UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

☐ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the Fiscal Year Ended December 31, 2020

OR

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from to .

Commission File No. 001-33093

LIGAND PHARMACEUTICALS INCORPORATED

(Exact name of registrant as specified in its charter)

Delaware	**77-0160744**
(State or other jurisdiction of incorporation or organization)	**(IRS Employer Identification No.)**
3911 Sorrento Valley Boulevard, Suite 110	
San Diego	
CA	**92121**
(Address of Principal Executive Offices)	**(Zip Code)**

Registrant's telephone number, including area code: (858) 550-7500

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Trading Symbol	Name of Each Exchange on Which Registered
Common Stock, par value $.001 per share	**LGND**	**The Nasdaq Global Market**

Securities registered pursuant to Section 12(g) of the Act:
None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934. Yes ☐ No ☒
Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐
Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐
Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definition of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large Accelerated Filer ☒ Accelerated Filer ☐ Non-accelerated Filer ☐ Smaller reporting company ☐ Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

Indicate by check mark whether the registrant is a shell company (as defined in Exchange Act Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

The aggregate market value of the Registrant's voting and non-voting stock held by non-affiliates was approximately $ 1.2 billion based on the last sales price of the Registrant's Common Stock on the Nasdaq Global Market of the Nasdaq Stock Market LLC on June 30, 2020. For purposes of this calculation, shares of Common Stock held by directors, officers and 10% stockholders known to the Registrant have been deemed to be owned by affiliates which should not be construed to indicate that any such person possesses the power, direct or indirect, to direct or cause the direction of the management or policies of the Registrant or that such person is controlled by or under common control with the Registrant.

As of February 18, 2021, the Registrant had 16,612,422 shares of Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for the Registrant's 2021 Annual Meeting of Stockholders to be filed with the Commission within 120 days of December 31, 2020 are incorporated by reference in Part III of this Annual Report on Form 10-K. With the exception of those portions that are specifically incorporated by reference in this Annual Report on Form 10-K, such Proxy Statement shall not be deemed filed as part of this Report or incorporated by reference herein.

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GLOSSARY OF TERMS AND ABBREVIATIONS

Abbreviation	Definition
2019 Notes	$245.0 million aggregate principal amount of convertible senior unsecured notes due 2019
2023 Notes	$750.0 million aggregate principal amount of convertible senior unsecured notes due 2023
AAALAC	Accreditation of Laboratory Animal Care International
Ab Initio	Ab Initio Biotherapeutics, Inc.
Abvivo	Abvivo, LLC
ACOVA	ACOVA, Inc.
ADHF	Acute decompensated heart failure
Aldeyra	Aldeyra Therapeutics, Inc.
Amended Interest Purchase Agreement	Amended and Restated Interest Purchase Agreement, dated May 31, 2017, between the Company and CorMatrix Cardiovascular, Inc.
Amgen	Amgen, Inc.
ANDA	Abbreviated New Drug Application
API	Active pharmaceutical ingredient
Aptevo	Aptevo Therapeutics
Arcus	Arcus Biosciences, Inc.
ASC	Accounting Standards Codification
ASCO	American Society of Clinical Oncology
ASCT	Autologous Stem Cell Transplantation
ASU	Accounting Standards Update
Aurobindo	Aurobindo Pharma Ltd
Aziyo	Aziyo Med, LLC
Baxter	Baxter International, Inc.
BeiGene	BeiGene Switzerland GmbH
BendaRx	BendaRx Corp.
Bexson Biomedical	Bexson Biomedical, Inc.
BLA	Biologics license application
CStone	CStone Pharmaceuticals (Suzhou) Co., Ltd.
CASI	CASI Pharmaceuticals, Inc.
Cardioxyl	Cardioxyl Pharmaceuticals, Inc.
CI-AKI	Contrast-induced acute kidney injury
Code of Conduct	Code of Conduct and Ethics Policy
Coherus	Coherus Biosciences, Inc.
CoM	Composition of Matter
Company	Ligand Pharmaceuticals Incorporated, including subsidiaries
Convertible Note	Senior Convertible Promissory Note
COPD	Chronic obstructive pulmonary disease
Cormatrix	Cormatrix Cardiovascular, Inc.
Cormatrix Asset Sale	Asset sale from CorMatrix to Aziyo
Corvus	Corvus Pharmaceuticals, Inc.
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CRO	Contract Research Organization
Crystal	Crystal Bioscience, Inc.
Cumulus	Cumulus Oncology, Ltd.
CVR	Contingent value right

CyDex	CyDex Pharmaceuticals, Inc.
Daiichi Sankyo	Daiichi Sankyo Company, Ltd.
Dianomi	Dianomi Therapeutics, Inc.
DMF	Drug Master File
ESG	Environmental, Social and Governance
Eisai	Eisai Inc.
Eli Lilly	Eli Lilly and Company
ECM	Extracellular matrix
EPA	Environmental Protection Agency
ESPP	Employee Stock Purchase Plan, as amended and restated
EU	European Union
Exelixis	Exelixis, Inc.
FASB	Financial Accounting Standards Board
FDA	Food and Drug Administration
FSGS	Focal segmental glomerulosclerosis
GAAP	Generally accepted accounting principles in the United States
GBM	Glioblastoma
Genagon	Genagon Therapeutics AB
GCSF	Granulocyte-colony stimulating factor
GigaGen	GigaGen, Inc.
Gilead	Gilead Sciences, Inc.
GPCR	G-protein coupled receptor
GRA	Glucagon receptor antagonist
HanAll	HanAll Biopharma Co., Ltd.
Harbour	Harbour BioMed Shanghai Co., Ltd.
HBV	Hepatitis B Virus
HCC	Hepatocellular Carcinoma
Hikma	Hikma Pharmaceuticals PLC
HNO	Nitroxyl
Hovione	Hovione FarmCiencia, S.A.
Icagen	Icagen, Inc.
IPR&D	In-Process Research and Development
IRAK4	Interleukin-1 Receptor Associated Kinase-4
IRS	Internal Revenue Service
IV	Intravenous
iMBP	iMetabolic Biopharma Corporation
Immunovant	Immunovant Sciences GmbH
IND	Investigational New Drug
Kira Pharma	Kira Pharmaceuticals Ltd.
KSQ Therapeutics	KSQ Therapeutics, Inc.
Ligand	Ligand Pharmaceuticals Incorporated, including subsidiaries
LTP	Liver targeting prodrug
Lundbeck	Lundbeck A/S
Marinus	Marinus Pharmaceuticals, Inc.
MCM	Mineral Coated Microparticle
Melinta	Melinta Therapeutics, Inc.
Merck	Merck & Co., Inc.

Merrimack	Merrimack Pharmaceuticals, Inc.
Metabasis	Metabasis Therapeutics, Inc.
Metavant	Metavant Sciences Ltd.
Millennium	Millennium Pharmaceuticals, Inc.
MLA	Master License Agreement
MRSA	Methicillin-resistant Staphylococcus aureu
NASH	Non-alcoholic steatohepatitis
NDA	New Drug Application
NOLs	Net Operating Losses
Novan	Novan, Inc.
Novartis	Novartis AG
Nucorion	Nucorion Pharmaceuticals, Inc.
OMT	Open Monoclonal Technology, Inc.
Ono	Ono Pharmaceutical Co., Ltd.
Opthea	Opthea Limited
Orange Book	Publication identifying drug products approved by the FDA based on safety and effectiveness
Original Interest Purchase Agreement	Interest Purchase Agreement, dated May 3, 2016, between the Company and CorMatrix Cardiovascular, Inc.
Palvella	Palvella Therapeutics, Inc.
Par	Par Pharmaceutical, Inc.
Pfenex	Pfenex Inc.
Pfizer	Pfizer, Inc.
PFS	Progression-free Survival
Pharmacopeia	Pharmacopeia, Inc.
Phoenix Tissue	Phoenix Tissue Repair
PhoreMost	PhoreMost Limited
PPD	Post-Partum Depression
PSU	Performance stock unit
R&D	Research and Development
Roivant	Roivant Sciences GMBH
RSU	Restricted stock unit
SAGE	Sage Therapeutics, Inc.
SARM	Selective Androgen Receptor Modulator
SEC	Securities and Exchange Commission
Sedor	Sedor Pharmaceuticals, Inc., or RODES, Inc.
Seelos	Seelos Therapeutics, Inc.
Selexis	Selexis, SA
Sermonix	Sermonix Pharmaceuticals, LLC
SII	Serum Institute of India
Spectrum	Spectrum Pharmaceuticals, Inc.
SQ Innovation	SQ Innovation, Inc.
Sunshine Lake Pharma	Sunshine Lake Pharma Co., Ltd.
Takeda	Takeda Pharmaceuticals Company Limited
Talem	Talem Therapeutics LLC
Taurus	Taurus Biosciences LLC
Tax Act	The Tax Cuts and Jobs Act
Teva	Teva Pharmaceuticals USA, Inc., Teva Pharmaceutical Industries Ltd. and Actavis, LLC

TG Therapeutics	TG Therapeutics, Inc.
Travere	Travere Inc.
TR-Beta	Thyroid hormone receptor beta
Valanbio	Valanbio Therapeutics, Inc.
VDP	Vernalis Design Platform
VentiRx	VentiRx Pharmaceuticals, Inc.
Vernalis	Vernalis plc
Verona	Verona Pharma plc
Viking	Viking Therapeutics
Vireo	Vireo Health
WuXi	WuXi Biologics Ireland Limited
WuXi Agreement	The Platform License Agreement, dated March 23, 2015, by and between Ligand and WuXi, as amended
Xi'an Xintong	Xi'an Xintong Medicine Research
X-ALD	X-linked adrenoleukodystrophy
xCella Biosciences	xCella Biosciences, Inc.
Zydus Cadila	Zydus Cadila Healthcare, Ltd

PART I

Cautionary Note Regarding Forward-Looking Statements:

You should read the following report together with the more detailed information regarding our company, our common stock and our financial statements and notes to those statements appearing elsewhere in this document.

This report contains forward-looking statements that involve a number of risks and uncertainties. Although our forward-looking statements reflect the good faith judgment of our management, these statements can only be based on facts and factors currently known by us. Consequently, these forward-looking statements are inherently subject to risks and uncertainties, and actual results and outcomes may differ materially from results and outcomes discussed in the forward-looking statements.

Forward-looking statements can be identified by the use of forward-looking words such as "believes," "expects," "may," "will," "plan," "intends," "estimates," "would," "continue," "seeks," "pro forma," or "anticipates," or other similar words (including their use in the negative), or by discussions of future matters such as those related to our future results of operations and financial position, royalties and milestones under license agreements, Captisol material sales, product development, and product regulatory filings and approvals, and the timing thereof, as well as other statements that are not historical. You should be aware that the occurrence of any of the events discussed under the caption "Risk Factors" could negatively affect our results of operations and financial condition and the trading price of our stock.

The cautionary statements made in this report are intended to be applicable to all related forward-looking statements wherever they may appear in this report. We urge you not to place undue reliance on these forward-looking statements, which speak only as of the date of this report. Except as required by law, we assume no obligation to update our forward-looking statements, even if new information becomes available in the future. This caution is made under the safe harbor provisions of Section 21E of the Securities Exchange Act of 1934, as amended.

References to "Ligand Pharmaceuticals Incorporated," "Ligand," the "Company," "we," "our" and "us" include Ligand Pharmaceuticals Incorporated and our wholly-owned subsidiaries.

Partner Information

Information regarding partnered products and programs comes from information publicly released by our partners and licensees.

Trademarks

Our trademarks, trade names and service marks referenced herein include Ligand®, Captisol®, LTP™, LTP Technology™, OmniAb®, OmniMouse®, OmniRat®, OmniFlic®, OmniClic™, OmniChicken®, xCella®, xCella Biosciences®, xPloration®, Icagen™, Pfenex Expression Technology® and XRPro® which are protected under applicable intellectual property laws and are our property. All other trademarks, trade names and service marks including Kyprolis®, Evomela®, Veklury®, Livogiva®, Zulresso®, Minnebro®, Baxdela®, Carnexiv™, Conbriza™, and Duavee®, are the property of their respective owners. Solely for convenience, trademarks, trade names and service marks referred to in this report may appear without the ®, ™ or SM symbols, but such references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or the right of the applicable licensor to such trademarks, trade names and service marks. Use or display by us of other parties' trademarks, trade dress or products is not intended to and does not imply a relationship with, or endorsement or sponsorship of, us by the trademark or trade dress owners.

Item 1. Business

Overview

We are a biopharmaceutical company focused on developing or acquiring technologies that help pharmaceutical companies discover and develop medicines. We employ research technologies such as antibody discovery technologies, ion channel discovery technology, *Pseudomonas fluorescens* protein expression technology, formulation science and liver targeted pro-drug technologies to assist companies in their work toward securing prescription drug and biologic approvals. We currently have partnerships and license agreements with over 130 pharmaceutical and biotechnology companies. Over 300 programs are in various stages of commercialization, development or research and are fully funded by our collaboration partners and licensees. We have contributed novel research and technologies for approved medicines that treat cancer, osteoporosis, fungal infections and postpartum depression, among others. Our collaboration partners and licensees have programs currently in clinical development targeting cancer, seizure, diabetes, cardiovascular disease, muscle wasting, liver disease, and kidney disease, among others. We have over 1,400 issued patents worldwide.

We have assembled our large portfolio of fully-funded programs either by licensing our own proprietary drug development programs, licensing our platform technologies such as Captisol or OmniAb to partners for use with their proprietary programs, or acquiring existing partnered programs from other companies. Fully-funded programs, which we refer to as "shots on goal," are those for which our partners pay all of the development and commercialization costs. For our internal programs, we generally plan to advance drug candidates through early-stage drug development or clinical proof-of-concept and then seek partners to continue development and potential commercialization.

Our business model creates value for stockholders by providing a diversified portfolio of biotech and pharmaceutical product revenue streams that are supported by an efficient and low corporate cost structure. Our goal is to offer investors an opportunity to participate in the promise of the biotech industry in a profitable, diversified and lower-risk business than a typical biotech company. Our business model is based on doing what we do best: drug discovery, early-stage drug development, product reformulation and partnering. We partner with other pharmaceutical companies to leverage what they do best (late-stage development, regulatory management and commercialization) to ultimately generate our revenue. We believe that focusing on discovery and early-stage drug development while benefiting from our partners' development and commercialization expertise will reduce our internal expenses and allow us to have a larger number of drug candidates progress to later stages of drug development.

Our revenue consists of three primary elements: royalties from commercialized products, sale of Captisol material, and contract revenue from license, milestone and other service payments. In addition to discovering and developing our own proprietary drugs, we selectively pursue acquisitions to bring in new assets, pipelines, and technologies to aid in generating additional potential new revenue streams.

Impact of COVID-19 Pandemic

Please see impact of COVID-19 pandemic described in Item 8. Consolidated Financial Statements -Note 1, "*Basis of Presentation and Summary of Significant Accounting Policies*". For additional information on the various risks posed by COVID-19 pandemic, please read *Item 1A. Risk Factors* included in this report.

2020 and Recent Major Business Highlights

Major Transactions and Strategic Investments

Consistent with our business model, we pursued novel investments to augment our technology platforms and assets.

In April 2020, we closed the acquisition of the core assets, partnered programs and ion channel technology from Icagen for $15.1 million in cash. Icagen will also be entitled to receive up to an additional contingent earn-out payment of $25 million based on certain revenue achievements.

In September 2020, we acquired two privately held companies that strengthen and complement our OmniAb platform's technology stack. We acquired xCella Biosciences, Inc. for $7.1 million in cash plus potential earnouts, and acquired Taurus Biosciences LLC for $5.1 million in cash plus non-transferable CVRs. In addition, we invested $2.5 million in a new company,

Minotaur Therapeutics, which is led by Taurus Biosciences' founder, in exchange for royalties on products from future programs.

In October 2020, we acquired Pfenex Inc. including its proprietary protein expression technology and existing collaboration contracts with Jazz Pharmaceuticals, Merck, Serum Institute of India and Alvogen, each of which has the potential to pay royalties. In October 2020, our partner Merck announced additional positive data from two Phase 3 studies with V114, which uses the protein expression technology, evaluating the safety, tolerability and immunogenicity of the investigational 15-valent pneumococcal conjugate vaccine. In November 2020, Merck announced they had submitted applications to the U.S. FDA and European Medicines Agency (EMA) for licensure of V114 for use in adults 18 years of age and older. Merck announced on January 12, 2021 that FDA accepted the BLA for V114 for priority review with a Prescription Drug User Fee Act (PDUFA) date of July 18, 2021. In December 2020, Jazz Pharmaceuticals initiated the submission of a BLA to the FDA seeking market approval for JZP-458, which is a recombinant Erwinia asparaginase produced using the protein expression platform that has resulted in a robust process showing manufacturing consistency and efficiency. The BLA was initiated and will be reviewed under the Real-Time Oncology Review (RTOR) pilot program, an initiative of the FDA's Oncology Center of Excellence designed to expedite the delivery of safe and effective cancer treatments to patients.

In December 2020, we sold the Vernalis research operations and internal programs to HitGen Inc. for $26.7 million in cash. Under the terms of the agreement, we retained economic rights on completed collaboration licenses as well as a share of the economic rights on current research collaboration contracts.

Corporate and Governance Highlights

We are committed to policies and practices focused on environmental sustainability, positively impacting our social community and maintaining and cultivating good corporate governance. By focusing on such ESG policies and practices, we believe we can affect a meaningful and positive change in our community and maintain our open, collaborative corporate culture. We will continue our proactive shareholder and employee engagement in 2021. See www.ligand.com for information about our ESG policies and practices.

OmniAb Technology Platform Updates

We continue to invest in and expand the OmniAb Technology platform. We entered into four new OmniAb platform license agreements in 2020 with Pandion Therapeutics, Adept Therapeutics, The Wistar Institute and RubrYc Therapeutics. In addition to the four platform license deals completed in 2020, we estimate that we and our partners initiated over 50 new programs in 2020. Our scientists and our partners presented data highlighting the utility of the OmniAb platform at multiple conferences throughout the year, and we published multiple papers in peer-reviewed journals.

Development-stage OmniAb partners continue to report progress clinically; notable advancements include:

- Janssen presented safety and response data of the OmniAb-derived teclistamab (anti-BCMA x CD3 T cell redirecting bispecific antibody) Phase 1 dose escalation trial for relapsed/refractory multiple myeloma at the 2020 American Society for Hematology (ASH) conference. Teclistamab showed a manageable safety profile with an overall response rate (ORR) of 73 percent (16/22) at the recommended subcutaneous (SC) Phase 2 dose. In addition, updated results for the intravenous formulation demonstrate the durability of responses. Janssen announced that it has chosen the recommended Phase 2 dose for the SC formulation.
- Gloria Biosciences submitted an application for marketing approval in China for OmniAb-derived zimberelimab for the treatment of classical Hodgkin lymphoma, marking multiple OmniAb drug applications filed seeking approval.
- Arcus Biosciences and Taiho Pharmaceutical announced Taiho's exercise of its option for an exclusive license to zimberelimab (also known as AB122) for Japan and other Asian countries, excluding China.
- CStone announced an agreement to out-license ex-Greater China rights for sugemalimab (CStone licensed worldwide rights from our licensee WuXi) and CS1003 (anti-PD-1) to EQRx. Under the terms of the agreement, CStone will receive an upfront payment of $150 million and is eligible to receive up to $1.15 billion in milestone payments as well as separate tiered royalties. EQRx will obtain exclusive rights to lead development and commercialization worldwide, excluding certain territories in Asia. In October 2020, CStone entered into a major partnership with Pfizer for the commercialization of sugemalimab in greater China. As part of the partnership, Pfizer invested $200 million in CStone shares, and CStone is eligible to receive up to $280 million in milestone payments and additional royalties.
- CStone announced that China's National Medical Products Administration accepted CStone's New Drug Application for sugemalimab combined with chemotherapy for the first-line treatment of advanced squamous and non-squamous

non-small cell lung cancer (NSCLC). CStone previously announced updated results from two clinical studies of sugemalimab at the 2020 Chinese Society of Clinical Oncology Annual Meeting and announced that sugemalimab met the primary endpoint as first-line treatment in stage IV squamous and non-squamous NSCLC.

- CStone and Blueprint Medicines initiated a Phase 1b/2 clinical trial of fisogatinib in combination with OmniAb-derived CS1001 for patients with hepatocellular carcinoma. CStone announced the first patient was dosed in a proof-of-concept study of OmniAb-derived CS1001 in combination with Bayer's regorafenib in patients with advanced solid tumors.
- Aptevo announced two complete remissions in the ongoing APVO436 Phase 1/1b clinical trial for the treatment of acute myeloid leukemia (AML) and myelodysplastic syndrome (MDS). Preliminary data indicating that OmniAb-derived APVO436 was well tolerated with a manageable safety profile were presented at the 2020 ASH conference.
- Immunovant announced positive results from its Phase 2a proof-of-concept study of OmniAb-derived IMVT-1401 (also known as batoclimab, HL161, or HBM9161) in thyroid eye disease. IMVT-1401 is a novel investigational anti-FcRn antibody delivered by subcutaneous injection. The results showed a 65% mean reduction in total IgG observed from baseline to end of treatment, with a pharmacodynamic response nearly identical to modeled predictions for the dosing regimen tested in the trial. In February 2021, Immunovant announced a voluntary pause in its ongoing clinical trials of IMVT-1401 due to elevated total cholesterol and LDL levels in Phase 2b trial of thyroid eye disease. Immunovant announced that it plans to continue development of IMVT-1401 following discussions with regulators and protocol modifications. In addition, Immunovant announced positive topline results from a multicenter, placebo-controlled Phase 2a trial (ASCEND MG) of IMVT-1401, in patients with myasthenia gravis (MG).
- Harbour announced first patient dosing of Phase 1b/2a study of Batoclimab for treating neuromyelitis optica spectrum disorder. On January 27, 2021 Harbour announced that China Center for Drug Evaluation granted Breakthrough Therapy designation to Batoclimab for the treatment of adult patients with MG. This designation indicates that the development and review of Batoclimab in adults with MG will be expedited.

Captisol Technology Updates

Our Captisol business unit achieved its highest sales ever in 2020 and we anticipate substantial continued demand for Captisol. We are investing to significantly expand annual manufacturing capacity for Captisol.

Gilead utilizes Captisol to solubilize the active ingredient for Veklury® (remdesivir), the first FDA approved anti-viral treatment for severe COVID-19. The drug has now been authorized or approved for use in numerous countries around the world. Gilead announced the formation of a consortium of generic pharmaceutical companies to manufacture remdesivir for the developing world. We have supplied, established initial agreements or are in supply discussions with those companies, and are prepared to meet the Captisol needs of all companies manufacturing remdesivir as well as the needs from our other Captisol partners.

We made the decision to conduct a Phase 2 trial for Captisol-enabled Iohexol that we believe could serve as the basis for potential registration of the product candidate. CE-Iohexol is an iodine-based contrast agent for hospital-based imaging procedures. The market for iodinated contrast agents is substantial, with approximately 20 million imaging procedures per year in the U.S., representing an estimated $1.5 billion in sales. The objective of the CE-Iohexol clinical trial will be to demonstrate a reduction in the incidence of contrast-induced acute kidney injury and an equivalent image quality compared to GE’s Omnipaque®.

Vernalis Design Platform (VDP) Updates

In December 2020, we sold our Vernalis research operations and internal programs to HitGen Inc. for $26.7 million in cash. Under the terms of the agreement, we retain economic rights on completed collaboration licenses as well as a share of the economic rights on current research collaboration contracts. We continued to expand our portfolio of VDP-derived partnerships during 2020, prior to the sale. Notable VDP developments include:

- We entered into an exclusive worldwide license agreement with Neuritek Therapeutics to develop and commercialize V158866, a novel oral, selective fatty acid amide hydrolase inhibitor that was discovered using the Vernalis Design Platform. Neuritek plans to develop V158866 for post-traumatic stress disorder and other CNS diseases. Under the terms of the agreement, we received an upfront license fee and are eligible to receive over $240 million in milestones and tiered royalties on net sales of six to eight percent. Neuritek has secured approximately $27 million in a capital commitment from GEM Global Yield LLC SCS.

- In February 2021, Verona Pharma announced ensifentrine delivered by a pressurized metered-dose inhaler (pMDI) met all of the primary and secondary lung function endpoints in the 7 day, Phase 2 clinical trial in patients with moderate to severe chronic obstructive pulmonary disease (COPD). The magnitude of improvement in lung function was dose-ordered and highly statistically significant at peak and over the 12-hour dosing interval compared with placebo, and supports twice-daily dosing of ensifentrine via pMDI for the treatment of COPD. Verona is evaluating nebulized ensifentrine in the pivotal Phase 3 ENHANCE-1 and 2 clinical trials for COPD maintenance treatment.

Icagen Technology Platform Updates

We continue to advance partnership programs following our 2020 acquisition of the core assets from Icagen Inc. The following developments occurred in 2020:

- In May of 2020 we expanded our license with Roche by adding a second program to our agreement initiated in December 2018. This new program incorporates Icagen's ion channel technology and is directed at a specific ion channel target relevant to neurodegenerative disease. Roche made a cash upfront payment and provides research funding to Icagen for this second program. In addition, Icagen is eligible to receive development and commercialization milestones up to $274 million for each program and royalty payments should a drug be commercialized from any of the collaboration's programs.
- In December 2020, we signed a collaboration agreement with GlaxoSmithKline to identify and develop inhibitors of specific genetically-validated molecular targets relevant to neurological diseases. Under the terms of this agreement we received an upfront payment of $7 million and could receive development, regulatory and commercialization milestones up to $155 million. We will also receive tiered royalties on net sales should any drug from the collaboration be commercialized.
- We continue to advance other programs including our collaboration with the Cystic Fibrosis Foundation targeting nonsense suppression as well as multiple internal programs which potentially offer future partnering opportunities.

Other Business Updates

On February 2, 2021, our partner, Travere, announced that sparsentan achieved its pre-specified interim FSGS partial remission of proteinuria endpoint (FPRE) in the DUPLEX study after 36 weeks of treatment. Sparsentan demonstrated a statistically significant response on FPRE compared to the active control, irbesartan (p=0.0094). Preliminary results from the interim analysis suggest that sparsentan has been generally well-tolerated and has shown a comparable safety profile to irbesartan. Based on the data from the interim analysis, Travere intends to pursue submissions for accelerated approval of sparsentan for FSGS in the second half of 2021. In January the FDA granted sparsentan Orphan Drug Designation for the treatment of IgA nephropathy, and on February 18, 2021, Travere announced the European Commission (EC) had granted orphan designation to sparsentan for the treatment of IgA nephropathy. Topline efficacy data from the ongoing pivotal Phase 3 PROTECT Study in IgA nephropathy, and the 36-week interim proteinuria endpoint analysis, are anticipated in the third quarter of 2021.

Technologies

A variety of technology platforms that enable elements of drug discovery or development form the basis of our portfolio of fully-funded shots on goal. Platform technologies or individual drugs discovered by Ligand are related to a broad estate of intellectual property that includes over 1,400 patents issued worldwide.

OmniAb Technologies

The OmniAb antibody discovery platform provides our biopharmaceutical industry partners access to the most advanced antibody repertoires and state-of-the-art screening technologies to enable efficient discovery of next-generation novel therapeutics and to deliver the highest quality therapeutic antibody candidates for a wide range of human diseases.

At the heart of the OmniAb Technology Stack is the Biological Intelligence™ (BI) of our proprietary and validated transgenic animals, including OmniRat, OmniChicken and OmniMouse, each capable of generating high quality fully human antibodies that have been optimized naturally through in vivo affinity maturation. OmniFlic (transgenic rat) and OmniClic (transgenic chicken) address industry needs for bispecific antibody applications though a common light chain approach, and OmniTaur features unique structural attributes of cow antibodies for complex targets. Our transgenic animals comprise the most diverse host systems available in the industry and they are optimally leveraged within the OmniAb Technology Stack through AI-enhanced antigen design and immunization methods, paired with high-throughput and microfluidic-based single B cell

screening and deep computational analysis of next-generation sequencing datasets to identify fully human antibodies with superior performance and developability characteristics. The OmniAb stack of technologies and differentiating AI and BI features have been combined to offer a highly efficient, scalable and customizable solution for the growing antibody discovery needs of the global biopharmaceutical industry.

We acquired the technologies in the OmniAb technology stack through the acquisition of OMT in January 2016, Crystal in October 2017, Ab Initio in July 2019, xCella Biosciences in September 2020 and Taurus Biosciences in September 2020. As of December 31, 2020, we had entered into OmniAb platform license agreements with more than 40 collaboration partners, including 7 partners who have rights through our partnership with WuXi. Our OmniAb partners were working on approximately 170 active programs, of which 15 were in various stages of clinical trials as of December 31, 2020.

Captisol Technology

Captisol is a patent-protected, chemically modified cyclodextrin with a structure designed to optimize the solubility and stability of drugs. Captisol was invented and initially developed by scientists in the laboratories of Dr. Valentino Stella, University Distinguished Professor at the University of Kansas' Higuchi Biosciences Center for specific use in drug development and formulation. This unique technology has enabled several FDA-approved products, including Gilead's Veklury®, Amgen's Kyprolis®, Baxter International's Nexterone®, Acrotech Biopharma L.L.C.'s and CASI Pharmaceuticals' Evomela®, Melinta Therapeutics' Baxdela™ and Sage Therapeutics' Zulresso™. There are many Captisol-enabled products currently in various stages of development. We maintain a broad global patent portfolio for Captisol with more than 400 issued patents worldwide relating to the technology (including over 40 in the U.S.) and with the latest expiration date in 2033. Other patent applications covering methods of making Captisol, if issued, extend to 2040.

In addition to solid Captisol powder, we offer our partners access to cGMP manufactured aqueous Captisol concentrate. This product offering was established in 2017 to reduce cycle time and increase Captisol production capacity for large volume drug products. We maintain both Type IV and Type V DMFs with the FDA. These DMFs contain manufacturing and safety information relating to Captisol that our licensees can reference when developing Captisol-enabled drugs. We also have active DMFs in Japan, China and Canada. As of December 31, 2020, Captisol-enabled drugs were being marketed in more than 70 countries, and over 50 partners had Captisol-enabled drugs in development.

Protein Expression Technology Platform

The Protein Expression Technology Platform is a robust, validated, cost-effective and scalable platform for recombinant protein production, and is especially well-suited for complex, large-scale protein production where traditional systems are not suitable. Multiple global manufacturers have demonstrated consistent success with the platform and the technology is currently out-licensed for numerous commercial and development-stage programs. The versatility of the platform has been demonstrated in the production of enzymes, peptides, antibody derivatives and engineered non-natural proteins. Partners seek the platform as it can contribute significant value to biopharmaceutical development programs by reducing development timelines and costs for manufacturing therapeutics and vaccines. Given pharmaceutical industry trends toward large molecules with increasing structural complexities, the Protein Expression Technology Platform is well positioned to meet these growing needs as the most comprehensive broadly available protein production platform in the industry.

We acquired the Protein Expression Technology through our acquisition of Pfenex in October 2020. Former stockholders of Pfenex received a CVR which would result in payment if FDA determines that teriparatide injection (also referred to as PF708 or Bonsity) is therapeutically equivalent (as will be indicated by assignment of a therapeutic equivalence code that begins with an "A" in the FDA publication, Approved Drug Products with Therapeutic Equivalence Evaluations) with respect to the listed product, FORTEO® (teriparatide injection). We estimate that up to an additional $77.8 million in the aggregate will be payable to holders of the CVRs in the event that the CVR payment milestone is timely achieved. As of December 31, 2020, we have agreements with 15 partners for active research collaboration using this technology on more than 25 active programs.

Icagen Technology Platform

The Icagen Technology Platform is a novel drug discovery platform which uses primarily ion channels and transporters which are key components in a wide variety of biological processes that involve rapid changes in cells and we believe have broad therapeutic applicability including cancer, metabolic disease, pain, neurological diseases, infectious diseases and others. The Icagen Technology Platform leverages proprietary expertise in the combination of biological assays, medicinal chemistry, and *in silico* and computational chemistry applications. Partners in the pharmaceutical industry have leveraged our platform to develop therapeutic candidates to address unmet medical needs. We typically work closely with our partners through therapeutic candidate selection and, our partners are typically responsible for clinical development and commercialization. Our Icagen Technology Platform collaboration agreements typically include developmental milestone payments and royalties based on the net sales of any commercialized therapies. Royalties range from low to high single digits. The royalty terms typically expire upon the last to expire patents on a product-by-product basis.

We acquired the Icagen Technology Platform through our acquisition of the core assets of Icagen in April 2020 for $15.1 million in cash. Icagen is entitled to receive up to an additional $25.0 million based on certain revenue achievements. As of December 31, 2020, we have agreements with seven partners for active research collaboration using this technology on a total of 10 active programs.

HepDirect/LTP Technology Platform

The HepDirect platform is a first generation liver-targeting prodrug technology designed to deliver certain phosphorus-containing drugs to the liver by using a proprietary chemical modification that renders an API biologically inactive until cleaved by a liver-specific enzyme. The HepDirect™ technology may improve the efficacy and/or safety of certain drugs and can be applied to marketed or new drug products to treat liver diseases or diseases caused by hemostasis imbalance of circulating molecules controlled by the liver.

Our LTP platform is a broad second generation liver-targeting prodrug technology that has an activation mechanism similar to HepDirect but with broader applications and many improved features. The proprietary chemical modifications can be used with many chemical classes of drugs in addition to phosphorus-containing compounds and have multiple chemistry strategies, designed to improve flexibility and success rates. In addition, the second generation technology eliminates the undesirable by-products released during activation of the first generation prodrugs. As of December 31, 2020, we had active HepDirect/LTP programs with three partners, using this technology across five programs.

SUREtechnology Platform (owned by Selexis)

We acquired economic rights to various SURE*technology* Platform programs from Selexis. The SURE*technology* Platform, developed and owned by Selexis, is a novel technology that improves the way that cells are utilized in the development and manufacturing of recombinant proteins and drugs. As of December 31, 2020, we are entitled to certain economic rights to SUREtechnology Platform license agreements with 12 partners developing or having commercialized 20 programs.

Partners and Licensees

We currently have partnerships and license agreements with over 130 pharmaceutical and biotechnology companies. In addition to the table below, we also have more than 10 undisclosed partners and licensees.

Big Pharma	Ticker	Biotech	Ticker	Biotech, continued	Ticker
Abbott	ABT	ABBA	Private	MEI	MEIP
AbbVie	ABBV	ABL Bio	298380	Melinta	Private
AstraZeneca	AZN	Abvivo	Private	Menarini	Private
Baxter	BAX	Adept	Private	Meridian Labs	Private
Boehringer Ingelheim	Private	Aldeyra	ALDX	Metavant	Private
Daiichi Sankyo	DSKY	Amgen	AMGN	Merrimack	MACK
Eli Lilly	LLY	Anebulo	Private	Nanjing King-Friend	603707
Eisai	4523	Aptevo	APVO	Neuritek	Private
GSK	GSK	Arcellx	Private	Novan	NOVN
Janssen	JNJ	Arcus	RCUS	Novogen	NVGN
Jazz	JAZZ	Asahi Kasei	3407	Nucorion	Private
Merck	MRK	Ascella	Private	Oncternal	Private

Merck KGaA	MRK.DE
Novartis	NVS
Ono	4528
Otsuka	4768
Pfizer	PFE
Roche	RHHBY
Sanofi	SNY
Takeda	4502
Teva	TEVA

Specialty Pharma	**Ticker**
Acrotech (Aurobindo)	AUROPHARMA
Aldevron	Private
Aytu Bioscience	AYTU
Aziyo	AZYO
Beloteca	Private
CASI	CASI
CorMatrix	Private
CTI Biopharma	CTIC
Ferring	Private
Gloria	2437
Lundbeck	LUN
Sedor	Private
Sermonix	Private
SQ Innovation	Private
Vireo Health	VREOF

Generics	**Ticker**
Alvogen	Private
Apotex	Private
BioCad	Private
Gedeon Richter	GEDSF
Hikma	HIK
Mylan	VTRS
Par	Private
Zydus Cadila	CADILAHC

BendaRx	Private
Bexson Biomedical	Private
Cantex	Private
Corvus	CRVS
CR Double-Crane	600062
CStone	2616.HK
Cumulus	Private
Electra	Private
Elevation	Private
Exelixis	EXEL
Five Prime	FRPX
Foghorn	Private
Genmab	GEN
Genagon	Private
Genekey Biotech	Private
Genentech (Roche)	RHHBY
Genovac	Private
GigaGen	Private
Gilead Sciences	GILD
Gordian	Private
HanAll	9420
Harbour	2142
IBC Generium	Private
Ichnos	Private
iMetabolic	Private
Immunovant	IMVT
Interventional Analgesix	Private
J-Pharma	Private
Jupiter	Private
Kangchen	Private
Kira	Private
KSQ	Private
Marinus	MRNS

OnKure	Private
Opthea	OPT
Outlook	OTLK
Palvella	Private
Pandion	PAND
Phoenix Tissue	Private
Precision Biologics	Private
Protagonist	PTGX
Revision	Private
RubrYc	Private
SAGE	SAGE
Seagen	SGEN
Seelos	SEEL
Servier	Private
Serum Inst. of India	Private
Softkemo	Private
Sunshine Lake	Private
Talem	Private
Teneobio	Private
TG Therapeutics	TGTX
Tizona	Private
Travere	TVTX
Tremeau	Private
Unity	UBX
Valanbio	Private
Vaxxas	Private
Vega	Private
VenBio	Private
VentiRx	Private
Verona	VRNA
Viking	VKTX
Virtuoso	Private
Xi'an Xintong	Private
WuXi	603259
Zhilkang Hongyi	Private

Commercial and Clinical Stage Partnered Portfolio

We have a large portfolio of current and future potential revenue-generating programs, including over 300 fully-funded by our partners. In addition to the table below, we also have more than 100 undisclosed preclinical programs.

Approved		
Partner Name	**Program**	**Therapeutic Area**
Acrotech/CASI	Evomela	Cancer

Alvogen/Adalvo	Teriparatide	Women's Health
Alvogen/Hikma/Nanjing King-Friend	Voriconazole	Infectious Disease
Amgen/Ono	Kyprolis	Cancer
Aytu	Tuzistra	Infectious Disease
Aziyo	ECM portfolio	Medical device/Cardiology
Baxter	Nexterone	Cardiovascular
Biocad	Teberif	Inflammatory/Metabolic
Exelixis/Daiichi-Sankyo	Minnebro	Cardiovascular
Gilead	Veklury	Infectious Disease
Lundbeck	Carnexiv	Central Nervous System
Melinta	Baxdela	Infectious Disease
Menarini	Frovatriptan	Central Nervous System
Merck	Noxafil-IV	Infectious Disease
Par	Posaconazole	Infectious Disease
Pfizer	Viviant/Conbriza	Inflammatory/Metabolic
Pfizer	Duavee	Inflammatory/Metabolic
Pfizer	Vfend-IV	Infectious Disease
SAGE	Zulresso	Central Nervous System
Sedor	Sesquient	Central Nervous System
Serum Institute of India	Pneumosil	Infectious Disease
Zydus Cadila	Vivitra	Cancer
Zydus Cadila	Bryxta/ZyBev	Cancer
Zydus Cadila	Exemptia	Inflammatory/Metabolic
Zydus Cadila	Vortuxi	Inflammatory/Metabolic

Phase 3/Pivotal or Regulatory Submission Stage		
Partner Name	**Program**	**Therapeutic Area**
Various	Teriparatide	Women's Health
Aldeyra	Reproxalap	Other/Undisclosed
Biocad	BCD-066	Blood Disorders
CStone	Sugemalimab	Cancer
Gloria	Zimberelimab	Cancer
IBC Generium	GNR-008	Severe and Rare
Jazz	JZP-458	Cancer
Marinus	Ganaxalone IV	Central Nervous System
Merck	V114	Infectious Disease
Novan	SB206	Infectious Disease
Novartis	Mekinist (CE-Trametinib)	Cancer
Outlook Therapeutics	ONS-5010	Other/Undisclosed
Palvella	PTX-022	Other/Undisclosed
Sage	Zulresso	Infectious disease
Sanofi	Sutimlimab	Blood Disorders
Sedor	CE-Fosphenytoin	Central Nervous System

Serum Institute	CRM197	Infectious Disease
Sunshine Lake	Vilazodone	Central Nervous System
Takeda	Pevonedistat	Cancer
Travere	Sparsentan	Severe and Rare
Verona	Ensifentrine (RPL554)	Respiratory Disease
Xi'an Xintong	Pradefovir	Infectious Disease

Phase 2		
Partner Name	**Program**	**Therapeutic Area**
Arcus	Zimberelimab	Cancer
Cantex	CX-01	Cancer
CTI Biopharma	Tosedostat	Cancer
Elevation Oncology	Seribantumab	Cancer
Eisai	FYCOMPA	Central Nervous System
Genmab	Gen1046	Cancer
Harbour	Batoclimab	Inflammatory/Metabolic
Immunovant	Batoclimab	Inflammatory/Metabolic
Janssen	Teclistimab	Cancer
J-Pharma	JPH-203	Cancer
Merck	M6620	Cancer
Merck	CRM197	Infectious Disease
Novartis	ECF843	Inflammatory/Metabolic
Opthea	OPT-302	Other/Undisclosed
Precision Biologics	NPC-1C	Cancer
Seelos	Aplindore	Central Nervous System
Sermonix	Lasofoxifene	Cancer
VentiRx	Motolimod	Cancer
Viking	VK5211	Inflammatory/Metabolic
Viking	VK2809	Inflammatory/Metabolic
Viking	VK0214	Inflammatory/Metabolic
Viking	VK0612	Inflammatory/Metabolic

Phase 1		
Partner Name	**Program**	**Therapeutic Area**
Amgen	AMG-330	Cancer
Apotex	Meloxicam	Migraine
Aptevo	APVO436	Cancer
Exelixis	ROR	Inflammatory/Metabolic
Gedeon Richter	Bevacizumab	Cancer
Genmab	Gen1046	Cancer
Janssen	JNJ-67371244	Cancer
Janssen	JNJ-70218902	Cancer
Jupiter Bioscience	Viright	Cancer

MEI Pharma	ME-344	Cancer
Merck	M6233	Cancer
Novartis	MIK-665	Cancer
Novartis	BCL-201	Cancer
Phoenix Tissue	PTR-01	Other/Undisclosed
Protagonist Therapeutics	PTG300	Hematology
Revision Therapeutics	Rev0100	Ophthalmology
Servier	S55746/S64315	Cancer
Symphogen/Servier	SYM022/SYM023/SYM024/SYM025	Cancer
Takeda	TAK-020	Inflammatory/Metabolic
Takeda	TAK-925	Severe and Rare
Takeda	TAK-243	Cancer
Vaxxas	Nanopatch	Infectious Disease
VentiRx Pharma	VTX-1463	Cancer
Xi'an Xintong	MB07133	Cancer

Selected Commercial Programs

We have multiple programs under license with other companies that have products that are already being commercialized. The following programs represent components of our current portfolio of revenue-generating assets and potential for near-term growth in royalty and other revenue. For information about the royalties owed to us for these programs, see "Royalties" later in this business section.

Kyprolis (Amgen)

We supply Captisol to Amgen for use with Kyprolis (carfilzomib), and granted Amgen an exclusive product-specific license under our patent rights with respect to Captisol. Kyprolis is formulated with Ligand's Captisol technology and is approved in the United States for the following:

- In combination with dexamethasone, lenalidomide plus dexamethasone, or daratumumab plus dexamethasone for the treatment of patients with relapsed or refractory multiple myeloma who have received one to three lines of therapy.
- As a single agent for the treatment of patients with relapsed or refractory multiple myeloma who have received one or more lines of therapy.

Kyprolis is also approved in multiple countries outside the U.S. and Amgen continues to invest significantly in Kyprolis to further expand its label and geography. Amgen's obligation to pay royalties does not expire until four years after the expiration of the last-to-expire patent covering Captisol. Our patents and applications relating to the Captisol component of Kyprolis are not expected to expire until 2033.

Kyprolis (Amgen)	
< $250 million	1.5%
$250 to $500 million	2.0%
$500 to $750 million	2.5%
>$750 million	3.0%

Our agreement with Amgen may be terminated by either party in the event of material breach or bankruptcy, or unilaterally by Amgen with prior written notice, subject to certain surviving obligations. Absent early termination, the agreement will terminate upon expiration of the obligation to pay royalties. Under this agreement, we are entitled to receive revenue from clinical and commercial Captisol material sales and royalties on annual net sales of Kyprolis.

Veklury® (Gilead)

We supply Captisol to Gilead for sales of Veklury® (remdesivir). Gilead received marketing approval in the US in October 2020. Veklury is the first and only antiviral treatment of Covid-19 that is FDA approved. The product has regulatory approvals for the treatment of moderate or severe COVID-19 in over 50 countries and is included in more than 30 ongoing clinical trials. We are supplying Captisol to Gilead under a recently signed 10-year supply agreement. We are also supplying Captisol to Gilead's voluntary licensing generic partners who are manufacturing remdesivir for 127 low- and middle-income countries. We receive our commercial compensation for this program through the sale of Captisol.

Teriparatide Injection Product (PF708) (Alvogen/Adalvo)

We acquired the Teriparatide Injection product with the acquisition of Pfenex Inc. in October 2020. Teriparatide Injection is a drug indicated for uses including the treatment of osteoporosis in certain patients at high risk for fracture. Teriparatide Injection was developed using our Protein Expression Technology and was approved by the FDA in 2019 in accordance with the 505(b)(2) regulatory pathway, with FORTEO as the reference product. Our partner, Alvogen launched the product in June 2020 in the United States.

Outside the U.S., PF708 received marketing authorization throughout the European Union in August 2020 under the tradename Livogiva®, was approved in Saudi Arabia in December 2020 under the name Bonteo, and is in various stages of regulatory and marketing application processes around the globe and, upon approval, may be marketed as Teriparatide Injection or under various tradenames, such as Bonsity® or Livogiva®.

Our partner Alvogen has exclusively licensed the rights to commercialize and manufacture the teriparatide injection product in the United States, while their Adalvo business has the rights to commercialize in the European Union (EU), certain countries in the Middle East and North Africa (MENA), and the rest of world (ROW) territories (the latter defined as all countries outside of the EU, US and MENA, excluding Mainland China, Hong Kong, Singapore, Malaysia and Thailand). Kangchen has exclusively licensed to commercialize PF708, upon receipt of applicable marketing authorizations, in Mainland China, Hong Kong, Singapore, Malaysia and Thailand and granted a non-exclusive right to conduct development activities in such countries with respect to PF708. Kangchen is responsible for all regulatory submissions, development costs and costs associated with regulatory approvals in these countries.

In accordance with our agreements with Alvogen/Adlavo, we are eligible to receive additional payments of up to $9.0 million based on the achievement of certain development, regulatory, and sales-related milestones. In addition, we may be eligible to receive tiered royalties on net sales between 25% and 40% prior to an “A” therapeutic equivalence designation, which increases to a flat 50% if an “A” rating is achieved.

In accordance with our EU, MENA and ROW agreements with Alvogen’s Adalvo subsidiary, we may be eligible to receive additional upfront and milestone payments of $1.5 million and may also be eligible to receive up to 60% of Alvogen’s gross profit derived from product sales and regional license fees, if approved, depending on geography, cost of goods sold and sublicense fees.

In accordance with our agreement with Kangchen, we may be eligible to receive additional payments of up to $22.5 million upon the achievement of certain development, regulatory, and sales-related milestones. We may be eligible to receive double-digit royalties on any net sales of PF708 in Kangchen’s territory.

Evomela (Acrotech and CASI)

We supply Captisol to Acrotech Biopharma for sales of Evomela in the U.S. and to CASI Pharmaceuticals for sales of Evomela in China. Evomela received market approval by the China National Medical Products Administration (NMPA). It is the only approved and commercially available melphalan product in China. Evomela is a Captisol-enabled melphalan IV formulation which is approved by the FDA for use in two indications:

- A high-dose conditioning treatment prior to ASCT in patients with multiple myeloma.
- For the palliative treatment of patients with multiple myeloma for whom oral therapy is not appropriate.

Evomela has been granted Orphan Designation by the FDA for use as a high-dose conditioning regimen for patients with multiple myeloma undergoing ASCT. The Evomela formulation avoids the use of propylene glycol, which has been reported to cause renal and cardiac side-effects that limit the ability to deliver higher quantities of therapeutic compounds. The use of the Captisol technology to reformulate melphalan is anticipated to allow for longer administration durations and slower infusion rates, potentially enabling clinicians to safely achieve a higher dose intensity of pre-transplant chemotherapy.

Under the terms of the license agreement, Acrotech Biopharma has marketing rights worldwide excluding China and CASI Pharmaceuticals has rights to market in China. We are eligible to receive over $50 million in potential milestone payments under this agreement and royalties on global net sales of the Captisol-enabled melphalan product. Acrotech and CASI’s obligation to pay royalties will expire at the end of the life of the relevant patents or when a competing product is launched, whichever is earlier, but in no event within ten years of the commercial launch. Our patents and applications relating to the Captisol component of melphalan are not expected to expire until 2033. As described herein, we have entered into a settlement agreement with Teva and Acrotech Biopharma (the holder of the NDA for Evomela) which will allow Teva to market a generic version of Evomela in the United States on June 1, 2026, or earlier under certain circumstances. Absent early termination, the agreement will terminate upon expiration of the obligation to pay royalties. The agreement may be terminated by either party for an uncured material breach or unilaterally by Acrotech and CASI by prior written notice.

Nexterone (Baxter)

We have a license agreement with Baxter, related to Baxter's Nexterone, a Captisol-enabled formulation of amiodarone, which is marketed in the United States and Canada. We supply Captisol to Baxter for use in accordance with the terms of the license agreement under a separate supply agreement. Under the terms of the license agreement we will continue to earn milestone payments, royalties, and revenue from Captisol material sales. We are entitled to earn royalties on sales of Nexterone through early 2033.

Zulresso (SAGE)

We have a license agreement with SAGE, related to SAGE's Zulresso, a Captisol-enabled formulation of brexanolone for the treatment of PPD. Under the terms of the agreement, we receive royalties and revenue from Captisol material sales.

Noxafil-IV (Merck)

We have a supply agreement with Merck related to Merck's NOXAFIL-IV, a Captisol-enabled formulation of posaconazole for IV use. NOXAFIL-IV is marketed in the United States, EU and Canada. We receive our commercial compensation for this program through the sale of Captisol, and we do not receive a royalty on this program.

Duavee or Duavive (bazedoxifene/conjugated estrogens) and Viviant/Conbriza (Pfizer)

Pfizer is marketing bazedoxifene, a selective estrogen receptor modulator, under the brand names Viviantand Conbriza in various territories for the treatment of postmenopausal osteoporosis. Pfizer is responsible for the marketing of bazedoxifene, a synthetic drug specifically designed to reduce the risk of osteoporotic fractures while also protecting uterine tissue. Pfizer has combined bazedoxifene with the active ingredient in Premarin to create a combination therapy for the treatment of post-menopausal symptoms in women. Pfizer is marketing the combination treatment under the brand names Duavee and Duavive in various territories. Net royalties on annual net sales of Viviant/Conbriza and Duavee/Duavive are each payable to us through the life of the relevant patents or ten years from the first commercial sale, whichever is longer, on a country by country basis.

Aziyo Portfolio (Aziyo)

We receive a share of revenue from the currently marketed Aziyo portfolio of commercial pericardial repair and CanGaroo® Envelope ECM products. In addition, we have the potential to receive a share of revenue and potential milestones from the currently marketed CanGaroo® ECM Envelope for cardiac implantable electronic devices. Aziyo's products are medical devices that are designed to permit the development and regrowth of human tissue.

Exemptia, Vivitra, Zybev and Bryxta (Zydus Cadila)

Zydus Cadila's Exemptia (adalimumab biosimilar) is marketed in India for autoimmune diseases. Zydus Cadila uses the Selexis technology platform for Exemptia. We are entitled to earn royalties on sales by Zydus Cadila for ten years following the first commercial sale.

Zydus Cadila's Vivitra (trastuzumab biosimilar) is marketed in India for breast cancer. Zydus Cadila uses the Selexis technology platform for Vivitra. We are entitled to earn royalties on sales by Zydus Cadila for ten years following the first commercial sale.

Zydus Cadila's Bryxta and Zybev (bevacizumab biosimilar) is marketed in India for various indications. Zydus Cadila uses the Selexis technology platform for Bryxta and Zybev. We are entitled to earn royalties on sales by Zydus Cadila for ten years following the first commercial sale.

Minnebro (Exelixis)

Minnebro is marketed in Japan for the treatment of hypertension. Our partner, Exelixis, entered into a collaboration agreement with Daiichi Sankyo for the development of esaxerenone, a mineralocorticoid receptor antagonist. Under the terms of the agreement with Exelixis, we are entitled to receive a royalty on future sales.

Summary of Selected Development Stage Programs

We have multiple fully-funded partnered programs that are either in or nearing the regulatory approval process, or given the area of research or value of the license terms, we consider particularly noteworthy. We are eligible to receive milestone payments and royalties on these programs. This list does not include all of our partnered programs. For information about the royalties owed to Ligand for these programs, see "Royalties" later in this business section. In the case of Captisol-related programs, we are also eligible to receive revenue for the sale of Captisol material supply.

Sparsentan (Travere)

Our partner, Travere, is developing sparsentan for orphan indications of severe kidney diseases, and is running an on-going global pivotal Phase 3 clinical trial (DUPLEX) for sparsentan for the treatment of FSGS. Additionally, Travere is running

a global pivotal Phase 3 clinical trial (PROTECT) evaluating the long-term nephroprotective potential of sparsentan for the treatment of IgA nephropathy, a rare, immune complex mediated chronic glomerular disease. Certain patient groups with severely compromised renal function, including those with FSGS and IgA nephropathy, exhibit extreme proteinuria resulting in progression to dialysis and a high mortality rate. Sparsentan, with its unique dual blockade of angiotensin and endothelin receptors, is expected to provide meaningful clinical benefits in mitigating proteinuria in indications where there are no approved therapies.

In February of 2021, Travere announced that sparsentan achieved its pre-specified interim FSGS partial remission of proteinuria endpoint (FPRE) in the DUPLEX Phase 3 study after 36 weeks of treatment. Sparsentan demonstrated a statistically significant response on FPRE compared to the active control, irbesartan (p=0.0094). Preliminary results from the interim analysis suggest that sparsentan has been generally well-tolerated and has shown a comparable safety profile to irbesartan. Based on the data from the interim analysis, Travere intends to pursue submissions for accelerated approval of sparsentan for FSGS in the second half of 2021.

Travere has stated that topline efficacy data from the ongoing pivotal Phase 3 PROTECT Study in IgA nephropathy, and the 36-week interim proteinuria endpoint analysis, are anticipated in the third quarter of 2021.

Under our license agreement with Travere, we may be entitled to receive potential milestones of over $70 million and net royalties on future worldwide sales by Travere. The royalty term is expected to be 10 years following the first commercial sale. Travere is responsible for all development costs related to the program.

TR-Beta - VK2809 and VK0214 (Viking)

Our partner, Viking, is developing VK2809, a novel selective TR-Beta agonist with potential in multiple indications, including hypercholesterolemia, dyslipidemia and NASH. VK2809 is currently in a Phase 2b clinical trial (the VOYAGE study) in patients with biopsy-confirmed NASH. Viking has previously announced positive results from a Phase 2a trial of VK2809 in hypercholesterolemia and fatty liver disease. VK0214 is currently in Phase 1 clinical development, and had been granted orphan drug study by the FDA for the treatment of X-ALD. Under the terms of the agreement with Viking, we may be entitled to up to $375 million of development, regulatory and commercial milestones and tiered royalties on potential future sales. Our TR Beta programs partnered with Viking are subject to CVR sharing and a portion of the cash received will be paid out to CVR holders.

TR-Beta - VK2809 and VK0214 **(Viking)**	
< $500 million	3.5%
$500 to $750 million	5.5%
>$750 million	7.5%

Batoclimab (Immunovant, HanAll and Harbour)

Our partner, HanAll has granted Immunovant an exclusive license for the development, manufacture and marketing of Batoclimab for the treatment of pathogenic IgG-mediated autoimmune diseases in the U.S., Canada, Mexico, the EU, the United Kingdom, Switzerland, Latin America, the Middle East and North Africa. Immunovant is currently conducting a Phase 2 clinical trial in myasthenia gravis and other inflammatory diseases. Additionally, HanAll and Harbour BioMed, are collaborating to develop Batoclimab for similar treatment in China and Korea and are currently conducting a Phase 2 trial in China. HanAll retains the rights to Batoclimab in Korea and Harbour will control the marketing in China. As part of our agreement with HanAll, we are entitled to development and regulatory milestones and royalties on potential future sales from HanAll and sublicense revenues from Immunovant and Harbour based on amounts received by HanAll.

V114 (Merck)

Merck's 15-valent pneumococcal conjugate vaccine, PCV-15 (V114) is in late stage clinical development with 17 Phase 3 clinical trials. In October 2020, Merck released additional positive data from two Phase 3 studies evaluating the safety, tolerability and immunogenicity of V114 and submitted applications in November 2020 to the FDA and EMA for licensure of V114. On January 12, 2021, Merck announced the FDA accepted the BLA for V114 for priority review with a PDUFA of July 18, 2021. V114 previously received Breakthrough Therapy Designation from the FDA for the prevention of invasive pneumococcal disease in pediatric patients 6 weeks to 18 years of age and adults 18 years of age and older. Pneumococcal disease in adults is on the rise in many countries, and V114 consists of pneumococcal polysaccharides from 15 serotypes conjugated to CRM197carrier protein, including serotypes 22F and 33F, which are commonly associated with invasive pneumococcal disease in older adults and are not contained in the currently licensed vaccine for adults.

In accordance with our CRM197 commercial license agreements, we are eligible to earn an additional $11.5 million in development and regulatory milestones and may also be eligible to receive low single digit royalties derived from net sales, depending on territory.

***Pneumosil*® (Serum Institute of India, SII)**

SII began commercialization of its 10-valent pneumococcal conjugate vaccine, Pneumosil® in the second quarter of 2020. Pneumosil is designed primarily to help fight against pneumococcal pneumonia among children, with an advantage of targeting the most prevalent serotypes of the bacterium causing serious illness in developing countries. Pneumosil achieved WHO Prequalification in December 2019, allowing the product to be procured by United Nations agencies and Gavi, the Vaccine Alliance, and subsequently achieved Indian Marketing Authorization in July 2020, and announced commercial launch of the product in India in December 2020. Additionally, SII is currently testing a meningococcal conjugate vaccine in a Phase 3 study in India.

