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

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended June 30, 2019

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 number: 001-34705

Codexis, Inc.
(Exact name of registrant as specified in its charter)

Delaware	**71-0872999**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
200 Penobscot Drive, Redwood City, California	**94063**
(Address of principal executive offices)	**(Zip Code)**

(650) 421-8100
(Registrant's telephone number, including area code)

(Former name, former address and former fiscal year, if changed since last report)

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

Title of Each Class	**Trading Symbol(s)**	**Name of Each Exchange on Which Registered**
Common Stock, par value $0.0001 per share	CDXS	The Nasdaq Global Select Market

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 definitions 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 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 is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

As of July 31, 2019, there were 58,358,569 shares of the registrant's Common Stock, par value $0.0001 per share, outstanding.

Codexis, Inc.

Quarterly Report on Form 10-Q

For the Quarter Ended June 30, 2019

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PART I. FINANCIAL INFORMATION

Item 1. Financial Statements

Codexis, Inc.
Condensed Consolidated Balance Sheets
(Unaudited)
(In Thousands, Except Per Share Amounts)

	June 30, 2019	December 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	$ 93,421	$ 53,039
Accounts receivable, net of allowances of $34 at June 30, 2019 and December 31, 2018	11,814	11,551
Unbilled receivables, current	2,336	1,916
Inventories	720	589
Prepaid expenses and other current assets	1,950	1,068
Contract assets	—	35
Total current assets	110,241	68,198
Restricted cash	1,749	1,446
Equity securities	419	588
Right-of-use assets - Operating leases, net	25,240	—
Right-of-use assets - Finance leases, net	384	—
Property and equipment, net	5,312	4,759
Goodwill	3,241	3,241
Other non-current assets	207	1,051
Total assets	$ 146,793	$ 79,283
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 2,164	$ 3,050
Accrued compensation	4,551	5,272
Other accrued liabilities	4,059	4,855
Current portion of lease obligations - Operating leases	683	—
Current portion of lease obligations - Finance leases	183	—
Deferred revenue	5,851	4,936
Total current liabilities	17,491	18,113
Deferred revenue, net of current portion	3,249	3,352
Long-term lease obligations - Operating leases	26,147	—
Long-term lease obligations - Finance leases	—	61
Lease incentive obligation, net of current portion	—	35
Other long-term liabilities	1,222	1,416
Total liabilities	48,109	22,977
Commitments and Contingencies (Note 11)		
Stockholders' equity:		
Preferred stock, $0.0001 par value per share; 5,000 shares authorized; none issued and outstanding	—	—
Common stock, $0.0001 par value per share; 100,000 shares authorized; 57,940 shares and 54,065 shares issued and outstanding at June 30, 2019 and December 31, 2018, respectively	6	5
Additional paid-in capital	440,795	386,775
Accumulated deficit	(342,117)	(330,474)
Total stockholders' equity	98,684	56,306
Total liabilities and stockholders' equity	$ 146,793	$ 79,283

See accompanying notes to the unaudited condensed consolidated financial statements

Codexis, Inc.

Condensed Consolidated Statements of Operations
(Unaudited)
(In Thousands, Except Per Share Amounts)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2019	**2018**	**2019**	**2018**
Revenues:				
Product revenue	$ 6,249	$ 3,723	$ 14,236	$ 9,886
Research and development revenue	6,070	9,815	13,665	17,694
Total revenues	12,319	13,538	27,901	27,580
Costs and operating expenses:				
Cost of product revenue	2,772	2,611	7,163	6,436
Research and development	8,274	7,370	16,290	14,548
Selling, general and administrative	7,896	7,395	16,311	15,141
Total costs and operating expenses	18,942	17,376	39,764	36,125
Loss from operations	(6,623)	(3,838)	(11,863)	(8,545)
Interest income	220	174	450	245
Other expenses, net	(88)	(82)	(211)	(142)
Loss before income taxes	(6,491)	(3,746)	(11,624)	(8,442)
Provision for (benefit from) income taxes	16	(11)	19	(13)
Net loss	$ (6,507)	$ (3,735)	$ (11,643)	$ (8,429)
Net loss per share, basic and diluted	$ (0.12)	$ (0.07)	$ (0.21)	$ (0.17)
Weighted average common stock shares used in computing net loss per share, basic and diluted	54,954	52,787	54,564	50,598

See accompanying notes to the unaudited condensed consolidated financial statements

Codexis, Inc.

Condensed Consolidated Statements of Stockholders' Equity
(Unaudited)
(In Thousands)

Three Months Ended June 30, 2019	Common Stock		Additional paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balance as of April 1, 2019	54,541	$ 5	$ 386,815	$ —	$ (335,610)	$ 51,210
Exercise of stock options	310	—	2,067	—	—	2,067
Release of stock awards	40	—	—	—	—	—
Employee stock-based compensation	—	—	1,988	—	—	1,988
Taxes paid related to net share settlement of equity awards	—	—	—	—	—	—
Issuance of common stock, net of issuance costs of $74	3,049	1	49,925	—	—	49,926
Net loss	—	—	—	—	(6,507)	(6,507)
Balance as of June 30, 2019	57,940	$ 6	$ 440,795	$ —	$ (342,117)	$ 98,684

Three Months Ended June 30, 2018	Common Stock		Additional paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balance as of April 1, 2018	48,925	$ 5	$ 339,354	$ —	$ (324,291)	$ 15,068
Exercise of stock options	224	—	1,423	—	—	1,423
Release of stock awards	46	—	—	—	—	—
Employee stock-based compensation	—	—	2,455	—	—	2,455
Non-employee stock-based compensation	—	—	2	—	—	2
Issuance of common stock, net of issuance costs of $179	4,313	—	37,317	—	—	37,317
Net loss	—	—	—	—	(3,735)	(3,735)
Balance as of June 30, 2018	53,508	$ 5	$ 380,551	$ —	$ (328,026)	$ 52,530

See accompanying notes to the unaudited condensed consolidated financial statements

Codexis, Inc.

