



Writing the Future

From DNA to AI

Twist's Synthetic DNA is bringing AI-generated biological designs to life.

SaxoCell Conference 2026

Julian Jude, PhD
Director Emerging Applications



Reading nature is just the beginning

Nature

READ

Understanding



WRITE

Manipulating



DISCOVER



Single 30aa CDR = $20^{30} \approx 1.07 \times 10^{39}$

Now AI let's us generate entirely new biology

Nature

AI

READ

Understanding



WRITE

Manipulating



GENERATE

Create new biology

DISCOVER

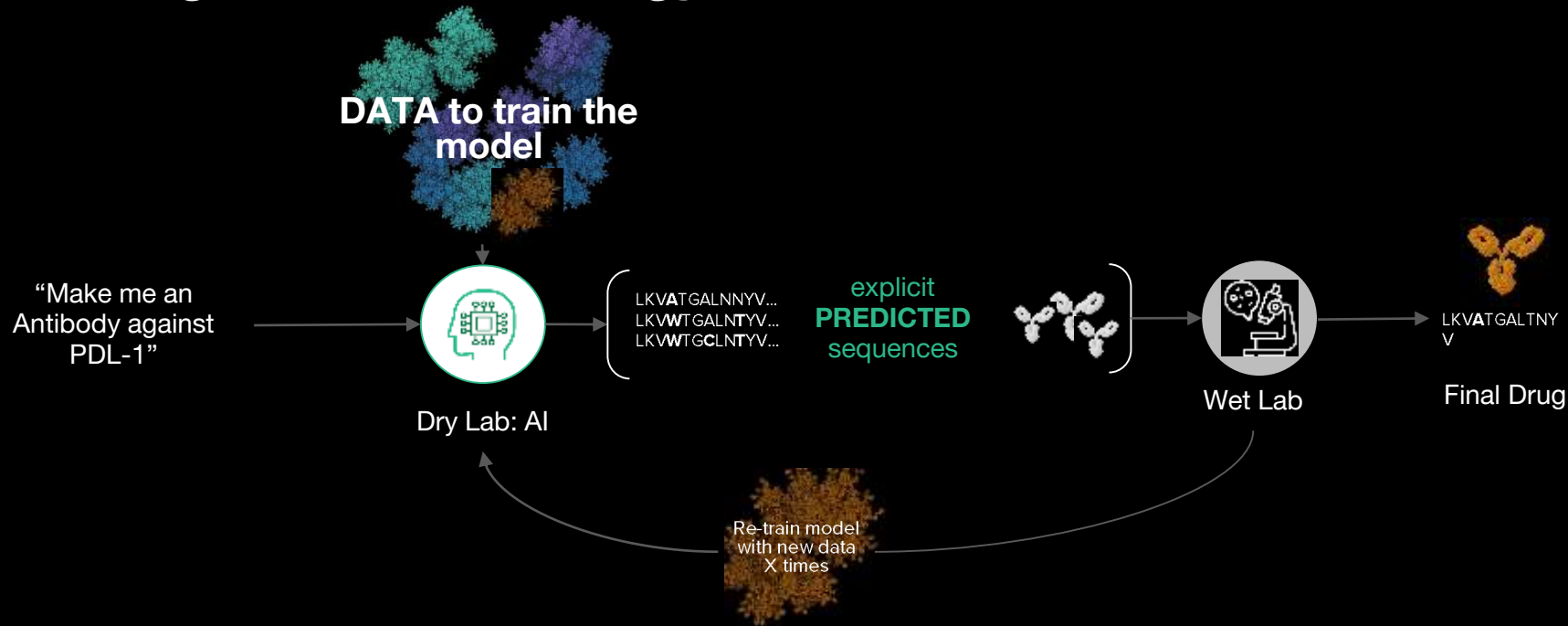


Single 30aa CDR = $20^{30} \approx 1.07 \times 10^{39}$

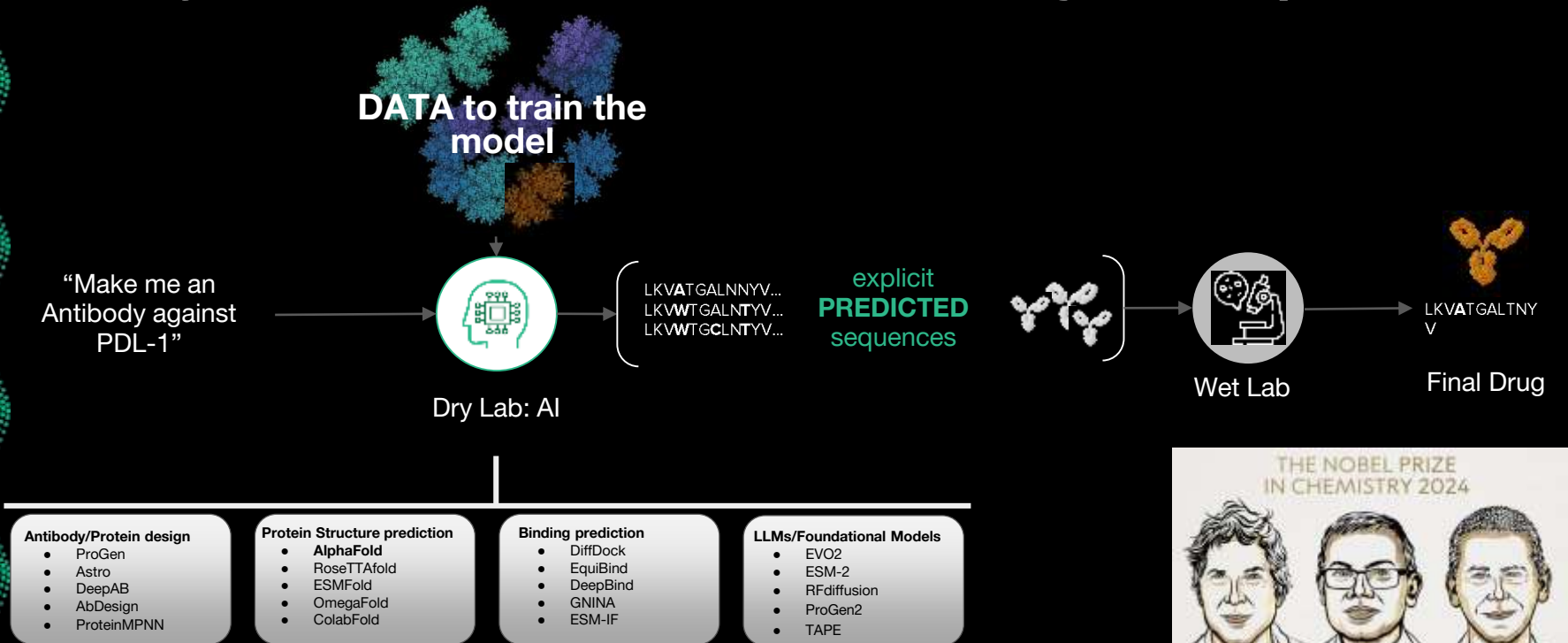


Final Drug

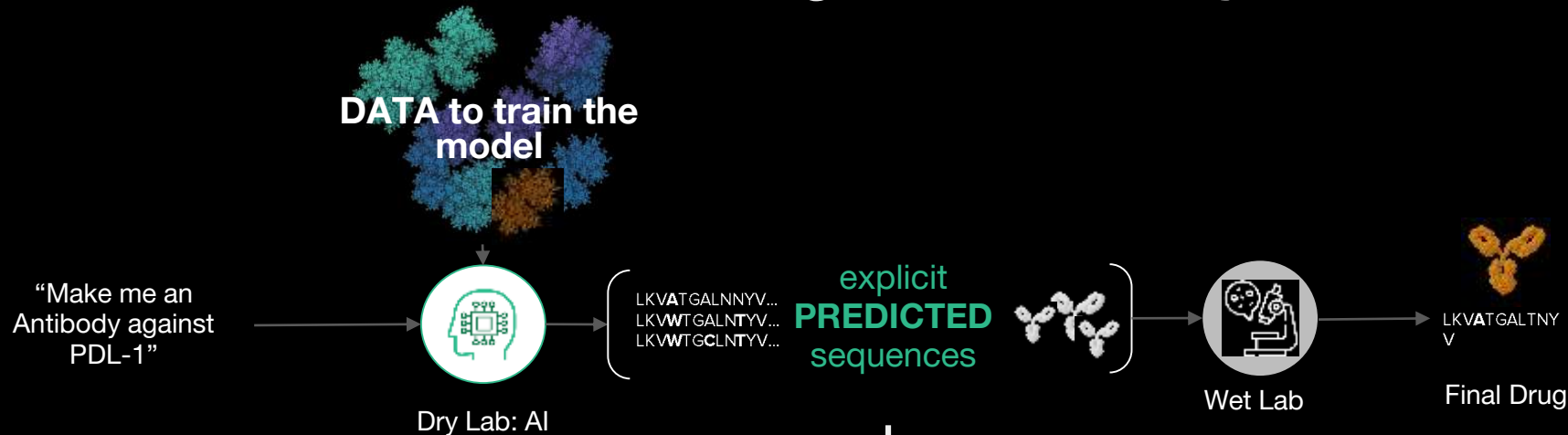
Turning code into biology



From just 2 models to 382: AI discovery has exploded



