

PHYLOGICA

BREAKTHROUGH PEPTIDE THERAPEUTICS



Harnessing Biodiversity for Peptide Therapeutics

October 2013



Corporate Introduction

About Phylogica

- Listed on Australian Stock Exchange in 2005 (ASX:PYC)
- Provides peptide drug discovery services to the Pharmaceutical industry
- Owns a unique proprietary class of peptide therapeutics (Phylomers®)
- Broad IP estate with multiple granted patents from 12 patent families
- Validated a ‘Discovery Alliance’ business model
- Alliances with Roche/Genentech, MedImmune, Pfizer, Janssen and Cubist

Corporate overview

- Operations in Perth, Australia
- Phylomer[®] peptide libraries derived from most structurally diverse genomes
- ‘Discovery Alliance’ business model for rapid revenue growth
 - Already received >\$5.8M in committed revenue in less than 4 years

- Alliances with      
 - Joint venture with Cambridge University for target discovery and validation
 - Joint venture with the IMB University of Queensland around biosensor development



Top-10 shareholders

Position	Holder name	Shares	% of issued
1	Hockings Family Office	35,251,999	7.55%
2	Telethon Institute	20,605,501	4.41%
3	Andrew Swift	18,186,088	3.90%
4	Ascent BioMedical Ventures	16,949,152	3.63%
5	Paul Watt	16,758,730	3.59%
6	John Jelbert	11,492,398	2.46%
7	Anthony Torresan	9,400,000	2.01%
8	Richard Hopkins	8,958,779	1.92%
9	Nick Woolf	7,871,956	1.69%
10	Yellowrock PL	7,761,298	1.66%
Top-10		153,235,901	32.82%

- 1/3 of Phylogica stock is held by top 10 shareholders

Phylogica's current partnerships span a wide a range of areas



Cell penetrating peptides

Phylogica

CNS Delivery



Vaccines



Antimicrobials



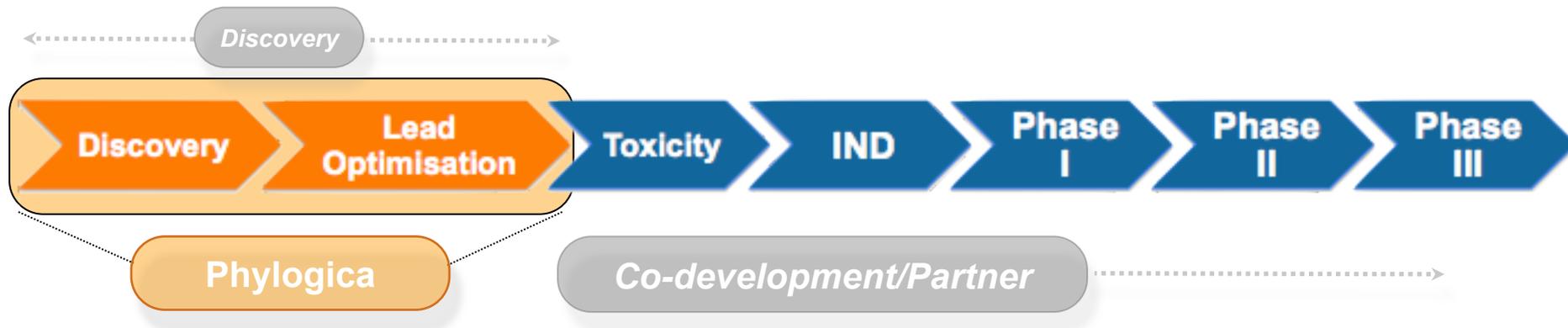
Phylogica owns an entire class of peptide drug

- Exclusive ownership enables PHYC to control access to Phylomer peptides.
- Analogous to ownership of rights to an oil field by and oil exploration company
- This control allows licensing of rights to access the resource (like licensing drilling rights) for upfront technology access fees, milestone payments and royalties
- Examples of biologics companies which have controlled access to a class of drug include: Morphosys, Domantis, Avidia and Peptidream



Business Model: focus on discovery alliances

- Fee-for-service screening against third party targets
- Building long-term value through milestones and royalties
- Increasing deal economics and share of down-stream value
- Opportunity to subsidise internal development through revenue streams



Collaborations and commercial partners validate Phylomers

■ Janssen (Johnson & Johnson)

- Collaboration to discover cell-penetrating peptides in Dec 2011
- Multi-product agreement with minimum of 18 months research funding
- Collaboration expanded in Jan 2013, expanded scope in June 2013



■ Pfizer

- Collaboration to discover peptide vaccines in Dec 2010
- Milestone payments triggered in Dec 2011 and May 2012
- Total deal value of up to US\$135M & royalties on worldwide sales



■ MedImmune (AstraZeneca)

- Collaboration to discover antibiotic peptides in Aug 2010
- Progressed to final stage of research plan in Nov 2011
- Total deal value of up to US\$100M & royalties on worldwide sales



■ Roche/Genentech

- Collaboration to discover brain delivery peptides in Dec 2009
- Expanded to discover peptides that cross blood-brain barrier in May 2011



■ Le Métier de Beauté

- License to commercialize a skin-repair peptide in cosmetic products in Sep 2012

LE MÉTIER DE BEAUTÉ

■ Cubist Pharmaceuticals

- Deal to evaluate antimicrobial peptides against gram negative bacteria in July 2013



Scope of deals underscores breadth of Phylomer platform

Recent highlights

- Expanded Janssen collaboration on peptide-drug conjugates to include downstream biological validation of optimal hits
- Filed patent on new technology to discover cell-penetrating peptides that escape the endosome (Endosomal Escape Trap)
- Constructed second generation libraries with increased diversity and sampling – increased library size to 400 billion peptides
- Initiated development of an arrayed library of synthetic Phylomers on a chip – application as universal biosensor for biomarker discovery and diagnostics
- New US patent granted for synthetic Phylomer libraries – priority to 2027

Leadership and experience



Dr Richard Hopkins – CEO

- Doctorate from Murdoch University, Western Australia
- Over 10 years commercial biotech experience
- Overseen development of the Phylomer platform.
- Over 20 publications and inventor on 13 patent families



