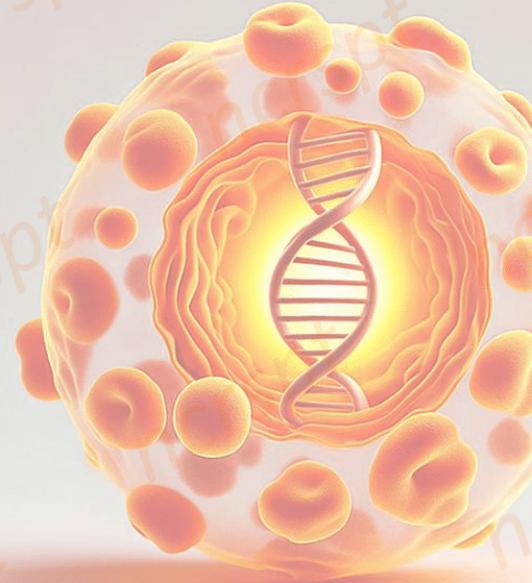




Transforming future by storing data in DNA in cells, forever

Nature's original hard drive



Data and Information couldn't last forever



8000 data centers = 8000 football fields
(~60 ZB in 2021)

~3X (175 ZB) by 2025 without AI
(\approx ~66.6% size of Washington D.C.)

Problem

- **Limited** storage capacity, prone to running out quickly
- **High energy** consumption, contributing to greenhouse gas emissions
- **Inefficient** data writing process on magnetic tape, limiting scalability for data duplication
- Requires **large and specialized equipment** for data writing, copying, and retrieval
- **Costly** and **inefficient** to copy data between tapes
- **Minimal** data encryption options, relying on physical protection only
- **Vulnerable to data loss** in catastrophic events with limited backups
- **Obsolescence** in physical storage formats (e.g., floppy disk → CD → DVD → USB drive; HDD → SSD → NVMe)

Data and Information could ~~X~~ last forever

The Nature's Hard Drive



Can be
→
replaced by



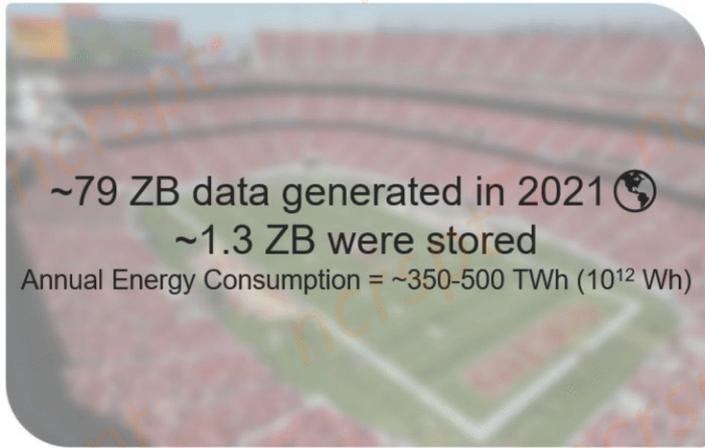
Storing all data from 1 data center into bacteria that occupying only the volume equals to 1 drinking glass (~312.5 mL*)

Value proposition **ncrspt**

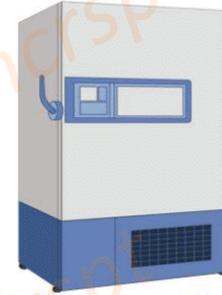
Synthetic biology + Genome engineering tools for large DNA modification
+ Encryption methods for digital files = **Storing data and information within living cells**

Data and Information couldn't last forever

The Nature's Hard Drive



Can be
 →
 replaced by



Storing all data from all data centers into bacteria that stores in 1 ultra-low temperature freezer (~635.7 ZB/freezer)
 Annual Energy Consumption = ~8,060 kWh (10^3 Wh)

Table 3: Comparative Summary of Data Infrastructure vs. DNA Storage

Metric	Digital Data Infrastructure (2021)	Hypothetical DNA Storage (Based on User's Premise)
Total Data Size	79 ZB (generated), 1.3 ZB (stored)	Up to 635.7 ZB per freezer (hypothetically)
Physical Footprint	6,761 to 10,978 data centers (ranging from small to massive)	1 ULT freezer
Annual Energy Consumption	350-500 TWh	8,060 kWh (per freezer)

ncrspt converts files into **DNA** and put into **living cells**
AND can reverse it (patent pending)