Condensed Consolidated Statements of Stockholders' Equity
(Unaudited)
(In Thousands)

Six Months Ended June 30, 2019	Common Stock Shares	Common Stock Amount	Additional paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
Balance as of January 1, 2019	54,065	$ 5	$ 386,775	$ —	$ (330,474)	$ 56,306
Exercise of stock options	529	—	2,843	—	—	2,843
Release of stock awards	441	—	—	—	—	—
Employee stock-based compensation	—	—	4,051	—	—	4,051
Taxes paid related to net share settlement of equity awards	(144)	—	(2,799)	—	—	(2,799)
Issuance of common stock, net of issuance costs of $74	3,049	1	49,925	—	—	49,926
Net loss	—	—	—	—	(11,643)	(11,643)
Balance as of June 30, 2019	57,940	$ 6	$ 440,795	$ —	$ (342,117)	$ 98,684

Six Months Ended June 30, 2018	Common Stock Shares	Common Stock Amount	Additional paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
Balance as of January 1, 2018	48,365	$ 5	$ 340,079	$ (472)	$ (315,065)	$ 24,547
Exercise of stock options	303	—	1,858	—	—	1,858
Release of stock awards	824	—	—	—	—	—
Employee stock-based compensation	—	—	4,413	—	—	4,413
Non-employee stock-based compensation	—	—	24	—	—	24
Taxes paid related to net share settlement of equity awards	(297)	—	(3,140)	—	—	(3,140)
Issuance of common stock, net of issuance costs of $179	4,313	—	37,317	—	—	37,317
Cumulative effect of change in accounting principles [1]	—	—	—	472	(4,532)	(4,060)
Net loss	—	—	—	—	(8,429)	(8,429)
Balance as of June 30, 2018	53,508	$ 5	$ 380,551	$ —	$ (328,026)	$ 52,530

[1] Cumulative effect of change in accounting principles included: Accounting Standards Update 2014-9 (Topic 606), of $4.1 million and Accounting Standards Update 2016-01 (Subtopic 825-10), of $0.5 million.

See accompanying notes to the unaudited condensed consolidated financial statements

Codexis, Inc.
Condensed Consolidated Statements of Cash Flows
(Unaudited, in Thousands)

	Six Months Ended June 30,	
	2019	**2018**
Operating activities:		
Net loss	$ (11,643)	$ (8,429)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation	693	503
Amortization expense - right-of-use assets - operating and finance leases	1,486	—
Loss (Gain) on disposal of property and equipment	(1)	1
Stock-based compensation	4,051	4,437
Unrealized loss (gain) on investment in equity securities	168	(5)
Changes in operating assets and liabilities:		
Accounts receivable, net	(262)	3,057
Unbilled receivables	365	(103)
Inventories	(131)	—
Prepaid expenses and other current assets	(882)	(132)
Contract assets	35	(554)
Other non-current assets	59	79
Accounts payable	(1,625)	(530)
Accrued compensation	(721)	(936)
Other accrued liabilities	402	451
Other long term liabilities	(715)	(514)
Deferred revenue	812	(9,466)
Net cash used in operating activities	(7,909)	(12,141)
Investing activities:		
Purchase of property and equipment	(1,258)	(1,472)
Proceeds from disposal of property and equipment	1	—
Net cash used in investing activities	(1,257)	(1,472)
Financing activities:		
Proceeds from exercises of stock options	2,843	1,858
Proceeds from issuance of common stock in connection with public offering, net of underwriting discounts and commission	—	37,497
Costs incurred in connection with public placement	—	(179)
Proceeds from issuance of common stock in connection with private placement	50,000	—
Costs incurred in connection with private placement	(74)	—
Payments of lease obligations - Finance leases	(119)	(118)
Taxes paid related to net share settlement of equity awards	(2,799)	(3,140)
Net cash provided by financing activities	49,851	35,918
Net increase in cash, cash equivalents and restricted cash	40,685	22,305
Cash, cash equivalents and restricted cash at the beginning of the period	54,485	32,776
Cash, cash equivalents and restricted cash at the end of the period	$ 95,170	$ 55,081
Supplemental disclosure of cash flow information		
Interest paid	$ 9	$ 42
Income taxes paid	$ —	$ 5
Purchase of property and equipment recorded in accounts payable and accrued expenses	$ 773	$ 67

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported within the unaudited condensed consolidated balance sheets to the total of the same such amounts shown above:

	Six Months Ended June 30,	
	2019	**2018**
Cash and cash equivalents	$ 93,421	$ 53,621
Restricted cash included in non-current assets	1,749	1,460
Total cash, cash equivalents and restricted cash at the end of the period	$ 95,170	$ 55,081

See accompanying notes to the unaudited condensed consolidated financial statements

Note 1. Description of Business

In these notes to the unaudited condensed consolidated financial statements, the "Company," "we," "us," and "our" refers to Codexis, Inc. and its subsidiaries on a consolidated basis.

We discover, develop and sell proteins that deliver value to our clients in a growing set of industries. We view proteins as a vast untapped source of value-creating materials, and we are using our proven technologies, which we have been continuously improving since our inception in 2002, to commercialize an increasing number of novel proteins, both as proprietary Codexis products and in partnership with our customers.