Dr Paul Watt – CSO

- Commonwealth overseas scholarship recipient; Doctorate at the University of Oxford,
- >45 publications, including several high-impact papers, inventor on 20 patent families
- Post Doctoral appointments at Oxford and Harvard Universities
- Over 10 years commercial biotech experience



Leadership and Experience: Non-executive Directors

Dr Douglas Wilson - Chairman

- Former Senior Vice-President, Medicine for Boehringer Ingelheim
- Overseen multiple drugs at all phases of development
- Overseen many drugs successfully to the market in the USA



Mr Bruce McHarrie – Non-executive Director

- Chartered accountant
- Director of Finance and Business Development at Telethon Institute for Child Health research
- Over 16 years of biotechnology experience
- Former Assistant Director, Bioscience Unit at Rothschild Asset Management, UK



Mr Jeremy Curnock-Cook – Non-executive Director

- Managing Director Phillip Capital
- Chairman International Bioscience Managers Ltd
- Experienced director of multiple biotechnology companies
- Former Managing Director of the Rothschild Bioscience Unit, UK



Phylomers derive from parts of biodiverse proteins

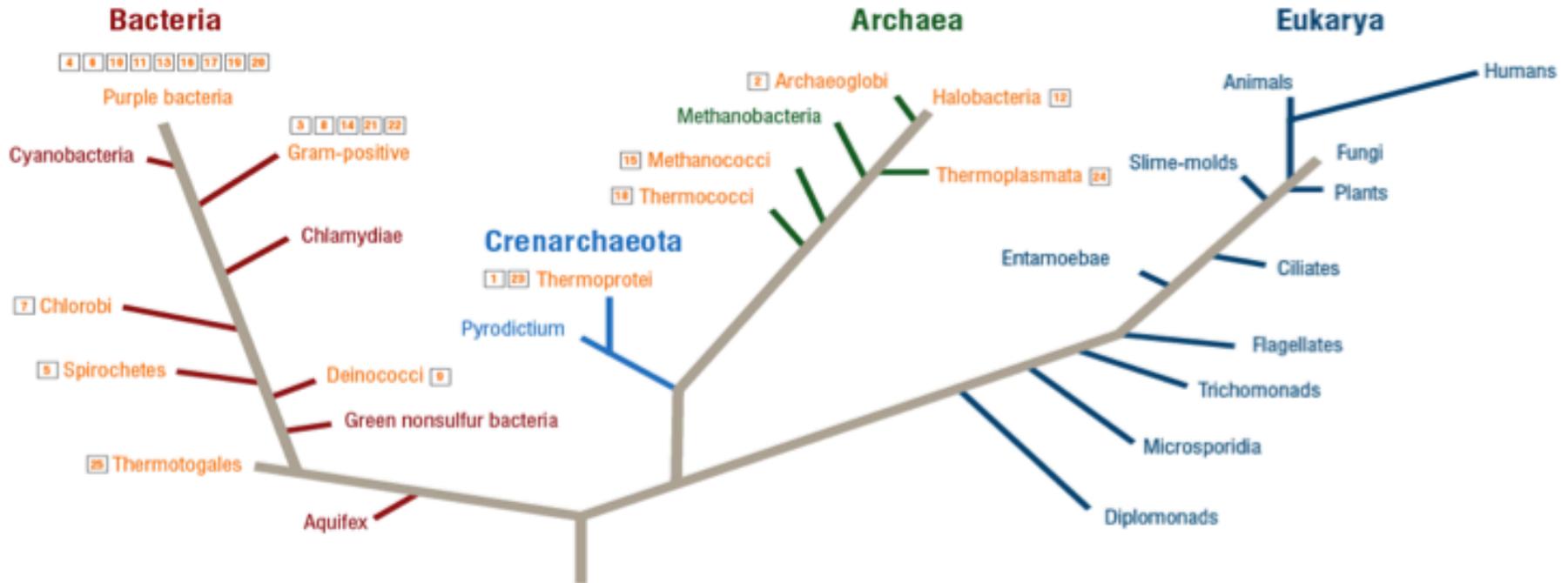
- Encoded from >35 biodiverse genomes derived from environments such volcanoes, geysers and undersea vents
- Phylomer libraries contain >400 billion distinct peptide sequences
- Pre-selected by evolution to allow survival, such as thermal stability
- Dominant intellectual property over entire drug class



Watt PM (2006) *Nature Biotechnology* 24 (2):177-83

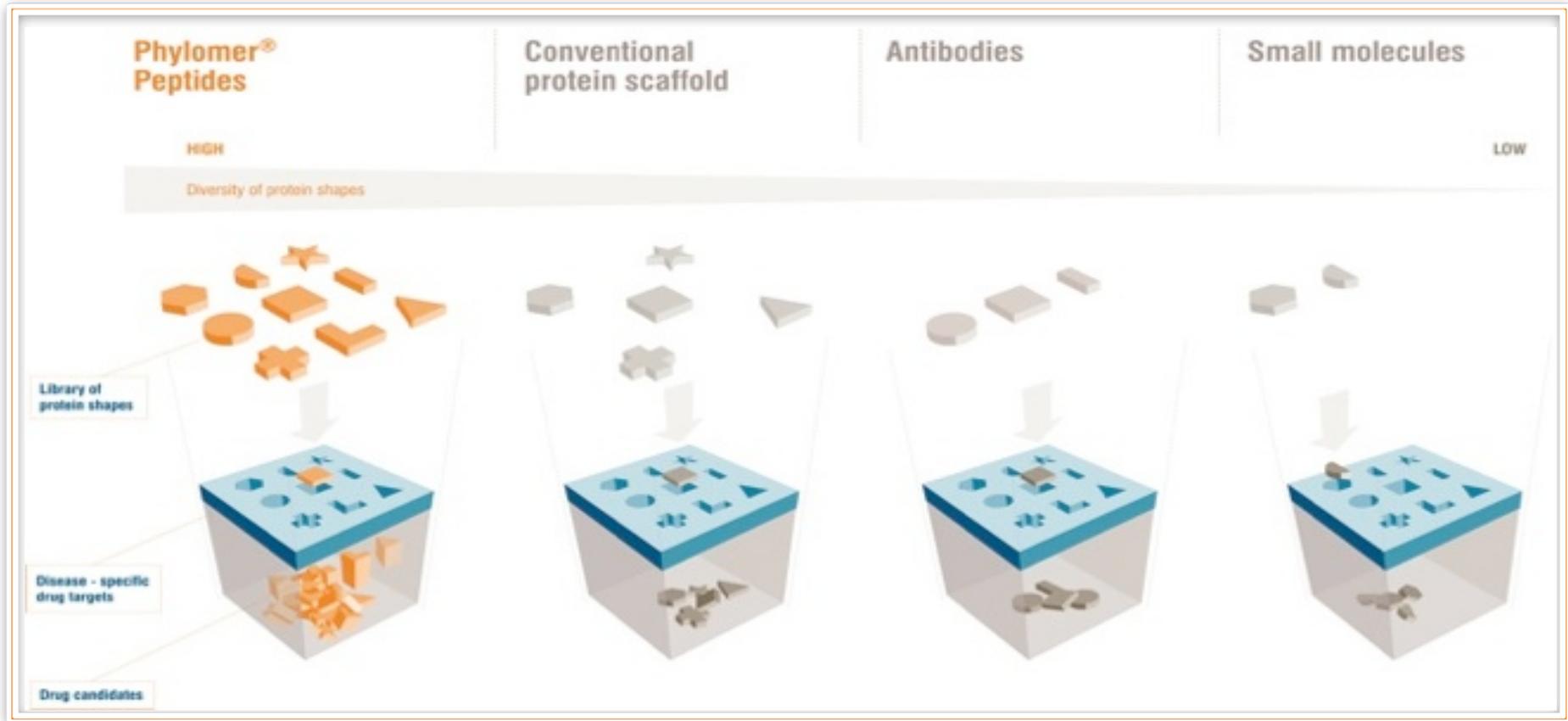
Sourced from different evolutionary species