Data Security

Biologically encrypted,
tamper-resistant



Stability

Potentially permanent data
storage

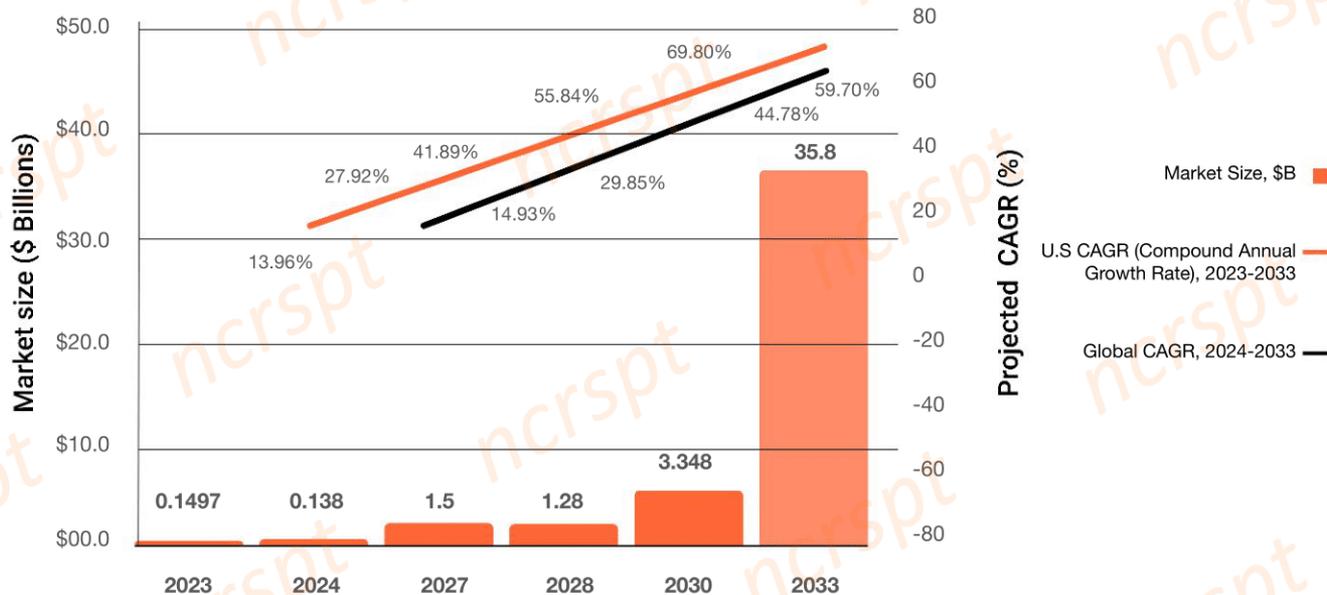


Eco-friendly

Slashes power, water,
space, and material use

DNA data storage market – exponential growth

Market size and compound annual growth rate of DNA data storage



<https://www.thebusinessresearchcompany.com/report/dna-digital-data-storage-global-market-report>
<https://www.marketsandmarkets.com/Market-Reports/dna-data-storage-market-66300978.html>
<https://www.bccresearch.com/market-research/biotechnology/dna-data-storage-market.html>
https://www.einnews.com/pr_news/722350472/global-dna-digital-data-storage-market-overview-and-statistic-for-2024-2033
<https://www.factmr.com/report/dna-data-storage-market>



How **ncrspt** could impact the world

Within and beyond the U.S.

Initial Target Market



Governments Archives:
Preserving historical, national records, legal data, classified information, scientific datasets, satellite imagery, etc.



Large Enterprises: Internet companies, corporates, financial & healthcare systems, etc. with large amount of private data for compliance or historical/legal purposes



DoD / Military / National Security:
surveillance record – cold data archiving; Alternative data encryption/security, data transfer

Collectively, these two sectors make up over half of the world's archived data. They are the backbone of global archives.



