JEFFERIES CONFERENCE

JUNE 1, 2021

Nasdaq: LGND

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ABOUT LIGAND

Medical research and technology company discovering medicines, improving safety and reducing manufacturing costs

PEOPLE & INNOVATION

Robust platform of discovery tools and technologies needed to solve industry challenges

TECHNOLOGY

Superior support and engagement with pharmaceutical partners for a wide range of medical and health needs

PARTNERS

High growth and strong cash flow driven by diverse and growing portfolio of partnerships

FINANCIALS

LIGAND ADDS VALUE . . .

. . . JUST ASK OUR MORE THAN 130 PARTNERS

Our research and technology help partners…

Discover medicines

Improve safety

Reduce costs

Ligand's technology and R&D support entitles us to **share in revenue of partners through royalties**

LIGAND'S TECHNOLOGIES

OUR PROPRIETARY PLATFORMS DRIVE VALUE FOR WORLD-CLASS PARTNERS THROUGHOUT THE DISCOVERY AND DEVELOPMENT PROCESS

OmniAb®

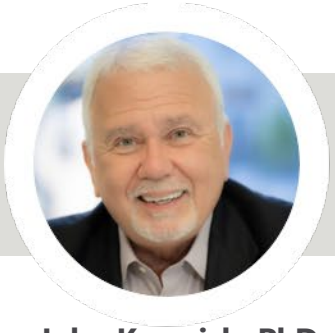
PELICAN™
P. fluorescens expression technology

ICAGEN™
ION CHANNEL TECHNOLOGY

CAPTISOL®

Discovery	*Development*	*Manufacturing*	*Commercialization*
			Ligand Partners Manage All Elements of Commercializing

LIGAND INDEPENDENT DIRECTORS



John Kozarich, PhD
Chairman

Merck Research Executive
CEO, ActivX Biosciences
Alkermes, Chemistry Professor

John LaMattina, PhD

Former President of Research, Pfizer, Inc.
Biotech Advisor and Board Member

Sunil Patel

Public & Private Biotech Executive
Past companies include: Abgenix, Gilead, BiPar and OncoMed
Protein/mAb Researcher

Sarah Boyce

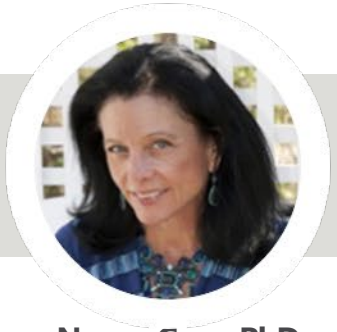
CEO, Avidity Biosciences
Past companies include: Akcea Therapeutics, Ionis Pharmaceuticals, Forest Labs

Jason Aryeh

Life-Sciences Fund Manager
Biotech Advisor and Board Member

Todd Davis

Biotech / Restructuring CEO, Benuvia Therapeutics
Private Equity Executive
Biopharmaceutical Board Member



Nancy Gray, PhD

CEO, Gordon Research Conferences
Executive at American Chemical Society and Researcher at Exxon

