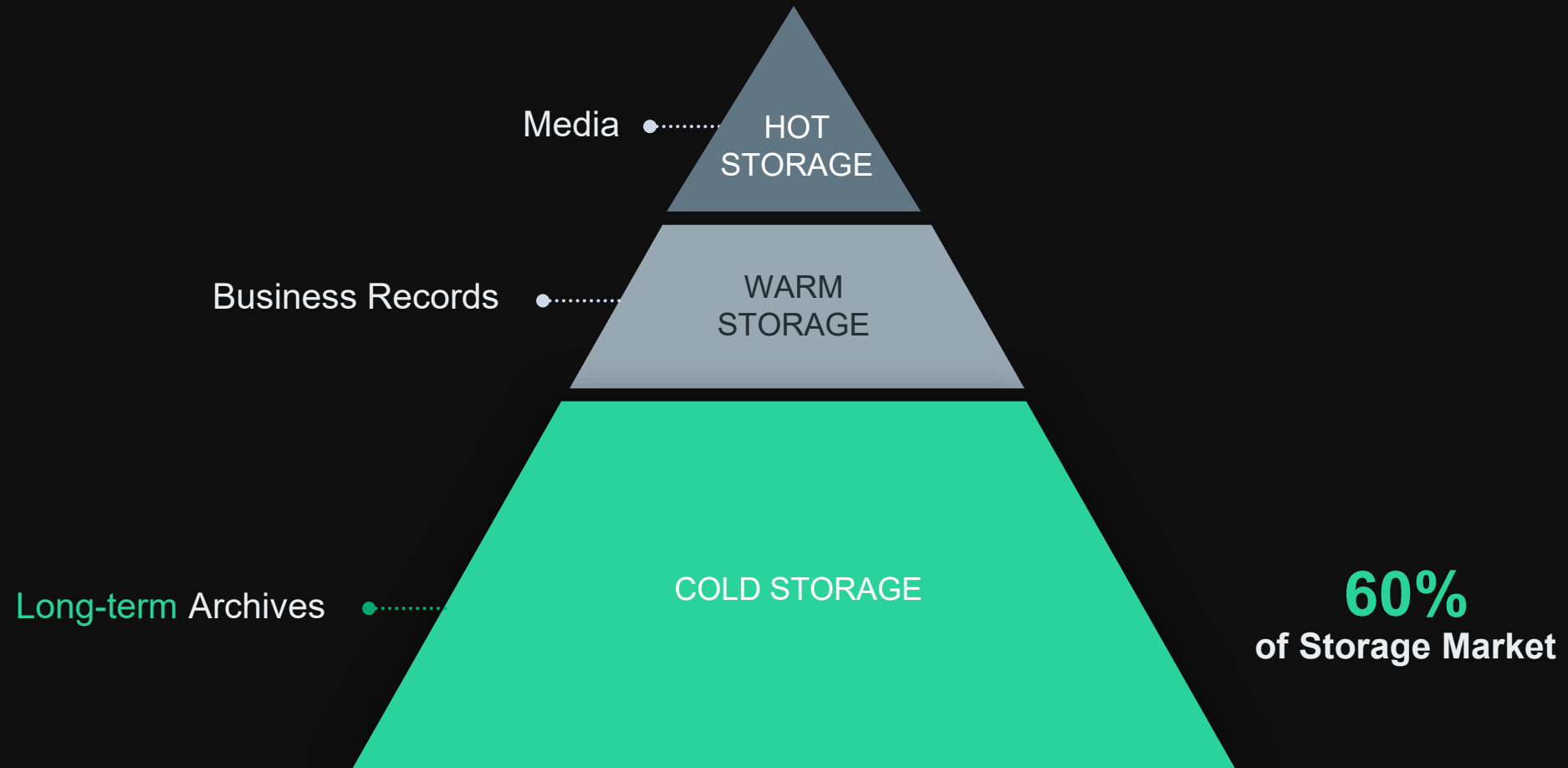


6 Decoding

A → 00
G → 01
C → 10
T → 11

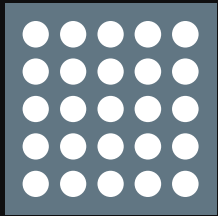


Data Storage: \$35B Large Market Opportunity

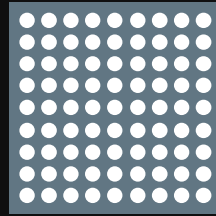
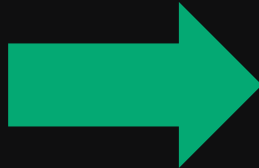