AI workflows demand a new generation of synthetic DNA



● Reliable quality

Confidently assign sequence to action with precise DNA

● Scalable to projects

Don't limit training and validation due to synthesis limits

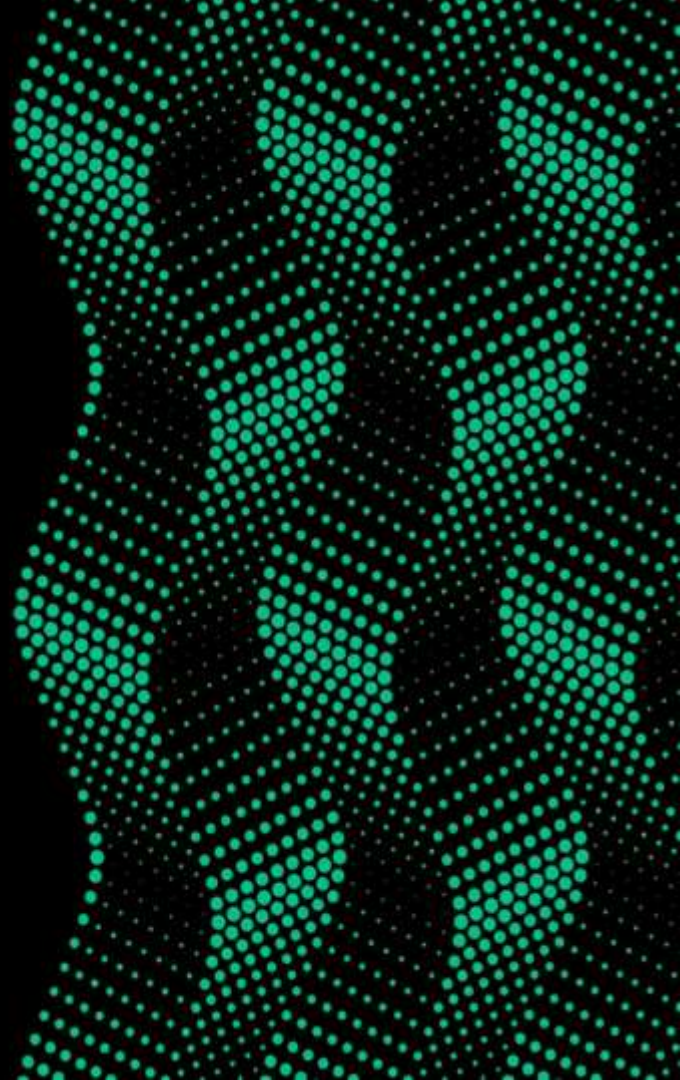
● No design limitations

Make exactly what the model suggests without compromise

● High speed synthesis

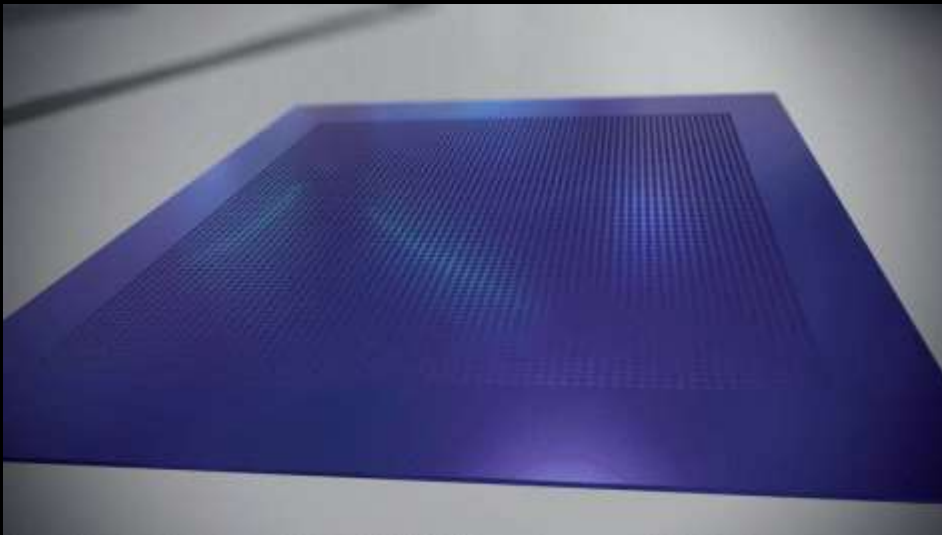
Iterate at a rate of days, not months

This is where Twist comes in



The compute is massive — your DNA has to match it

Quality starts at the chip

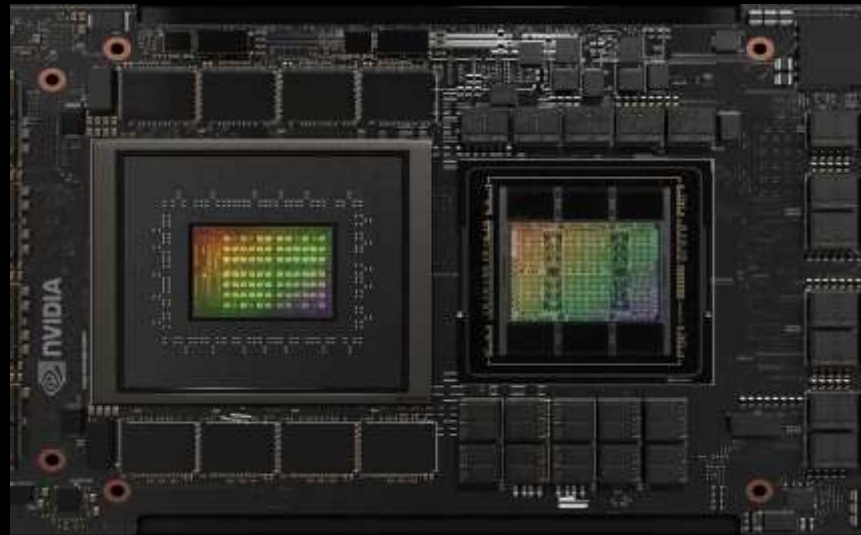


>32M

oligos per day capacity

3M

Genes per year



petaflops (quadrillions of calculations per second)

AlphaFold2 trained on: ~170,000 protein structures