- Worlds richest source of diverse natural secondary and tertiary structures



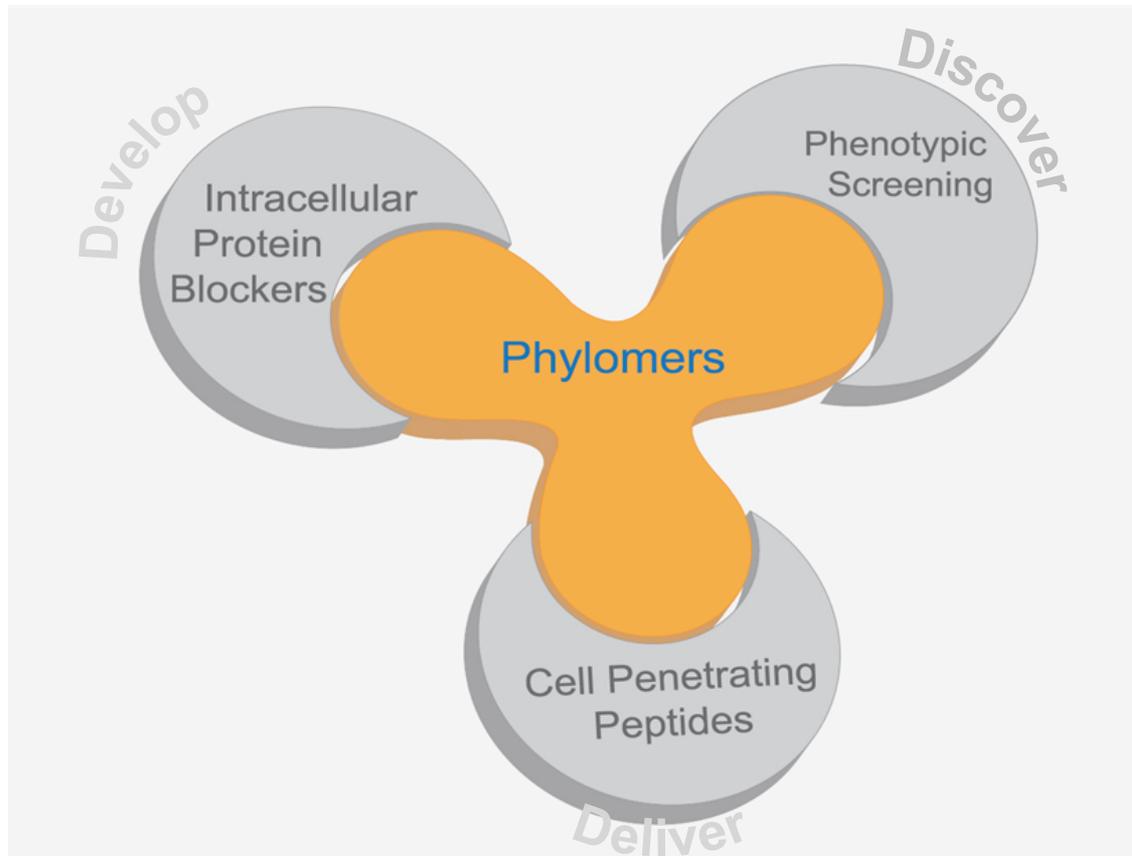
Watt PM (2006), *Nature Biotechnology*, Vol 24 (2):177-83

Harvesting structural diversity for drug discovery



- Phylomer libraries comprise thousands of unique structural families
- Phylomer screens allow the target to 'choose' the scaffold from thousands of folds