We are a pioneer in the harnessing of computational technologies to drive biology advancements. Since 2002, we have made substantial investments in the development of our CodeEvolver® protein engineering technology platform, the primary source of our competitive advantage. Our technology platform is powered by proprietary, artificial intelligence-based, computational algorithms that rapidly mine our large and continuously growing library of protein variants' performance attributes. These computational outputs enable increasingly reliable predictions for next generation protein variants to be engineered, enabling delivery of targeted performance enhancements in a time-efficient manner. In addition to its computational prowess, our CodeEvolver® protein engineering technology platform integrates additional modular competencies, including robotic high-throughput screening and genomic sequencing, organic chemistry and process development which are all coordinated to create our novel protein innovations.

Our approach to develop commercially viable biocatalytic manufacturing processes begins by conceptually designing the most cost-effective and practical process for a targeted product. We then develop optimized protein catalysts to enable that process design, using our CodeEvolver® protein engineering platform technology. Engineered protein catalyst candidates - many thousands for each protein engineering project - are then rapidly screened and validated in high throughput screening under relevant manufacturing operating conditions. This approach results in an optimized protein catalyst enabling cost-efficient processes that typically are relatively simple to run in conventional manufacturing equipment. This also allows for the efficient technical transfer of our process to our manufacturing partners.

The successful embodiment of our CodeEvolver® protein engineering technology platform in commercial manufacturing processes requires well-integrated expertise in a number of technical disciplines. In addition to those directly involved in practicing our CodeEvolver® protein engineering platform technology, such as molecular biology, enzymology, microbiology, cellular engineering, metabolic engineering, bioinformatics, biochemistry and high throughput analytical chemistry, our process development projects also involve integrated expertise in organic chemistry, chemical process development, chemical engineering, fermentation process development and fermentation engineering. Our integrated, multi-disciplinary approach to biocatalyst and process development is a critical success factor for our company.

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, which remains our primary business focus. Our customers, which include several large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development.

We have also used the technology to develop protein catalysts for use in the fine chemicals market. The fine chemicals market consists of several large market verticals, including food and food ingredients, animal feed, flavors, fragrances and agricultural chemicals.

We have also begun using the CodeEvolver® protein engineering technology platform to develop early stage, novel biotherapeutic product candidates, both for our customers and for our own business, most notably our lead program for the potential treatment of phenylketonuria ("PKU") in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In October 2017, we entered into a Global Development, Option and License Agreement (the "Nestlé Agreement") with Nestec Ltd. ("Nestlé Health Science") to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of PKU. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive license to develop and commercialize CDX-6114.

In April 2018, we entered into a strategic agreement (the "Porton Agreement") with Porton Pharma Solutions, Ltd. ("Porton") to license key elements of our CodeEvolver® protein engineering technology platform to Porton's global custom intermediate and active pharmaceutical ingredients ("API") development and manufacturing business. This gives us access to a wide variety of small and medium-sized pharmaceutical customers.

We are also using our technology to develop enzymes for customers using next generation sequencing ("NGS") and polymerase chain reaction ("PCR/qPCR") for *in vitro* molecular diagnostic and genomic research applications. Our first enzyme for this application is a DNA ligase which we began marketing to customers in 2018.

In May 2019, we entered into a Platform Technology Transfer and License Agreement (the "Novartis CodeEvolver® Agreement") with Novartis Pharma AG ("Novartis"). The Novartis CodeEvolver® Agreement allows Novartis to use Codexis' proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare.

Below are brief descriptions of our business segments (See Note 13, "Segment, Geographical and Other Revenue Information"):

Performance Enzymes

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, and to date this continues to be our largest market served. Our customers, which include many large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development. We have also used the technology to develop customized enzymes for use in other industrial markets. These markets consist of several large industrial verticals, including food and food ingredients, animal feed, flavors, fragrances, and agricultural chemicals. We also use our technology to develop enzymes for customers using NGS and PCR/qPCR for *in vitro* molecular diagnostic and molecular biology research applications.

Novel Biotherapeutics

We are also targeting new opportunities in the pharmaceutical industry to discover, improve, and/or develop biotherapeutic drug candidates. We believe that our CodeEvolver® protein engineering platform technology can be used to discover novel biotherapeutic drug candidates that will target human diseases that are in need of improved therapeutic interventions. Similarly, we believe that we can deploy our platform technology to improve specific characteristics of a customer's pre-existing biotherapeutic drug candidate, such as its activity, stability or immunogenicity. Most notable is our lead program for the potential treatment of PKU in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In October 2017, we announced a strategic collaboration with Nestlé Health Science to advance CDX-6114, our own novel orally administrable enzyme therapeutic candidate for the potential treatment of PKU. In July 2018, we announced that we had dosed the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114, which was conducted in Australia. In November 2018, we announced top-line results from the Phase 1a study in healthy volunteers with CDX-6114. In December 2018, Nestlé Health Science became obligated to pay us an additional $1.0 million within 60 days after the achievement of a milestone relating to formulation of CDX-6114. In January 2019, we received notice from the U.S. Food and Drug Administration (the "FDA") that it had completed its review of our investigational new drug application ("IND") for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. As a result of the option exercise, we earned a milestone and recognized $3.0 million in revenues in the first quarter of 2019. Upon exercising its option, Nestlé Health Science has assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the second quarter of 2019.

We have also developed a pipeline of other biotherapeutic drug candidates, which are in preclinical development, and in which we expect to continue to make additional investments with the aim of advancing additional product candidates targeting other therapeutic areas.