JZP-458 and JZP-341 (Jazz Pharmaceuticals)

We are developing hematologic oncology products with our partner Jazz Pharmaceuticals Ireland Limited (Jazz) including PF743 (JZP-458), a recombinant Erwinia asparaginase, PF745 (JZP-341), a long-acting Erwinia asparaginase, and PF690, a pegaspargase. Both PF743 and PF745 are being developed for the treatment of acute lymphoblastic leukemia and other hematological malignancies. Jazz has worldwide rights to develop and commercialize PF743 and PF745 and an exclusive option to license PF690 subject to certain option triggers.

In accordance with the Jazz agreement, we are eligible to earn remaining milestones of $162.5 million. We may also be eligible to receive tiered royalties on worldwide sales of any product resulting from the collaboration.

CRM197

CRM197 is a non-toxic mutant of diphtheria toxin. It is a well characterized protein and functions as a carrier for polysaccharides and haptens, making them immunogenic. CRM197 is used in prophylactic and therapeutic vaccine candidates. We have developed CRM197 production strains using our Protein Expression Technology platform and supply preclinical grade and cGMP CRM197 to several vaccine development focused pharmaceutical customers. Our partners Merck & Co., Inc. (Merck) and Serum Institute of India Private Limited (SII) have exclusively licensed unique production strains for use in their conjugate vaccine products and candidates for pneumococcal and meningitis bacterial infections. Pneumococcus bacterium *(Streptococcus pneumoniae)* is a leading cause of severe pneumonia and major cause of morbidity and mortality worldwide.

Pevonedistat - TAK-924 (Millennium/Takeda)

Our partner, Millennium/Takeda, is currently conducting Phase 3 trials for the development of pevonedistat for the treatment of hematological malignancies and solid tumors. Pevonedistat is a Captisol-enabled Nedd8-Activating Enzyme Inhibitor. Under the terms of the clinical-stage agreement, we may be entitled to over $25 million in regulatory and development milestones from Millennium/Takeda, revenue from Captisol material sales, and royalties on potential future net sales.

Ensifentrine – RPL554 (Verona)

Our partner, Verona, is currently conducting a comprehensive Phase 3 clinical trial to evaluate the efficacy and safety of nebulized ensifentrine in patients with moderate to severe COPD. Under the terms of our agreement with Verona, we are entitled to development and regulatory milestones, including a £5.0 million payment upon the first approval of any regulatory authority, and royalties on potential future sales.

Teclistamab (Janssen)

Our partner, Janssen, is developing Teclistamab, a BCMAxCD3 bispecific antibody discovered in part with the OmniAb platform technology. Janssen is currently conducting two Phase 2 trials, as a single agent and in combination with daratumumab in multiple myeloma. We are entitled to earn development and regulatory milestones based on the development of Teclistamab.

JNJ-67371244 (Janssen)

Janssen is also developing JNJ-67371244, an anti-CD33xCD3 antibody discovered in part with the OmniAb platform technology. Janssen is currently conducting a Phase I trial for cancer therapy. We are entitled to earn development and regulatory milestones based on the development of JNJ-67371244.

JNJ-70218902 (Janssen)

Janssen is also developing JNJ-70218902, a T-cell redirecting agent antibody discovered in part with the OmniAb platform technology. Janssen is currently conducting a Phase I trial for cancer therapy for patients with metastatic castration resistant prostate cancer. We are entitled to earn development and regulatory milestones based on the development of JNJ-70218902.

M6223 (Merck KGaA)

Our partner, Merck KGaA, is currently conducting a Phase 1 trial of M6223, an anti-TIGIT antibody discovered with the OmniAb platform, in patients with metastatic or locally advanced solid unresectable tumors in combination with bintrafusp alfa. Under the terms of the agreement, we are entitled to sublicense revenues, milestones and royalties on potential future net sales.

SARM - VK5211 (Viking)

Viking is also developing VK5211, a novel, potentially best-in-class SARM for patients recovering from hip-fracture. SARMs retain the beneficial properties of androgens without undesired side-effects of steroids or other less selective androgens. In the fourth quarter of 2017, Viking announced positive results from its Phase 2 trial in patients who suffered hip fracture. Under the terms of the agreement with Viking, we may be entitled to up to $270 million of development, regulatory and commercial milestones as well as tiered royalties on potential future sales.

SARM - VK5211 (Viking)	
< $500 million	7.25%
$500 to $750 million	8.25%
>$750 million	9.25%

Ganaxalone IV (Marinus)

Our partner, Marinus, is conducting Phase 3 clinical trials with Captisol-enabled ganaxolone IV in patients with PPD and refractory status epilepticus. Marinus has exclusive worldwide rights to Captisol-enabled ganaxolone, a GABAA receptor modulator, for use in humans. We are entitled to development and regulatory milestones, revenue from Captisol material sales, and royalties on potential future sales.

APVO436 (Aptevo)

Our partner, Aptevo, is currently conducting a Phase 1 trial of APVO436 for the treatment of acute myeloid leukemia and high-grade myelodysplastic syndrome. There is a high unmet medical need for targeted immunotherapies such as APVO436, that can potentially treat patients with relapsed or refractory disease, or patients who cannot tolerate traditional chemotherapy. Under the terms of the agreement with Aptevo, we are entitled to development and regulatory milestones and royalties on potential future net sales.

Gen1046 (GenMab)

Our partner, GenMab, is currently conducting a Phase 1/2 trial of Gen1046 for use in patients with malignant solid tumors. Under the terms of the agreement with GenMab, we are entitled to clinical and regulatory milestones and royalties on potential future sales.

SYM022 and SYM023 (Symphogen/Servier)

Our partner, Symphogen (acquired by Servier), is currently conducting Phase 1 trials of SYM022 and SYM023 to determine if it is safe and tolerable for patients with locally advanced/unresectable or metastatic solid tumor malignancies or lymphomas that are refractory to available therapy for which no standard therapy is available. Under the terms of the agreement with Symphogen, we are entitled to sublicense revenues, milestones and royalties on potential future net sales.

WuXi Partnership

Pursuant to the WuXi Agreement, we have granted WuXi a non-exclusive license to use our OmniRat, OmniMouse and OmniFlic platforms solely to research, develop and make antibodies, and we have agreed to use commercially reasonable efforts to deliver to WuXi animals from such platforms to support WuXi's licensing rights under the WuXi Agreement. Further, WuXi has the right to out-license antibodies it discovers (whether for itself or at the direction of out-licensees) under the WuXi Agreement to out-licensees worldwide. We are entitled to royalties in the low single digits on net sales of products. Unless earlier terminated, the term of the WuXi Agreement shall continue indefinitely. Either party may terminate the WuXi Agreement upon specified notice of the other party's uncured material breach of the WuXi Agreement. In addition, we have the right to terminate the WuXi Agreement if WuXi or one of its out-licensees challenges the validity of one of our patents covering the platform and WuXi has the right to terminate the WuXi Agreement for convenience following a specified period after notice of termination.

In addition to other earlier stage programs, the following programs have been licensed pursuant to the WuXi Agreement:

Zimberelimab AB122/GLS010/WBP3055 (Arcus and Gloria)

Our partner, WuXi, has outlicensed the rights to certain programs using the OmniAb technology to Arcus and Gloria. Arcus is conducting multiple Phase 1 trials and a Phase 2 trial to evaluate the safety and tolerability of Zimberelimab in subjects with advanced solid tumors. Additionally, Gloria, has submitted an NDA in China for the treatment of recurrent or refractory classical Hodgkin's lymphoma. Under the terms of our agreement with WuXi, we are entitled to royalties on potential future sales.

Sugemalimab CS1001 (CStone)

WuXi has also outlicensed the rights to certain programs using the OmniAb technology to CStone. CStone is currently conducting a Phase 3 trial to evaluate the efficacy and safety of CS1001 to treat patients with natural killer cell/T-cell lymphoma and classical Hodgkin's lymphoma. Under the terms of our agreement with WuXi, we are entitled to royalties on potential future sales.

Ciforadenant – CPI-444 (Corvus)

Our partner, Corvus, is conducting a Phase 1b/2 clinical trial in patients with renal cell carcinoma and metastatic castration resistant prostate cancer to evaluate Ciforadenant, an antagonist of adenosine A2A, in combination with the immunotherapy drug atezolizumab. Positive preliminary data was presented in February at ASCO 2020 Genitourinary Cancers Symposium (ASCO-GU) and additional data was presented at ASCO 2020 in May/June. Ciforadenant is also being evaluated in a Phase 1b/2 trial in combination with atezolizumab in patients with non-small cell lung cancer who have failed no more than two prior regimens. Under the terms of our agreement with Corvus, we are entitled to development and regulatory milestones and tiered royalties on potential future sales. The aggregate potential milestone payments from Corvus are approximately $220 million for all indications.

FYCOMPA IV (Eisai)

Our partner, Eisai, recently completed an open-label, single group assignment, multicenter, Phase 2 study in Japan to evaluate the safety and tolerability of intravenous perampanel, formulated with Captisol, as substitute for oral tablets as an adjunctive therapy in patients with partial onset seizures (including secondarily generalized seizures) or primary generalized tonic-clonic seizures. The primary endpoint was the number of patients with adverse events and serious adverse events. We are entitled to revenue from Captisol material sales and tiered royalties on potential future sales.

SB206 (Novan)

We acquired certain economic rights to SB206 from Novan in May 2019. SB206 is a topical nitric-oxide antiviral gel for the treatment of viral skin infections, including molluscum contagiosum (MC). MC is an infection which causes skin lesions that affect approximately 6 million people in the United States annually, with the greatest incidence in children aged one to 14 years. During the first quarter of 2020, Novan announced that it did not achieve statistically significant results for its primary end point from its Phase 3 pivotal trials of SB206 in MC. Novan continues to explore financial as well as strategic options in order to progress SB206.

PTX - 022 (Palvella)

We acquired the economic rights to PTX-022 from Palvella in December 2018. PTX-022 is a novel, topical formulation comprising high-strength rapamycin in development to treat pachyonychia congenita (PC). PC is a serious, chronically debilitating lifelong monogenic rare skin disease with no approved treatment. Palvella announced top line results of the Phase 2/3 VALOR study in late 2020. The Phase 3 portion of the study missed the primary endpoint, but significant improvement in the primary endpoint was achieved in the open-label, Phase 2 portion. Palvella plans to share the results with the FDA in the first quarter of 2021.

PTX - 022 (Palvella)	
< $50 million	5.00%
$50 to $100 million	7.50%
>$100 million	9.80%

Lasofoxifene (Sermonix)

Lasofoxifene is a selective estrogen receptor modulator for osteoporosis treatment and other diseases, discovered through the research collaboration between Pfizer and us.

Our partner, Sermonix has a license for the development of oral lasofoxifene for the United States and additional territories. Under the terms of the agreement, we are entitled to receive over $45 million in potential regulatory and commercial milestone payments as well as royalties on potential future net sales.

Sermonix announced in October 2020 the enrollment and dosing of the first patient into the Phase 2 ELAINE 2 clinical trial of lasofoxifene in combination with Eli Lilly's FDA-approved CDK 4 and 6 inhibitor, abemaciclib for the treatment of pre- and postmenopausal women with locally advanced metastatic estrogen receptor-positive (ER+)/HER2- breast cancer and an ESR1 mutation. The Phase 2 ELAINE 1 trial, which began enrollment in September 2019, is assessing the efficacy of oral lasofoxifene versus intramuscular fulvestrant for the treatment of postmenopausal women with locally advanced or metastatic ER+/HER2- breast cancer with an ESR1 mutation.

Pradefovir (Xi'an Xintong)

Our Chinese licensee, Xi'an Xintong Medicine Research (following its acquisition of Chiva Pharmaceuticals), is developing pradefovir, an oral liver-targeting prodrug of the HBV DNA polymerase/reverse transcriptase inhibitor adefovir, for the potential treatment of hepatitis B virus (HBV) infection. Pradefovir was developed using Ligand's HepDirect technology. In September 2019, Xi'an Xintong Medicine Research reported positive results from a Phase 2 trial of pradefovir, showing good efficacy, safety and tolerability. At the dose of 75 mg, the reduction of DNA viral load, the percentage of no viral load detected, and HBeAg negative conversion rate were better than tenofovir disoproxil fumarate (TDF) after 24 weeks of treatment. Overall incidence of side effects was less than TDF and there was no renal or skeletal toxicity. Xi'an Xintong Medicine Research is planning for a Phase 3 trial. We are entitled to an annual licensing maintenance fee and royalties on potential future sales.

MB07133 (Xi'an Xintong)

Chinese licensee Xi'an Xintong Medicine Research is also developing MB07133, a liver specific, HepDirect prodrug of cytarabine monophosphate, for the potential treatment of hepatocellular carcinoma (HCC) and intrahepatic cholangiocarcinoma. MB07133 is currently in Phase 1 in China. We are entitled to an annual licensing maintenance fee and royalties on potential future sales.

Summary of Selected Collaborations

GSK Collaboration

In December 2020, we entered into a license and collaboration agreement with GSK to leverage our unique expertise in small molecule therapeutics targeting transmembrane proteins. The goal of this collaboration is to identify and develop inhibitors of a specific, genetically validated molecular target relevant to neurological diseases. Under the terms of the agreement, we received an upfront payment of $7.0 million and could receive additional development, regulatory and commercialization milestones of up to $154.5 million. We are also entitled to receive tiered royalties should any drug from the collaboration be commercialized. We will be responsible for the majority of preclinical activities up to lead optimization with both Ligand and GSK collaborating to identify candidates of IND-enabling studies. GSK has the exclusive option to license any identified inhibitors and will be responsible for further development and commercialization of any drug candidates identified through the collaboration.

Roche Collaboration

In December 2018, prior to the acquisition by Ligand, Icagen entered into a license and collaboration agreement with Roche to develop and commercialize small molecule ion channel modulators for the treatment of neurological disorders and in May 2020 amended the license and collaboration agreement to include a second target. These programs incorporate our technology platform for ion channel drug discovery and are directed at specific ion channel targets expressed in neurons. Under the terms of the agreement, Roche paid us on a per target basis an upfront payment for program exclusivity and research funding. In addition, we are eligible to potentially receive development and commercial milestone payments of up to $274 million per program and royalty payments if a drug is commercialized. We will be responsible for most preclinical activities up to lead optimization with both us and Roche applying resources to identify candidates for entry into late stage preclinical and IND enabling studies. Thereafter, Roche will be responsible for the further development and commercialization of the programs.

Cystic Fibrosis Foundation Collaboration

In May 2018, prior to the acquisition by Ligand, Icagen announced an award of up to $11 million from the Cystic Fibrosis Foundation for a project focused on the discovery of therapeutics to treat patients with cystic fibrosis (CF) caused by nonsense mutations. Nonsense mutations in the Cystic Fibrosis Transmembrane Conductance Regulator ("CFTR") gene result in the premature termination of protein synthesis and the formation of truncated, non-functional CFTR. Patients with these mutations in both copies of their CFTR genes currently have no therapies that treat the underlying cause of their disease. The aim of this program is to provide these patients with a transformative therapeutic that will markedly improve their quality of life and lifespan. The award is to support an integrated, multi-year drug discovery initiative. At the North American Cystic Fibrosis Conference in October 2020, we reported the identification and characterization of a class of small molecule agents that enhance CFTR-PTC mutant readthrough and enable functional CFTR currents in combination with aminoglycosides.

Royalties

We have multiple programs under license with other companies that have products that are already being commercialized. In addition to the table below, we have generally described a typical Captisol and OmniAb royalty arrangement as low- to mid-single digit royalties. The following table represents substantially all of the disclosed information about our royalty arrangements:

Royalty Table

Ligand Licenses With Tiered Royalties		
Program	Licensee	Royalty Rate
CE-Meloxicam	Sedor	8.0% - 10.0%
Ciforadenant	Corvus	Mid-single digit to low-teen royalty
DGAT-1	Viking	3.0% - 7.0%
Duavee	Pfizer	0.5% - 2.5%
Ensifentrine (RPL554)	Verona	Low to mid-single digit royalty
FBPase Inhibitor (VK0612)	Viking	7.5% - 9.5%
Kyprolis	Amgen	1.5% - 3.0%
Lasofoxifene	Sermonix	6.0% - 10.0%
Mineral Coated Microparticle	Dianomi	2.0% - 3.0%
OmniAb-Genagon	Genagon	4.0% - 6.0%
OmniAb-GigaGen	GigaGen	Mid-single digit royalty
OmniAb-iMetabolic	iMetabolic	<6%
OmniAb-Kira	Kira	Low to mid-single digit royalty
OmniAb-Takeda	Takeda	Low single digit royalty
Oral EPO	Viking	4.5% - 8.5%
PTX-022	Palvella	5.0% - 9.8%
SARM (VK5211)	Viking	7.25% - 9.25%
SB206	Novan	7.0% - 10.0%
TR Beta (VK2809 and VK0214)	Viking	3.5% - 7.5%
Viviant/Conbriza	Pfizer	0.5% - 2.5%
Various	Nucorion	4.0% - 9.0%
Various	Seelos	4.0% - 10.0%

Ligand Licenses With Fixed Royalties		
Program	Licensee	Royalty Rate
4-1BB	Zhilkang Hongyi	Low single digit royalty
AB122	Arcus	Low single digit royalty
Baxdela	Melinta	2.5%
CE-Fosphenytoin	Sedor	11%
Sugemalimab	CStone	3%
Evomela	Acrotech/CASI	20%
V114	Merck	Low single digit royalty
Pneumosil	Serum Institute	Low single digit royalty
MB07133	Xi'an Xintong	6%
ME-344	MEI Pharma	Low single digit royalty
OmniAb-KSQ Therapeutics	KSQ Therapeutics	Single digit royalty
PCSK-9	Genekey	Low single digit royalty
Pradefovir	Xi'an Xintong	9%
Reproxalap	Aldeyra Therapeutics	Low single digit royalty
Sparsentan	Travere	9%
Various	Gloria	Low single digit royalty
Zulresso	SAGE	3%

Contract Payments (Milestones)

Many of our programs under license with our partners will generate contract payments to us if our partners reach certain development, regulatory and commercial milestones. The following table represents the potential maximum value of our contract payment pipeline on milestones by development stage, technology and partner (in thousands):

Technology*		Stage*		Partner*	
OmniAb	> $800,000	Preclinical	> $25,000	Viking	$1,500,000
Icagen	>$750,000	Clinical	> $600,000	Roche	$543,000
PET	>$500,000	Regulatory	> $2,100,000	Janssen	$355,000
Vernalis	> $350,000	Commercial	> $1,800,000	Merck	$296,000
Captisol	> $150,000	Other	> $75,000	Neuritek	$246,000
LTP/Hep Direct	> $250,000	Total	>$4,600,000	Jazz	$170,000
NCE/Other	> $1,800,000			Seelos	$139,000
Total	>$4,600,000			Travere	$70,000
				Other	>$1,281,000
				Total	>$4,600,000

**All tables exclude our annual access fees and collaboration revenue for development work.*

Internal Development Programs

We have a number of internal development or unpartnered programs focused on a wide-range of potential indications or disease.

The Captisol-enabled (CE)-Iohexol program was established in January 2018 to develop a next-generation contrast agent for diagnostic imaging with a reduced risk of renal toxicity. Contrast-induced acute kidney injury (CI-AKI) is the acute impairment of renal function following intravascular administration of an iodinated contrast agent, and occurs most frequently following coronary angiography, percutaneous coronary intervention and contrast-enhanced computed tomography, especially among patients at risk of renal injury such as those with advanced age, diabetes or heart failure. Currently no products are approved to prevent or treat CI-AKI in this setting, and therefore we believe a significant opportunity exists for a safer formulation of contrast agents. The goal is for CE-Iohexol to improve upon the limitations of existing contrast agents and enable a future partner to gain meaningful market share. In July 2019, we announced positive top-line results from a Phase 1 clinical trial CE-Iohexol conducted in Canada. The trial achieved the primary endpoint by demonstrating pharmacokinetic bioequivalence of CE-Iohexol injection and a reference Iohexol injection (OMNIPAQUE™) after IV administration in healthy adults. CE-Iohexol injection was well tolerated, and adverse events were in line with the known safety profile of OMNIPAQUE. We submitted an IND with the FDA in November and received a “Study May Proceed” letter in December 2020 along with feedback from the FDA on the clinical plan. We plan to initiate a Phase 2 study in the U.S. in the first quarter of 2021.

The Luminespib/Hsp90 Inhibitor is a Phase 2-ready Hsp90 inhibitor, previously investigated in clinical trials for cancer. Third-party academic drug analyses suggest a potential role for heat shock protein 90 (Hsp90) inhibitors in treating COVID-19 infection. Based on these studies, we are evaluating potential collaborations or partnerships relating to intravenous luminespib (AUY-922) as a potential treatment for patients with COVID-19.

Our primary research and development efforts are led by our teams in Emeryville, California, San Diego, California, and Durham, North Carolina,. The following table represents internal programs eligible for further development or partnership:

Program	Development Stage	Targeted Indication or Disease
CE-Iohexol	Phase 2	Diagnostics
Luminespib/Hsp90 Inhibitor	Phase 2	Oncology
CE-Sertraline, Oral Concentrate	Phase 1	Depression
PF530 Interferon Beta	Phase 1	Immunomodulatory
PF582 Ranibizumab	Phase 1	Ocular
CCR1 Antagonist	Preclinical	Oncology
CE-Busulfan	Preclinical	Oncology
CE-Cetirizine Injection	Preclinical	Allergy
CE-Silymarin for Topical formulation	Preclinical	Sun damage
FLT3 Kinase Inhibitors	Preclinical	Oncology
GCSF Receptor Agonist	Preclinical	Blood disorders
Anti-B7-H3	Preclinical	Oncology
Anti-TIM3	Preclinical	Oncology
Anti-TIGIT	Preclinical	Oncology
Anti-CD38	Preclinical	Oncology
Anti-BDNF	Preclinical	Oncology
PF529 Pegfilgrastim	Preclinical	Oncology
PF810 Recombinant Peptide	Preclinical	Endocrine System

Manufacturing

We contract with a third party manufacturer, Hovione, for Captisol production. Hovione operates FDA-inspected sites in the United States, Macau, Ireland and Portugal. Manufacturing and distribution operations for Captisol are performed primarily at Hovione's Portugal and Ireland facilities. We believe we maintain adequate inventory of Captisol to meet our current and future partner needs.

In the event of a Captisol supply interruption, we are permitted to designate and, with Hovione’s assistance, qualify one or more alternate suppliers. If the supply interruption continues beyond a designated period, we may terminate the agreement. In addition, if Hovione cannot supply our requirements of Captisol due to an uncured force majeure event, we may also obtain Captisol from a third party and have previously identified such parties.

The current term of the agreement with Hovione is through December 2024. The agreement will automatically renew for successive two year renewal terms unless either party gives written notice of its intention to terminate the agreement no less than two years prior to the expiration of the initial term or renewal term. In addition, either party may terminate the agreement for the uncured material breach or bankruptcy of the other party or an extended force majeure event. We may terminate the agreement for extended supply interruption, regulatory action related to Captisol or other specified events. We have ongoing minimum purchase commitments under the agreement.

Competition

Some of the drugs we and our licensees and partners are developing may compete with existing therapies or other drugs in development by other companies. Furthermore, academic institutions, government agencies and other public and private organizations conducting research may seek patent protection with respect to potentially competing products or technologies and may establish collaborative arrangements with our competitors.

Our Captisol business may face competition from other suppliers of similar cyclodextrin excipients or other technologies that are aimed to increase solubility or stability of APIs. Our OmniAb antibody technology faces competition from suppliers of other transgenic animal systems that are also available for antibody drug discovery such as AbCellera Biologics.

Our competitive position also depends upon our ability to obtain patent protection or otherwise develop proprietary products or processes. For a discussion of the risks associated with competition, see below under *“Item 1A. Risk Factors.”*

Environmental, Health and Safety (EHS)

We are committed to providing a safe and healthy workplace, promoting environmental excellence in our communities, and complying with all relevant regulations and industry standards. We establish and monitor programs to reduce pollution, prevent injuries, and maintain compliance with applicable regulations. By focusing on such practices, we believe we can affect a meaningful, positive change in our community and maintain a healthy and safe environment. Our animal health facility in Emeryville, California, has accreditation from Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC), a nonprofit organization that promotes the humane treatment of animals in science through voluntary accreditation and assessment programs. We expect to continue our effort and to refine our EHS policies and practices in 2021.

Government Regulation

The research and development, manufacturing and marketing of pharmaceutical products are subject to regulation by numerous governmental authorities in the United States and other countries. We and our partners, depending on specific activities performed, are subject to these regulations. In the United States, pharmaceuticals are subject to regulation by both federal and various state authorities, including the FDA. The Federal Food, Drug and Cosmetic Act and the Public Health Service Act govern the testing, manufacture, safety, efficacy, labeling, storage, record keeping, approval, advertising and promotion of pharmaceutical products. These activities are subject to additional regulations that apply at the state level. There are similar regulations in other countries as well. For both currently marketed products and products in development, failure to comply with applicable regulatory requirements can, among other things, result in delays, the suspension of regulatory approvals, as well as possible civil and criminal sanctions. In addition, changes in existing regulations could have a material adverse effect on us or our partners. For a discussion of the risks associated with government regulations, see below under "*Item 1A. Risk Factors.*"

Patents and Proprietary Rights

We believe that patents and other proprietary rights are important to our business. Our policy is to file patent applications to protect technology, inventions and improvements to our inventions that are considered important to the development of our business. We also rely upon trade secrets, know-how, continuing technological innovations and licensing opportunities to develop and maintain our competitive position.

Patents are issued or pending for the following key products or product families. The scope and type of patent protection provided by each patent family is defined by the claims in the various patents. Patent term may vary by jurisdiction and depend on a number of factors including potential patent term adjustments, patent term extensions, and terminal disclaimers. For each product or product family, the patents and/or applications referred to are in force in at least the United States, and for most products and product families, the patents and/or applications are also in force in European jurisdictions, Japan and other jurisdictions.

Kyprolis

Patents protecting Kyprolis include those owned by Amgen and those owned by us. The United States patent listed in the Orange Book relating to Kyprolis with the latest expiration date is not expected to expire until 2029. Patents and applications owned by Ligand relating to the Captisol component of Kyprolis are not expected to expire until 2033. Amgen has filed suit against several generic drug companies over their applications to make generic versions of Kyprolis. Several generics have settled with Amgen on confidential terms. However, it has been publicly reported that the U.S. launch date for at least Breckenridge Pharmaceuticals' generic product will be on a date that is held as confidential in 2027 or sooner, depending on certain occurrences. One generic company, Cipla Limited/Cipla USA, Inc. chose not to settle the litigation with Amgen, and proceeded to trial. The District Court upheld the validity of patent claims from three of the patents and Cipla has appealed. The type of patent protection (*e.g.*, composition of matter or use) for each patent listed in the Orange Book and the expiration dates for each patent listed in the Orange Book are provided in the following table. In addition, certain related patents in the commercially important jurisdictions of Europe and Japan are identified in the following table.

Kyprolis					
United States			Corresponding Foreign		
Type of Protection	U.S. Patent No.	U.S. Expiration Date	Jurisdiction	Patent Number	Expiration Date‡

CoM	7,232,818	4/14/2025	EU	1,745,064	4/14/2025
			EU	1,781,688	8/8/2025
			EU	2,266,999	8/8/2025
			EU	2,270,026	8/8/2025
			EU	3,101,026	8/8/2025
			Japan	4,743,720	8/8/2025
			Japan	5,394,423	4/14/2025
CoM	7,417,042	7/20/2026	EU	1,781,688	8/8/2025
			EU	2,266,999	8/8/2025
			EU	2,270,026	8/8/2025
			EU	3,101,026	8/8/2025
			Japan	4,743,720	8/8/2025
			Japan	5,394,423	4/14/2025
Use	7,491,704	4/14/2025	EU	1,745,064	4/14/2025
			EU	1,781,688	8/8/2025
			EU	2,266,999	8/8/2025
			EU	2,270,026	8/8/2025
			EU	3,101,026	8/8/2025
			Japan	4,743,720	8/8/2025
			Japan	5,394,423	4/14/2025
CoM	7,737,112	12/7/2027	EU	1,819,353	12/7/2025
			EU	2,260,835	12/7/2025
			EU	2,261,236	12/7/2025
			Japan	4,990,155	12/7/2025
			Japan	5,108,509	5/9/2025
Use	8,129,346	4/14/2025	EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
CoM	8,207,125	4/14/2025	EU	1,781,688	8/8/2025
			EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
			Japan	4,743,720	8/8/2025
CoM / Use	8,207,126	4/14/2025	EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
Use	8,207,127	4/14/2025	EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
CoM / Use	8,207,297	4/14/2025	EU	1,745,064	4/14/2025
			Japan	5,394,423	4/14/2025
			Japan	5,616,569	4/14/2025
CoM	9,493,582	2/27/2033	Japan	6,517,725	2/27/2033
Use	9,511,109	10/21/2029	EU	2,796,134	10/21/2029
			Japan	5,675,629	10/21/2029
			Japan	6,081,964	10/21/2029
			Japan	6,714,664	10/21/2029

‡Expiration dates of European and Japanese patents are calculated as 20 years from the earliest nonprovisional filing date to which priority is claimed, and do not take into account extensions that are or may be available in these jurisdictions.

Captisol

Patents and pending patent applications covering Captisol and methods of making Captisol are owned by us. The patents covering the Captisol product, if issued, with the latest expiration date would not be set to expire until 2033 (*see, e.g.,* U.S. Patent No. 9,493,582 (expires Feb. 27, 2033)). Other patent applications covering methods of making Captisol, if issued,

potentially have terms to 2040. We have asserted U.S. Patents 8,410,077, 9,200,088, and 9,493,582 against Teva in connection with their attempt to obtain FDA approval to manufacture and sell a generic version of EVOMELA®. We also own several patents and pending patent applications covering drug products containing Captisol as a component. The type of patent protection (*e.g.*, composition of matter or use) and the expiration dates for several issued patents covering Captisol are provided in the following table. In addition, certain related patents and applications in the commercially important jurisdictions of Europe and Japan are listed in the following table.

Captisol					
United States			Corresponding Foreign		
Type of Protection	U.S. Patent No.	U.S. Expiration Date	Jurisdiction	Patent Number	Expiration Date‡
CoM	8,114,438	10/26/2025	EU	2,708,225	4/22/2025
			Japan	6,141,906	4/22/2025
			Japan	6,538,739	4/22/2025
CoM	10,117,940	4/22/2025	EU	2,708,225	4/22/2025
			Japan	6,141,906	4/22/2025
			Japan	6,538,739	4/22/2025
CoM	10,668,160	12/19/2026	EU	2,708,225	4/22/2025
			Japan	6,141,906	4/22/2025
			Japan	6,538,739	4/22/2025
CoM	7,629,331	10/26/2025	EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			Japan	5,465,432	10/26/2026
Use	8,049,003	12/19/2026	EU	2,583,668	10/26/2025
CoM	8,846,901	10/26/2025	EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			Japan	5,465,432	10/26/2026
CoM	8,829,182	10/26/2025	EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			EU	2,952,197	10/26/2025
			Japan	5,465,432	10/26/2026
CoM/Use/MoM	9,617,352	6/8/2026	EU	2,583,668	10/26/2025
			EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			EU	2,952,197	10/26/2025
			Japan	5,465,432	10/26/2026
CoM/MoM	10,202,468	10/26/2025	EU	2,583,668	10/26/2025
			EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			EU	2,952,197	10/26/2025
			Japan	5,465,432	10/26/2026

CoM	10,703,826	10/26/2025	EU	2,583,668	10/26/2025
			EU	1,945,228	10/26/2025
			EU	2,335,707	10/26/2025
			EU	2,581,078	10/26/2025
			Japan	5,465,432	10/26/2026
CoM / Use	7,635,773	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
CoM	8,410,077	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
CoM	9,200,088	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
CoM	9,750,822	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
CoM	10,117,951	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
CoM	10,780,177	3/13/2029	Japan	4,923,144	4/28/2029
			Japan	6,039,721	4/28/2029
			Japan	6,276,828	4/28/2029
			Japan	6,444,548	4/28/2029
MoM	9,751,957	6/28/2033	EU	2,814,849	2/14/2033
			Japan	6,508,944	2/14/2033
MoM	10,633,462	2/14/2033	EU	2,814,849	2/14/2033
			Japan	6,508,944	2/14/2033
CoM	9,493,582	2/27/2033	Japan	6,517,725	2/27/2033
MoM	10,323,103	2/27/2033	Japan	6,517,725	2/27/2033
CoM/MoM	10,040,872	2/27/2033	Japan	6,557,144	10/21/2033
MoM	10,800,861	2/27/2033	Japan	6,557,144	10/21/2033

‡ Expiration date of European and Japanese patents are calculated as 20 years from the earliest nonprovisional filing date to which priority is claimed, and do not take into account extensions that are or may be available in these jurisdictions.

Subject to compliance with the terms of the respective agreements, our rights to receive royalty payments under our licenses with our exclusive licensors typically extend for the life of the patents covering such developments. For a discussion of the risks associated with patent and proprietary rights, see below under "*Item 1A. Risk Factors*."

OmniAb Technology Stack

Our OmniAb therapeutic antibody platforms, including OmniRat, OmniMouse and OmniChicken, produce naturally optimized, fully human antibodies in animals. We have received patent protection on OmniAb animals and methods in over 40 jurisdictions, including the United States, multiple countries throughout Europe, Japan and China (see selected cases listed in

the table below). The patents and applications owned by us are expected to expire between 2028 and 2039 and partners are able to use the OmniAb patented technology to generate novel antibodies, which may be entitled to additional patent protection.

OmniAb in OmniMouse and OmniRat					
United States			Corresponding Foreign		
Type of Protection	U.S. Patent No.	U.S. Expiration Date	Jurisdiction	Patent Number	Expiration Date‡
CoM	8,703,485	10/10/2031	EU	2,152,880	5/30/2028
			EU	2,336,329	5/30/2028
			EU	2,603,323	5/30/2028
			Japan	5,823,690	5/30/2028
			Japan	6,220,827	5/30/2028
CoM	9,388,233	5/30/2028	EU	2,152,880	5/30/2028
			EU	2,336,329	5/30/2028
			EU	2,602,323	5/30/2028
			Japan	5,823,690	5/30/2028
			Japan	6,220,827	5/30/2028
CoM	10,072,069	5/30/2028	EU	2,152,880	5/30/2028
			EU	2,336,329	5/30/2028
			EU	2,602,323	5/30/2028
			Japan	5,823,690	5/30/2028
			Japan	6,220,827	5/30/2028
Use/MoM	8,907,157	5/30/2028	N/A		
CoM/Use	9,475,859	4/15/2034	EU	2,931,030	12/13/2033
			Japan	6,705,650	12/13/2033
CoM	10,385,132	1/8/2034	EU	2,931,030	12/13/2033
			Japan	6,705,650	12/13/2033

OmniAb in OmniChicken					
United States			Corresponding Foreign		
Type of Protection	U.S. Patent No.	U.S. Expiration Date	Jurisdiction	Patent Number	Expiration Date‡
CoM/Use	8,030,095	12/23/2029	Europe	2,271,657	3/2/2029
			Japan	5,737,707	3/2/2029
MoM	8,415,173	3/2/2029	Europe	2,271,657	3/2/2029
			Japan	5,737,707	3/2/2029
CoM	8,592,644	8/30/2030	Japan	5,756,802	8/11/2030
CoM	9,404,125	12/29/2030	Japan	5,756,802	8/11/2030
Use	9,549,538	8/11/2030	Japan	5,756,802	8/11/2030
CoM/Use	10,010,058	8/11/2030	Japan	5,756,802	8/11/2030
CoM/Use	10,172,334	8/11/2030	Japan	5,756,802	8/11/2030
CoM/Use	10,687,519	8/11/2030	Japan	5,756,802	8/11/2030
CoM/Use	10,362,770	8/11/2030	N/A	5,756,802	8/11/2030
CoM/MoM/Use	8,865,462	5/8/2032	N/A		
CoM	10,689,433	5/23/2032	N/A		
Com/MoM/Use	9,644,178	1/7/2031	N/A		
CoM	9,380,769	5/23/2032	EU	2,713,712	5/23/2032
CoM	9,809,642	5/23/2032	N/A		
CoM/Use	9,394,372	10/16/2032	N/A		
CoM	9,982,062	10/16/2032	N/A		
CoM/Use	10,555,508	10/16/2032	N/A		

‡ Expiration date of European and Japanese patents are calculated as 20 years from the earliest nonprovisional filing date to which priority is claimed, and do not take into account extensions that are or may be available in these jurisdictions.

Vernalis

Under the terms of our sale of Vernalis (R&D) Limited to HitGen in December 2020, Ligand retained a portfolio of fully-funded shots on goal, which now include RPL554, a Phase 2, novel treatment for COPD, which is partnered with Verona; Ciforadenant, a Phase 1 adenosine A2A receptor antagonist for treatment of solid tumors, partnered with Corvus; Tosedostat, an aminopeptidase inhibitor for treatment of blood cancers, partnered with Cell Therapeutics, Inc. (CTI), S65487, a Bcl-2 inhibitor, and S64315, an Mcl-1 inhibitor for treatment of cancers, both of which are partnered with Servier in collaboration with Novartis, and VER250840 (an oral, selective Chk1 inhibitor for treatment of cancer). These programs and their IP are now owned by Ligand UK Development Limited, which has a worldwide patent portfolio of over 200 granted patents in over 60 countries.

Protein Expression Technology Platform

We acquired the Protein Expression Technology Platform through acquisition of Pfenex Inc. in October 2020. This acquisition brought a robust product patent portfolio in the areas of biosimilars, microbial toxin, and vaccine antigen production, as well as a growing number of patents that cover our platform technology (including promoters, secretion leader sequences, methods for high throughput screening, protein expression, strain engineering, marker systems, etc.) useful to the core business. Together there are over 200 issued patents worldwide, and nearly 50 pending applications.

Icagen Technology Platform

In April 2020, we acquired the core assets of Icagen, Inc., an early-stage drug discovery company focused on ion channel and transporter targets. Icagen has a portfolio of over 75 issued patents worldwide and ten pending applications relating to micro X-ray fluorescence-based detection of binding events and transport across barriers.

xCella Biosciences

In September 2020, we acquired xCella Biosciences, Inc.. xCella's platform is a proprietary microcapillary platform that can screen single B cells for specificity and bioactivity which expand our existing single- B cell assay capabilities in the OmniAb technology stack. We acquired one issued patent directed to xCella's assay platform, and nearly 20 pending applications, along with access to several technologies owned by Stanford University.

Taurus Bioscience

In September 2020, we acquired Taurus Biosciences which added technologies for discovery and humanization of antibodies from immunized cows or cow-derived libraries in our OmniAb platform technology stack. These antibodies feature some of the longest CDRH3s of any species, with unique genetic and structural diversity that can enable binding to challenging antigens with application in therapeutics, diagnostics and research. We acquired over 15 issued patents along with access to technology owned by The Scripps Research Institute.

Human Capital Management

We recognize and take care of our employees by offering a wide range of competitive pay, recognition, and benefit programs. We are proud to provide our employees the opportunity to grow and advance as we invest in their education and career development. As of December 31, 2020, we have 155 employees, of whom 118 are involved directly in scientific research and development activities.

We rely on skilled, experienced, and innovative employees to conduct the operations of our company. Our key human capital objectives include identifying, recruiting, retaining, incentivizing and integrating our existing and new employees. We frequently benchmark our compensation practices and benefits programs against those of comparable industries and in the geographic areas where our facilities are located. We believe that our compensation and employee benefits are competitive and allow us to attract and retain skilled labor throughout our organization. Our notable health, welfare and retirement benefits include:

- equity awards through our 2002 Stock Incentive Plan;
- subsidized health insurance;
- 401(k) Plan with matching contributions;

- tuition assistance program; and
- paid time off.

We strive to maintain an inclusive environment free from discrimination of any kind, including sexual or other discriminatory harassment. Our employees have multiple avenues available through which inappropriate behavior can be reported, including a confidential hotline. All reports of inappropriate behavior are promptly investigated with appropriate action taken to stop such behavior.

Investor Information

Financial and other information about us is available on our website at www.ligand.com. We make available on our website, without charge, copies of our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to, the U.S. Securities and Exchange Commission, or SEC. You may obtain copies of these documents by visiting the SEC's website at www.sec.gov. These website addresses are not intended to function as hyperlinks, and the information contained in our website and in the SEC's website is not intended to be a part of this filing.

ITEM 1A. RISK FACTORS

The following is a summary description of some of the many risks we face in our business. You should carefully review these risks in evaluating our business, including the businesses of our subsidiaries. You should also consider the other information described in this report. Additional risks not presently known to us or that we currently deem immaterial also may impair our business.

Risks Related to Our Business Operations and Reliance on Third Parties:

Our business is subject to risks arising from epidemic diseases, such as the recent COVID-19 pandemic, which has impacted and could continue to impact our business.

The current COVID-19 worldwide pandemic has presented substantial public health and economic challenges and is affecting our employees and partners, patients, communities and business operations, as well as the U.S. and global economy and financial markets. International and U.S. governmental authorities in impacted regions are taking actions in an effort to slow the spread of COVID-19, including issuing varying forms of "stay-at-home" orders, and restricting business functions outside of one's home. In response, we have restricted in-person access to our executive offices, our administrative employees are mostly working remotely, and we have limited the number of staff in our research and development laboratories and other facilities.

Several of our partners have reported that their operations have been impacted including delays in research and development programs and deprioritizing clinical trials in favor of treating patients who have contracted the virus or to prevent the spread of the virus. This may lead to clinical trial protocol deviations or to discontinuation of treatment for patients who are currently enrolled in the clinical trials being conducted by us or our partners. In addition, certain of our partners have reported negative impacts on product sales which will impact our royalty revenues. As the COVID-19 pandemic continues to spread around the globe, we may experience disruptions that could severely impact our business, drug manufacturing and supply chain, nonclinical activities and clinical trials and our partners' business may be impacted in similar ways, including due to:

- delays or difficulties in enrolling patients in clinical trials;
- delays or difficulties in clinical site initiation, including difficulties in recruiting or supporting clinical site investigators and clinical site staff;
- diversion of healthcare resources away from the conduct of clinical trials, including the diversion of hospitals serving as clinical trial sites and hospital staff supporting the conduct of clinical trials;
- interruption of key clinical trial activities, such as clinical trial site monitoring, due to limitations on travel imposed or recommended by federal or state governments, employers and others or interruption of clinical trial subject visits and study procedures, which may impact the integrity of subject data and clinical study endpoints;
- interruption or delays in the operations of the FDA or other regulatory authorities, which may impact review and approval timelines;
- interruption of, or delays in receiving, supplies of Captisol or other product or product candidates from contract manufacturing organizations due to staffing shortages, production slowdowns or stoppages and disruptions in delivery systems, which may result in cancellations of Captisol orders or refunds if we fail to deliver Captisol timely;

- delays in clinical sites receiving the supplies and materials needed to conduct clinical trials and interruption in global shipping that may affect the transport of clinical trial materials;
- interruptions in nonclinical studies due to restricted or limited operations at laboratory facility or those of outsourced service providers;
- limitations on employee resources that would otherwise be focused on the conduct of nonclinical studies or clinical trials, including because of sickness of employees or their families or the desire of employees to avoid contact with large groups of people;
- delays in receiving approval from local regulatory authorities to initiate planned clinical trials;
- changes in local regulations as part of a response to COVID-19 which may require us to change the ways in which clinical trials are conducted, which may result in unexpected costs, or to discontinue the clinical trials altogether;
- delays in necessary interactions with local regulators, ethics committees and other important agencies and contractors due to limitations in employee resources or forced furlough of government employees;
- refusal of the FDA to accept data from clinical trials in affected geographies outside the United States;
- interruption or delays to discovery and development pipelines; and
- difficulties launching or commercializing products, including due to reduced access to doctors as a result of social distancing protocols.

In addition, if COVID-19 infects our genetically modified animals which form the basis of our OmniAb platform, or if there is an outbreak among our employees who maintain and care for these animals, we and our partners may be unable to produce antibodies for development. Further, the spread of COVID-19 has had and may continue to severely impact the trading price of shares of our common stock and could further severely impact our ability to raise additional capital on a timely basis or at all.

The COVID-19 pandemic continues to evolve. The extent to which the COVID-19 may impact our business, including our drug manufacturing and supply chain, nonclinical activities, clinical trials and financial condition, including due to impacts on our partners' businesses, will depend on future developments, which are highly uncertain and cannot be predicted with confidence, the duration of the pandemic, travel restrictions and social distancing in the United States and other countries, business closures or business disruptions and the effectiveness of actions taken in the United States and other countries to contain and treat the disease.

Future revenue based on Kyprolis and Evomela, as well as royalties from our other partnered products, may be lower than expected.

Substantially all of our royalty revenue is based on sales of Kyprolis by Amgen and sales of Evomela by Acrotech Biopharma. Royalties, including payments from Amgen and Acrotech Biopharma, are expected to be a substantial portion of our ongoing revenues for the foreseeable future. Any setback that may occur with respect to any of our partners' products, and in particular Kyprolis, could significantly impair our operating results and/or reduce our revenue and the market price of our stock. Setbacks for the products could include problems with shipping, distribution, manufacturing, product safety, marketing, government regulation or reimbursement, licenses and approvals, intellectual property rights, including Amgen's or Acrotech Biopharma's failure to enforce their respective intellectual property rights, competition with existing or new products and physician or patient acceptance of the products, as well as higher than expected total rebates, returns, discounts, or unfavorable exchange rates. These products also are or may become subject to generic competition. For example, we entered into a settlement agreement with Teva and Acrotech Biopharma (the holder of the NDA for Evomela) which will allow Teva to market a generic version of Evomela in the United States on June 1, 2026, or earlier under certain circumstances. The entry of generic competition for Evomela may materially and adversely affect the revenue we derive from Evomela sales. Also, Amgen has settled patent litigation related to Kyprolis on confidential terms with several parties, but it has been publicly reported that the U.S. launch date for at least Breckenridge Pharmaceuticals' applicable generic product will be "on a date that is held as confidential in 2027 or sooner, depending on certain occurrences" and litigation against one other party is awaiting a post-trial judgement.

Future revenue from sales of Captisol material to our license partners may be lower than expected.

Revenues from sales of Captisol material to our collaborative partners, including Amgen and Gilead, represent a significant portion of our current revenues. Any setback that may occur with respect to Captisol could significantly impair our operating results and/or reduce the market price of our stock. Setbacks for Captisol could include problems with shipping, distribution, manufacturing, product safety, marketing, government regulation or reimbursement, licenses and approvals, intellectual property rights, competition with existing or new products and physician or patient acceptance of the products using Captisol. In addition, revenue from Captisol sales related to remdesivir may not continue or materially increase due to a number of factors, including: if remdesivir is later shown to not be effective or safe for the treatment of COVID-19; the FDA revises or revokes its approval of remdesivir; if alternative therapies or vaccines are approved; or the risk of COVID-19 infection significantly diminishes, in which case the commercial opportunity could be materially and adversely affected.

If products or product candidates incorporating Captisol material were to cause any unexpected adverse events, the perception of Captisol safety could be seriously harmed. If this were to occur, we may not be able to sell Captisol unless and until we are able to demonstrate that the adverse event was unrelated to Captisol, which we may not be able to do. Further, the FDA could require us to submit additional information for regulatory review or approval, including data from extensive safety testing or clinical testing of products using Captisol. This would be expensive and it may delay the marketing of Captisol-enabled products and receipt of revenue related to those products, which could significantly impair our operating results and/or reduce the market price of our stock.

We obtain Captisol from Hovione, our third party manufacturer, primarily at Hovione's facilities in Portugal and Ireland.If Hovione were to cease to be able, for any reason, to supply Captisol to us in the amounts we require, or decline to supply Captisol to us, we would be required to seek an alternative source, which could potentially take a considerable length of time and impact our revenue and customer relationships. In the event of a Captisol supply interruption, we are permitted to designate and, with Hovione's assistance, qualify one or more alternate suppliers, although there is no assurance that we could do so timely or at an acceptable costs, if at all. In addition to manufacturing at Hovione's facilities in Ireland and Portugal, we have now added final step processing capacity for Captisol in both the United States and England.

We maintain inventory of Captisol, which has a five year shelf life, at three geographically dispersed storage locations in the United States and Europe. If we were to encounter problems maintaining our inventory, such as natural disasters, at one or more of these locations, it could lead to supply interruptions. In addition, we will rely on Hovione to expand manufacturing capacity of Captisol and any failure by Hovione to timely implement such increased capacity could adversely affect our ability to supply Captisol to our partners. While we believe we maintain adequate inventory of Captisol to meet our current partner needs, and our planned expansion of Captisol capacity will be sufficient to meet future partner needs, our estimates and projections for Captisol demand may not be correct and any supply interruptions could materially adversely impact our operating results. In addition, our plan to invest additional capital for the expansion of Captisol manufacturing capacity may not yield a return on investment if future Captisol sales fall below our expectations.

We currently depend on our arrangements with our partners and licensees to sell products using our Captisol technology. These agreements generally provide that our partners may terminate the agreements at will. If our partners discontinue sales of products using Captisol, fail to obtain regulatory approval for products using Captisol, fail to satisfy their obligations under their agreements with us, or choose to utilize a competing product, or if we are unable to establish new licensing and marketing relationships, our financial results and growth prospects would be materially affected. Furthermore, we maintain significant accounts receivable balances with certain customers purchasing Captisol materials, which may result in the concentration of credit risk. We generally do not require any collateral from our customers to secure payment of these accounts receivable. If any of our major customers were to default in the payment of their obligations to us, our business, operating results and cash flows could be adversely affected.

Further, under most of our Captisol outlicenses, the amount of royalties we receive will be reduced or will cease when the relevant patent expires. Our low-chloride patents and foreign equivalents are not expected to expire until 2033, our high purity patents and foreign equivalents, are not expected to expire until 2029 and our morphology patents and foreign equivalents, are not expected to expire until 2026 in United States, but the initially filed patents relating to Captisol expired starting in 2010 in the United States and in 2016 in most countries outside the United States. If our other intellectual property rights are not sufficient to prevent a generic form of Captisol from coming to market and if in such case our partners choose to terminate their agreements with us, our Captisol revenue may decrease significantly.

We rely heavily on collaboration relationships to generate milestone and royalty payments and our collaboration partners have significant discretion when deciding whether to pursue any development program, and any failure by our partners to successfully develop a product candidate or a termination or breach of any of the related agreements could reduce our milestone and license fee revenue, and potential reduce future royalties.

Our strategy for developing and commercializing many of our product candidates includes entering into collaboration agreements, outlicenses, and development funding and royalty purchase agreements with corporate partners and others. These agreements give our collaboration partners significant discretion when deciding whether or not to pursue any development program. Our existing collaborations may not continue or be successful, and we may be unable to enter into future collaboration arrangements to develop and commercialize our unpartnered assets.

In addition, our collaborators may develop products, either alone or with others that compete with the types of products they are developing with us (or that we are developing on our own). This would result in increased competition for our or our partners' programs. If product candidates are approved for marketing under our collaboration programs, revenues we receive will depend on the manufacturing, marketing and sales efforts of our collaboration partners, who generally retain commercialization rights under the collaboration agreements. Generally, our current collaboration partners also have the right to terminate their collaborations at will or under specified circumstances. If any of our collaboration partners breach (for example, by not making required payments when due, or at all) or terminate their agreements with us or otherwise fail to conduct their collaboration activities successfully, including due to insolvency events, ongoing product development under these agreements will be delayed or terminated. Disputes or litigation may also arise with our collaborators (with us and/or with one or more third parties), including those over ownership rights to intellectual property, know-how or technologies developed with our collaborators. Such disputes or litigation could adversely affect our rights to one or more of our product candidates. Any such dispute or litigation could delay, interrupt or terminate the collaboration research, development and commercialization of certain potential products, create uncertainty as to ownership rights of intellectual property, or could result in litigation or arbitration. The occurrence of any of these problems could be time-consuming and expensive and could adversely affect our business.

Our collaboration partners may change their strategy or the focus of their development and commercialization efforts with respect to our partnered programs, and the success of our partnered programs could be adversely affected.

If our collaboration partners terminate their collaborations with us or do not commit sufficient resources to the development, manufacture, marketing or distribution of our partnered programs, we could be required to devote additional resources to our partnered programs, seek new collaboration partners or abandon such partnered programs, all of which could reduce our revenues and otherwise have an adverse effect on our business. For example, several of our collaboration partners using our OmniAb antibody platform have terminated their contracts or substantially reduced their investment in the antibodies discovered based on the platform. Although we expect growth in the net number of partners with one more active programs based on antibodies discovered using our OmniAb platform, there can be no assurance that our partners will continue their programs or that we will be able to find new collaboration partners interested in discovering antibodies based on our OmniAb platform.

Our product candidates, and the product candidates of our partners, face significant development and regulatory hurdles prior to partnering and/or marketing which could delay or prevent licensing, sales-based royalties and/or milestone revenue.

Before we or our partners obtain the approvals necessary to sell any of our unpartnered assets or partnered programs, we must show through preclinical studies and human testing that each potential product is safe and effective. We and/or our partners have a number of partnered programs and unpartnered assets moving toward or currently awaiting regulatory action. Failure to show any product's safety and effectiveness could delay or prevent regulatory approval of a product and could adversely affect our business. The product development and clinical trials process is complex and uncertain. For example, the results of preclinical studies and initial clinical trials may not necessarily predict the results from later large-scale clinical trials. In addition, clinical trials may not demonstrate a product's safety and effectiveness to the satisfaction of the regulatory authorities. A number of companies have suffered significant setbacks in advanced clinical trials or in seeking regulatory approvals, despite promising results in earlier trials. The FDA may also require additional clinical trials after regulatory approvals are received. Such additional trials may be expensive and time-consuming, and failure to successfully conduct those trials could jeopardize continued commercialization of a product.

The speed at which we and our partners complete our scientific studies and clinical trials depends on many factors, including, but not limited to, the ability to obtain adequate supplies of the products to be tested and patient enrollment. Patient enrollment is a function of many factors, including the size of the patient population, the proximity of patients to clinical sites, the eligibility criteria for the trial and other potential drug candidates being studied. Delays in patient enrollment for our or our partners' trials may result in increased costs and longer development times. In addition, our partners have rights to control product development and clinical programs for products developed under our collaborations. As a result, these partners may

conduct these programs more slowly or in a different manner than expected. Moreover, even if clinical trials are completed, we or our partners still may not apply for FDA or foreign regulatory approval in a timely manner or the FDA or foreign regulatory authority still may not grant approval.

Our product candidate discovery, early-stage development, and product reformulation programs may require substantial additional capital to complete successfully. Our partners' development programs may require substantial additional capital to complete successfully, arising from costs to: conduct research, preclinical testing and human studies; establish pilot scale and commercial scale manufacturing processes and facilities; and establish and develop quality control, regulatory, marketing, sales and administrative capabilities to support these programs. While we expect to fund our research and development activities from cash generated from operations to the extent possible, if we are unable to do so, we may need to complete additional equity or debt financings or seek other external means of financing. These financings could depress our stock price. If additional funds are required to support our operations and we are unable to obtain them on terms favorable to us, we may be required to cease or reduce further development or commercialization of our products, to sell some or all of our technology or assets or to merge with another entity.

Our OmniAb antibody platform faces specific risks, including the fact that no product using antibodies from the platform has been approved by the FDA or similar regulatory agency.

None of our collaboration partners using our OmniAb antibody platform have received approval from the FDA or similar regulatory agency to market a product discovered based on our platform. In addition, only a few of our collaboration partners' product candidates based on the platform have been tested in late stage clinical trials. If one of our OmniAb collaboration partners' product candidates fails during preclinical studies or clinical trials, our other OmniAb collaboration partners may decide to abandon product candidates using antibodies generated from the OmniAb platform, whether or not such failure is attributable to the platform. All of our OmniAb collaboration partners may terminate their programs at any time without penalty. In addition, our OmniRat and OmniFlic platforms, which we consider the most promising, are covered by six patents within the U.S. and three patents in the European Union and are subject to the same risks as our patent portfolio discussed elsewhere in this report and our 2019 Annual Report, including the risk that our patents may infringe on third party patent rights or that our patents may be invalidated. As of a result of these factors, the future revenue generated from this platform may be materially lower than what we currently anticipate. Further, we face significant competition from other companies selling human antibody-generating rodents, especially mice which compete with our OmniMouse platform, including the VelocImmune mouse, the AlivaMab mouse, the Trianni mouse and the Kymouse. Many of our competitors have greater financial, technical and human resources than we do and may be better equipped to develop, manufacture and market competing antibody platforms. Our competitors may render our OmniAb antibody platform obsolete, or limit the commercial value of any product candidates developed using our platform, by advances in existing technological approaches or the development of new or different approaches, potentially eliminating the advantages that we believe our platform offers.

Risks Related to Intellectual Property:

Third party intellectual property may prevent us or our partners from developing our potential products; our and our partners' intellectual property may not prevent competition; and any intellectual property issues may be expensive and time consuming to resolve.

The manufacture, use or sale of our potential products or our licensees' products or potential products may infringe the patent rights of others. If others obtain patents with conflicting claims, we may be required to obtain licenses to those patents or to develop or obtain alternative technology. We may not be able to obtain any such licenses on acceptable terms, or at all. Any failure to obtain such licenses could delay or prevent us from pursuing the development or commercialization of our potential products.

Generally, our success will depend on our ability and the ability of our partners to obtain and maintain patents and other intellectual property rights for our and their potential products. Our patent position is uncertain and involves complex legal and technical questions for which legal principles are unresolved. Even if we or our partners do obtain patents, such patents may not adequately protect the technology we own or have licensed.

We permit our partners to list our patents that cover their branded products in the Orange Book. If a third party files an NDA or ANDA for a generic drug product that relies in whole or in part on studies contained in our partner's NDA for their branded product, the third party will have the option to certify to the FDA that, in the opinion of that third party, the patents listed in the Orange Book for our partner's branded product are invalid, unenforceable, or will not be infringed by the manufacture, use or sale of the third party's generic drug product. A third party certification that a new product will not infringe Orange Book-listed patents, or that such patents are invalid, is called a paragraph IV patent certification. If the third party submits a paragraph IV patent certification to the FDA, a notice of the paragraph IV patent certification must be sent to the NDA owner and the owner of the patents that are subject to the paragraph IV patent certification notice once the third-party's

NDA or ANDA is accepted for filing by the FDA. A lawsuit may then be initiated to defend the patents identified in the notice. The filing of a patent infringement lawsuit within 45 days of the receipt of notice of a paragraph IV patent certification automatically prevents the FDA from approving the generic NDA or ANDA until the earlier of the expiration of a 30-month period, the expiration of the patents, the entry of a settlement order stating that the patents are invalid or not infringed, a decision in the infringement case that is favorable to the NDA or ANDA applicant, or such shorter or longer period as the court may order. If a patent infringement lawsuit is not initiated within the required 45-day period, the third-party's NDA or ANDA will not be subject to the 30-month stay.