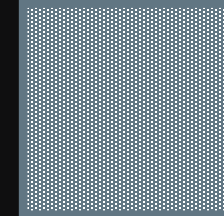
Data Storage: Progression



1 Micron
Integrated Chip
Proof-of-concept



Alpha
Integrated Chip
Initial Customers



Beta
Integrated Chip
Grow Customer Base



Enterprise Solution

DNA Data Storage:

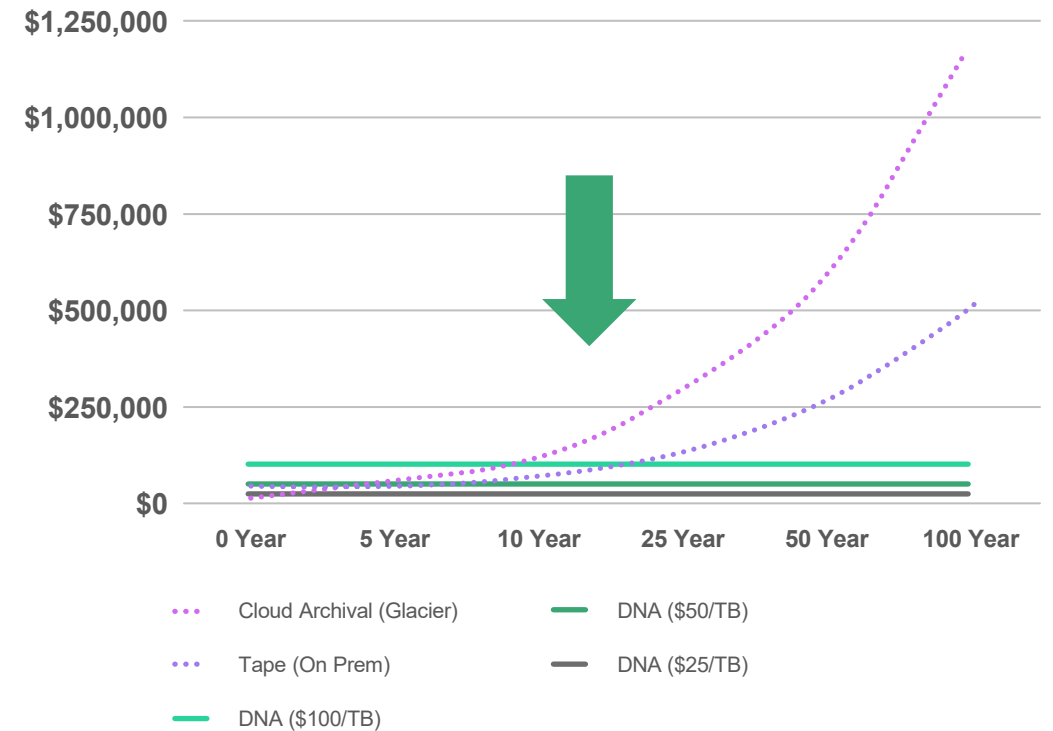
Cost for Digital Film Preservation



- As resolution increases, films and tv episodes get more expensive to store, and each additional copy multiplies the cost
- DNA copies are almost free due to the PCR process
- Cost of storage on Tape/Cloud will grow over time due to required data migration while the cost of DNA will remain flat
- When DNA reaches \$100/TB it will be more economical to store any data on DNA if it needs to be preserved for 15+ years

TCO COMPARISON

TCO Analysis for Cloud Archival (Glacier Deep Archive), Tape (On-Prem) and DNA for 1 PB