Recent Financing Activities

In June 2019, we entered into a Securities Purchase Agreement with an affiliate of Casdin Capital, LLC ("Casdin") pursuant to which we issued and sold to Casdin 3,048,780 shares of our common stock at a purchase price of $16.40 per share (the "Private Offering"). After deducting legal fees of $74 thousand from the Private Offering, our net proceeds were $49.9 million. See Note 10, "Capital Stock" to our unaudited condensed consolidated financial statements for further details.

Note 2. Basis of Presentation and Summary of Significant Accounting Policies

Basis of Presentation and Principles of Consolidation

The accompanying unaudited condensed consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States of America ("GAAP") and the applicable rules and regulations of the Securities and Exchange Commission ("SEC") for interim financial information. Accordingly, they do not include all of the information and notes required by GAAP for complete financial statements. These interim unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto contained in our Annual Report on Form 10-K for the year ended December 31, 2018. The condensed consolidated balance sheet at December 31, 2018 has been derived from the audited consolidated financial statements at that date, but does not include all disclosures, including notes, required by GAAP for complete financial statements. The significant accounting policies used in preparation of the unaudited condensed consolidated financial statements for the three months and six months ended June 30, 2019 are consistent with those discussed in Note 2 to the audited consolidated financial statements in the Company's 2018 Annual Report on Form 10-K and are updated below as necessary.

The unaudited condensed consolidated financial statements have been prepared on the same basis as the audited consolidated financial statements and, in the opinion of management, reflect all adjustments of a normal recurring nature considered necessary to present fairly our financial position as of June 30, 2019, results of our operations for the three and six months ended June 30, 2019 and 2018, changes in stockholders' equity for the three and six months ended June 30, 2019 and 2018, and cash flows for the six months ended June 30, 2019 and 2018. The interim results are not necessarily indicative of the results for any future interim period or for the entire year. Accounting Standard Update ("ASU") 2016-02, "Leases (Topic 842)" ("ASC 842) establishes a right-of-use ("ROU") model that requires a lessee to record a right-of-use asset and a lease obligation on the balance sheet for all leases with terms longer than 12 months. See "Recently Adopted Accounting Pronouncements" for details regarding the adoption of ASU 2016-02 effective January 1, 2019.

The unaudited interim condensed consolidated financial statements include the accounts of Codexis, Inc. and its wholly owned subsidiaries in the United States, India and the Netherlands. All significant intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosures of contingent liabilities at the date of the unaudited condensed consolidated financial statements, and the reported amounts of revenue and expenses during the reporting period. We regularly assess these estimates which primarily affect revenue recognition, accounts receivable, inventories, the valuation of marketable securities, goodwill arising out of business acquisitions, accrued liabilities, stock awards, and the valuation allowances associated with deferred tax assets. Actual results could differ from those estimates and such differences may be material to the unaudited condensed consolidated financial statements.

Segment Reporting

We report two business segments, Performance Enzymes and Novel Biotherapeutics, which are based on our operating segments. Operating segments are defined as components of an enterprise about which separate financial information is available that is evaluated regularly by the chief operating decision maker ("CODM"), or decision making group, in deciding how to allocate resources, and in assessing performance. Our CODM is our Chief Executive Officer. Our business segments are primarily based on our organizational structure and our operating results as used by our CODM in assessing performance and allocating resources for our company. We do not allocate or evaluate assets by segment.

The Novel Biotherapeutics segment focuses on new opportunities in the pharmaceutical industry to discover or improve novel biotherapeutic drug candidates that will target human diseases that are in need of improved therapeutic interventions. The Performance Enzymes segment consists of protein catalyst products and services with focus on pharmaceutical, food, molecular diagnostics, and other industrial markets.

Leases

We determine if an arrangement is a lease at inception. Operating leases are included in right-of-use ("ROU") lease assets, current portion of lease obligations, and long-term lease obligations on our balance sheets.

ROU lease assets represent our right to use an underlying asset for the lease term and lease obligations represent our

obligation to make lease payments arising from the lease. Operating ROU lease assets and obligations are recognized at the commencement date based on the present value of the future minimum lease payments over the lease term. As our leases do not provide an implicit rate, we use our incremental borrowing rate based on the information available at the commencement date in determining the present value of lease payments. The lease terms may include options to extend or terminate the lease when it is reasonably certain that the option will be exercised. Lease expense is recognized on a straight-line basis over the lease term. We elected to apply the short-term lease measurement and recognition exemption in which ROU assets and lease obligations are not recognized for short-term leases.

Recent Accounting Pronouncements

Recently adopted accounting pronouncements

In February 2016, the FASB issued ASU 2016-02, "Leases (Topic 842)" (“ASC 842”), which is intended to improve financial reporting of leasing transactions by requiring lessees to recognize leases on balance sheets and disclose key information about leasing arrangements. Topic 842 was subsequently amended by ASU No. 2018-01, "Land Easement Practical Expedient for Transition to Topic 842"; ASU 2018-10, "Codification Improvements to ASC 842, Leases"; and ASU 2018-11, "Leases (Topic 842): Targeted Improvements." The new standard establishes a right-of-use ("ROU") model that requires lessees to record a ROU asset and lease obligations on the balance sheet for all leases with terms longer than 12 months. Leases are classified as either finance or operating, with classification affecting the pattern and classification of expense recognition in the condensed consolidated statement of operations. We adopted the new standard on January 1, 2019 using a modified retrospective approach and effective date method. We also elected the "package of practical expedients," which permit us not to reassess under the new standard its prior conclusions about lease identification, lease classification and initial direct costs. We did not elect the use-of-hindsight or the practical expedient pertaining to land easements; the latter is not applicable to us. Upon adoption, for operating leases, we recognized $26.6 million of ROU assets and $27.6 million of lease obligations, which represents the present value of the lease payments discounted using our incremental borrowing rate ("IBR") of 6.6%. For finance leases, we recognized $0.5 million of ROU assets and $0.3 million of lease obligations which represents the present value of the lease payments discounted using weighted-average implicit rate of 5.0%. These amounts, included the eighth amendment to the lease agreement disclosed in Note 11, "Commitments and Contingencies," were recorded in our unaudited condensed consolidated balance sheet on January 1, 2019.

