

# Multiple Licensable Life Sciences Technologies



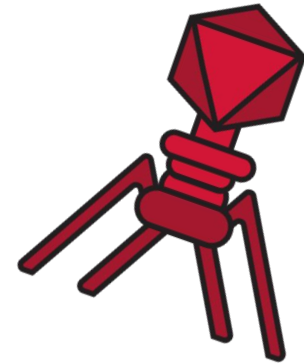
# Customized Phage Therapies

**Problem:** Antibiotic-resistant bacterial infections contribute to 4.95 million deaths per year worldwide

**Solution:** Methods to purify clinically safe, bioinformatics- informed bacteriophages for intravenous use

## Advantages:

- Standardized, reproducible and scalable
- Up to 64,000 treatment doses in one batch
- Endotoxin levels within human-safe regulatory limits
- Tested in several human patients



Dwayne Roach, Ph.D.  
US provisional patent application (62/983,453)  
US patent application (17/802,849)

# Bacteriophages in Milk Products

**Problem:** Antibiotic-resistant bacterial infections contribute to 4.95 million deaths per year worldwide

**Solution:** Deliver customized mixture of bacteriophages or prophages to the gut in milk, milk product or cream to selectively kill bacteria.

## Advantages:

- Decreases chance of gastrointestinal infections and disease
- Resistant to various conditions (temperature, pH, gut enzymes)
- Can incorporate into infant formula or veterinary feed



Forest Rohwer, Ph.D.  
US issued patent (11,260,089)  
Pending US continuation application (17/541,063)

# Microbiome Therapies for Obesity

**Problem:** Globally, more than 650 million adults are obese and 486 million people have type 2 diabetes.

**Solution:** Deliver engineered or wild type bacteriophages that attach to mucus in gut to kill bacteria associated with weight gain and inability to lose weight (e.g., *Firmicutes*)

## Advantages:

- Specific and customizable
- Adaptable to other natural and artificial surfaces



Forest Rohwer, Ph.D.

US issued patent (11,214,773)

Pending US continuation application (17/534,372)

Pending EU patent application (16849443.3)

Pending US patent application (16/761,037)

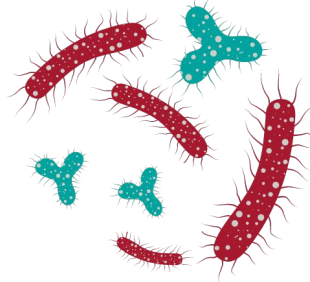
# Marine Bacteria Modular Toolkit

**Problem:** Genetic engineering in wild microorganisms beyond *E.coli* and yeast is limited, challenging and time-consuming

**Solution:** Leverage naturally occurring mechanisms from marine bacteria to create new model organisms and knockout lines

## Advantages:

- Customizable
- Rapid production
- By scientists for scientists



Nick Shikuma, Ph.D.  
US application (17/294,656)  
PCT Application (PCT/US2023/024108)

# Molecular Syringes for Protein and Peptide Therapeutic Delivery

**Problem:** Most peptide therapeutics require subcutaneous injection and release throughout the body, resulting in unwanted side effects and reduced efficacy.

**Solution:** Targeted injection of protein and peptide payloads into eukaryotic cells based on surface markers w/ nanoscale syringe

## Advantages:

- Increased efficacy of delivery to target tissues
- Organic mechanism derived from marine bacteria
- Adaptable to pest management, genetic modification



Nick Shikuma, Ph.D.  
US application (17/294,656)  
PCT Application (2023/024108)

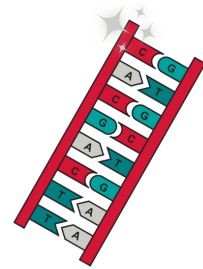
# Fluorescent Probes for SNPs

**Problem:** Sequencing DNA and RNA can be expensive, slow and require sophisticated instruments with high error rates and lack of specificity for single nucleotide polymorphisms (SNPs).

**Solution:** Fluorescence reporting capabilities built into DNA and RNA sequences through cytidine modifications to detect SNPs

## Advantages:

- Can test on- and off-target effects of drugs
- Customizable for any target DNA or RNA sequence
- Instantaneous readout for diagnostics



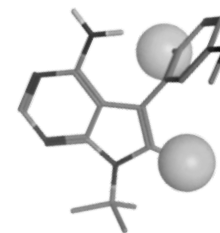
Byron Purse, Ph.D.  
US issued patent (11,447,519)

# Selective Kinase Inhibitors

**Problem:** Kinase inhibitors often have undesirable side effects caused by off-target inhibition.

**Solution:** Manufacture higher yield of desirable molecular shape more selective to targets during pharmaceutical synthesis

Cancer Type	Reported Mutations
NSCLC, thyroid cancer, Tamoxifen-resistant breast cancer, neuroblastoma	RET kinase
NSCLC, breast cancer	Drug-resistant EGFR mutants
Mantle cell lymphoma, chronic lymphocytic leukemia	BTK



## Advantages:

- Use against “undruggable” targets
- Reduction of off-target effects
- More selective and potent



Jeff Gustafson, Ph.D.  
Pending EP patent (16836030.3)  
Granted EP patent (18821459.7)  
US patent application (17/619,688)  
US issued patents (11,345,707, 10,550,124, 10,934,300)



# Contact SDSU Innovation

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Hala Madanat  
Vice President for Research and Innovation  
[hmadanat@sdsu.edu](mailto:hmadanat@sdsu.edu)

Laura Buffard  
Associate Vice President for Innovation  
[lbuffard@sdsu.edu](mailto:lbuffard@sdsu.edu)

Tommy Martindale  
Director of Technology Transfer Office  
[tmartindale@sdsu.edu](mailto:tmartindale@sdsu.edu)

Brendan Daly  
Senior Innovation and Licensing Manager  
[bdaly2@sdsu.edu](mailto:bdaly2@sdsu.edu)

Tolulope Perrin-Stowe  
Business Development and Licensing Associate  
[tperrinstowe@sdsu.edu](mailto:tperrinstowe@sdsu.edu)