Stephen Sabba, MD

Institutional Investor
BioTech Fund Manager
Gastroenterologist

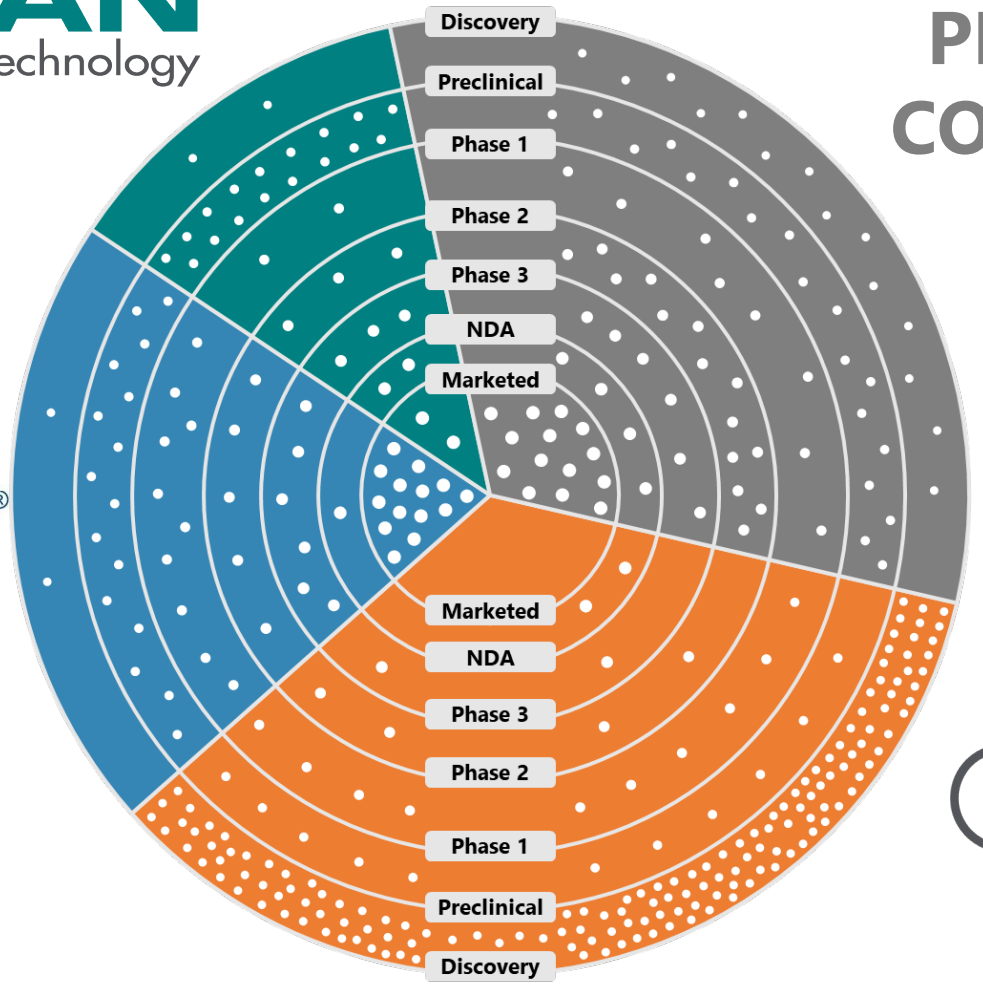
Ligand®

PARTNERED PIPELINE

BROAD PORTFOLIO WITH OVER 130 DIFFERENT PARTNERS

PELICAN™
P. fluorescens expression technology

CAPTISOL®



PROPRIETARY COMPOUNDS &

ICAGEN™
ION CHANNEL TECHNOLOGY

OmniAb®

WE EXPECT THE MOST SUBSTANTIAL CALENDAR OF LATE-STAGE EVENTS IN LIGAND'S HISTORY

Next Four Quarters of Potential Events

Approvals		NDA Submissions & Major Data	
Erwinia asparaginase Approval (US) Jazz Pharmaceuticals	**V114** Approval (US) MERCK	**Sparsentan** MAA Submission TRAVERE THERAPEUTICS	**Ensifentrine** Phase 3 data Verona Pharma
Zimberelimab Approval (China) 誉衡药业 GLORIA PHARMACEUTICALS	**Teriparatide** TE (US) Alvogen	**Pevonedistat** NDA Submission Takeda	**Sparsentan** Phase 3 data (IgAN) TRAVERE THERAPEUTICS
Sugemalimab Approval (China) 基石药业 CSTONE PHARMACEUTICALS	**Kyprolis** Approval (China) BeiGene AMGEN	**SB206** Phase 3 data NOVAN	**GEN1046** Phase 2 data Genmab

Based on clinicaltrials.gov or partner disclosures

PARTNERED PIPELINE SNAPSHOT

Partner	Program	Therapy Area	Technology	Preclinical	Phase 1	Phase 2	Phase 3	Marketed
AMGEN	Kyprolis®	Oncology	Captisol					
ACROTECH BIOPHARMA	EVOMELA®	Oncology	Captisol					
GILEAD	*Veklury®*	Infection	Captisol					
Alvogen	*Teriparatide*	*Osteoporosis*	Pelican					
SERUM INSTITUTE OF INDIA PVT. LTD.	Pneumosil	Infection	Pelican					
Multiple	***Multiple***	***Multiple***	***Multiple***	*Includes: ZULRESSO (Sage), MINNEBRO (Daiichi-Sankyo), NEXTERONE (Baxter), DUAVEE (Pfizer), Others*				
MERCK	V114	Infection	Pelican	*BLA accepted by US FDA*				
Jazz Pharmaceuticals	JZP-458	Oncology	Pelican	*BLA submission initiated*				
基石药业 CSTONE PHARMACEUTICALS	Sugemalimab	Oncology	OmniAb	*NMPA filed in China*				
TRAVERE THERAPEUTICS	Sparsentan	Kidney Disease	NCE					
ARCUS BIOSCIENCES	Zimberelimab	Oncology	OmniAb					
Takeda	Pevonedistat	Oncology	Captisol					
Verona Pharma	Ensifentrine	Respiratory	VDP					
Multiple	***Multiple***	***Multiple***	***Multiple***	*Pipeline includes 19 additional Phase 3 or Pivotal assets*				
誉衡药业 GLORIA PHARMACEUTICALS	Zimberelimab	Oncology	OmniAb	*NMPA filed in China*				
MARINUS PHARMACEUTICALS	Ganaxolone	CNS	Captisol					
Multiple	***Multiple***	***Multiple***	***Multiple***	*Pipeline includes 18 additional Phase 2 assets*				
VIKING THERAPEUTICS	VK2809	NASH	HepDirect					
Sermonix Pharmaceuticals	Lasofoxifene	Oncology	NCE					
Eisai	Parempanel	CNS	Captisol					
IMMUNOVANT	IMVT-1401	Autoimmune	OmniAb					
CORVUS PHARMACEUTICALS	Ciforadenant	Oncology	VDP					
Johnson & Johnson	Teclistamab	Oncology	OmniAb					
Genmab	GEN1046	Oncology	OmniAb					
AMGEN	AMG-330	Oncology	Captisol					
Multiple	Multiple	***Multiple***	***Multiple***	*28 additional Phase 1 assets*				

Partnered pipeline also includes >200 preclinical and discovery programs

Status of partnered programs from information released by our partners and from clinicaltrials.gov, VDP indicates Vernalis Design Platform

DISCOVERY & MANUFACTURING PLATFORMS

CUTTING-EDGE, ROYALTY-BEARING TECHNOLOGIES THAT MAKE MAJOR LIFE-SAVING GLOBAL DRUGS POSSIBLE

Antibody Discovery	*Ion Channel Discovery*	*Manufacturing/CMC*
OmniAb®	ICAGEN™ ION CHANNEL TECHNOLOGY	PELICAN™ *P. fluorescens* expression technology
Delivering fully human antibodies	***Deep biological expertise focused on ion channels and transporters***	***Making production possible***

Ligand's business model is based on providing drug discovery platforms, completing early-stage drug development and partnering

OmniAb®
TECHNOLOGY OVERVIEW

ANTIBODIES *AND INDUSTRY DEMAND*

HIGHER SUCCESS RATES FOR ANTIBODY MEDICINES DRIVE OUR INDUSTRY'S NEED FOR DISCOVERY TECHNOLOGY

Increasing Antibody Market

>$250 Billion Total Addressable Market for Antibodies by 2025

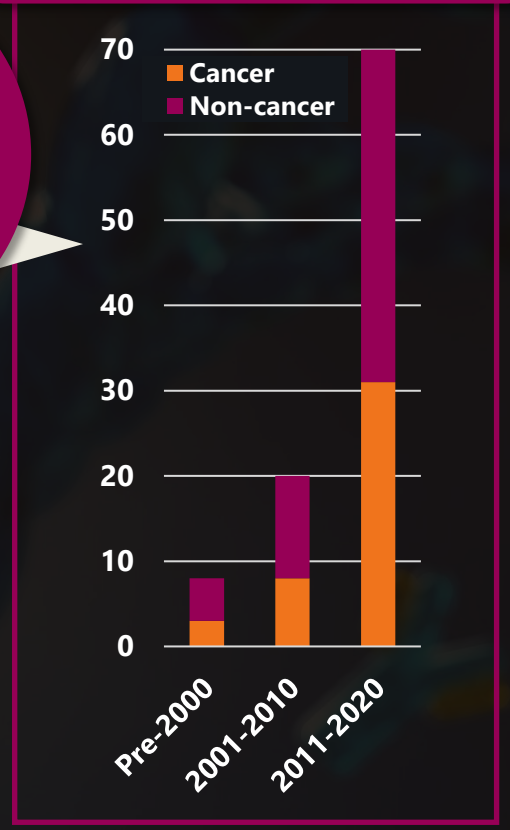
Higher Success Rates

Type of Drug	***Likelihood of Approval at Phase 1 Stage***
Small molecules	6.2%
Biologics/Antibodies	**11.5%**

Historical success rates for antibody classes is **nearly twice the rate** of small molecules

Acceleration of Regulatory Approvals

Substantial growth in number of new antibody therapeutics



Clinical Development success rates 2006-2019 (Bio, Biomedtracker and Amplion)
Tables of approved mAbs and antibodies in review available at https://www.antibodysociety.org/resources/approved-antibodies/

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OMNIAB *OUR PHILOSOPHY AND APPROACH*

LEVERAGING OUR TECH STACK TO SERVE A FAST-GROWING AND CRITICALLY IMPORTANT INDUSTRY

We apply proprietary, AI-powered antigen generation techniques to highly-optimized next-generation transgenic animals.