Several third-parties have challenged, and additional third parties may challenge, the patents covering our partner's branded products, including Kyprolis and Evomela, which could result in the invalidation or unenforceability of some or all of the relevant patent claims. We may from time to time become party to litigation or other proceedings as a result of Paragraph IV certifications. For example, as a result of the settlement of one such matter, Teva will be permitted to market a generic version of Evomela® in the United States on June 1, 2026 or earlier under certain circumstances. The terms of the settlement agreement are otherwise confidential. Also, as noted above, Amgen has settled patent litigation related to Kyprolis on confidential terms with several parties, but it has been publicly reported that the U.S. launch date for at least Breckenridge Pharmaceuticals' applicable generic product will be "on a date that is held as confidential in 2027 or sooner, depending on certain occurrences" and litigation against one other party is awaiting a post-trial judgement.

In addition, we cannot assure you that all of the potentially relevant prior art information that was or is deemed available to a person of skill in the relevant art prior to the priority date of the claimed invention-relating to our and our partners' patents and patent applications has been found. If such prior art exists, it can invalidate a patent or prevent a patent from issuing from a pending patent application, and we or our partners may be subject to a third party pre-issuance submission of prior art to the United States Patent and Trademark Office. Even if patents do successfully issue and even if such patents cover our or our partner's products or potential products, third parties may initiate litigation or opposition, interference, re-examination, post-grant review, *inter partes* review, nullification or derivation action in court or before patent offices, or similar proceedings challenging the validity, enforceability or scope of such patents, which may result in the patent claims being narrowed or invalidated, may allow third parties to commercialize our or our partners' products and compete directly with us and our partners, without payment to us or our partners, or limit the duration of the patent protection of our and our partners' technology and products.

Litigation or other proceedings to enforce or defend intellectual property rights are often very complex in nature, may be very expensive and time-consuming, may divert our management's attention from our core business, and may result in unfavorable results that could adversely impact our ability to prevent third parties from competing with our partner's products. Any adverse outcome of such litigation or other proceedings could result in one or more or our patents being held invalid or unenforceable, which could adversely affect our ability to successfully execute our business strategy and negatively impact our financial condition and results of operations. However, given the unpredictability inherent in litigation, we cannot predict or guarantee the outcome of these matters or any other litigation. Regardless of how these matters are ultimately resolved, these matters may be costly, time-consuming and distracting to our management, which could have a material adverse effect on our business.

In addition, periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and or applications will be due to the U.S. and various foreign patent offices at various points over the lifetime of our and our licensees' patents and/or applications. We have systems in place to remind us to pay these fees, and we rely on our outside patent annuity service to pay these fees when due. Additionally, the U.S. and various foreign patent offices require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. We employ reputable law firms and other professionals to help us comply, and in many cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with rules applicable to the particular jurisdiction. However, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. If such an event were to occur, it could have a material adverse effect on our business.

Any conflicts with the patent rights of others could significantly reduce the coverage of our patents or limit our ability to obtain meaningful patent protection. For example, our European patent related to Agglomerated forms of Captisol was limited during an opposition proceeding, and the rejection of our European patent application related to High Purity Captisol was upheld on appeal. In addition, any determination that our patent rights are invalid may result in early termination of our agreements with our license partners and could adversely affect our ability to enter into new license agreements. We also rely on unpatented trade secrets and know-how to protect and maintain our competitive position. We require our employees, consultants, licensees and others to sign confidentiality agreements when they begin their relationship with us. These agreements may be breached, and we may not have adequate remedies for any breach. In addition, our competitors may independently discover our trade secrets.

We may also need to initiate litigation, which could be time-consuming and expensive, to enforce our proprietary rights or to determine the scope and validity of others' rights. If this occurs, a court may find our patents or those of our licensors invalid or may find that we have infringed on a competitor's rights. In addition, if any of our competitors have filed patent applications in the United States which claim technology we also have invented, the United States Patent and Trademark Office may require us to participate in expensive interference proceedings to determine who has the right to a patent for the technology.

The occurrence of any of the foregoing problems could be time-consuming and expensive and could adversely affect our financial position, liquidity and results of operations.

The validity, scope and enforceability of any patents that cover our partners' biologic product candidate can be challenged by third parties.

For biologics, the Biologics Price Competition and Innovation Act of 2009, BPCIA, provides a mechanism for one or more third parties to seek FDA approval to manufacture or sell a biosimilar or interchangeable versions of brand name biological products. Due to the large size and complexity of biological products, as compared to small molecules, a biosimilar must be "highly similar" to the reference product with "no clinically meaningful differences between the two." The BPCIA does not require reference product sponsors to list patents in an Orange Book and does not include an automatic 30-month stay of FDA approval upon the timely filing of a lawsuit. The BPCIA, however, does require a formal pre-litigation process which includes the exchange of information between a biosimilar applicant and a reference biologic sponsor that includes the identification of relevant patents and each parties' basis for infringement and invalidity. After the exchange of this information, sponsors may then initiate a lawsuit within 30 days to defend the patents identified in the exchange. If the biosimilar applicant successfully challenges the asserted patent claims it could result in the invalidation of, or render unenforceable, some or all of the relevant patent claims or result in a finding of non-infringement. Such litigation or other proceedings to enforce or defend intellectual property rights are often very complex in nature, may be very expensive and time-consuming, may divert our management's attention from our core business, and may result in unfavorable results that could limit our partners' ability to prevent third parties from competing with their products or product candidates.

Risks Related to Government Regulation and Legal Proceedings:

Market acceptance and sales of any approved product will depend significantly on the availability and adequacy of coverage and reimbursement from third-party payors and may be affected by existing and future healthcare reform measures.

Sales of the products we license to our collaboration partners and the royalties we receive will depend in large part on the extent to which coverage and reimbursement is available from government and health administration authorities, private health maintenance organizations and health insurers, and other healthcare payors. Significant uncertainty exists as to the reimbursement status of healthcare products. Healthcare payors, including Medicare, are challenging the prices charged for medical products and services. Government and other healthcare payors are increasingly attempting to contain healthcare costs by limiting both coverage and the level of reimbursement for medical products. Even if a product is approved by the FDA, insurance coverage may not be available, and reimbursement levels may be inadequate, to cover the costs associated with the research, development, marketing and sale of the product. If government and other healthcare payors do not provide adequate coverage and reimbursement levels for any product, market acceptance and any sales could be reduced.

From time to time, legislation is implemented to reign in rising healthcare expenditures. By way of example, in March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or collectively, the ACA, was enacted, which included a number of provisions affecting the pharmaceutical industry, including, among other things, annual, non-deductible fees on any entity that manufactures or imports some types of branded prescription drugs and increases in Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program. Since its enactment, there have been judicial and Congressional challenges to certain aspects of the ACA, and we expect there will be additional challenges and amendments to the ACA in the future.

Other legislative changes have been proposed and adopted since the ACA was enacted, including aggregate reductions of Medicare payments to providers of 2% per fiscal year and reduced payments to several types of Medicare providers. Moreover, there has recently been heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products, which has resulted in several Congressional inquiries and proposed bills designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drug products. Individual states in the United States have also become increasingly active in implementing regulations designed to control pharmaceutical product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. We cannot predict

whether other legislative changes will be adopted, if any, or how such changes would affect our operations or financial condition.

We and our collaboration partners may be subject to federal and state healthcare laws, including fraud and abuse, false claims, physician payment transparency and health information privacy and security laws. Our operations and those of our collaboration partners are subject to various federal and state fraud and abuse laws, including, without limitation, anti-kickback, false claims and physician payment transparency statutes. These laws may impact, among other things, financial arrangements with physicians, sales, marketing and education programs and the manner in which any of those activities are implemented. In addition, we may be subject to federal and state patient privacy regulations. If our operations or those of our collaboration partners are found to be in violation of any of those laws or any other applicable governmental regulations, we or our collaboration partners may be subject to penalties, including civil and criminal penalties, damages, fines, imprisonment, exclusion from government healthcare programs or the curtailment or restructuring of operations, any of which could adversely affect our ability to operate our business and our financial condition.

Changes in funding for the FDA and other government agencies could hinder their ability to hire and retain key leadership and other personnel, or otherwise prevent new products and services from being developed or commercialized in a timely manner, which could negatively impact our business or the business of our partners.

The ability of the FDA to review and approve new products can be affected by a variety of factors, including government budget and funding levels, ability to hire and retain key personnel and accept the payment of user fees, and statutory, regulatory, and policy changes. Average review times at the agency have fluctuated in recent years as a result. In addition, government funding of other government agencies that fund research and development activities is subject to the political process, which is inherently fluid and unpredictable.

Disruptions at the FDA and other agencies may also slow the time necessary for new drugs to be reviewed and/or approved by necessary government agencies, which would adversely affect our business or the business of our partners. For example, over the last several years, including for 35 days beginning on December 22, 2018, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA, have had to furlough critical FDA employees and stop critical activities. If a prolonged government shutdown occurs, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business. If the timing of FDA's review and approval of new products is delayed, the timing of our or our partners' development process may be delayed which would result in delayed milestone revenues and materially harm our operations of business.

If plaintiffs bring product liability lawsuits against us or our partners, we or our partners may incur substantial liabilities and may be required to limit commercialization of our approved products and product candidates.

As is common in our industry, our partners and we face an inherent risk of product liability as a result of the clinical testing of our product candidates in clinical trials and face an even greater risk for commercialized products. Although we are not currently a party to product liability litigation, if we are sued, we may be held liable if any product or product candidate we develop causes injury or is found otherwise unsuitable during product testing, manufacturing, marketing or sale. Regardless of merit or eventual outcome, liability claims may result in decreased demand for any product candidates, partnered products or products that we may develop, injury to our reputation, discontinuation of clinical trials, costs to defend litigation, substantial monetary awards to clinical trial participants or patients, loss of revenue and product recall or withdrawal from the market and the inability to commercialize any products that we develop. We have product liability insurance that covers our clinical trials up to a $10.0 million annual limit. Our insurance coverage may not be sufficient to cover all of our product liability related expenses or losses and may not cover us for any expenses or losses we may suffer. If we are sued for any injury caused by our product candidates, partnered products or any future products, our liability could exceed our total assets.

We face risks related to handling of hazardous materials and other regulations governing environmental safety.

Our operations are subject to complex and stringent environmental, health, safety and other governmental laws and regulations that both public officials and private individuals may seek to enforce. Our activities that are subject to these regulations include, among other things, our use of hazardous materials and the generation, transportation and storage of waste. Although we have secured clearance from the EPA historically, and currently are operating in material compliance with applicable EPA rules and regulations, our business could be adversely affected if we discover that we or an acquired business is not in material compliance with these rules and regulations. In the future, we may pursue the use of other surfactant substances that will require clearance from the EPA, and we may fail to obtain such clearance. Existing laws and regulations may also be revised or reinterpreted, or new laws and regulations may become applicable to us, whether retroactively or prospectively, that may have a negative effect on our business and results of operations. It is also impossible to eliminate completely the risk of accidental environmental contamination or injury to individuals. In such an event, we could be liable for any damages that result, which could adversely affect our business.

Risk Related to Our Strategic Transactions:

Any difficulties from strategic acquisitions could adversely affect our stock price, operating results and results of operations.

We may acquire companies, businesses and products that complement or augment our existing business. We may not be able to integrate any acquired business successfully or operate any acquired business profitably. Integrating any newly acquired business could be expensive and time-consuming. Integration efforts often take a significant amount of time, place a significant strain on managerial, operational and financial resources and could prove to be more difficult or expensive than we predict. The diversion of our management's attention and any delay or difficulties encountered in connection with any future acquisitions we may consummate could result in the disruption of our ongoing business or inconsistencies in standards and controls that could negatively affect our ability to maintain third-party relationships. Moreover, we may need to raise additional funds through public or private debt or equity financing, or issue additional shares, to acquire any businesses or products, which may result in dilution for stockholders or the incurrence of indebtedness.

As part of our efforts to acquire companies, business or product candidates or to enter into other significant transactions, we conduct business, legal and financial due diligence with the goal of identifying and evaluating material risks involved in the transaction. Despite our efforts, we ultimately may be unsuccessful in ascertaining or evaluating all such risks and, as a result, might not realize the intended advantages of the transaction. If we fail to realize the expected benefits from acquisitions we may consummate in the future or have consummated in the past, whether as a result of unidentified risks, integration difficulties, regulatory setbacks, litigation with current or former employees and other events, our business, results of operations and financial condition could be adversely affected. If we acquire product candidates, we will also need to make certain assumptions about, among other things, development costs, the likelihood of receiving regulatory approval and the market for such product candidates. Our assumptions may prove to be incorrect, which could cause us to fail to realize the anticipated benefits of these transactions.

In addition, we will likely experience significant charges to earnings in connection with our efforts, if any, to consummate acquisitions. For transactions that are ultimately not consummated, these charges may include fees and expenses for investment bankers, attorneys, accountants and other advisors in connection with our efforts. Even if our efforts are successful, we may incur, as part of a transaction, substantial charges for closure costs associated with elimination of duplicate operations and facilities and acquired IPR&D charges. In either case, the incurrence of these charges could adversely affect our results of operations for particular quarterly or annual periods.

We recently acquired Pfenex, as well as Taurus and xCella. We may not be able to integrate these acquired businesses successfully, achieve the expected growth prospects and synergies, expected royalties and other economics or operate such businesses profitably. In addition, such acquisitions may disrupt our current plans and operations, we may not be able to retain key personnel or preserve existing business relationships following such acquisitions, and may incur unexpected costs, charges or expenses resulting from completion of the acquisitions.

We also recently announced the disposition of Vernalis (R&D) Limited. We may not realize expected future benefits from the Vernalis transaction, including from retained licenses and collaboration economics and as a result of indemnification claims under the Vernalis Purchase Agreement and our retention of certain liabilities associated with the Vernalis business.

If we fail to realize the expected benefits from these acquisitions and Vernalis disposition, our business, results of operations and financial condition could be adversely affected.

Other Risks:

Our operating results may fluctuate significantly, which makes our future operating results difficult to predict and could cause our operating results to fall below expectations or any guidance we may provide.

Our quarterly and annual operating results may fluctuate significantly, which makes it difficult for us to predict our future operating results. These fluctuations may occur due to a variety of factors, many of which are outside of our control, including, but not limited to:

- the royalties from the sales of Kyprolis, Evomela and other products sold by our partners;
- the success of our collaboration partners' preclinical and clinical programs;
- the timing of Captisol purchases for use in clinical trials and commercial products;
- the timing and cost of, and level of investment in, research, development, regulatory approval and commercialization activities relating to our internal development programs, which may change from time to time;

- expenditures that we may incur to acquire or develop additional product candidates and platform technologies; and
- future accounting pronouncements or changes in our accounting policies.

The cumulative effects of these factors could result in large fluctuations and unpredictability in our quarterly and annual operating results and revenues. This variability and unpredictability could result in our failing to meet the expectations of industry or financial analysts or investors for any period. If our revenue or operating results fall below the expectations of analysts or investors or below any forecasts we may provide to the market, or if the forecasts we provide to the market are below the expectations of analysts or investors, the price of our common stock could decline substantially. Such a stock price decline could occur even when we have met any previously publicly stated revenue or earnings guidance we may provide.

Changes or modifications in financial accounting standards, including those related to revenue recognition, may harm our results of operations.

From time to time, the FASB either alone or jointly with other organizations, promulgates new accounting principles that could have an adverse impact on our results of operations. For example, in May 2014, FASB issued an accounting standard for revenue recognition-Accounting Standards Codification Topic 606, *Revenue from Contracts with Customers*, or ASC 606-that supersedes most current revenue recognition guidance. The guidance requires a company to recognize revenue upon transfer of goods or services to a customer at an amount that reflects the expected consideration to be received in exchange for those goods or services. The guidance became effective in fiscal 2018.

Under ASC 606, Ligand estimates and books royalties in the same quarter that our partners report the sale of the underlying product. We rely on our partners' earning releases and other information from our partners to determine the sales of our partners' products and to estimate the related royalty revenues. If our partners report incorrect sales, or if our partners delay reporting of their earnings release, our royalty estimates may need to be revised and/or our financial reporting may be delayed.

Our ability to use our net operating loss carryforwards and certain other tax attributes to offset future taxable income may be subject to certain limitations.

As of December 31, 2020, we had U.S. federal and state net operating loss carryforwards (NOLs) of approximately $162.4 million and $129.3 million, respectively. Our federal NOLs expire through 2037 and our state NOLs begin to expire in 2031, if not utilized. Under the Tax Act, any federal NOLs arising in taxable years ending after December 31, 2017 will carry forward indefinitely. As of December 31, 2020, we had federal and California research and development tax credit carryforwards of approximately $9.2 million and $23.1 million, respectively. The federal research and development tax credit carryforwards expire in various years through 2040, if not utilized. The California research and development credit will carry forward indefinitely. Under Sections 382 and 383 of Internal Revenue Code of 1986, as amended (Code) if a corporation undergoes an "ownership change," the corporation's ability to use its pre-change NOLs and other pre-change tax attributes, such as research tax credits, to offset its future post-change income and taxes may be limited. In general, an "ownership change" occurs if there is a cumulative change in our ownership by "5% shareholders" that exceeds 50 percentage points over a rolling three-year period. Similar rules may apply under state tax laws. We believe we have experienced certain ownership changes in the past and have reduced our deferred tax assets related to NOLs and research and development tax credit carryforwards accordingly. In the event that it is determined that we have in the past experienced additional ownership changes, or if we experience one or more ownership changes as a result future transactions in our stock, then we may be further limited in our ability to use our NOLs and other tax assets to reduce taxes owed on the net taxable income that we earn in the event that we attain profitability. Furthermore, under the Tax Act, although the treatment of tax losses generated in tax years beginning before December 31, 2017 has generally not changed, tax losses generated in tax years beginning after December 31, 2017 may only offset 80% of our taxable income. This change may require us to pay federal income taxes in future years despite having potentially generated a loss for federal income tax purposes in prior years. Any such limitations on the ability to use our NOLs and other tax assets could adversely impact our business, financial condition and operating results.

We rely on information technology and any failure, inadequacy, interruption or security lapse of that technology, including any cyber security incidents, could harm our ability to operate our business effectively.

Our business is increasingly dependent on critical, complex and interdependent information technology systems, including internet-based systems, to support business processes as well as internal and external communications. Despite the implementation of security measures, our internal computer systems and those of our partners are vulnerable to damage from cyber-attacks, computer viruses, security breaches, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. System failures, accidents or security breaches could cause interruptions in our operations, could lead to the loss of trade secrets or other intellectual property, could lead to the public exposure of personal information of our employees and others, and could result in a material disruption of our clinical and commercialization activities and business operations, in addition to possibly requiring substantial expenditures to remedy. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and our business and financial condition could be harmed.

The occurrence of a catastrophic disaster could damage our facilities beyond insurance limits or we could lose key data which could cause us to curtail or cease operations.

We are vulnerable to damage and/or loss of vital data from natural disasters, such as earthquakes, tornadoes, power loss, fire, floods and similar events, as well as from accidental loss or destruction. If any disaster were to occur, our ability to operate our business could be seriously impaired. We have property, liability, and business interruption insurance which may not be adequate to cover our losses resulting from disasters or other similar significant business interruptions, and we do not plan to purchase additional insurance to cover such losses due to the cost of obtaining such coverage. Any significant losses that are not recoverable under our insurance policies could seriously impair our business, financial condition and prospects.

Conversion of our outstanding convertible notes may result in losses, result in the dilution of existing stockholders, create downward pressure on the price of our common stock, and restrict our ability to take advantage of future opportunities.

In May 2018, we issued $750.0 million principal amount of the 2023 Notes. The sale of the 2023 Notes may affect our earnings per share figures, as accounting procedures require that we include in our calculation of earnings per share the number of shares of our common stock into which the 2023 Notes are convertible. The convertible notes may be converted into cash and shares of our common stock, if any (subject to our right or obligation to pay cash in lieu of all or a portion of such shares). If shares of our common stock are issued to the holders of the convertible notes upon conversion, there will be dilution to our shareholders equity and the market price of our shares may decrease due to the additional selling pressure in the market. Any downward pressure on the price of our common stock caused by the sale or potential sale of shares issuable upon conversion of the convertible notes could also encourage short sales by third parties, creating additional selling pressure on our stock. Upon the occurrence of certain circumstances, holders of the convertible notes may require us to purchase all or a portion of their notes for cash, which may require the use of a substantial amount of cash. If such cash is not available, we may be required to sell other assets or enter into alternate financing arrangements at terms that may or may not be desirable. The existence of the convertible notes and the obligations that we incurred by issuing them may restrict our ability to take advantage of certain future opportunities, such as engaging in future debt or equity financing activities.

As of December 31, 2020, we had $495.3 million aggregate principal amount of 2023 Notes. The notes are convertible into cash, and if applicable, shares of our common stock under certain circumstances, including trading price conditions related to our common stock. Upon conversion, we are required to record a gain or loss for the difference between the fair value of the notes to be extinguished and their corresponding net carrying value. The fair value of the notes to be extinguished depends on our current incremental borrowing rate. If our incremental borrowing rate at the time of conversion is lower than the implied interest rate of the notes, we will record a loss in our consolidated statement of income during the period in which the notes are converted.

Impairment charges pertaining to goodwill, identifiable intangible assets or other long-lived assets from our mergers and acquisitions could have an adverse impact on our results of operations and the market value of our common stock.

The total purchase price pertaining to our acquisitions in recent years have been allocated to net tangible assets, identifiable intangible assets, in-process research and development and goodwill. To the extent the value of goodwill or identifiable intangible assets or other long-lived assets become impaired, we will be required to incur material charges relating to the impairment. Any impairment charges could have a material adverse impact on our results of operations and the market value of our common stock.

Our investments are subject to market and credit risks that could diminish their value and these risks could be greater during periods of extreme volatility or disruption in the financial and credit markets, which could adversely impact our business, financial condition, results of operations, liquidity and cash flows.

Our investments are subject to risks of credit defaults and changes in market values. Periods of macroeconomic weakness or recession, heightened volatility or disruption in the financial and credit markets could increase these risks, potentially resulting in other than temporary impairment of assets in our investment portfolio. Any event reducing the estimated fair value of these securities, other than on a temporary basis, could have a material and adverse effect on our business, results of operations, financial condition, liquidity and cash flows. If our investment manager, fails to react appropriately to difficult market, economic and geopolitical conditions, our investment portfolio could incur material losses.

We have a risk management framework in place to identify, assess and prioritize risks, including the market and credit risks to which our investments are subject. As part of that framework, we test our investment portfolio based on various market scenarios. Under certain stressed market scenarios, unrealized losses on our investment portfolio could lead to material reductions in its carrying value.

A decline in fair value below the amortized cost of a security requires management to assess whether an impairment has occurred. The decision on whether to record an impairment is determined in part by our assessment of the financial condition and prospects of a particular issuer, projections of future cash flows and recoverability of the particular security as well as management's assertion of whether it is more likely than not that we will sell the particular security before recovery.

Our charter documents and concentration of ownership may hinder or prevent change of control transactions.

Provisions contained in our certificate of incorporation and bylaws may discourage transactions involving an actual or potential change in our ownership. In addition, our Board of Directors may issue shares of common or preferred stock without any further action by the stockholders. Our directors and certain of our institutional investors collectively beneficially own a significant portion of our outstanding common stock. Such provisions and issuances may have the effect of delaying or preventing a change in our ownership. If changes in our ownership are discouraged, delayed or prevented, it would be more difficult for our current Board of Directors to be removed and replaced, even if you or our other stockholders believe that such actions are in the best interests of us and our stockholders.

Our amended and restated bylaws provide that the Court of Chancery of the State of Delaware will be the exclusive forum for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated bylaws provide that the Court of Chancery of the State of Delaware is the exclusive forum for (i) any derivative action or proceeding brought on our behalf, (ii) any action asserting a claim of breach of a fiduciary duty owed by our directors, officers or other employees to us or our stockholders, (iii) any action asserting a claim arising pursuant to any provision of the General Corporation Law of Delaware or our amended and restated certificate of incorporation or amended and restated bylaws, or (iv) any action asserting a claim governed by the internal affairs doctrine. To the extent that any such claims may be based upon federal law claims, Section 27 of the Exchange Act creates exclusive federal jurisdiction over all suits brought to enforce any duty or liability created by the Exchange Act or the rules and regulations thereunder. Furthermore, Section 22 of the Securities Act provides for concurrent jurisdiction for federal and state courts over all suits brought to enforce any duty or liability created by the Securities Act or the rules and regulations thereunder, and as such, the exclusive jurisdiction clauses set forth above would not apply to such suits. The choice of forum provisions in our amended and restated bylaws may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and other employees. By agreeing to these provisions, however, stockholders will not be deemed to have waived our compliance with the federal securities laws and the rules and regulations thereunder. Furthermore, the enforceability of similar choice of forum provisions in other companies' certificates of incorporation and bylaws has been challenged in legal proceedings, and it is possible that a court could find these types of provisions to be inapplicable or unenforceable. If a court were to find the choice of forum provisions in our amended and restated bylaws to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could adversely affect our business and financial condition.

Our stock price has been volatile and could experience a sudden decline in value.

The market prices for securities of biotechnology and pharmaceutical companies have historically been highly volatile, and the market has recently experienced significant price and volume fluctuations that are unrelated to the operating performance of particular companies. Continued volatility in the overall capital markets could reduce the market price of our common stock in spite of our operating performance. Further, high stock price volatility could result in higher share-based compensation expense.

Our common stock has experienced significant price and volume fluctuations and may continue to experience volatility in the future. Many factors may have a significant impact on the market price of our common stock, including, but not limited to, the following factors: results of or delays in our preclinical studies and clinical trials; the success of our collaboration agreements; publicity regarding actual or potential medical results relating to products under development by us or others; announcements of technological innovations or new commercial products by us or others; developments in patent or other proprietary rights by us or others; comments or opinions by securities analysts or major stockholders or changed securities analysts' reports or recommendations; future sales or shorting of our common stock by existing stockholders; regulatory developments or changes in regulatory guidance; litigation or threats of litigation; economic and other external factors or other disaster or crises; the departure of any of our officers, directors or key employees; period-to-period fluctuations in financial results; and price and volume fluctuations in the overall stock market.

Our results of operations and liquidity needs could be materially negatively affected by market fluctuations and economic downturn.

Our results of operations could be materially negatively affected by economic conditions generally, both in the United States and elsewhere around the world. Concerns over inflation, energy costs, geopolitical issues, public health emergencies, the availability and cost of credit, and the U.S. financial markets have in the past contributed to, and may continue in the future to contribute to, increased volatility and diminished expectations for the economy and the markets. For example, the outbreak of a novel strain of coronavirus has affected the People's Republic of China and elsewhere and has affected worldwide equity markets. Domestic and international equity markets periodically experience heightened volatility and turmoil. These events may have an adverse effect on us. In the event of a market downturn, our results of operations could be adversely affected by those factors in many ways, including making it more difficult for us to raise funds if necessary, and our stock price may further decline. We cannot provide assurance that our investments are not subject to adverse changes in market value. If our investments experience adverse changes in market value, we may have less capital to fund our operations.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

The following table summarizes our principal facilities leased as of December 31, 2020, including the location and size of each facility, and their designated use. We also lease facilities in other locations. We believe our facilities are adequate for our current and near-term needs, and we will be able to locate additional facilities, as needed.

Location	Approximate Square Feet	Operation	Lease Expiration Date
San Diego, CA	54,000	Corporate headquarters office and laboratory	March 2024
Emeryville, CA	13,000	Office and laboratory	August 2021
Durham, NC	11,200	Office and laboratory	April 2022

Item 3. Legal Proceedings

See "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (10), Commitments and Contingencies—Legal Proceedings.*"

Item 4. Mine Safety Disclosures

Not applicable.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters, and Issuer Purchases of Equity Securities

Our common stock is traded on the Nasdaq Global Market under the symbol "LGND." As of February 18, 2021, there were approximately 424 holders of record of the common stock.

Except for 2007, during which we declared a cash dividend on our common stock of $2.50 per share, we have not paid any dividends on our common stock in the past and currently do not expect to pay cash dividends or make any other distributions on common stock in the future. We expect to retain our future earnings, if any, for use in the operation and expansion of our business, to pay down debt and potentially for share repurchases. Any future determination to pay dividends on common stock will be at the discretion of our board of directors and will depend upon our financial condition, results of operations, capital requirements and such other factors as the board deems relevant.

The following table presents information regarding repurchases by us of our common stock during the three months ended December 31, 2020 under the stock repurchase program approved by our board of directors in September 2019, under which we may acquire up to $500 million of our common stock in open market and negotiated purchases for a period of up to three years.

ISSUER PURCHASES OF EQUITY SECURITIES

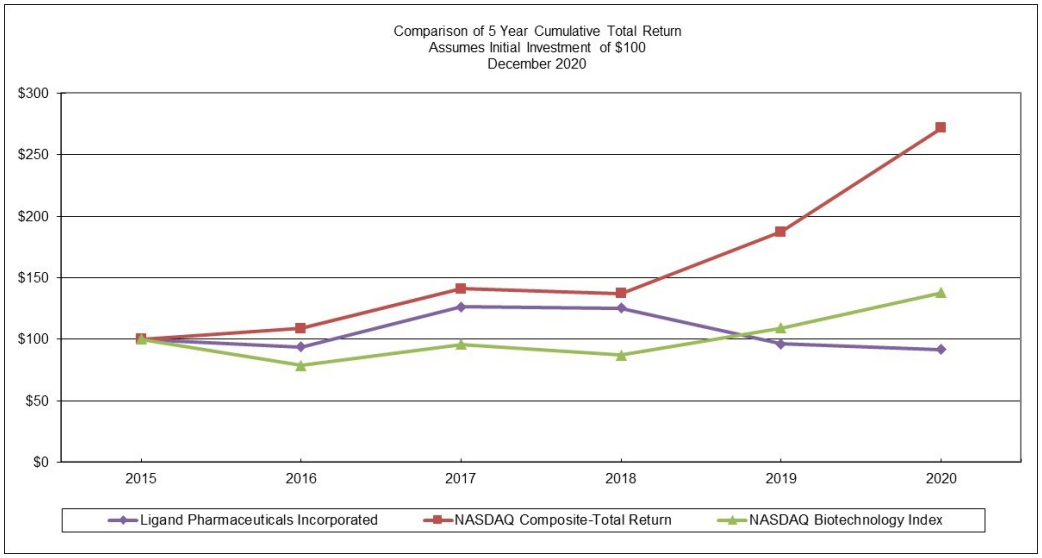
	Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Dollar Value of Shares that May Yet Be Purchased Under the Program (in thousands)
October 1 - October 31, 2020	—	$ —	—	$ 253,499
November 1 - November 30, 2020	55,554	$ 84.81	55,554	$ 248,788
December 1 - December 31, 2020	—	$ —	—	$ 248,788
Total	55,554	$ 84.81	55,554	

The information required by Item 201(d) of Regulation S-K is incorporated by reference to the 2021 Annual Meeting Proxy Statement as defined in Item 10 below.

Performance Graph

The graph below shows the five-year cumulative total stockholder return assuming the investment of $100 and is based on the returns of the component companies weighted monthly according to their market capitalizations. The graph compares total stockholder returns of our common stock, of all companies traded on the Nasdaq Stock market, as represented by the Nasdaq Composite® Index, and of the Nasdaq Biotechnology Stock Index, as prepared by The Nasdaq Stock Market Inc.

The stockholder return shown on the graph below is not necessarily indicative of future performance and we will not make or endorse any predictions as to future stockholder returns.



Value of $100 Invested Over Time

	12/31/2015	12/31/2016	12/31/2017	12/31/2018	12/31/2019	12/31/2020
Ligand	$ 100.00	$ 93.72	$ 126.30	$ 125.16	$ 96.19	$ 91.73
NASDAQ Composite-Total Return	$ 100.00	$ 108.87	$ 141.13	$ 137.12	$ 187.44	$ 271.64
NASDAQ Biotechnology Index	$ 100.00	$ 78.65	$ 95.69	$ 87.21	$ 109.11	$ 137.94

Item 6. Selected Consolidated Financial Data

The following selected historical consolidated financial and other data are qualified by reference to, and should be read in conjunction with, our consolidated financial statements and the related notes thereto appearing elsewhere herein and "Management's Discussion and Analysis of Financial Condition and Results of Operations." Our selected statement of operations data set forth below for each of the years ended December 31, 2020, 2019, 2018, 2017 and 2016 and the balance sheet data as of December 31, 2020, 2019, 2018, 2017 and 2016 are derived from our consolidated financial statements.

The comparability of the information is affected by a variety of factors, including acquisitions and divestitures of businesses, issuance and repayment of debt, share-based compensation expense, and repurchases of common stock under our stock repurchase programs. In addition, the consolidated statements of operations data for each of the years ended December 31, 2017 and 2016 and the selected consolidated balance sheet data as of December 31, 2017 and 2016 set forth in the tables below do not reflect the adoption of Topic 606 and continue to be reported under the standards in effect for those periods. Additionally, the selected consolidated balance sheet data as of December 31, 2018, 2017 and 2016 set forth in the tables below do not reflect the adoption of Topic 842 regarding leases and continue to be reported under Topic 840 for those periods. The selected consolidated financial data in this section are not intended to replace our consolidated financial statements and related notes. Our historical results are not necessarily indicative of our future results.

	Year Ended December 31,				
	2020	2019	2018	2017	2016
Consolidated Statements of Operations Data:	(in thousands, except per share amounts)				
Royalties	$ 33,796	$ 46,976	$ 128,556	$ 88,685	$ 59,423
Captisol	109,959	31,489	29,123	22,070	22,502
Contract revenue	42,664	41,817	93,774	30,347	27,048
Total revenues	186,419	120,282	251,453	141,102	108,973
Cost of Captisol	30,419	11,347	6,337	5,366	5,571
Amortization of intangibles	23,442	16,864	15,792	12,120	10,643
Research and development	59,392	55,908	27,863	26,887	21,221
General and administrative	64,435	41,884	37,734	28,653	27,653
Total operating costs and expenses	177,688	126,003	87,726	73,026	65,088
Gain from sale of Vernalis R&D	17,114	—	—	—	—
Gain from sale of Promacta license	—	812,797	—	—	—
Income from operations	25,845	807,076	163,727	68,076	43,885
Total other income (expense), net	(36,383)	(10,437)	9,603	(10,845)	(35,925)
Income tax benefit (expense)	7,553	(167,337)	(30,009)	(44,675)	(10,327)
Income (loss) from continuing operations	(2,985)	629,302	143,321	12,556	(2,367)
Discontinued operations	—	—	—	—	731
Net income (loss)	$ (2,985)	$ 629,302	$ 143,321	$ 12,556	$ (1,636)
Basic per share amounts:					
Income (loss) from continuing operations	$ (0.18)	$ 33.13	$ 6.77	$ 0.60	$ (0.11)
Discontinued operations	—	—	—	—	0.04
Net income (loss)	$ (0.18)	$ 33.13	$ 6.77	$ 0.60	$ (0.08)
Weighted average number of common shares-basic	16,185	18,995	21,160	21,032	20,831
Diluted per share amounts:					
Income (loss) from continuing operations	$ (0.18)	$ 31.85	$ 5.96	$ 0.53	$ (0.11)
Discontinued operations	—	—	—	—	0.04
Net income (loss)	$ (0.18)	$ 31.85	$ 5.96	$ 0.53	$ (0.08)
Weighted average number of common shares-diluted	16,185	19,757	24,067	23,481	20,831

	December 31,				
	2020	2019	2018	2017	2016
	(in thousands)				
Consolidated Balance Sheet Data:					
Cash, cash equivalents, short-term investments, restricted cash and investments	$ 411,186	$ 1,070,597	$ 776,445	$ 208,099	$ 149,393
Working capital (deficit)	$ 400,448	$ 1,106,643	$ 788,291	$ (1,847)	$ (64,076)
Total assets	$ 1,362,285	$ 1,494,915	$ 1,260,803	$ 671,021	$ 601,585
Other long-term obligations	$ 110,356	$ 71,722	$ 7,776	$ 13,506	$ 3,603
Total notes payable, net (including current portion)	$ 442,293	$ 638,959	$ 636,297	$ 224,529	$ 212,910
Retained earnings (accumulated deficit)	$ 391,952	$ 400,105	$ (229,197)	$ (400,924)	$ (431,127)
Total stockholders' equity	$ 709,525	$ 767,232	$ 560,914	$ 399,788	$ 341,290

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

Our Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) will help readers understand our results of operations, financial condition, and cash flows. It is provided in addition to the accompanying consolidated financial statements and notes. Comparisons under this heading refer to twelve months ended December 31, 2020 and 2019, respectively, unless otherwise indicated.

Our MD&A is organized as follows:

- *Results of Operations.* Detailed discussion of our revenue and expenses for twelve months ended December 31, 2020 and 2019. A comparison of our results of operations for twelve months ended December 31, 2019 and 2018 can be found under "*Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations*" in our Annual Report on Form 10-K for the fiscal year ended December 31, 2019, filed with the SEC on February 27, 2020.

- *Liquidity and Capital Resources.* Discussion of key aspects of our consolidated statements of cash flows, changes in our financial position, and our financial commitments.

- *Off-Balance Sheet Arrangements.* We have no off-balance sheet arrangements.

- *Contractual Obligations.* Tabular disclosure of known contractual obligations as of December 31, 2020.

- *Critical Accounting Policies and Estimates.* Discussion of significant changes we believe are important to understand the assumptions and judgments underlying our consolidated financial statements.

- *Recent Accounting Pronouncements.* For summary of recent accounting pronouncements applicable to our consolidated financial statements, see "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (1), Basis of Presentation and Summary of Significant Accounting Policies.*"

Results of Operations

Revenue

(Dollars in thousands)	2020	2019	Change	% Change
Royalties	$ 33,796	$ 46,976	$ (13,180)	(28) %
Captisol Sales	109,959	31,489	78,470	249 %
Contract Revenue	42,664	41,817	847	2 %
Total revenue	$ 186,419	$ 120,282	$ 66,137	55 %

Royalty revenue is a function of our partners' product sales and the applicable royalty rate. Kyprolis royalty rate is under a tiered royalty rate structure with the highest being 3.0%. Evomela has a fixed royalty rate of 20%. On March 6, 2019, we sold all of our rights, title and interest in and to the Promacta license to RPI. Subsequent to March 6, 2019, we no longer recognize revenue related to sales of Promacta. See "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements —Note (2), Sale of Vernalis R&D and Promacta License.*"

Royalty revenue decreased in 2020 as compared to 2019 driven primarily by the above mentioned sale of the Promacta license in March 2019, which contributed $14.2 million revenue in 2019. In addition, royalties for 2020 were impacted by the ongoing COVID-19 pandemic. Captisol sales increased year over year in 2020 primarily reflecting higher sales of Captisol for use in the manufacturing of Veklury. Contract revenue increased slightly year over year in 2020.

The following table represents royalty revenue by program:

(in millions)	2020 Estimated Partner Product Sales	Effective Royalty Rate	2020 Royalty Revenue	2019 Estimated Partner Product Sales	Effective Royalty Rate	2019 Royalty Revenue
Kyprolis	$ 1,094.6	2.3%	$ 25.2	$ 1,095.4	2.3%	$ 25.0
Evomela	32.6	20.0%	6.4	26.0	20.0%	5.2
Other	178.5	1.2%	2.2	194.1	1.3%	2.6
Promacta	N/A	N/A	N/A	225.1	6.3%	14.2
Total	$ 1,305.7		$ 33.8	$ 1,540.6		$ 47.0

Operating Costs and Expenses

(Dollars in thousands)	2020	2019	Change	% Change
Cost of Captisol	$ 30,419	$ 11,347	$ 19,072	168 %
Amortization of intangibles	23,442	16,864	6,578	39 %
Research and development	59,392	55,908	3,484	6 %
General and administrative	64,435	41,884	22,551	54 %
Total operating costs and expenses	$ 177,688	$ 126,003	$ 51,685	41 %

Total operating costs and expenses for 2020 increased $51.7 million or 41% compared with 2019.

Cost of Captisol increased year over year in 2020 primarily due to higher sales of Captisol during 2020.

Amortization of intangibles increased year over year in 2020 primarily due to the acquisitions of Icagen in April 2020 and Pfenex in October 2020.

At any one time, we are working on multiple programs. As such, we generally do not track our R&D expenses on a specific program basis. Our R&D expenses increased year over year in 2020 due to the costs associated with our acquisitions of Icagen in April 2020 and Pfenex in October 2020, which primarily consisted of salaries and lab costs and intangible amortizations associated with Icagen ($10.4 million) and Pfenex ($13.5 million). The increases were partially offset by a $17.0 million year over year decreases in amortization of other economic rights, primarily consisting of economic rights acquired from Palvella in December 2018 and Novan in February 2019.

General and administrative expenses increased year over year in 2020 primarily due to $20.7 million acquisition and integration related expenses associated with the Pfenex acquisition.

We do not provide forward-looking estimates of costs and time to complete our ongoing research and development projects as such estimates would involve a high degree of uncertainty. Uncertainties include our inability to predict the outcome of research and clinical studies, regulatory requirements placed upon us by regulatory authorities such as the FDA and EMA, our inability to predict the decisions of our partners, our ability to fund research and development programs, competition from other entities of which we may become aware in future periods, predictions of market potential for products that may be derived from our work, and our ability to recruit and retain personnel or third-party contractors with the necessary knowledge and skills to perform certain research. Refer to "*Item 1A. Risk Factors*" for additional discussion of the uncertainties surrounding our research and development initiatives.

Other income (expense)

(Dollars in thousands)	2020	2019	Change	% Change
Gain (loss) from short-term investments	$ (16,933)	$ 1,049	$ (17,982)	(1,714)%
Interest income	8,078	28,430	(20,352)	(72)%
Interest expense	(27,420)	(35,745)	8,325	23 %
Other expense, net	(108)	(4,171)	4,063	97 %
Total other income (expense,) net	$ (36,383)	$ (10,437)	$ (25,946)	(249)%

The fluctuation in the gain (loss) from short-term investments is primarily driven by the changes in the fair value of our ownership in Viking common stock and warrants (an unrealized loss of $19.0 million in 2020 as compared to an unrealized gain of $2.9 million in 2019).

Interest income consists primarily of interest earned on our short-term investments. The year over year decrease in 2020 resulted from the decrease in our short-term investment balances due to the usage of funds in share repurchases, the 2023 Notes repurchase and the acquisitions of Icagen, xCella, Taurus and Pfenex during 2020 as well as lower interest rates during 2020.

Interest expense includes the 0.75% coupon cash interest expense in addition to the non-cash accretion of discount (including the amortization of debt issuance costs) on our 2023 Notes. The year over year decrease in 2020 was primarily due to lower average debt outstanding balance as compared to the prior year. The 2019 Notes were paid off upon the maturity date in August 2019. During 2020, we repurchased $254.7 million in principal of the 2023 Notes for $222.8 million in cash, including accrued interest of $0.6 million. See "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (7), Convertible Senior Notes*."

Other expense, net, decreased year over year in 2020 primarily due to a $5.1 million reduction in the value of our Selexis commercial license right in 2019. See additional information in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (1), Basis of Presentation and Summary of Significant Accounting Policies - Commercial License and Other Economic Rights.*"

Income tax benefit (expense)

(Dollars in thousands)	2020	2019	Change	% Change
Income before income tax expense (benefit)	$ (10,538)	$ 796,639	$ (807,177)	(101)%
Income tax benefit (expense)	7,553	(167,337)	174,890	105 %
Net income (loss)	$ (2,985)	$ 629,302	$ (632,287)	(100)%
Effective Tax Rate	72 %	21 %		

Our effective tax rate for 2020 and 2019 was 72% and 21%, respectively. Our tax rate is affected by recurring items, such as the U.S. federal and state statutory tax rates and the relative amounts of income we earn in those jurisdictions, which we expect to be fairly consistent in the near term. It is also affected by discrete items that may occur in any given year, but are not consistent from year to year. In 2020, the variance from the U.S. federal statutory rate of 21% was primarily attributable to the mix of earnings in jurisdictions with lower statutory rates than the U.S. federal statutory tax rate, primarily the United Kingdom. The items below also had an impact on the difference between our statutory U.S. rate.

2020

- $2.4 million (22.9%) increase from Section 162(m) limitation
- $1.7 million (15.7%) decrease from the foreign-derived intangible income deduction
- $1.5 million (13.8%) increase from state income taxes
- $0.9 million (8.3%) increase due to non-deductible transaction costs primarily related to the acquisition of Pfenex
- $0.7 million (6.6%) decrease from research and development tax credits
- $0.3 million (3.4%) decrease due to excess tax benefits from share-based compensation which are recorded as a discrete item within the provision for income tax pursuant to ASU 2016-09

2019

- $1.2 million (0.1%) decrease due to the release of a valuation allowance primarily relating to research and development tax credits.
- $0.9 million (0.1%) decrease from research and development tax credits
- $0.8 million (0.1%) decrease due to excess tax benefits from share-based compensation which are recorded as a discrete item within the provision for income tax pursuant to ASU 2016-09

Liquidity and Capital Resources

At December 31, 2020, we had approximately $411.2 million in cash, cash equivalents, and short-term investments. Cash and cash equivalents and short-term investments decreased by $658.7 million from last year, due to factors described in the "Cash Flow Summary" below. Our primary source of liquidity, other than our holdings of cash, cash equivalents, and investments, which decreased during 2020 primarily from the acquisitions of Icagen, xCella, Taurus and Pfenex, has been cash flows from operations. Our ability to generate cash from operations provides us with the financial flexibility we need to meet operating, investing, and financing needs.

Historically, we have liquidated our short-term investments and/or issued debt and equity securities to finance our business needs as a supplement to cash provided by operating activities. Our short-term investments include U.S. government debt securities, investment-grade corporate debt securities, mutual funds and certificates of deposit. We have established guidelines relative to diversification and maturities of our investments in order to provide both safety and liquidity. These guidelines are periodically reviewed and modified to take advantage of trends in yields and interest rates. Additionally, we own certain securities which are classified as short-term investments that we received as a result of a milestone and an upfront license payment as well as 5.8 million shares of common stock in Viking.

In August 2014, we issued the 2019 Notes with aggregate principal amount of $245.0 million. During 2018, $217.7 million in principal of the 2019 Notes were converted into cash. In June 2019, we received notices for conversion of $1.0 million of principal amount of the 2019 Notes, which were settled in cash upon the 2019 Notes' maturity date in August 2019. On August 15, 2019, the 2019 Notes maturity date, we paid the noteholders the remaining $26.3 million principal amount.

In May 2018, we issued the 2023 Notes with an aggregate principal amount of $750.0 million. A portion of the proceeds from such issuance totaling $49.7 million were used to repurchase 260,000 shares of our common stock. During 2020, we repurchased $254.7 million in principal of the 2023 Notes for $222.8 million in cash, including accrued interest of $0.6 million. After the repurchases, $495.3 million in principal amount of the 2023 Notes remain outstanding. We may continue to use cash on hand to repurchase additional 2023 Notes through open-market transactions, including through Rule 10b5-1 trading plan to facilitate open-market repurchases, or otherwise, from time to time. The timing and amount of repurchase transactions will be determined by management based on the evaluation of market conditions, trading price of the 2023 Notes, legal requirements and other factors. The 2023 Notes were not convertible as of December 31, 2020. It is our intent and policy to settle conversions through combination settlement, which essentially involves payment in cash equal to the principal portion and delivery of shares of common stock for the excess of the conversion value over the principal portion. See detail in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (7), Convertible Senior Notes*."

In September 2018, our Board of Directors authorized us to repurchase up to $200.0 million of our common stock from time to time over a period of up to three years. On January 23, 2019, our Board of Directors increased the share repurchase authorization by $150.0 million. The available amount under the $350.0 million repurchase plan was fully utilized during the third quarter of 2019.

On September 11, 2019, our Board of Directors approved a stock repurchase program authorizing the repurchase of up to $500.0 million of our common stock from time to time over the next three years. We expect to acquire shares primarily through open-market transactions and have entered into a Rule 10b5-1 trading plan, and may enter into additional Rule 10b5-1 trading plans in the future, to facilitate open-market repurchases. The timing and amount of repurchase transactions will be determined by management based on our evaluation of market conditions, share price, legal requirements and other factors. Our prior $350.0 million stock repurchase program mentioned above was terminated in connection with the approval of the new stock repurchase program. Authorization to repurchase $248.8 million of our common stock remained available as of December 31, 2020. See *"Item 5. Market for Registrant's Common Equity, Related Stockholder Matters, and Issuer Purchase of Equity Securities*."

We believe that existing funds, cash generated from operations and existing sources of and access to financing are adequate to satisfy our needs for working capital; capital expenditure and debt service requirements; continued advancement of research and development efforts; potential stock repurchases; and other business initiatives we plan to strategically pursue, including acquisitions and strategic investments.

As of December 31, 2020, we had $49.1 million in fair value of contingent consideration liabilities associated with the acquisitions to be settled in future periods.

Cash Flow Summary

(in thousands)	2020	2019	2018
Net cash provided by (used in):			
Operating activities	$ 54,586	$ (29,336)	$ 194,059
Investing activities	$ 231,648	$ 466,918	$ (423,269)
Financing activities	$ (310,545)	$ (485,172)	$ 328,585

In 2020, we generated cash from operations, from the sale of Vernalis R&D business and from issuance of common stock under employee stock plans. During the year we used cash for investing activities, including the acquisition of Pfenex, Icagen, xCella and Taurus. We also used cash for financing activities, including the payments related to the extinguishment of certain 2023 Notes and stock repurchases.

In 2019, we generated $827 million from the sale of the Promacta license (including $14.2 million recorded to revenue related to the Promacta royalty for the period between January 1, 2019 and March 6, 2019), used cash for net purchases of short-term investments, used $453.0 million to repurchase our common stock, used $103.8 million to pay federal and state estimated income taxes, paid off the remaining balance of the 2019 Notes in the amount of $27.3 million, paid $12.0 million for the purchase of Novan economic rights and paid $11.8 million for the Ab Initio acquisition (net of cash acquired).

In 2018, we generated cash from operations, from issuance of the 2023 Notes and associated warrants, and from issuance of common stock under employee stock plans. During the same period we used cash for investing activities, including the acquisition of commercial rights, net purchases of short-term investments, payments made to acquire Vernalis, payments to CVR holders and capital expenditures. We also used cash for financing activities, including principal payments related to conversions of the 2019 Notes, payments to purchase the bond hedge associated with the 2023 Notes, payments for taxes related to net share settlement of equity awards and to repurchase shares of our common stock.

Off-Balance Sheet Arrangements

We do not participate in any transactions that generate relationships with unconsolidated entities or financial partnerships, such as entities often referred to as structured finance or special purpose entities, which would have been established for the purpose of facilitating off-balance sheet arrangements or other contractually narrow or limited purposes. During the fiscal year ended December 31, 2020, we were not involved in any “off-balance sheet arrangements” within the meaning of the rules of the SEC.

We lease our office facilities under operating lease arrangements with varying terms through March 2024. The agreements provide for increases in annual rents based on changes in the Consumer Price Index or fixed percentage increases of 3.0%. We had no off-balance sheet arrangements at December 31, 2020, 2019 and 2018.

Contractual Obligations

As of December 31, 2020, future minimum payments due under our contractual obligations are as follows (in thousands):

	Payments Due by Period				
	Total	Less than 1 year	1-3 years	3-5 years	Thereafter
Purchase obligations [1]	$ 63,056	$ 36,416	$ 26,640	$ —	$ —
Notes payable [2]	$ 503,947	$ 3,714	$ 500,233	$ —	$ —
Operating lease obligations [3]	$ 8,659	$ 2,259	$ 3,895	$ 1,805	$ 700
Finance lease obligations [4]	$ 6,758	$ 6,649	$ 105	$ 4	$ —

Amounts represent our commitments under our supply agreement with Hovione for Captisol purchases.
Amounts represent contractual amounts due under our 2023 Notes, including interest based on the fixed rate of 0.75% per year.

We lease two office facilities, which we have fully vacated under operating lease arrangements. The lease agreements expire on February 2023 and April 2024. We sublet the facilities through the end of our lease. As of December 31, 2020, we expect to receive aggregate future minimum lease payments totaling $1.0 million (non-discounted) over the duration of the sublease agreement, which are not included in the table above.

Amounts represent our commitments under our finance lease agreements.

Critical Accounting Policies and Estimates

The preparation of financial statements in conformity with GAAP requires estimates and assumptions that affect the reported amounts of assets and liabilities, revenues and expenses, and related disclosures of contingent liabilities in the consolidated financial statements and accompanying notes. The SEC has defined a company's critical accounting policies as the ones that are most important to the portrayal of the company's financial condition and results of operations, and which require the company to make its most difficult and subjective judgments, often as a result of the need to make estimates of matters that are inherently uncertain. Based on this definition, we have identified the critical accounting policies and judgments addressed below. We also have other key accounting policies, which involve the use of estimates, judgments, and assumptions that are significant to understanding our results. For additional information, see "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (1), Basis of Presentation and Summary of Significant Accounting Policies*." Although we believe that our estimates, assumptions, and judgments are reasonable, they are based upon information presently available. Actual results may differ significantly from these estimates under different assumptions, judgments, or conditions.

Revenue Recognition

On January 1, 2018, we adopted ASC 606, which amends the guidance for recognition of revenue from contracts with customers using the modified-retrospective method applied to those contracts that were not completed as of January 1, 2018. We apply the following five-step model in order to determine the revenue: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations, including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations; and (v) recognition of revenue when (or as) the Company satisfies each performance obligation.

We receive royalty revenue on sales by our partners of products covered by patents that we or our partners own under the contractual agreements. We do not have future performance obligations under these license arrangements. We generally satisfy our obligation to grant intellectual property rights on the effective date of the contract. However, we apply the royalty recognition constraint required under the guidance for sales-based royalties which requires a sales-based royalty to be recorded no sooner than the underlying sale occurs. Therefore, royalties on sales of products commercialized by our partners are recognized in the quarter the product is sold. Our partners generally report sales information to us on a one quarter lag. Thus, we estimate the expected royalty proceeds based on an analysis of historical experience and interim data provided by our partners including their publicly announced sales. Differences between actual and estimated royalty revenues, which have not been material, are adjusted in the period in which they become known, typically the following quarter.

Our contracts with customers often will include future contingent milestone based payments. We include contingent milestone based payments in the estimated transaction price when it is probable to estimate the amount of the payment. These estimates are based on historical experience, anticipated results and our best judgment at the time. If the contingent milestone based payment is sales-based, we apply the royalty recognition constraint and record revenue when the underlying sale has taken place. Significant judgments must be made in determining the transaction price for our sales of intellectual property. Because of the risk that products in development with our partners will not reach development based milestones or receive regulatory approval, we generally recognize any contingent payments that would be due to us upon the development milestone or regulatory approval. Depending on the terms of the arrangement, we may also defer a portion of the consideration received if we have to satisfy a future obligation. We use an observable price to determine the stand-alone selling price for separate performance obligations or a cost plus margin approach when one is not available.

For R&D services that we recognize over time, we measure our progress using an input method. The input methods we use are based on the effort we expend or costs we incur toward the satisfaction of our performance obligation. We estimate the amount of effort we expend, including the time it will take us to complete the activities, or the costs we may incur in a given period, relative to the estimated total effort or costs to satisfy the performance obligation. This results in a percentage that we multiply by the transaction price to determine the amount of revenue we recognize each period. This approach requires us to make numerous estimates and use significant judgement. If our estimates or judgements change over the course of the collaboration, they may affect the timing and amount of revenue that we recognize in the current and future periods.

Revenue from Captisol sales is recognized when control of Captisol material or intellectual property license rights is transferred to our customers in an amount that reflects the consideration we expect to receive from our customers in exchange for those products. This process involves identifying the contract with a customer, determining the performance obligations in the contract, determining the contract price, allocating the contract price to the distinct performance obligations in the contract, and recognizing revenue when the performance obligations have been satisfied. A performance obligation is considered distinct from other obligations in a contract when it provides a benefit to the customer either on its own or together with other resources that are readily available to the customer and is separately identified in the contract. We consider a performance obligation satisfied once we have transferred control of the product, meaning the customer has the ability to use and obtain the benefit of the Captisol material or intellectual property license right. We recognize revenue for satisfied performance obligations only when we determine there are no uncertainties regarding payment terms or transfer of control. Sales tax and other taxes we collect concurrent with revenue-producing activities are excluded from revenue. We have elected to recognize the cost of freight and shipping when control over Captisol material has transferred to the customer as an expense in cost of material sales. We expense incremental costs of obtaining a contract when incurred if the expected amortization period of the asset that we would have recognized is one year or less or the amount is immaterial. We did not incur any incremental costs of obtaining a contract during the periods reported.

We occasionally have sub-license obligations related to arrangements for which we receive license fees, milestones and royalties. We evaluate the determination of gross as a principal versus net as an agent reporting based on each individual agreement.

Intangible Assets and Other Long-Lived Assets — Impairment Assessments

We regularly perform reviews to determine if the carrying values of our long-lived assets are impaired. A review of identifiable intangible assets and other long-lived assets is performed when an event occurs indicating the potential for impairment. If indicators of impairment exist, we first assess the impairment evaluation and then assess the recoverability of the affected long-lived assets and compare their fair values to the respective carrying amounts if needed. An impairment evaluation is based on an undiscounted cash flow analysis at the lowest level at which cash flows of the long-lived assets are largely independent of other groups of assets and liabilities.

In order to estimate the fair value of identifiable intangible assets and other long-lived assets, we estimate the present value of future cash flows from those assets. The key assumptions that we use in our discounted cash flow model are the amount and timing of estimated future cash flows to be generated by the asset over an extended period of time and a rate of return that considers the relative risk of achieving the cash flows, the time value of money, and other factors that a willing market participant would consider. Significant judgment is required to estimate the amount and timing of future cash flows and the relative risk of achieving those cash flows.

Assumptions and estimates about future values and remaining useful lives are complex and often subjective. They can be affected by a variety of factors, including external factors such as industry and economic trends, and internal factors such as changes in our business strategy and our internal forecasts. For example, if our future operating results do not meet current forecasts or if we experience a sustained decline in our market capitalization that is determined to be indicative of a reduction in fair value of our reporting unit, we may be required to record future impairment charges for purchased intangible assets. Impairment charges could materially decrease our future net income and result in lower asset values on our balance sheet.