ProteinMPNN training set: ~25,000 protein chains

ESM-2 (Meta): trained on 250 million sequences

One portfolio for every AI-driven experiment (not only)

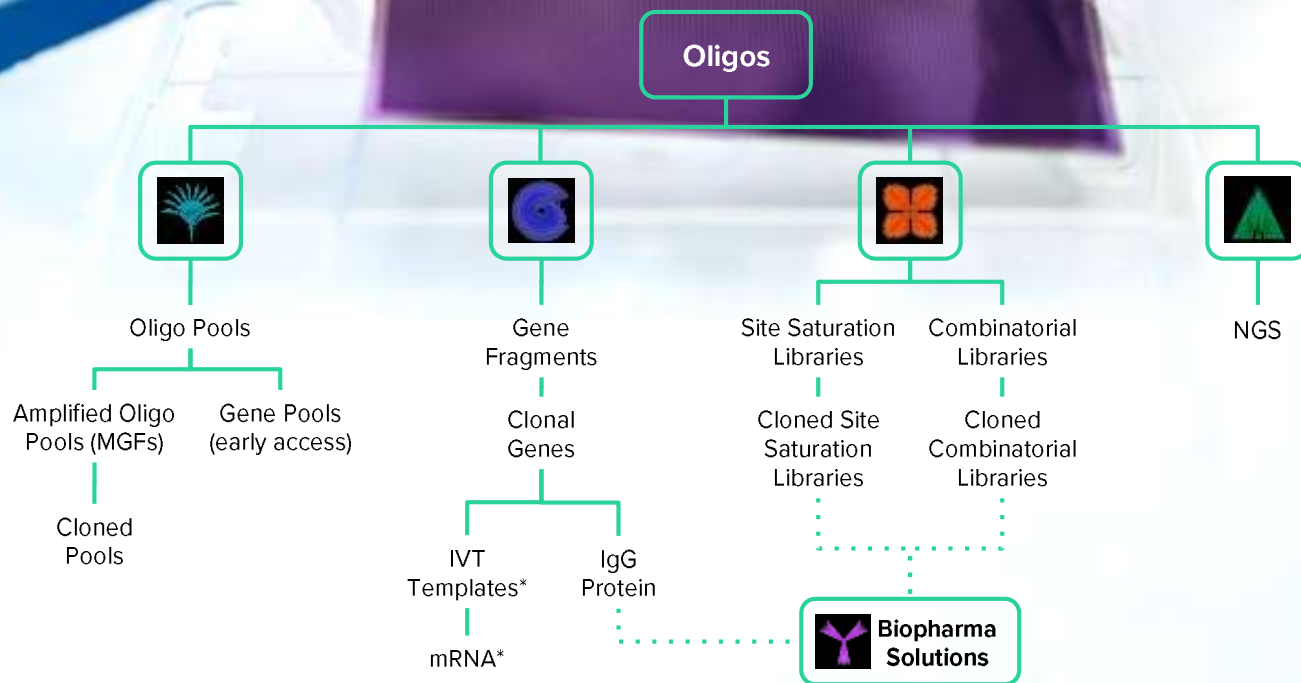
High quality DNA to not train on
synthesis errors or biases

Explicit sequences as designed
by AI

Scalable to generate enough
data for model training

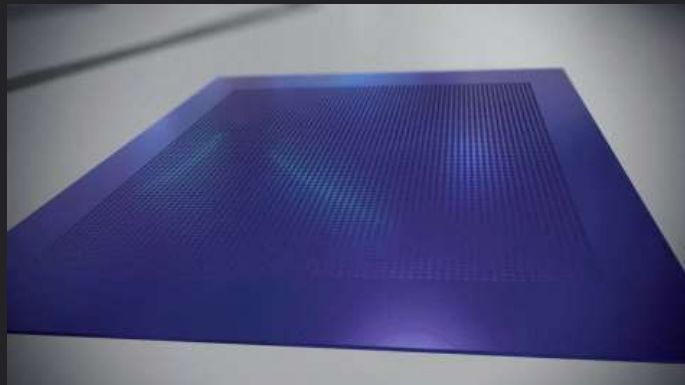
Fast TAT to quickly iterate
through design cycles

**Coming soon.*



Quality starts at the chip

Large scale, quality oligo synthesis
is the cornerstone of our portfolio.



>32M

oligos per day capacity

3M

Genes per year

A new generation of Pooled DNA

Gene Pools (Early Access*)

1800 bp

Paired Heavy+Light Chain Libraries (scFV); Precisely Paired Bispecific VHHS
Paired TCR