We then tap into the unparalleled powers of **biological intelligence™** and *in vivo* maturation to generate massive numbers of target-specific antibodies.

Those antibodies are efficiently mined with validated state-of-the-art high-throughput screening technologies designed to deliver highest quality therapeutic candidates for a wide range of human diseases.

THE OMNIAB TECH STACK

AbInitio Antigen

OmniRat®, OmniMouse® and OmniChicken®

OmniFlic® and OmniClic™

OmniTaur™

xPloration® and GEM

Discovery and Antibody Optimization algorithm technologies and services

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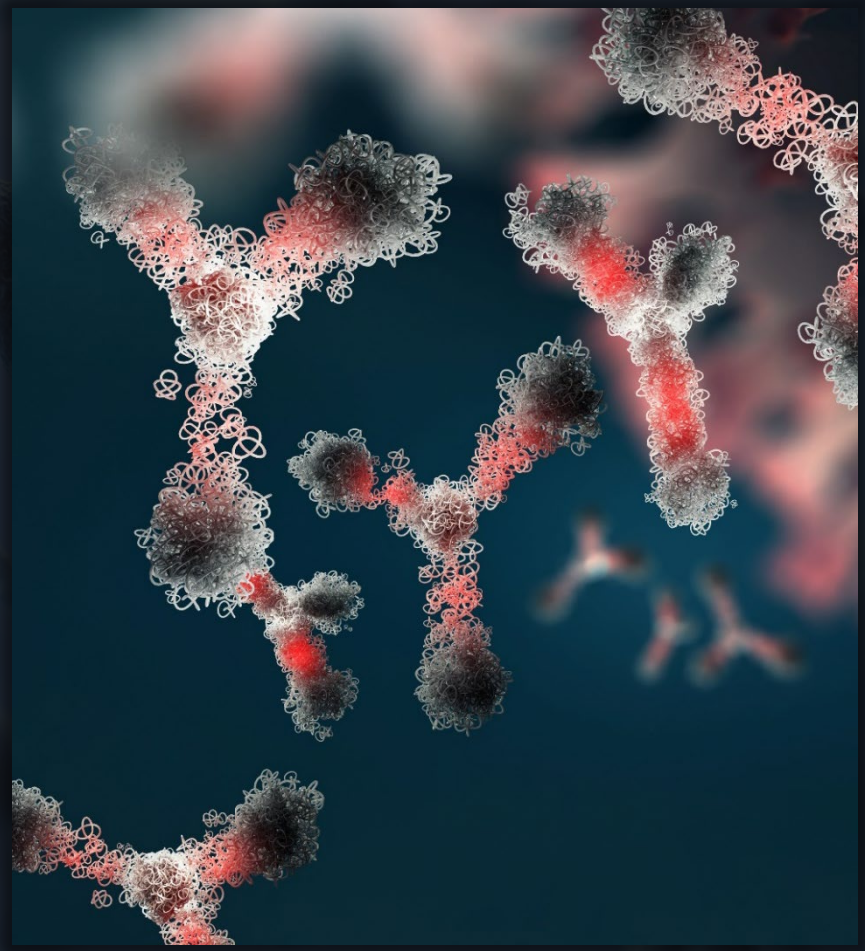
Validated platform: 17 OmniAb antibodies are in clinical development (with 2 awaiting approval)

OmniAb partners enjoy evergreen access to the **most comprehensive and cutting-edge** stack of antibody discovery technologies available

OmniAb®

We believe screening the best and broadest antibody repertoires available with the most cutting-edge and highest-throughput validated screening technologies available **will deliver high quality drug candidates** for a wide range of programs…