Uniquely integrated capabilities of Phylomer platform

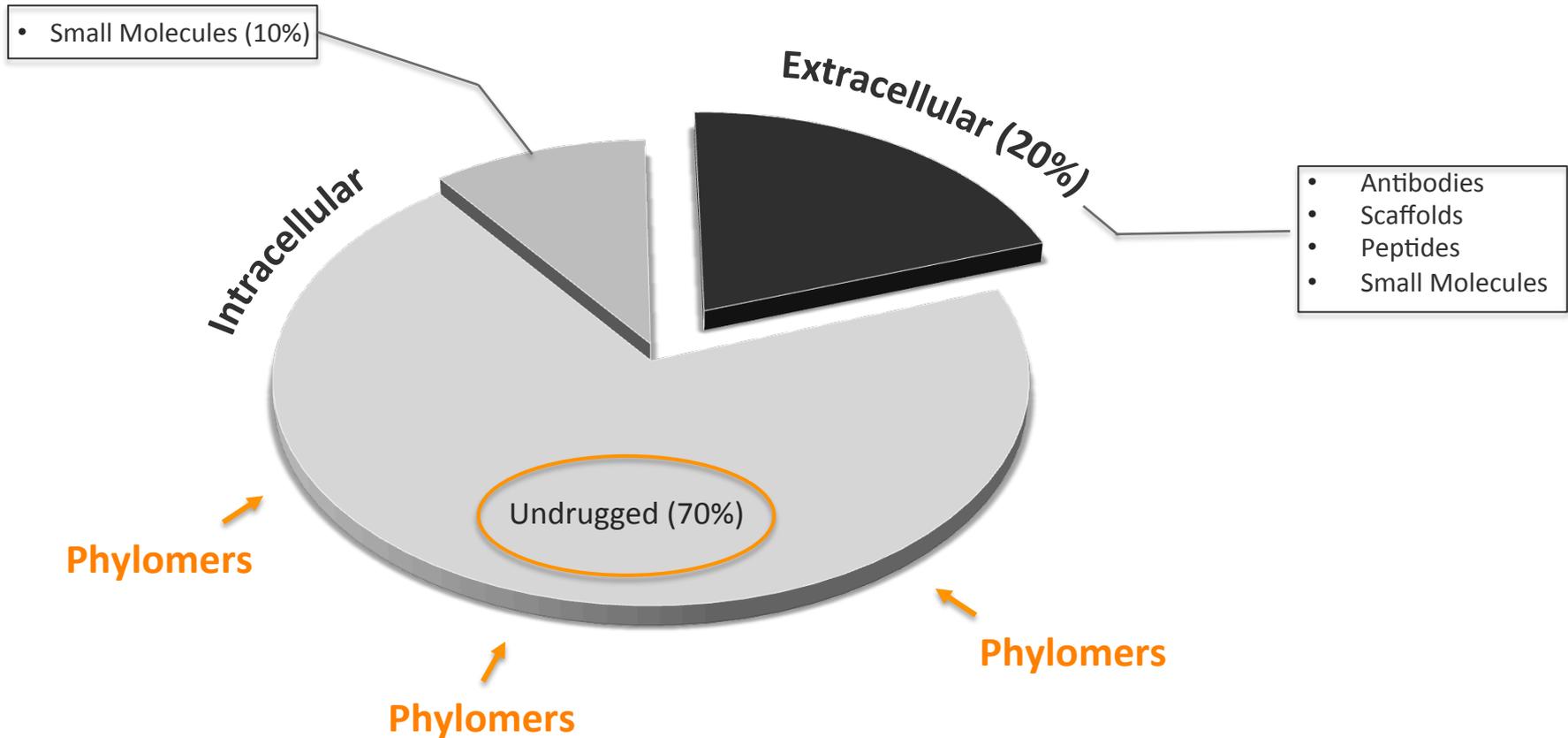


Phylogica's unique discovery platform:

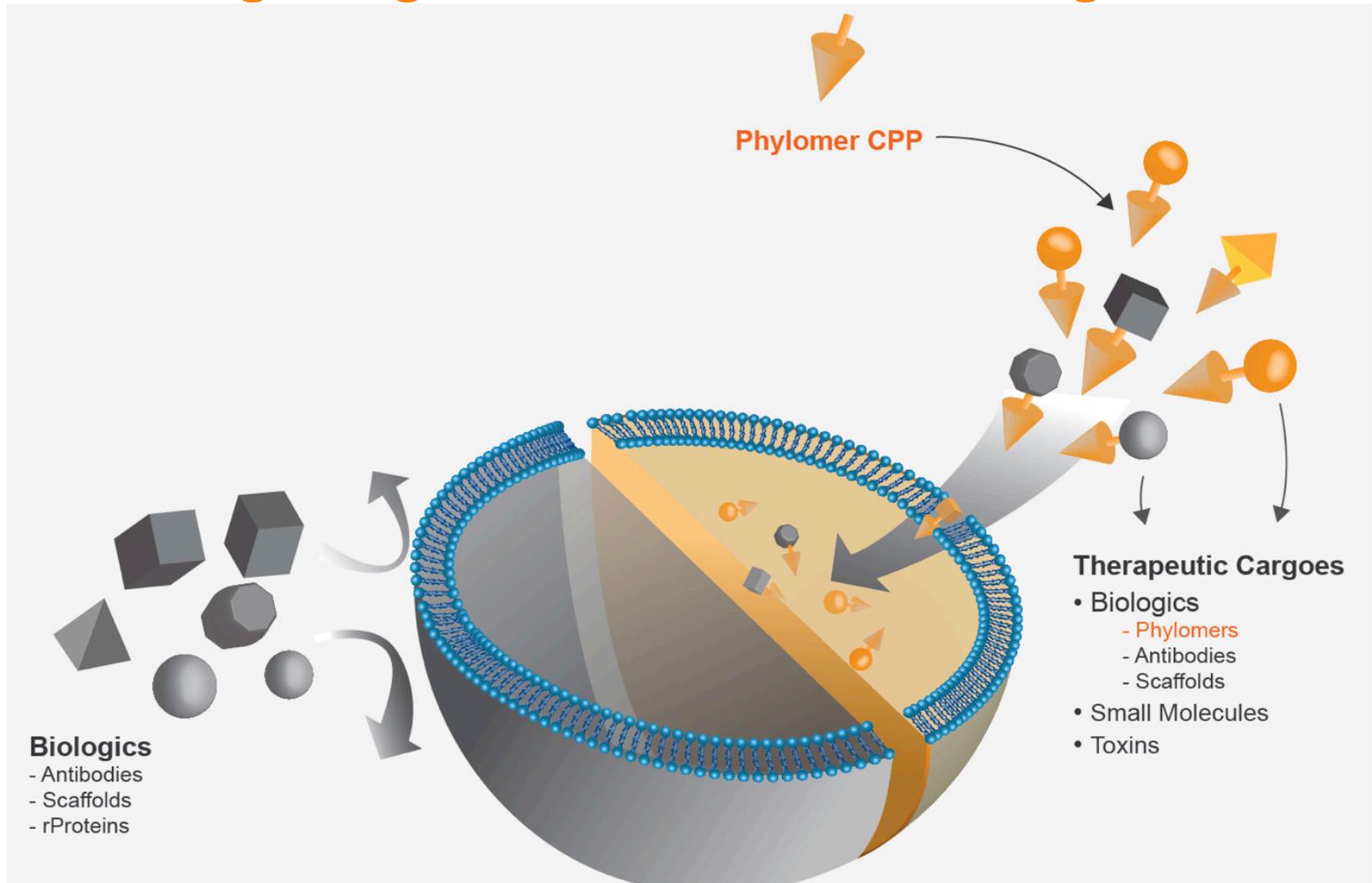
- **Discover** and validate new therapeutic targets found inside cells (Phenomica)
- **Develop** therapeutic peptide leads against such targets
- **Deliver** therapeutic cargoes into cells with cell penetrating peptides