In February 2018, the FASB issued ASU No. 2018-02, “Income Statement - Reporting Comprehensive Income (Topic 220) - Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income”. This standard allows a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act and requires certain disclosures about stranded tax effects and will be effective for us beginning January 1, 2019 and should be applied either in the period of adoption or retrospectively. We adopted ASU 2018-02 in the first quarter of 2019, and the adoption had no impact on our unaudited condensed consolidated financial statements.

In June 2018, the FASB issued ASU 2018-07, "Compensation-Stock Compensation (Topic 718): Improvements to Non-employee Share-Based Payment Accounting," which expands the scope of Topic 718, Compensation—Stock Compensation (which currently only includes share-based payments to employees) to include share-based payments issued to nonemployees for goods or services. Consequently, the accounting for share-based payments to non-employees and employees will be substantially aligned. The ASU supersedes Subtopic 505-50, Equity—Equity-Based Payments to Non-Employees. The new standard is effective for fiscal years beginning after December 15, 2018, with early adoption permitted. We adopted ASU 2018-07 in the first quarter of 2019, and the adoption had no impact on our unaudited condensed consolidated financial statements.

In July 2018, the FASB issued ASU 2018-09, "Codification Improvements”, which represent changes to clarify, correct errors in, or make minor improvements to the Codification, eliminating inconsistencies and providing clarifications in current guidance. The amendments in this ASU include those made to: Subtopic 220-10, Income Statement-Reporting Comprehensive Income-Overall; Subtopic 470-50, Debt-Modifications and Extinguishments; Subtopic 480-10, Distinguishing Liabilities from Equity-Overall; Subtopic 718-740, Compensation-Stock Compensation-Income Taxes; Subtopic 805-740, Business Combinations-Income Taxes; Subtopic 815-10, Derivatives and Hedging-Overall; Subtopic 820-10, Fair Value Measurement-Overall; Subtopic 940-405, Financial Services-Brokers and Dealers-Liabilities; and Subtopic 962-325, Plan Accounting-Defined Contribution Pension Plans-Investments-Other. The transition and effective date guidance is based on the facts and circumstances of each amendment. Some of the amendments do not require transition guidance and will be effective upon issuance. However, many of the amendments do have transition guidance with effective dates for annual periods beginning after December 15, 2018, for public business entities. We adopted subtopics under ASU 2018-09 that are applicable to our Company which included subtopics 718-740 and 820-10 in the first quarter of 2019, and the adoption had no impact on our unaudited condensed consolidated financial statements.

Recently issued accounting pronouncements not yet adopted

From time to time, new accounting pronouncements are issued by the FASB or other standards setting bodies that are adopted by us as of the specified effective date. Unless otherwise discussed, we believe that the impact of recently issued standards that are not yet effective will not have a material impact on our unaudited condensed consolidated financial statements upon adoption.

In June 2016, the FASB issued ASU 2016-13, "Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments," which amends the FASB's guidance on the impairment of financial instruments. The standard adds a new impairment model (known as the "current expected credit loss model") that is based on expected losses rather than incurred losses. ASU 2016-13 is effective for annual reporting periods ending after December 15, 2019, including interim periods within those fiscal years. Early adoption is permitted for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. We are currently evaluating the impact of adopting ASU 2016-13 on our financial statements and related disclosures.

In January 2017, the FASB issued ASU No. 2017-04, "Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment." The amendments eliminate Step 2 from the goodwill impairment test. The annual, or interim, goodwill impairment test is performed by comparing the fair value of a reporting unit with its carrying amount. An impairment charge should be recognized for the amount by which the carrying amount exceeds the reporting unit’s fair value; however, the loss recognized should not exceed the total amount of goodwill allocated to that reporting unit. In addition, income tax effects from any tax deductible goodwill on the carrying amount of the reporting unit should be considered when measuring the goodwill impairment loss, if applicable. The amendments also eliminate the requirements for any reporting unit with a zero or negative carrying amount to perform a qualitative assessment and, if it fails that qualitative test, to perform Step 2 of the goodwill impairment test. An entity still has the option to perform the qualitative assessment for a reporting unit to determine if the quantitative impairment test is necessary. The new standard is effective for fiscal years beginning after December 15, 2019, with early adoption permitted. We are currently evaluating the impact of adoption of ASU 2017-04 on our financial statements and related disclosures.

In August 2018, the FASB issued ASU 2018-13, "Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement". The primary focus of ASU 2018-13 is to improve the effectiveness of the disclosure requirements for fair value measurements. The changes affect all companies that are required to include fair value measurement disclosures. In general, the amendments in ASU 2018-13 are effective for all entities for fiscal years and interim periods within those fiscal years, beginning after December 15, 2019. Early adoption is permitted. We are currently evaluating the impact of adoption of ASU 2018-13 on our financial statements and related disclosures.

In November 2018, the FASB issued ASU 2018-18, "Collaborative Arrangements (Topic 808): Clarifying the Interaction Between Topic 808 and Topic 606." ASU 2018-18 provides guidance on how to assess whether certain transactions between collaborative arrangement participants should be accounted for within the revenue recognition standard. The ASU also provides more comparability in the presentation of revenue for certain transactions between collaborative arrangement participants. In general, for public companies, the amendments in this standard are effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. Early adoption is permitted. We are currently evaluating the impact of adoption of ASU 2018-18 on our financial statements.