SELECT OMNIAB PARTNERS

50 COMPANIES CURRENTLY HAVE ACCESS TO OMNIAB ANTIBODIES

MERCK

Genmab

janssen

AMGEN

Pfizer

SANOFI

symphogen
a Servier Company

Boehringer Ingelheim

基石药业
CSTONE
PHARMACEUTICALS

WuXi Biologics
Global Solution Provider

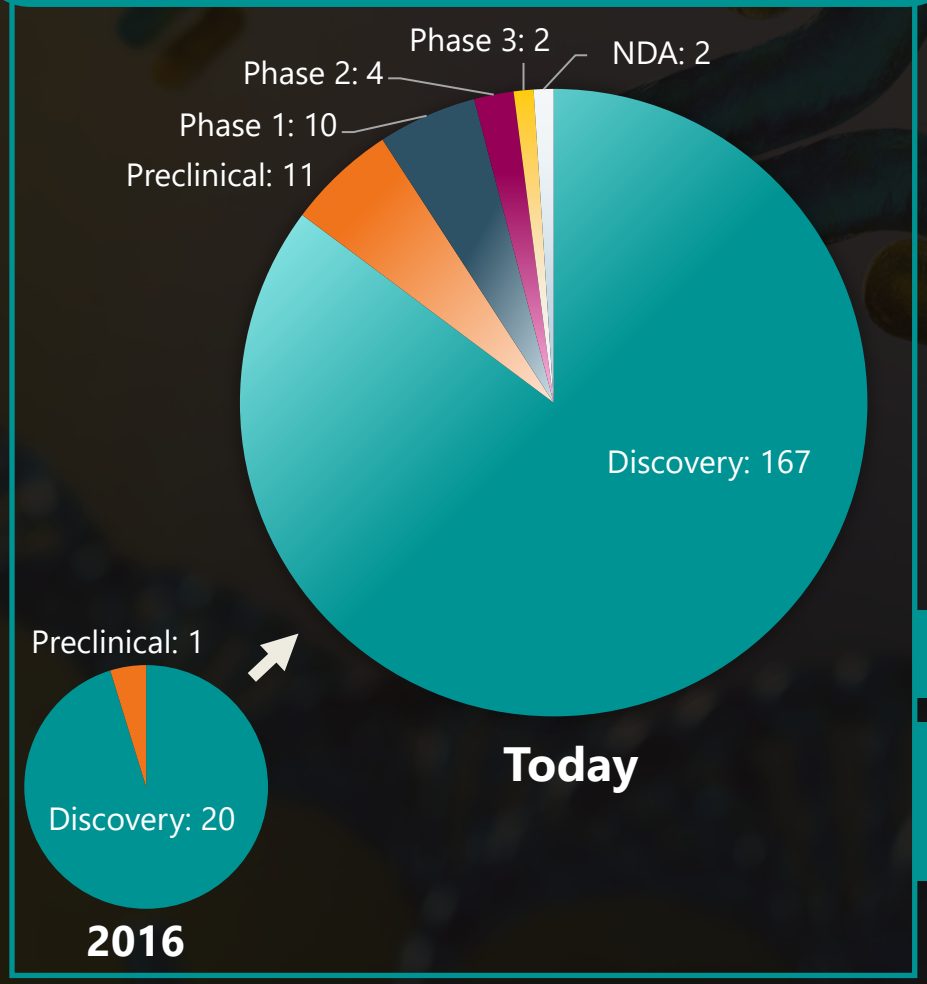
誉衡药业
GLORIA
PHARMACEUTICALS

Takeda

OMNIAB *PARTNER PROGRAMS*

PROGRESSION AND PERFORMANCE

Programs by Stage of Development

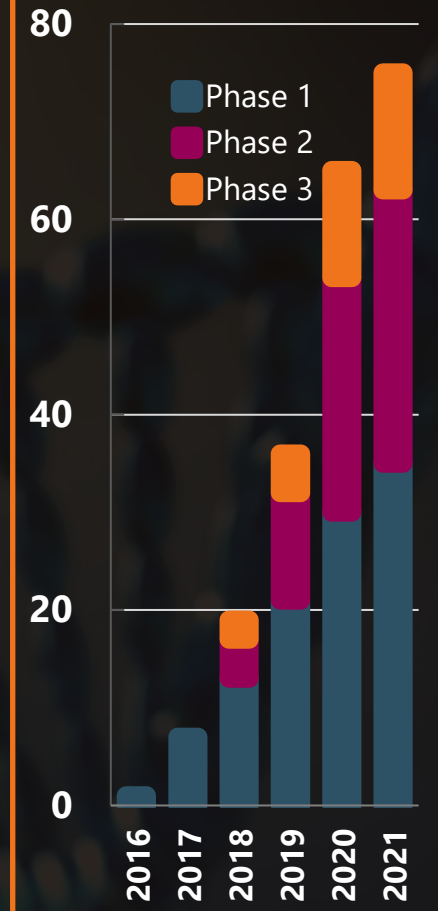


>14,000 clinical patients have been or are planned to be treated with OmniAb antibodies

Substantial growth in all phases

Increases in Discovery poised to **rapidly feed growth** in new clinical programs and future approvals

Total Clinical Trial Starts



Upcoming new clinical starts

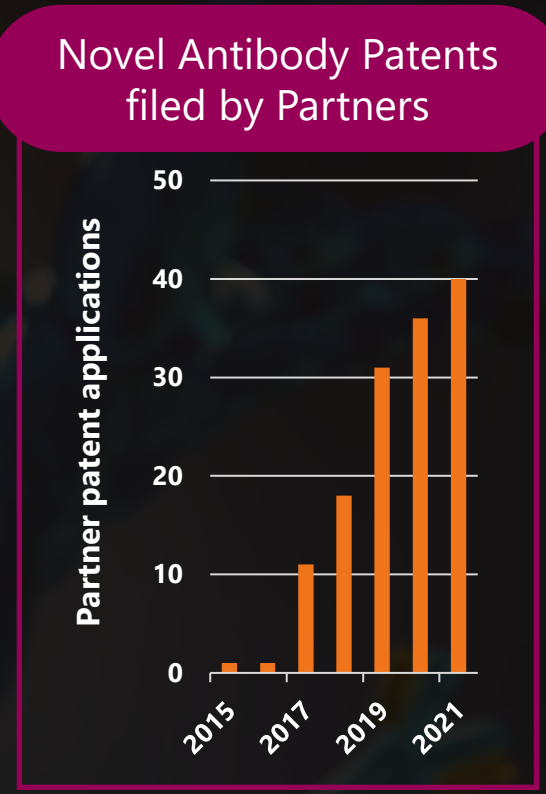
OmniAb

OMNIAB *PERFORMANCE AND IP*

PARTNERS FILING PATENTS ON OMNIAB ANTIBODIES CREATE DURABLE ROYALTY STREAMS AND A POTENTIALLY LENGTHY INTELLECTUAL PROPERTY TAIL

- We maintain a broad intellectual property estate with multiple long duration patent families covering each major element of our tech stack

- Licenses are structured so that royalties are linked to the patents for the antibodies discovered with OmniAb, thereby creating a potentially **lengthy coverage "tail"**



Now approaching **40 patent filings by our partners** claiming an OmniAb-derived antibody as primary invention, with expiries up to 2040

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OMNIAB *PARTNER PROGRAMS*

LATE-STAGE PIPELINE POISED FOR GROWTH AND TWO APPROVALS IN 2021

Partner	Program	Therapy Area	*Preclinical*	*Phase 1*	*Phase 2*	*Phase 3*	*BLA*	*Marketed*
基石药业 CSTONE PHARMACEUTICALS / Pfizer	Sugemalimab	*Oncology*	*NMPA filed for NSCLC, approval expected in '21*					
誉衡药业 GLORIA PHARMACEUTICALS	Zimberelimab	*Oncology*	*NMPA filed for R/R classical Hodgkin's lymphoma, approval expected in '21*					
HANALL BIOPHARMA / HARBOUR BIOMED	Batoclimab	*Autoimmune*	*Phase 2/3 completion in ITP Q3 '21*					
ARCUS BIOSCIENCES / GILEAD	Zimberelimab	*Oncology*	*Interim Phase 2 completion Q2' 21*					
HANALL BIOPHARMA / IMMUNOVANT	Batoclimab	*Autoimmune*	*ASCEND-MG completed with positive data. Restart of ASCEND-GO2 and ASCEND-WAIHA in '21*					
janssen	Teclistamab	*Oncology*	*Phase 2 data expected in '22*					
Genmab	GEN1046	*Oncology*	*Data expected Q4 '21*					
MERCK	M6233	*Oncology*	*In combo with bintrafusp-alfa in solid tumors*					
Aptevo Therapeutics	APVO436	*Oncology*	*Data expected in '22*					
Multiple	Multiple	*Multiple*	*8 additional Phase 1*					
Multiple	Multiple	*Multiple*	*>160 additional Preclinical & Discovery*					