Majority of Therapeutic Targets are Intracellular

Cellular distribution of therapeutic targets considered 'druggable'
(1,700-3,000 targets)



Cell penetrating Phylomers (CPP's): gaining access to intracellular targets

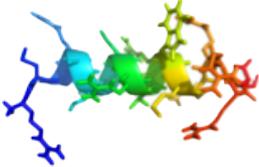


Phylomers can expand the druggable landscape by >10-fold!!



Discovery of Phylomer-derived Cell Penetrating Peptides

Multiple classes of validated Phylomer CPPs

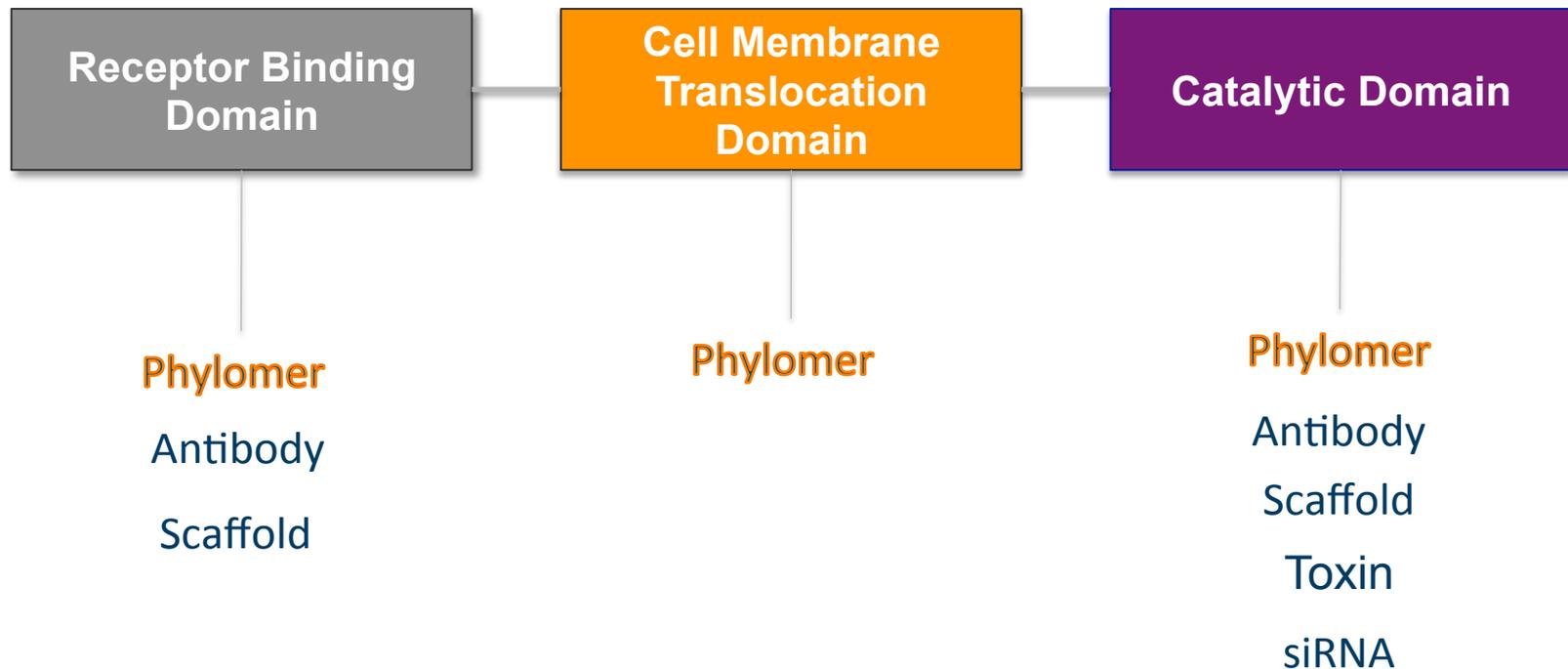
Phylomer	Comments	Length (aa)	Charge
BEN_1079	<ul style="list-style-type: none"> Cationic TAT-like sequence. 	18	+9
BEN_0805	<ul style="list-style-type: none"> Similar to gp41 transmembrane protein from SIV. Facilitates fusion between viral and endosomal membranes. 	26	+3
BEN_5000	<ul style="list-style-type: none"> Putative transposase from <i>S. avermitilis</i> Negatively charged sequence suggests a different mode of uptake compared to the cationic TAT-like peptides. Preference for brain endothelial cells 	35	-3
BEN_1312	<ul style="list-style-type: none"> Fibronectin Binding protein from <i>S. aureus</i> Virulence factor known to play a role in cell invasion 	42	-12

Summary of 'First Generation' CPP screens

- Phylomers represent a rich source of novel CPPs
- Identified different classes of CPPs
- Libraries can be used to capture CPPs with a range of cell penetrating mechanisms
- **Currently developing Second Generation CPP discovery platform**
 - Enrich for pathogenic viral and bacterial genomes
 - Engineer platform to specifically capture phage that have escaped from the endosome into the cytoplasm
 - Develop high throughput functional screens for downstream validation of CPP activity