Multiplexed Gene Fragments 500 bp

VH, VL, VHH, Miniproteins / AAV / Promoters

Twist Oligos 350 nts

Paired or Unpaired CDRs / CRISPR / MPRA

250 nts

170 nts

● Up to 959% longer

More design possibilities than atoms in the universe

Complex sequences and GC content ready

Any scale

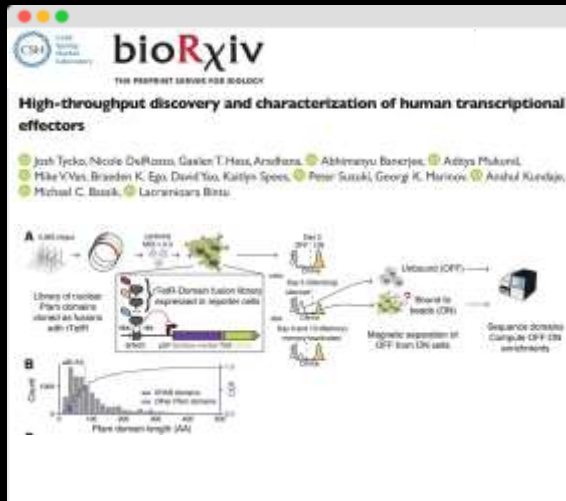
Direct synthesis of 500mers

Oligo length that sets trends, not follows them



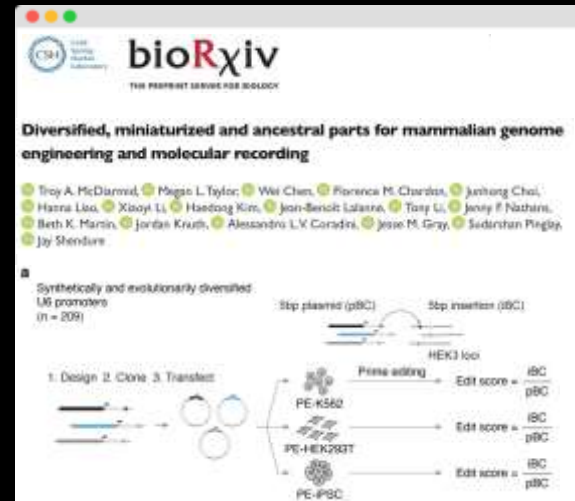
100bp

>1000 CRISPR screens were performed with Twist Oligos. Any flavour and scale



300bp

To screen functional protein domains through tiling libraries



500bp

First (short)gene length FGX screen to optimise pol III promoters

Turning code into Biology | *de novo* design of single-domain antibodies

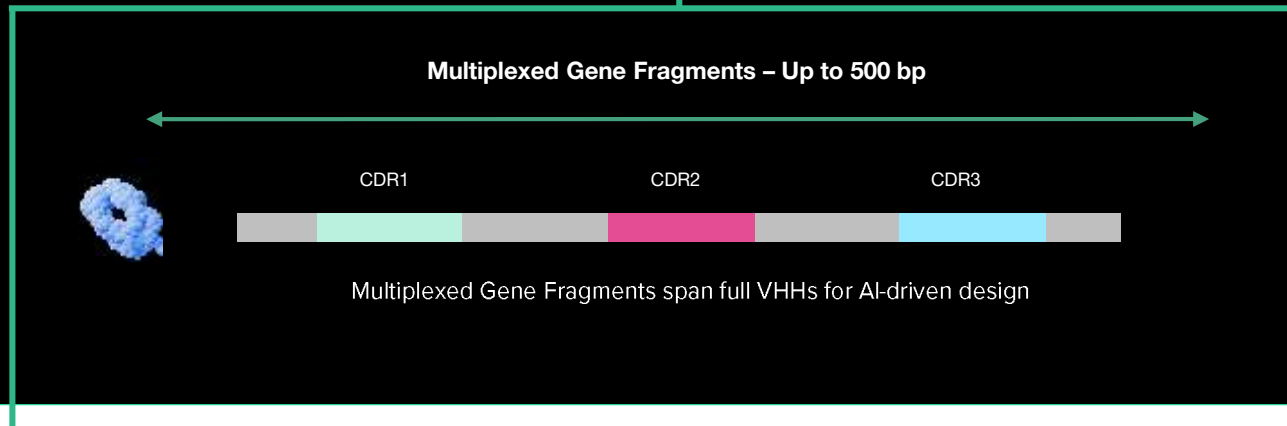
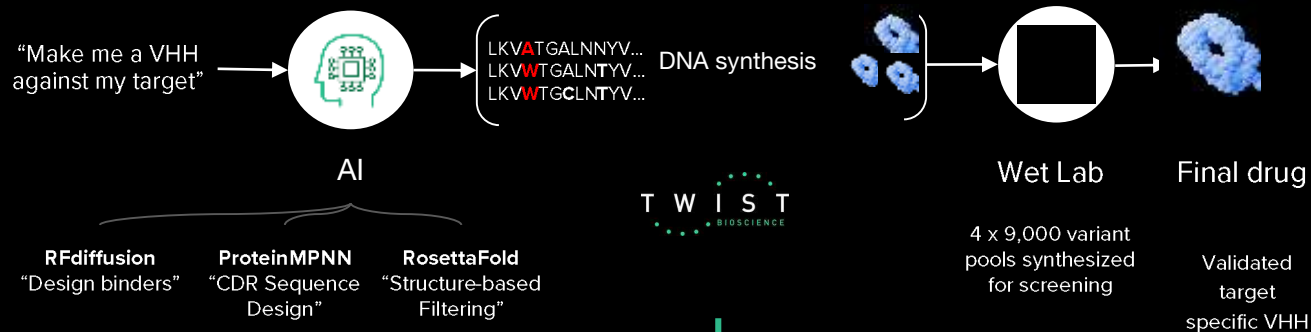


bioRxiv
THE PREPRINT SERVER FOR BIOLOGY

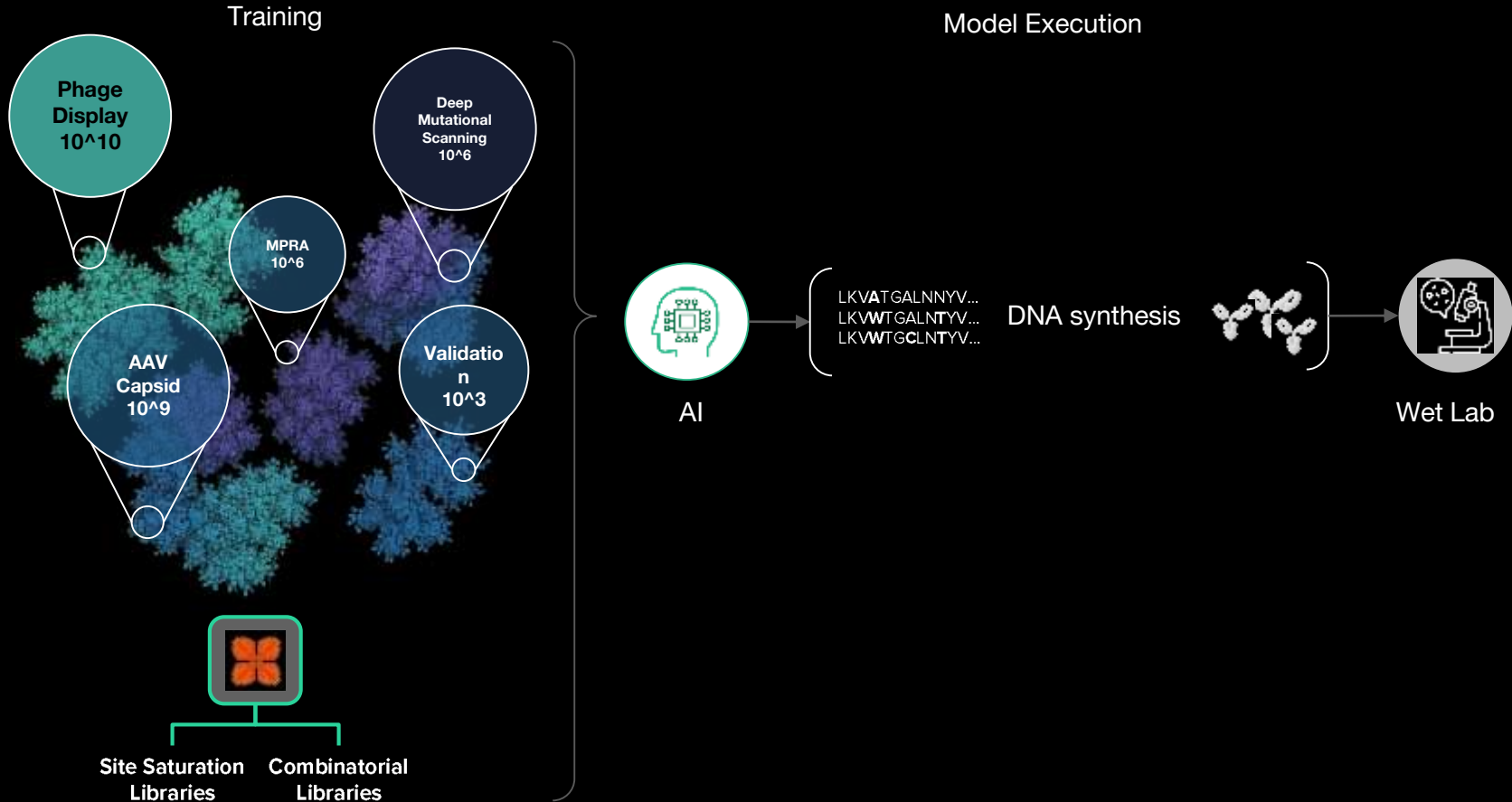
Atomically accurate *de novo* design of single-domain antibodies