17 Clinical-Stage OmniAb Antibodies

Status of partnered programs from information released by our partners and from clinicaltrials.gov, 17 clinical-stage antibodies include two with fully paid licenses from Genentech/Roche and TeneoBio

OmniAb

OMNIAB PERFORMANCE

CLINICAL SUCCESSES BY OUR PARTNERS

Major commercial deals centered on OmniAb antibodies, first two approvals expected in 2021

Sugemalimab

- mAb targeting PD-L1 discovered using OmniAb
- NDA is under review by the China NMPA for Stage IV squamous/non-squamous NSCLC; expect approval in 2H 2021
- Breakthrough Therapy Designation (BTD) granted in China and the US for the treatment of relapsed or refractory extranodal natural killer/T-cell lymphoma (R/R ENKTL)
- CStone and Pfizer established a strategic collaboration for the development and commercialization of sugemalimab in China

Zimberelimab

- mAb targeting PD-1 discovered using OmniAb
- Gloria filed with the China NMPA for recurrent/ refractory classical Hodgkin's lymphoma; approval anticipated 1H 2021
- Arcus conducting pivotal Phase 3 study in 1st-line NSCLC in combo with an anti-TIGIT mAb; Phase 1 & 2 studies underway in NSCLC, prostate, colorectal and pancreatic cancer
- Arcus and Gilead formed 10-year partnership to develop and commercialize Arcus' product candidates including zimberelimab in US

THE POWER OF OMNIAB *PARTNER CASE STUDIES*

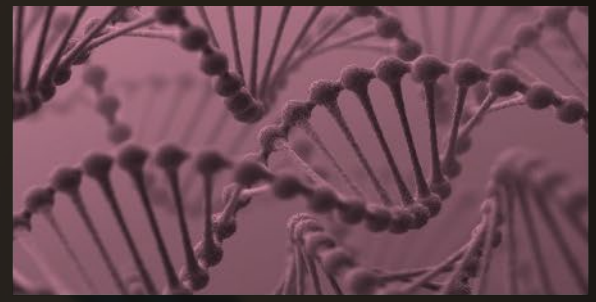
Partner A
Emerging Biotech

- **Novel multi-transmembrane target** for triple negative breast cancer
- All previously-known antibodies to target could only bind to denatured or fixed form, **therefore unsuitable for therapeutic use**
- **Our antigen tech** was applied to deliver mg-scale quantities of purified receptor **in native conformation** for immunization and screening
- **OmniChicken immunization then led to discovery of a large and diverse panel of fully-human antibodies** capable of binding target on live tissues

Partner B
Big Pharma

- Growth factor target, **highly conserved among mammals**
- Human version of target non-immunogenic in other rodents; **no titer achieved despite numerous immunization attempts at partner**
- Genetic knockout of target gene attempted in mice **but was lethal**
- **OmniChicken** immunization led to robust titers and diverse fully-human antibody panels
- **>90% of sequences recovered had excellent developability profiles** based on multi-parameter *in-silico* analysis

Partner C
Established Biotech



- Partner has history of success in *first-in-class* and *best-in-class* antibodies, **with large discovery group and expanding novel biology**
- Need flexible fully-human antibody discovery toolbox to **start dozens of new programs every year**
- Deep collaboration including parallel pilot testing of **next-gen rodents on active novel programs**
- Clinical candidates identified with Phase 1 and 2 data readouts in next 18 months, and **multiple candidates to enter clinical development in the coming years**

Partner D
Global Pharma

- Asia-based **global pharma player**
- **Establishing new and substantial presence in antibody space** with large investment and expansion of global antibody team
- **Selected OmniAb as core technology** to feed robust discovery and development efforts
- Developed three-way collaboration with **deep repertoire analysis to rapidly identify best binders** for bispecific antibodies

OmniAb®

OMNIAB *HISTORY*

12 YEARS OF INVESTMENT BUILT *BEST-IN-CLASS* PLATFORM

Significant Internal Investment and R&D

- *Next generation animals (Bispecifics, HCO, etc.)*
- *Expanded state-of-the art labs and added capacity*
- *Bioinformatics capabilities powered by AI*
- *Characterization and optimization team*
- *Comprehensive network of partners for characterization, bioinformatics, cell line development, and GMP manufacturing*

Strategically built tech stack to optimally harness the unparalleled power of *BIOLOGICAL INTELLIGENCE*™

OmniAb®

THE OMNIAB OFFERING CONTINUUM

OUR *BEST-IN-CLASS* TECH STACK AND CAPABILITIES

Antigen Design | ***Antibody Generation*** | ***Deep Screening*** | ***Discovery*** | ***Optimization***

Technology offering addresses critical industry needs and is paired with our highly specialized and efficient operation

We leverage our proprietary and differentiated technologies rather than commoditized industry services that are widely available from CROs or built into big pharma

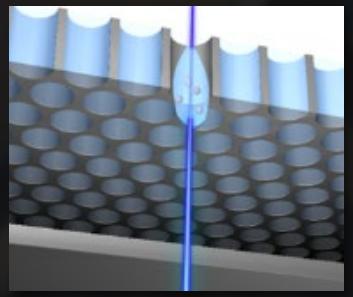
THE OMNIAB OFFERING CONTINUUM

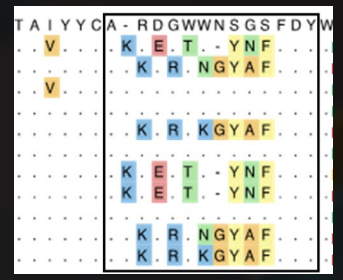
OUR *BEST-IN-CLASS* TECH STACK AND CAPABILITIES

Our capabilities, investment and innovation position OmniAb for near and long-term success

Antigen Design	***Antibody Generation***	***Deep Screening***	***Discovery***	***Optimization***
AI-powered antigen design for challenging therapeutic targets	World-class transgenic animals **for fast discovery** of naturally-optimized human antibodies in multiple modalities	Ultra-high resolution, high-speed **automated antibody selection**	Rapid expression and specificity, epitope and affinity determination	Next generation sequencing analysis and bioinformatics to further improve and de-risk leads