Contingent Liabilities

In October 2017, we acquired Crystal for total cash consideration of $27.2 million, plus contingent consideration of up to an additional $10.5 million ($5.8 million has been paid as of December 31, 2020) over a five year period following the acquisition date based on certain research milestones and a portion of the payments that we receive from a specified part of the historical Crystal business. The contingent consideration is measured at fair value using an income approach valuation technique, specifically with probability weighted and discounted cash flows. The fair value of the liability is assessed at each reporting date and the change in fair value is recorded in our consolidated statements of operations. The carrying amount of the liability may fluctuate significantly and actual amounts paid may be materially different than the carrying amount of the liability. The fair value of the contingent consideration liability as of December 31, 2020 was $0.8 million.

In connection with our acquisition of Metabasis in January 2010, we issued Metabasis stockholders four tradable CVRs, one CVR from each of four respective series of CVR, for each Metabasis share. The CVRs entitle Metabasis stockholders to cash payments as proceeds are received by us from the sale or partnering of any of the Metabasis drug development programs. The fair values of the CVRs are remeasured at each reporting date through the term of the related agreement. Changes in the fair values are reported in the statement of operations as income (decreases) or expense (increases). The carrying amount of the liability may fluctuate significantly based upon quoted market prices and actual amounts paid under the agreements may be materially different than the carrying amount of the liability.

On April 1, 2020, we acquired the core assets, including its partnered programs and ion channel technology from Icagen and certain of its affiliates for total cash consideration of $15.1 million, and a contingent earn-out payment of up to $25.0 million based on certain revenue milestones with an estimated fair value upon acquisition of $4.8 million. The fair value of the earn-out liability was determined using a probability weighted income approach incorporating the estimated future cash flows from expected future milestones. These cash flows were then discounted to present value using a discount rate based on the market participants' cost of debt reflective of Icagen. The fair value of the liability is assessed at each reporting date and the change in fair value is recorded in our consolidated statements of operations. The carrying amount of the liability may fluctuate significantly and actual amounts paid may be materially different than the carrying amount of the liability. The fair value of the contingent consideration liability as of December 31, 2020 was $6.4 million.

On October 1, 2020, we acquired Pfenex, which develops next-generation and novel protein therapeutics to improve existing therapies and create new therapies for biological targets linked to critical, unmet diseases using a protein expression technology platform. The preliminary purchase price of $465.1 million included $429.6 million cash consideration paid upon acquisition, and a contingent CVR payment of up to $77.8 million of cash payments based on certain specified milestones with an estimated initial fair value of $37.0 million, net of $1.5 million recorded as post-acquisition expenses based on double trigger accelerate feature. The fair value of the CVR liability was determined using a probability adjusted income approach. These cash flows were then discounted to present value using a discount rate based on the market participants' cost of debt reflective of Pfenex. The liability is periodically assessed based on events and circumstances related to the underlying milestone, and any change in fair value is recorded in our consolidated statements of operations. The fair value of the CVR liability as of December 31, 2020 was $37.6 million.

See additional information in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (5), Fair Value Measurement.*"

Income Taxes

Our provision for income taxes, deferred tax assets and liabilities, and reserves for unrecognized tax benefits reflect our best assessment of estimated future taxes to be paid. Significant judgments and estimates based on interpretations of existing tax laws or regulations in the United States are required in determining our provision for income taxes. Changes in tax laws, statutory tax rates, and estimates of our future taxable income could impact the deferred tax assets and liabilities provided for in the consolidated financial statements and would require an adjustment to the provision for income taxes.

Deferred tax assets are regularly assessed to determine the likelihood they will be recovered from future taxable income. A valuation allowance is established when we believe it is more likely than not the future realization of all or some of a deferred tax asset will not be achieved. In evaluating our ability to recover deferred tax assets within the jurisdiction which they arise, we consider all available positive and negative evidence. Factors reviewed include the cumulative pre-tax book income for the past three years, scheduled reversals of deferred tax liabilities, our history of earnings and reliability of our forecasts, projections of pre-tax book income over the foreseeable future, and the impact of any feasible and prudent tax planning strategies.

We recognize the impact of a tax position in our financial statements only if that position is more likely than not of being sustained upon examination by taxing authorities, based on the technical merits of the position. Tax authorities regularly examine our returns in the jurisdictions in which we do business and we regularly assess the tax risk of our return filing positions. Due to the complexity of some of the uncertainties, the ultimate resolution may result in payments that are materially different from our current estimate of the tax liability. These differences, as well as any interest and penalties, will be reflected in the provision for income taxes in the period in which they are determined.

Recent Accounting Pronouncements

For the summary of recent accounting pronouncements applicable to our consolidated financial statements, see "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (1), Basis of Presentation and Summary of Significant Accounting Policies.*"

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to market risk from interest rates and equity prices which could affect our results of operations, financial condition and cash flows. We manage our exposure to these market risks through our regular operating and financing activities.

Investment Portfolio Risk

At December 31, 2020, our investment portfolio included investments in available-for-sale securities of $363.6 million, including the investment in Viking common stock and warrants of $39.1 million. These securities are subject to market risk and may decline in value based on market conditions.

Equity Price Risk

Our 2023 Notes include conversion and settlement provisions that are based on the price of our common stock at conversion or maturity of the notes, as applicable. As of December 31, 2020, the "if-converted value" did not exceed the principal amount of the 2023 Notes. See detail in "*Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements—Note (7), Convertible Senior Notes.*"

Foreign Currency Risk

Through our licensing and business operations, we are exposed to foreign currency risk. Foreign currency exposures arise from transactions denominated in a currency other than the functional currency and from foreign denominated revenues and profit translated into U.S. dollars. Our license partners sell our products worldwide in currencies other than the U.S. dollar. Because of this, our revenues from royalty payments are subject to risk from changes in exchange rates.

We purchase Captisol from Hovione, located in Lisbon, Portugal. Payments to Hovione are denominated and paid in U.S. dollars; however, the unit price of Captisol contains an adjustment factor which is based on the sharing of foreign currency risk between the two parties. The effect of an immediate 10% change in foreign exchange rates would not have a material impact on our financial condition, results of operations or cash flows. We do not currently hedge our exposures to foreign currency fluctuations.

Interest Rate Risk

We are exposed to changes in interest rates related primarily to our investment portfolio. Our investment policy and strategy are focused on the preservation of capital and supporting our liquidity requirements. We use a combination of internal and external management to execute our investment strategy. We typically invest in highly rated securities, with the primary objective of minimizing the risk of principal loss. Our investment policy generally requires securities to be investment grade and limits the amount of credit exposure to any one issuer. We have historically maintained a relatively short average maturity for our investment portfolio, and we believe a hypothetical 100 basis point adverse move in interest rates across all maturities would not materially impact the fair market value of the portfolio in either period.

Item 8. **Consolidated Financial Statements and Supplementary Data**

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Ligand Pharmaceuticals Incorporated

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Ligand Pharmaceuticals Incorporated (the Company) as of December 31, 2020 and 2019, and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2020, and the related notes, (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2020, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2020, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 24, 2021 expressed an unqualified opinion thereon.

Adoption of ASU No. 2016-13

As discussed in Note 1 to the consolidated financial statements, the Company changed its method of accounting of measurement for credit losses on financial instruments effective January 1, 2020, due to the adoption of Accounting Standards Update (ASU) No. 2016-13, *Measurement of Credit Losses on Financial Instruments (Topic 326)*, and the related amendments.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of the critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing a separate opinion on the critical audit matters or on the account or disclosure to which they relate.

Acquisition of Pfenex Inc.

Description of the Matter

As disclosed in Note 4 to the consolidated financial statements, during 2020, the Company completed the acquisition of Pfenex Inc. for total aggregate consideration of $465.1 million. The transaction was accounted for as a business combination. In connection with the acquisition, the Company recognized identified intangible assets which totaled $385 million and principally consisted of contractual relationships and developed technology, and recognized the Contingent Value Right (CVR) liability for acquisition consideration that is payable based on a predefined regulatory milestone if achieved by December 31, 2021 for which there is a maximum earnout of $77.8 million. The Company determines the fair value of the CVR both as part of the initial purchase price allocation, and on an ongoing basis each reporting period until the CVR is settled. As of December 31, 2020, the liability related to the CVR is $37.6 million.

Auditing the Company's accounting for its acquisition of Pfenex Inc. was complex due to the significant judgement required by management to determine the fair value of identified intangible assets, and to determine the fair value of the CVR arrangement. The Company used an income approach to measure the value of the contractual relationship and technology-related intangible assets and a discounted cash flow model to value the CVR. Determination of the fair value of the acquired intangible assets was sensitive to the underlying assumptions including the estimated revenue growth rates and timing and the probability of technical and regulatory success. The fair value of CVR was sensitive to the significant underlying assumptions including the probability and timing of achieving the predefined regulatory milestone. These significant assumptions are forward looking and could be affected by future economic and market conditions.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of the controls over the Company's accounting for acquisitions. For example, we tested controls over management's review of the valuation of intangible assets acquired and CVR, including the valuation models used and the underlying assumptions used to develop such estimates, and management's review of the completeness and accuracy of the data used to develop the estimates.

To test the estimated fair value of the intangible assets and CVR, our audit procedures included, among others, evaluating the Company's use of valuation methodologies, evaluating the prospective financial information and testing the completeness and accuracy of underlying data. We compared the significant assumptions to current industry, market and economic trends and historical results of the acquired business. We also involved internal valuation specialists to assist in our evaluation of the valuation methodology and certain significant assumptions used by the Company. Our internal valuation specialists' procedures included, among others, developing a range of independent estimates for the discount rates and comparing those to the discount rates selected by management.

Impairment assessment of finite-lived intangibles

Description of the Matter

At December 31, 2020, the Company's finite-lived intangible assets totaled $595.3 million. As discussed in Note 1 to the consolidated financial statements, the Company reviews finite-lived intangible assets for impairment whenever events or changes in circumstances indicate that the finite-lived intangibles are not expected to be recovered through future undiscounted cash flows. The Company did not identify indicators of impairment for its finite-lived intangibles at December 31, 2020.

Auditing management's assessment of impairment is challenging due to the high degree of subjective auditor judgment necessary in evaluating management's identification of indicators of potential impairment and the related assessment of the severity of such indicators in determining whether a triggering event has occurred that requires the Company to evaluate the recoverability of the asset. A high degree of auditor judgment was required to evaluate the significant inputs used in the assessment for potential triggering events which included market conditions, industry and economic trends, changes in regulations, clinical success and historical and forecasted financial results. These possible triggering events could have a significant effect on the Company's impairment assessment and the determination of whether further quantitative analysis of finite-lived intangible impairment was required.

How We Addressed the Matter in Our Audit	We obtained an understanding of management's process to identify indicators of impairment, including the qualitative analysis and related inputs and assumptions used in performing the analyses. We evaluated the design and tested the operating effectiveness of the controls that address the identification of indicators of impairment. For example, we tested controls over management's assessment of indicators of impairment. To test the Company's evaluation of indicators of impairment for finite-lived intangibles, our audit procedures included, among others, assessing the methodologies and testing the completeness and accuracy of the Company's analysis of events or changes in circumstances. As part of our evaluation, we considered market conditions, industry and economic trends, changes in regulations, clinical success and historical and forecasted financial results, in assessing whether an indicator of impairments exists.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2016.

San Diego, California
February 24, 2021

LIGAND PHARMACEUTICALS INCORPORATED

CONSOLIDATED BALANCE SHEETS
(in thousands, except par value)

	December 31,	
	2020	**2019**
ASSETS		
Current assets:		
Cash and cash equivalents	$ 47,619	$ 71,543
Short-term investments	363,567	998,324
Accounts receivable, net	56,847	30,387
Inventory	26,487	7,296
Income taxes receivable	2,217	11,361
Other current assets	3,822	4,734
Total current assets	500,559	1,123,645
Deferred income taxes, net	24,320	25,608
Intangible assets, net	595,330	210,448
Goodwill	189,662	95,229
Commercial license and other economic rights	10,979	20,090
Property and equipment, net	14,434	7,185
Operating lease assets	6,892	10,353
Finance lease assets	15,842	84
Other assets	4,267	2,273
Total assets	$ 1,362,285	$ 1,494,915
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 3,784	$ 2,420
Accrued liabilities	18,530	8,581
Current contingent liabilities	39,884	2,607
Deferred revenue	29,435	2,139
Current operating lease liabilities	1,885	1,242
Current finance lease liabilities	6,593	13
Total current liabilities	100,111	17,002
2023 convertible senior notes, net	442,293	638,959
Long-term contingent liabilities	9,249	6,335
Deferred income taxes, net	64,598	32,937
Long-term operating lease liabilities	5,643	9,970
Other long-term liabilities	30,866	22,480
Total liabilities	652,760	727,683
Commitments and contingencies		
Stockholders' equity:		
Preferred stock, $0.001 par value; 5,000 shares authorized; zero issued and outstanding at December 31, 2020 and 2019	—	—
Common stock, $0.001 par value; 60,000 shares authorized; 16,080 and 16,823 shares issued and outstanding at December 31, 2020 and 2019, respectively	16	17
Additional paid-in capital	318,358	367,326
Accumulated other comprehensive loss	(801)	(216)
Retained earnings	391,952	400,105
Total stockholders' equity	709,525	767,232
Total liabilities and stockholders' equity	$ 1,362,285	$ 1,494,915

See accompanying notes to these consolidated financial statements.

LIGAND PHARMACEUTICALS INCORPORATED

CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except per share amounts)

	Year Ended December 31,		
	2020	**2019**	**2018**
Revenues:			
Royalties	$ 33,796	$ 46,976	$ 128,556
Captisol	109,959	31,489	29,123
Contract revenue	42,664	41,817	93,774
Total revenues	186,419	120,282	251,453
Operating costs and expenses:			
Cost of Captisol	30,419	11,347	6,337
Amortization of intangibles	23,442	16,864	15,792
Research and development	59,392	55,908	27,863
General and administrative	64,435	41,884	37,734
Total operating costs and expenses	177,688	126,003	87,726
Gain from sale of Vernalis R&D	17,114	—	—
Gain from sale of Promacta license	—	812,797	—
Income from operations	25,845	807,076	163,727
Other income (expense):			
Gain (loss) from short-term investments	(16,933)	1,049	50,377
Interest income	8,078	28,430	13,999
Interest expense	(27,420)	(35,745)	(48,276)
Other expense, net	(108)	(4,171)	(6,497)
Total other income (expense), net	(36,383)	(10,437)	9,603
Income (loss) before income tax	(10,538)	796,639	173,330
Income tax benefit (expense)	7,553	(167,337)	(30,009)
Net income (loss)	(2,985)	629,302	143,321
Basic net income (loss) per share	$ (0.18)	$ 33.13	$ 6.77
Shares used in basic per share calculation	16,185	18,995	21,160
Diluted net income (loss) per share	$ (0.18)	$ 31.85	$ 5.96
Shares used in diluted per share calculation	16,185	19,757	24,067

See accompanying notes to these consolidated financial statements.

LIGAND PHARMACEUTICALS INCORPORATED
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(in thousands)

	Year Ended December 31,		
	2020	**2019**	**2018**
Net income (loss)	$ (2,985)	$ 629,302	$ 143,321
Unrealized net gain (loss) on available-for-sale securities, net of tax	(162)	200	73
Foreign currency translation adjustment	(423)	608	(921)
Comprehensive income (loss)	$ (3,570)	$ 630,110	$ 142,473

See accompanying notes to these consolidated financial statements.

LIGAND PHARMACEUTICALS INCORPORATED

CONSOLIDATED STATEMENT OF STOCKHOLDERS' EQUITY
(in thousands, except share data)

	Common Stock		Additional paid-in capital	Accumulated other comprehensive income (loss)	Accumulated deficit	Total stockholders' equity
	Shares	Amount				
Balance at January 1, 2018	21,148,665	$ 21	$ 798,205	$ 2,486	$ (400,924)	$ 399,788
Issuance of common stock under employee stock compensation plans, net	399,116	—	16,417	—	—	16,417
Reclassification of equity component of currently redeemable convertible notes	—	—	18,859	—	—	18,859
Share-based compensation	—	—	20,846	—	—	20,846
Repurchase of common stock	(782,248)	—	(127,481)	—	—	(127,481)
Other comprehensive income	—	—	—	73	—	73
Cumulative-effect adjustment from adoption of ASU 2016-01	—	—	—	(2,662)	2,662	—
Cumulative-effect adjustment from adoption of ASU 2014-09, net of tax	—	—	—	—	25,581	25,581
Derivative associated with 2019 Notes and Bond Hedge	—	—	(1,559)	—	—	(1,559)
Loss on settlement of 2019 Notes	—	—	3,187	—	—	3,187
Warrant repurchase in connection with 2019 Notes	—	—	(30,472)	—	—	(30,472)
Loss on repurchase of warrants in connection with 2019 Notes	—	—	1,792	—	—	1,792
Tax effect on 2019 Notes transactions	—	—	(1,680)	—	—	(1,680)
Derivative associated with 2023 Notes and Bond Hedge	—	—	(1,807)	—	—	(1,807)
Warrant derivative in connection with 2023 Notes	—	—	97,805	—	—	97,805
Tax effect for 2023 Notes transactions	—	—	(3,181)	—	—	(3,181)
Foreign currency translation adjustment	—	—	—	(921)	—	(921)
Other tax adjustments	—	—	183	—	163	346
Net income	—	—	—	—	143,321	143,321
Balance at December 31, 2018	20,765,533	$ 21	$ 791,114	$ (1,024)	$ (229,197)	$ 560,914
Issuance of common stock under employee stock compensation plans, net	179,838	—	(1,421)	—	—	(1,421)
Share-based compensation	—	—	24,515	—	—	24,515
Repurchase of common stock	(4,122,133)	(4)	(448,429)	—	—	(448,433)
Unrealized net gain on available-for-sale securities, net of deferred tax	—	—	—	200	—	200
Foreign currency translation adjustment	—	—	—	608	—	608
Other tax adjustments	—	—	1,547	—	—	1,547
Net income	—	—	—	—	629,302	629,302
Balance at December 31, 2019	16,823,238	$ 17	$ 367,326	$ (216)	$ 400,105	$ 767,232
Issuance of common stock under employee stock compensation plans, net	190,672	—	1,535	—	—	1,535
Share-based compensation	—	—	30,727	—	—	30,727
Repurchase of common stock	(934,079)	(1)	(77,997)	—	—	(77,998)
Unrealized net loss on available-for-sale securities, net of deferred tax	—	—	—	(162)	—	(162)
Foreign currency translation adjustment	—	—	—	(423)	—	(423)
Reacquisition of equity due to 2023 debt extinguishment, net of tax	—	—	(3,236)	—	—	(3,236)
Cumulative-effect adjustment from adoption of ASU 2016-13, net of tax	—	—	—	—	(5,168)	(5,168)
Other tax adjustments	—	—	3	—	—	3
Net loss	—	—	—	—	(2,985)	(2,985)
Balance at December 31, 2020	16,079,831	$ 16	$ 318,358	$ (801)	$ 391,952	$ 709,525

See accompanying notes to these consolidated financial statements.

LIGAND PHARMACEUTICALS INCORPORATED

CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)

	Year Ended December 31,		
	2020	**2019**	**2018**
Operating activities			
Net income (loss)	$ (2,985)	$ 629,302	$ 143,321
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:			
Gain from sale of Promacta license	—	(812,797)	—
Gain from sale of Vernalis R&D	(17,114)	—	—
Change in estimated fair value of contingent liabilities	963	(30)	3,448
Depreciation and amortization of intangible assets	25,691	18,361	12,784
Loss (gain) short-term investments	16,933	(1,049)	(50,377)
Amortization/accretion of premium (discount) on investments, net	1,479	(10,274)	(5,452)
Amortization of debt discount and issuance fees	23,077	29,988	43,954
Amortization of commercial license and other economic rights	2,275	25,370	1,934
Share-based compensation	30,727	24,515	20,846
Deferred income taxes, net	(19,053)	74,829	29,739
Royalties recorded in retained earnings upon adoption of ASC 606	—	—	32,707
Other	2,657	(3,498)	2,931
Changes in operating assets and liabilities, net of acquisitions:			
Accounts receivable, net	(26,061)	25,463	(29,544)
Inventory	(17,799)	(2,061)	(2,559)
Accounts payable and accrued liabilities	(1,245)	(6,664)	(4,533)
Income taxes receivable	9,144	(11,219)	318
Other economic rights	—	(12,000)	—
Deferred revenue	29,236	(1,147)	(1,158)
Other	(3,339)	3,575	(4,300)
Net cash provided by (used in) operating activities	54,586	(29,336)	194,059
Investing activities			
Proceeds from sale of Promacta license	—	812,797	—
Purchase of commercial license rights	—	—	(10,000)
Cash paid for acquisition, net of cash and restricted cash acquired	(404,884)	(11,840)	(5,856)
Purchases of property and equipment	(4,458)	(2,553)	(887)
Purchases of short-term investments	(422,523)	(2,356,545)	(1,434,255)
Proceeds from commercial license rights	1,358	—	—
Proceeds from sale of short-term investments	394,539	535,877	131,942
Proceeds from maturity of short-term investments	644,155	1,494,851	892,873
Proceeds received from repayment of Viking note receivable	—	—	3,914
Cash paid for equity method investment	(500)	(1,000)	—
Proceeds on sale of Vernalis R&D, net	22,061	—	—
Other, net	1,900	(4,669)	(1,000)
Net cash provided by (used in) investing activities	231,648	466,918	(423,269)
Financing activities			
Repayment of debt	(222,209)	(27,323)	(217,674)
Payments under finance lease obligations	(9,549)	—	—
Gross proceeds from issuance of 2023 Convertible Senior Notes	—	—	750,000
Payment of debt issuance costs	—	—	(16,900)
Proceeds from issuance of warrants	—	—	90,000
Purchase of convertible bond hedge	—	—	(140,250)
Proceeds from bond hedge settlement	—	12,401	439,559
Payments to convert holders for bond conversion	—	(12,401)	(439,581)

Net proceeds from stock option exercises and ESPP	3,017	2,997	20,183
Taxes paid related to net share settlement of equity awards	(1,481)	(4,418)	(3,765)
Share repurchases	(77,998)	(453,048)	(122,868)
Repurchase of warrants	—	(380)	(30,094)
Payments to CVR Holders	(2,325)	(3,000)	(25)
Net cash provided by (used in) financing activities	(310,545)	(485,172)	328,585
Net increase (decrease) in cash, cash equivalents, and restricted cash	(24,311)	(47,590)	99,375
Effect of exchange rate changes on cash	—	83	(215)
Cash, cash equivalents and restricted cash at beginning of year	72,273	119,780	20,620
Cash, cash equivalents and restricted cash at end of year	$ 47,962	72,273	119,780
Supplemental disclosure of cash flow information			
Cash paid during the year:			
Interest paid	$ 4,463	$ 5,827	$ 1,513
Taxes paid	$ 2,130	$ 103,817	$ 341
Restricted cash in other current assets	$ 343	$ 730	$ 2,616
Supplemental schedule of non-cash investing and financing activities			
Accrued inventory purchases	$ 1,562	$ 170	$ 2,059
Unrealized (loss) gain on AFS investments	$ (212)	$ 256	$ 48
Purchase of fixed assets recorded in accounts payable	$ 249	$ 495	$ 15

See accompanying notes to these consolidated financial statements.

Unless the context requires otherwise, references in this report to "Ligand," "we," "us," the "Company," and "our" refer to Ligand Pharmaceuticals Incorporated and its consolidated subsidiaries.

1. Basis of Presentation and Summary of Significant Accounting Policies

Business

We are a biopharmaceutical company with a business model primarily based on developing or acquiring assets which generate royalty, milestone or other passive revenue for us using a lean corporate cost structure. We operate in one business segment: development and licensing of biopharmaceutical assets.

Principles of Consolidation

The accompanying consolidated financial statements include Ligand and its wholly-owned subsidiaries. All significant intercompany accounts and transactions have been eliminated in consolidation.

Basis of Presentation
Our consolidated financial statements have been prepared in accordance with U.S. GAAP and include the accounts of our parent company and its wholly-owned subsidiaries. All intercompany transactions and balances have been eliminated in consolidation.

Reclassifications

Certain reclassifications have been made to the previously issued financial statements to conform with the current period presentation. Specifically, our investment in Viking common stock and warrants was reclassified from "investment in Viking" to "short-term investments" in the audited consolidated balance sheet as of December 31, 2019. Additionally, "gain (loss) from
short-term investments" in the consolidated statements of operations include both the gain (loss) from investment in Viking and other short-term investments, which was previously included in "other income, net" for both the twelve months ended December 31, 2019 and 2018.

Use of Estimates

The preparation of consolidated financial statements in conformity with U.S. GAAP requires the use of estimates and assumptions that affect the amounts reported in the consolidated financial statements and the accompanying notes. Actual results may differ from those estimates.

Concentrations of Business Risk

Financial instruments that potentially subject us to significant concentrations of credit risk consist primarily of cash equivalents and investments. We invest excess cash principally in United States government debt securities, investment grade corporate debt securities, mutual funds and certificates of deposit. We maintain some cash and cash equivalents balances with financial institutions that are in excess of the Federal Deposit Insurance Corporation insurance limits. We have established guidelines relative to diversification and maturities that maintain safety and liquidity. These guidelines are periodically reviewed and modified to take advantage of trends in yields and interest rates.

Revenue from significant partners, which is defined as 10% or more of our total revenue, was as follows:

	Year-ended December 31,		
	2020	**2019**	**2018**
Partner A	45 %	13 %	40 %
Partner B	17 %	27 %	13 %
Partner C	< 10%	< 10%	20 %

* Except for Partner B, who represents the same customer for all three years presented, Partner A represents two different customers and Partner C represents another two different customers for the three years presented.

We obtain Captisol primarily from two sites at a single supplier, Hovione. If this supplier were not able to supply the requested amounts of Captisol from each site, and if our safety stocks of material were depleted, we would be unable to continue to derive revenues from the sale of Captisol until we obtained material from an alternative source, which could take a considerable length of time.

Cash Equivalents & Short-term Investments

Cash equivalents consist of all investments with maturities of three months or less from the date of acquisition. Short-term investments primarily consist of investments in debt and equity securities and mutual funds. Debt securities have effective maturities greater than three months and less than twelve months from the date of acquisition. We classify our short-term investments as "available-for-sale". Such investments are carried at fair value, with unrealized gains and losses on debt securities included in the statement of comprehensive income (loss) and unrealized gains and losses on equity securities and mutual funds included the consolidated statement of operations. Mutual funds are valued at their net asset value (NAV) on the last day of the period. We determine the cost of investments based on the specific identification method. We determine the realized gains or losses on the sale of available-for-sale securities using the specific identification method and includes net realized gains and losses as a component of other income or expense within the consolidated statements of operations. We periodically review available-for-sale securities for other than temporary declines in fair value below the cost basis whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. To date, we have not identified any other than temporary declines in fair value of its short-term investments.

Accounts Receivable

Our accounts receivable arise primarily from sales on credit to customers. We establish an allowance for credit losses to present the net amount of accounts receivable expected to be collected. The allowance is determined by using the loss-rate method, which requires an estimation of loss rates based upon historical loss experience adjusted for factors that are relevant to determining the expected collectability of accounts receivable. Some of these factors include macroeconomic conditions that correlate with historical loss experience, delinquency trends, aging behavior of receivables and credit and liquidity quality indicators for industry groups, customer classes or individual customers. During 2020, we considered the current and expected future economic and market conditions including, but not limited to, the anticipated unfavorable impacts of the surrounding novel coronavirus (COVID-19) pandemic on our business and recorded an adjustment of $0.3 million of allowance for credit losses as of December 31, 2020.

Inventory

Inventory, which consists of finished goods, is stated at the lower of cost or net realizable value. We determine cost using the first-in, first-out method or the specific identification method. We analyze our inventory levels periodically and write down inventory to net realizable value if it has become obsolete, has a cost basis in excess of its expected net realizable value or is in excess of expected requirements. There were no write downs related to obsolete inventory recorded for the years ended December 31, 2020, 2019 and 2018.

Property and Equipment

Property and equipment are stated at cost, subject to review for impairment, and depreciated over the estimated useful lives of the assets, which generally range from three to ten years, using the straight-line method. Amortization of leasehold improvements is recorded over the shorter of the lease term or estimated useful life of the related asset. Maintenance and repairs are charged to operations as incurred. When assets are sold, or otherwise disposed of, the cost and related accumulated depreciation are removed from the accounts and any gain or loss is included in operating income or expense.

Acquisitions

We first determine whether a set of assets acquired constitute a business and should be accounted for as a business combination. If the assets acquired are not a business, we account for the transaction as an asset acquisition. Business combinations are accounted for by using the acquisition method of accounting which requires us to use significant estimates and assumptions, including fair value estimates, as of the business combination date and to refine those estimates as necessary during the measurement period (defined as the period, not to exceed one year, in which we may adjust the provisional amounts recognized for a business combination).

Under the acquisition method of accounting, we recognize separately from goodwill the identifiable assets acquired, the liabilities assumed, including contingent consideration and all contractual contingencies, generally at the acquisition date fair value. Contingent purchase consideration to be settled in cash are remeasured to estimated fair value at each reporting period with the change in fair value recorded in statement of operations. Costs that we incur to complete the business combination such as investment banking, legal and other professional fees are not considered part of consideration and we charge them to general and administrative expense as they are incurred.

We measure goodwill as of the acquisition date as the excess of consideration transferred, which we also measure at fair value, over the net of the acquisition date amounts of the identifiable assets acquired and liabilities assumed. In addition, IPR&D is capitalized and assessed for impairment annually. IPR&D is amortized upon product commercialization or upon out-licensing the underlying intellectual property where we have no active involvement in the licensee's development activities. IPR&D is amortized over the estimated life of the commercial product or licensing arrangement.

Should the initial accounting for a business combination be incomplete by the end of a reporting period that falls within the measurement period, we report provisional amounts in our financial statements. During the measurement period, we adjust the provisional amounts recognized at the acquisition date to reflect new information obtained about facts and circumstances that existed as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of that date and we record those adjustments to our financial statements in the period of change, if any.

Under the acquisition method of accounting for business combinations, if we identify changes to acquired deferred tax asset valuation allowances or liabilities related to uncertain tax positions during the measurement period and they relate to new information obtained about facts and circumstances that existed as of the acquisition date, those changes are considered a measurement period adjustment and we record the offset to goodwill. We record all other changes to deferred tax asset valuation allowances and liabilities related to uncertain tax positions in current period income tax expense.

Contingent Liabilities

In connection with the acquisition of Pfenex in October 2020, we will pay $2.00 per share or $77.8 million as a CVR in the event a predefined regulatory milestone is achieved by December 31, 2021. The CVR Agreement provides that the required milestone will be achieved upon the receipt of a notice from the FDA that the teriparatide injection is therapeutically equivalent to FORTEO® (teriparatide injection).
In connection with the acquisition of Icagen in April 2020, Icagen selling shareholders will be entitled to receive up to an additional $25 million of cash payments based on certain revenue achievements.

In connection with the acquisition of Crystal in October 2017, we may be required to pay up to an additional $10.5 million in purchase consideration upon achievement of certain commercial and development milestones to the Crystal shareholders.

In connection with the acquisition of CyDex in January 2011, we recorded a contingent liability for amounts potentially due to holders of the CyDex CVRs and former license holders. The liability is periodically assessed based on events and circumstances related to the underlying milestones, royalties and material sales.

In connection with the acquisition of Metabasis in January 2010, we issued Metabasis stockholdersfour tradable CVRs for each Metabasis share. The fair values of the CVRs are remeasured at each reporting date through the term of the related agreement.

Any change in fair value is recorded in our consolidated statement of operations. For additional information, see "*Note (5), Fair Value Measurement and Note (8), Balance Sheet Account Details*."

Goodwill, Intangible Assets and Other Long-Lived Assets

Goodwill, which has an indefinite useful life, represents the excess of cost over fair value of net assets acquired. Goodwill is reviewed for impairment at least annually during the fourth quarter, or more frequently if an event occurs indicating the potential for impairment. During the goodwill impairment review, we assess qualitative factors to determine whether it is more likely than not that the fair value of our reporting unit is less than the carrying amount, including goodwill. We operate in one reporting unit. The qualitative factors include, but are not limited to, macroeconomic conditions, industry and market considerations, and the overall financial performance. If, after assessing the totality of these qualitative factors, we determine that it is not more likely than not that the fair value of our reporting unit is less than the carrying amount, then no additional assessment is deemed necessary. Otherwise, we proceed to perform the quantitative assessment. We will then evaluate goodwill

for impairment by comparing the estimated fair value of the reporting unit to its carrying value, including the associated goodwill. To determine the fair value, we generally use a combination of market approach based on Ligand and comparable publicly traded companies in similar lines of businesses and the income approach based on estimated discounted future cash flows. Our cash flow assumptions consider historical and forecasted revenue, operating costs and other relevant factors. We may also elect to bypass the qualitative assessment in a period and elect to proceed to perform the quantitative assessment for the goodwill impairment test. We performed the annual assessment for goodwill impairment during the fourth quarter of 2020, noting no impairment.

Our identifiable intangible assets are typically composed of acquired core technologies, licensed technologies, contractual relationships, customer relationships and trade names. The cost of identifiable intangible assets with finite lives is generally amortized on a straight-line basis over the assets' respective estimated useful lives. We regularly perform reviews to determine if any event has occurred that may indicate that intangible assets with finite useful lives and other long-lived assets are potentially impaired. If indicators of impairment exist, an impairment test is performed to assess the recoverability of the affected assets by determining whether the carrying amount of such assets exceeds the undiscounted expected future cash flows. If the affected assets are not recoverable, we estimate the fair value of the assets and record an impairment loss if the carrying value of the assets exceeds the fair value. Factors that may indicate potential impairment include market conditions, industry and economic trends, changes in regulations, clinical success, historical and forecasted financial results, market capitalization, significant changes in the ability of a particular asset to generate positive cash flows, and the pattern of utilization of a particular asset. We did not identify indicators of impairment for the finite-lived intangibles at December 31, 2020.

Commercial license and other economic rights

Commercial license and other economic rights consist of the following (in thousands):

	December 31, 2020			December 31, 2019		
	Gross	Adjustments[1]	Net	Gross	Adjustments[2]	Net
Aziyo and CorMatrix	$ 17,696	$ (9,588)	$ 8,108	$ 17,696	$ (5,500)	$ 12,196
Palvella	10,000	(10,000)	—	10,000	(7,492)	2,508
Selexis and Dianomi	10,602	(7,731)	2,871	10,602	(5,216)	5,386
Total	$ 38,298	$ (27,319)	$ 10,979	$ 38,298	$ (18,208)	$ 20,090

(1) Amounts represent accumulated amortization to principal or research and development expenses of $21.3 million and credit loss adjustments of $ 6.0 million as of December 31, 2020 . Of the $ 6.0 million credit loss adjustments as of December 31, 2020, $5.5 million was recorded to retained earnings upon the adoption of ASU 2016-13, Financial Instruments - Credit Losses, on January 1, 2020.
(2) Amounts represent accumulated amortization to principal or research and development expenses as of December 31, 2019.

Commercial license and other economic rights as of December 31, 2020 represent a portfolio of future milestone and royalty payment rights acquired from Selexis in April 2013 and April 2015, CorMatrix in May 2016, Palvella in December 2018, and Dianomi in January 2019. Commercial license rights acquired are accounted for as financial assets, and other economic rights are accounted for as funded research and developments as further discussed below.

In May 2019, we entered into a development funding and royalties agreement with Novan, pursuant to which we would receive certain payments at specified milestones, as well as royalties on any future net sales of SB206, a product candidate being developed to treat molluscum contagiosum, and any other Novan products used for the treatment of molluscum ("Novan Molluscum Products"). We paid Novan an upfront payment of $12.0 million, which Novan is required to use to fund the development of SB206. We are not obligated to provide additional funding to Novan for the development or commercialization of SB206. Pursuant to the agreement, we would receive up to $20.0 million of milestone payments upon the achievement by Novan of certain regulatory milestones for SB206 or any other Novan Molluscum Product and commercial milestones. In addition to the milestone payments, Novan will pay us tiered royalties from 7.0% to 10.0% based on aggregate annual net sales of SB206 or any other Novan Molluscum Product in North America. We determined the economic rights related to Novan should be characterized as a funded research and development arrangement, thus we account for it in accordance with ASC 730-20, *Research and Development Arrangement*, and reduce our asset as the funds are expended by Novan. As of December 31, 2019, Novan had used up the $12.0 million upfront payment provided by us. As such, our other economic rights related to Novan had been fully amortized as of December 31, 2019.

In December 2018, we entered into a development funding and royalties agreement with Palvella. Pursuant to the agreement, we will receive up to $8.0 million of milestone payments upon the achievement by Palvella of certain corporate, financing and regulatory milestones for PTX-022, a product candidate being developed to treat pachyonychia congenita. In addition to the milestone payments, Palvella will pay us tiered royalties from 5.0% to 9.8% based on aggregate annual worldwide net sales of any PTX-022 products, if approved, subject to Palvella's right to reduce the royalty rates by making payments in certain circumstances. We made an upfront payment of $10.0 million, which Palvella is required to use to fund the development of PTX-022. We are not obligated to provide additional funding to Palvella for development or commercialization of PTX-022. We determined the economic rights related to Palvella should be characterized as a funded research and development arrangement, thus we account for it in accordance with ASC 730-20, and reduce our asset as the funds are expended by Palvella. As of December 31, 2020, the fund has been fully expended by Palvella and our cost basis for the asset has been reduced to zero, and therefore we will recognize milestones and royalties as revenue when earned. During 2020, we recorded a $3.0 million milestone from Palvella under contract revenue, which has been included in our consolidated statement of operations for the year ended December 31, 2020.

In May 2017, we entered into a royalty agreement with Aziyo pursuant to which we will receive royalties from certain marketed products that Aziyo acquired from CorMatrix. Pursuant to the agreement, we received $10.0 million in 2017 from Aziyo to buydown the royalty rates on the products CorMatrix sold to Aziyo. The agreement closed on May 31, 2017, in connection with the closing of the asset sale from CorMatrix to Aziyo (the "CorMatrix Asset Sale"). Per the agreement, we will receive a 5% royalty on the products Aziyo acquired in the CorMatrix Asset Sale, reduced from the original 20% royalty from CorMatrix pursuant to the previously disclosed interest purchase agreement, dated May 3, 2016 (the "Original Interest Purchase Agreement") between CorMatrix and us. In addition, Aziyo has agreed to pay us up to $10.0 million of additional milestones tied to cumulative net sales of the products Aziyo acquired in the CorMatrix Asset Sale and to extend the term on these royalties by one year. The royalty agreement will terminate on May 31, 2027. In addition, in May 2017, we entered into an amended and restated interest purchase agreement (the "Amended Interest Purchase Agreement") with CorMatrix, which supersedes in its entirety the Original Interest Purchase Agreement. Other than removing the commercial products sold to Aziyo in the CorMatrix Sale, the terms of the Amended Interest Purchase Agreement remain unchanged with respect to the CorMatrix developmental pipeline products, including the royalty rate of 5% on such pipeline products. The Amended Interest Purchase Agreement will terminate 10 years from the date of the first commercial sale of such products.

We account for the Aziyo commercial license right as a financial asset in accordance with ASC 310, *Receivables*, and amortize the commercial license right using the effective interest method whereby we forecast expected cash flows over the term of the arrangement to arrive at an annualized effective interest. The annual effective interest associated with the forecasted cash flows from the royalty agreement with Aziyo as of December 31, 2020 is 23%. Revenue is calculated by multiplying the carrying value of the commercial license right by the effective interest. The payments received in 2020 were accordingly allocated between revenue and the amortization of the commercial license rights.

Prior to 2020, we accounted for commercial license rights related to developmental pipeline products such as Selexis and Dianomi on a non-accrual basis. These developmental pipeline products are non-commercialized, non-approved products that require FDA or other regulatory approval, and thus have uncertain cash flows. The developmental pipeline products are on a non-accrual basis as we are not yet able to forecast future cash flows given their pre-commercial stages of development. We will prospectively update the yield model under the effective interest method once the underlying products are commercialized and we can reliably forecast expected cash flows. Income will be calculated by multiplying the carrying value of the commercial license right by the effective interest rate. We regularly perform reviews to determine if any event has occurred that may indicate the carrying value of these commercial license rights are potentially impaired. If the affected commercial license rights are not recoverable, we estimate the fair value of the assets and record an impairment loss if the carrying value of the assets exceeds the fair value. During 2020, given the expected cash flow from the Selexis program, we started to account for the Selexis commercial license right as a financial asset in accordance with ASC 310, and amortize the commercial license right using the effective interest method whereby we forecast expected cash flows over the term of the arrangement to arrive at an annualized effective interest. The annual effective interest associated with the forecasted cash flows from the royalty agreement with Selexis as of December 31, 2020 is 21%. Revenue is calculated by multiplying the carrying value of the commercial license right by the effective interest. The payments received in 2020 were accordingly allocated between revenue and the amortization of the commercial license rights. We still accounted for commercial license rights related to Dianomi on a non-accrual basis as of December 31, 2020.

For commercial license rights, we have elected a prospective approach to account for changes in estimated cash flows and selected a method for determining when an impairment would be recognized and how to measure that impairment. In circumstances where our new estimate of expected cash flows is greater than previously expected, we will update our yield prospectively. In circumstances where our new estimate of expected cash flows is less than previously expected and below our original estimated yield we record an impairment. Impairment is recognized by reducing the financial asset to an amount that

represents the present value of our most recent estimate of expected cash flows discounted by the original effective interest rate. In circumstances where our new estimate of expected cash flows is less than previously expected, but not below our original estimated yield, we update our yield prospectively.

As a result of adopting ASU 2016-13, we now recognize an allowance for current expected credit losses on the commercial license rights subject to credit risk. We recorded a $5.5 million pre-tax reserve for credit losses upon adoption of the standard on January 1, 2020. We estimated the credit losses at the individual asset level by considering the performance against the programs, the company operating performance and the macroeconomic forecast. In addition, we have judgmentally applied credit loss risk factors to the future expected payments with consideration given to the timing of the payment. Given the higher inherent credit risk associated with longer term receivables, we applied a lower risk factor to the earlier years and progressively higher risk factors to the later years. During the twelve months ended December 31, 2020, we further considered the current and expected future economic and market conditions surrounding novel coronavirus (COVID-19) pandemic and recorded an additional $0.5 million reserve for credit losses in other expense, net, in our consolidated statement of operations.

Revenue Recognition

Our revenue is generated primarily from royalties on sales of products commercialized by our partners, Captisol material sales, license fees and development, regulatory and sales based milestone payments.

On January 1, 2018, we adopted Accounting Standards Update (ASU) 2014-09,*Revenue from Contracts with Customers (Topic 606),* which amends the guidance for recognition of revenue from contracts with customers by using the modified-retrospective method applied to those contracts that were not completed as of January 1, 2018. The results for reporting periods beginning January 1, 2018, are presented in accordance with the new standard. See additional information in *Disaggregation of Revenue* subsection below.

Royalties

We receive royalty revenue on sales by our partners of products covered by patents that we own. We do not have future performance obligations under these license arrangements. We generally satisfy our obligation to grant intellectual property rights on the effective date of the contract. However, we apply the royalty recognition constraint required under the guidance for sales-based royalties which requires a sales-based royalty to be recorded when the underlying sale occurs. Therefore, royalties on sales of products commercialized by our partners are recognized in the quarter the product is sold. Our partners generally report sales information to us on a one quarter lag. Thus, we estimate the expected royalty proceeds based on an analysis of historical experience and interim data provided by our partners including their publicly announced sales. Differences between actual and estimated royalty revenues, which have not been material, are adjusted for in the period in which they become known, typically the following quarter.

Captisol Sales

We recognize revenue when control of Captisol material is transferred to our customers in an amount that reflects the consideration we expect to receive from our customers in exchange for those products. This process involves identifying the contract with a customer, determining the performance obligations in the contract, determining the contract price, allocating the contract price to the distinct performance obligations in the contract, and recognizing revenue when the performance obligations have been satisfied. A performance obligation is considered distinct from other obligations in a contract when it provides a benefit to the customer either on its own or together with other resources that are readily available to the customer and is separately identified in the contract. We consider a performance obligation satisfied once we have transferred control of the product, meaning the customer has the ability to use and obtain the benefit of the Captisol material or intellectual property license right. We recognize revenue for satisfied performance obligations only when we determine there are no uncertainties regarding payment terms or transfer of control. We have elected to recognize the cost of freight and shipping when or after control over Captisol material has transferred to the customer as an expense in cost of Captisol. Sales tax and other taxes we collect concurrent with revenue-producing activities are excluded from revenue. We expense incremental costs of obtaining a contract when incurred if the expected amortization period of the asset that we would have recognized is one year or less or the amount is immaterial. We did not incur any incremental costs of obtaining a contract during the periods reported.

Contract Revenue

Our contract revenue includes service revenue, license fees and future contingent milestone based payments. We recognize service revenue for contracted R&D services performed for our customers over time. We measure our progress using an input method based on the effort we expend or costs we incur toward the satisfaction of our performance obligation. We estimate the amount of effort we expend, including the time it will take us to complete the activities, or the costs we may incur in a given

period, relative to the estimated total effort or costs to satisfy the performance obligation. This results in a percentage that we multiply by the transaction price to determine the amount of revenue we recognize each period. This approach requires us to make estimates and use judgement. If our estimates or judgements change over the course of the collaboration, they may affect the timing and amount of revenue that we recognize in the current and future periods.

We include contingent milestone based payments in the estimated transaction price when there is a basis to reasonably estimate the amount of the payment. These estimates are based on historical experience, anticipated results and our best judgment at the time. If the contingent milestone based payment is sales-based, we apply the royalty recognition constraint and record revenue when the underlying sale has taken place. Significant judgments must be made in determining the transaction price for our licenses of intellectual property. Because of the risk that products in development with our partners will not reach development based milestones or receive regulatory approval, we generally recognize any contingent payments that would be due to us upon or after the development milestone or regulatory approval.

Deferred Revenue

Depending on the terms of the arrangement, we may also defer a portion of the consideration received if we have to satisfy a future obligation. We use an observable price to determine the stand-alone selling price for separate performance obligations or a cost plus margin approach when one is not available.

The timing of revenue recognition, billings and cash collections results in billed accounts receivable, unbilled receivables (contract assets), and customer advances and deposits (contract liabilities) on the consolidated balance sheet. Except for royalty revenue, we generally receive payment at the point we satisfy our obligation or soon after. Therefore, we do not generally carry a contract asset balance. Any fees billed in advance of being earned are recorded as deferred revenue. During the twelve months ended December 31, 2020, the amount recognized as revenue that was previously deferred at December 31, 2019 was $0.9 million. During the twelve months ended December 31, 2019, the amount recognized as revenue that was previously deferred at December 31, 2018 was $3.3 million.

Disaggregation of Revenue

Royalty revenue for 2020, 2019 and 2018 are reported as below (in thousands):

	Year ended December 31,		
	2020	**2019**	**2018**
Kyprolis	$ 25,164	$ 25,046	$ 21,686
Evomela	6,377	5,171	5,658
Other	2,255	2,566	1,952
Promacta	N/A	14,193	99,260
	$ 33,796	$ 46,976	$ 128,556

The following table represents disaggregation of Material Sales and License fees, milestone and other (in thousands):

	Year ended December 31,		
	2020	**2019**	**2018**
Captisol	$ 109,959	$ 31,489	$ 29,123
Contract			
Service Revenue	21,803	16,776	4,749
License Fees	4,378	6,199	78,195
Milestone	11,516	17,173	6,577
Other	4,967	1,669	4,253
	$ 42,664	$ 41,817	$ 93,774

Preclinical Study and Clinical Trial Accruals

Substantial portions of our preclinical studies and all of our clinical trials have been performed by third-party laboratories, CROs. We account for a significant portion of the clinical study costs according to the terms of our contracts with CROs. The terms of the CRO contracts may result in payment flows that do not match the periods over which services are provided to us under such contracts. Our objective is to reflect the appropriate preclinical and clinical trial expenses in our financial statements in the same period as the services occur. As part of the process of preparing our financial statements, we rely on cost information provided by our CROs. We are also required to estimate certain of our expenses resulting from the obligations under the CRO contracts. Accordingly, our preclinical study and clinical trial accrual is dependent upon the timely and accurate reporting of CROs and other third-party vendors. We periodically evaluate our estimates to determine if adjustments are necessary or appropriate as more information becomes available concerning changing circumstances, and conditions or events that may affect such estimates. No material adjustments to preclinical study and clinical trial accrued expenses have been recognized to date.

Research and Development Expenses

Research and development expense consists of labor, material, equipment, and allocated facilities costs of our scientific staff who are working pursuant to our collaborative agreements and other research and development projects. Also included in research and development expenses are third-party costs incurred for our research programs including in-licensing costs, CRO costs and costs incurred by other research and development service vendors. We expense these costs as they are incurred. When we make payments for research and development services prior to the services being rendered, we record those amounts as prepaid assets on our consolidated balance sheet and we expense them as the services are provided. In addition, the amortization of the above mentioned other economic rights such as Palvella and Novan are included in research and development expenses in accordance with ASC 730-20.

Share-Based Compensation

We incur share-based compensation expense related to restricted stock, ESPP, and stock options.

Restricted stock unit (RSU) and performance stock unit (PSU) are all considered restricted stock. The fair value of restricted stock is determined by the closing market price of our common stock on the date of grant. We recognize share-based compensation expense based on the fair value on a straight-line basis over the requisite service periods of the awards, taking into consideration of forfeitures as they occur. PSU represents a right to receive a certain number of shares of common stock based on the achievement of corporate performance goals and continued employment during the vesting period. At each reporting period, we reassess the probability of the achievement of such corporate performance goals and any expense change resulting from an adjustment in the estimated shares to be released are treated as a cumulative catch-up in the period of adjustment.

We use the Black-Scholes-Merton option-pricing model to estimate the fair value of stock purchases under ESPP and stock options granted. The model assumptions include expected volatility, term, dividends, and the risk-free interest rate. We look to historical and implied volatilities of our stock to determine the expected volatility. The expected term of an award is based on historical forfeiture experience, exercise activity, and on the terms and conditions of the stock awards. The expected dividend yield is determined to be 0% given that except for 2007, during which we declared a cash dividend on our common stock of $2.50 per share, we have not paid any dividends on our common stock in the past and currently do not expect to pay cash dividends or make any other distributions on common stock in the future. The risk-free interest rate is based upon U.S. Treasury securities with remaining terms similar to the expected term of the share-based awards.

We grant options, RSUs and PSUs to employees and non-employee directors. Non-employee directors are accounted for as employees. Options and RSUs granted to certain non-employee directors typically vest one year from the date of grant. Options granted to employees typically vest 1/8 on the six month anniversary of the date of grant, and 1/48 each month thereafter for forty-two months. RSUs and PSUs granted to employees vest over three years. All option awards generally expire ten years from the date of grant.

Share-based compensation expense for awards to employees and non-employee directors is recognized on a straight-line basis over the vesting period until the last tranche vests.

Derivatives

In May 2018, we issued $750.0 million aggregate principal amount of 2023 Notes, bearing cash interest at a rate of 0.75% per year, payable semi-annually, as further described in "*Note (7), Convertible Senior Notes*." Concurrently with the issuance of the notes, we entered into a series of convertible note hedge and warrant transactions which in combination are designed to reduce the potential dilution to our stockholders and/or offset the cash payments we are required to make in excess of the principal amount upon conversion of the notes. The conversion option associated with the 2023 Notes temporarily met the criteria for an embedded derivative liability which required bifurcation and separate accounting. In addition, the note hedge and warrants were also temporarily classified as a derivative asset and liability, respectively, on our consolidated balance sheet. As a result of shareholder approval to increase the number of authorized shares of our common stock on June 19, 2018, as discussed in "*Note (7), Convertible Senior Notes*," the derivative asset and liabilities were reclassified to additional paid-in capital. Changes in the fair value of these derivatives prior to being classified in equity were reflected in other expense, net, in our consolidated statements of operations for the twelve months ended December 31, 2018.

In connection with our 2019 Notes, which we issued in August 2014 for $245.0 million aggregate principal amount, on May 22, 2018, we amended it making an irrevocable election to settle the entire note in cash. As a result, we reclassified from equity to derivative liability the fair value of the conversion premium as of May 22, 2018. Amounts paid in excess of the principal amount would be offset by an equal receipt of cash under the corresponding convertible bond hedge. As a result, we reclassified from equity to derivative asset the fair value of the bond hedge as of May 22, 2018. Changes in the fair value of these derivatives are reflected in other expense, net, in our consolidated statements of operations.

In connection with the payoff of the 2019 Notes in August 15, 2019, the bond hedge was settled and accordingly, the derivative asset and derivative liability were settled to zero. See detail in "*Note (7), Convertible Senior Notes*."

Income Taxes

The provision for income taxes is computed using the asset and liability method, under which deferred tax assets and liabilities are recognized for the expected future tax consequences of temporary differences between the financial reporting and tax bases of assets and liabilities, and for the expected future tax benefit to be derived from tax loss and credit carryforwards. Deferred tax assets and liabilities are determined using the enacted tax rates in effect for the years in which those tax assets are expected to be realized. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in the provision for income taxes in the period that includes the enactment date.

Deferred tax assets are regularly assessed to determine the likelihood they will be recovered from future taxable income. A valuation allowance is established when we believe it is more likely than not the future realization of all or some of a deferred tax asset will not be achieved. In evaluating the ability to recover deferred tax assets within the jurisdiction which they arise we consider all available positive and negative evidence. Factors reviewed include the cumulative pre-tax book income for the past three years, scheduled reversals of deferred tax liabilities, history of earnings and reliable forecasting, projections of pre-tax book income over the foreseeable future, and the impact of any feasible and prudent tax planning strategies.

We recognize the impact of a tax position in our financial statements only if that position is more likely than not of being sustained upon examination by taxing authorities, based on the technical merits of the position. Tax authorities regularly examine our returns in the jurisdictions in which we do business and we regularly assess the tax risk of our return filing positions. Due to the complexity of some of the uncertainties, the ultimate resolution may result in payments that are materially different from our current estimate of the tax liability. These differences, as well as any interest and penalties, will be reflected in the provision for income taxes in the period in which they are determined.

Income (loss) Per Share

Basic income (loss) per share is calculated by dividing net income (loss) by the weighted-average number of common shares outstanding during the period. Diluted income per share is computed based on the sum of the weighted average number of common shares and potentially dilutive common shares outstanding during the period. Diluted loss per share is computed based on the sum of the weighted average number of common shares outstanding during the period.

For the twelve months ended December 31, 2020, all of the 0.6 million weighted average shares of outstanding equity awards as of December 31, 2020 were anti-dilutive due to the net loss for the period.

Potentially dilutive common shares consist of shares issuable under 2019 and 2023 convertible senior notes, stock options and restricted stock. 2019 and 2023 convertible senior notes have a dilutive impact when the average market price of the Company's common stock exceeds the applicable conversion price of the respective notes. It is our intent and policy to settle conversions through combination settlement, which essentially involves payment in cash equal to the principal portion and

delivery of shares of common stock for the excess of the conversion value over the principal portion. In addition, post May 22, 2018, the 2019 Notes can only be settled in cash and therefore there will be no further impact on income (loss) per share of these notes. Potentially dilutive common shares from stock options and restricted stock are determined using the average share price for each period under the treasury stock method. In addition, the following amounts are assumed to be used to repurchase shares: proceeds from exercise of stock options and the average amount of unrecognized compensation expense for stock options and restricted stock. In loss periods, basic net loss per share and diluted net loss per share are identical since the effect of otherwise dilutive potential common shares is anti-dilutive and therefore excluded.

The following table presents the calculation of weighted average shares used to calculate basic and diluted income (loss) per share (in thousands):

	Year Ended December 31,		
	2020	2019	2018
Weighted average shares outstanding:	16,185	18,995	21,160
Dilutive potential common shares:			
Restricted stock	—	43	72
Stock options	—	719	1,125
Warrants associated with 2019 Notes	—	—	1,017
2019 Convertible Senior Notes	—	—	693
Shares used to compute diluted income (loss) per share	16,185	19,757	24,067
Potentially dilutive shares excluded from calculation due to anti-dilutive effect	8,458	8,926	2,845

Comprehensive Income (Loss)

Comprehensive income (loss) represents net income (loss) adjusted for the change during the periods presented in unrealized gains and losses on available-for-sale securities, foreign currency translation adjustments, and reclassification adjustments for realized gains or losses included in net income (loss). The unrealized gains or losses are reported on the Consolidated Statements of Comprehensive Income (Loss).

Foreign Currency Translation

The British Pound Sterling is the functional currency of Vernalis and the corresponding financial statements have been translated into U.S. Dollars in accordance with ASC 830-30, *Translation of Financial Statements*. Assets and liabilities are translated at end-of-period rates while revenues and expenses are translated at average rates in effect during the period in which the activity took place. Equity is translated at historical rates and the resulting cumulative translation adjustments are included as a component of accumulated other comprehensive income (loss).

Impact of COVID-19 Pandemic

The current COVID-19 worldwide pandemic has presented substantial public health and economic challenges and is affecting our employees and partners, patients, communities and business operations, as well as the U.S. and global economy and financial markets. International and U.S. governmental authorities in impacted regions have taken actions in an effort to slow the spread of COVID-19, including issuing varying forms of “stay-at-home” orders, and restricting business functions outside of one’s home. In response, we have restricted in-person access to our executive offices, our administrative employees are mostly working remotely, and we have limited the number of staff in our research and development laboratories and other facilities. The continued spread of the COVID-19 pandemic and the measures taken by the governments of countries have affected, and could continue to affect, our business and the business of our partners, including future disruptions to our supply chain and the manufacture or shipment of drug substance and finished drug product for Captisol, delays by us or our partners in the initiation or enrollment of patients in clinical trials, discontinuations by patients enrolled in clinical trials, difficulties launching or commercializing products and other related activities, which could delay ongoing clinical trials, increase development costs, reduce royalty revenues and have a material adverse effect on our business, financial condition and results of operations. Several of our partners have reported that their operations have been impacted including delays in research and development programs and deprioritizing clinical trials in favor of treating patients who have contracted the virus or to prevent the spread of the virus. This may lead to clinical trial protocol deviations or to discontinuation of treatment for patients who are currently enrolled in the clinical trials being conducted by us or our partners. In addition, certain of our partners have reported negative impacts on product sales which will impact our royalty revenues.

Some of our partners are working to develop drugs to treat COVID-19. For example, we are supplying Captisol to partners, including Gilead for Veklury (remdesivir), the first FDA-approved treatment for COVID-19 for the treatment of patients with COVID-19 requiring hospitalization and, as a result, we have extended our Captisol supply agreement with Gilead until September 2030 and worked to increase our manufacturing of Captisol to meet this increased demand. In addition, certain of our OmniAb and Vernalis partners have initiated antibody discovery programs for the potential treatment of COVID-19.