Hattarali R. Benveniste, Joseph L. Whitson, Robert J. Ragotte, Andrew J. Borst, Omer L. Sali, Cameron Wilder, Fitz Baker, Ellen L. Shrock, Phila J.T. Leung, Suwei Huang, Anna Geroldi, Russell Auli, Kenneth D. Cain, Benedicte Singer, Cameron Criswell, Dianna Velasco, Mariana Garcia Sanchez, He Min Kim, Susana Vilagras Torres, Sidney Chan, David Baker

- AI-generated VHH designs: RFdiffusion + ProteinMPNN created 9,000 unique VHs per target
- Fully designed CDRs: All 3 loops tailored to 4 distinct epitopes
- Twist-built libraries: 4 multiplexed gene fragment pools of 9,000 VHs each
- Target specificity validated: Cryo-EM & SPR confirmed correct binding and fold



Twist can support AI driven workflows from from training to model execution





Our oligonucleotides are formatted into libraries by our team of leading DNA experts.

Precision DNA Variant Library Synthesis

By using the highest quality raw materials and automation, our variant libraries provide:



Base-by base
precision



Codon usage
control



CDR length
variation



Avoid restriction
sites and
unwanted motifs



Precisely controlled
combinatorial
diversity



Ratio controlled
amino acid
distribution



Multiple germline
scaffolds

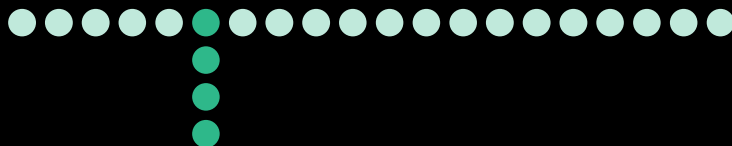


Library validation
by next generation
sequencing

Which library fits your design?

Site Saturation Variant Libraries

Diversify single amino acids across your sequence of interest.



Example application: Alanine scan your protein but pick every amino acid or codon.

Combinatorial Variant Libraries

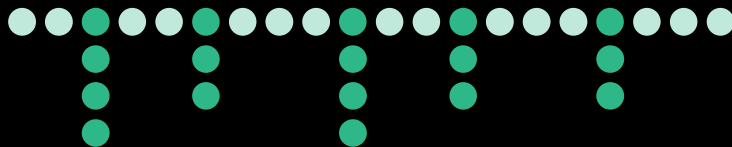
Introduce combinatorial diversity confined to domains of <99 bp along the sequence of interest.



Example application: Generate a phage display antibody discovery library with 10^{10} unique sequences.

Spread Out Low Diversity Libraries

Scatter combinatorial diversity across the gene of interest.



Example application: Co-mutate multiple target amino acids forming the active site of an enzyme to identify novel substrate specificity.

Combinatorial Assembly Libraries

Shuffle explicitly designed cassettes up to 1 kb each.



Example application: Find the best TCR by shuffling alpha and beta chain pairs.

Evaluation of CAR libraries to improve therapeutic performance of CAR T Cells

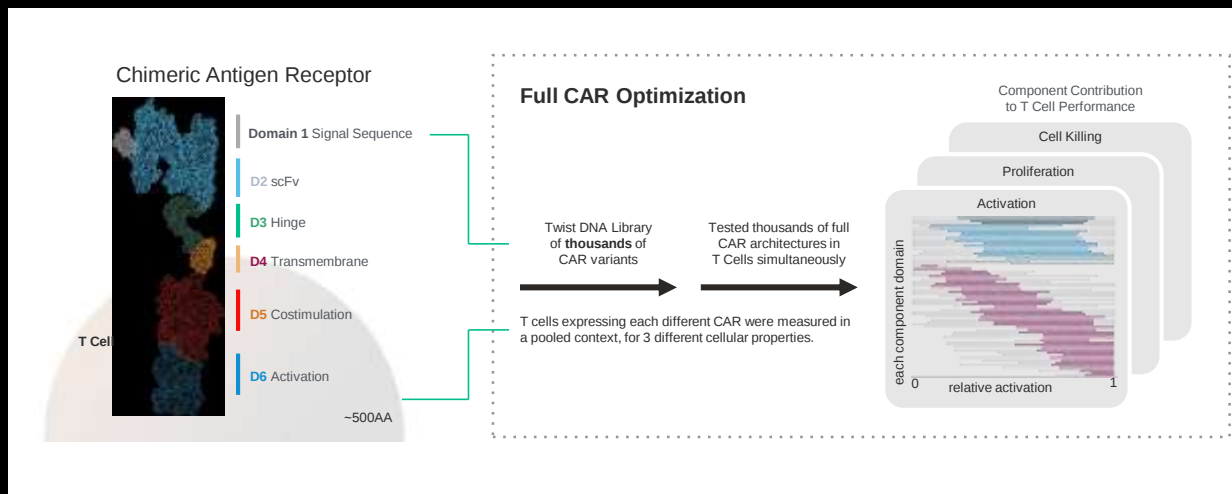
Serotiny designs and evaluates therapeutic Multi-Domain Proteins in a high-throughput manner, in their native cellular contexts.



Serotiny partnered with Twist to construct libraries of DNA encoding CARs built as combinations of large domain components for extracellular optimization and full CAR optimization.