OmniRat OmniMouse OmniChicken OmniFlic OmniClic OmniTaur





OmniAb

THE OMNIAB OFFERING CONTINUUM

OUR *BEST-IN-CLASS* TECH STACK AND CAPABILITIES

AI-POWERED ANTIGEN DESIGN FOR CHALLENGING THERAPEUTIC TARGETS

Antigen Design	*Antibody Generation*	*Deep Screening*	*Discovery*	*Optimization*

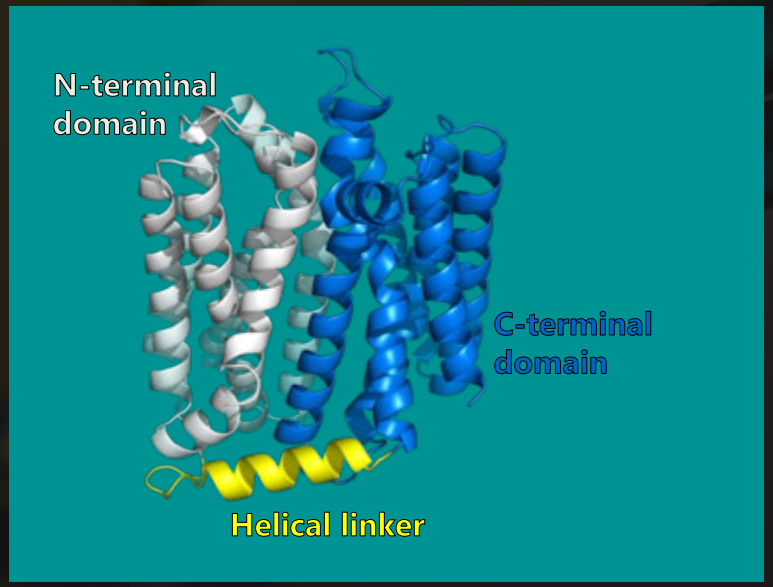
The first step in antibody generation can define success or failure

Our antigen technology has shown success with high-value and difficult targets

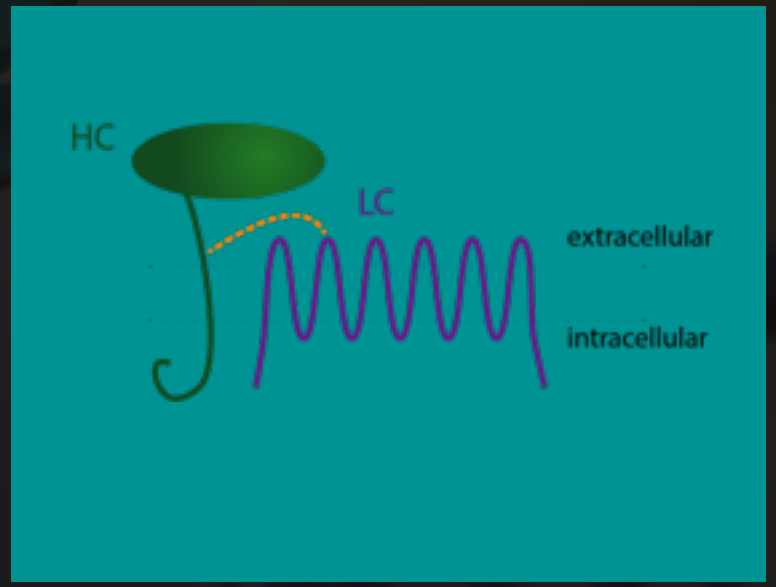
OmniAb®

EXAMPLES *ANTIGEN PROGRAMS*

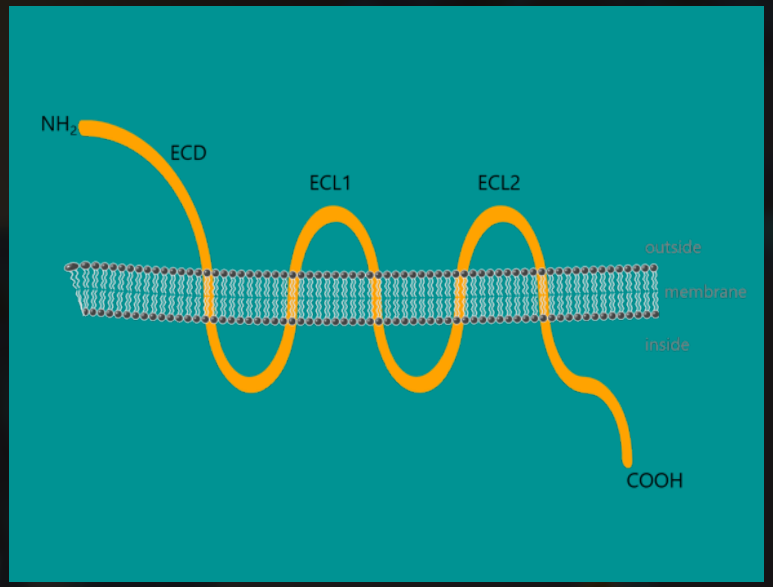
12-transmembrane transporter



Heterodimeric amino acid transporter



5-transmembrane span protein



Multiple complex and high-value targets successfully "solved" by our technology

THE OMNIAB OFFERING CONTINUUM

OUR *BEST-IN-CLASS* TECH STACK AND CAPABILITIES

Antigen Design | ***Antibody Generation*** | ***Deep Screening*** | ***Discovery*** | ***Optimization***

Industry's only platform that leverages **four species**

Validated with 17 antibodies now in clinical development, and **with two at NDA stage**

THE OMNIAB OFFERING CONTINUUM

BUILT WITH INNOVATION, TECHNOLOGY INVESTMENT AND EXPANSION

Bispecific platforms ▸

Ultralong CDR-H3 humanized binding domains ▸

The only **four species platform**

Industry-leading **broadest transgenic animal offering**

Bispecific and cow-inspired technologies

We leverage a heritage of **unparalleled genetic engineering capabilities**

THE OMNIAB OFFERING CONTINUUM

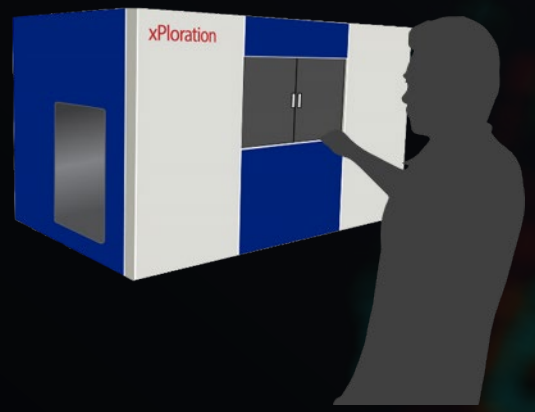
OUR *BEST-IN-CLASS* TECH STACK AND CAPABILITIES

Antigen Design | ***Antibody Generation*** | ***Deep Screening*** | ***Discovery*** | ***Optimization***