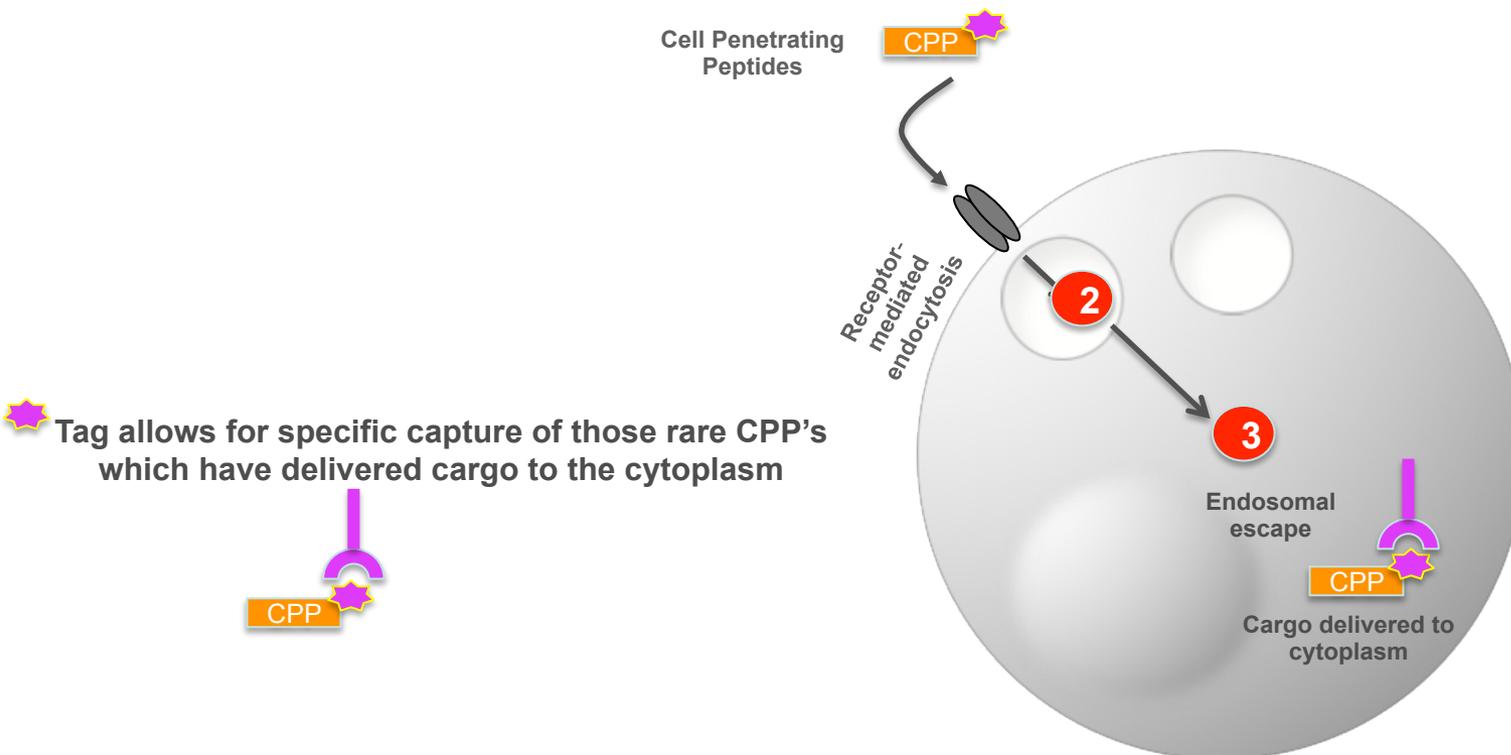
Nature's Modular Solution to Cell Penetration

- The modular structure of Bacterial Toxins provides a template for improving efficiency of cell penetration and cargo delivery
- Modularity enable Phylomers to 'Plug-n-Play' with existing therapies



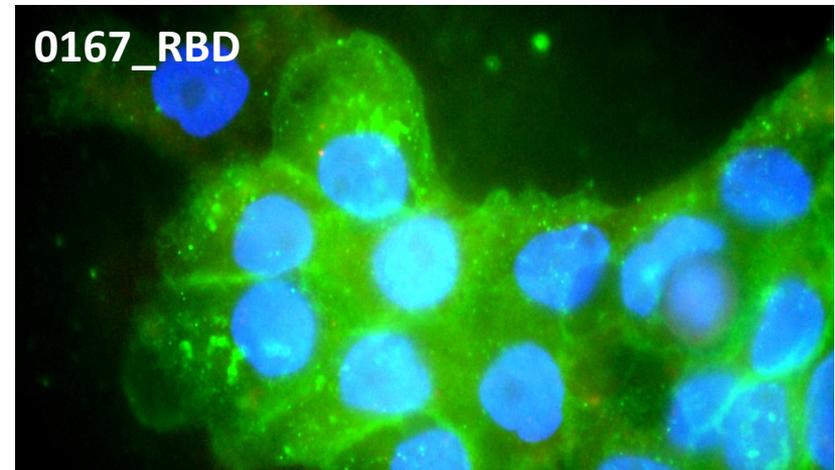
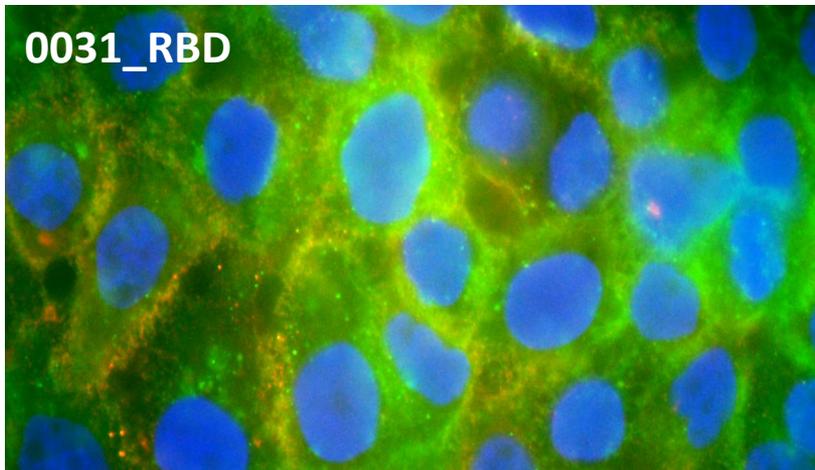
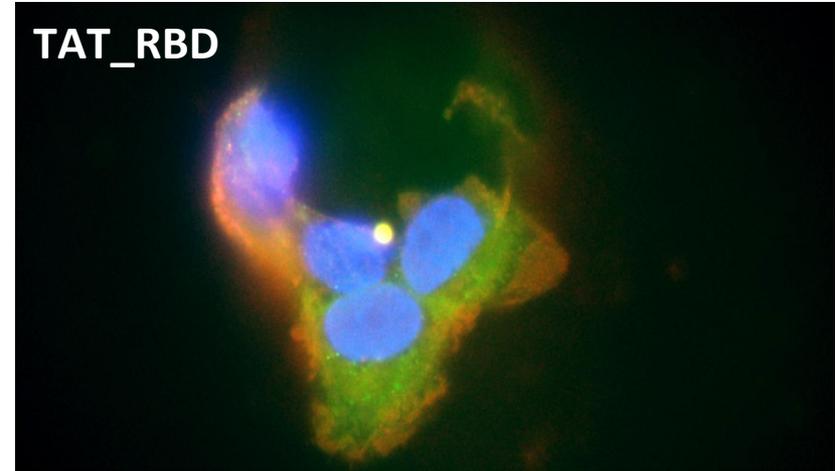
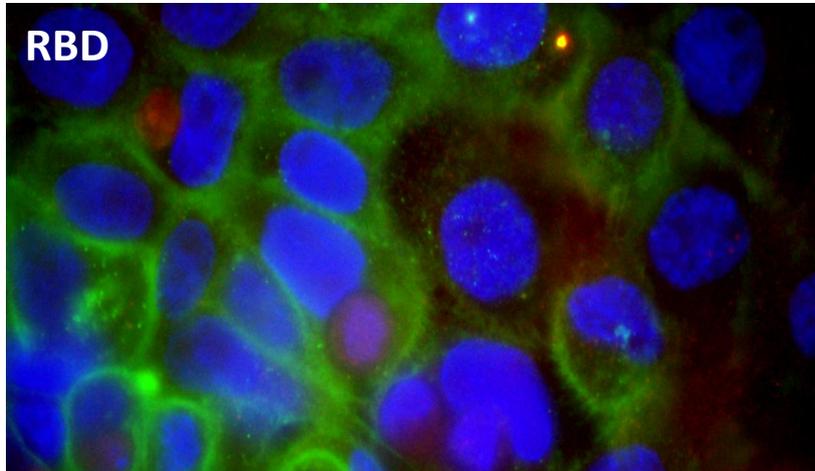
Endosomal Escape Trap for efficient CPP Discovery