In November 2018, the FASB issued ASU 2018-19, "Codification Improvements to Topic 326, Financial Instruments-Credit Losses." ASU 2018-19 clarifies that receivables arising from operating leases are not within the scope of the credit losses standard, but rather, should be accounted for in accordance with the leases standard. In general, the amendments in this standard are effective for public business entities that meet the definition of a SEC filer for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. We are currently evaluating the impact of adoption of ASU 2018-19 on our financial statements.

In January 2019, the FASB issued ASU 2019-01, "Leases (Topic 842): Codification Improvements". These amendments align the guidance for fair value of the underlying asset by lessors that are not manufacturers or dealers in Topic 842 with that of existing guidance (Issue #1). The ASU also requires lessors within the scope of Topic 942, Financial Services—Depository and Lending, to present all “principal payments received under leases” within investing activities (Issue #2). The ASU exempts both lessees and lessors from having to provide certain interim disclosures in the fiscal year in which a company adopts the new leases standard (Issue #3). In general, the amendments in ASU 2019-01 are effective for all entities for fiscal years and interim periods within those fiscal years, beginning after December 15, 2019. Early adoption is permitted. The transition and effective date provisions apply to Issue 1 and Issue 2. They do not apply to Issue 3 because the amendments for that Issue are to the

original transition requirements in Topic 842. We are currently evaluating the impact of adopting ASU 2019-01 on our financial statements and related disclosures.

In April 2019, the FASB issued ASU 2019-04, "Codification Improvements to Topic 326, Financial Instruments-Credit Losses, Topic 815, Derivatives and Hedging, and Topic 825, Financial Instruments." ASU 2019-04 clarifies and improves areas of guidance related to the recently issued standards on credit losses, hedging, and recognition and measurement. As we have adopted the amendments in ASU 2016-13 as of the issuance date of ASU 2019-04, the effective date is for fiscal years and interim periods beginning after December 15, 2019. Early adoption is permitted. We are currently evaluating the impact of adopting ASU 2019-04 on our financial statements and related disclosures.

In May 2019, the FASB issued ASU 2019-05, "Financial Instruments-Credit Losses (Topic 326): Targeted Transition Relief." ASU 2019-05 provides entities that have certain instruments within the scope of Subtopic 326-20, Financial Instruments—Credit Losses—Measured at Amortized Cost, with an option to irrevocably elect the fair value option in Subtopic 825-10, Financial Instruments—Overall, applied on an instrument-by-instrument basis for eligible instruments, upon adoption of Topic 326. The fair value option election does not apply to held-to-maturity debt securities. An entity that elects the fair value option should subsequently apply the guidance in Subtopics 820-10, Fair Value Measurement—Overall, and 825-10. As we have adopted the amendments in ASU 2016-13, the effective date is for fiscal years and interim periods beginning after December 15, 2019. We are currently evaluating the impact of adopting ASU 2019-05 on our financial statements and related disclosures.

Note 3. Revenue Recognition

Disaggregation of Revenue

The following table provides information about disaggregated revenue from contracts with customers, the nature of the products and services and geographic regions, and includes a reconciliation of the disaggregated revenue with reportable segments. The geographic regions that are tracked are the Americas (United States, Canada, Latin America), EMEA (Europe, Middle East, Africa), and APAC (Australia, New Zealand, Southeast Asia, China).

	Three months ended June 30, 2019			Three months ended June 30, 2018		
(in thousands)	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Major products and service:						
Product Revenue	$ 6,249	$ —	$ 6,249	$ 3,723	$ —	$ 3,723
Research and development revenue	4,340	1,730	6,070	7,442	2,373	9,815
Total revenues	$ 10,589	$ 1,730	$ 12,319	$ 11,165	$ 2,373	$ 13,538
Primary geographical markets:						
Americas	$ 4,076	$ —	$ 4,076	$ 6,058	$ —	$ 6,058
EMEA	3,011	1,730	4,741	1,435	2,373	3,808
APAC	3,502	—	3,502	3,672	—	3,672
Total revenues	$ 10,589	$ 1,730	$ 12,319	$ 11,165	$ 2,373	$ 13,538

(in thousands)	Six months ended June 30, 2019			Six months ended June 30, 2018		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Major products and service:						
Product Revenue	$ 14,236	$ —	$ 14,236	$ 9,886	$ —	$ 9,886
Research and development revenue	6,440	7,225	13,665	12,008	5,686	17,694
Total revenues	$ 20,676	$ 7,225	$ 27,901	$ 21,894	$ 5,686	$ 27,580
Primary geographical markets:						
Americas	$ 6,913	$ —	$ 6,913	$ 9,655	$ —	$ 9,655
EMEA	5,241	7,225	12,466	3,114	5,686	8,800
APAC	8,522	—	8,522	9,125	—	9,125
Total revenues	$ 20,676	$ 7,225	$ 27,901	$ 21,894	$ 5,686	$ 27,580

Contract Balances

The following table presents changes in the contract assets, unbilled receivables, contract costs, and contract liabilities (in thousands):

	January 1, 2019 balance	Additions	Deductions [1]	June 30, 2019 balance
Contract Assets	$ 35	3,510	(3,545)	$ —
Unbilled receivables, current	$ 1,916	2,758	(2,338)	$ 2,336
Unbilled receivables, non-current [2]	$ 786	—	(786)	$ —
Contract Costs [2]	$ 42	—	(38)	$ 4
Contract Liabilities: Deferred Revenue	$ 8,288	6,386	(5,574)	$ 9,100

[1] The asset or liability balances are presented as a net position per contract and accordingly the deductions column includes the netting effect of presenting each contract on a net position basis as either a net liability or asset.