Deep screening capability in-house and poised to rapidly expand

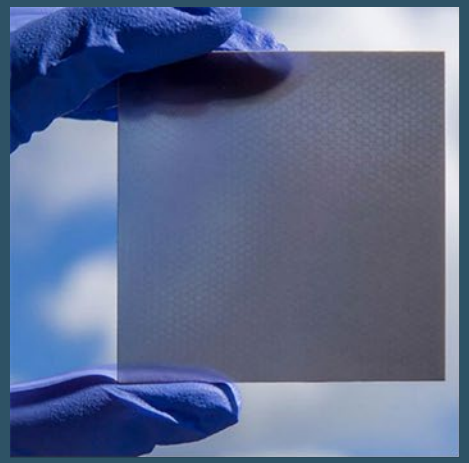
XPLORATION®

TECHNOLOGY EMPOWERING ANTIBODY DISCOVERY EFFORTS

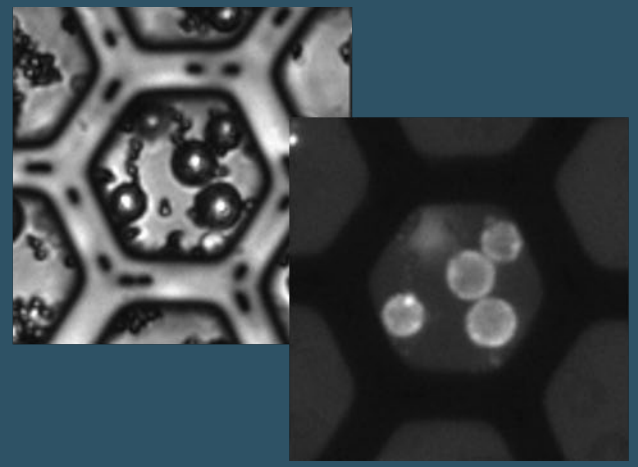


Core Components

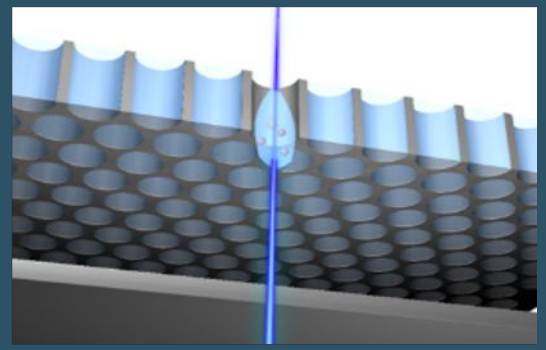
Image millions of cells



Diverse and flexible assays



Rapidly recover 1000's of antibody sequences



- xPloration provides deep searches into immune repertoires to identify unique antibodies with special properties **in hours**
- Through-hole format enables examination of millions of antibody secreting cells
- Proprietary laser recovery method recovers thousands of sequences **in minutes**

OmniAb®

THE OMNIAB OFFERING CONTINUUM

OUR *BEST-IN-CLASS* TECH STACK AND CAPABILITIES

Antigen Design | ***Antibody Generation*** | ***Deep Screening*** | ***Discovery*** | ***Optimization***

OUR PROJECT TEAMS WORK CLOSELY WITH PARTNERS TO CUSTOMIZE AND OPTIMIZE THE DISCOVERY PROCESS FOR EACH CAMPAIGN

Established track-record of delivery of panels of recombinant antibodies to partners

Offer a full antibody discovery services menu to partners that leverage our technologies

THE OMNIAB OFFERING CONTINUUM

OUR *BEST-IN-CLASS* TECH STACK AND CAPABILITIES

Antigen Design | ***Antibody Generation*** | ***Deep Screening*** | ***Discovery*** | ***Optimization***

Newest capability leveraging next generation sequencing and computer modeling algorithms to optimize antibodies of interest

Identify clonal variants *in silico* that improve potency and/or developability

PELICAN™
P. fluorescens expression technology

PELICAN EXPRESSION TECHNOLOGY

Overview

SOLVING OUR INDUSTRY'S PROTEIN PRODUCTION CHALLENGES

Our Pelican Expression Technology™ Platform uniquely enables complex protein drug production with quality and efficiency

PELICAN™
P. fluorescens expression technology

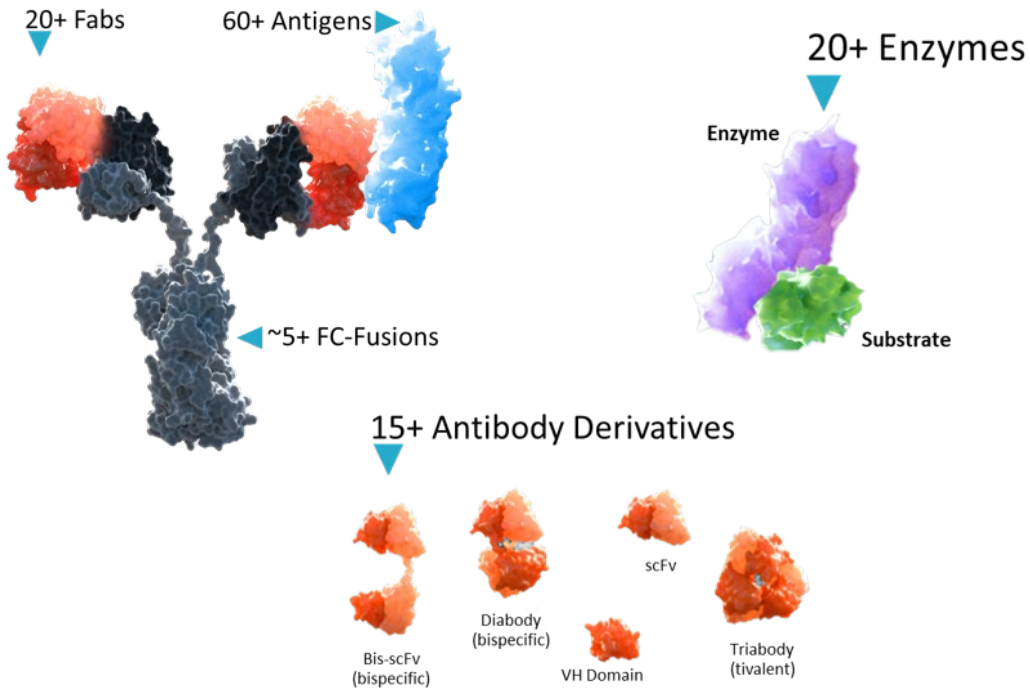
- Global therapeutic protein market estimated at **$100B+** and growing
- Clinical and commercial success achieved with protein therapeutics is **increasing demand for technologies** that deliver competitively positioned products with desired properties
- Protein therapeutics are often of a physical size that is orders of magnitude larger than small-molecule drugs and exhibit **complex secondary, tertiary and quaternary structures that must be maintained in production**