The full extent to which the COVID-19 pandemic will directly or indirectly impact our business, the businesses of our partners, our results of operations and our financial condition will depend on future developments that are highly uncertain and cannot be accurately predicted, including new information that may emerge concerning COVID-19, the actions taken to contain it or treat its impact, including the timing and extent of governments reopening or further restricting activities, and the economic impact on local, regional, national and international markets.

Accounting Standards Recently Adopted

Credit Losses - In June 2016, the FASB issued ASU 2016-13,*Financial Instruments - Credit Losses: Measurement of Credit Losses on Financial Instruments (Topic 326),* which amends the impairment model by requiring entities to use a forward-looking approach based on expected losses to estimate credit losses on certain types of financial instruments, including trade receivables and available for sale debt securities. This standard includes our financial instruments, such as accounts receivable, investments that are generally of high credit quality, and commercial license rights. Previously, when credit losses were measured under GAAP, an entity generally only considered past events and current conditions in measuring the incurred loss. The new guidance requires us to identify, analyze, document and support new methodologies for quantifying expected credit loss estimates for our financial instruments, using information such as historical experience and current economic conditions, plus the use of reasonable supportable forecast information. We adopted ASU 2016-13 on January 1, 2020, using a modified retrospective transition method, which requires a cumulative-effect adjustment, if any, to the opening balance sheet of retained earnings to be recognized on the date of adoption with prior periods not restated. The cumulative-effect adjustment, net of tax, recorded on January 1, 2020, is approximately $5.2 million. Results for periods after January 1, 2020 are presented under ASU 2016-13 while prior period amounts continue to be reported under previously applicable accounting standards. See additional disclosure on credit losses under *"Accounts Receivable and Allowance for Credit Losses"* and *"Commercial License and Other Economic Rights"* discussed above and *"Short-term Investments"* in "*Note (8), Balance Sheet Accent Details*".

Goodwill Impairment Testing - In January 2017, the FASB issued ASU 2017-04,*Simplifying the Test for Goodwill Impairment,* which eliminates the requirement to perform a hypothetical purchase price allocation to measure goodwill impairment. Under the new standard the goodwill impairment test is performed by comparing the fair value of a reporting unit with its carrying amount, and recognizing an impairment charge for the amount by which the carrying amount of the reporting unit exceeds its fair value, although it cannot exceed the total amount of goodwill allocated to that reporting unit. We adopted this standard on January 1, 2020, and the adoption did not have a material impact on our consolidated financial statements.

Fair Value Measurement - In August 2018, the FASB issued ASU 2018-13,*Fair Value Measurement: Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement (Topic 820)*, which modifies the disclosure requirements on fair value measurements. We adopted this standard on January 1, 2020, and the adoption did not have a material impact on our consolidated financial statements.

Collaborative Arrangements - In November 2018, the FASB issued ASU 2018-18,*Collaborative Arrangements: Clarifying the Interaction between Topic 808 and Topic 606 (Topic 808)*. The new standard clarifies that certain transactions between participants in a collaborative arrangement should be accounted for under Topic 606,*Revenue from Contracts with Customers*, when the counterparty is a customer for a good or service that is a distinct unit of account. The amendments also preclude entities from presenting consideration from transactions with a collaborator that is not a customer together with revenue recognized from contracts with customers. We adopted this standard on January 1, 2020, and the adoption did not have a material impact on our consolidated financial statements.

Income Taxes - In December 2019, the FASB issued ASU 2019-12,*Simplifying the Accounting for Income Taxes.* The standard is expected to reduce cost and complexity related to accounting for income taxes. The new guidance eliminates certain exceptions and clarifies and amends existing guidance to promote consistent application among reporting entities. This standard is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2020, with early adoption permitted. Depending on the amendment, adoption may be applied on a retrospective, modified retrospective or prospective basis. We adopted this standard on a prospective basis on January 1, 2020, and the adoption did not have a material impact on our consolidated financial statements.

Accounting Standards Not Yet Adopted

In August 2020, the FASB issued ASU 2020-06,*Debt—Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging—Contracts in Entity's Own Equity (Subtopic 815-40): Accounting for Convertible Instruments and Contracts in an Entity's Own Equity.* The new guidance simplifies accounting for convertible instruments by removing major separation models required under current GAAP. This standard removes certain settlement conditions that are required for equity contracts to qualify for the derivative scope exception and it also simplifies the diluted earnings per share calculation in certain areas. This standard is effective for fiscal years beginning after December 15, 2021, including interim periods within those fiscal years. Early adoption is permitted, but no earlier than fiscal years beginning after December 15, 2020 and adoption must be as of the beginning of the Company's annual fiscal year. We are currently evaluating the impact of this standard on our consolidated financial statements and related disclosures. We intent to adopt this standard on January 1, 2022.

We do not believe that any other recently issued, but not yet effective accounting pronouncements, if adopted, would have a material impact on our consolidated financial statements or disclosures.

2. Sale of Vernalis R&D and Promacta License

Vernalis R&D

On October 11, 2020, we entered into an Agreement for the Sale and Purchase of the Entire Issued Share Capital of Vernalis (R&D) Limited (the "Purchase and Sale Agreement") with HitGen UK Ltd ("Buyer"). Under the terms of the Purchase and Sale Agreement, we transferred certain intellectual property on completed collaboration licenses to Ligand UK Limited, which is a subsidiary of the Company, which we retain rights and interest to and are entitled to receive future milestones and royalties. Under the Purchase and Sale Agreement, we are also entitled to a share of the economic rights on current research collaboration contracts. In addition, Vernalis will continue to support certain existing Ligand partnerships. On December 2, 2020, we completed the sale. Pursuant to the terms of the Purchase and Sale Agreement, at the closing of the transaction, Buyer paid $26.7 million in cash, following adjustment for debt, cash and net working capital. As Vernalis R&D has the input, process and output elements defined in ASC 805, *Business Combinations*, we concluded the sale qualifies as a sale of business. Net assets sold, net of working capital adjustment, was $6.1 million, goodwill allocated to the selling business that was written off was $3.5 million, resulting in a $17.1 million gain from sale of Vernalis R&D recorded to income from operations.

Promacta License

On March 5, 2019, we entered into an Asset Purchase Agreement (the "Asset Purchase Agreement") with RPI Finance Trust ("RPI"), doing business as "Royalty Pharma", who is not an affiliate. Under the Asset Purchase Agreement, we sold, transferred, assigned and conveyed to RPI, and RPI purchased, acquired and accepted from us, all of our rights, title and interest in and to the Purchased Assets, which include among other things the intellectual property and related know-how generated by us in connection with the license agreement (collectively, the "Purchased Assets"), dated December 29, 1994, by and between Novartis (as successor in interest to SmithKline Beecham Corporation) and Ligand, which allowed us to receive a royalty on net sales of Promacta. We concluded the sale does not qualify as a sale of a business, but as a sale of a non-financial asset. At the closing on March 6, 2019, RPI paid us $827.0 million in cash and we do not have any remaining performance obligations related to Novartis or RPI for Promacta. The carrying value of our Promacta asset as of March 6, 2019 was zero. Of the total cash proceeds from the sale, $14.2 million was recorded to revenue related to the Promacta royalty for the period between January 1, 2019 and March 6, 2019, and the remaining $812.8 million was recorded to income from operations in accordance with ASC 610-20, *Other Income - Gains and Losses from the Derecognition of Nonfinancial Assets.*

3. Short-term Investments: Investment in Viking

Our ownership in Viking was approximately 9.8% as of December 31, 2020, and we account for it as an investment in available-for-sale securities, which is measured at fair value, with changes in fair value recognized in net income. Viking is considered a related party as we maintain a seat on Viking's board of directors and we do not exert significant influence over Viking.

As of December 31, 2020 and December 31, 2019, we recorded our common stock in Viking in "short-term investments" at fair value of $2.8 million and $48.4 million, respectively. We also have outstanding warrants to purchase 1.5 million shares of Viking's common stock at an exercise price of $1.50 per share. We recorded the warrants in Viking in "short-term investments" in our consolidated balance sheets at fair value of $6.3 million and $9.9 million at December 31, 2020 and 2019, respectively. See further discussion in "*Note (5), Fair Value Measurement*."

4. Acquisitions

As set forth below, we completedsix acquisitions from January 1, 2018 through December 31, 2020, of which four (Pfenex, Icagen, Ab Initio and Vernalis) were accounted for as business combinations and two (Taurus and xCella) were accounted for as asset acquisitions. For business combinations, we applied the acquisition method of accounting. Accordingly, we recorded the tangible and intangible assets acquired and liabilities assumed at their estimated fair values as of the applicable date of acquisition. Except for the Pfenex acquisition, for all other acquisitions, we did not incur any material acquisition related costs.

Pfenex Acquisition

On October 1, 2020, we acquired Pfenex, which develops next-generation and novel protein therapeutics to improve existing therapies and create new therapies for biological targets linked to critical, unmet diseases using a protein expression technology platform.

The preliminary purchase price of $465.1 million included $429.6 million cash consideration paid upon acquisition, and a contingent CVR payment of up to $77.8 million in cash based on a certain specified milestone with an estimated initial fair value of $37.0 million. The CVR will only be paid in full if the milestone is achieved by December 31, 2021. The amount of the CVR included in purchase price was reduced by $1.5 million which was determined to be post-combination expense. The fair value of the CVR liability was determined using a probability adjusted income approach. These cash flows were then discounted to present value using a discount rate based on market participants' cost of debt reflective of the Company, which was 7.1%. The liability is periodically assessed based on events and circumstances related to the underlying milestone, and any change in fair value is recorded in our consolidated statements of operations.

In connection with the acquisition, a portion of Pfenex's equity awards that were outstanding and unvested prior to the acquisition became fully vested per the terms of the merger agreement. The acceleration of vesting required us to allocate the fair value of the equity attributable to pre-combination service to the purchase price and the remaining amount was considered our post-combination expense. We paid $17.3 million in cash for equity compensation, which is attributable to pre-combination services and is reflected as a component of the total purchase price paid of $429.6 million. In addition, the fair value of equity compensation attributable to the post-combination service period was $8.7 million.These amounts were associated with the accelerated vesting of stock options previously granted to Pfenex employees and were fully paid in cash, which was recognized as general and administrative expenses during the fourth quarter of 2020.

We recorded $20.7 million of acquisition-related costs for legal, severance and other costs in connection with the acquisition within operating expenses in our consolidated statement of operations for 2020. The following table sets forth an allocation of the preliminary purchase price to the identifiable tangible and intangible assets acquired and liabilities assumed, with the excess recorded to goodwill (in thousands):

Cash	$	51,407
Restricted cash		200
Accounts and unbilled receivables		1,359
Property and equipment, net		7,823
Right-of-use asset		3,070
Other assets		1,338
Intangibles acquired		385,000
Goodwill[(1)]		90,750
Accounts payable		(6,814)
Accrued liabilities		(7,379)
Deferred revenue		(3,908)
Lease liabilities		(3,070)
Other liabilities		(1,382)
Deferred tax liabilities, net		(53,296)
Total consideration	$	465,098

(1) Goodwill represents the excess of the purchase price over the preliminary fair value of the underlying assets acquired and liabilities assumed. Goodwill is attributable to the assembled workforce of experienced personnel at Pfenex and expected synergies.

None of the goodwill is expected to be deductible for tax purposes.The intangibles acquired and their weighted average useful life are as follows (in thousands, except useful lives):

	Approximate Fair Value	Estimated useful life (in years)
Contractual Relationships:		
Alvogen	$ 114,000	12
Merck	117,000	12
Jazz	80,000	17
SII	49,000	10
Arcellx	2,000	17
Acquired Technologies	23,000	10-19
	$ 385,000	

The fair values of the contractual relationships were based on the discounted cash flow method that estimated the present value of the potential royalties, milestones and collaboration revenue streams derived from the licensing of the related technologies over the estimated contractual relationship period. The fair values of the acquired technologies were based on the discounted cash flow method that estimated the present value of the potential royalties, milestones, collaboration and product revenue streams derived from the licensing of the related technologies over the estimated useful lives. These projected cash flows were discounted to present value using discount rate, which varies from 12% to 15%. The intangible assets acquired are being amortized on a straight-line basis over the estimated useful life.

The estimated fair values of assets acquired and liabilities assumed, including deferred tax assets and liabilities, and purchased intangibles are provisional. The accounting for these amounts falls within the measurement period and therefore we may adjust these provisional amounts to reflect new information obtained about facts and circumstances that existed as of the acquisition date.

Approximately $2.0 million of revenue and $19.3 million of loss before income taxes of Pfenex were included in the consolidated statement of operations for the year ended December 31, 2020. The following summary presents our unaudited pro forma consolidated results of operations for the years ended December 31, 2020 and December 31, 2019 as if the Pfenex acquisition had occurred on January 1, 2019, which gives effect to certain transaction accounting adjustments, including amortization of acquired intangibles and stock based compensation expense for retained Pfenex employees. The transaction accounting adjustments do not include non-recurring adjustments related to Pfenex's executive salary, board of director compensation, and salary of Pfenex employees involved in the reduction of force as part of the acquisition, estimated to be $7.1 million in 2020 and $4.8 million in 2019. The pro forma financial information is not necessarily indicative of the operating results that would have occurred had the acquisition been consummated as if the date indicated, nor is it necessarily indicative of future operating results (in thousands, except per share amounts):

	Year Ended December 31,	
(Unaudited)	2020	2019
Revenue	$ 189,203	$ 170,608
Net Income (loss)	$ (60,059)	$ 594,941
Net income (loss) per common share:		
Basic	$ (3.71)	$ 31.32
Diluted	$ (3.71)	$ 30.11

Taurus Acquisition

On September 9, 2020, we acquired Taurus, which discovers and develops novel antibodies from immunized cows and cow-derived libraries. These antibodies feature some of the longest CDR3s of any species, with unique genetic and structural diversity that can enable binding to challenging antigens with application in therapeutics, diagnostics and research.

The purchase price of $5.1 million included $4.6 million in cash, and a $0.5 million holdback to satisfy indemnification obligations which will be settled by September 2021. We also issued nontransferable CVRs for up to $4.5 million tied to

partnered and internal research and development and for up to $25.0 million as a 25% share of post-clinical Taurus product revenues (including milestone payments) received by us. We accounted for this transaction as an asset acquisition as we concluded that substantially all of the fair value of the gross assets acquired was concentrated in the acquired core technology.

The allocation of the consideration was allocated to the acquisition date fair values of acquired assets as follows (in thousands)

Cash	$	47
Intangibles assets with finite-life - core technologies		5,005
	$	5,052

The core technology is being amortized on a straight-line basis over the estimated useful life of10 years. We account for the CVRs in accordance with ASC 450,*Contingencies*, when the contingency is resolved and the liability becomes payable. None of the CVRs are recognized as of the acquisition date.

xCella Acquisition

On September 8, 2020, we acquired xCella, an antibody discovery company. xCella's xPloration platform is a proprietary microcapillary platform that can screen single B cells for specificity and bioactivity and will increase Ligand's antibody discovery throughput and efficiency.

We paid $7.1 million in cash (including a $0.5 million holdback to satisfy indemnification obligations which will be settled by September 2021), and issued earnout rights for up to $5.0 million tied to our use of the xCella technology for partnered research and development and for up to $25.75 million as a 25% share of any future milestone payments we received under a certain existing xCella partner arrangement. We evaluated this acquisition in accordance with ASC 805, *Business Combinations*, to discern whether the assets and operations of xCella met the definition of a business. We accounted for this transaction as an asset acquisition as we concluded that substantially all of the fair value of the gross assets acquired was concentrated in the acquired core technology.

The allocation of the consideration was allocated to the acquisition date fair values of acquired assets and assumed liabilities as follows (in thousands):

Cash and other assets	$	240
Accrued liabilities		(142)
Deferred tax liabilities, net		(820)
Intangibles assets with finite-life - core technology		7,798
	$	7,076

The core technology is being amortized on a straight-line basis over the estimated useful life of15 years. We account for the earnout rights in accordance with ASC 450, *Contingencies*, when the contingency is resolved and the liability becomes payable.None of the earnout rights are recognized as of the acquisition date.

Icagen Acquisition

On April 1, 2020, we acquired the core assets, including its partnered programs and ion channel technology from Icagen and certain of its affiliates.

The purchase price of $19.9 million included $15.1 million cash consideration paid upon acquisition, and a CVR of up to $25.0 million of cash payments based on certain revenue milestones with an estimated fair value of $4.8 million. The fair value of the earn-out liability was determined using a probability weighted income approach incorporating the estimated future cash flows from expected future milestones. These cash flows were then discounted to present value using a discount rate based on the market participants' cost of debt reflective of the Company, which was 5.5%. The liability is periodically assessed based on events and circumstances related to the underlying milestones, and any change in fair value is recorded in our consolidated statements of operations. The carrying amount of the liability may fluctuate significantly and actual amount paid may be materially different than the carrying amount of the liability. As the acquisition is not considered significant, pro forma information has not been provided. The results of Icagen have been included in our results of operations since the date of acquisition.

The preliminary allocation of the consideration was allocated to the acquisition date fair values of acquired assets and assumed liabilities as follows (in thousands):

Property and equipment, net	$	1,173
Prepaids and other assets		588
Liabilities assumed		(812)
Deferred revenue		(3,685)
Deferred tax assets, net		861
Acquired intangibles		12,800
Goodwill[(1)]		9,015
	$	19,940

(1) Goodwill represents the excess of the purchase price over the preliminary fair value of the underlying assets acquired and liabilities assumed. Goodwill is attributable to the assembled workforce of experienced personnel at Icagen and expected synergies.

The majority of the goodwill is deductible for tax purposes. Acquired intangibles include $11.1 million of customer relationships and $1.7 million of core technology. The fair values of the customer relationships were based on a discounted cash flow analysis incorporating the estimated future cash flows from these relationships during the contractual term. These cash flows were then discounted to present value using a discount rate of 17%. The fair value of the customer relationships is being amortized on a straight-line basis over the weighted average estimated useful life of 9.6 years. The fair value of the core technology was based on the discounted cash flow method that estimated the present value of the potential royalties, milestones, and collaboration revenue streams derived from the licensing of the related technologies. These projected cash flows were discounted to present value using a discount rate of 17%. The fair value of the core technology is being amortized on a straight-line basis over the estimated useful life of 10 years. The total acquired intangibles are being amortized on a straight-line basis over the estimated useful life of 9.7 years.

The estimated fair values of assets acquired and liabilities assumed, including deferred tax assets and liabilities, and purchased intangibles are provisional. The accounting for these amounts falls within the measurement period and therefore we may adjust these provisional amounts to reflect new information obtained about facts and circumstances that existed as of the acquisition date.

Ab Initio Acquisition

On July 23, 2019, we acquired privately-held Ab Initio, an antigen-discovery company located in South San Francisco, California. Ab Initio has a patented antigen technology that is synergistic with the OmniAb® therapeutic antibody discovery platform, providing our current and potential new partners enhanced capabilities for the discovery of therapeutic antibodies against difficult-to-access cellular targets. Ab Initio has a collaboration agreement with Pfizer to discover novel therapeutic antibodies against an undisclosed target in the GPCR superfamily.

The purchase price of $12.0 million included $11.9 million cash consideration paid upon acquisition, net of cash acquired, and $0.15 million cash holdback for potential indemnification claims. As the acquisition is not considered significant, pro forma information has not been provided.

The final purchase consideration was allocated to the acquisition date fair values of acquired assets and assumed liabilities as follows (in thousands):

Cash and other assets	$	28
Accounts payable and accrued liabilities		(83)
Deferred tax liabilities, net		(146)
Intangibles assets with finite-life - core technologies		7,400
Goodwill[(1)]		4,812
	$	12,011

(1) Goodwill represents the excess of the purchase price over the fair value of the underlying assets acquired and liabilities assumed. Goodwill is attributable to the assembled workforce of experienced personnel at Ab Initio and expected synergies.

None of the goodwill is deductible for tax purposes. The fair value of the core technologies was determined based on the discounted cash flow method that estimated the present value of the hypothetical royalty/ milestone streams from the licensing of the antigen-discovery technology and collaboration agreement. These projected cash flows were discounted to present value using a discount rate of 12.0%. The fair value of the core technologies is being amortized on a straight-line basis over the weighted average estimated useful life of approximately 20 years.

Vernalis Acquisition

In October 2018, we acquired Vernalis, a biotechnology company for $43.0 million, funded through cash on hand. The acquisition of Vernalis increases our overall portfolio of fully-funded programs. As Vernalis' operations are not considered material, pro forma information is not provided.

The final purchase consideration was allocated to the acquisition date fair values of acquired assets and assumed liabilities as follows (in thousands):

Cash and cash equivalents	$	34,286
Restricted cash		2,836
Other assets		6,383
Accounts payable and accrued liabilities		(3,479)
Restructuring and product reserves		(9,241)
Deferred revenue		(746)
Intangibles assets with finite-life - core technologies		7,000
Goodwill		5,939
	$	42,978

None of the goodwill is deductible for tax purposes. The fair value of the core technologies was based on the discounted cash flow method that estimated the present value of the hypothetical royalty/milestone streams derived from the licensing of the related technologies. These projected cash flows were discounted to present value using a discount rate of 34.0%. The fair value of the core technology is being amortized on a straight-line basis over the weighted average estimated useful life of approximately nine years. We retained the core technology after the sale of Vernalis R&D in December 2020. See further discussion in "*Note (2), Sale of Vernalis R&D and Promacta License*."

5. Fair Value Measurement

We measure certain financial assets and liabilities at fair value on a recurring basis. Fair value is a market-based measurement that should be determined using assumptions that market participants would use in pricing an asset or liability. We establish a three-level hierarchy to prioritize the inputs used in measuring fair value. The levels are described in the below with level 1 having the highest priority and level 3 having the lowest:

Level 1 - Observable inputs such as quoted prices in active markets

Level 2 - Inputs other than the quoted prices in active markets that are observable either directly or indirectly

Level 3 - Unobservable inputs in which there is little or no market data, which require the Company to develop its own assumptions

The following table provides a summary of the assets and liabilities that are measured at fair value on a recurring basis as of December 31, 2020 and 2019 (in thousands):

December 31, 2020	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	Fair Value Measurements at Reporting Date Using			
Assets:				
Short-term investments [1]	$ 324,478	$ 3,438	$ 320,647	$ 393
Investment in Viking common stock	32,763	32,763	—	—
Investment in Viking warrants [2]	6,326	6,326	—	—
Total assets	$ 363,567	$ 42,527	$ 320,647	$ 393
Liabilities:				
Contingent liabilities - Crystal [3]	$ 800	$ —	$ —	$ 800
Contingent liabilities - Cydex	508	—	—	508
Contingent liabilities - Metabasis [4]	3,821	—	3,821	—
Contingent liabilities - Icagen [5]	6,404	—	—	6,404
Contingent liabilities - Pfenex [6]	37,600	—	—	37,600
Liability for amounts owed to a former licensor	60	60	—	—
Total liabilities	$ 49,193	$ 60	$ 3,821	$ 45,312

December 31, 2019	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	Fair Value Measurements at Reporting Date Using			
Assets:				
Short-term investments [1]	$ 939,989	$ 3,073	$ 936,791	$ 125
Investment in Viking common stock	48,425	48,425	—	—
Investment in Viking warrants [2]	9,910	9,910	—	—
Total assets	$ 998,324	$ 61,408	$ 936,791	$ 125
Liabilities:				
Contingent liabilities - Crystal [3]	$ 2,659	$ —	$ —	$ 2,659
Contingent liabilities - Cydex	348	—	—	348
Contingent liabilities - Metabasis [4]	5,935	—	5,935	—
Liability for amounts owed to a former licensor	75	75	—	—
Total liabilities	$ 9,017	$ 75	$ 5,935	$ 3,007

(1) Excluding our investment in Viking, our short-term investments in marketable debt and equity securities are classified as available-for-sale securities based on management's intentions and are at level 2 of the fair value hierarchy, as these investment securities are valued based upon quoted prices for identical or similar instruments in markets that are not active, and model-based valuation techniques for which all significant assumptions are observable in the market. Short-term investments in mutual funds are valued at their net asset value (NAV) on the last day of the period. We have classified marketable securities with original maturities of greater than one year as short-term investments based upon our ability and intent to use any and all of those marketable securities to satisfy the liquidity needs of our current operations. In addition, we have investment in warrants resulting from Seelos Therapeutics Inc. milestone payments that were settled in shares during the first quarter of 2019 and are at level 3 of the fair value hierarchy, based on Black Scholes value estimated by management on the last day of the period.

(2) Investment in Viking warrants, which we received as a result of Viking's partial repayment of the Viking note receivable and our purchase of Viking common stock and warrants in April 2016, is classified as level 1 as the fair value is determined using quoted market prices in active markets for the same securities. The change of the fair value is recorded in "gain (loss) from short-term investments" in our consolidated statement of operations. See further discussion in "*Note (3), Short-term Investments: Investment in Viking.*"

(3) The fair value of Crystal contingent liabilities was determined using a probability weighted income approach. Most of the contingent payments are based on development or regulatory milestones as defined in the merger agreement with Crystal. The fair value is subjective and is affected by changes in inputs to the

valuation model including management's estimates regarding the timing and probability of achievement of certain developmental and regulatory milestones. During the twelve months ended December 31, 2020, we paid $1.8 million contingent liability on development milestones to former Crystal shareholders.

(4) In connection with our acquisition of Metabasis in January 2010, we issued Metabasis stockholders four tradable CVRs, one CVR from each of four respective series of CVR, for each Metabasis share. The CVRs entitle Metabasis stockholders to cash payments as frequently as every six months as cash is received by us from proceeds from the sale or partnering of any of the Metabasis drug development programs, among other triggering events. The liability for the CVRs is determined using quoted prices in a market that is not active for the underlying CVR. The carrying amount of the liability may fluctuate significantly based upon quoted market prices and actual amounts paid under the agreements may be materially differ than the carrying amount of the liability. Several of the Metabasis drug development programs have been outlicensed to Viking, including VK2809. VK2809 is a novel selective TR-β agonist with potential in multiple indications, including hypercholesterolemia, dyslipidemia, NASH, and X-ALD. Under the terms of the agreement with Viking, we may be entitled to up to $375.0 million of development, regulatory and commercial milestones and tiered royalties on potential future sales including a $10.0 million payment upon initiation of a Phase 3 clinical trial.

(5) The fair value of Icagen contingent liabilities was determined using a probability weighted income approach. Most of the contingent payments are based on certain revenue milestones as defined in the asset purchase agreement with Icagen. The fair value is subjective and is affected by changes in inputs to the valuation model including management's estimates regarding the timing and probability of achievement of certain developmental and regulatory milestones. Changes in these estimates may materially affect the fair value. During the third quarter of 2020, we paid a $0.5 million contingent liability based on revenue milestones to Icagen.

(6) The fair value of the CVR liability was determined using a probability adjusted income approach. These cash flows were then discounted to present value using a discount rate based on the market participants' cost of debt reflective of the Company.

A reconciliation of the level 3 financial instruments as of December 31, 2020 is as follows (in thousands):

Liabilities		
Fair value of level 3 financial instruments as of December 31, 2019	$	3,007
Payments to CVR holders and other contingency payments		(2,325)
Fair value adjustments to contingent liabilities		2,830
Contingent liabilities due to acquisitions		41,800
Fair value of level 3 financial instruments as of December 31, 2020	$	45,312

Assets Measured on a Non-Recurring Basis

We apply fair value techniques on a non-recurring basis associated with valuing potential impairment losses related to our goodwill, indefinite-lived intangible assets, and long-lived assets.

We evaluate goodwill and indefinite-lived intangible assets annually for impairment and whenever circumstances occur indicating that goodwill might be impaired. We determine the fair value of our reporting unit based on a combination of inputs, including the market capitalization of Ligand, as well as Level 3 inputs such as discounted cash flows, which are not observable from the market, directly or indirectly. We determine the fair value of our indefinite-lived intangible assets using the income approach based on Level 3 inputs.

Other than a reduction in goodwill resulting from the sale of Vernalis R&D disclosed in "*Note (2),Sale of Vernalis R&D and Promacta License*", there were no impairment of our goodwill, indefinite-lived assets, or long-lived assets recorded during the twelve months ended December 31, 2020.

Fair Value of Financial Instruments

In August 2014 and May 2018, we issued the 2019 Notes and 2023 Notes, respectively. We use quoted market rates in an inactive market, which are classified as a Level 2 input, to estimate the fair value of our 2019 and 2023 Notes. The carrying value of the notes does not reflect the market rate. See "*Note (7), Convertible Senior Notes*" for additional information related to the fair value.

6. Leases

We lease certain office facilities and equipment primarily under various operating leases and one finance lease. Our operating leases have remaining contractual terms up to three years, some of which include options to extend the leases for up tofive years. Our lease agreements do not contain any material residual value guarantees, material restrictive covenants, or material termination options. Our operating lease costs are primarily related to facility leases for administration offices and research and development facilities, and our finance leases are immaterial in prior years.

Lease assets and lease liabilities are recognized at the commencement of an arrangement where it is determined at inception that a lease exists. Lease assets represent the right to use an underlying asset for the lease term, and lease liabilities represent the obligation to make lease payments arising from the lease. These assets and liabilities are initially recognized based on the present value of lease payments over the lease term calculated using our incremental borrowing rate generally applicable to the location of the lease asset, unless the implicit rate is readily determinable. Lease assets also include any upfront lease payments made and lease incentives. Lease terms include options to extend or terminate the lease when it is reasonably certain that those options will be exercised.

In addition to base rent, certain of our operating leases require variable payments, such as insurance and common area maintenance. These variable lease costs, other than those dependent upon an index or rate, are expensed when the obligation for those payments is incurred. Leases with an initial term of 12 months or less are not recorded on the balance sheet, and the expense for these short-term leases and for operating leases is recognized on a straight-line basis over the lease term.

The depreciable life of lease assets and leasehold improvements is limited by the expected lease term, unless there is a transfer of title or purchase option reasonably certain of exercise.

In May 2020, we entered into an agreement with Hovione, our third-party manufacturer, to increase our manufacturing of Captisol. The agreement is considered to include an embedded finance lease under ASC 842, *Leases*, as it provides the Company the right to use the underlying equipment to exclusively manufacture Captisol. We allocated consideration in the agreement between lease and non-lease components using relative standalone prices. As of December 31, 2020, we have paid consideration of $35.3 million and have total future commitments of approximately $24.1 million through 2021. In October 2020, we determined the lease had commenced and recognized a right of use asset of $16.1 million. We allocated $25.8 million of the consideration paid to the non-lease component which is accounted for as prepaid inventory and have a remaining lease liability of $6.6 million as of December 31, 2020. The right of use asset is to be amortized straight-line over the remaining 8 year lease term.

Operating and Finance Lease Assets and Liabilities (in thousands):

	December 31, 2020	December 31, 2019
Assets		
Operating lease assets	$ 6,892	$ 10,353
Finance lease assets	15,842	84
Total lease assets	$ 22,734	$ 10,437
Liabilities		
Current operating lease liabilities	$ 1,885	$ 1,242
Current finance lease liabilities	6,593	13
	8,478	1,255
Long-term operating lease liabilities	5,643	9,970
Long-term finance lease liabilities	112	71
Total lease liabilities	$ 14,233	$ 11,296

Maturity of Operating and Finance Lease Liabilities as of December 31, 2020(in thousands):

Maturity Dates	Operating Leases	Finance Leases
2021	$ 2,259	$ 6,649
2022	2,129	56
2023	1,766	49
2024	1,013	4
2025	792	—
Thereafter	700	—
Total lease payments	8,659	6,758
Less imputed interest	(1,131)	(53)
Present value of lease liabilities	$ 7,528	$ 6,705

As of December 31, 2020, our operating leases have a weighted-average remaining lease term of4.4 years and a weighted-average discount rate of6%. Cash paid for amounts included in the measurement of operating lease liabilities was $2.4 million for the twelve months ended December 31, 2020. Operating lease expense was $2.1 million (net of sublease income of $0.3 million) and $2.1 million (net of sublease income of $0.7 million) for the twelve months ended December 31, 2020 and 2019, respectively.

As of December 31, 2020, our finance leases have a weighted-average remaining lease term of7.9 years and a weighted-average discount rate of3.5%. Cash paid for amounts included in the measurement of finance lease liabilities was $9.7 million for the twelve months ended December 31, 2020. Finance lease expense, which was recorded in cost of Captisol, was $0.2 million for the twelve months ended December 31, 2020.

7. Convertible Senior Notes

0.75% Convertible Senior Notes due 2019

In August 2014, we issued $245.0 million aggregate principal amount of 2019 Notes, resulting in net proceeds of $239.3 million. The implied estimated effective rate of the liability component of the 2019 Notes was 5.83%. The 2019 Notes are convertible into common stock at an initial conversion rate of 13.3251 shares per $1,000 principal amount of convertible notes, subject to adjustment upon certain events, which is equivalent to an initial conversion price of approximately $75.05 per share of common stock. The notes bear cash interest at a rate of 0.75% per year, payable semi-annually.

Holders of the 2019 Notes may convert the notes at any time prior to the close of business on the business day immediately preceding May 15, 2019, under any of the following circumstances:

(1) during any fiscal quarter (and only during such fiscal quarter) commencing after December 31, 2014, if,
for at least 20 trading days (whether or not consecutive) during the 30 consecutive trading day period ending on the last trading day of the immediately preceding fiscal quarter, the last reported sale price of our common stock on such trading day is greater than 130% of the conversion price on such trading day;

(2) during the five business day period immediately following any 10 consecutive trading day period, in which the trading price per $1,000 principal amount of notes was less than 98% of the product of the last reported sale price of our common stock on such trading day and the conversion rate on each such trading day; or

(3) upon the occurrence of certain specified corporate events as specified in the indenture governing the notes.

On May 22, 2018, we entered into a supplemental indenture whereby we made an irrevocable election to settle the entire 2019 Notes in cash. As such, we would have been required to deliver cash to settle the principal and any premium due upon conversion. As a result of the requirement to deliver cash to settle any premium due upon conversion, on May 22, 2018, we reclassified from equity to liability the conversion option (a derivative) fair value of $341.6 million. In accordance with ASC 815, *Derivatives and Hedging*, the derivative was adjusted to its fair value as of December 31, 2018 to $23.4 million with the resulting $118.7 million increase, net of payments made, reflected in other expense, net, in our consolidated statements of operations for the year ended December 31, 2018.
In March and April 2018, we received notices for conversion of $21.8 million of principal amount of the 2019 Notes which were settled in May and June 2018. We paid the noteholders the conversion value of the notes in cash, up to the principal amount of the 2019 Notes. The excess of the conversion value over the principal amount, totaling $31.6 million, was paid in shares of common stock. In July and August 2018, we received notices for conversion of $195.9 million of principal amount of the 2019 Notes which were settled in October and November 2018. We paid the noteholders the $195.9 million principal amount and the excess of conversion value over the principal amount, totaling $439.6 million, in cash. The equity dilution and cash conversion premium payment upon conversion of the 2019 Notes was offset by the reacquisition of the shares and cash under the convertible bond hedge transactions entered into in connection with the offering of the 2019 Notes. As a result of the conversions, we recorded a $3.2 million loss on extinguishment of debt calculated as the difference between the estimated fair value of the debt and the carrying value of the 2019 Notes as of the settlement dates. To measure the fair value of the converted 2019 Notes as of the settlement dates, the applicable interest rates were estimated using Level 2 observable inputs and applied to the converted notes using the same methodology as in the issuance date valuation.

In June 2019, we received notices for conversion of $1.0 million of principal amount of the 2019 Notes, which were settled in cash upon the 2019 Notes' maturity date in August 2019. As a result, we paid the noteholders (1) the $1.0 million principal amount, and (2) the excess of conversion value over the principal portion in an amount of $0.5 million in cash.

On August 15, 2019, the 2019 Notes maturity date, we paid the noteholders the remaining $26.3 million principal amount and $11.9 million bond premium, which was classified as a derivative liability, in cash. We recorded the decrease in fair value of the derivative liability of $11.0 million in other expense, net, in our consolidated statements of operations for the twelve months ended December 31, 2019.

Convertible Bond Hedge and Warrant Transactions

In August 2014, we entered into convertible bond hedges and sold warrants covering 3,264,643 shares of our common stock to minimize the impact of potential dilution to our common stock and/or offset the cash payments we were required to make in excess of the principal amount upon conversion of the 2019 Notes.

The convertible bond hedges had an exercise price of $75.05 per share and are exercisable when and if the 2019 Notes were converted. If upon conversion of the 2019 Notes, the price of our common stock was above the exercise price of the convertible bond hedges, the counterparties would have delivered shares of common stock and/or cash with an aggregate value approximately equal to the difference between the price of common stock at the conversion date and the exercise price, multiplied by the number of shares of common stock related to the convertible bond hedge transaction being exercised. The convertible bond hedges and warrants described below were separate transactions entered into by us and were not part of the terms of the 2019 Notes. Holders of the 2019 Notes and warrants did not have any rights with respect to the convertible bond hedges. We paid $48.1 million for these convertible bond hedges and recorded the amount as a reduction to additional paid-in capital.

As a result of the irrevocable cash election, conversion notices received relating to the 2019 Notes after May 22, 2018 must be fully settled in cash and amounts paid in excess of the principal amount would be offset by an equal receipt of cash under the convertible bond hedge. We have accounted for the bond hedge as a derivative asset and market it to market at the end of each reporting period. We reclassified from equity to derivative asset the remaining bond hedge fair value of $340.0 million and marked it to market as of December 31, 2018 to $22.6 million with the resulting $119.4 million increase, net of $471.2 million in payments received, reflected in other expense, net, in our consolidated statements of operations for the twelve months ended December 31, 2018. Upon the 2019 Notes payoff on August 15, 2019, the bond hedge was settled, with the remaining $10.2 million fair value decrease reflected in other expense, net, in our consolidated statement of operations for the twelve months ended December 31, 2019.

Concurrently with the convertible bond hedge transactions, we entered into warrant transactions whereby we sold warrants to acquire 3,264,643 shares of common stock with an exercise price of $125.08 per share, subject to certain adjustments. The warrants had expired between November 13, 2019 and April 22, 2020. The warrants have a dilutive effect to the extent the market price per share of common stock exceeds the applicable exercise price of the warrants, as measured under the terms of the warrant transactions. We received $11.6 million for these warrants and recorded this amount to additional paid-in capital.

In November 2018, we modified agreements with one of the bond hedge counterparties to cash settle a total of 525,000 warrants. As the modifications required the warrants to be cash settled, the fair value of the warrants was reclassified from stockholders' equity to a derivative liability on the modification dates, resulting in a $28.3 million deduction to additional paid-in-capital during 2018. We settled these repurchases for total consideration of $30.1 million and recorded a $1.8 million loss during 2018 on the change in the fair value of the derivative liabilities between their modification and settlement dates, which was included in other expense, net in the consolidated statement of operations for the twelve months ended December 31, 2018. As of December 31, 2020, there are no warrants outstanding.

0.75% Convertible Senior Notes due 2023

In May 2018, we issued $750 million aggregate principal amount of 2023 Notes, bearing cash interest at a rate of 0.75% per year, payable semi-annually. The net proceeds from the offering, after deducting the initial purchasers' discount and offering expenses, were approximately $733.1 million. The 2023 Notes will be convertible into cash, shares of common stock, or a combination of cash and shares of common stock, at our election, based on an initial conversion rate, subject to adjustment, of 4.0244 shares per $1,000 principal amount of the 2023 Notes which represents an initial conversion price of approximately $248.48 per share.

Holders of the 2023 Notes may convert the notes at any time prior to the close of business on the business day immediately preceding November 15, 2022, under any of the following circumstances:

(1) during any fiscal quarter (and only during such fiscal quarter) commencing after September 30, 2018, if, for at least 20 trading days (whether or not consecutive) during the 30 consecutive trading day period ending on the last trading day of the immediately preceding fiscal quarter, the last reported sale price of our common stock on such trading day is greater than 130% of the conversion price on such trading day;

(2) during the five business day period immediately following any 10 consecutive trading day period, in which the trading price per $1,000 principal amount of notes was less than 98% of the product of the last reported sale price of our common stock on such trading day and the conversion rate on each such trading day; or

(3) upon the occurrence of certain specified corporate events as specified in the indenture governing the notes.

At the May 22, 2018 issuance date of the 2023 Notes, we did not have the necessary number of authorized but unissued shares of our common stock available to settle the conversion option of the 2023 Notes in shares. Therefore, in accordance with guidance found in ASC 815-15 – *Embedded Derivatives*, the conversion option of the Notes was deemed an embedded derivative requiring bifurcation from the 2023 Notes (host contract) and separate accounting as a derivative liability. The fair value of the conversion option derivative liability at May 22, 2018 was $144.0 million, which was recorded as a reduction to the carrying value of the debt. This debt discount is amortized to interest expense over the term of the debt using the effective interest method. Up to the date in which we received shareholder approval on June 19, 2018 to increase the authorized number of shares of our common stock, the conversion option was accounted for as a liability with the resulting change in fair value of $13.5 million during that period reflected in other expense, net, in our consolidated statements of operations for the twelve months ended December 31, 2018.

The notes will have a dilutive effect to the extent the average market price per share of common stock for a given reporting period exceeds the conversion price of $248.48. As of December 31, 2020, the "if-converted value" did not exceed the principal amount of the 2023 Notes.

In connection with the issuance of the 2023 Notes, we incurred $16.9 million of issuance costs, which primarily consisted of underwriting, legal and other professional fees. The portion of these costs allocated to the conversion option totaling $3.2 million was recorded as interest expense for the twelve months ended December 31, 2019. The portion of these costs allocated to the liability component totaling $13.7 million is amortized to interest expense using the effective interest method over the five year expected life of the 2023 Notes.

It is our intent and policy to settle conversions through combination settlement, which essentially involves payment in cash equal to the principal portion and delivery of shares of common stock for the excess of the conversion value over the principal portion.

During 2020, we repurchased $254.7 million in principal of the 2023 Notes for $222.8 million in cash, including accrued interest of $0.6 million. We accounted for the repurchase as a debt extinguishment, which resulted (1) a loss of $2.5 million reflected in other income (expense), net, in our consolidated statement of operations for the twelve months ended December 31, 2020; (2) a $35.0 million reduction in debt discount, and (3) a $3.2 million reduction to additional paid-in-capital, net of tax, related to the reacquisition of the equity component in our condensed consolidated balance sheet as of December 31, 2020. After the repurchases, approximately $495.3 million in principal amount of the 2023 Notes remain outstanding.

Convertible Bond Hedge and Warrant Transactions

In conjunction with the 2023 Notes, in May 2018, we entered into convertible bond hedges and sold warrants covering 3,018,327 shares of our common stock to minimize the impact of potential dilution to our common stock and/or offset the cash payments we are required to make in excess of the principal amount upon conversion of the 2023 Notes. The convertible bond hedges have an exercise price of $248.48 per share and are exercisable when and if the 2023 Notes are converted. We paid $140.3 million for these convertible bond hedges. If upon conversion of the 2023 Notes, the price of our common stock is above the exercise price of the convertible bond hedges, the counterparties will deliver shares of common stock and/or cash with an aggregate value approximately equal to the difference between the price of common stock at the conversion date and the exercise price, multiplied by the number of shares of common stock related to the convertible bond hedge transaction being exercised. The convertible bond hedges and warrants described below are separate transactions entered into by us and are not part of the terms of the 2023 Notes. Holders of the 2023 Notes and warrants will not have any rights with respect to the convertible bond hedges.

Concurrently with the convertible bond hedge transactions, we entered into warrant transactions whereby we sold warrants covering 3,018,327 shares of common stock with an exercise price of $315.38 per share, subject to certain adjustments. We received $90.0 million for these warrants. The warrants have various expiration dates ranging from August 15, 2023 to February 6, 2024. The warrants will have a dilutive effect to the extent the market price per share of common stock exceeds the applicable exercise price of the warrants, as measured under the terms of the warrant transactions. The common stock issuable upon exercise of the warrants will be in unregistered shares, and we do not have the obligation and do not intend to file any registration statement with the SEC registering the issuance of the shares under the warrants.

For the period from May 22, 2018, the issuance date of the bond hedge and warrant transactions, to June 19, 2018, the date shareholders approved an increase in our authorized shares of common stock, the bond hedges and warrants required cash settlement and were accounted for as a derivative asset and liability, respectively, with the resulting increase in fair value of $19.2 million and $7.5 million reflected in other expense, net, in our consolidated statements of operations for twelve months ended December 31, 2018.

In April 2020, in connection with the repurchases of $234.4 million in principal of the 2023 Notes for $203.8 million in cash, including accrued interest of $0.6 million, during the quarter ended March 31, 2020, we entered into amendments with Barclays Bank PLC, Deutsche Bank AG, London Branch, and Goldman Sachs & Co. LLC to the convertible note hedges transactions we initially entered into in connection with the issuance of the 2023 Notes. The amendments provide that the options under the convertible note hedges corresponding to such repurchased 2023 Notes will remain outstanding notwithstanding such repurchase.

On January 28, 2021, in connection with the repurchases of approximately $20.3 million in principal of the 2023 Notes for approximately $19.1 million in cash, including accrued interest of $0.1 million, during the quarter ended December 31, 2020, we entered into amendments with Barclays Bank PLC, Deutsche Bank AG, London Branch, and Goldman Sachs & Co. LLC to the convertible note hedges transactions we initially entered into in connection with the issuance of the 2023 Notes. The amendments provide that the options under the convertible note hedges corresponding to such repurchased 2023 Notes will remain outstanding notwithstanding such repurchase.

The following table summarizes information about the equity and liability components of the 2023 Notes (in thousands).

	December 31, 2020	December 31, 2019
Principal amount of 2023 Notes outstanding	$ 495,280	$ 750,000
Unamortized discount (including unamortized debt issuance cost)	(52,987)	(111,041)
Total long-term portion of notes payable	$ 442,293	$ 638,959
Carrying value of equity component of 2023 Notes	$ 48,397	$ 101,422
Fair value of convertible senior notes outstanding (Level 2)	$ 466,053	$ 647,280

As of December 31, 2020, there were no events of default or violation of any covenants under our financing obligations.

8. Balance Sheet Account Details

Short-term Investments

Excluding our investments in Viking, the following table summarizes the various investment categories at December 31, 2020 and 2019 (in thousands):

	Cost	Gross unrealized gains	Gross unrealized losses	Estimated fair value
December 31, 2020				
Short-term investments				
Mutual fund	$ 151,512	$ 386	$ —	$ 151,898
Bank deposits	84,120	35	(1)	84,154
Commercial paper	45,459	27	(1)	45,485
Corporate bonds	30,512	99	(1)	30,610
Agency bonds	4,499	2	—	4,501
Corporate equity securities	4,466	360	(1,388)	3,438
Treasury bill	3,999	—	—	3,999
Warrants	—	393	—	393
	$ 324,567	$ 1,302	$ (1,391)	$ 324,478
December 31, 2019				
Short-term investments				
Bank deposits	$ 411,690	$ 188	$ (3)	$ 411,875
Corporate bonds	63,818	161	—	63,979
Corporate equity securities	4,506	416	(1,850)	3,072
Commercial paper	210,525	43	(16)	210,552
Warrants	—	125	—	125
Mutual Fund	250,636	—	(249)	250,387
	$ 941,175	$ 933	$ (2,118)	$ 939,990

In addition, as of December 31, 2020 and December 31, 2019, we recorded shares of Viking common stock we own at fair value of $32.8 million and $48.4 million, respectively, in “Short-term investments” in our consolidated balance sheets. We also own warrants to purchase up to 1.5 million shares of Viking's common stock at an exercise price of $1.50 per share. We recorded the warrants in “Short-term investments” in our consolidated balance sheet at fair value of $6.3 million and $9.9 million at December 31, 2020 and December 31, 2019, respectively.

Gain (loss) from short-term investments on our consolidated statements of operations includes both realized and unrealized gain (loss) from our short-term investments in public equity and warrant securities.

The following table summarizes our available-for-sale debt securities by contractual maturity (in thousands):

	December 31, 2020	
	Amortized Cost	Fair Value
Within one year	$ 141,732	$ 141,793
After one year through five years	26,856	26,956
After five years	—	—
Total	$ 168,588	$ 168,749

The following table summarizes our available-for-sale debt securities in an unrealized loss position (in thousands):

	Less than 12 months		12 months or greater		Total	
	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value
December 31, 2020						
Bank deposits	$ (1)	$ 14,013	$ —	$ —	$ (1)	$ 14,013
Corporate bonds	(1)	4,526	—	—	(1)	4,526
Commercial paper	(1)	7,693	—	—	(1)	7,693
Total	$ (3)	$ 26,232	$ —	$ —	$ (3)	$ 26,232
December 31, 2019						
Bank deposits	$ (3)	$ 58,584	$ —	$ —	$ (3)	$ 58,584
Commercial paper	(16)	79,362	—	—	(16)	79,362
Total	$ (19)	$ 137,946	$ —	$ —	$ (19)	$ 137,946

Our investment policy is capital preservation and we only invested in U.S.-dollar denominated investments. We held a total of 14 positions which were in an unrealized loss position as of December 31, 2020. We believe that we will collect the principal and interest due on our debt securities that have an amortized cost in excess of fair value. The unrealized losses are largely due to changes in interest rates and not to unfavorable changes in the credit quality associated with these securities that impacted our assessment on collectability of principal and interest. We do not intend to sell these securities nor do we believe that we will be required to sell these securities before the recovery of the amortized cost basis. Accordingly, no credit losses were recognized for the twelve months ended December 31, 2020.

Property and equipment are stated at cost and consists of the following (in thousands):

	December 31,	
	2020	2019
Lab and office equipment	$ 14,666	$ 6,307
Leasehold improvements	3,519	2,729
Computer equipment and software	1,056	999
	19,241	10,035
Less accumulated depreciation and amortization	(4,807)	(2,850)
	$ 14,434	$ 7,185

Depreciation of equipment is computed using the straight-line method over the estimated useful lives of the assets which ranges from three to ten years. Leasehold improvements are amortized using the straight-line method over their estimated useful lives or their related lease term, whichever is shorter. Depreciation expense of $1.8 million, $1.5 million, and $0.9 million was recognized for the twelve months ended December 31, 2020, 2019, and 2018, respectively, and was included in operating expenses.

Goodwill and identifiable intangible assets consist of the following (in thousands):

	As of December 31,	
	2020	2019
Indefinite-lived intangible assets		
Goodwill	$ 189,662	$ 95,229
Definite-lived intangible assets		
Complete technology	277,740	242,813
Less: Accumulated amortization	(63,600)	(50,203)
Trade name	2,642	2,642
Less: Accumulated amortization	(1,312)	(1,180)
Customer relationships	40,700	29,600
Less: Accumulated amortization	(15,597)	(13,224)
Contractual relationships	362,000	—
Less: Accumulated amortization	(7,243)	—
Total goodwill and other identifiable intangible assets, net	$ 784,992	$ 305,677

Amortization of finite-lived intangible assets is computed using the straight-line method over the estimated useful life of the asset of 20 years. Amortization expense of $23.4 million, $16.9 million, and $15.8 million was recognized for the years ended December 31, 2020 and 2019, and 2018, respectively. Estimated amortization expense for the years ending December 31, 2021 through 2025 is $47.1 million per year. For each of the years ended December 31, 2020, 2019, and 2018, there wasno material impairment of intangible assets with finite lives.

Accrued liabilities consist of the following (in thousands):

	December 31,	
	2020	2019
Compensation	$ 8,810	$ 1,986
Professional fees	977	1,135
Amounts owed to former licensees	421	381
Royalties owed to third parties	693	—
Return reserve	687	3,027
Acquisition related liabilities	1,500	—
Subcontractor	733	—
Supplier	604	—
Other	4,105	2,052
	$ 18,530	$ 8,581

Contingent liabilities:

In connection with the acquisition of Crystal in October 2017, we entered into contingent liabilities based on achievement of certain research and business milestones as well as certain revenue goal.

In connection with the acquisition of CyDex in January 2011, we issued a series of CVRs and also assumed certain contingent liabilities. We may be required to make additional payments upon achievement of certain clinical and regulatory milestones to the CyDex shareholders and former license holders.

In connection with the acquisition of Metabasis in January 2010, we entered into four CVR agreements with Metabasis shareholders. The CVRs entitle the holders to cash payments as frequently as every six months as proceeds are received by us upon the sale or licensing of any of the Metabasis drug development programs and upon the achievement of specified milestones.

For CVRs associated with the Pfenex and Icagen acquisitions, see "*Note (4), Acquisitions*" for more information.

The following table summarizes rollfoward of contingent liabilities as of December 2020 and 2019 (in thousands):

	December 31, 2018	Payments	Fair Value Adjustment	Repurchases	December 31, 2019	Additional Contingent Liabilities	Payments	Fair Value Adjustment	Repurchases	December 31, 2020
Cydex	$ 514	$ (50)	$ (116)	$ —	$ 348	$ —	$ —	$ 160	$ —	$ 508
Metabasis	5,551	—	904	(520)	5,935	—	—	(1,867)	(247)	3,821
Crystal	6,477	(3,000)	(818)	—	2,659	—	(1,800)	(59)	—	800
Icagen	—	—	—	—	—	4,800	(525)	2,129	—	6,404
Pfenex	—	—	—	—	—	37,000	—	600	—	37,600
Total	**$ 12,542**	**$ (3,050)**	**$ (30)**	**$ (520)**	**$ 8,942**	**$ 41,800**	**$ (2,325)**	**$ 963**	**$ (247)**	**$ 49,133**

9. Stockholders' Equity

Share-based Compensation Expense

The following table summarizes non-cash share-based compensation expense (in thousands):

	December 31,		
	2020	2019	2018
Share-based compensation expense as a component of:			
Research and development expenses	$ 13,497	$ 9,641	$ 8,352
General and administrative expenses	17,230	14,874	12,494
	$ 30,727	$ 24,515	$ 20,846

Stock Plans

In December 2020, our 2002 Stock Incentive Plan was amended to increase the number of shares available for issuance by1.1 million shares. As of December 31, 2020, there were 1.1 million shares available for future option grants or direct issuance under the Amended 2002 Plan.

Following is a summary of our stock option plan activity and related information:

	Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term in Years	Aggregate Intrinsic Value (In thousands)
Balance at January 1, 2018	1,876,332	$ 53.17	5.77	$ 157,340
Granted	228,362	$ 162.00		
Exercised	(358,162)	$ 55.24		
Forfeited	(10,228)	$ 114.53		
Balance at December 31, 2018	1,736,304	$ 66.71	5.47	125,858
Exercisable at December 31, 2018	1,313,374	$ 47.03	4.56	117,314
Options vested and expected to vest as of December 31, 2018	1,736,304	$ 66.71	5.47	$ 125,858
Granted	338,617	$ 116.69		
Exercised	(112,011)	$ 23.65		
Forfeited	(6,531)	$ 139.37		
Balance at December 31, 2019	1,956,379	$ 77.54	5.45	72,002
Exercisable at December 31, 2019	1,454,726	$ 61.82	4.42	70,345
Options vested and expected to vest as of December 31, 2019	1,956,379	$ 77.54	5.45	$ 72,002
Granted	806,300	$ 92.93		
Exercised	(156,845)	$ 21.26		
Forfeited	(44,012)	$ 91.30		
Balance at December 31, 2020	2,561,822	$ 85.59	6.09	59,033
Exercisable at December 31, 2020	1,611,830	$ 76.05	4.54	53,286
Options vested and expected to vest as of December 31, 2020	2,561,822	$ 85.59	6.09	$ 59,033

The weighted-average grant-date fair value of all stock options granted during 2020, 2019 and 2018 was $41.39, $48.65 and $58.85 per share, respectively. The total intrinsic value of all options exercised during 2020, 2019 and 2018 was approximately $11.9 million, $10.4 million and $51.9 million, respectively.

Cash received from options exercised, net of fees paid, in 2020, 2019 and 2018 was $2.5 million, $2.6 million and $19.8 million, respectively.

Following is a further breakdown of the options outstanding as of December 31, 2020:

Range of exercise prices	Options outstanding	Weighted average remaining life in years	Weighted average exercise price	Options exercisable	Weighted average exercise price
$10.05-$14.47	284,184	0.86	$ 13.08	270,184	$ 13.00
$21.92-$56.26	344,629	2.88	$ 35.34	344,629	$ 35.34
$63.58-$74.42	307,356	5.20	$ 71.96	220,650	$ 73.41
$82.90-$95.35	185,033	6.23	$ 86.22	140,400	$ 86.32
$95.68	305,106	9.12	$ 95.68	63,059	$ 95.68
$97.92	4,976	5.02	$ 97.92	4,976	$ 97.92
$98.20	270,850	9.26	$ 98.20	—	$ 98.20
$100.02-$113.76	257,914	6.69	$ 104.12	220,092	$ 103.96
$117.58	19,744	9.44	$ 117.58	—	$ 117.58
$117.97-$195.91	582,030	7.56	$ 137.18	347,840	$ 141.38
	2,561,822	6.09	$ 85.59	1,611,830	$ 76.05

The assumptions used for the specified reporting periods and the resulting estimates of weighted-average grant date fair value per share of options granted:

	Year Ended December 31,		
	2020	2019	2018
Risk-free interest rate	0.2%-1.4%	1.4%-2.6%	2.7%-3.0%
Expected volatility	47%-71%	40%-49%	33%-36%
Expected term	4.7 to 5.1 years	4.6 to 5.9 years	5.1 to 5.8 years

As of December 31, 2020, there was $37.2 million of total unrecognized compensation cost related to non-vested stock options. That cost is expected to be recognized over a weighted average period of 2.9 years.

Restricted Stock Activity

The following is a summary of our restricted stock activity and related information:

	Shares	Weighted-Average Grant Date Fair Value
Outstanding at January 1, 2018	133,294	$ 91.60
Granted	62,133	$ 169.92
Vested	(61,989)	$ 86.19
Forfeited	(1,165)	$ 125.16
Outstanding at December 31, 2018	132,273	$ 130.63
Granted	118,498	$ 115.90
Vested	(102,846)	$ 121.55
Forfeited	(666)	$ 134.36
Outstanding at December 31, 2019	147,259	$ 125.11
Granted	111,306	$ 89.73
Vested	(52,363)	$ 121.69
Forfeited	—	$ —
Outstanding at December 31, 2020	206,202	$ 106.88

As of December 31, 2020, unrecognized compensation cost related to non-vested stock awards amounted to $10.6 million. That cost is expected to be recognized over a weighted average period of 1.5 years.