DNA Data Storage Alliance

34 Industry Leaders Joining Forces to Advance DNA Data Storage

Twist Bioscience
Microsoft

Illumina
Western Digital

DNA Script

Catalog

IMEC

Molecular Assemblies

PFU, a Fujitsu company

Ansa Biotechnologies

EPFL

Claude Nobs Foundation

University of Washington

ETH Zurich

Iridia

Quantum

Generate industry roadmap

Develop use cases

Educate for broader
awareness and adoption

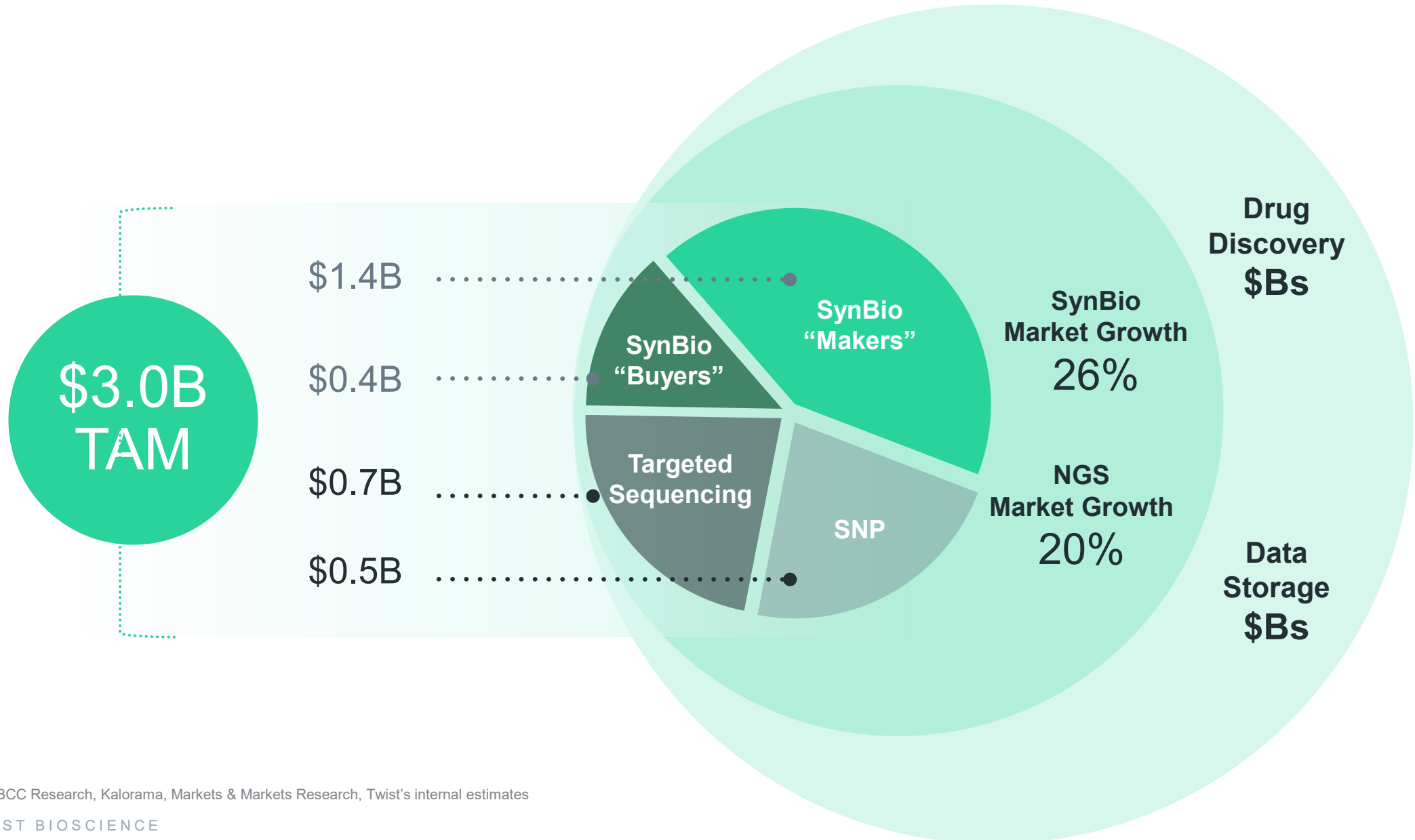
by 2024

30%
of digital business
will mandate DNA
storage trials

– GARTNER, OCT. 2020



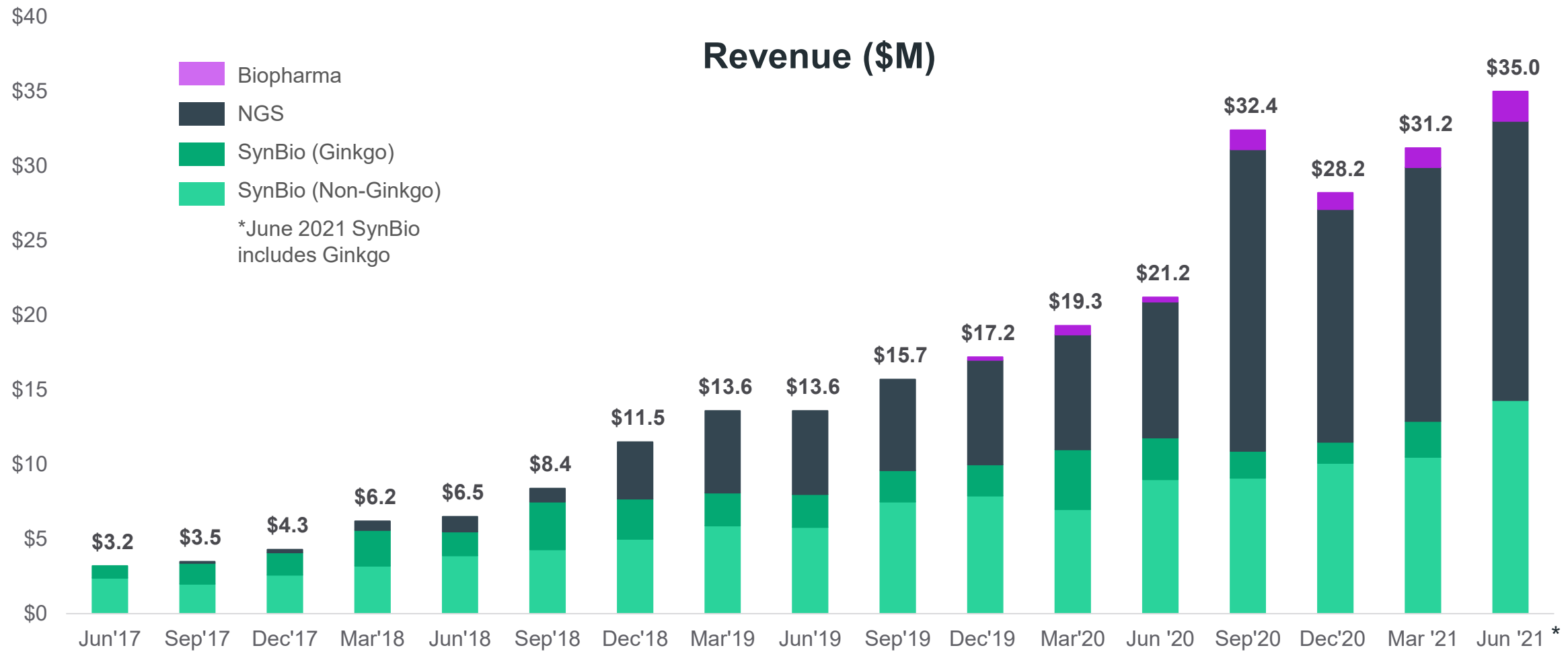
Large and Expanding Addressable Market



Source: BCC Research, Kalorama, Markets & Markets Research, Twist's internal estimates



Strong Revenue Growth





Making our Vision a Reality Near Term Objectives

Synbio

- ✓ Continued growth and diversification of revenue stream
- Ramping pharma-focused products, including DNA preps and IgG
- ✓ Launch of clonal ready gene fragments
- B2B solutions to allow capture of specific multi-site institutions
- ✓ Significant investment in “Factory of the Future”
- Expand OEM strategy

NGS

- ✓ Continued revenue growth and customer ramping production
- ✓ Full launch of methylation solution
- Relaunch library prep kit
- Continued conversion of SNP Microarrays to NGS + sequencing
- Expand OEM strategy

Biopharma

- Additional partnerships to expand technology base and generate revenue
- Additional internal pipeline of antibodies, pursuing out licensing opportunities by mid-2022

Data Storage

- Integrated 1-micron pitch chip as proof-of-concept
- Begin design for alpha integrated chip
- Execute on agreement with IARPA
- Work with DNA Data Storage Alliance to educate and prepare market

Expand and Accelerate Internal Efforts and Inorganic Investment to Help Ensure Long-term Leadership



Writing the Future

Platform for writing DNA on silicon

Large, growing markets

Differentiated value proposition

Portfolio of high growth businesses

Validated business models

High revenue growth

Track record of execution and innovation



Writing the Future

EMILY LEPROUST, PH.D., CEO and CO-FOUNDER