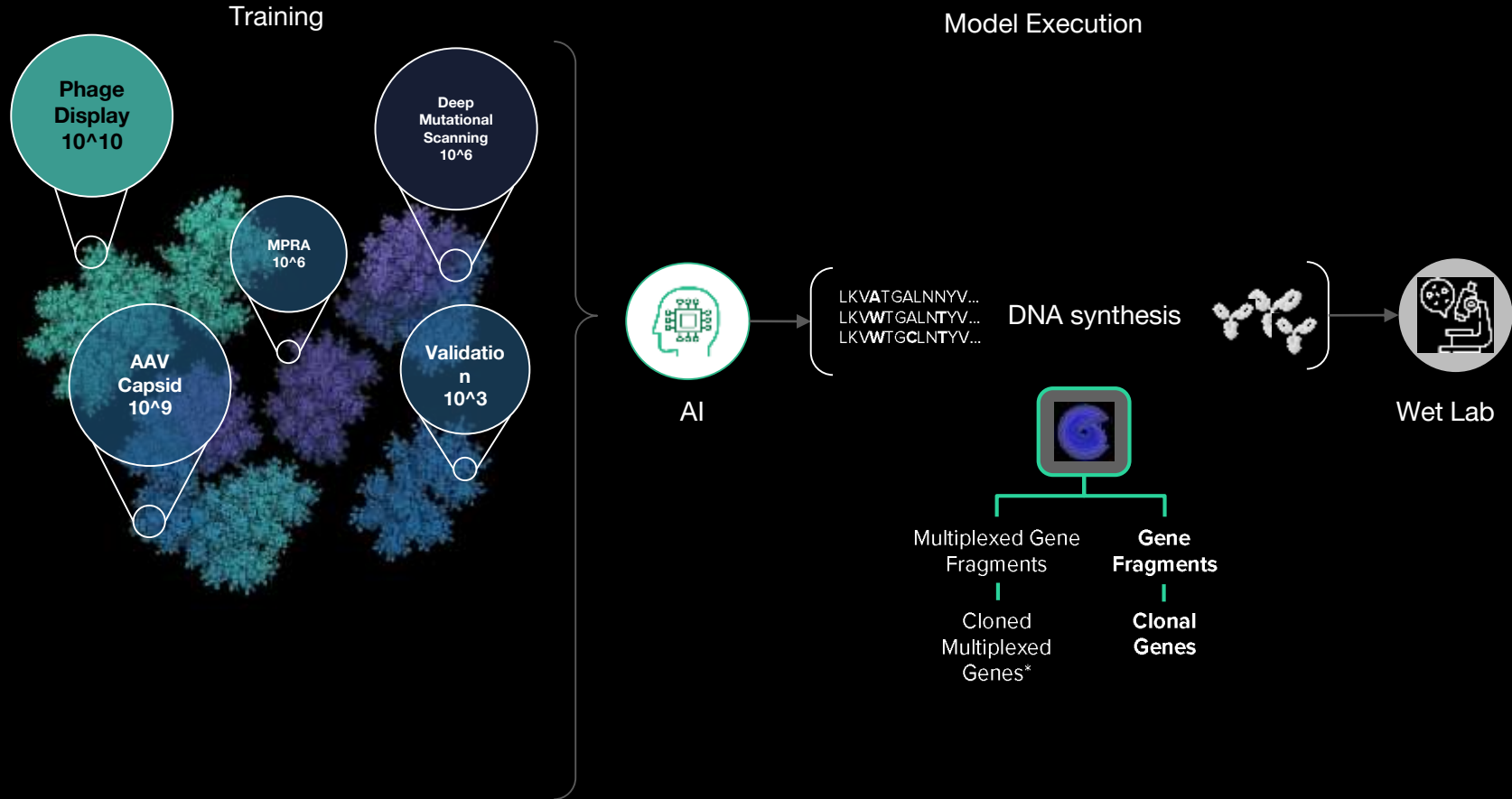
This enabled Serotiny to:

- 1 Evaluate T Cell performance when expressing a diverse set of CARs
- 2 Calculate rules & relationships between CAR components
- 3 Quantify the contribution of each component to the cell's performance



"This was only possible with a massive combinatorial library of large DNA components, as each components were distinct protein sequences - not similar by mutation"

Twist can support AI driven workflows from from training to model execution



Gene fragments and clonal genes

Available up to 5 kb, built to speed up your research.

Twist synthetic genes are available in 2 formats:

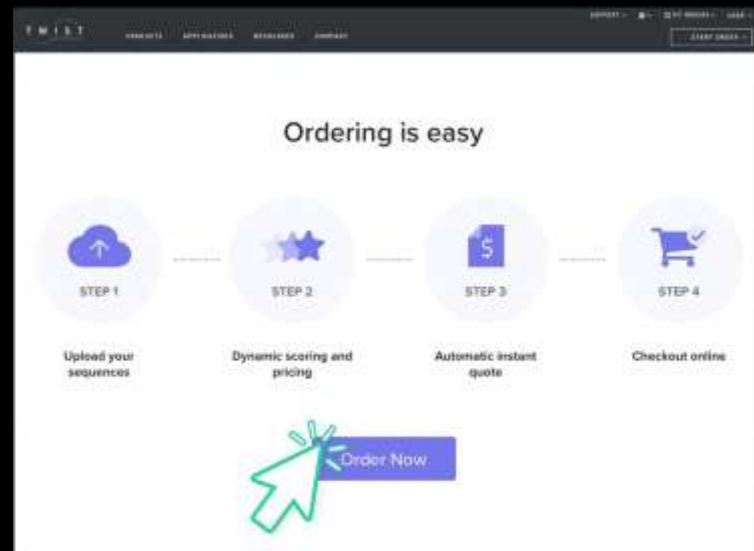
Gene Fragments

- Industry leading low error rate of 1:7500
- Shipped in 2 – 4 business days*
- Delivered mass between 100 ng – 1 µg

Clonal Genes

- NGS verified sequence perfect cloned genes
- Use your own vector or Twist catalog vectors
- Shipped in 10 business days standard or 4 – 7 business days express**
- Choose from micro, mini, midi and maxi preps
- Academic accounts can order express genes at no additional cost***

Flexible ordering with instantaneous scoring, pricing and tech support.

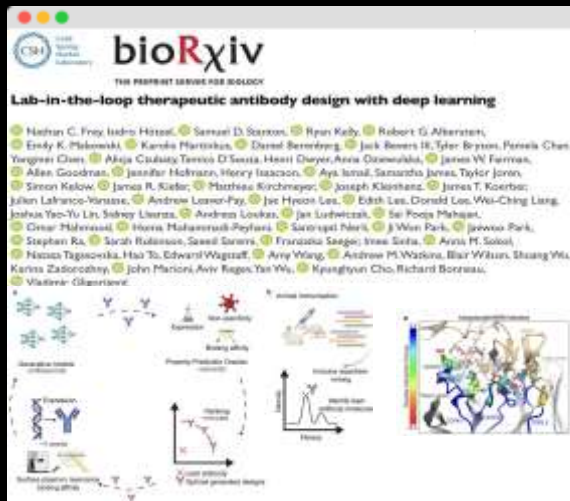


*Turnaround time starts at 2 – 4 business days for Gene Fragments with adapters and increases to 4 – 8 business days for Gene Fragments without adapters.