Employee Stock Purchase Plan

As of December 31, 2020, 52,808 shares of our common stock are available for future issuance under the Amended Employee Stock Purchase Plan, or ESPP. The ESPP permits eligible employees to purchase up to 1,250 shares of Ligand common stock per calendar year at a discount through payroll deductions. The price at which stock is purchased under the ESPP is equal to 85% of the fair market value of the common stock on the first of a six month offering period or purchase date, whichever is lower. There were 6,455, 4,745 and 3,386 shares issued under the ESPP in 2020, 2019 and 2018, respectively.

Share Repurchases

In May 2018, in conjunction with our 2023 Notes debt offering, we repurchased 260,000 shares of our common stock at a cost of $191.14 per share. In September 2018, the board of directors authorized us to repurchase up to $200.0 million of our common stock from time to time over a period of up to three years (the "Repurchase Program"). On January 23, 2019, the board of directors elected to increase the Repurchase Program, authorizing us to repurchase up to a maximum of $350.0 million of our outstanding common stock under the Repurchase Program.

On September 11, 2019, our Board of Directors approved a stock repurchase program authorizing the repurchase of up to $300.0 million of our common stock from time to time over the next three years. We expect to acquire shares primarily through open-market transactions and have entered into a Rule 10b5-1 trading plan, and may enter into additional Rule 10b5-1 trading

plans in the future, to facilitate open-market repurchases. The timing and amount of repurchase transactions will be determined by management based on our evaluation of market conditions, share price, legal requirements and other factors. Our prior $350.0 million stock repurchase program mentioned above was terminated in connection with the approval of the new stock repurchase program. Authorization to repurchase $248.8 million of our common stock remained available as of December 31, 2020.

During the twelve months ended December 31, 2020, 2019 and 2018, we repurchased934,079 shares for $78.0 million, 4,122,133 shares for $448.4 million, and 782,248 shares for $127.5 million, respectively.

10. Commitment and Contingencies: Legal Proceedings

We record an estimate of a loss when the loss is considered probable and estimable. Where a liability is probable and there is a range of estimated loss and no amount in the range is more likely than any other number in the range, we record the minimum estimated liability related to the claim in accordance with *ASC 450, Contingencies.* As additional information becomes available, we assess the potential liability related to our pending litigation and revises our estimates. Revisions in our estimates of potential liability could materially impact our results of operations.

On April 9, 2019, CyDex, our wholly-owned subsidiary, received a Paragraph IV certification Notice Letter from Alembic Global Holdings SA ("Alembic") stating that Alembic had submitted an ANDA to the FDA, seeking approval to manufacture, offer to sell, and sell a generic version of EVOMELA® prior to the expiration of any of the '077 patent; the '088 patent, the '582 patent, or U.S. Patent No. 10,040,872 ("the '872 patent"), and alleging that these patents, each of which relates to Captisol®, are invalid, unenforceable, and/or would not be infringed by Alembic's ANDA product. On May 23, 2019, CyDex filed a complaint against Alembic, Alembic Pharmaceuticals, Ltd., and Alembic Pharmaceuticals, Inc. in the U.S. District Court for the District of Delaware, asserting that the filing of Alembic's ANDA constitutes infringement of each of the '088 patent and the '582 patent. On July 29, 2019, Alembic filed an answer and counterclaims seeking declarations of non-infringement and invalidity as to each of the asserted patents and, on August 19, 2019, CyDex filed an answer to Alembic's counterclaims. On April 7, 2020, the Court ordered that the Scheduling Order be amended such that, inter alia, the fact discovery cut off occurred on November 2, 2020, the close of expert discovery was set for March 22, 2021, and that May 17, 2021 would remain the first day of a five-to-six-day bench trial.

On September 16, 2019, CyDex received a Paragraph IV certification Notice Letter from Lupin Ltd. ("Lupin") stating that Lupin had submitted an ANDA to the FDA, seeking approval to manufacture, offer to sell, and sell a generic version of EVOMELA® prior to the expiration of any of the '077 patent; the '088 patent, the '582 patent, or the '872 patent, and alleging that these patents, each of which relates to Captisol®, are invalid, unenforceable, and/or would not be infringed by Lupin's ANDA product. CyDex filed a complaint on October 29, 2019, alleging patent infringement against Lupin. Lupin filed an answer on December 11, 2019 and counterclaimed for declaratory judgments of invalidity and non-infringement as to all four patents and CyDex filed its answer to Lupin's counterclaims on January 2, 2020. Fact discovery is ongoing. The Court's scheduling order sets close of discovery on May 7, 2021 and a five day bench trial starting on December 13, 2021.

On October 31, 2019, we receivedthree civil complaints filed in the US District Court for the Northern District of Ohio on behalf of several Indian tribes. The Northern District of Ohio is the Court that the Judicial Panel on Multi-District Litigation ("JPML") has assigned more than one thousand civil cases which have been designated as a Multi-District Litigation ("MDL") and captioned In Re: National Prescription Opiate Litigation. The allegations in these complaints focus on the activities of defendants other than the company and no individualized factual allegations have been advanced against us in any of the three complaints. We reject all claims raised in the complaints and intend to vigorously defend these matters.

In May and August of 2019, Pfenex Inc., which was acquired by us in October 2020, filed three petitions (IPR2019- 01027, IPR2019-01028 and IPR2019-01478) for inter partes review of U.S. Patent No. 9,422,345 ("the '345 patent"; entitled "Expression System"), which is owned by GlaxoSmithKline Biologicals S.A., with the Patent Trial and Appeal Board ("PTAB") of the U.S. Patent and Trademark Office. In November 2019 and February 2020, the Board instituted trial on the invalidity grounds in IPR2019-01028, but exercised its discretion not to institute trial on IPR2019-01027 or IPR2019-01478. In May 2020, GlaxoSmithKline Biologicals S.A. ("GSK") filed two petitions (IPR2020-00890 and IPR2020-00962) for inter partes review of U.S. Pat. No. 8,530,171 ("the '171 patent," entitled "High Level Expression of Recombinant Toxin Proteins"), which is owned by Pfenex, with the PTAB of the U.S. Patent and Trademark Office. On June 29, 2020, GSK filed a motion to withdraw IPR2020-00890, which was granted on August 28, 2020. In October 2020, Pfenex and GSK executed a confidential settlement agreement agreeing to terminate the proceedings before the PTAB resolving these issues. Pfenex and GSK filed a joint motion to terminate IPR2019-01028 and IPR2020-00962 on October 30, 2020, and an amended joint motion to terminate on November 4, 2020. A decision granting the parties' joint motion to terminate in IPR2019-01028 was issued on November 12, 2020. The PTAB subsequently granted the parties' joint motion to terminate in IPR2020-00962 on December 30, 2020.

On January 12, 2021, Abvivo submitted a JAMS arbitration demand naming the Company as respondent. Abvivo claims that the Company is in violation of the assignment provision of that certain Commercial Platform License and Services Agreement, dated October 9, 2019, by and among OMT and Crystal, on the one hand, and Abvivo, on the other hand because the Company allegedly withheld its consent to a proposed assignment required for Abvivo to negotiate a discovery and development alliance with certain third parties. On January 26, 2021, we submitted a response to the demand, denying all claims and alleging counterclaims against Abvivo and Brian Lundstrom, a Company employee and the sole owner of Abvivo. We allege that Mr. Lundstrom breached his fiduciary duty of loyalty to the Company and that Abvivo and Mr. Lundstrom fraudulently induced the Company, OMT and Crystal into certain business transactions and contracts. Abvivo and Mr. Lundstrom's response to these counterclaims was due on February 9, 2021, but they did not submit a response. Under JAMS rules, the counterclaims are deemed denied. On February 22, 2021, Abvivo submitted documents to JAMS which indicated that it seeks to dismiss its claim without prejudice. The arbitration will be conducted by a three arbitrator panel, who have not yet been appointed. The parties must each appoint one arbitrator by February 26, 2021, and the two arbitrators will then appoint a third arbitrator. We intend to vigorously defend ourselves against this action.

11. Income Taxes

The components of the income tax expense (benefit) for continuing operations are as follows (in thousands):

	Year Ended December 31,		
	2020	2019	2018
Current expense (benefit):			
Federal	$ 10,889	$ 89,471	$ —
State	589	3,103	424
Foreign	23	(66)	(158)
	11,501	92,508	266
Deferred expense (benefit):			
Federal	(15,672)	74,627	29,928
State	(3,382)	202	(185)
	$ (7,553)	$ 167,337	$ 30,009

A reconciliation of income tax expense (benefit) from continuing operations to the amount computed by applying the statutory federal income tax rate to the net income (loss) from continuing operations is summarized as follows (in thousands):

	Year Ended December 31,		
	2020	2019	2018
Tax at federal statutory rate	$ (2,213)	$ 167,294	$ 36,400
State, net of federal benefit	(1,456)	2,466	1,635
Contingent liabilities	(278)	18	948
Share-based compensation	(362)	(819)	(8,131)
FDII	(1,652)	(402)	—
Research and development credits	(699)	(879)	(2,758)
Change in uncertain tax positions	(650)	441	858
Rate change for changes in federal or state law	(173)	(210)	178
Provision to return adjustments	(4,803)	(184)	(150)
Foreign tax differential on income/loss of foreign subsidiaries	(3,839)	57	(14)
Change in valuation allowance	(121,876)	(1,193)	(4,225)
Sale of Vernalis R&D	127,372	—	—
Expired NOLs and credits	—	—	3,054
Change in derivatives	—	—	615
Other	3,076	748	1,599
	$ (7,553)	$ 167,337	$ 30,009

We remeasured certain deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future, which is generally 21%. Significant components of our deferred tax assets and liabilities as of December 31, 2020 and 2019 are shown below. We assess the positive and negative evidence to determine if sufficient future taxable income will be generated to use the existing deferred tax assets. Our evaluation of evidence resulted in management concluding that the majority of our deferred tax assets will be realized. However, we maintain a valuation allowance to offset certain net deferred tax assets as management believes realization of such assets are uncertain as of December 31, 2020, 2019 and 2018. The valuation allowance decreased $116.5 million in 2020, increased $136.9 million in 2019 and decreased $2.5 million in 2018.

We offset all deferred tax assets and liabilities by jurisdiction, as well as any related valuation allowance, and present them on our consolidated balance sheet as a non-current deferred income tax asset or liability (as applicable). Deferred tax assets (liabilities) are comprised of the following:

	December 31,	
	2020	2019
	(in thousands)	
Deferred tax assets:		
Net operating loss carryforwards	$ 64,147	$ 150,727
Research credit carryforwards	19,623	14,843
Stock Compensation	11,994	9,544
Other	13,120	10,602
	108,884	185,716
Valuation allowance for deferred tax assets	(24,858)	(141,338)
Net deferred tax assets	$ 84,026	$ 44,378
Deferred tax liabilities:		
Identified intangibles	(119,381)	(40,768)
Other	(4,923)	(10,939)
Net deferred tax liabilities	$ (124,304)	$ (51,707)
Deferred income taxes, net	$ (40,278)	$ (7,329)

As of December 31, 2020, we had federal net operating loss carryforwards set to expire through 2037 of $162.4 million and $129.3 million of state net operating loss carryforwards that begin to expire in 2031. We also have $9.2 million of federal research and development credit carryforwards, which expire through 2040. We have $23.1 million of California research and development credit carryforwards that have no expiration date. In addition, we have approximately $110.1 million of non-U.S. net operating loss carryovers and approximately $17.6 million of non-U.S. capital loss carryovers that have no expiration date. At December 31, 2019 we had approximately $713.8 million of non-U.S. net operating loss carryovers and approximately $14.6 million of non-U.S. capital loss carryovers. The year over year decrease in non-U.S. deferred tax assets was attributable to the sale of Vernalis in December 2020. The remaining non-U.S. deferred tax assets as of December 31, 2020 were attributable to the portion of the Vernalis business that we did not sell. We have a full valuation allowance against these non-U.S. tax attributes. See detail in "*Note (2), Sale of Vernalis R&D and Promacta License."*

Pursuant to Section 382 and 383 of the Internal Revenue Code of 1986, as amended, utilization of our net operating losses and credits may be subject to annual limitations in the event of any significant future changes in its ownership structure. These annual limitations may result in the expiration of net operating losses and credits prior to utilization. The deferred tax assets as of December 31, 2020 are net of any previous limitations due to Section 382 and 383.

We account for income taxes by evaluating a probability threshold that a tax position must meet before a financial statement benefit is recognized. The minimum threshold is a tax position that is more likely than not to be sustained upon examination by the applicable taxing authority, including resolution of any related appeals or litigation processes, based on the technical merits of the position. Our remaining liabilities for uncertain tax positions are presented net of the deferred tax asset balances on the accompanying consolidated balance sheet.

A reconciliation of the amount of unrecognized tax benefits at December 31, 2020, 2019 and 2018 is as follows (in thousands):

	December 31,		
	2020	2019	2018
Balance at beginning of year	$ 28,736	$ 30,289	$ 29,363
Additions based on tax positions related to the current year	3,911	543	1,247
Additions for tax positions of prior years	179	—	336
Reductions for tax positions of prior years	(955)	(2,096)	(657)
Balance at end of year	$ 31,871	$ 28,736	$ 30,289

Included in the balance of unrecognized tax benefits at December 31, 2020 is $30.2 million of tax benefits that, if recognized would impact the effective rate. There are no positions for which it is reasonably possible that the uncertain tax benefit will significantly increase or decrease within twelve months.

We recognize interest and penalties related to uncertain tax positions in income tax expense. As of December 31, 2020 and December 31, 2019, we recognized an immaterial amount of interest and penalties. We file income tax returns in the United States, various state jurisdictions, United Kingdom, and Canada with varying statutes of limitations. The federal statute of limitation remains open for the 2017 tax year to the present. The state income tax returns generally remain open for the 2016 tax year through the present. Net operating loss and research credit carryforwards arising prior to these years are also open to examination if and when utilized.

We are subject to taxation in the U.S. and various states and foreign jurisdictions. With few exceptions, as of December 31, 2020, we are no longer subject to state, local or foreign examinations by tax authorities for tax years before 2016 and we are no longer subject to U.S. federal income or payroll tax examinations for tax years before 2017. No tax returns are currently under examination by any tax authorities. Net operating loss and research credit carryforwards arising prior to these years are also open to examination if and when utilized. We believe our reserve for unrecognized tax benefits and contingent tax issues is adequate with respect to all open years.

12. Summary of Unaudited Quarterly Financial Information

The following financial information reflects all normal recurring adjustments, which are, in the opinion of management, necessary for a fair statement of the results and cash flows of interim periods. Summarized quarterly data for 2020 and 2019 are as follows (in thousands, except per share amounts):

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2020				
Total revenues	$ 33,161	$ 41,420	$ 41,848	$ 69,990
Total operating costs and expenses	29,373	34,320	38,101	75,894
Income tax (expense) benefit	6,284	(6,033)	4,911	2,391
Net income (loss)	(24,131)	22,086	(6,701)	5,761
Basic per share amounts:				
Net income (loss)	$ (1.46)	$ 1.38	$ (0.42)	$ 0.36
Diluted per share amounts:				
Net income (loss)	$ (1.46)	$ 1.32	$ (0.42)	$ 0.35
Weighted average shares—basic	16,529	16,055	16,082	16,077
Weighted average shares—diluted	16,529	16,694	16,082	16,684

	First Quarter[(1)]	Second Quarter	Third Quarter	Fourth Quarter
2019				
Total revenues	$ 43,484	$ 24,987	$ 24,808	$ 27,003
Total operating costs and expenses	29,738	29,117	29,966	37,182
Income tax (expense) benefit	(176,376)	3,609	4,620	810
Net income (loss)	666,337	(14,419)	(15,251)	(7,365)
Basic per share amounts:				
Net income (loss)	$ 32.59	$ (0.74)	$ (0.81)	$ (0.43)
Diluted per share amounts:				
Net income (loss)	$ 31.32	$ (0.74)	$ (0.81)	$ (0.43)
Weighted average shares—basic	20,447	19,558	18,770	17,243
Weighted average shares—diluted	21,277	19,558	18,770	17,243

(1) *Includes pre-tax gain from sale of Promacta license of $ 812,797.*

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

(a) Evaluation of Disclosure Controls and Procedures

We are responsible for maintaining disclosure controls and procedures designed to provide reasonable assurance that information required to be disclosed in reports we file under the Exchange Act is recorded, processed, summarized and reported within the specified time periods and accumulated and communicated to management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure. The design of any system of controls is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected. As of the end of the period covered by this Annual Report on Form 10-K, we have carried out an evaluation, under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, of the effectiveness of our disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, and have concluded our disclosure controls and procedures were effective at a reasonable assurance level as of December 31, 2020.

There have been no changes in our internal control over financial reporting that occurred during the quarter ended December 31, 2020 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

(b) Management's Report on Internal Control Over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting for the Company. Internal control over financial reporting is a process to provide reasonable assurance regarding the reliability of our financial reporting for external purposes in accordance with accounting principles generally accepted in the United States of America. Internal control over financial reporting includes maintaining records that in reasonable detail accurately and fairly reflect our transactions; providing reasonable assurance that transactions are recorded as necessary for preparation of our financial statements in accordance with generally accepted accounting principles; providing reasonable assurance that receipts and expenditures are made in accordance with our management and directors; and providing reasonable assurance that
unauthorized acquisition, use or disposition of company assets that could have a material effect on our financial statements would be prevented or detected on a timely basis. Because of its inherent limitations, internal control over financial reporting is not intended to provide absolute assurance that a misstatement of our financial statements would be prevented or detected.

Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework established by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) as set forth in the 2013 Internal Control-Integrated Framework. Based on our evaluation under the 2013 framework in Internal Control - Integrated Framework, management concluded that our internal controls over financial reporting were effective as of December 31, 2020.

A registrant may omit an assessment of an acquired business's internal control over financial reporting from the registrant's assessment of its internal control; however, such an exclusion may not extend beyond one year from the date of the acquisition, nor may such assessment be omitted from more than one annual management report on internal control over financial reporting. We acquired Pfenex in October 2020, and we excluded from the assessment of the effectiveness of our internal control over financial reporting as of December 31, 2020, the acquired entity's internal control over financial reporting associated with total assets of $14.2 million (exclusive of net intangible assets and goodwill of $468.1 million), total revenue of $2.0 million and net loss of $19.3 million included in our consolidated financial statements as of and for the year ended December 31, 2020.

Ernst & Young LLP, an independent registered public accounting firm, has audited the Company's consolidated financial statements included in this Annual Report on Form 10-K and has issued an attestation report, included herein, on the effectiveness of our internal control over financial reporting as of December 31, 2020.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Ligand Pharmaceuticals Incorporated

Opinion on Internal Control Over Financial Reporting

We have audited Ligand Pharmaceuticals Incorporated's internal control over financial reporting as of December 31, 2020, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Ligand Pharmaceuticals Incorporated (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2020, based on the COSO criteria.

As indicated in the accompanying Management's Report on Internal Control Over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of Pfenex Inc., which is included in the 2020 consolidated financial statements of the Company and constituted $14.2 million of assets (exclusive of goodwill and intangibles), as of December 31, 2020 and $2 million and $19.3 million of revenues and net loss, respectively, for the year then ended. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of Pfenex Inc.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2020 and 2019, the related consolidated statements of operations, comprehensive income (loss), stockholders' equity and cash flows for each of the three years in the period ended December 31, 2020, and the related notes and our report dated February 24, 2021 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

San Diego, California
February 24, 2021

Item 9B. Other Information

None.

Part III

Item 10. Directors, Executive Officers and Corporate Governance

Code of Conduct

The Board of Directors has adopted a Code of Conduct and Ethics Policy ("Code of Conduct") that applies to all officers, directors and employees. The Company will promptly disclose (1) the nature of any amendment to the Code of Conduct that applies to our principal executive officer, principal financial officer, principal accounting officer or controller or persons performing similar functions and (2) the nature of any waiver, including an implicit waiver, from a provision of our Code of Conduct that is granted to one of these specified officers, the name of such person who is granted the waiver and the date of the waiver on our website in the future. The Code of Conduct can be accessed via our website (http://www.ligand.com), Corporate Overview page. You may also request a free copy by writing to: Investor Relations, Ligand Pharmaceuticals Incorporated, 3911 Sorrento Valley Blvd, Suite 110, San Diego, CA 92121.

The other information under Item 10 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2020.

Item 11. Executive Compensation

Item 11 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2020.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Item 12 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2020.

Item 13. Certain Relationships and Related Transactions, and Director Independence

Item 13 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2020.

Item 14. Principal Accountant Fees and Services

Item 14 is hereby incorporated by reference to Ligand's Definitive Proxy Statement to be filed with the SEC within 120 days of December 31, 2020.

PART IV

Item 15. Exhibits and Financial Statement Schedule

(a) The following documents are included as part of this Annual Report on Form 10-K.

(1) Financial statements

(2) Schedules not included herein have been omitted because they are not applicable or the required information is in the consolidated financial statements or notes thereto.

(3) The following exhibits are filed as part of this Form 10-K and this list includes the Exhibit Index.

		Incorporated by Reference				
Exhibit Number	**Description of Exhibit**	**Form**	**File Number**	**Date of Filing**	**Exhibit Number**	**Filed Herewith**
2.1	Rule 2.7 Announcement issued by Ligand Holdings UK Ltd., dated August 9, 2018	8-K	001-33093	August 9, 2018	2.1	
2.2	Asset Purchase Agreement, dated March 5, 2019, by and among Ligand Pharmaceuticals Incorporated and RPI Financial Trust	8-K	001-33093	March 5, 2019	2.1	
2.3	Asset Purchase Agreement, dated February 11, 2020, (as amended on April 1, 2020), by and among Ligand Pharmaceuticals Incorporated, Icagen Inc., Icagen Corp., XRPro Sciences, Inc. and Caldera Discovery, Inc.	10-Q	001-33093	May 8, 2020	2.1	
2.4	Agreement and Plan of Merger, dated as of August 10, 2020, by and among Pfenex Inc., Ligand Pharmaceuticals Incorporated and Pelican Acquisition Sub, Inc.	8-K	001-33093	August 11, 2020	2.1	
2.5	Agreement and Plan of Merger, dated September 8, 2020, among Ligand Pharmaceuticals Incorporated, xCella Biosciences, Inc. and Eton Venture Services, Ltd. Co., as stockholders' representative	8-K	001-33093	September 10, 2020	10.1	
2.6	Agreement and Plan of Merger, dated September 9, 2020, among Ligand Pharmaceuticals Incorporated, Taurus Biosciences, LLC and the other signatories listed therein	8-K	001-33093	September 10, 2020	10.2	
2.7*	Agreement for the Sale and Purchase of the Entire Issued Share Capital of Vernalis (R&D) Limited, dated as of October 11, 2020, by and among Ligand Pharmaceuticals Incorporated, Vernalis Limited, HitGen UK Ltd and HitGen Inc.	8-K	001-33093	October 13, 2020	2.1	
3.1	Amended and Restated Certificate of Incorporation of the Company.	S-4	333-58823	July 9, 1998	3.1	
3.2	Certificate of Amendment of the Amended and Restated Certificate of Incorporation of the Company, dated June 14, 2000	10-K	0-20720	March 29, 2001	3.5	

3.3	Certificate of Amendment of the Amended and Restated Certificate of Incorporation of the Company, dated June 30, 2004	10-Q	0-20720	August 5, 2004	3.6	
3.4	Certificate of Amendment of the Amended and Restated Certificate of Incorporation of the Company, dated November 17, 2010	8-K	001-33093	November 19, 2010	3.1	
3.5	Certificate of Amendment of the Amended and Restated Certification of Incorporation of the Company, dated June 19, 2018	S-8	333-233130	August 8, 2019	3.6	
3.6	Fourth Amended and Restated Bylaws of the Company	8-K	001-33093	October 30, 2020	3.1	
4.1	Specimen stock certificate for shares of the common stock of the Company	10-K	001-33093	March 1, 2018	4.1	
4.2	Indenture, dated as of May 22, 2018, between the Company and Wilmington Trust, National Association, as trustee, including the form of 0.75% Convertible Senior Notes due 2023	8-K	001-33093	May 22, 2018	4.1	
4.3	Description of Registered Securities					X
10.1#	2002 Stock Incentive Plan (as amended and restated effective December 15, 2020)					X
10.2#	2002 Employee Stock Purchase Plan (as amended and restated effective June 6, 2019)	DEF	001-33093	April 24, 2019	Appendix B	
10.3#	Form of Stock Option Grant Notice and Stock Option Agreement under the Company's 2002 Stock Incentive Plan	10-K	001-33093	February 24, 2014	10.5	
10.4#	Form of Stock Issuance Agreement for non-employee directors under the Company's 2002 Stock Incentive Plan	S-1	333-131029	January 13, 2006	10.289	
10.5#	Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement under the Company's 2002 Stock Incentive Plan	10-K	001-33093	March 1, 2018	10.6	
10.6#	Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement under the Company's 2002 Stock Incentive Plan - Performance-Based RSU Form	10-K	001-33093	March 1, 2018	10.7	
10.7#	Form of Executive Officer Change in Control Severance Agreement	8-K	001-33093	August 22, 2007	10.1	
10.8#	Amended and Restated Severance Plan, dated December 20, 2008	8-K	001-33093	December 24, 2008	10.2	
10.9#	Amended and Restated Director Compensation and Stock Ownership Policy, effective March 28, 2019	10-K	001-33093	February 27, 2020	10.9	
10.10	TR Beta Contingent Value Rights Agreement, dated January 27, 2010, among the Company, Metabasis Therapeutics, Inc., David F. Hale and Mellon Investor Services LLC	8-K	001-33093	January 28, 2010	10.2	
10.11	Glucagon Contingent Value Rights Agreement, dated January 27, 2010, among the Company, Metabasis Therapeutics, Inc., David F. Hale and Mellon Investor Services LLC	8-K	001-33093	January 28, 2010	10.3	
10.12	General Contingent Value Rights Agreement, dated January 27, 2010, among the Company, Metabasis Therapeutics, Inc., David F. Hale and Mellon Investor Services LLC	8-K	001-33093	January 28, 2010	10.4	
10.13	Amendment of General Contingent Value Rights Agreement, dated January 26, 2011, among the Company, Metabasis Therapeutics, Inc., David F. Hale and Mellon Investor Services LLC	8-K	001-33093	January 31, 2011	10.1	
10.14	Amendment of General Contingent Value Rights Agreement dated May 20, 2014 among the Company, Metabasis Therapeutics, Inc., David F. Hale and Computershare Inc.	8-K	001-33093	May 22, 2014	10.1	
10.15	Amendment of TR Beta Contingent Value Rights Agreement dated May 20, 2014 among the Company, Metabasis Therapeutics, Inc., David F. Hale and Computershare, Inc.	8-K	001-33093	May 22, 2014	10.2	

10.16	Contingent Value Rights Agreement, dated as of September 30, 2020, by and between Ligand Pharmaceuticals Incorporated and American Stock Transfer & Trust Company, LLC	10-Q	001-33093	November 6, 2020	2.5
10.17†	Captisol® Supply Agreement, dated December 20, 2002, among CyDex, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited and Hovione International Limited	10-K	001-33093	March 3, 2011	10.1
10.18†	1st Amendment to Captisol® Supply Agreement, dated July 29, 2005, among CyDex, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited and Hovione International Limited	10-K	001-33093	March 3, 2011	10.101
10.19	2nd Amendment to Captisol® Supply Agreement, dated March 1, 2007, among CyDex, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited, and Hovione International Limited	10-K	001-33093	March 3, 2011	10.102
10.20†	3rd Amendment to Captisol® Supply Agreement, dated January 25, 2008, among CyDex, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited, and Hovione International Limited	10-K	001-33093	March 3, 2011	10.103
10.21†	4th Amendment to Captisol® Supply Agreement, dated September 28, 2009, among CyDex Pharmaceuticals, Inc., Hovione LLC, Hovione FarmaCiencia S.A., Hovione Pharmascience Limited and Hovione International Limited	10-K	001-33093	March 3, 2011	10.104
10.22†	License Agreement, dated September 3, 1993, between CyDex L.C. and The University of Kansas	10-K	001-33093	March 3, 2011	10.105
10.23	First Amendment to License Agreement, dated August 4, 2004, between CyDex, Inc. and The University of Kansas	10-K	001-33093	March 3, 2011	10.106
10.24†	Second Amendment to License Agreement, dated August 4, 2004, between CyDex, Inc. and The University of Kansas	10-K	001-33093	March 3, 2011	10.107
10.25†	Acknowledgement Agreement, dated February 22, 2008, between CyDex, Inc. and The University of Kansas	10-K	001-33093	March 3, 2011	10.111
10.26†	Exclusive License Agreement, dated June 4, 1996, between Pfizer, Inc. and The University of Kansas	10-K	001-33093	March 3, 2011	10.108
10.27†	Addendum to Nonexclusive License Agreement, dated December 11, 2001, between CyDex, Inc. and Pfizer, Inc.	10-K	001-33093	March 3, 2011	10.11
10.28†	Amendment to License Agreement, dated May 12, 2006, between CyDex, Inc. and Prism Pharmaceuticals, Inc.	10-K	001-33093	March 3, 2011	10.113
10.29†	Supply Agreement, dated March 5, 2007, between CyDex, Inc. and Prism Pharmaceuticals, Inc.	10-K	001-33093	March 3, 2011	10.114
10.30†	License and Supply Agreement, dated October 12, 2005, between CyDex Pharmaceuticals, Inc. and Proteolix, Inc.	10-K	000-28298	February 23, 2010	10.22
10.31†	License Agreement, by and between CyDex Pharmaceuticals, Inc. and Spectrum Pharmaceuticals, Inc., dated as of March 8, 2013	10-Q	001-33093	May 8, 2013	10.2
10.32†	Supply Agreement, by and between CyDex Pharmaceuticals, Inc. and Spectrum Pharmaceuticals, Inc., dated as of March 8, 2013	10-Q	001-33093	May 8, 2013	10.3
10.33†	Royalty Stream and Milestone Payments Purchase Agreement, dated April 29, 2013, between the Company and Selexis S.A.	10-Q	001-33093	August 1, 2013	10.2
10.34†	Master License Agreement dated May 21, 2014 among the Company, Metabasis Therapeutics, Inc. and Viking Therapeutics, Inc.	10-Q	001-33093	August 5, 2014	10.2

10.35	Letter Agreement, dated as of August 12, 2014, between Bank of America, N.A. and the Company regarding the Base Issuer Warrant Transaction	8-K	001-33093	August 18, 2014	10.2
10.36	Letter Agreement, dated as of August 12, 2014, between Deutsche Bank AG, London Branch and the Company regarding the Base Issuer Warrant Transaction	8-K	001-33093	August 18, 2014	10.4
10.37	Letter Agreement, dated as of August 14, 2014, between Bank of America, N.A. and the Company regarding the Additional Issuer Warrant Transaction	8-K	001-33093	August 18, 2014	10.6
10.38	Letter Agreement, dated as of August 14, 2014, between Deutsche Bank AG, London Branch and the Company regarding the Additional Issuer Warrant Transaction	8-K	001-33093	August 18, 2014	10.8
10.39†	First Amendment to Master License Agreement dated September 6, 2014 among the Company, Metabasis Therapeutics, Inc. and Viking Therapeutics, Inc.	10-Q	001-33093	October 31, 2014	10.9
10.40†	Second Amendment to Master License Agreement, dated April 8, 2015, among the Company, Metabasis Therapeutics, Inc. and Viking Therapeutics, Inc.	10-Q	001-33093	August 5, 2015	10.1
10.41†	Development Funding and Royalties Agreement, dated December 13, 2018, by and between Ligand Pharmaceuticals Incorporated and Palvella Therapeutics, Inc.	10-K	001-33093	February 28, 2019	10.48
10.42†	Sublicense Agreement between the Company, Pharmacopeia, Inc. and Retrophin LLC dated as of February 16, 2012, as amended through Amendment No. 5 to Sublicense Agreement, dated March 20, 2018.	10-K	001-33093	February 27, 2020	10.42
10.43†	Lease, dated November 3, 2015, between the Company and 3911/3931 SVB, LLC	8-K	001-33093	November 10, 2015	10.1
10.44†	Interest Purchase Agreement, dated May 3, 2016, between the Company and CorMatrix Cardiovascular, Inc.	8-K/A	001-33093	May 9, 2016	10.1
10.45	Amended and Restated Interest Purchase Agreement, dated May 31, 2017, between the Company and CorMatrix Cardiovascular, Inc.	10-Q	001-033093	August 9, 2017	10.2
10.46	Letter Agreement, dated as of May 17, 2018, between Barclays Capital Inc. and the Company regarding the Base Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.1
10.47	Letter Agreement, dated as of May 17, 2018, between Barclays Capital Inc. and the Company regarding the Base Warrant Transaction	8-K	001-00393	May 22, 2018	10.2
10.48	Letter Agreement, dated as of May 17, 2018, between Deutsche Bank AG and the Company regarding the Base Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.3
10.49	Letter Agreement, dated as of May 17, 2018, between Deutsche Bank AG and the Company regarding the Base Warrant Transaction	8-K	001-00393	May 22, 2018	10.4
10.50	Letter Agreement, dated as of May 17, 2018, between Goldman Sachs & Co. LLC and the Company regarding the Base Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.5
10.51	Letter Agreement, dated as of May 17, 2018, between Goldman Sachs & Co. LLC and the Company regarding the Base Warrant Transaction	8-K	001-00393	May 22, 2018	10.6
10.52	Letter Agreement, dated as of May 18, 2018, between Barclays Capital Inc. and the Company regarding the Additional Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.7
10.53	Letter Agreement, dated as of May 18, 2018, between Barclays Capital Inc. and the Company regarding the Additional Warrant Transaction	8-K	001-00393	May 22, 2018	10.8

10.54	Letter Agreement, dated as of May 18, 2018, between Deutsche Bank AG and the Company regarding the Additional Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.9	
10.55	Letter Agreement, dated as of May 18, 2018, between Deutsche Bank AG and the Company regarding the Additional Warrant Transaction	8-K	001-00393	May 22, 2018	10.10	
10.56	Letter Agreement, dated as of May 18, 2018, between Goldman Sachs & Co. LLC and the Company regarding the Additional Convertible Note Hedge Transaction	8-K	001-00393	May 22, 2018	10.11	
10.57	Letter Agreement, dated as of May 18, 2018, between Goldman Sachs & Co. LLC and the Company regarding the Additional Warrant Transaction	8-K	001-00393	May 22, 2018	10.12	
10.58†	Platform License Agreement, dated March 23, 2015, by and between Open Monoclonal Technology, Inc. and WuXi AppTec Biopharmaceuticals Co., Ltd.	10-Q	001-33093	August 8, 2018	10.13	
10.59†	Amendment Number 1 to Platform License Agreement, dated June 11, 2017, by and between Open Monoclonal Technology, Inc. and WuXi Biologics (Hong Kong) Limited (as successor-in-interest to WuXi AppTec Biopharmaceuticals Co., Ltd.)	10-Q	001-33093	August 8, 2018	10.14	
10.60†	Amendment Number 2 to Platform License Agreement, dated June 25, 2018, by and between Open Monoclonal Technology, Inc. and WuXi Biologics Ireland Limited (as successor-in-interest to WuXi Biologics (Hong Kong) Limited).	10-Q	001-33093	August 8, 2018	10.15	
10.61#	Form of Indemnification Agreement between the Company and each of its directors	10-K	001-33093	March 1, 2018	10.60	
10.62#	Form of Indemnification Agreement between the Company and each of its officers	10-K	001-33093	March 1, 2018	10.60	
10.63†	Addendum, dated May 22, 2019, by and among Ligand Pharmaceuticals Incorporated, CyDex Pharmaceuticals, Inc., and Acrotech Biopharma LLC (as successor-in-interest to Spectrum Pharmaceuticals, Inc.), to that certain License Agreement between Ligand Pharmaceuticals Incorporated and Spectrum Pharmaceuticals, Inc., dated March 8, 2013	10-Q	001-33093	August 8, 2019	10.1	
10.64	Call Option Amendment Agreed, dated April 6, 2020, between the Registrant and Barclays Bank PLC	10-Q	001-33093	May 8, 2020	10.1	
10.65	Call Option Amendment Agreed, dated April 6, 2020, between the Registrant and Deutsche Bank AG, London Branch	10-Q	001-33093	May 8, 2020	10.2	
10.66	Call Option Amendment Agreed, dated April 6, 2020, between the Registrant and Goldman Sachs & Co. LLC	10-Q	001-33093	May 8, 2020	10.3	
10.67	Call Option Amendment Agreed, dated January 28, 2021, between the Registrant and Barclays Bank PLC					X
10.68	Call Option Amendment Agreed, dated January 28, 2021, between the Registrant and Deutsche Bank AG, London Branch					X
10.69	Call Option Amendment Agreed, dated January 28, 2021, between the Registrant and Goldman Sachs & Co. LLC					X

10.70	Contingent Value Rights Agreement, dated September 9, 2020, between Ligand Pharmaceuticals Incorporated and Vaughn Smider, as Members' Representative (regarding Taurus Biosciences, LLC acquisition) (incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed with the Securities and Exchange Commission on September 10, 2020)	10-Q	001-33093	November 6, 2020	2.4	
10.71	Commercial License Agreement, dated September 9, 2020, between Taurus Biosciences, LLC and Minotaur Therapeutics, Inc. (incorporated by reference to Exhibit 10.4 to the Company's Current Report on Form 8-K filed with the Securities and Exchange Commission on September 10, 2020)	10-Q	001-33093	November 6, 2020	10.1	
10.72	Supply agreement, dated December 22, 2015, by and between Cydex Pharmaceuticals, Inc. and Gilead Sciences, Inc.					X
10.73	Amendment to Supply Agreement, dated September 21, 2020, by and between Cydex Pharmaceuticals, Inc. and Gilead Sciences, Inc., which amends that certain Supply Agreement, dated December 2, 2015, by and between Cydex Pharmaceuticals, Inc. and Gilead Sciences, Inc.	10-Q	001-33093	November 6, 2020	10.2	
21.1	Subsidiaries of the Company					X
23.1	Consent of Independent Registered Public Accounting Firm					X
31.1	Certification by Principal Executive Officer, Pursuant to Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
31.2	Certification by Principal Financial Officer, Pursuant to Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
32.1	Certifications by Principal Executive Officer and Principal Financial Officer, Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
101	The following financial information from our Annual Report on Form 10-K for the fiscal year ended December 31, 2020, formatted in iXBRL (inline eXtensible Business Reporting Language): (i) Consolidated Balance Sheets, (ii) Consolidated Statements of Operations, (iii) Consolidated Statement of Comprehensive Income, (iv) Consolidated Statements of Stockholders' Equity, (v) Consolidated Statements of Cash Flows, and (vi) the Notes to Consolidated Financial Statements.					X
104	The cover page from the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2020, formatted in Inline XBRL and contained in Exhibit 101.					X

† Confidential treatment has been requested for portions of this exhibit. These portions have been omitted and submitted separately to the Securities and Exchange Commission.

# Indicates management contract or compensatory plan.

* Certain schedules and annexes have been omitted in accordance with Item 601(b)(2) of Regulation S-K. A copy of any omitted schedule and/or annex will be furnished as a supplement to the U.S. Securities and Exchange Commission upon request.

Item 16. Form 10-K Summary

None

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

LIGAND PHARMACEUTICALS INCORPORATED

By: /S/ JOHN L. HIGGINS
John L. Higgins,
Chief Executive Officer

Date: February 24, 2021

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ JOHN L. HIGGINS **John L. Higgins**	Chief Executive Officer and Director (Principal Executive Officer)	February 24, 2021
/s/ MATTHEW KORENBERG **Matthew Korenberg**	Executive Vice President, Finance and Chief Financial Officer (Principal Financial and Accounting Officer)	February 24, 2021
/s/ JOHN W. KOZARICH **John W. Kozarich**	Director and Chairman of the Board	February 24, 2021
/s/ JASON M. ARYEH **Jason M. Aryeh**	Director	February 24, 2021
/s/ SARAH BOYCE **Sarah Boyce**	Director	February 24, 2021
/s/ TODD C. DAVIS **Todd C. Davis**	Director	February 24, 2021
/s/ NANCY R. GRAY **Nancy R. Gray**	Director	February 24, 2021
/s/ JOHN L. LAMATTINA **John L. LaMattina**	Director	February 24, 2021
/s/ SUNIL PATEL **Sunil Patel**	Director	February 24, 2021
/s/ STEPHEN L. SABBA **Stephen L. Sabba**	Director	February 24, 2021

DESCRIPTION OF THE REGISTRANT'S SECURITIES REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

Ligand Pharmaceuticals Incorporated ("Ligand," "we," "our" and "us") has one class of securities registered pursuant to Section 12 of the Securities Exchange Act of 1934, as amended: our common stock.

Description of Common Stock

General

The following summary of the terms of our common stock does not purport to be complete and is subject to and qualified in its entirety by reference to our Amended and Restated Certificate of Incorporation, as amended (the "certificate of incorporation"), and the Amended and Restated Bylaws, as amended (the "bylaws"), which are filed as exhibits to our most recent Annual Report on Form 10-K and are incorporated by reference herein.

Under our certificate of incorporation, the total number of shares of all classes of stock that we have authority to issue is 65,000,000, consisting of 5,000,000 shares of preferred stock, par value $0.001 per share, and 60,000,000 shares of common stock, par value $0.001 per share.

Common Stock

Voting Rights

The holders of our common stock are entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders, including the election of directors, and do not have cumulative voting rights. Accordingly, the holders of a majority of the shares of common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they so choose.

Dividends

Subject to limitations under Delaware law and preferences that may be applicable to any then outstanding preferred stock, holders of common stock are entitled to receive ratably those dividends, if any, as may be declared by our board of directors out of legally available funds.

Liquidation

Upon our liquidation, dissolution or winding up, the holders of common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities of our company, subject to the prior rights of any preferred stock then outstanding.

Rights and Preferences

Holders of common stock have no preemptive or conversion rights or other subscription rights and there are no redemption or sinking funds provisions applicable to the common stock.

Fully Paid and Nonassessable

All outstanding shares of our common stock are fully paid and nonassessable and the shares of common stock offered hereby will be fully paid and nonassessable.

Anti-Takeover Effects of Provisions of Our Certificate of Incorporation, Our Bylaws and Delaware Law

Some provisions of Delaware law, our certificate of incorporation and our bylaws contain provisions that could make the following transactions more difficult: acquisition of us by means of a tender offer; acquisition of us by means of a proxy contest or otherwise; or removal of our incumbent officers and directors. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions that might result in a premium over the market price of our shares.

These provisions, summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Undesignated Preferred Stock

The ability to authorize undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change control of us. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of our company.

Requirements for Advance Notification of Stockholder Nominations and Proposals

Our bylaws establish advance notice procedures with respect to stockholder proposals and the nomination of candidates for election as directors, other than nominations made by or at the direction of the board of directors or a committee of the board of directors. These provisions could have the effect of delaying until the next stockholder meeting stockholder actions that are favored by the holders of a majority of our outstanding voting securities.

Elimination of Stockholder Action by Written Consent

Our certificate of incorporation eliminates the right of stockholders to act by written consent without a meeting.

Special Meetings

Our bylaws state that a special meeting of the stockholders may be called by our president and shall be called by our president or secretary upon written request from our board of directors or upon a written request from stockholders owning at least 10% of the entire capital stock of the company issued and outstanding and entitled to vote.

Delaware Anti-Takeover Statute

We are subject to Section 203 of the Delaware General Corporation Law. This statute regulating corporate takeovers prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for three years following the date that the stockholder became an interested stockholder, unless:

- prior to the date of the transaction, the Board approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder;
- the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the number of shares outstanding (a) shares owned by persons who are directors and also officers and (b) shares owned by employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- on or subsequent to the date of the transaction, the business combination is approved by the Board and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock which is not owned by the interested stockholder.

Section 203 defines a business combination to include:

- any merger or consolidation involving the corporation and the interested stockholder;
- any sale, transfer, pledge or other disposition involving the interested stockholder of 10% or more of the assets of the corporation;
- subject to exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;

- any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or

- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.

In general, Section 203 defines an interested stockholder as an entity or person beneficially owning 15% or more of the outstanding voting stock of the corporation and any entity or person affiliated with or controlling or controlled by such entity or person.

Exclusive Forum Selection

Our bylaws provide that the Court of Chancery of the State of Delaware is the exclusive forum for (i) any derivative action or proceeding brought on our behalf, (ii) any action asserting a claim of breach of a fiduciary duty owed by our directors, officers or other employees to us or our stockholders, (iii) any action asserting a claim arising pursuant to any provision of the General Corporation Law of Delaware or our amended and restated certificate of incorporation or amended and restated bylaws, or (iv) any action asserting a claim governed by the internal affairs doctrine. To the extent that any such claims may be based upon federal law claims, Section 27 of the Exchange Act creates exclusive federal jurisdiction over all suits brought to enforce any duty or liability created by the Exchange Act or the rules and regulations thereunder. Furthermore, Section 22 of the Securities Act provides for concurrent jurisdiction for federal and state courts over all suits brought to enforce any duty or liability created by the Securities Act or the rules and regulations thereunder, and as such, the exclusive jurisdiction clauses set forth above would not apply to such suits. The choice of forum provisions in our bylaws may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and other employees. By agreeing to these provisions, however, stockholders will not be deemed to have waived our compliance with the federal securities laws and the rules and regulations thereunder. Furthermore, the enforceability of similar choice of forum provisions in other companies' certificates of incorporation and bylaws has been challenged in legal proceedings, and it is possible that a court could find these types of provisions to be inapplicable or unenforceable.

Fair Market Value Provision

Our certificate of incorporation contains a fair market value provision that requires the approval of the holders of 66 2/3% of our outstanding voting stock as a condition to a merger or certain other business transactions with, or proposed by, any person that beneficially owns, directly or indirectly, 15% or more of our voting stock (an "Interested Stockholder"), except in cases where a majority of the Continuing Directors (as defined below) approve the transaction or certain minimum price criteria and other procedural requirements are met. A "Continuing Director" is (i) a director who was originally elected upon incorporation of Ligand, (ii) a director who is not an Interested Stockholder or affiliated with an Interested Stockholder, or (iii) a

director whose nomination or election to our board of directors is recommended or approved by a majority of the Continuing Directors. The minimum price criteria are recommended or approved by a majority of the Continuing Directors. The minimum price criteria generally require that, in a transaction in which stockholders are to receive payments, holders of our common stock must receive, on the consummation date of the transaction, a value equal to the higher of (A) the highest price paid by the Interested Stockholder for common stock during the prior two years and (B) the highest closing sale price of common stock during the 30-day period before (1) the announcement of the transaction or (2) the date on which the Interested Stockholder became an Interested Stockholder, whichever is higher. In addition, such payment must be made in cash or in the type of consideration paid by the Interested Stockholder for the greatest portion of its shares. Our board of directors believes that this fair market value provision helps assure that all our stockholders will be treated similarly if certain kinds of business transactions are effected. However, this fair market value provision may make it more difficult to accomplish certain transactions that are opposed by the incumbent board of directors and that could be beneficial to stockholders.

Amendment of Charter Provisions

The amendment of any of the above provisions, except for the provision making it possible for our board of directors to issue preferred stock, would require approval by holders of at least 66 2/3% of our then outstanding common stock.

The provisions of Delaware law, our certificate of incorporation and our bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in our management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Amendment of Bylaws

The affirmative vote of the holders of at least the majority of the total voting power of all outstanding shares of our voting stock is required for stockholders to amend our bylaws. This provision makes it more difficult to circumvent the anti-takeover provisions of our bylaws. Our board of directors is authorized to make, amend, supplement or repeal our bylaws; provided that no amendment or supplement to the bylaws adopted by the board of directors may vary or conflict with any amendment or supplement duly adopted by the stockholders.

Listing

Our common stock is listed for trading on the Nasdaq Global Market under the symbol “LGND.”

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare Trust Company N.A.

LIGAND PHARMACEUTICALS INCORPORATED

2002 STOCK INCENTIVE PLAN

(AS AMENDED AND RESTATED EFFECTIVE DECEMBER 15, 2020)

ARTICLE ONE

GENERAL PROVISIONS

I. PURPOSE OF THE PLAN

This 2002 Stock Incentive Plan is intended to promote the interests of Ligand Pharmaceuticals Incorporated, a Delaware corporation, by providing eligible persons in the Corporation's and its Subsidiaries' service with the opportunity to acquire a proprietary interest, or otherwise increase their proprietary interest, in the Corporation as an incentive for them to remain in such service.

Capitalized terms shall have the meanings assigned to such terms in the attached Appendix.

II. STRUCTURE OF THE PLAN

A. The Plan shall be divided into three separate equity incentives programs:

1. the Discretionary Option Grant Program under which eligible persons may, at the discretion of the Plan Administrator, be granted options to purchase shares of Common Stock,

2. the Stock Issuance Program under which eligible persons may, at the discretion of the Plan Administrator, be issued shares of Common Stock, and

3. the Other Stock Award Program under which eligible persons may, at the discretion of the Plan Administrator, be granted restricted stock units, stock appreciation rights and dividend equivalents.

B. The provisions of Articles One, Five and Six shall apply to all equity programs under the Plan and shall govern the interests of all persons under the Plan.

III. ADMINISTRATION OF THE PLAN

A. The Primary Committee shall have sole and exclusive authority to administer the Plan with respect to Section 16 Insiders (other than non-employee Board members, whose Awards shall be administered by the full Board, as provided below). Administration of the Plan with respect to all other persons eligible to participate in those programs may, at the Board's discretion, be vested in the Primary Committee or a Secondary Committee, or the Board may retain the power to administer those programs with respect to all such persons. However, any discretionary Awards for members of the Primary Committee must be authorized by a disinterested majority of the Board.

B. Members of the Primary Committee or any Secondary Committee shall serve for such period of time as the Board may determine and may be removed by the Board at any time. The Board may also at any time terminate the functions of any Secondary Committee and reassume all powers and authority previously delegated to such committee.

C. Each Plan Administrator shall, within the scope of its administrative functions under the Plan, have full power and authority (subject to the provisions of the Plan) to establish such rules and regulations as it may deem appropriate for proper administration of the Plan and to make such determinations under, and issue such interpretations of, the provisions of those programs and any outstanding Awards thereunder as it may deem necessary or advisable. Decisions of the Plan Administrator within the scope of its administrative functions under the Plan shall be final and binding on all parties who have an interest in the equity incentive programs under its jurisdiction or any Award thereunder.

D. Service on the Primary Committee or the Secondary Committee shall constitute service as a Board member, and members of each such committee shall accordingly be entitled to full indemnification and reimbursement as Board members for their service on such committee. No member of the Primary Committee or the Secondary Committee shall be liable for any act or omission made in good faith with respect to the Plan or any Awards under the Plan.

E. Notwithstanding the foregoing, the full Board shall administer the Plan with respect to any Awards to the non-employee members of the Board. In addition, in its sole discretion, the Board may at any time and from time to time exercise any and all rights and duties of the Primary Committee or any Secondary Committee under the Plan except with respect to matters which under Rule 16b3 under the Exchange Act, or any regulations or rules issued thereunder, are required to be determined in the sole discretion of the Primary Committee. Should any Awards made under the Plan prior to November 2, 2017, be intended to qualify as Qualified Performance-Based Compensation within the meaning of Section 162(m)(4)(C) of the Code prior to its repeal, then all such determinations regarding such Awards will be made solely by the Primary Committee comprised solely of two of more "outside directors" within the meaning of Section 162(m) of the Code.

IV. ELIGIBILITY

A. The persons eligible to participate in the Discretionary Option Grant, Stock Issuance and Other Stock Award Programs are as follows:

(i) Employees,

(ii) non-employee members of the Board or the board of directors of any Parent or Subsidiary, and

(iii) consultants and other independent advisors who provide services to the Corporation (or any Parent or Subsidiary).

B. Each Plan Administrator shall, within the scope of its administrative jurisdiction under the Plan, have full authority to determine, (i) with respect to the option grants under the Discretionary Option Grant Program, which eligible persons are to receive such grants, the time or times when those grants are to be made, the number of shares to be covered by each such grant, the status of the granted option as either an Incentive Option or a Non-Statutory Option, the time or times when each option is to become exercisable, the vesting schedule (if any) applicable to the option shares, the maximum term for which the option is to remain outstanding and such other terms and conditions of such option as the Plan Administrator determines are appropriate, (ii) with respect to stock issuances under the Stock Issuance Program, which eligible persons are to receive such issuances, the time or times when the issuances are to be made, the number of shares to be issued to each Participant, the vesting schedule (if any) applicable to the issued shares, the purchase price, if any, and consideration for such shares and such other terms and conditions of such issued shares as the Plan Administrator determines are appropriate, and (iii) with respect to other Awards under the Other Stock Awards Program, which eligible persons are to receive such Awards, the type of Award, the time or times when the issuances are to be made, the number of shares subject to such Award to be issued to each Participant, the vesting schedule (if any) applicable to

the Awards, the consideration for such Awards and such other terms and conditions of such Awards as the Plan Administrator determines are appropriate.

V. STOCK SUBJECT TO THE PLAN

A. Subject to adjustment pursuant to this Section V, the number of shares of Common Stock which may be issued or transferred pursuant to Awards under the Plan is 7,413,754 shares, which number shall be reduced at any time by (i) one share for each share subject to any outstanding Award that is not a Full Value Award, and (ii) 1.5 shares for each share subject to any outstanding Award that is a Full Value Award. Notwithstanding anything in this Section V.A. to the contrary, the number of shares of Common Stock that may be issued or transferred pursuant to Incentive Stock Options under the Plan shall not exceed an aggregate of 7,413,754 shares, subject to adjustment pursuant to this Section V.

B. No one person participating in the Plan may receive Awards for more than 1,000,000 shares of Common Stock in the aggregate per calendar year. In addition, notwithstanding any provision to the contrary in the Plan, the sum of any cash compensation, or other compensation, and the value (determined as of the grant date in accordance with Financial Accounting Standards Board Accounting Standards Codification Topic 718, or any successor thereto) of Awards granted to a non-employee member of the Board as compensation for services as a non-employee member of the Board during any calendar year of the Corporation may not exceed $550,000, increased to $850,000 in the calendar year of his or her initial service as a non-employee member of the Board. The Plan Administrator may make exceptions to this limit for individual non-employee members of the Board in extraordinary circumstances, as the Plan Administrator may determine in its discretion, provided that the non-employee member of the Board receiving such additional compensation may not participate in the decision to award such compensation or in other contemporaneous compensation decisions involving non-employee members of the Board.

C. To the extent all or a portion of an Award is forfeited, expires or such Award or portion thereof is settled for cash (in whole or in part), the shares of Common Stock subject to such Award or portion thereof, shall, to the extent of such forfeiture, expiration or cash settlement, again be available for future grants of Awards under the Plan in an amount corresponding to the reduction in the share reserve previously made in accordance with Section V.A above. Notwithstanding anything to the contrary contained herein, the following shares of Common Stock shall not be added to the shares of Common Stock authorized for grant under Section V.A and will not be available for future grants of Awards: (i) shares of Common Stock tendered by an Optionee or withheld by the Corporation in payment of the exercise price of an option; (ii) shares of Common Stock tendered by the Optionee or Participant or withheld by the Corporation to satisfy any tax withholding obligation with respect to an option or stock appreciation right; (iii) shares of Common Stock subject to a stock appreciation right that are not issued in connection with the stock settlement of the stock appreciation right on exercise thereof; and (iv) shares of Common Stock purchased on the open market with the cash proceeds from the exercise of options. Shares of Common Stock tendered by the Participant or withheld by the Corporation to satisfy any tax withholding obligation with respect to a Full Value Award shall be available for future grants of Awards under the Plan in an amount corresponding to the reduction in the share reserve previously made in accordance with Section V.A. above; provided, however, that, notwithstanding the foregoing, in the event shares subject to a Full Value Award are delivered by a Participant or withheld by the Company to satisfy any Withholding Taxes at a tax withholding rate in excess of the minimum statutory withholding rates, such shares tendered or withheld to satisfy the Withholding Taxes at a rate in excess of the minimum statutory withholding rates shall not be available for future grants of Awards under the Plan and shall continue to be counted against the share reserve in an amount corresponding to the reduction in the share reserve previously made in accordance with Section V.A. above.

Any shares of Common Stock forfeited by the Participant or repurchased by the Corporation under Article Three, Section I.C at a price not greater than the price originally paid by the Participant so that such shares are returned to the Corporation will again be available for Awards in an amount

corresponding to the reduction in the share reserve previously made in accordance with Section V.A. above. The payment of Dividend Equivalents in cash in conjunction with any outstanding Awards shall not be counted against the shares available for issuance under the Plan. Notwithstanding the provisions of this Section V.C, no shares of Common Stock may again be optioned, granted or awarded if such action would cause an Incentive Option to fail to qualify as an incentive stock option under Section 422 of the Code.

D. If any change is made to the Common Stock by reason of any stock split, stock or cash dividend (other than normal cash dividends), recapitalization, combination of shares, exchange of shares or other change affecting the outstanding Common Stock as a class without the Corporation's receipt of consideration, equitable adjustments shall be made by the Plan Administrator to (i) the maximum number and/or class of securities issuable under the Plan or with respect to Incentive Stock Options under the Plan, (ii) the maximum number and/or class of securities for which any one person may be granted Awards under the Plan per calendar year, (iii) the number and/or class of securities for which grants are subsequently to be made under the Automatic Option Grant Program to new and continuing non-employee Board members, (iv) the number and/or class of securities and the exercise or purchase price per share in effect under each outstanding Award under the Plan, and (v) the terms and conditions of any outstanding Awards (including, without limitation, any applicable performance targets or criteria with respect thereto). Such adjustments to the outstanding Awards are to be effected in a manner which shall preclude the enlargement or dilution of rights and benefits under such Awards. The adjustments determined by the Plan Administrator shall be final, binding and conclusive.