- CPP delivery requires 3 independent activities
 - Cell binding
 - Endosomal Uptake
 - Endosomal Release
- Phylogica's endosome escape trap for capture of CPPs which efficiently deliver biologics cargoes into cell and out of endosome



Phylomer-mediated delivery of RBD cargo to mammalian cells

- Increased binding/uptake of FITC-labeled PHYC_RBD fusions at 2 μ M





Phylogica Differentiation, Deals and Growth Strategy

Demand for novel approaches to peptide drug discovery

Limited success with conventional approaches has increased demand for novel approaches

PHYLOGICA

Find new structures within proteins selected by evolution for diversity, stability and biological compatibility

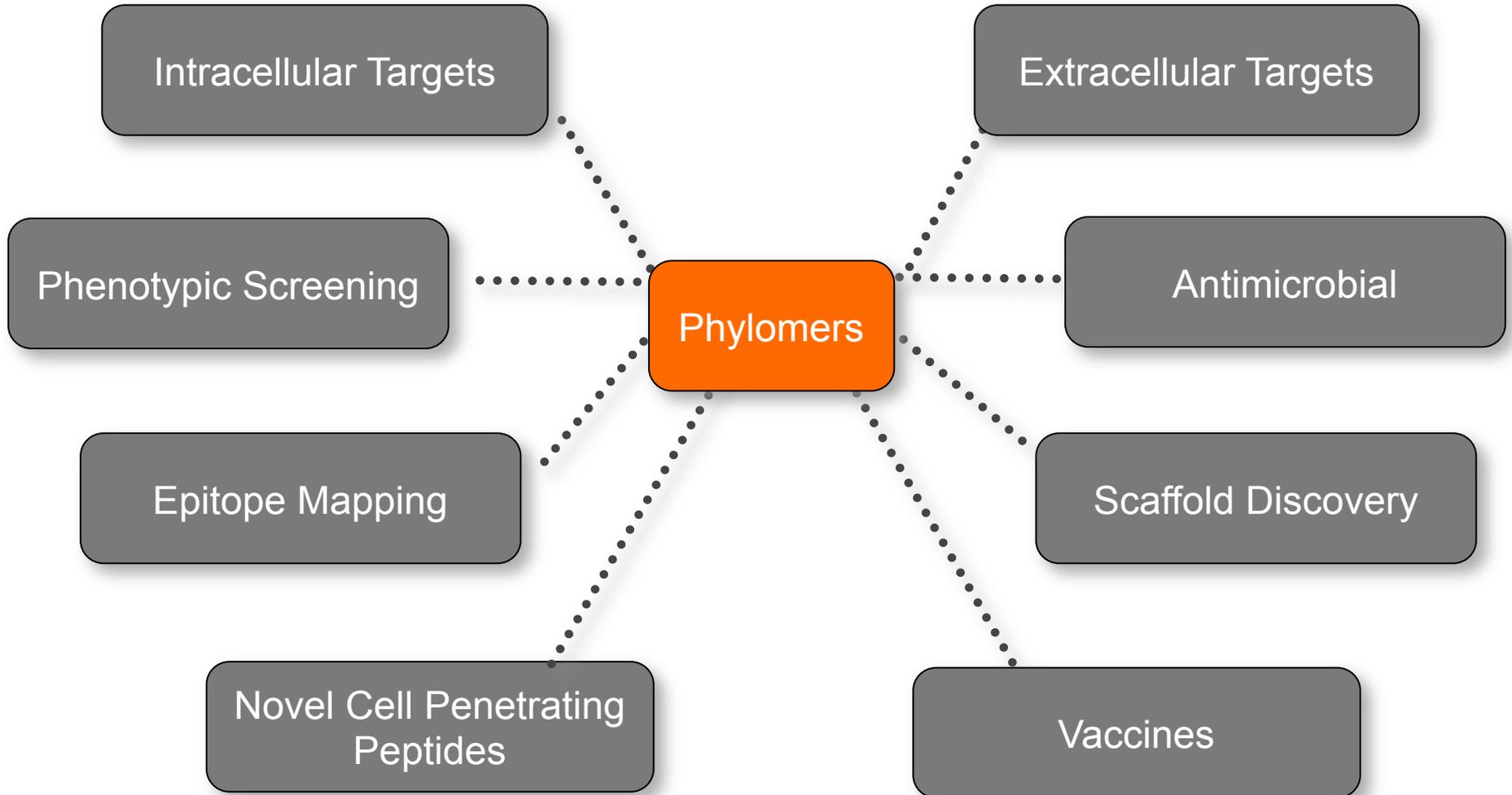
Peers

Design peptide inhibitors that mimic known natural interfaces
(e.g. Kai, Aileron, Trimeris)