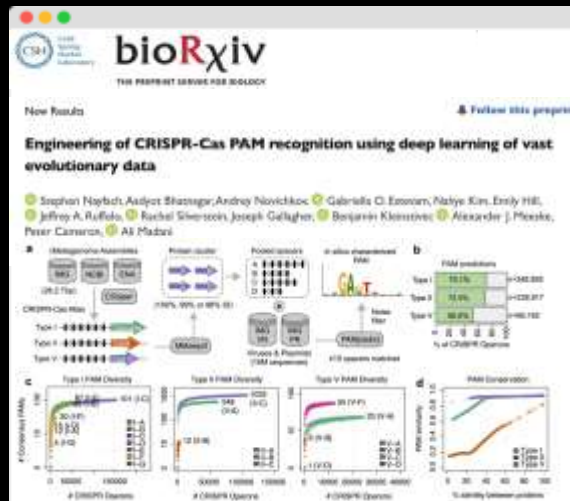
**Turnaround time starts at 4 – 7 business days and increases to 8 – 10 business days for 10 µg–100 µg and 100 µg–1 mg DNA prep scales.

***Offer available until December 31, 2025.

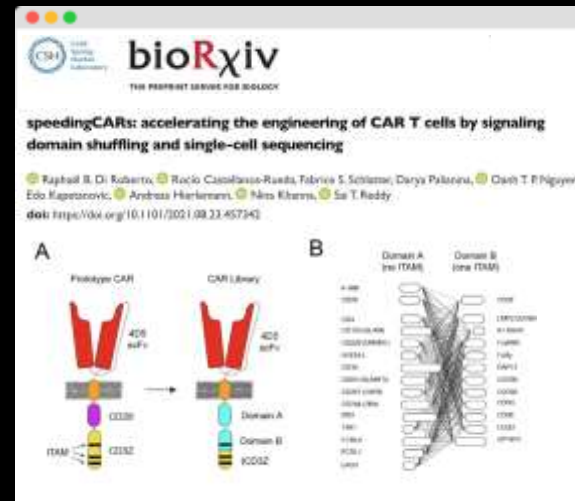
Synthetic DNA that scales with your needs



Automate antibody design and characterisation



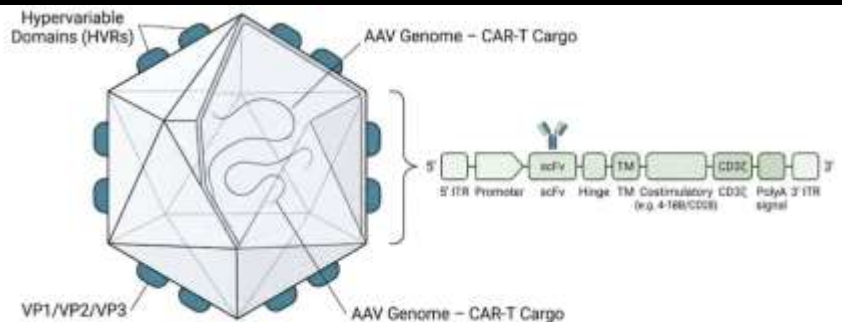
Validate AI generated Cas9 PAM variants



Test every possible CAR signalling domain - in combination

We now accept even more Complex Gene sequences!

Get reliable and transparent genes ordering, regardless of complexity or scale.



Short tandem repeats



Extreme localized GC content



Long repeats



Homopolymers



Inverted repeats (hairpins)



High/low average GC content

Timeline unpredictability and black-box manufacturing can make projects involving complex DNA a headache. We believe ordering the foundational DNA material for your experiments should be a simple, transparent and worry free process regardless of sequence complexity. This is why we provide instant manufacturability information on our ordering portal, why we aim to deliver Complex Genes within 15 BD, and why our scientists tell you immediately about challenges with your sequence.

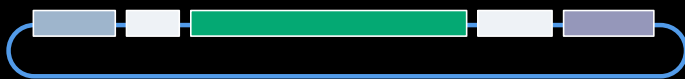
*For research use only. Not for use in diagnostic procedures.

Sneak Peek: Twist mRNA tools — soon including mRNA.

Right-sized DNA and mRNA for every step of the IVT workflow.

- **Throughput** - no order limit and no TAT difference based on order size
- **TAT** - faster than the 'Rush' service from the competition
- **Flexibility** - Order DNA and RNA in the same order, customize each sequence
- **Easy Ordering** - Replacing manual forms with a brand new sequence designer
- **Complexity** - The biggest hurdle, we are pushing the limits further than ever before

Plasmid Templates



- IVT vectors with T7 promoter, hBG UTRs and 120 nt poly A
- As fast as 4 business days when ordered as express genes
- 50 ng - 1 mg scales