E. Subject to Article Two, Section III, Article Three, Section II and Article Four, Section V, in the event of any transaction or event described in Section V.D or any unusual or nonrecurring transactions or events affecting the Corporation, any affiliate of the Corporation, or the financial statements of the Corporation or any affiliate, or of changes in applicable laws, regulations or accounting principles, including, without limitation, a Change in Control or a Hostile Take-Over, the Plan Administrator, in its sole and absolute discretion, and on such terms and conditions as it deems appropriate, either by the terms of the Award or by action taken prior to the occurrence of such transaction or event and either automatically or upon the Optionee's or Participant's request, is hereby authorized to take any one or more of the following actions whenever the Plan Administrator determines that such action is appropriate in order to prevent dilution or enlargement of the benefits or potential benefits intended to be made available under the Plan or with respect to any Award under the Plan, to facilitate such transactions or events or to give effect to such changes in laws, regulations or principles:

1. To provide for either (A) termination of any such Award in exchange for an amount of cash, if any, equal to the amount that would have been attained upon the exercise of such Award or realization of the Optionee's or Participant's rights (and, for the avoidance of doubt, if as of the date of the occurrence of the transaction or event described in this Section V.E the Plan Administrator determines in good faith that no amount would have been attained upon the exercise of such Award or realization of the Optionee's or Participant's rights, then such Award may be terminated by the Corporation without payment) or (B) the replacement of such Award with other rights or property selected by the Plan Administrator in its sole discretion;

2. To provide that such Award be assumed by the successor or survivor corporation, or a parent or subsidiary thereof, or shall be substituted for by similar Awards covering the stock of the successor or survivor corporation, or a parent or subsidiary thereof, with appropriate adjustments as to the number and kind of shares and prices;

3. To make adjustments in the number and type of shares of Common Stock (or other securities or property) subject to outstanding Awards, and in the number and/or in the terms and conditions of (including the grant or exercise price), and the criteria included in, outstanding Awards;

4. To provide that such Award shall be exercisable or payable or fully vested with respect to all shares covered thereby, notwithstanding anything to the contrary in the Plan or the applicable award agreement; and

5. To provide that the Award cannot vest, be exercised or become payable after such event.

F. In the event of any pending stock dividend, stock split, combination or exchange of shares, merger, consolidation or other distribution (other than normal cash dividends) of Corporation assets to stockholders, or any other change affecting the shares of Common Stock or the share price of the Common Stock, for reasons of administrative convenience, the Corporation in its sole discretion may refuse to permit the exercise of any Award during a period of thirty (30) days prior to the consummation of any such transaction.

ARTICLE TWO

DISCRETIONARY OPTION GRANT PROGRAM

I. OPTION TERMS

Each option shall be evidenced by one or more documents in the form approved by the Plan Administrator; provided, however, that each such document shall comply with the terms specified below. Each document evidencing an Incentive Option shall, in addition, be subject to the provisions of the Plan applicable to such options.

A. EXERCISE PRICE.

1. The exercise price per share shall be fixed by the Plan Administrator but shall not be less than one hundred percent (100%) of the Fair Market Value per share of Common Stock on the option grant date.

2. The exercise price shall become immediately due upon exercise of the option and shall, subject to the provisions of the documents evidencing the option, be payable in one or more of the forms specified below:

(i) cash or check made payable to the Corporation,

(ii) shares of Common Stock held by the Optionee or otherwise issuable upon exercise of the option and valued at Fair Market Value on the Exercise Date,

(iii) to the extent the option is exercised for vested shares, through a special sale and remittance procedure pursuant to which the Optionee shall concurrently provide irrevocable instructions to (a) a Corporation-designated brokerage firm to effect the immediate sale of the purchased shares and remit to the Corporation, out of the sale proceeds available on the settlement date, sufficient funds to cover the aggregate exercise price payable for the purchased shares plus all applicable income and employment taxes required to be withheld by the Corporation by reason of such exercise and (b) the Corporation to deliver the certificates for the purchased shares directly to such brokerage firm in order to complete the sale, or

(iv) with the consent of the Plan Administrator, a promissory note bearing interest at no less than such rate as shall then preclude the imputation of interest under the Code.

Except to the extent such sale and remittance procedure is utilized, payment of the exercise price for the purchased shares must be made on the Exercise Date. Notwithstanding any other provision of the

Plan to the contrary, no Optionee who is a member of the Board or an "executive officer" of the Corporation within the meaning of Section 13(k) of the Exchange Act shall be permitted to pay the exercise price of an option, or continue any extension of credit with respect to the exercise of an option, with a loan from the Corporation or a loan arranged by the Corporation in violation of Section 13(k) of the Exchange Act.

B. EXERCISE AND TERM OF OPTIONS. Each option shall be exercisable at such time or times, during such period and for such number of shares as shall be determined by the Plan Administrator and set forth in the documents evidencing the option. However, no option shall have a term in excess of ten (10) years measured from the option grant date.

C. EFFECT OF TERMINATION OF SERVICE.

1. The following provisions shall govern the exercise of any options held by the Optionee at the time of cessation of Service or death:

(i) Any option outstanding at the time of the Optionee's cessation of Service for any reason shall remain exercisable for such period of time thereafter as shall be determined by the Plan Administrator and set forth in the documents evidencing the option, but no such option shall be exercisable after the expiration of the option term.

(ii) Any option held by the Optionee at the time of death and exercisable in whole or in part at that time may be subsequently exercised by the personal representative of the Optionee's estate or by the person or persons to whom the option is transferred pursuant to the Optionee's will or the laws of inheritance or by the Optionee's designated beneficiary or beneficiaries of that option.

(iii) During the applicable post-Service exercise period, the option may not be exercised in the aggregate for more than the number of vested shares for which the option is exercisable on the date of the Optionee's cessation of Service. Upon the expiration of the applicable exercise period or (if earlier) upon the expiration of the option term, the option shall terminate and cease to be outstanding for any vested shares for which the option has not been exercised. However, the option shall, immediately upon the Optionee's cessation of Service, terminate and cease to be outstanding to the extent the option is not otherwise at that time exercisable for vested shares.

2. The Plan Administrator shall have complete discretion, exercisable either at the time an option is granted or at any time while the option remains outstanding, to:

(i) extend the period of time for which the option is to remain exercisable following the Optionee's cessation of Service from the limited exercise period otherwise in effect for that option to such greater period of time as the Plan Administrator shall deem appropriate, but in no event beyond the expiration of the option term, and/or

(ii) permit the option to be exercised, during the applicable post-Service exercise period, not only with respect to the number of vested shares of Common Stock for which such option is exercisable at the time of the Optionee's cessation of Service but also with respect to one or more additional installments in which the Optionee would have vested had the Optionee continued in Service.

D. STOCKHOLDER RIGHTS. The holder of an option shall have no stockholder rights with respect to the shares subject to the option until such person shall have exercised the option, paid the exercise price and become a holder of record of the purchased shares.

E. REPURCHASE RIGHTS. The Plan Administrator shall have the discretion to grant options which are exercisable for unvested shares of Common Stock. Should the Optionee cease Service while holding such unvested shares, the Corporation shall have the right to repurchase any or all of those unvested shares. The terms upon which such repurchase right shall be exercisable (including the period and procedure for exercise and the appropriate vesting schedule for the purchased shares) shall be established by the Plan Administrator and set forth in the document evidencing such repurchase right.

F. LIMITED TRANSFERABILITY OF OPTIONS. During the lifetime of the Optionee, Incentive Options shall be exercisable only by the Optionee and shall not be assignable or transferable other than by will or the laws of inheritance following the Optionee's death. Non-Statutory Options shall be subject to the same restriction, except that a Non-Statutory Option may be assigned in whole or in part during the Optionee's lifetime to one or more members of the Optionee's family or to a trust established exclusively for one or more such family members or to Optionee's former spouse, to the extent such assignment is in connection with the Optionee's estate plan or pursuant to a domestic relations order. The assigned portion may only be exercised by the person or persons who acquire a proprietary interest in the option pursuant to the assignment. The terms applicable to the assigned portion shall be the same as those in effect for the option immediately prior to such assignment and shall be set forth in such documents issued to the assignee as the Plan Administrator may deem appropriate. Notwithstanding the foregoing, the Optionee may also designate one or more persons as the beneficiary or beneficiaries of his or her outstanding options under this Article Two, and those options shall, in accordance with such designation, automatically be transferred to such beneficiary or beneficiaries upon the Optionee's death while holding those options. Such beneficiary or beneficiaries shall take the transferred options subject to all the terms and conditions of the applicable agreement evidencing each such transferred option, including (without limitation) the limited time period during which the option may be exercised following the Optionee's death.

II. INCENTIVE OPTIONS

The terms specified below shall be applicable to all Incentive Options. Except as modified by the provisions of this Section II, all the provisions of Articles One, Five and Six shall be applicable to Incentive Options. To the extent an option which is designated as an Incentive Option fails to meet the requirements of Section 422 of the Code, then such option shall be treated as a Non-Statutory Option. Options which are specifically designated as Non-Statutory Options when issued under the Plan shall not be subject to the terms of this Section II.

A. ELIGIBILITY. Incentive Options may only be granted to Employees.

B. DOLLAR LIMITATION. The aggregate Fair Market Value of the shares of Common Stock (determined as of the respective date or dates of grant) for which one or more options granted to any Employee under the Plan (or any other option plan of the Corporation or any Parent or Subsidiary) may for the first time become exercisable as Incentive Options during any one calendar year shall not exceed the sum of One Hundred Thousand Dollars ($100,000). To the extent the Employee holds two (2) or more such options which become exercisable for the first time in the same calendar year, the foregoing limitation on the exercisability of such options as Incentive Options shall be applied on the basis of the order in which such options are granted.

C. 10% STOCKHOLDER. If any Employee to whom an Incentive Option is granted is a 10% Stockholder, then the exercise price per share shall not be less than one hundred ten percent (110%) of the Fair Market Value per share of Common Stock on the option grant date, and the option term shall not exceed five (5) years measured from the option grant date.

III. CHANGE IN CONTROL/HOSTILE TAKE-OVER

A. In the event of a Change in Control, each outstanding option under the Discretionary Option Grant Program shall automatically accelerate so that each such option shall, immediately prior to the effective date of that Change in Control, become exercisable for all the shares of Common Stock at the time subject to such option and may be exercised for any or all of those shares as fully vested shares of Common Stock. However, an outstanding option shall NOT become exercisable on such an accelerated basis if and to the extent: (i) such option is to be assumed by the successor corporation (or parent thereof) or is otherwise to continue in full force and effect pursuant to the terms of the Change in Control transaction or (ii) such option is to be replaced with a cash incentive program of the successor corporation which preserves the spread existing at the time of the Change in Control on any shares for which the option is not otherwise at that time exercisable and provides for subsequent payout of that spread in accordance with the same exercise/vesting schedule applicable to those option shares or (iii) the acceleration of such option is subject to other limitations imposed by the Plan Administrator at the time of the option grant.

B. All outstanding repurchase rights under the Discretionary Option Grant Program shall automatically terminate, and the shares of Common Stock subject to those terminated rights shall immediately vest in full, in the event of a Change in Control, except to the extent: (i) those repurchase rights are to be assigned to the successor corporation (or parent thereof) or are otherwise to continue in full force and effect pursuant to the terms of the Change in Control transaction or (ii) such accelerated vesting is precluded by other limitations imposed by the Plan Administrator at the time the repurchase right is issued.

C. Immediately following the consummation of the Change in Control, all outstanding options under the Discretionary Option Grant Program shall terminate and cease to be outstanding, except to the extent assumed by the successor corporation (or parent thereof) or otherwise continued in full force and effect pursuant to the terms of the Change in Control transaction.

D. Each option which is assumed in connection with a Change in Control or otherwise continued in effect shall be appropriately adjusted, immediately after such Change in Control, to apply to the number and class of securities which would have been issuable to the Optionee in consummation of such Change in Control had the option been exercised immediately prior to such Change in Control. Appropriate adjustments shall also be made to the exercise price payable per share under each outstanding option, provided the aggregate exercise price payable for such securities shall remain the same (subject only to reduction by reason of rounding). To the extent the actual holders of the Corporation's outstanding Common Stock receive cash consideration for their Common Stock in consummation of the Change in Control, the successor corporation may, in connection with the assumption of the outstanding options under the Discretionary Option Grant Program, substitute one or more shares of its own common stock with a fair market value equivalent to the cash consideration paid per share of Common Stock in such Change in Control transaction.

E. The Plan Administrator shall have the discretionary authority to structure one or more outstanding options under the Discretionary Option Grant Program so that those options shall, immediately prior to the effective date of a Change in Control, become exercisable for all the shares of Common Stock at the time subject to those options and may be exercised for any or all of those shares as fully vested shares of Common Stock, whether or not those options are to be assumed in the Change in Control transaction or otherwise continued in effect. In addition, the Plan Administrator shall have the discretionary authority to structure one or more of the Corporation's repurchase rights under the Discretionary Option Grant Program so that those rights shall immediately terminate upon the consummation of the Change in Control transaction, and the shares subject to those terminated rights shall thereupon vest in full.

F. The Plan Administrator shall have full power and authority to structure one or more outstanding options under the Discretionary Option Grant Program so that those options shall become exercisable for all the shares of Common Stock at the time subject to those options in the event the

Optionee's Service is subsequently terminated by reason of an Involuntary Termination within a designated period (not to exceed eighteen (18) months) following the effective date of any Change in Control transaction in which those options do not otherwise accelerate. In addition, the Plan Administrator may structure one or more of the Corporation's repurchase rights so that those rights shall immediately terminate with respect to any shares held by the Optionee at the time of such Involuntary Termination, and the shares subject to those terminated repurchase rights shall accordingly vest in full at that time.

G. The Plan Administrator shall have the discretionary authority to structure one or more outstanding options under the Discretionary Option Grant Program so that those options shall, immediately prior to the effective date of a Hostile Take-Over, become exercisable for all the shares of Common Stock at the time subject to those options and may be exercised for any or all of those shares as fully vested shares of Common Stock. In addition, the Plan Administrator shall have the discretionary authority to structure one or more of the Corporation's repurchase rights under the Discretionary Option Grant Program so that those rights shall terminate automatically upon the consummation of such Hostile Take-Over, and the shares subject to those terminated rights shall thereupon vest in full. Alternatively, the Plan Administrator may condition the automatic acceleration of one or more outstanding options under the Discretionary Option Grant Program and the termination of one or more of the Corporation's outstanding repurchase rights under such program upon the subsequent termination of the Optionee's Service by reason of an Involuntary Termination within a designated period (not to exceed eighteen (18) months) following the effective date of such Hostile Take-Over.

H. The portion of any Incentive Option accelerated in connection with a Change in Control or Hostile Take-Over shall remain exercisable as an Incentive Option only to the extent the applicable One Hundred Thousand Dollar ($100,000) limitation is not exceeded. To the extent such dollar limitation is exceeded, the accelerated portion of such option shall be exercisable as a Nonstatutory Option under the Federal tax laws.

I. The outstanding options shall in no way affect the right of the Corporation to adjust, reclassify, reorganize or otherwise change its capital or business structure or to merge, consolidate, dissolve, liquidate or sell or transfer all or any part of its business or assets.

ARTICLE THREE

STOCK ISSUANCE PROGRAM

I. STOCK ISSUANCE TERMS

Shares of Common Stock may be issued under the Stock Issuance Program through direct and immediate issuances without any intervening option grants. Each such stock issuance shall be evidenced by a Stock Issuance Agreement which complies with the terms specified below. Shares of Common Stock may also be issued under the Stock Issuance Program pursuant to share right awards which entitle the recipients to receive those shares upon the attainment of designated performance goals or the satisfaction of specified Service requirements.

A. PURCHASE PRICE.

1. The purchase price per share, if any, shall be fixed by the Plan Administrator.

2. Shares of Common Stock may be issued under the Stock Issuance Program for any form of consideration as the Plan Administrator may deem appropriate in each individual instance, including, without limitation:

(i) cash or check made payable to the Corporation, or

(ii) past services rendered to the Corporation (or any Parent or Subsidiary), or

(iii) future services to be rendered to the Corporation (or any Parent or Subsidiary).

B. RESTRICTIONS. Shares of Common Stock issued under this Stock Issuance Program shall be subject to such restrictions on transferability and other restrictions as the Plan Administrator may impose (including, without limitation, limitations on the right to vote such shares or the right to receive dividends on such shares). These restrictions may lapse separately or in combination at such times, pursuant to such circumstances, in such installments, or otherwise, as the Plan Administrator determines at the time of the grant of the shares or thereafter. Notwithstanding the foregoing, with respect to shares of Common Stock issued under this Stock Issuance Program subject to vesting, dividends which are paid prior to vesting shall only be paid out to the Participant to the extent that the vesting conditions are subsequently satisfied and the share vests.

C. Forfeiture. Except as otherwise determined by the Plan Administrator at the time of the grant of the shares or thereafter, upon termination of employment or service during the applicable restriction period, shares of Common Stock issued under this Stock Issuance Program that are at that time subject to restrictions shall be forfeited; *provided, however*, that, the Plan Administrator may (a) provide in any award agreement that restrictions or forfeiture conditions relating to such shares will be waived in whole or in part in the event of terminations resulting from specified causes, and (b) in other cases waive in whole or in part restrictions or forfeiture conditions relating to such shares.

II. CHANGE IN CONTROL/HOSTILE TAKE-OVER

A. All of the Corporation's outstanding forfeiture restrictions or repurchase rights on any shares of Common Stock issued under the Stock Issuance Program shall terminate automatically, and all the shares of Common Stock subject to those terminated rights shall immediately vest in full, in the event of any Change in Control, except to the extent (i) those forfeiture restrictions or repurchase rights are to be assigned to the successor corporation (or parent thereof) or are otherwise to continue in full force and effect pursuant to the terms of the Change in Control transaction or (ii) such accelerated vesting is precluded by other limitations imposed in the Stock Issuance Agreement.

B. The Plan Administrator shall have the discretionary authority to structure one or more of the Corporation's forfeiture restrictions or repurchase rights under the Stock Issuance Program so that those rights shall automatically terminate in whole or in part, and the shares of Common Stock subject to those terminated rights shall immediately vest, in the event the Participant's Service should subsequently terminate by reason of an Involuntary Termination within a designated period (not to exceed eighteen (18) months) following the effective date of any Change in Control transaction in which those forfeiture restrictions or repurchase rights are assigned to the successor corporation (or parent thereof) or are otherwise continued in effect.

C. The Plan Administrator shall also have the discretionary authority to structure one or more of the Corporation's forfeiture restrictions or repurchase rights under the Stock Issuance Program so that those rights shall automatically terminate in whole or in part, and the shares of Common Stock subject to those terminated rights shall immediately vest, either upon the occurrence of a Hostile Take-Over or upon the subsequent termination of the Participant's Service by reason of an Involuntary Termination within a designated period (not to exceed eighteen (18) months) following the effective date of that Hostile Take-Over.

III. SHARE ESCROW/LEGENDS

Unvested shares may, in the Plan Administrator's discretion, be held in escrow by the Corporation until the Participant's interest in such shares vests or may be issued directly to the Participant with restrictive legends on the certificates evidencing those unvested shares.

ARTICLE FOUR

OTHER STOCK AWARDS PROGRAM

I. STOCK APPRECIATION RIGHTS

A. A stock appreciation right may be granted to any eligible person selected by the Plan Administrator. A stock appreciation right shall be subject to such terms and conditions not inconsistent with the Plan as the Plan Administrator shall impose and shall be evidenced by a stock appreciation right agreement.

B. A stock appreciation right shall entitle the Participant (or other person entitled to exercise the stock appreciation right pursuant to the Plan) to exercise all or a specified portion of the stock appreciation right (to the extent then exercisable pursuant to its terms) and to receive from the Corporation an amount equal to the product of (i) the excess of (A) the Fair Market Value of the Common Stock on the date the stock appreciation right is exercised over (B) the Fair Market Value of the Common Stock on the date the stock appreciation right was granted and (ii) the number of shares of Common Stock with respect to which the stock appreciation right is exercised, subject to any limitations the Plan Administrator may impose. The exercise or base price per share of a stock appreciation right shall be fixed by the Plan Administrator but shall not be less than one hundred percent (100%) of the Fair Market Value per share of Common Stock on the date the stock appreciation right was granted.

C. Subject to Section I.B above, payment of the amounts determined under Sections I.B. above shall be in cash, in Common Stock (based on its Fair Market Value as of the date the stock appreciation right is exercised) or a combination of both, as determined by the Plan Administrator. To the extent any payment is effected in Stock, it shall be made subject to satisfaction of all provisions of Article Two above pertaining to options.

D. Each stock appreciation right shall be exercisable at such time or times, during such period and for such number of shares as shall be determined by the Plan Administrator and set forth in the documents evidencing the stock appreciation right. However, no stock appreciation right shall have a term in excess of ten (10) years measured from the date the stock appreciation right was granted.

II. Dividend Equivalents

Any eligible person selected by the Plan Administrator may be granted dividend equivalents based on the dividends declared on the shares of Common Stock that are subject to any Award, to be credited as of dividend payment dates, during the period between the date the Award is granted and the date the Award is exercised, vests or expires, as determined by the Plan Administrator. Such dividend equivalents shall be converted to cash or additional shares of Common Stock by such formula and at such time and subject to such limitations as may be determined by the Plan Administrator. Notwithstanding anything to the contrary, dividends or dividend equivalents with respect to an Award that is subject to vesting that are based on dividends paid prior to the vesting of such Award shall only be paid out to the extent that the vesting conditions are subsequently satisfied and the Award vests. In addition, notwithstanding anything to the contrary, no dividend equivalents shall be payable with respect to options or stock appreciation rights.

III. Restricted Stock Units

The Plan Administrator is authorized to make Awards of restricted stock units (a right to shares of Common Stock deliverable in the future) to any eligible person selected by the Plan Administrator in such amounts and subject to such terms and conditions as determined by the Plan Administrator. At the time of grant, the Plan Administrator shall specify the date or dates on which the restricted stock units shall become fully vested and nonforfeitable, and may specify such conditions to vesting as it deems appropriate. At the time of grant, the Plan Administrator shall specify the maturity date applicable to each grant of restricted stock units which shall be no earlier than the vesting date or dates of the Award and may be determined at the election of the grantee. On the maturity date, the Corporation shall, subject to Article Six, Section V, transfer to the Participant one unrestricted, fully transferable share of Common Stock for each restricted stock unit scheduled to be paid out on such date and not previously forfeited.

IV. OTHER TERMS

A. Except as otherwise provided herein, the term of any award of stock appreciation rights, dividend equivalents or restricted stock units shall be set by the Plan Administrator in its discretion.

B. Except as otherwise provided herein, the Plan Administrator may establish the exercise or purchase price, if any, of any award of stock appreciation rights, dividend equivalents or restricted stock units.

C. An award of stock appreciation rights, dividend equivalents or restricted stock units shall only be exercisable or payable prior to the Participant's termination of Service; *provided, however*, that the Plan Administrator in its sole and absolute discretion may provide that an award of stock appreciation rights, dividend equivalents or restricted stock units may be exercised or paid subsequent to a termination of Service, as applicable, or following a Change in Control of the Corporation, or because of the Participant's retirement, death or disability, or otherwise.

D. Payments with respect to any Awards granted under this Article Four shall be made in cash, in Stock or a combination of both, as determined by the Committee.

E. All Awards under this Article Four shall be subject to such additional terms and conditions as determined by the Plan Administrator and shall be evidenced by an award agreement.

V. CHANGE IN CONTROL/HOSTILE TAKE-OVER

A. In the event of a Change in Control, each outstanding Award under the Other Stock Award Program shall automatically accelerate so that each such Award shall, immediately prior to the effective date of that Change in Control, become vested and exercisable and/or payable with respect to all the shares of Common Stock at the time subject to such Award and may be exercised or paid for any or all of those shares as fully vested shares of Common Stock. However, an outstanding Award shall NOT become vested and exercisable and/or payable on such an accelerated basis if and to the extent: (i) such Award is to be assumed by the successor corporation (or parent thereof) or is otherwise to continue in full force and effect pursuant to the terms of the Change in Control transaction or (ii) such Award is to be replaced with a cash incentive program of the successor corporation which preserves the spread existing at the time of the Change in Control on any shares for which the Award is not otherwise at that time vested, exercisable or payable and provides for subsequent payout of that spread in accordance with the same exercise/vesting/payment schedule applicable to those Award shares or (iii) the acceleration of such Award is subject to other limitations imposed by the Plan Administrator at the time of the Award grant.

B. Immediately following the consummation of the Change in Control, all outstanding Awards under the Other Stock Award Program shall terminate and cease to be outstanding, except to the extent assumed by the successor corporation (or parent thereof) or otherwise continued in full force and effect pursuant to the terms of the Change in Control transaction.

C. Each Award which is assumed in connection with a Change in Control or otherwise continued in effect shall be appropriately adjusted, immediately after such Change in Control, to apply to the number and class of securities which would have been issuable to the Participant in consummation of such Change in Control had the Award been exercised or paid immediately prior to such Change in Control. Appropriate adjustments shall also be made to the exercise or purchase price payable per share under each outstanding Award, provided the aggregate exercise or purchase price payable for such securities shall remain the same. To the extent the actual holders of the Corporation's outstanding Common Stock receive cash consideration for their Common Stock in consummation of the Change in Control, the successor corporation may, in connection with the assumption of the outstanding Awards under the Other Stock Award Program, substitute one or more shares of its own common stock with a fair market value equivalent to the cash consideration paid per share of Common Stock in such Change in Control transaction.

D. The Plan Administrator shall have the discretionary authority to structure one or more outstanding Awards under the Other Stock Award Program so that those Awards shall, immediately prior to the effective date of a Change in Control, become vested and exercisable and/or payable exercisable for all the shares of Common Stock at the time subject to those Awards and may be exercised or paid for any or all of those shares as fully vested shares of Common Stock, whether or not those Awards are to be assumed in the Change in Control transaction or otherwise continued in effect. In addition, the Plan Administrator shall have the discretionary authority to structure one or more of the Corporation's repurchase rights under the Other Stock Award Program so that those rights shall immediately terminate upon the consummation of the Change in Control transaction, and the shares subject to those terminated rights shall thereupon vest in full.

E. The Plan Administrator shall have full power and authority to structure one or more outstanding Awards under the Other Stock Award Program so that those Awards shall become vested and exercisable and/or payable for all the shares of Common Stock at the time subject to those Awards in the event the Participant's Service is subsequently terminated by reason of an Involuntary Termination within a designated period (not to exceed eighteen (18) months) following the effective date of any Change in Control transaction in which those Awards do not otherwise accelerate.

F. The Plan Administrator shall have the discretionary authority to structure one or more outstanding Awards under the Other Stock Award Program so that those Awards shall, immediately prior to the effective date of a Hostile Take-Over, become vested and exercisable and/or payable for all the shares of Common Stock at the time subject to those Awards and may be exercised or paid for any or all of those shares as fully vested shares of Common Stock. Alternatively, the Plan Administrator may condition the automatic acceleration of one or more outstanding Awards under the Other Stock Award Program upon the subsequent termination of the Optionee's Service by reason of an Involuntary Termination within a designated period (not to exceed eighteen (18) months) following the effective date of such Hostile Take-Over.

G. The outstanding Awards shall in no way affect the right of the Corporation to adjust, reclassify, reorganize or otherwise change its capital or business structure or to merge, consolidate, dissolve, liquidate or sell or transfer all or any part of its business or assets.

ARTICLE FIVE

PERFORMANCE-BASED AWARDS

Notwithstanding any other provision of the Plan or any Award, with respect to any Award which is intended to continue to qualify as Qualified Performance-Based Compensation (as described in Section 162(m)(4)(C) of the Code prior to its repeal) pursuant to the transition relief rules in the Tax Cuts and Jobs Act of 2017, to the extent any of the provisions of the Plan or any Award (or any amendments hereto pursuant to this amendment and restatement of the Plan) would cause such Awards to fail to so qualify,

any such provisions shall not apply to such Awards to the extent necessary to ensure the such Awards continue to so qualify. In addition, any Award which is intended to continue to qualify as Qualified Performance-Based Compensation (as described in Section 162(m)(4)(C) of the Code prior to its repeal) pursuant to the transition relief rules in the Tax Cuts and Jobs Act of 2017 shall be subject to any additional limitations as the Primary Committee determines necessary for such Award to continue to so qualify. To the extent permitted by applicable law, and the Plan and any such Awards shall be deemed amended to the extent necessary to conform to such requirements.

ARTICLE SIX

MISCELLANEOUS

I. TAX WITHHOLDING

A. The Corporation's obligation to deliver shares of Common Stock upon the exercise, vesting or payment of Awards under the Plan shall be subject to the satisfaction of all applicable income and employment tax withholding requirements.

B. The Plan Administrator may, in its discretion, provide any or all holders of Awards under the Plan with the right to use shares of Common Stock in satisfaction of all or part of the Withholding Taxes to which such holders may become subject in connection with the exercise, vesting or payment of their Awards. Such right may be provided to any such holder in either or both of the following formats:

Stock Withholding: The election to have the Corporation withhold, from the shares of Common Stock otherwise issuable upon the exercise, vesting or payment of such Award, a portion of those shares with an aggregate Fair Market Value equal to the minimum required percentage of the Withholding Taxes.

Stock Delivery: The election to deliver to the Corporation, at the time the Award is exercised, vests or is paid, one or more shares of Common Stock previously acquired by such holder (other than in connection with the exercise, vesting or payment triggering the Withholding Taxes) and held for at least six (6) months (or such other period determined by the Plan Administrator) with an aggregate Fair Market Value equal to the percentage of the Withholding Taxes (not to exceed one hundred percent (100%)) designated by the holder.

C. Notwithstanding any other provision of the Plan, the number of shares of Common Stock which may be withheld or delivered by the Participant in order to satisfy the Withholding Taxes with respect to the exercise, vesting or payment of an Award shall be limited to the number of shares of Common Stock which have a Fair Market Value on the date of withholding or delivery equal to the aggregate amount of such Withholding Taxes based on the minimum statutory withholding rates for federal, state, local and foreign income tax and payroll tax purposes that are applicable to such supplemental taxable income or such higher rate as may approved by the Administrator (which rates shall in no event exceed the maximum individual statutory tax rate in the applicable jurisdiction at the time of such withholding (or such other rate as may be required to avoid the liability classification of the applicable award under generally accepted accounting principles in the United States of America)); provided, however, unless otherwise approved by the Administrator, to the extent such shares of Common Stock were acquired by the Participant from the Company as compensation, the shares of Common Stock must have been held for the minimum period required by applicable accounting rules to avoid a charge to the Company's earnings for financial reporting purposes; provided, further, that the number of shares of Common Stock withheld or delivered shall be rounded up to the nearest whole share sufficient to cover the Withholding Taxes to the extent rounding up to the nearest whole share does not result in the liability classification of the applicable Award under generally accepted accounting principles in the United States of America.

II. EFFECTIVE DATE AND TERM OF THE PLAN

A. This Plan constitutes an amendment and restatement of the Ligand Pharmaceuticals Incorporated 2002 Stock Incentive Plan most recently adopted by the Board on March 28, 2019, and approved by the Corporation's stockholders on June 6, 2019 (the "Existing Plan"). This amended and restated Plan was adopted by the Board on October 26, 2020, and will become effective on the Restatement Effective Date.

B. The Plan shall terminate upon the earliest to occur of (i) October 25, 2030, or (ii) the termination of all outstanding options in connection with a Change in Control. In the event of the termination of the Plan, then all option grants and unvested stock issuances outstanding at that time shall continue to have force and effect in accordance with the provisions of the documents evidencing such grants or issuances.

C. This amended and restated Plan shall be submitted for the approval of the Company's stockholders within 12 months after the date of the Board's adoption of this amended and restated Plan. If this amended and restated Plan is not approved by the Company's stockholders, this amended and restated Plan shall not become effective and the Existing Plan shall continue in full force and effect in accordance with its terms.

III. AMENDMENT OF THE PLAN

The Board shall have complete and exclusive power and authority to amend or modify the Plan in any or all respects. However, no such amendment or modification shall adversely affect the rights and obligations with respect to Awards at the time outstanding under the Plan unless the Optionee or the Participant consents to such amendment or modification. In addition, certain amendments may require stockholder approval pursuant to applicable laws or regulations. Except as permitted by Article One, Section V, Article Two, Section III or Article Four, Section V in connection with a transaction specified in Article One, Section V.D or V.E (including, without limitation, any Change in Control, Hostile Take-Over, stock dividend, stock split, extraordinary cash dividend, recapitalization, combination of shares or exchange of shares), the terms of outstanding Awards may not be amended to reduce the exercise price of outstanding Options or stock appreciation rights or cancel, exchange, substitute, buyout or surrender outstanding Options or stock appreciation rights in exchange for cash, other Awards or Options or stock appreciation rights with an exercise price that is less than the exercise price of the original Options or stock appreciation rights without stockholder approval.

IV. USE OF PROCEEDS

Any cash proceeds received by the Corporation from the sale of shares of Common Stock under the Plan shall be used for general corporate purposes.

V. REGULATORY APPROVALS

A. The implementation of the Plan, the granting of any Award under the Plan and the issuance of any shares of Common Stock under the Plan shall be subject to the Corporation's procurement of all approvals and permits required by regulatory authorities having jurisdiction over the Plan, the Awards granted under it and the shares of Common Stock issued pursuant to it.

B. No shares of Common Stock or other assets shall be issued or delivered under the Plan unless and until there shall have been compliance with all applicable requirements of applicable securities laws, including the filing and effectiveness of the Form S-8 registration statement for the shares of Common Stock issuable under the Plan, and all applicable listing requirements of any stock exchange (or the Nasdaq Global Market, if applicable) on which Common Stock is then listed for trading.

C. All stock certificates delivered pursuant to the Plan are subject to any stop-transfer orders and other restrictions as the Plan Administrator deems necessary or advisable to comply with federal, state, or foreign jurisdiction, securities or other laws, rules and regulations and the rules of any national securities exchange or automated quotation system on which the Stock is listed, quoted, or traded. The Plan Administrator may place legends on any stock certificate to reference restrictions applicable to the Common Stock. In addition to the terms and conditions provided herein, the Board may require that an Optionee or Participant make such reasonable covenants, agreements, and representations as the Board, in its discretion, deems advisable in order to comply with any such laws, regulations, or requirements. The Plan Administrator shall have the right to require any Optionee or Participant to comply with any timing or other restrictions with respect to the settlement or exercise of any Award, including a window-period limitation, as may be imposed in the discretion of the Plan Administrator.

D. Notwithstanding any other provision of the Plan, unless otherwise determined by the Plan Administrator or required by any applicable law, rule or regulation, the Corporation shall not deliver to any Optionee or Participant certificates evidencing shares of Common Stock issued in connection with any award and instead such shares of Common Stock shall be recorded in the books of the Corporation (or, as applicable, its transfer agent or stock plan administrator).

E. In the event that the Corporation establishes, for itself or using the services of a third party, an automated system for the documentation, granting or exercise of Awards, such as a system using an internet website or interactive voice response, then the paperless documentation, granting or exercise of Awards by an Optionee or a Participant may be permitted through the use of such an automated system.

VI. NO EMPLOYMENT/SERVICE RIGHTS

Nothing in the Plan shall confer upon the Optionee or the Participant any right to continue in Service for any period of specific duration or interfere with or otherwise restrict in any way the rights of the Corporation (or any Parent or Subsidiary employing or retaining such person) or of the Optionee or the Participant, which rights are hereby expressly reserved by each, to terminate such person's Service at any time for any reason, with or without cause.

VII. COMPLIANCE WITH SECTION 409A OF THE CODE

To the extent that the Plan Administrator determines that any Award granted under the Plan is subject to Section 409A of the Code, the agreement evidencing such Award shall incorporate the terms and conditions required by Section 409A of the Code. To the extent applicable, the Plan and Award agreements shall be interpreted in accordance with Section 409A of the Code and Department of Treasury regulations and other interpretive guidance issued thereunder, including without limitation any such regulations or other guidance that may be issued after the adoption of the Plan. Notwithstanding any provision of the Plan to the contrary, in the event that following the adoption of the Plan the Plan Administrator determines that any Award may be subject to Section 409A of the Code and related Department of Treasury guidance (including such Department of Treasury guidance as may be issued after the adoption of the Plan), the Plan Administrator may adopt such amendments to the Plan and the applicable Award agreement or adopt other policies and procedures (including amendments, policies and procedures with retroactive effect), or take any other actions, that the Plan Administrator determines are necessary or appropriate to (a) exempt the Award from Section 409A of the Code and/or preserve the intended tax treatment of the benefits provided with respect to the Award, or (b) comply with the requirements of Section 409A of the Code and related Department of Treasury guidance.

VIII. FORFEITURE AND CLAW-BACK PROVISIONS

A. Pursuant to its general authority to determine the terms and conditions applicable to Awards under the Plan, the Plan Administrator shall have the right to provide, in the terms of Awards made under the Plan, or to require a participant to agree by separate written or electronic instrument, that: (1) any proceeds, gains or other economic benefit actually or constructively received by the participant upon any receipt or exercise of the Award, or upon the receipt or resale of any shares underlying the Award, must be paid to the Corporation, and (2) the Award shall terminate and any unexercised portion of the Award (whether or not vested) shall be forfeited, if (i) a termination of Service occurs prior to a specified date, or within a specified time period following receipt or exercise of the Award, (ii) the participant at any time, or during a specified time period, engages in any activity in competition with the Corporation, or which is inimical, contrary or harmful to the interests of the Corporation, as further defined by the Plan Administrator or (iii) the participant incurs a termination of Service for Misconduct; and

B. All Awards (including any proceeds, gains or other economic benefit actually or constructively received by a participant upon any receipt or exercise of any Award or upon the receipt or resale of any shares underlying the Award) shall be subject to the applicable provisions of any claw-back policy implemented by the Corporation, whether implemented prior to or after the grant of such Award, including without limitation, any claw-back policy adopted to comply with the requirements of applicable law, including without limitation, the Dodd-Frank Wall Street Reform and Consumer Protection Act and any rules or regulations promulgated thereunder, to the extent set forth in such claw-back policy and/or in the applicable Award agreement.

APPENDIX

The following definitions shall be in effect under the Plan:

A. AWARD shall mean an option, stock issuance award, stock appreciation right award, restricted stock unit award or dividend equivalent award granted pursuant to the Plan.

B. BOARD shall mean the Corporation's Board of Directors.

C. CHANGE IN CONTROL shall mean a change in ownership or control of the Corporation effected through any of the following transactions:

(i) a merger, consolidation or other reorganization approved by the Corporation's stockholders, unless securities representing more than fifty percent (50%) of the total combined voting power of the voting securities of the successor corporation are immediately thereafter beneficially owned, directly or indirectly and in substantially the same proportion, by the persons who beneficially owned the Corporation's outstanding voting securities immediately prior to such transaction, or

(ii) the sale, transfer or other disposition of all or substantially all of the Corporation's assets in complete liquidation or dissolution of the Corporation, or

(iii) the acquisition, directly or indirectly by any person or related group of persons (other than the Corporation or a person that directly or indirectly controls, is controlled by, or is under common control with, the Corporation), of beneficial ownership (within the meaning of Rule 13d-3 of the 1934 Act) of securities possessing more than fifty percent (50%) of the total combined voting power of the Corporation's outstanding securities pursuant to a tender or exchange offer made directly to the Corporation's stockholders.

D. CODE shall mean the Internal Revenue Code of 1986, as amended.

E. COMMON STOCK shall mean the Corporation's common stock.

F. CORPORATION shall mean Ligand Pharmaceuticals Incorporated, a Delaware corporation, and any corporate successor to all or substantially all of the assets or voting stock of Ligand Pharmaceuticals Incorporated which shall by appropriate action adopt the Plan.

G. DISCRETIONARY OPTION GRANT PROGRAM shall mean the discretionary option grant program in effect under Article Two of the Plan.

H. EMPLOYEE shall mean an individual who is in the employ of the Corporation (or any Parent or Subsidiary), subject to the control and direction of the employer entity as to both the work to be performed and the manner and method of performance.

I. EXERCISE DATE shall mean the date on which the Corporation shall have received written notice of the option exercise.

J. FAIR MARKET VALUE per share of Common Stock on any relevant date shall be determined in accordance with the following provisions:

(i) If the Common Stock is at the time traded on the Nasdaq Global Market, then the Fair Market Value shall be the closing selling price per share of Common Stock on the date in question, as such price is reported by the National Association of Securities Dealers on the Nasdaq Global Market and published in The Wall Street Journal. If there is no closing selling price for the Common

Stock on the date in question, then the Fair Market Value shall be the closing selling price on the last preceding date for which such quotation exists.

(ii) If the Common Stock is at the time listed on any Stock Exchange, then the Fair Market Value shall be the closing selling price per share of Common Stock on the date in question on the Stock Exchange determined by the Plan Administrator to be the primary market for the Common Stock, as such price is officially quoted in the composite tape of transactions on such exchange and published in The Wall Street Journal. If there is no closing selling price for the Common Stock on the date in question, then the Fair Market Value shall be the closing selling price on the last preceding date for which such quotation exists.

K. Full Value Award shall mean any Award other than an option or a stock appreciation right and that is settled by the issuance of shares of Common Stock.

L. HOSTILE TAKE-OVER shall mean a change in ownership or control of the Corporation effected through either of the following transactions:

(i) a change in the composition of the Board over a period of thirty-six (36) consecutive months or less such that a majority of the Board members ceases, by reason of one or more contested elections for Board membership, to be comprised of individuals who either (A) have been Board members continuously since the beginning of such period or (B) have been elected or nominated for election as Board members during such period by at least a majority of the Board members described in clause (A) who were still in office at the time the Board approved such election or nomination, or

(ii) a Hostile Tender-Offer.

M. HOSTILE TENDER-OFFER shall mean the acquisition, directly or indirectly, by any person or related group of persons (other than the Corporation or a person that directly or indirectly controls, is controlled by, or is under common control with, the Corporation) of beneficial ownership (within the meaning of Rule 13d-3 of the 1934 Act) of securities possessing more than fifty percent (50%) of the total combined voting power of the Corporation's outstanding securities pursuant to a tender or exchange offer made directly to the Corporation's stockholders which the Board does not recommend such stockholders to accept.

N. INCENTIVE OPTION shall mean an option which satisfies the requirements of Code Section 422.

O. INVOLUNTARY TERMINATION shall mean the termination of the Service of any individual which occurs by reason of:

(i) such individual's involuntary dismissal or discharge by the Corporation for reasons other than Misconduct, or

(ii) such individual's voluntary resignation following (A) a change in his or her position with the Corporation which materially reduces his or her duties and responsibilities or the level of management to which he or she reports, (B) a reduction in his or her level of compensation (including base salary, fringe benefits and target bonus under any corporate-performance based bonus or incentive programs) by more than fifteen percent (15%) or (C) a relocation of such individual's place of employment by more than fifty (50) miles, provided and only if such change, reduction or relocation is effected by the Corporation without the individual's consent.

P. MISCONDUCT shall mean the commission of any act of fraud, embezzlement or dishonesty by the Optionee or Participant, any unauthorized use or disclosure by such person of

confidential information or trade secrets of the Corporation (or any Parent or Subsidiary), or any other intentional misconduct by such person adversely affecting the business or affairs of the Corporation (or any Parent or Subsidiary) in a material manner. The foregoing definition shall not in any way preclude or restrict the right of the Corporation (or any Parent or Subsidiary) to discharge or dismiss any Optionee, Participant or other person in the Service of the Corporation (or any Parent or Subsidiary) for any other acts or omissions, but such other acts or omissions shall not be deemed, for purposes of the Plan, to constitute grounds for termination for Misconduct.

Q. 1934 ACT shall mean the Securities Exchange Act of 1934, as amended.

R. NON-STATUTORY OPTION shall mean an option not intended to satisfy the requirements of Code Section 422.

S. OPTIONEE shall mean any person to whom an option is granted under the Discretionary Option Grant Program.

T. OTHER STOCK AWARD PROGRAM shall mean the discretionary stock award grant program in effect under Article Four of the Plan

U. PARENT shall mean any corporation (other than the Corporation) in an unbroken chain of corporations ending with the Corporation, provided each corporation in the unbroken chain (other than the Corporation) owns, at the time of the determination, stock possessing fifty percent (50%) or more of the total combined voting power of all classes of stock in one of the other corporations in such chain.

V. PARTICIPANT shall mean any person who is issued an Award under the Plan other than an option.

W. Performance Criteria shall mean the criteria that the Primary Committee selects for purposes of establishing the Performance Goal or Performance Goals for a Participant for a Performance Period, determined as follows:

(i) The Performance Criteria that will be used to establish Performance Goals shall be determined by the Plan Administrator. Such criteria may include, but are not limited to, one or more of the following: net earnings (either before or after interest, taxes, depreciation and amortization), gross or net sales or revenue, adjusted net income, operating earnings or profit, cash flow (including, but not limited to, operating cash flow and free cash flow), return on assets, return on capital, return on stockholders' equity, total stockholder return, return on sales, gross or net profit or operating margin, expenses, working capital, earnings per share, adjusted earnings per share, price per share of Stock, regulatory body approval for commercialization of a product, implementation or completion of critical projects, and market share, any of which may be measured either in absolute terms or as compared to any incremental increase or decrease or as compared to results of a peer group or to market performance indicators or indices.

(ii) The Plan Administrator may, in its sole discretion, provide that one or more adjustments shall be made to one or more of the Performance Goals. Such adjustments may include, but are not limited to, one or more of the following: items related to a change in accounting principle, items relating to financing activities, expenses for restructuring or productivity initiatives, other non-operating items, items related to acquisitions, items attributable to the business operations of any entity acquired by us during the performance period, items related to the disposal of a business or segment of a business, items related to discontinued operations that do not qualify as a segment of a business under applicable accounting standards, items attributable to any stock dividend, stock split, combination or exchange of stock occurring during the performance period, other items of significant income or expense which are determined to be appropriate adjustments, items relating to unusual or extraordinary corporate transactions, events or developments, items related to amortization of acquired intangible assets, items

that are outside the scope of our core, on-going business activities, items related to acquired in-process research and development, items relating to changes in tax laws, items relating to major licensing or partnership arrangements, items relating to asset impairment charges, items relating to gains or losses for litigation, arbitration and contractual settlements, or items relating to any other unusual or nonrecurring events or changes in applicable laws, accounting principles or business conditions.

X. Performance Goals shall mean, for a Performance Period, the goals established in writing by the Plan Administrator for the Performance Period. Performance Goals may be expressed in terms of overall Corporation performance or the performance of a division, business unit, or an individual.

Y. Performance Period shall mean the one or more periods of time, which may be of varying and overlapping durations, as the Plan Administrator may select, over which the attainment of one or more Performance Goals will be measured for the purpose of determining a Participant's right to, and the payment of, an Award.

Z. PERMANENT DISABILITY OR PERMANENTLY DISABLED shall mean the inability of the Optionee or the Participant to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment expected to result in death or to be of continuous duration of twelve (12) months or more. However, solely for purposes of the Awards granted to non-employee Board members, Permanent Disability or Permanently Disabled shall mean the inability of the non-employee Board member to perform his or her usual duties as a Board member by reason of any medically determinable physical or mental impairment expected to result in death or to be of continuous duration of twelve (12) months or more.

AA. PLAN shall mean the Corporation's 2002 Stock Incentive Plan, as amended and restated and set forth in this document.

BB. PLAN ADMINISTRATOR shall mean the particular entity, whether the Primary Committee, the Board or the Secondary Committee, which is authorized to administer the Plan with respect to one or more classes of eligible persons, to the extent such entity is carrying out its administrative functions under those programs with respect to the persons under its jurisdiction.

CC. PRIMARY COMMITTEE shall mean the committee of two (2) or more non-employee Board members appointed by the Board to administer the Discretionary Option Grant and Stock Issuance Programs with respect to Section 16 Insiders.

DD. Qualified Performance-Based Compensation means any compensation granted under the Plan prior to November 2, 2017 that is intended to qualify as "qualified performance-based compensation" as described in Section 162(m)(4)(C) of the Code prior to its repeal.

EE. RESTATEMENT EFFECTIVE DATE shall mean the date the Plan shall become effective and shall be coincident with the approval of the Plan at the special meeting of the Corporation's stockholders scheduled to take place on December 15, 2020.

FF. SECONDARY COMMITTEE shall mean a committee of one or more Board members appointed by the Board to administer the Discretionary Option Grant, Stock Issuance and Other Stock Award Programs with respect to eligible persons other than Section 16 Insiders.

GG. SECTION 16 INSIDER shall mean an officer or director of the Corporation subject to the short-swing profit liabilities of Section 16 of the 1934 Act.

HH. SERVICE shall mean the performance of services for the Corporation (or any Parent or Subsidiary) by a person in the capacity of an Employee, a non-employee member of the board of directors

or a consultant or independent advisor, except to the extent otherwise specifically provided in the documents evidencing the option grant or stock issuance.

II. STOCK EXCHANGE shall mean either the American Stock Exchange or the New York Stock Exchange.

JJ. STOCK ISSUANCE AGREEMENT shall mean the agreement entered into by the Corporation and the Participant at the time of issuance of shares of Common Stock under the Stock Issuance Program.

KK. STOCK ISSUANCE PROGRAM shall mean the stock issuance program in effect under Article Three of the Plan.

LL. SUBSIDIARY shall mean any corporation (other than the Corporation) in an unbroken chain of corporations beginning with the Corporation, provided each corporation (other than the last corporation) in the unbroken chain owns, at the time of the determination, stock possessing fifty percent (50%) or more of the total combined voting power of all classes of stock in one of the other corporations in such chain.

MM. 10% STOCKHOLDER shall mean the owner of stock (as determined under Code Section 424(d)) possessing more than ten percent (10%) of the total combined voting power of all classes of stock of the Corporation (or any Parent or Subsidiary).

NN. WITHHOLDING TAXES shall mean the applicable income and employment withholding taxes to which the holder of Non-Statutory Options or unvested shares of Common Stock may become subject in connection with the exercise of those options or the vesting of those shares.

SECOND CALL OPTION AMENDMENT AGREEMENT
dated as of January 28, 2021
Between LIGAND PHARMACEUTICALS INCORPORATED and BARCLAYS BANK PLC

THIS SECOND CALL OPTION AMENDMENT AGREEMENT (this "**Agreement**") with respect to the Call Option Confirmations (as defined below) is made as of January 28, 2021 between Ligand Pharmaceuticals Incorporated ("**Company**") and Barclays Bank PLC ("**Dealer**").

WHEREAS, Company issued $650,000,000 principal amount of 0.75% Convertible Senior Notes due 2023 (the "**Convertible Notes**") pursuant to an Indenture dated as of May 22, 2018 between Company and Wilmington Trust, National Association as trustee;

WHEREAS, in connection with the pricing of the Convertible Notes, Company and Dealer entered into a Base Call Option Transaction (the "**Base Call Option Transaction**") pursuant to an ISDA confirmation dated as of May 17, 2018, which supplements, forms a part of, and is subject to an agreement in the form of the 2002 ISDA Master Agreement, pursuant to which Company purchased from Dealer 650,000 call options (as amended, modified, terminated or unwound from time to time, the "**Base Call Option Confirmation**"), with an Applicable Percentage of 40% applicable to Dealer;

WHEREAS, in connection with the exercise of the over-allotment option by the initial purchasers of the Convertible Notes, Company and Dealer entered into an Additional Call Option Transaction (the "**Additional Call Option Transaction**" and, together with the Base Call Option Transaction, the "**Call Option Transactions**") pursuant to an ISDA confirmation dated as of May 18, 2018, which supplements, forms a part of, and is subject to an agreement in the form of the 2002 ISDA Master Agreement, pursuant to which Company purchased from Dealer 100,000 call options (as amended, modified, terminated or unwound from time to time, the "**Additional Call Option Confirmation**" and, together with the Base Call Option Confirmation, the "**Call Option Confirmations**"), with an Applicable Percentage of 40% applicable to Dealer;

WHEREAS, Company and Dealer entered into that certain Call Option Amendment Agreement, dated as of April 6, 2020 (the "**First Call Option Amendment**") to, among other things, amend certain terms of the Call Option Confirmations; and

WHEREAS, in connection with a repurchase by Company of $20,280,000 aggregate principal amount of Convertible Notes (the "**January 2021 Repurchase**"), the Company has requested and the Dealer has agreed to make certain amendments to the Call Option Confirmations for the Options relating to such repurchased Convertible Notes to remain outstanding until a later exercise, notwithstanding the repurchase of the corresponding Convertible Notes;

NOW, THEREFORE, in consideration of their mutual covenants herein contained, the parties hereto, intending to be legally bound, hereby mutually covenant and agree as follows:

1. Defined Terms. Any capitalized term not otherwise defined herein shall have the meaning set forth for such term in the Call Option Confirmations.

2. Amendment. (a) Each of the Call Option Confirmations shall be amended by adding the sentence "Notwithstanding anything to the contrary herein, the January 2021 Repurchase shall not constitute a Repayment Event" to the end of Section 8(a)(iii).

(b) For the avoidance of doubt, the amendments set forth in Sections 2(ii) through (vi) of the First Call Option Amendment shall apply to each of the Call Option Confirmations.

3. Representations and Warranties of Company. Company represents and warrants to Dealer on the date hereof that:

(a) it has the power to execute this Agreement and any other documentation relating to this Agreement to which it is a party, to deliver this Agreement and to perform its obligations under this Agreement and has taken all necessary action to authorize such execution, delivery and performance;

(b) such execution, delivery and performance do not violate or conflict with any law applicable to it, any provision of its constitutional documents, any order or judgment of any court or other agency of government applicable to it or any of its assets or any material contractual restriction binding on or affecting it or any of its assets;

(c) all governmental and other consents that are required to have been obtained by it with respect to this Agreement have been obtained and are in full force and effect and all conditions of any such consents have been complied with;

(d) its obligations under this Agreement constitute its legal, valid and binding obligations, enforceable in accordance with their respective terms (subject to applicable bankruptcy, reorganization, insolvency, moratorium or similar laws affecting creditors' rights generally and subject, as to enforceability, to equitable principles of general application (regardless of whether enforcement is sought in a proceeding in equity or at law));

(e) it is not in possession of any material nonpublic information regarding Company or the Shares;

(f) it is not entering into this Agreement to create actual or apparent trading activity in the Shares (or any security convertible into or exchangeable for the Shares) or to raise or depress or otherwise manipulate the price of the Shares (or any security convertible into or exchangeable for the Shares) or otherwise in violation of the Securities Exchange Act of 1934, as amended (the "**Exchange Act**"); and

(g) the execution, delivery and performance of this Agreement do not violate or conflict with any applicable law or regulation promulgated under the Coronavirus Aid, Relief and Economic Security Act (the "**CARES Act**") or the Federal Reserve Act, as amended, to the extent applicable to the Company and which may require the Company, as a condition of a loan, loan guarantee, direct loan (as that term is defined in the CARES Act) or any other investment, or any financial assistance or relief under any program or facility, to comply with a requirement not to, or otherwise agree, attest, certify or warrant that it has not, as of the date specified in such condition, repurchased, or will not repurchase, any equity security of the Company, and that it has not, as of the date specified in the condition, made a capital distribution or will make a capital distribution.

4. Representations and Warranties of Dealer. Dealer represents and warrants to Company on the date hereof that:

(a) it has the power to execute this Agreement and any other documentation relating to this Agreement to which it is a party, to deliver this Agreement and to perform its obligations under this Agreement and has taken all necessary action to authorize such execution, delivery and performance;

(b) such execution, delivery and performance do not violate or conflict with any law applicable to it, any provision of its constitutional documents, any order or judgment of any court or other agency of government applicable to it or any of its assets or any material contractual restriction binding on or affecting it or any of its assets;

(c) all governmental and other consents that are required to have been obtained by it with respect to this Agreement have been obtained and are in full force and effect and all conditions of any such consents have been complied with; and

(d) its obligations under this Agreement constitute its legal, valid and binding obligations, enforceable in accordance with their respective terms (subject to applicable bankruptcy, reorganization, insolvency, moratorium or similar laws affecting creditors' rights generally and subject, as to enforceability, to equitable principles of general application (regardless of whether enforcement is sought in a proceeding in equity or at law)).

5. Governing Law. This Agreement and any dispute arising hereunder shall be governed by and construed in accordance with the laws of the State of New York (without reference to choice of law doctrine).

6. Counterparts. This Agreement may be signed in any number of counterparts, each of which shall be an original, with the same effect as if all of the signatures thereto and hereto were upon the same instrument.

7. No Reliance, etc. Company confirms that it has relied on the advice of its own counsel and other advisors (to the extent it deems appropriate) with respect to any legal, tax, accounting, or regulatory consequences of this Agreement,

that it has not relied on Dealer or its affiliates in any respect in connection therewith, and that it will not hold Dealer or its affiliates accountable for any such consequences.

8. No Other Changes. Except as expressly set forth herein, all of the terms and conditions of the Call Option Confirmations (as amended by the First Call Option Amendment) shall remain in full force and effect and are hereby confirmed in all respects.

[*Signature Page Follows*]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed as of the date first written above.

Barclays Bank PLC

By: /s/ Faiz Khan
Name: Faiz Khan
Title: Authorized Signatory

[Signature Page to Call Option Amendment Agreement]

Ligand Pharmaceuticals Incorporated

By: /s/ Matthew Korenberg
Name: Matthew Korenberg
Title: EVP, CFO

[Signature Page to Call Option Amendment Agreement]

Exhibit 10.68

SECOND CALL OPTION AMENDMENT AGREEMENT
dated as of January 28, 2021
Between LIGAND PHARMACEUTICALS INCORPORATED and DEUTSCHE BANK AG, LONDON BRANCH

THIS SECOND CALL OPTION AMENDMENT AGREEMENT (this "**Agreement**") with respect to the Call Option Confirmations (as defined below) is made as of January 28, 2021 between Ligand Pharmaceuticals Incorporated ("**Company**") and Deutsche Bank AG, London Branch ("**Dealer**").

WHEREAS, Company issued $650,000,000 principal amount of 0.75% Convertible Senior Notes due 2023 (the "**Convertible Notes**") pursuant to an Indenture dated as of May 22, 2018 between Company and Wilmington Trust, National Association as trustee;

WHEREAS, in connection with the pricing of the Convertible Notes, Company and Dealer entered into a Base Call Option Transaction (the "**Base Call Option Transaction**") pursuant to an ISDA confirmation dated as of May 17, 2018, which supplements, forms a part of, and is subject to an agreement in the form of the 2002 ISDA Master Agreement, pursuant to which Company purchased from Dealer 650,000 call options (as amended, modified, terminated or unwound from time to time, the "**Base Call Option Confirmation**"), with an Applicable Percentage of 20% applicable to Dealer;

WHEREAS, in connection with the exercise of the over-allotment option by the initial purchasers of the Convertible Notes, Company and Dealer entered into an Additional Call Option Transaction (the "**Additional Call Option Transaction**" and, together with the Base Call Option Transaction, the "**Call Option Transactions**") pursuant to an ISDA confirmation dated as of May 18, 2018, which supplements, forms a part of, and is subject to an agreement in the form of the 2002 ISDA Master Agreement, pursuant to which Company purchased from Dealer 100,000 call options (as amended, modified, terminated or unwound from time to time, the "**Additional Call Option Confirmation**" and, together with the Base Call Option Confirmation, the "**Call Option Confirmations**"), with an Applicable Percentage of 20% applicable to Dealer;

WHEREAS, Company and Dealer entered into that certain Call Option Amendment Agreement, dated as of April 6, 2020 (the "**First Call Option Amendment**") to, among other things, amend certain terms of the Call Option Confirmations; and

WHEREAS, in connection with a repurchase by Company of $20,280,000 aggregate principal amount of Convertible Notes (the "**January 2021 Repurchase**"), the Company has requested and the Dealer has agreed to make certain amendments to the Call Option Confirmations for the Options relating to such repurchased Convertible Notes to remain outstanding until a later exercise, notwithstanding the repurchase of the corresponding Convertible Notes;

NOW, THEREFORE, in consideration of their mutual covenants herein contained, the parties hereto, intending to be legally bound, hereby mutually covenant and agree as follows:

1. Defined Terms. Any capitalized term not otherwise defined herein shall have the meaning set forth for such term in the Call Option Confirmations.