[2] Included in non-current assets in our unaudited condensed consolidated balance sheets.

We had no asset impairment charges related to contract assets in thethree and six months ended June 30, 2019.

During the three and six months ended June 30, 2019, we recognized the following revenues (in thousands):

Revenue recognized in the period from:	Three months ended June 30, 2019	Six months ended June 30, 2019
Amounts included in contract liabilities at the beginning of the period:		
Performance obligations satisfied	$ 1,367	$ 3,752
Changes in the period:		
Changes in the estimated transaction price allocated to performance obligations satisfied in prior periods	(92)	43
Performance obligations satisfied from new activities in the period - contract revenue	11,044	24,106
Total revenue	$ 12,319	$ 27,901

Performance Obligations

The following table includes estimated revenue expected to be recognized in the future related to performance obligations that are unsatisfied or partially unsatisfied at the end of the reporting period. The estimated revenue does not include contracts with original durations of one year or less, amounts of variable consideration attributable to royalties, or contract renewals that are unexercised as of June 30, 2019.

The balances in the table below are partially based on judgments involved in estimating future orders from customers subject to the exercise of material rights pursuant to respective contracts.

(in thousands)	Remainder of 2019	2020	2021 and Thereafter	Total
Product Revenue	$ —	$ 1,910	$ 1,623	$ 3,533
Research and development revenue	5,567	—	—	5,567
Total	$ 5,567	$ 1,910	$ 1,623	$ 9,100

Note 4. Net Loss per Share

Basic net loss per share is computed by dividing the net loss by the weighted-average number of shares of common stock outstanding, less restricted stock awards ("RSAs") subject to forfeiture. Diluted net loss per share is computed by dividing net loss by the weighted average number of shares of common stock outstanding, less RSAs subject to forfeiture, plus all additional common stock shares that would have been outstanding, assuming dilutive potential common stock shares had been issued for other dilutive securities. For periods of net loss, diluted and basic net loss per share are identical since potential common stock shares are excluded from the calculation, as their effect was anti-dilutive.

Anti-Dilutive Securities

In periods of net loss, the weighted average number of shares outstanding related to potentially dilutive securities, prior to the application of the treasury stock method, are excluded from the computation of diluted net loss per common share because including such shares would have an anti-dilutive effect.

The following shares were not included in the computation of diluted net loss per share (in thousands):

	Three months ended June 30,		Six Months Ended June 30,	
	2019	2018	2019	2018
Shares of common stock issuable pursuant to equity awards outstanding under the Equity Incentive Plan	6,254	7,462	6,254	7,462

Note 5. Collaborative Arrangements

GSK Platform Technology Transfer, Collaboration and License Agreement

In July 2014, we entered into a CodeEvolver® protein engineering platform technology transfer collaboration and license agreement (the "GSK CodeEvolver® Agreement") with GlaxoSmithKline ("GSK"). Pursuant to the terms of the agreement, we granted GSK a non-exclusive license to use the CodeEvolver® protein engineering platform technology to develop novel enzymes for use in the manufacture of GSK's pharmaceutical and health care products.

We received an upfront fee upon the execution of the agreement in July 2014 and milestone payments in each of the years from 2014 through April 2016. We completed the transfer of the CodeEvolver® protein engineering platform technology to GSK in April 2016 and all revenues relating to the technology transfer have been recognized as of April 2016. We have the potential to receive additional cumulative contingent payments that range from $5.75 million to $38.5 million per project based on GSK’s successful application of the licensed technology. We are also eligible to receive royalties based on net sales of GSK’s sales of licensed enzyme products that are currently constrained.

Merck Platform Technology Transfer and License Agreement

In August 2015, we entered into a CodeEvolver® platform technology transfer collaboration and license agreement (the "Merck CodeEvolver® Agreement") with Merck, Sharp & Dohme ("Merck") which allows Merck to use the CodeEvolver® protein engineering technology platform in the field of human and animal healthcare.

We received an upfront license fee upon execution of the Merck CodeEvolver® Agreement, and milestone payments in September 2015 and in September 2016, when we completed the transfer of the engineering platform technology. Additionally, we recognized research and development revenues of $1.0 million and $2.0 million for the three and six months ended June 30, 2019, respectively, compared to $1.0 million and $1.9 million for the three and six months ended June 30, 2018, respectively, for various research projects under our collaborative arrangement.

We have the potential to receive payments of up to a maximum of $15.0 million for each commercial active pharmaceutical ingredient ("API") that is manufactured by Merck using one or more novel enzymes developed by Merck using the CodeEvolver® protein engineering technology platform. The API payments, which are currently not recognized in revenue, are based on quantity of API developed and manufactured by Merck and will be recognized as usage-based royalties.

In January 2019, we entered into an amendment to the Merck CodeEvolver® Agreement whereby we will install certain CodeEvolver® protein engineering technology upgrades into Merck's platform license installation and maintain those upgrades for a multi-year term. We recognized research and development revenues of $0.9 million for the three and six months ended June 30, 2019 under the amendment.

Merck Sitagliptin Catalyst Supply Agreement

In February 2012, we entered into a five-year Sitagliptin Catalyst Supply Agreement ("Sitagliptin Catalyst Supply Agreement") with Merck whereby Merck may obtain commercial scale substance for use in the manufacture of Januvia®, its product based on the active ingredient sitagliptin. In December 2015, Merck exercised its option under the terms of the Sitagliptin Catalyst Supply Agreement to extend the agreement for an additional five years through February 2022.