Linear IVT Templates



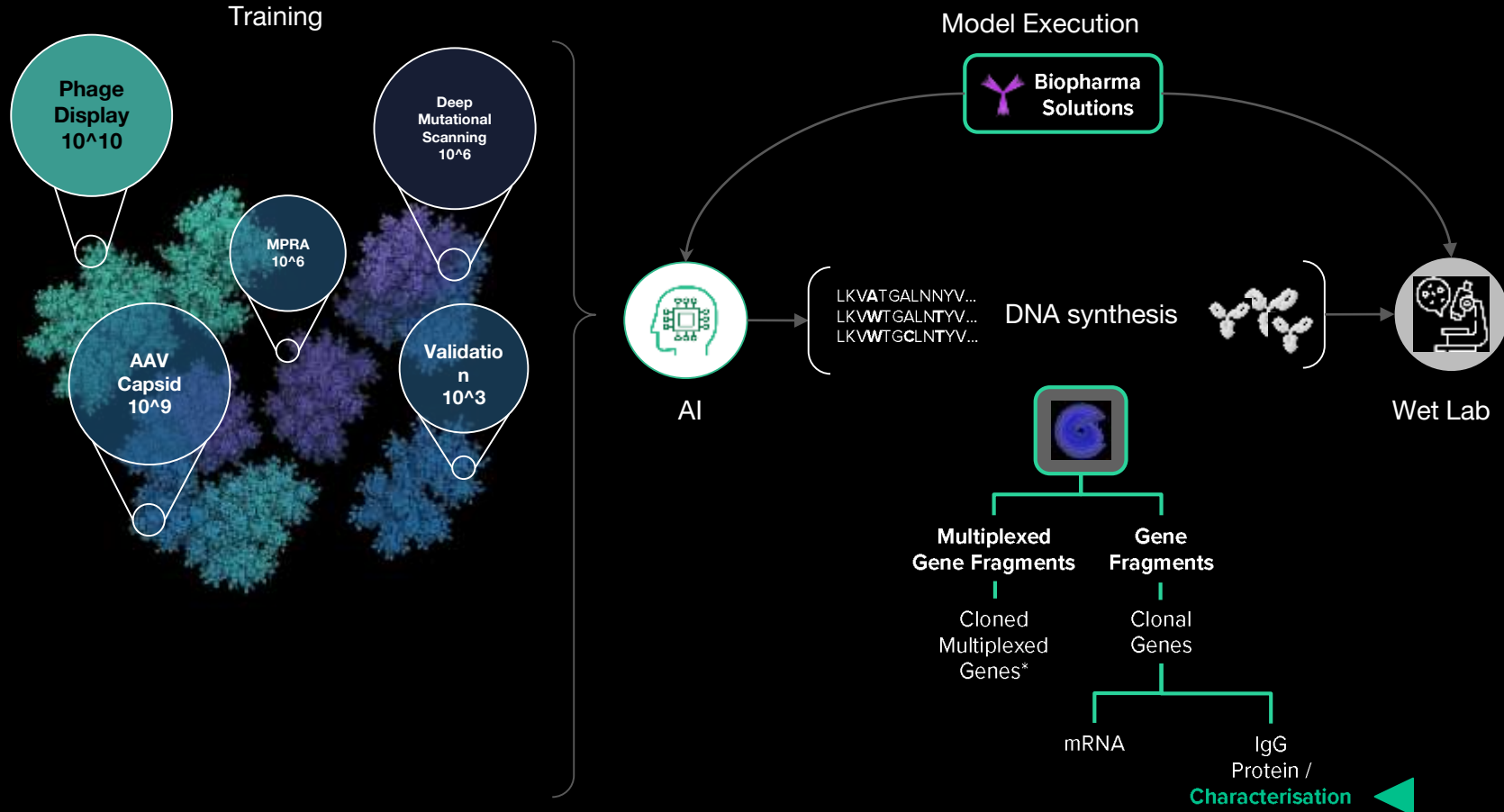
- Ready-to-use linear template
- 10ug scale for early IVT experiments in as few as 5 bd
- No limit in the number of designs

mRNA



- 100 ug or 1 mg scales
- As few as 7 bd
- Included QC (sequenced template, dsRNA, purity, yield)

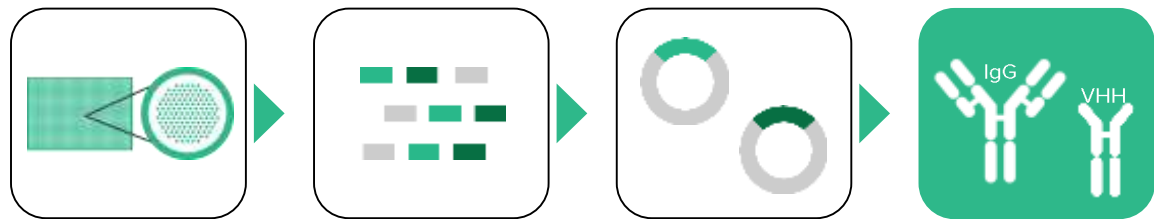
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Twist Express Antibodies

Access unlimited recombinant expression.

Twist Express Clonal Genes enable Twist Express Antibody generation in as few as 10 business days.



**Oligo synthesis
on silicon platform**

**Fragment
assembly**

**Cloning and
NGS verification**

**Antibody generation
in HEK293/CHO**

Product Specifications

Formats

- Full-length human IgG (hIgG1, hIgG2, hIgG4)
- Single Domain VHH-Fc, VHH-His

Turnaround Time

- HEK293: starting at 10 BD
- CHO: starting at 13 BD

Average Yields* (ProA Purified)

293 Expression:

- 1 mL: ~180 µg (IgG) – 290 µg (VHH Fc)
- 8 mL: ~760 µg (IgG) – 1050 µg (VHH Fc)

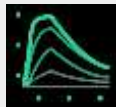
CHO Expression:

- 1 mL: ~99 µg (IgG)
- 8 mL: ~690 µg (IgG)



Protein production

Small to medium scale purification of antibodies up to 5 mg+.



Binding assessment

Choose from binding confirmation, binding affinity, kinetics and epitope binning to identify optimal binders.



Developability

Identify your most promising candidates for manufacturing with 96-well or 384-well format developability assays.



Customization

Format your antibody as you need it with intact mass, endotoxin testing and custom characterization options.

*Turnaround time starts at 10 – 15 business days for 1 mL antibody expressed in HEK293 and 13 – 18 business days for 1 mL antibody expressed in CHO. 8 mL expression volumes take an additional business day.

High-fidelity data, 10-day velocity

130K+

Antibodies assayed

Every antibody run through our characterization platform generates reproducible, structured data, ready to train, rank, and refine your models.

200K+

Proteins expressed

IgG to VHH, scFv, and Fab formats across HEK and CHO systems, at the scale your pipeline demands.

7M+

Data points generated

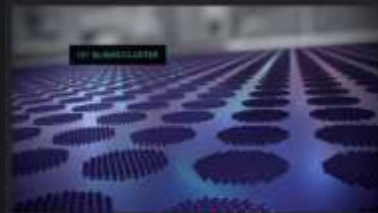
Binding, biophysical, and developability data delivered in standardized formats that plug directly into your AI platform.



What can Twist do for you?

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Large scale, quality oligo synthesis is the cornerstone of our portfolio.



>32M

oligos per day capacity

3M Genes per year

A new generation of Pooled DNA

Gene Pools (Bioscience) 1800 bp
Paired Heavy+Light Chain Libraries (acFV); Precisely Paired Bispecific VHHs
Paired TCR

Multiplexed Gene Fragments 500 bp

VH, VL, VHH, Mini-proteins / AAV / Promoters

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Paired or Unpaired CDRs / CRISPR / MPRA

250 nt

170 nt

● Up to 959% longer
More design possibilities than atoms in the universe
Complex sequences and GC content ready
Any scale
Direct synthesis of 500mers



With Twist, you get more than just DNA. You get:



Access to large scale synthesis.

Over 800,000 genes were delivered to scientists in 2024.



Consistent synthesis times regardless of scale.

Order hundreds of genes, or millions of oligos and they still arrive in days.



A dedicated team of scientific experts.

Our Field Application and customer support teams are on hand to support your research.



Easy ordering with our eCommerce platform.

Visualize your sequences, get real time quotes and see synthesis progress.



A proven track record.

Our DNA drives innovation with over 9,000 publications cited to date.



Rapid chat support.

Speak to experts in your region in one click through chat support.



Environmentally conscious synthesis.

Our manufacturing produces 600x fewer emissions than other technologies.*



Flexible payment options.

Pay by PO, credit card or a pre-paid Twist Wallet.



Digital tools for success.

Access codon optimization, pricing calculators, and protocols.



Exclusive academic discounts.

Academic accounts get cloned genes shipped express at no additional cost.**

*Calculated Twist internal data using Dr. Oligo benchmark January 2021. [ESG Report](#)

**Offer available until September 31, 2025.