A UNIQUE VALUE-DRIVING PLATFORM

- Industrial legacy from Mycogen Corp, Dow Chemical and Pfenex
- Platform delivers **significant competitive advantages to our partners**, including:
  - ✓ Speed to identifying production strain
  - ✓ Success rates resulting in minimization of time/cost of development
  - ✓ Efficient production
  - ✓ Decreased long-term cost-of-goods
- Significant institutional knowledge of protein production developed over **three decades**

PELICAN™
P. fluorescens expression technology

Pelican Expression Platform™ has given rise to approved products and has maintained a **success rate of over 80%** in expressing a variety of "lead" protein candidates

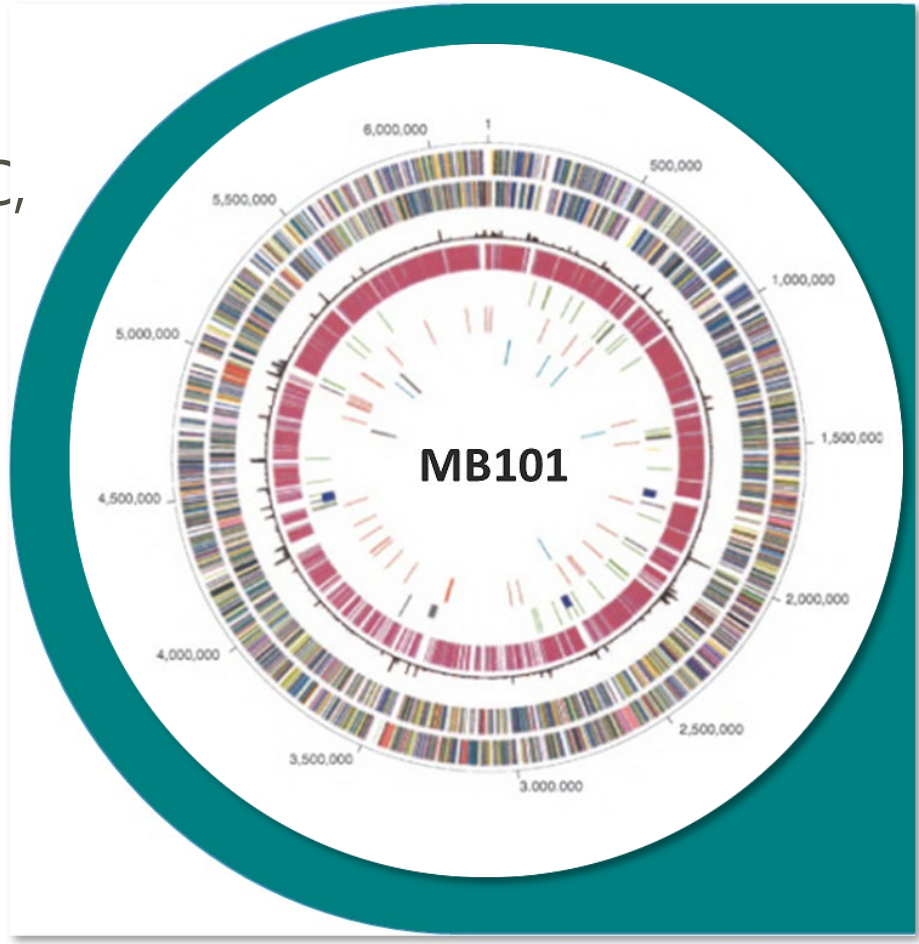


Ligand®

PELICAN: THE INDUSTRY'S DEEPEST PROKARYOTIC PROTEIN PRODUCTION PLATFORM

P. fluorescens: A GRAM-NEGATIVE, NON-PATHOGENIC, METABOLICALLY VERSATILE ORGANISM

- Genomic, RNAseq, and proteomics data leveraged to engineer host strains and design expression plasmids
- Animal origin-free and used with antibiotic-free processes
- High-throughput growth and test methods
- Rapid, effective, fermentation and purification development/scale-up expedite program timelines



Clinically and **recently commercially validated** with approved therapeutics and vaccines

PELICAN EXPRESSION TECHNOLOGY PLATFORM

INTELLECTUAL PROPERTY

Platform supported by **27 issued U.S. patents**

Substantial know-how also supports the platform

Protein Expression & Recovery

3 Patent Families (last expiry 2030)

Tools for Protein Expression

6 Patent Families (last expiry 2036)

High-Throughput Screening Methods

2 Patent Families (last expiry 2029)

Product-Specific Processes

8 Patent Families (last expiry 2038)

PELICAN EXPRESSION TECHNOLOGY PARTNERS

HIGHLIGHTING THE CRM197 OPPORTUNITY

CRM197 is a non-toxic mutant of diphtheria toxin, used as a carrier protein in vaccines

MERCK

Platform rights to use CRM197 in up to 4 vaccine products

- **V114**
  - Next-generation pneumococcal vaccine containing 15 serotypes, 2 more than Pfizer's Prevnar13®
  - Commercial license exclusive to a production strain capable of producing CRM197 carrier protein
  - If approved, to compete with Prevnar13, 2019 worldwide sales of $5.8B
  - BLA filed, PDUFA in July

SERUM INSTITUTE OF INDIA PVT. LTD.

Commercial license exclusive to a production strain for CRM197 for use in any SII products

- **Pneumosil®**
  - Pneumosil is a 10-valent pneumococcal vaccine developed for middle-income countries and developing world
  - Pneumosil launched, first UNICEF tender in June 2020; India Marketing Authorization received; royalty flow beginning
  - Phase 3 trial for Pentavalent Meningococcal conjugate vaccine ongoing

PELICAN EXPRESSION TECHNOLOGY PLATFORM

COMPETITIVE ADVANTAGE

Pelican Expression Technology Platform Has a Legacy of Success and Value Creation

- Platform has long history of successful production strain identification with unprecedented speed, while maintaining a success rate of >80% with complex proteins

Technology Platform Benefits

- Toolbox diversity and automation enables rapid and broad exploration of expression strategies, enabling success with even the most challenging and complex proteins
- Speed and success rate have direct impact on development cost and time
- Significant reduction of long-term cost-of-goods
- Platform has enabled integration and improved productivity of several modifications via genetic manipulation (e.g., site-specific pegylation (Ambrx), pasylation (XL-protein), fusions (teriparatide))
- Track record of successful expression of novel modalities positions the platform to potentially enable *state-of-the-art* drugs relevant to the industry today and in the future

JEFFERIES CONFERENCE

JUNE 1, 2021

Nasdaq: LGND