Guess peptide sequence from random combinatorial libraries
(e.g. Affymax, Dyax, Isogenica, Ra, Bicycle, Peptidream)

Phylomers: a versatile toolbox for drug discovery:

platform validated in diverse areas



Extensive intellectual property position

- Phylogica controls access to the Phylomer class of peptide drug, allowing it to do license deals around access to peptides derived from its libraries
- Granted patents cover methods of making and screening Phylomer libraries and composition of matter on peptides and the libraries themselves
- Filed 17 patent families covering international markets, including the USA, Europe, Japan and Australia
- Granted composition-of-matter claim in Europe
“A gene fragment expression library comprising a plurality of different nucleotide sequences from a plurality of biodiverse organisms, each having a sequenced genome and wherein the organisms are microorganisms and/or eukaryotes having compact genomes”
- Granted US Patent for synthetic Phylomer libraries (priority to 2027)



Three overlapping strategic phases

1. **Partnering:** generate near-term revenue from discovery alliances
2. **Technological leadership:** enhance platform through value-adding upgrades
3. **In-house drug development:** build value by advancing internal products



Anticipated technology validation milestones

- Each milestone provides value-adding enhancement to Phylomer platform
 - Boosts our attractiveness to discovery alliance partners and potential acquirers

Technology	Purpose	Estimated validation date
Endosomal Escape Trap	Identifying new generation cell-penetrating peptides	Q4 FY2013
Functional CPP Trap	Selecting peptides that have biological function	Q1 FY2014
Structure Trap	Enriching libraries for drug-like macrocyclic structures	Q2 FY2014

New Internal Discovery Program: MAP4K4

- MAP4K4 is a critical regulator of muscle, inflammatory disease and of certain cancers
 - eg. ovarian cancer, hepatocellular carcinoma, lung cancer, pancreatic or prostate cancer
- Inhibition of MAP4K4 with siRNA inhibits growth of hepatocellular carcinomas
- Phylomer lead already identified from phenotypic screen
 - 17nM affinity for target and blocks known phenotypes of MAP4K4 depletion
- Phylomer against MAP4K4 target has a novel mode of action
 - does not block conserved active site of kinase, instead binds to RAP2A binding domain
- Target cancer indication is hepatocellular carcinoma but inhibition is also expected to improve muscle tone in cachexia (common in cancer patients)

New Internal Discovery Program: Myc/Max

- The Myc genes are the most commonly upregulated oncogenes in cancer
- Validated PPI's targets involving Myc family members:
 - cMyc/Max (lymphoma, lung breast cancer and colorectal cancer) and
 - MycN/Max (neuroblastoma)
 - Target already validated with low potency small-molecule tool compounds & siRNA
- Screening for inhibitor which blocks interaction of Max with both cMyc and MycN
- Target compatible with Phylogica's proven expertise hitting transcription factors
- Primary validation to be lymphoma (excellent mouse models for rapid PD)
- Target market non small cell lung cancer

Anticipated commercial milestones

- Further Pharma deals around areas of expertise such as:
 - Phenotypic screening for discovery and validation of new targets (Phenomica)
 - Efficient delivery of biologics by phylomer-derived cell penetrating peptides
 - Discovery of novel antimicrobials which penetrate bacterial cells
- Exercise of an Option-to-Licence of an existing deal by Q1 2014
- Progress from the collaboration with University of Queensland on the development of a Phylomer based biosensor array
- Progress from Phylogica's new discovery programs around intracellular targets involved in cancers

Phylogica vs. Peptidream

- Both Phylogica and Peptidream own a proprietary source of peptide drugs and both platforms have potential to capture macrocyclic peptides
- PeptiDream's Peptide Discovery Platform System enables incorporation of modified unnatural amino acids into peptide libraries
- PeptiDream has active discovery deals with nine companies, including Novartis, Ipsen, MedImmune and Amgen – **deals are of similar size and economics to PYC's deals**

	Phylogica	Peptidream
Listing	ASX (PYC)	Tokyo (4587)
Founded	2003	2006
Number of employees	26 (includes contractors)	60
Number of partnerships signed	4 (4/4 top 10 Pharma)	9 (3/9 top 10 Pharma)
Revenue 2012 (calendar year)	\$2 million	\$9 million
Net profit/loss 2012	Loss \$4 million	Profit \$0.1 million
Cash 31/03/2013	\$3 million	\$10 million (pre-IPO)
IPO	March 2005	June 2013
Pre-money valuation at IPO	\$16 million	\$278 million
Current valuation	\$8 million*	\$1.5 billion*

*at Sept. 2013, down 30% from peak

Summary

- Assembled and validated a world-class peptide drug discovery platform
- Patent protection on worlds largest source of naturally structured peptides and related screening technologies – priority to 2027
- Successfully validated ‘Alliance Model’ with four top 10 Pharma in < 4 years which has generated > \$5.8M in committed revenue, plus milestones & royalties
- Anticipate near-term revenue growth and cash sustainability
- Building value through technical enhancements and in-house discovery programs
- Peer comparison provides first time indication of potential value

Dr. Richard Hopkins
Chief Executive Officer
Tel: +61 8 9489 7777
Fax: +61 8 9489 7700
Mobile: +61 405 656 868
richardh@phylogica.com

Contact Details

Dr. Paul Watt
Chief Scientific Officer
Tel: +61 8 9489 7777
Fax: +61 8 9489 7700
Mobile: +61 421 550 213
paulw@phylogica.com



www.phylogica.com