Our Growth

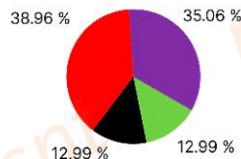
Check Points and Milestones



Phase 1

Funding

Startup funding
\$100,000.00 5%
Post-money SAFE

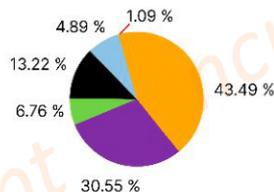


- Head Counts (R&D)
- Lab Space
- Lab Operations & Lab Service
- Consumables
- Marketing & Sales
- Tax & Legals

Phase 2

Budget

Pre-Seed/Seed funding
Raising minimum
\$6,000,000.00
via SAFE



- Head Counts (R&D, Product)
- Lab Space
- Lab Operations & Lab Service
- Consumables
- Marketing & Sales
- Tax & Legals



- Overall Timeline
- Prototype / Demo
- Product / Service
- Proof of concept
- Phase 1 Budget
- Phase 2 Budget
- Phase 3 Budget



Meet the *team*



T. K. Martin Tsui, Ph.D.

Founder, CEO

Structural biochemist

Protein-nucleic acid interactions (CRISPR and CRISPR-Cas9) expert

Former Sr. Scientist 

Postdoc, UC San Francisco

Ph.D., Molecular Biophysics, Florida State Univ.

B.S., Chemistry, UC San Diego

World's first thermostable CRISPR-Cas9
(US11111492B2) 



Yue Chiu Chan

Head of Engineering

Software engineer

Technical key of our IP software development

Sr. Full Stack Web Developer, Three UK
M.S., Software Systems, Univ. of Bath (UK)
B.S., Computer Science, Hong Kong Baptist Univ.



In-development:

- Advisory Board Member – Scientific
- Advisory Board Member – Information Technology
- Advisory Board Member – Data Storage

Thank you!

Target Markets

- Government archives
- Enterprise data (Corporations, financial institutions, healthcare, legal, etc.)
- Medical records

Next Steps

- Investment opportunities
- Partnership inquiries
- Pilot program interest

Transforming future by storing data in
DNA in cells, forever

Nature's original hard drive



Connect with **us!**

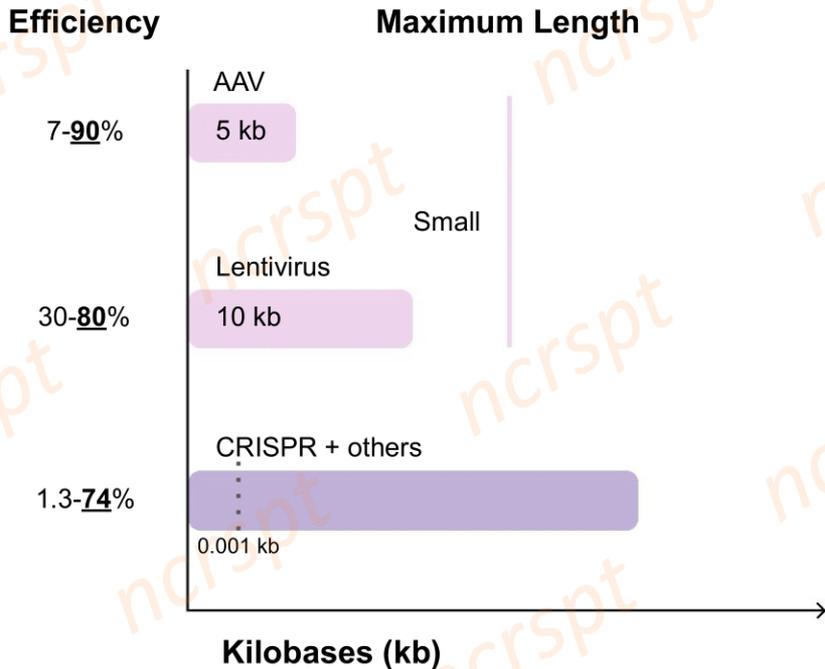
 martin@ncrspt.com

 www.ncrspt.com

Appendix



DNA editing technology limitation



zolgensma®

NOVARTIS
How this gene therapy drug earned its \$2.1 million price tag

LentiGlobin™
bluebirdbio

A hemophilia drug that just won FDA approval pegs a one-time \$3.5 million vial against several millions in lifelong costs

Beam THERAPEUTICS

BEAM-101: IND Approval for First Ever Base-Edited Therapy

On Monday, Beam Therapeutics announced that the U.S. FDA had cleared BEAM-101 for clinical evaluation as a treatment for sickle cell disease. BEAM-101 is an ex-vivo cell therapy candidate that has been edited to express fetal hemoglobin to compensate for hemoglobin deficiency and potentially alleviate the symptoms of sickle cell disease.