2. Amendment. (a) Each of the Call Option Confirmations shall be amended by adding the sentence "Notwithstanding anything to the contrary herein, the January 2021 Repurchase shall not constitute a Repayment Event" to the end of Section 8(a)(iii).

(b) For the avoidance of doubt, the amendments set forth in Sections 2(ii) through (vi) of the First Call Option Amendment shall apply to each of the Call Option Confirmations.

3. Representations and Warranties of Company. Company represents and warrants to Dealer on the date hereof that:

(a) it has the power to execute this Agreement and any other documentation relating to this Agreement to which it is a party, to deliver this Agreement and to perform its obligations under this Agreement and has taken all necessary action to authorize such execution, delivery and performance;

(b) such execution, delivery and performance do not violate or conflict with any law applicable to it, any provision of its constitutional documents, any order or judgment of any court or other agency of government applicable to it or any of its assets or any material contractual restriction binding on or affecting it or any of its assets;

(c) all governmental and other consents that are required to have been obtained by it with respect to this Agreement have been obtained and are in full force and effect and all conditions of any such consents have been complied with;

(d) its obligations under this Agreement constitute its legal, valid and binding obligations, enforceable in accordance with their respective terms (subject to applicable bankruptcy, reorganization, insolvency, moratorium or similar laws affecting creditors' rights generally and subject, as to enforceability, to equitable principles of general application (regardless of whether enforcement is sought in a proceeding in equity or at law));

(e) it is not in possession of any material nonpublic information regarding Company or the Shares;

(f) it is not entering into this Agreement to create actual or apparent trading activity in the Shares (or any security convertible into or exchangeable for the Shares) or to raise or depress or otherwise manipulate the price of the Shares (or any security convertible into or exchangeable for the Shares) or otherwise in violation of the Securities Exchange Act of 1934, as amended (the "**Exchange Act**"); and

(g) the execution, delivery and performance of this Agreement do not violate or conflict with any applicable law or regulation promulgated under the Coronavirus Aid, Relief and Economic Security Act (the "**CARES Act**") or the Federal Reserve Act, as amended, to the extent applicable to the Company and which may require the Company, as a condition of a loan, loan guarantee, direct loan (as that term is defined in the CARES Act) or any other investment, or any financial assistance or relief under any program or facility, to comply with a requirement not to, or otherwise agree, attest, certify or warrant that it has not, as of the date specified in such condition, repurchased, or will not repurchase, any equity security of the Company, and that it has not, as of the date specified in the condition, made a capital distribution or will make a capital distribution.

4. Representations and Warranties of Dealer. Dealer represents and warrants to Company on the date hereof that:

(a) it has the power to execute this Agreement and any other documentation relating to this Agreement to which it is a party, to deliver this Agreement and to perform its obligations under this Agreement and has taken all necessary action to authorize such execution, delivery and performance;

(b) such execution, delivery and performance do not violate or conflict with any law applicable to it, any provision of its constitutional documents, any order or judgment of any court or other agency of government applicable to it or any of its assets or any material contractual restriction binding on or affecting it or any of its assets;

(c) all governmental and other consents that are required to have been obtained by it with respect to this Agreement have been obtained and are in full force and effect and all conditions of any such consents have been complied with; and

(d) its obligations under this Agreement constitute its legal, valid and binding obligations, enforceable in accordance with their respective terms (subject to applicable bankruptcy, reorganization, insolvency, moratorium or similar laws affecting creditors' rights generally and subject, as to enforceability, to equitable principles of general application (regardless of whether enforcement is sought in a proceeding in equity or at law)).

5. Governing Law. This Agreement and any dispute arising hereunder shall be governed by and construed in accordance with the laws of the State of New York (without reference to choice of law doctrine).

6. Counterparts. This Agreement may be signed in any number of counterparts, each of which shall be an original, with the same effect as if all of the signatures thereto and hereto were upon the same instrument.

7. No Reliance, etc. Company confirms that it has relied on the advice of its own counsel and other advisors (to the extent it deems appropriate) with respect to any legal, tax, accounting, or regulatory consequences of this Agreement, that it has not relied on Dealer or its affiliates in any respect in connection therewith, and that it will not hold Dealer or its affiliates accountable for any such consequences.

8. No Other Changes. Except as expressly set forth herein, all of the terms and conditions of the Call Option Confirmations (as amended by the First Call Option Amendment) shall remain in full force and effect and are hereby confirmed in all respects.

9. U.S. Stay Regulations. The parties agree that (i) to the extent that prior to the date hereof both parties have adhered to the 2018 ISDA U.S. Resolution Stay Protocol (the "**Protocol**"), the terms of the Protocol are incorporated into and form a part of this Agreement and the Call Option Confirmations, and for such purposes each of this Agreement and the Call Option Confirmations shall be deemed a Protocol Covered Agreement and each party shall be deemed to have the same status as "Regulated Entity" and/or "Adhering Party" as applicable to it under the Protocol; (ii) to the extent that prior to the date hereof the parties have executed a separate agreement the effect of which is to amend the qualified financial contracts between them to conform with the requirements of the QFC Stay Rules (the "**Bilateral Agreement**"), the terms of the Bilateral Agreement are incorporated into and form a part of this Agreement and the Call Option Confirmations and each party shall be deemed to have the status of "Covered Entity" or "Counterparty Entity" (or other similar term) as applicable to it under the Bilateral Agreement; or (iii) if clause (i) and clause (ii) do not apply, the terms of Section 1 and Section 2 and the related defined terms (together, the "**Bilateral Terms**") of the form of bilateral template entitled "Full- Length Omnibus (for use between U.S. G-SIBs and Corporate Groups)" published by ISDA on November 2, 2018 (currently available on the 2018 ISDA U.S. Resolution Stay Protocol page at www.isda.org and, a copy of which is available upon request), the effect of which is to amend the qualified financial contracts between the parties thereto to conform with the requirements of the QFC Stay Rules, are hereby incorporated into and form a part of this Agreement and the Call Option Confirmations, and for such purposes each of this Agreement and the Call Option Confirmations shall be deemed a "Covered Agreement," Dealer shall be deemed a "Covered Entity" and Company shall be deemed a "Counterparty Entity." In the event that, after the date of this Agreement, both parties hereto become adhering parties to the Protocol, the terms of the Protocol will replace the terms of this paragraph. In the event of any inconsistencies between this Agreement and the terms of the Protocol, the Bilateral Agreement or the Bilateral Terms (each, the " **QFC Stay Terms**"), as applicable, the QFC Stay Terms will govern. Terms used in this paragraph without definition shall have the meanings assigned to them under the QFC Stay Rules. For purposes of this paragraph, references to "this Agreement and the Call Option Confirmations" include any related credit enhancements entered into between the parties or provided by one to the other. In addition, the parties agree that the terms of this paragraph shall be incorporated into any related covered affiliate credit enhancements, with all references to Dealer replaced by references to the covered affiliate support provider.

"**QFC Stay Rules**" means the regulations codified at 12 C.F.R. 252.2, 252.81–8, 12 C.F.R. 382.1-7 and 12 C.F.R. 47.1-8, which, subject to limited exceptions, require an express recognition of the stay-and-transfer powers of the FDIC under the Federal Deposit Insurance Act and the Orderly Liquidation Authority under Title II of the Dodd Frank Wall Street Reform and Consumer Protection Act and the override of default rights related directly or indirectly to the entry of an affiliate into certain insolvency proceedings and any restrictions on the transfer of any covered affiliate credit enhancements.

[*Signature Page Follows*]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed as of the date first written above.

Deutsche Bank AG, London Branch

By: /s/ Andrew Yaeger
Name: Andrew Yaeger
Title: Managing Director

By: /s/ Paul Stowell
Name: Paul Stowell
Title: Managing Director

Deutsche Bank Securities Inc., acting solely as
Agent in connection with the Call Option Confirmations

By: /s/ Andrew Yaeger
Name: Andrew Yaeger
Title: Managing Director

By: /s/ Paul Stowell
Name: Paul Stowell
Title: Managing Director

Ligand Pharmaceuticals Incorporated

By: /s/ Matthew Korenberg

Name: Matthew Korenberg
Title: EVP, CFO

[Signature Page to Call Option Amendment Agreement]

SECOND CALL OPTION AMENDMENT AGREEMENT
dated as of January 28, 2021
Between LIGAND PHARMACEUTICALS INCORPORATED and GOLDMAN SACHS & CO. LLC

THIS SECOND CALL OPTION AMENDMENT AGREEMENT (this "**Agreement**") with respect to the Call Option Confirmations (as defined below) is made as of January 28, 2021 between Ligand Pharmaceuticals Incorporated ("**Company**") and Goldman Sachs & Co. LLC ("**Dealer**").

WHEREAS, Company issued $650,000,000 principal amount of 0.75% Convertible Senior Notes due 2023 (the "**Convertible Notes**") pursuant to an Indenture dated as of May 22, 2018 between Company and Wilmington Trust, National Association as trustee;

WHEREAS, in connection with the pricing of the Convertible Notes, Company and Dealer entered into a Base Call Option Transaction (the "**Base Call Option Transaction**") pursuant to an ISDA confirmation dated as of May 17, 2018, which supplements, forms a part of, and is subject to an agreement in the form of the 2002 ISDA Master Agreement, pursuant to which Company purchased from Dealer 650,000 call options (as amended, modified, terminated or unwound from time to time, the "**Base Call Option Confirmation**"), with an Applicable Percentage of 40% applicable to Dealer;

WHEREAS, in connection with the exercise of the over-allotment option by the initial purchasers of the Convertible Notes, Company and Dealer entered into an Additional Call Option Transaction (the "**Additional Call Option Transaction**" and, together with the Base Call Option Transaction, the "**Call Option Transactions**") pursuant to an ISDA confirmation dated as of May 18, 2018, which supplements, forms a part of, and is subject to an agreement in the form of the 2002 ISDA Master Agreement, pursuant to which Company purchased from Dealer 100,000 call options (as amended, modified, terminated or unwound from time to time, the "**Additional Call Option Confirmation**" and, together with the Base Call Option Confirmation, the "**Call Option Confirmations**"), with an Applicable Percentage of 40% applicable to Dealer; and

WHEREAS, Company and Dealer entered into that certain Call Option Amendment Agreement, dated as of April 6, 2020 (the "**First Call Option Amendment**") to, among other things, amend certain terms of the Call Option Confirmations; and

WHEREAS, in connection with a repurchase by Company of $20,280,000 aggregate principal amount of Convertible Notes (the "**January 2021 Repurchase**"), the Company has requested and the Dealer has agreed to make certain amendments to the Call Option Confirmations for the Options relating to such repurchased Convertible Notes to remain outstanding until a later exercise, notwithstanding the repurchase of the corresponding Convertible Notes;

NOW, THEREFORE, in consideration of their mutual covenants herein contained, the parties hereto, intending to be legally bound, hereby mutually covenant and agree as follows:

1. Defined Terms. Any capitalized term not otherwise defined herein shall have the meaning set forth for such term in the Call Option Confirmations.

2. Amendment. (a) Each of the Call Option Confirmations shall be amended by adding the sentence "Notwithstanding anything to the contrary herein, the January 2021 Repurchase shall not constitute a Repayment Event" to the end of Section 8(a)(iii).

(b) For the avoidance of doubt, the amendments set forth in Sections 2(ii) through (vi) of the First Call Option Amendment shall apply to each of the Call Option Confirmations.

3. Representations and Warranties of Company. Company represents and warrants to Dealer on the date hereof that:

(a) it has the power to execute this Agreement and any other documentation relating to this Agreement to which it is a party, to deliver this Agreement and to perform its obligations under this Agreement and has taken all necessary action to authorize such execution, delivery and performance;

(b) such execution, delivery and performance do not violate or conflict with any law applicable to it, any provision of its constitutional documents, any order or judgment of any court or other agency of government applicable to it or any of its assets or any material contractual restriction binding on or affecting it or any of its assets;

(c) all governmental and other consents that are required to have been obtained by it with respect to this Agreement have been obtained and are in full force and effect and all conditions of any such consents have been complied with;

(d) its obligations under this Agreement constitute its legal, valid and binding obligations, enforceable in accordance with their respective terms (subject to applicable bankruptcy, reorganization, insolvency, moratorium or similar laws affecting creditors' rights generally and subject, as to enforceability, to equitable principles of general application (regardless of whether enforcement is sought in a proceeding in equity or at law));

(e) it is not in possession of any material nonpublic information regarding Company or the Shares; and

(f) it is not entering into this Agreement to create actual or apparent trading activity in the Shares (or any security convertible into or exchangeable for the Shares) or to raise or depress or otherwise manipulate the price of the Shares (or any security convertible into or exchangeable for the Shares) or otherwise in violation of the Securities Exchange Act of 1934, as amended (the "**Exchange Act**"); and

(g) it and any of its subsidiaries has not applied, and shall not, until after the first date on which no portion of the Call Option Transaction remains outstanding following any final exercise and settlement, cancellation or early termination of the Call Option Transaction, apply, for a loan, loan guarantee, direct loan (as that term is defined in the Coronavirus Aid, Relief and Economic Security Act (the "**CARES Act**")) or other investment, or to receive any financial assistance or relief under any program or facility (collectively "**Financial Assistance**") that (a) is established under applicable law (whether in existence as of the Trade Date or subsequently enacted, adopted or amended), including without limitation the CARES Act and the Federal Reserve Act, as amended, and (b) (i) requires under applicable law (or any regulation, guidance, interpretation or other pronouncement of a governmental authority with jurisdiction for such program or facility) as a condition of such Financial Assistance, that the Counterparty comply with any requirement not to, or otherwise agree, attest, certify or warrant that it has not, as of the date specified in such condition, repurchased, or will not repurchase, any equity security of Counterparty, and that Counterparty has not, as of the date specified in the condition, made a capital distribution or will make a capital distribution, or (ii) where the terms of the Transaction would cause Counterparty to fail to satisfy any condition for application for or receipt or retention of the Financial Assistance (collectively "**Restricted Financial Assistance**"); provided, that Counterparty or any of its subsidiaries may apply for Restricted Financial Assistance if Counterparty either (a) determines based on the advice of outside counsel of national standing that the terms of the Transaction would not cause Counterparty or any of its subsidiaries to fail to satisfy any condition for application for or receipt or retention of such Financial Assistance based on the terms of the program or facility as of the date of such advice or (b) delivers to Dealer evidence or other guidance from a governmental authority with jurisdiction for such program or facility that the Transaction is permitted under such program or facility (either by specific reference to the Transaction or by general reference to transactions with the attributes of the Transaction in all relevant respects).

4. Representations and Warranties of Dealer. Dealer represents and warrants to Company on the date hereof that:

(a) it has the power to execute this Agreement and any other documentation relating to this Agreement to which it is a party, to deliver this Agreement and to perform its obligations under this Agreement and has taken all necessary action to authorize such execution, delivery and performance;

(b) such execution, delivery and performance do not violate or conflict with any law applicable to it, any provision of its constitutional documents, any order or judgment of any court or other agency of government applicable to it or any of its assets or any material contractual restriction binding on or affecting it or any of its assets;

(c) all governmental and other consents that are required to have been obtained by it with respect to this Agreement have been obtained and are in full force and effect and all conditions of any such consents have been complied with; and

(d) its obligations under this Agreement constitute its legal, valid and binding obligations, enforceable in accordance with their respective terms (subject to applicable bankruptcy, reorganization, insolvency, moratorium or similar

laws affecting creditors' rights generally and subject, as to enforceability, to equitable principles of general application (regardless of whether enforcement is sought in a proceeding in equity or at law)).

5. Governing Law. This Agreement and any dispute arising hereunder shall be governed by and construed in accordance with the laws of the State of New York (without reference to choice of law doctrine).

6. Counterparts. This Agreement may be signed in any number of counterparts, each of which shall be an original, with the same effect as if all of the signatures thereto and hereto were upon the same instrument.

7. No Reliance, etc. Company confirms that it has relied on the advice of its own counsel and other advisors (to the extent it deems appropriate) with respect to any legal, tax, accounting, or regulatory consequences of this Agreement, that it has not relied on Dealer or its affiliates in any respect in connection therewith, and that it will not hold Dealer or its affiliates accountable for any such consequences.

8. No Other Changes. Except as expressly set forth herein, all of the terms and conditions of the Call Option Confirmations (as amended by the First Call Option Amendment) shall remain in full force and effect and are hereby confirmed in all respects.

9. U.S. Resolution Stay Provisions.

(a) Recognition of the U.S. Special Resolution Regimes.

(i) In the event that Dealer becomes subject to a proceeding under (x) the Federal Deposit Insurance Act and the regulations promulgated thereunder or (y) Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act and the regulations promulgated thereunder (a "**U.S. Special Resolution Regime**") the transfer from Dealer of this Agreement and the Call Option Confirmations, and any interest and obligation in or under, and any property securing, this Agreement and the Call Option Confirmations, will be effective to the same extent as the transfer would be effective under the U.S. Special Resolution Regime if each of this Agreement, the Call Option Confirmations, and any interest and obligation in or under, and any property securing, this Agreement or the Call Option Confirmations were governed by the laws of the United States or a state of the United States.

(ii) In the event that Dealer or an Affiliate becomes subject to a proceeding under a U.S. Special Resolution Regime, any Default Rights (as defined in 12 C.F.R. §§ 252.81, 47.2 or 382.1, as applicable ("**Default Right**")) under this Agreement or the Call Option Confirmations that may be exercised against Dealer are permitted to be exercised to no greater extent than such Default Rights could be exercised under the U.S. Special Resolution Regime if this Agreement or the Call Option Confirmations, as applicable, were governed by the laws of the United States or a state of the United States.

(b) Limitation on Exercise of Certain Default Rights Related to an Affiliate's Entry Into Insolvency Proceedings. Notwithstanding anything to the contrary in this Agreement or either of the Call Option Confirmations, the parties expressly acknowledge and agree that:

(i) The Company shall not be permitted to exercise any Default Right with respect to this Agreement or either Call Option Confirmation or any Affiliate Credit Enhancement that is related, directly or indirectly, to an Affiliate of Dealer becoming subject to receivership, insolvency, liquidation, resolution, or similar proceeding (an "**Insolvency Proceeding**"), except to the extent that the exercise of such Default Right would be permitted under the provisions of 12 C.F.R. 252.84, 12 C.F.R. 47.5 or 12 C.F.R. 382.4, as applicable; and

(ii) Nothing in this Agreement or any Call Option Confirmation shall prohibit the transfer of any Affiliate Credit Enhancement, any interest or obligation in or under such Affiliate Credit Enhancement, or any property securing such Affiliate Credit Enhancement, to a transferee upon or following an Affiliate of Dealer becoming subject to an Insolvency Proceeding, unless the transfer would result in the Company being the beneficiary of such Affiliate Credit Enhancement in violation of any law applicable to the Company.

For the purpose of this paragraph, "**Affiliate**" is defined in, and shall be interpreted in accordance with, 12 U.S.C. § 1841(k) and "**Credit Enhancement**" means any credit enhancement or credit support arrangement in support of the obligations of Dealer under or with respect to this Agreement or any Call Option Confirmation, including any guarantee, collateral arrangement (including any pledge, charge, mortgage or other security interest in collateral or title transfer arrangement), trust or similar arrangement, letter of credit, transfer of margin or any similar arrangement.

(c) U.S. Protocol. If the Company has previously adhered to, or subsequently adheres to, the ISDA 2018 U.S. Resolution Stay Protocol as published by the International Swaps and Derivatives Association, Inc. as of July 31, 2018 (the "**ISDA U.S. Protocol**"), the terms of such protocol shall be incorporated into and form a part of this Agreement and each Call Option Confirmation and the terms of the ISDA U.S. Protocol shall supersede and replace the terms of this section. For purposes of incorporating the ISDA U.S. Protocol, Dealer shall be deemed to be a Regulated Entity, the Company shall be deemed to be an Adhering Party, and this Agreement and each Call Option Confirmation shall each be deemed to be a Protocol Covered Agreement. Capitalized terms used but not defined in this paragraph shall have the meanings given to them in the ISDA U.S. Protocol.

(d) Pre-existing In-Scope Agreements. Dealer and the Company agree that to the extent there are any outstanding "in-scope QFCs," as defined in 12 C.F.R. § 252.82(d), that are not excluded under 12 C.F.R. § 252.88, between Dealer and the Company that do not otherwise comply with the requirements of 12 C.F.R. § 252.2, 252.81–8 (each such agreement, a "**Preexisting In-Scope Agreement**"), then each such Preexisting In-Scope Agreement is hereby amended to include the foregoing provisions in this section, with references to "this Confirmation and each Call Option Confirmation" being understood to be references to the applicable Preexisting In-Scope Agreement.

[*Signature Page Follows*]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed as of the date first written above.

Goldman Sachs & Co. LLC

By: /s/ Josh Murray
Name: Josh Murray
Title: Authorized Signatory

Ligand Pharmaceuticals Incorporated

By: /s/ Matthew Korenberg
Name: Matthew Korenberg
Title: EVP, CFO

[Signature Page to Call Option Amendment Agreement]

CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY [***], HAS BEEN OMITTED BECAUSE LIGAND PHARMACEUTICALS INCORPORATED HAS DETERMINED THE INFORMATION (I) IS NOT MATERIAL AND (II) WOULD LIKELY CAUSE COMPETITIVE HARM TO LIGAND PHARMACEUTICALS INCORPORATED IF PUBLICLY DISCLOSED.

SUPPLY AGREEMENT

This SUPPLY AGREEMENT (" **Agreement**") is effective December 22, 2015 (the "**Effective Date**"), by and between CyDex Pharmaceuticals, Inc., a Delaware corporation with principal offices at 11119 North Torrey Pines Road, Suite 200, La Jolla, California 92037 ("**CYDEX**"), and Gilead Sciences, Inc., a Delaware corporation with principal offices at 333 Lakeside Drive, Foster City, California 94404 ("**Gilead**"). CYDEX and Gilead are sometimes referred to individually as "Party" or collectively as the "Parties."

RECITALS

WHEREAS, Gilead and its Affiliates (as defined below) wish to purchase the product listed on **Exhibit A-1** to this Agreement from CYDEX (collectively, the "**Product**"), as such **Exhibit A-1** may be amended from time to time in writing by the Parties; and

WHEREAS, CYDEX is ready, willing and able to supply Product to Gilead and Gilead's Affiliates subject to the terms and conditions of this Agreement.

NOW, **THEREFORE**, in consideration of the foregoing and the covenants and other agreements contained herein, and other good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:

1. Purchase and Sale

(A) CYDEX agrees to sell Product to Gilead and its Affiliates based on orders placed under this Agreement pursuant to a Purchase Order (as defined below). In addition, CYDEX agrees to sell Product to Gilead's Affiliates based on orders placed under this Agreement pursuant to a Purchase Order (as defined below); provided, that Gilead shall be jointly and severally obligated to pay for all Product purchased by its Affiliates and shall be responsible to CYDEX for any actions or inactions by an Affiliate which, if they had been done by Gilead, would constitute a breach of this Agreement. "**Affiliate**" means any (A) entity that, directly or indirectly, Controls, is Controlled by, or is under common Control with, Gilead and (B) any third party contract manufacturers of Gilead that may have purchase Product on Gilead's behalf for the manufacture of the Licensed Products (as defined below). "**Control**" means (i) the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of an entity, whether by the ownership of stock, by contract, or otherwise, and/or (ii) ownership or direct or indirect control of at least fifty percent (50%) of the voting stock of an entity. Gilead shall from time to time provide CYDEX a list of Gilead's Affiliates; CYDEX shall have no obligation to deal with an Affiliate which is not included on the most recent such list.

(B) This Agreement and the Purchase Orders accepted under it comprise the Parties' entire agreement and understanding with respect to Product. In the event of a conflict between any provision of this Agreement and any provision of the Purchase Order Terms and Conditions,

the provision of this Agreement shall control. For avoidance of doubt: the Parties confirm that the first sentence of Section 2 of the Purchase Order Terms and Conditions constitutes such a conflict. It is the Parties' express intent that no other document may supplement or vary the terms hereof absent a written amendment duly executed by both Parties and expressly referencing this Agreement.

2. Supply

(A) **Purchase Orders**. Gilead or its Affiliates shall issue a Purchase Order for Product ordered under this Agreement in substantially the form of **Exhibit B** attached hereto (the "**Purchase Order**"). CYDEX shall have three (3) business days after the date of receipt of a Purchase Order to either: (i) provide written notice of its acceptance; or (ii) present Gilead or its Affiliates with a Purchase Order for Gilead consideration and acceptance. CYDEX shall supply the Product to Gilead or its Affiliate in accordance with each Purchase Order and the terms of this Agreement, and shall cause each delivery to made strictly in accordance with the delivery dates and locations specified in the Purchase Order.

(B) **Forecasting**. On at least an annual basis during the Term, Gilead (on behalf of itself and its Affiliates) shall provide to CYDEX a non-binding rolling forecast detailing the quantities for the delivery of Product for the next twelve (12) calendar months of the Term (each, a "**Forecast**"). Gilead shall have the right to update a Forecast at any time. CYDEX shall supply Product in a quantity up to a maximum of 150% of the quantity specified in the Forecast and shall utilize commercially reasonable efforts to supply such additional Product in excess of those quantities in the timeline requested by Gilead.

(C) **Minimum Stock**. Unless otherwise agreed to by the Parties, CYDEX shall maintain a minimum stock of the Product at all times in order to satisfy the quantities set forth in **Exhibit A-2**.

(D) **Delay and Shortfall**. If delivery of any quantity of Product is delayed after CYDEX has accepted a Purchase Order, through no fault of Gilead and not due to a Force Majeure Event (as defined in Section 23), by more than thirty (30) days beyond the delivery date set forth in the Purchase Order (but subject to the delivery windows specified in **Exhibit A-2**), the quantity shall be considered a shortfall ("**Shortfall**"). Upon a Shortfall, or indication from CYDEX that a Shortfall is to occur, Gilead or its Affiliates shall have the right, in its discretion, to cancel the applicable Purchase Order without liability.

(E) **Minimum Shelf Life**. CYDEX warrants that the Product supplied by CYDEX at the time of delivery to Gilead shall have a minimum shelf life as set forth in **Exhibit A-2**. During such Product's shelf life, the Product shall conform to the Specifications (as defined below) and be consistent with and in compliance with the Product Warranty (as defined below).

(F) **Commercialization Rights**. CYDEX hereby grants to Gilead a non-exclusive, worldwide, royalty-free license under CYDEX Intellectual Property to use and incorporate the Product in and sell (and have sold) any Licensed Product for any and all human diseases and conditions which are identified in **Exhibit A-3** for such Licensed Product. No license is granted

for making (or having made) the Product or for selling (or having sold) the Product other than for Licensed Products. For purposes of this Section, "**CYDEX Intellectual Property**" shall mean (i) any and all know-how owned or controlled by CYDEX that relates to the use of the Product, and (ii) any and all patents owned or controlled by CYDEX that claims the Product or use thereof. "**Licensed Product**" means a pharmaceutical composition comprising as the active pharmaceutical ingredient the compound identified in **Exhibit A-3** (as such **Exhibit A-3** may be amended from time to time in writing by the Parties) prepared or combined with or formulated using the Product. For avoidance of doubt: because only CYDEX-supplied material is "Product," such a composition which is prepared or combined with or formulated using non-CYDEX-supplied cyclodextrin material is not a "Licensed Product." Similarly, a pharmaceutical composition comprising as an active pharmaceutical ingredient a compound not identified in **Exhibit A-3** (as such **Exhibit A-3** may be amended from time to time in writing by the Parties) prepared or combined with or formulated using the (CYDEX-supplied) Product is not a "Licensed Product."

(G) **DMF Reference Fee**. Gilead shall pay CYDEX a one-time DMF Reference Fee of [***] in exchange for the right of Gilead and its Affiliates to reference, in its regulatory filings for and to the extent regarding Licensed Products, CYDEX's Type III, IV and V Drug Master Files (DMF) for the Product. CYDEX shall invoice this amount within 15 days after the Effective Date. For avoidance of doubt, Gilead shall not be obligated to pay any royalties or other milestones other than the one-time DMF Reference Fee payment.

(H) **Purchase Order Quantities**. Gilead shall order a minimum of [***] of Product on or before December 28, 2015 and the delivery time for such initial order shall be "January 5, 2016 or such sooner time as CYDEX is able to deliver." There is no annual minimum Product purchase quantity.

(I) **Negative Covenants**. Gilead covenants and agrees that it shall not, and it shall cause its Affiliates not to, resell or transfer (other than in or for Licensed Products) any quantity of the Product, or use any of the Product for anything other than for a Licensed Product.

3. Price

(A) The prices of the Product as of the Effective Date are as set forth in **Exhibit A-2** attached hereto. Such prices shall be fixed during the Term unless otherwise agreed to by the Parties.

(B) To the extent applicable, CYDEX shall calculate and charge Gilead or its Affiliates for applicable sales, GST or VAT imposed by any federal, state, provincial, local, or other governmental entity for Product provided under this Agreement, excluding taxes based solely on CYDEX's net income or arising from the employment relationship between CYDEX and its personnel. Gilead and its Affiliates shall have no liability for taxes billed later than one hundred eighty (180) days after their due date. CYDEX shall hold Gilead and its Affiliates harmless from all claims and liability arising from CYDEX's failure to calculate or charge any such taxes or similar charges.

*** Certain Confidential Information Omitted.

(C) All items ordered by Gilead can be delayed for shipment up to [***] from date of original requested ship date at no charge to Gilead. Gilead shall pay a warehouse charge to CYDEX at a rate to be agreed to by the Parties on [***] after the original requested ship date. CYDEX may invoice in full the total cost of the Product on the original requested ship date notwithstanding Gilead's request to delay shipment.

4. Payment

Invoices for Product shipped to Gilead or its Affiliates and for the DMF Reference Fee are due and payable net thirty (30) days from the date of receipt of invoice by Gilead. CYDEX shall submit invoices referencing the applicable Purchase Order or DMF Reference Fee to Gilead at the following address:

Gilead Sciences, Inc.
ATTN: Accounts Payable
P.O. Box 5469
San Mateo, CA 94402
Email: apinvoices@gilead.com

5. [***]

6. Delivery; Risk of Loss

Unless otherwise agreed to by the Parties in writing, CYDEX shall deliver all shipments of Product to Gilead DDP (Incoterms 2010) to the facility designated in the accepted Purchase Order. Title and risk of loss, damage or destruction to the Product shall remain with CYDEX until final delivery of the Product to Gilead at the named place of destination on the accepted Purchase Order. CYDEX shall package and label the Product for delivery in accordance with Gilead's packaging and labeling requirements.

7. Product

(A) CYDEX shall supply the Product (i) in conformance with the specifications (including for the Product and any raw materials or components) set forth in **Exhibit A**, which may be modified from time to time by mutual agreement of the Parties (collectively, the "**Specifications**").

(B) CYDEX shall notify Gilead within two (2) business days of any information of which CYDEX becomes aware of any deviations of the Product from the Specifications.

(C) From time to time, Gilead may request, and CYDEX shall promptly provide, sales reports detailing the purchase of Product under this Agreement, including a list of all Affiliates who have purchased Product.

*** Certain Confidential Information Omitted.

8. Warranties and Remedies

(A) CYDEX warrants that all Product shall be consistent with and in compliance with the Specifications, this Agreement, any Quality Agreement entered into by the Parties, all

applicable laws and current good manufacturing practices as established by the United States Food and Drug Administration (the "**Product Warranty**").

(B) Each Party represents and warrants to the other Party that it has the full right, power and authority to enter into this Agreement and to perform its obligations hereunder without the consent of any third party and without breach of any agreements with or obligations to any third party.

(C) CYDEX warrants that any Product it delivers to Gilead and its Affiliates is free and clear of any liens, security interests or encumbrances of any kind.

(D) CYDEX represents and warrants that neither CYDEX, nor any of its subsidiaries, nor any of their respective directors, officers, employees or agents has taken any action, directly or indirectly, that would result in a violation by such persons of the Foreign Corrupt Practices Act of 1977, as amended (such act, including the rules and regulations thereunder, the "**FCPA**"), the U.K. Bribery Act 2010 (as amended from time to time and including the rules and regulations thereunder, the "**U.K. Bribery Act**"), the Convention on Combating Bribery of Foreign Public Officials in International Business Transactions adopted by the Negotiating Conference of the Organisation for Economic Co-operation and Development on 21 November 1997 (such convention, including the rules and regulations thereunder, the "**OECD Convention**") or any other applicable anticorruption laws, rules or regulations (collectively with the FCPA, the U.K. Bribery Act and OECD Convention, the "**Anticorruption Laws**"). CYDEX shall ensure that it, its employees, any permitted subcontractor or agent and/or affiliates shall comply with the Anticorruption Laws at all times. CYDEX represents and warrants that it and, to its knowledge, its affiliates, have conducted their businesses in compliance with the Anticorruption Laws and have instituted and maintain policies and procedures designed to ensure, and which are reasonably expected to continue to ensure, continued compliance therewith. Specifically but without limiting CYDEX's obligation to comply with all applicable laws, CYDEX shall comply with laws prohibiting human trafficking, slavery and child labor.

(E) Notwithstanding the representations and warranties set forth in this Agreement, Gilead acknowledges and accepts the risks inherent in attempting to develop and commercialize any pharmaceutical product. There is no implied representation that any Licensed Products can be successfully developed or commercialized. The express warranties set forth in Section 2 and this Section 8 are provided in lieu of, and **EXCEPT AS EXPRESSLY PROVIDED IN THIS AGREEMENT**, **NEITHER PARTY PROVIDES**, **ANY WARRANTIES**, **WHETHER WRITTEN OR ORAL**, **EXPRESS OR IMPLIED**, **AND EACH PARTY HEREBY DISCLAIMS ALL OTHER WARRANTIES**, **WHETHER WRITTEN OR ORAL**, **EXPRESS AND IMPLIED**, **INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE**. Each Party's representations and/or warranties under this Agreement are solely for the benefit of the other Party

*** Certain Confidential Information Omitted.

and may be asserted only by the other Party. Each Party shall be solely responsible for all representations and warranties that it or its Affiliates make to any customer (or other third party

9. Limitation of Liability

[***]

10. Indemnity

(A) Each Party shall indemnify, and at the other Party's request, defend, and hold the other Party, its affiliates, and its and their respective officers, directors, employees, stockholders and agents harmless from and against any and all losses, settlements, liabilities, damages and expenses (including reasonable attorneys' fees) (collectively, "**Losses**") resulting from any third party claims, demands, suits or proceedings ("**Claims**") to the extent arising out of or relating to (i) a breach by the indemnifying Party of any of its representations, warranties or covenants set forth in this Agreement, or any other material breach of this Agreement or of any applicable laws by such Party or (ii) [***]; except to the extent any such Loss(es) is covered by indemnification obligations of the indemnified Party hereunder.

(B) Each Party shall notify the other Party promptly upon learning of a Claim that is subject to indemnification pursuant to this Section 10, and if so requested by the indemnified Party, the indemnifying Party shall control defense and settlement thereof diligently, in good faith, and using reasonably experienced counsel with expertise in the relevant field; provided, however, that the indemnifying Party shall make no settlement of any such Claim which is binding upon the indemnified Party or admitting fault on behalf of the indemnified Party, in each case without first receiving the indemnified Party's consent thereto, which consent shall not unreasonably be withheld or delayed. The indemnified Party shall reasonably cooperate in such defense and/or settlement and may participate at its own expense using its own counsel.

11. Records

(A) CYDEX shall prepare and maintain complete and accurate records and data for the Product and shall maintain such records and data with respect to the Product (collectively, "**Gilead Data**"), for five (5) years after termination or expiration of this Agreement or such longer period of time as may be required by applicable laws. Upon Gilead's request, CYDEX shall provide copies of all such Gilead Data to Gilead (as Confidential Information of CYDEX). If CYDEX wants to destroy Gilead Data as it is no longer required to maintain such Gilead Data as required by this Agreement or applicable laws, it shall offer to provide all such Gilead Data to Gilead (as Confidential Information of CYDEX) prior to its destruction.

(B) CYDEX shall maintain the Drug Master File for the Product. At Gilead's request and upon Gilead's payment of the one-time payment set forth in Section 2(g), CYDEX shall provide a letter of authorization to Gilead permitting Gilead to refer to CYDEX's Drug Master File in connection with any regulatory filings for Gilead's (and/or Gilead's Affiliates') Licensed Products. In addition, upon request, CYDEX shall provide to Gilead all documents and information related to the Product necessary for Gilead to submit in connection with any regulatory filing for Gilead's (and/or Gilead's Affiliates') Licensed Products.

_____

*** Certain Confidential Information Omitted.

12. Inspection; Release; Latent Defects

(A) Gilead or its Affiliate shall examine each shipment of Product upon its arrival at the destination specified in this Agreement and shall promptly notify CYDEX in writing of any shortage, loss or damage apparent under reasonable examination within [***] ("**Inspection Period**"). If such shipment is not expressly rejected by the end of the Inspection Period, it shall be deemed to have been accepted (in each case within the meaning of the Uniform Commercial Code). CYDEX shall provide Gilead with a written response within five (5) business days of being notified in writing, of the discovery of a Product that does not conform to the Product Warranty (a "**Defective Product**"). CYDEX's written response shall acknowledge receipt and planned investigation. A follow up CYDEX's written response within thirty (30) days shall include at a minimum, the root cause of the defect and CYDEX's corrective actions.

(B) If after actual or deemed acceptance of a shipment of Product, Gilead or its Affiliate concludes that such Product nonetheless is (or has become) Defective Product is discovered, Gilead shall notify CYDEX and the provisions in the last three sentences of Section 12(a) above and Section 12(c)-(e) below shall apply.

(C) In the event of any Defective Product, CYDEX shall, at Gilead's sole option, either (i) replace the Defective Product at no additional charge to Gilead, or (ii) provide Gilead with a full refund for any Defective Product. Return freight and any other costs incurred by Gilead, including the cost of destruction, for Defective Product shall be borne by CYDEX.

(D) In the event the Parties disagree with respect to whether or not the Product is Defective Product, the Product in question shall be submitted to a third party laboratory agreeable to both Parties for further testing. The Parties further agree that the determination of the third party laboratory as to whether or not the Product is Defective Product shall be binding on both Parties, and the costs associated with such testing shall be borne by the Party whose position is not supported by the findings of the third party laboratory.

(E) Gilead and CYDEX agree to work together rapidly, with time being of the essence, to resolve any quality issues relating to the Product, which may include holding quality improvement meetings to be scheduled at mutually agreeable times.

(F) In the event either Party believes it may be necessary to conduct a recall with respect to any quantity of the Product(s) which were sold by CYDEX to Gilead or its Affiliates under this Agreement (a "**Recall**"), CYDEX and Gilead shall consult with each other as to how best to proceed, it being understood and agreed that the final decision as to any Recall of any quantity of the Product shall be made by Gilead; provided, however, that CYDEX shall not be prohibited hereunder from taking any action that it is required to take by applicable law. Any Recall required primarily because of the failure of the Product(s) to conform to the Product Warranty or other breach of this Agreement by CYDEX, shall be conducted by Gilead at CYDEX's expense.

13. Confidentiality

(A) Each respective Party agrees not to use or disclose any Confidential Information (as defined below) which it may receive from the other Party for any purpose other than the purchase of Product under this Agreement. For purposes of this Agreement, "**Disclosing Party**" shall mean the Party that releases or discloses Confidential Information and "**Receiving Party**" shall mean the Party that receives the Confidential Information from the Disclosing Party. No Party shall disclose or permit disclosure of any Confidential Information to any person other than officers, employees and agents of the Receiving Party who have a bona fide need to know such Confidential Information and who are bound by obligations of confidentiality and non-use at least as protective as those of this Agreement. Each Party agrees that it shall take all reasonable measures to protect and avoid disclosure or use of the Confidential Information contrary to the terms of this Agreement. Such measures shall include, but not be limited to, employing the same degree of care that the Receiving Party utilizes to protect its own Confidential Information of a similar nature, which in no event shall be less than a reasonable degree of care. Each Party agrees to promptly notify the other in writing of any actual or suspected misuse, misappropriation or unauthorized disclosure of the Confidential Information which may come to the Receiving Party's attention.

(B) "**Confidential Information**" means all non-public proprietary or confidential information disclosed by the Disclosing Party to the Receiving Party under this Agreement. Confidential Information shall also include confidential findings and observations obtained during visits and/or demonstrations in research and development laboratories or production facilities of the other Party.

(C) The confidentiality obligations set forth in this Section 13 shall not apply to information that: (i) was in the possession or control of the Receiving Party (with no duty of confidentiality) prior to its receipt from the Disclosing Party, as demonstrated by written records; (ii) was or thereafter becomes part of the public domain through no fault of the Receiving Party or of persons for whom the Receiving Party is responsible; (iii) was rightfully obtained by the Receiving Party from a third party with no obligation of confidentiality to or for the benefit of the Disclosing Party; (iv) the Disclosing Party gives prior written approval for the Receiving Party to disclose onward free of confidentiality obligations; or (v) the Receiving Party independently developed without use or reference to the Confidential Information, as demonstrated by written records contemporaneous with such development.

(D) Notwithstanding the above, nothing herein shall be construed to limit disclosure of Confidential Information pursuant to the order, rule or requirement of a court, administrative agency or other governmental body with proper jurisdiction (an "**Order**")**;** provided, however, that the Receiving Party, to the extent allowed by law, shall promptly notify the Disclosing Party of such Order and shall reasonably cooperate with the Disclosing Party in its efforts to seek a protective order or other limitations or exemptions from such Order. Nothing in this Agreement shall be construed as authorizing the Receiving Party to use or disclose Confidential Information beyond the scope of any protective order or other limitation.

(E) The Receiving Party agrees that it shall not attempt to reverse engineer or otherwise analyze any Disclosing Party Confidential Information for purposes of determining the

composition, chemical structure, chemical pretreatments or other properties, attributes, or characteristics of such Confidential Information. In addition, whether or not the Product constitutes Confidential Information, Gilead shall not attempt to reverse engineer, deconstruct or otherwise analyze the Product for purposes of determining the composition, chemical structure, chemical pretreatments or other properties, attributes, or characteristics of the Product.

(F) Upon the first of expiration or termination of this Agreement, or at Disclosing Party's written request, the Receiving Party agrees to promptly destroy all of the Disclosing Party's Confidential Information, except one copy which may be retained in its legal archives for the sole purpose of monitoring the Receiving Party's surviving obligations under this Agreement. The Receiving Party agrees to promptly destroy any and all materials to the extent that they are synthesized or otherwise contain Confidential Information in their synthesis or production. Upon request of the Disclosing Party, the Receiving Party shall provide written confirmation of such destruction. Each Party's obligations of confidentiality and non-use shall survive the expiration or termination of this Agreement for a period of [***].

14. Governing Law

The validity and interpretation of this Agreement and the legal relations of the Parties to it shall be governed by the internal substantive laws of the state of California, excluding that state's conflicts of law provisions.

15. Term

This Agreement shall have a term of five (5) years following the Effective Date (the "**Term**").

16. Termination

(A) Gilead may terminate this Agreement (and/or, subject to the following sentence, any Purchase Order) without cause by providing thirty (30) days prior written notice to CYDEX. Termination or expiration of this Agreement without cause shall not relieve the Parties of their rights and responsibilities under any accepted Purchase Order which is outstanding as of the effective date of such termination or expiration.

(B) In the event of a material breach of this Agreement, the Party in such breach shall be provided with written notification of the breach by the other Party. The Party in such breach shall have thirty (30) days to cure the breach (to the extent the breach is of a type that can be cured in 30 days). If the breach is not cured within thirty (30) days following notice or if the breach is not of the type that can be cured in 30 days, then this Agreement shall automatically terminate.

(C) In the event of a Party's voluntary bankruptcy petition; liquidation, winding up or similar proceeding; or appointment of a receiver, trustee or manager for the benefit of creditors

(which is not dismissed within 60 days); or the filing of an involuntary bankruptcy petition against a Party (which is not dismissed within 60 days), then the other Party shall be entitled immediately to terminate this Agreement and any accepted Purchase Orders without notice or liability.

(D) Expiration or termination of this Agreement shall not affect accrued rights or obligations of the Parties. Sections 2(i), 9, 10, 11(a), 12, 13, 16, 17, 22, 25, 26 and 29 shall survive termination or expiration of this Agreement.

17. Intellectual Property Rights

Each Party shall retain all proprietary rights in and to its respective Confidential Information including, but not limited to, that related to patent, copyright, trademark, and trade secrets. Except as expressly set forth herein, no license in or to any proprietary right is granted or implied by conveying Confidential Information hereunder. Indeed, except as expressly set forth herein, no license in or to any intellectual property or other proprietary right is granted or implied by virtue of entering into or operating under this Agreement.

18. Insurance

(A) Each Party shall maintain in full force and effect during the term of this Agreement, the following insurance coverages, with limits of liability not less than those specified below:

(i) Commercial General Liability with limits of $5 million, including coverage for premises liability, personal and advertising injury, products and completed operations liability, broad form property damage and blanket contractual liability. Such insurance may be provided on a claims-made basis, however, such insurance shall have a retroactive date prior to the date that any work will be performed pursuant to the Agreement, and shall be maintained (or shall have an extended reporting period) of at least 5 years after the termination of this Agreement. The use of primary and excess limits to achieve the total required limits is acceptable.

(B) With respect to CYDEX only,

(ii) Workers' compensation insurance pursuant to all applicable laws, covering CYDEX employees (including principals) and contractors engaged in providing services under this Agreement; and

(iii)Employer's liability insurance with a minimum limit of $5,000,000 bodily injury - each accident, $5,000,000 disease - each employee, $5,000,000 disease - policy limit. The use of primary and excess limits to achieve the total required limits is acceptable.

(C) All insurance programs provided by an outside insurance carrier required to be maintained hereunder shall be from insurers having an A.M. Best rating of A VIII or better, or its

equivalent, and shall be from insurance carriers and in a form reasonably acceptable to the other Party. Gilead may self-insure for the above coverages.

(D) To the extent requested by the other Party, each Party shall provide the other with written evidence of self-insurance and/or an original certificate of insurance evidencing that (A) all such insurance coverages are in effect, and (B) none of the required policies of insurance shall be terminated, canceled or materially modified by insurers except upon at least thirty (30) days written notice to the other Party. Any failure to maintain the insurance coverage required by this Section 18 shall be a material breach which may be cured only by restoring such coverage retroactive to the date of lapse of the prior coverage.

19. Successors and Assigns

The terms and provisions of this Agreement shall be binding upon and inure to the benefit of any successor of a Party. Neither this Agreement, nor the Parties rights or duties hereunder, may be assigned or delegated without the express, written consent of the other Party, which consent may be withheld for any reason, except that Gilead may assign this Agreement to an Affiliate without CYDEX's consent, and either Party may without the other Party's consent assign this Agreement in connection with such (first) Party (or its parent company) being acquired.

20. Notices

All notices under this Agreement shall be in writing and shall be deemed given upon personal delivery, facsimile transmission with electronic confirmation of transmission, delivery by internationally- or nationally-recognized courier service, or three (3) days after sending by certified or registered mail, postage prepaid and return receipt requested, to the following addresses or facsimile numbers of the respective Parties or such other address or facsimile number as given by notice under this Section 20:

Gilead: Gilead Sciences, Inc.
333 Lakeside Drive
Foster City, CA 94404
Attention: Rob Silber

Copy to:
Gilead Sciences, Inc.
333 Lakeside Drive
Foster City, CA 94404
Attention: General Counsel
Fax No.: (650) 522-5771

CYDEX CyDex Pharmaceuticals, Inc.
c/o Ligand Pharmaceuticals Incorporated
11119 North Torrey Pines Road, Suite 200

La Jolla, CA 92037
Attention: Vice President and Secretary

Copy to:

Ligand Pharmaceuticals Incorporated
11119 North Torrey Pines Road, Suite 200
La Jolla, CA 92037
Attention: General Counsel

21. Severability

This Agreement is severable. The invalidity, illegality or unenforceability (to any extent) of any provision of this Agreement shall not affect the validity, legality, or enforceability of the remaining provisions.

22. Use of Name

As between CYDEX and Gilead, Gilead shall have the sole authority to select trademarks for Licensed Products and shall own all such trademarks. Neither Party grants the other the right to use any of its or its Affiliates' logos, trademarks or trade names. Under no circumstances shall CYDEX use the Gilead trademark or corporate logo or name any of its personnel in promotional materials, literature, press releases, advertising or any other public announcement without Gilead's prior written permission and approval on each occurrence.

23. Force Majeure

Neither Party shall be liable for any delay in performing or for failing to perform its obligations under this Agreement where such failure or delay results from any force majeure cause beyond its reasonable control including, without limitation, acts of God; earthquakes; severe weather conditions such as hurricanes, tornadoes, ice storms or blizzards; epidemics or quarantines; fire; explosions; floods; sabotage; destruction of production facilities; general shortages of specified raw materials, power or fuel; war; acts of domestic or international terrorism; transportation accidents; riots or civil disturbances; insurrection; embargo; and acts of government or governmental agencies including changes in law or regulations that materially and adversely impact the Party or its obligations under this Agreement (individually and collectively a "**Force Majeure Event**") provided that the affected Party promptly notifies (within ten (10) business days or as soon as practicable after discovery of the event) the other Party of the event. If the delays caused by the Force Majeure Event are not cured within sixty (60) calendar days following passage of the Force Majeure Event, then either Party may immediately terminate this Agreement upon written notice to the other Party. A Force Majeure Event shall not include labor disputes or strikes.

24. Entire Agreement

This Agreement sets forth the entire understanding and agreement between the Parties as to the subject matter herein. This Agreement replaces and supersedes any previously existing understandings or agreements between the Parties as to the subject matter herein; provided, that any prior nondisclosure/nonuse agreement is not superseded and shall remain in full force and effect in addition to this Agreement. None of the terms of this Agreement shall be amended or modified or waived except in writing, signed by the Parties.

25. Export Control

In handling Confidential Information provided or received hereunder the Parties shall adhere to all applicable United States export laws and regulations, and shall not knowingly export or re-export (directly or indirectly) any of the Confidential Information or any product, process, or service resulting directly therefrom to any restricted country without first obtaining any and all required government authorizations.

26. Relationship of Parties

Neither Party is the agent or legal representative of the other Party. Nothing contained in this Agreement shall be deemed to create the relationship of partner, principal and agent, or joint venture between the Parties. Neither Party has the right or authority to incur obligations of any kind in the name of or for the other Party, and each Party agrees not to purport to do so.

27. Further Assurances

The Parties hereby covenant and agree without the necessity of any further consideration, to execute, acknowledge and deliver any and all such other documents and instruments and take any such other action as may be reasonably necessary or appropriate to carry out the intent and purposes of this Agreement.

28. No Guaranty of Favorable Outcomes

CYDEX does not warrant that Gilead's clinical studies (if any) will produce any particular results or any favorable results, or that Licensed Products can ever be successfully or profitably commercialized.

29. Patent Marking

Gilead agrees (for itself and its Affiliates) that with respect to each unit or package of Licensed Products sold in a given country, Gilead (or its Affiliate) shall comply with the customary patent marking laws and practices.

30. In Vivo Studies

If Gilead wishes to conduct any in vivo study (preclinical or clinical, in animals or in humans, each a "**Study**") of a Licensed Product, the following provisions shall apply:

(A) **Compliance with Laws**. Gilead represents and warrants that each Study shall be performed in accordance with all applicable laws, regulations and requirements. Gilead shall provide or cause to be provided all appropriate information and warnings to participants enrolled in each Study and obtain or cause to be obtained appropriate documentation of informed consent from all participants in each such Study.

(B) **Responsibility**. Gilead has the freedom to design each Study, and (as between Gilead and CYDEX) Gilead is solely responsible for executing each Study; and so it is reasonable that, and the parties agree that, Gilead shall be solely responsible therefor and for any effects or consequences of the design and execution of each Study, except to the extent any such effects or consequences arise out of or result from the actions of CYDEX.

[The remainder of this page has intentionally been left blank.]-

WITNESSETH, that the Parties execute and deliver this Supply Agreement on and as of the Effective Date. By signing this Supply Agreement, the Parties agree to all terms and conditions set forth herein as of the Effective Date, and warrant and represent that the individuals signing below are authorized to make such commitments on behalf of their respective organizations.

CyDex Pharmaceuticals, Inc.

By: /s/ Matthew W. Foehr
Printed Name: MATTHEW W. FOEHR
Title: PRESIDENT/COO

Gilead Sciences, Inc.

By: /s/ Reza Olivai
Printed Name: Reza Oliyai
Title: VP, PDCS

Exhibit A-1
Product

Product: Captisol® sulfobutylether ß (beta) cyclodextrin, sodium salt (Clinical Grade or Commercial Grade, as specified for Gilead's proposed use and supplied by CYDEX)

Specifications: [***]

*** Certain Confidential Information Omitted.

Exhibit A-2

Commercial Provisions

The price for all Product ordered shall be [***].
Safety Stock: [***]

Minimum Shelf Life: [***]

Forecasting Mechanism: Non-binding annual forecast as provided in Section 2(b).

Product Delivery:

Days after Purchase Order	Minimum Monthly Delivery Quantity
[***]	[***]

*** Certain Confidential Information Omitted.

Exhibit A-3

Licensed Products

Active Pharmaceutical Ingredient

[***]

Permitted Indications

All indications except (a) ocular treatment of any disease or condition with a formulation including a hormone; (b) topical ocular treatment of inflammatory conditions; (c) treatment and prophylaxis of fungal infections in humans; and (d) any ocular treatment for retinal degeneration.

_____

*** Certain Confidential Information Omitted.

Exhibit B

Form of Purchase Order

[***]

_____

*** Certain Confidential Information Omitted.

*** Certain Confidential Information Omitted.

Exhibit 21.1

LIGAND PHARMACEUTICALS INCORPORATED
LIST OF SUBSIDIARIES

Name	**Jurisdiction of Incorporation**
Ab Initio Biotherapeutics, Inc.	Delaware
Allergan Ligand Retinoid Therapeutics, Inc.	Delaware
Cita NeuroPharmaceuticals Inc.	Canada
Crystal Bioscience, Inc.	California
CyDex Pharmaceuticals, Inc.	Delaware
Glycomed Incorporated	California
Icagen, LLC	Delaware
Ligand Biopharmaceuticals Incorporated	Delaware
Ligand JVR, Inc.	Delaware
Ligand Pharmaceuticals (Canada) Incorporated	Canada
Ligand Pharmaceuticals International, Inc.	Delaware
Ligand Pharmaceuticals UK Limited	United Kingdom
Metabasis Therapeutics, Inc.	Delaware
Neurogen Corporation	Delaware
OMT I, Inc.	Delaware
OMT II, Inc.	Delaware
OMT, LLC	Delaware
Open Monoclonal Technology, Inc.	Delaware
Pfenex Inc.	Delaware
Pharmacopeia, LLC	Delaware
Seragen Incorporated	Delaware
Seragen Technology, Inc.	Delaware
Taurus Biosciences, LLC	Delaware
Vernalis (Canada II) Inc.	Canada
Vernalis (Canada) Inc.	Canada
Vernalis Development Limited	England and Wales
Vernalis Group Limited	England and Wales
Vernalis plc	England and Wales
Vernalis Research Limited	England and Wales
Vernalis Therapeutics Inc.	Delaware
xCella Biosciences, Inc.	Delaware

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement (Form S-8 No. 333-252480) pertaining to the 2002 Stock Incentive Plan, as amended and restated of Ligand Pharmaceuticals Incorporated,

(2) Registration Statement (Form S-8 No. 333-233130) pertaining to the 2002 Stock Incentive Plan, as amended and restated of Ligand Pharmaceuticals Incorporated,

(3) Registration Statement (Form S-8 No. 333-212775) pertaining to the 2002 Stock Incentive Plan, as amended and restated of Ligand Pharmaceuticals Incorporated,

(4) Registration Statement (Form S-8 No. 333-182547) pertaining to the 2002 Stock Incentive Plan, as amended and restated of Ligand Pharmaceuticals Incorporated,

(5) Registration Statement (Form S-8 No. 333-160132) pertaining to the 2002 Stock Incentive Plan, as amended and restated, and Employee Stock Purchase Plan, as amended and restated of Ligand Pharmaceuticals Incorporated, and

(6) Registration Statement (Form S-8 No. 333-131029) pertaining to the 2002 Stock Incentive Plan and 2002 Employee Stock Purchase Plan of Ligand Pharmaceuticals Incorporated;

of our reports dated February 24, 2021, with respect to the consolidated financial statements of Ligand Pharmaceuticals Incorporated and the effectiveness of internal control over financial reporting of Ligand Pharmaceuticals Incorporated included in this Annual Report (Form 10-K) of Ligand Pharmaceuticals Incorporated for the year ended December 31, 2020.

/s/ Ernst & Young LLP

San Diego, California
February 24, 2021

Exhibit 31.1

I, John L. Higgins, certify that:

1. I have reviewed this Annual Report on Form 10-K of Ligand Pharmaceuticals Incorporated;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 24, 2021

/s/ John L. Higgins

John L. Higgins
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

I, Matthew Korenberg, certify that:

1. I have reviewed this Annual Report on Form 10-K of Ligand Pharmaceuticals Incorporated;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 24, 2021

/s/ Matthew Korenberg

Matthew Korenberg
Executive Vice President, Finance and Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER

In connection with the Annual Report of Ligand Pharmaceuticals Incorporated (the "Company") on Form 10-K for the year ended December 31, 2020, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, John L. Higgins, Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 24, 2021

/s/ John L. Higgins

John L. Higgins
Chief Executive Officer
(Principal Executive Officer)

The foregoing certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. Section 1350, and is not being filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and is not to be incorporated by reference into any filing of the Company, whether made before or after the date hereof, regardless of any general incorporation language in such filing. A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER

In connection with the Annual Report of Ligand Pharmaceuticals Incorporated (the "Company") on Form 10-K for the year ended December 31, 2020, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Matthew Korenberg, Executive Vice President, Finance and Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 24, 2021

/s/ Matthew Korenberg

Matthew Korenberg
Executive Vice President, Finance and Chief Financial Officer
(Principal Financial Officer)

The foregoing certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. Section 1350, and is not being filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and is not to be incorporated by reference into any filing of the Company, whether made before or after the date hereof, regardless of any general incorporation language in such filing. A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.