CRISPR THERAPEUTICS VERTEX

Vertex and CRISPR Therapeutics to Present New Clinical Data on Investigational CRISPR/Cas9 Gene-Editing Therapy CTX001™ For Severe Hemoglobinopathies at the Annual European Hematology Association Virtual Congress

Tome BIOSCIENCES

Tome Biosciences debuts with \$213M and a new way to edit the genome

The well-funded startup is developing technologies designed to insert large amounts of genetic material anywhere in the genome without damaging or breaking DNA.

DNA editing technology limitation & *opportunities*

Efficiency

Maximum Length

7-90%

AAV

5 kb

Small

30-80%

Lentivirus

10 kb

1.3-74%

CRISPR + others

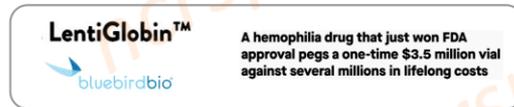
0.001 kb

36 Kb

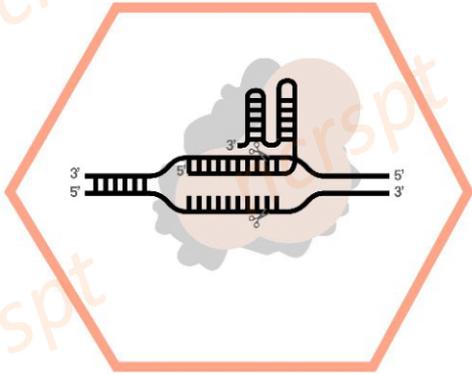
Theoretical Max

Large

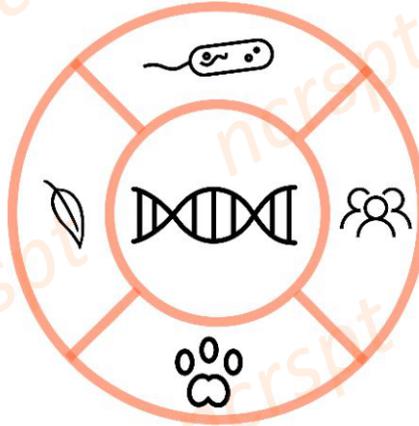
Kilobases (kb)



There are many CRISPR-technology startups



Genome Engineering



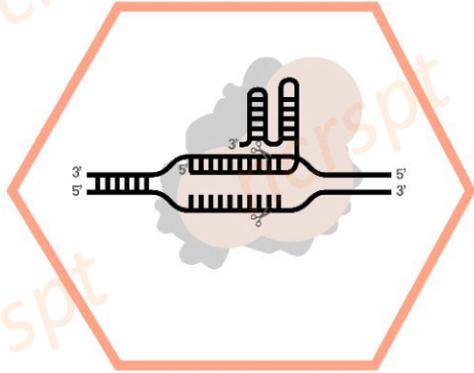
Synthetic Biology



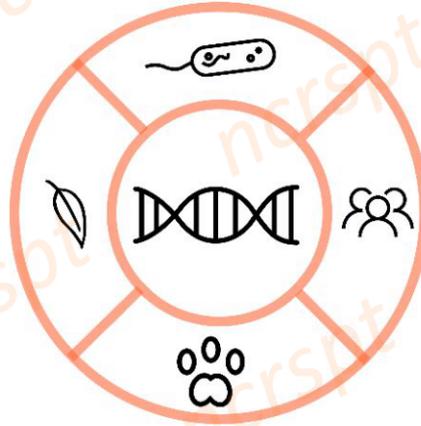
Technology & Field Interest



There are many CRISPR-technology startups
ncrspt rewrites DNA but not for therapeutics...



Genome Engineering
(Cut, edit, repair DNA)



Synthetic Biology



What **ncrspt** does





ncrspt converts files into DNA and put into living cells AND can reverse it

43850
 Morgan, Lewis & Bockius LLP (SF)
 One Market, Spear Street Tower, Suite 2800
 San Francisco, CA 94105

CONFIRMATION NO. 8408
FILING RECEIPT



0000000072924550

Date Mailed: 05/22/2024

Title
 METHODS AND COMPOSITIONS FOR ENCODING AND STORING ELECTRONIC DATA IN BIOLOGICAL CONTEXTS

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt identifying the requested changes, preferably by including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

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 Yue Chiu Chan, San Francisco, CA;

Applicant(s)
 Tsz Kin Martin Tsui, San Francisco, CA;
 Yue Chiu Chan, San Francisco, CA;

Power of Attorney:
 EVELYN CHOU -79300

Traction

Startup funding

\$100k

2023



Storing data *in cells* separate us

DNA storage outside of the cells

 **CATALOG** (DNA drive, computing)

BIOMEMORY (DNA card, storage)

 **TWIST+ FUJIFILM**
Value from Innovation
(DNA drive, storage)

 **LIGOARCHIVE**
(DNA database, storage)

 **Microsoft + UNIVERSITY of WASHINGTON**
(DNA instrument, read-write & storage)

 (DNA in tube, read-write & storage)

 **IRIDIA** (DNA microchip, read-write & storage)

 **Cache** (DNA encapsulation in polymer, storage)

BIOMEMORY (DNA card, \$1,000 for 1 kb)

DNA storage *inside* of the cells

VS



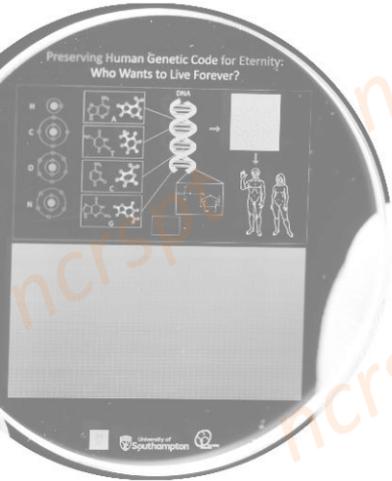
Storing data *in cells* separate us

DNA storage outside of the cells

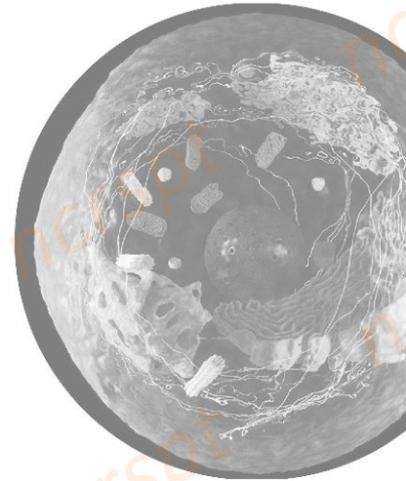
CATALOG (DNA drive, computing) **BIOMEMORY** (DNA card, storage)
T.W.I.S.T. + FUJIFILM (DNA drive, storage) **IRIDIA** (DNA microchip, read-write & storage)
 (DNA database, storage) **Cache** (DNA encapsulation in polymer, storage)
Microsoft + University of Washington (DNA instrument, read-write & storage)
 (DNA in tube, read-write & storage)

VS

DNA storage inside of the cells



- | | | |
|-------------------------------------|---|-------------------------------------|
| <input checked="" type="checkbox"/> | Long-term storage of data in biomaterial | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | Established method of material storage | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | Time to generate data in biomaterial | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | Physical space saved of data in biomaterial | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> | Reduce GHG emission during storage | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> | Ability to duplicate data before archiving | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | Ability to duplicate data after archiving | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | Access of technology to retrieve archive | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> | Ability to introduce complex data encryption to prevent reverse engineering | <input checked="" type="checkbox"/> |



BIOMEMORY (DNA card, \$1,000 for 1 kb)



Hybrid model: Subscription-and-usage-based

Platform as a Service

Storage

Monthly, Capacity Subscription

- 1) **AWS Cloud-based Data Archiving (S3 Glacier Deep Archive)**
 - \$0.0144/GB/month
- 2) **Microsoft 365 Archive**
 - \$0.05/GB/month
- 3) **Google Cloud Archive Storage (Multi-regions)**
 - \$0.0024/GB/month
- 4) **IBM Analysis**
 - \$0.0731/GB (SSD, unprofitable in 2022) to ~\$0.0179/GB (2030)
 - \$0.0096/GB (HDD, marginally profitable in 2022) to ~\$0.0061/GB (2030)
 - \$0.0051/GB (magnetic tape, profitable in 2022) to ~\$0.0013/GB (2030)

Transfer & Retrieval

Volume per access

Custom Request

- 1) Different organisms
- 2) Different encryption methods
- 3) Different storage conditions, locations

Government

<https://aws.amazon.com/s3/pricing/>
<https://learn.microsoft.com/en-us/microsoft-365/svntex/svntex-pay-as-you-go-services>
<https://cloud.google.com/storage/pricing#multi-regions>
<https://www.ibm.com/downloads/cas/LD7LER2M>