Effective as of January 2016, we and Merck amended the Sitagliptin Catalyst Supply Agreement to prospectively provide for variable pricing based on the cumulative volume of sitagliptin catalyst purchased by Merck and to allow Merck to purchase a percentage of its requirements for sitagliptin catalyst from a specified third-party supplier. Merck received a distinct, functional license to manufacture a portion of its demand beginning January 1, 2018, which we recognized as research and development revenue. We recognized no research and development revenue for the three and six months ended June 30, 2019, compared to zero and $1.3 million for the three and six months ended June 30, 2018, respectively.

We have determined that the variable pricing, which provides a discount based on the cumulative volume of sitagliptin catalyst purchased by Merck, provides Merck material rights and we are recognizing product revenues using the alternative method. Under the alternative approach, we estimate the total expected consideration and allocate it proportionately with the expected sales.

The Sitagliptin Catalyst Supply Agreement requires Merck to pay an annual fee for the rights to the sitagliptin technology each year for the term of the Sitagliptin Catalyst Supply Agreement. Amounts of annual license fees are based on contractually agreed prices and are on a declining scale over the term of the contract.

We had a deferred revenue balance from Merck of $1.5 million at June 30, 2019 and $3.6 million at December 31, 2018. In addition, pursuant to the terms of the Sitagliptin Catalyst Supply Agreement, Merck may purchase supply from us for a fee based on contractually stated prices and we recognized $2.5 million and $7.8 million for the three and six months ended June 30, 2019, respectively, compared to $2.7 million and $7.2 million for the three and six months ended June 30, 2018, respectively, in product revenue under this agreement.

Enzyme Supply Agreement

In November 2016, we entered into a supply agreement whereby our customer may purchase quantities of one of our proprietary enzymes for use in its commercial manufacture of a product. Pursuant to the supply agreement, we received an upfront payment of $0.8 million in December 2016, which we accordingly recorded as deferred revenue. Such upfront payment will be recognized over the period of the supply agreement as the customer purchases our proprietary enzyme. We additionally have determined that the volume discounts under the supply agreement provides the customer material rights and we are recognizing revenues using the alternative method. As of June 30, 2019 and December 31, 2018, we had deferred revenue from the supply agreement of $2.0 million.

Research and Development Agreement

In March 2017, we entered into a multi-year research and development services agreement with Tate & Lyle Ingredients Americas LLC ("Tate & Lyle") to develop enzymes for use in the manufacture of Tate & Lyle's zero-calorie TASTEVA® M Stevia sweetener. Under the agreement, we received an upfront payment of $3.0 million, which was recognized ratably over the maximum term of the services period of 21 months. Beginning January 1, 2018, we recognized revenue using a single measure of progress that depicted our performance in transferring the services. During the second quarter of 2018, Tate & Lyle opted to obtain additional development services that we completed by June 30, 2018 and we earned milestone payments upon completion of the services. We recognized no revenue for the three and six months ended June 30, 2019, compared to $4.5 million and $5.9 million for the three and six months ended June 30, 2018, respectively, for research and development services under the research and development agreement. As of June 30, 2019 and December 31, 2018, we had no deferred revenue from the development services agreement.

Global Development, Option and License Agreement and Strategic Collaboration Agreement

In October 2017, we entered into a Global Development, Option and License Agreement (the "Nestlé Agreement") with Nestec Ltd. ("Nestlé Health Science") and, solely for the purpose of the integration and the dispute resolution clauses of the Nestlé Agreement, Nestlé Health Science S.A., to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of PKU.

We received an upfront cash payment of $14.0 million upon the execution of the Nestlé Agreement, a $4.0 million milestone payment after dosing the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114, and a $1.0 million milestone payment upon achievement of a milestone relating to formulation of CDX-6114. The $4.0 million milestone payment that was triggered by the initiation of the trial was received in September 2018 and the $1.0 million milestone payment that was triggered by the achievement of a formulation relating to CDX-6114 was received in February 2019. The upfront payment and the variable consideration relating to the progress payment of $4.0 million and milestone payment of $1.0 million are being recognized over time as the development work is being performed. Revenue is being recognized using a single measure of progress that depicts our performance in transferring control of the services, which is based on the ratio of level of effort incurred to date compared to the total estimated level of effort required to complete all performance obligations under the agreement. We recognized development fees of $0.5 million and $1.7 million for the three and six months ended June 30, 2019, respectively, compared to $1.8 million and $4.5 million for the three and six months ended June 30, 2018, respectively, as research and development revenue. We had deferred revenue related to the development fees attributed to the milestone payment and upfront fees of $0.2 million at June 30, 2019 and $1.9 million at December 31, 2018.

In January 2019, we received notice from the FDA that it had completed its review of our IND for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. The option payment of $3.0 million was recognized as revenue in the first quarter of 2019 as research and development fees. Upon exercising its option, Nestlé Health Science has assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the second quarter of 2019. Other potential payments from Nestlé Health Science to us under the Nestlé Agreement include (i) development and approval milestones of up to $85.0 million, (ii) sales-based milestones of up to $250.0 million in the aggregate, which aggregate amount is achievable if net sales exceed $1.0 billion in a single year, and (iii) tiered royalties, at percentages ranging from the middle single digits to low double-digits, of net sales of product.

In addition to the Nestlé Agreement, we and Nestlé Health Science concurrently entered into a Strategic Collaboration Agreement (the "Strategic Collaboration Agreement") pursuant to which we and Nestlé Health Science will collaborate to leverage the CodeEvolver® protein engineering technology platform to develop novel enzymes for Nestlé Health Science's established Consumer Care and Medical Nutrition business areas. Under the Strategic Collaboration Agreement, we received an upfront payment of $1.2 million in 2017 and an incremental $0.6 million payment in September 2018 for additional services. We recognized research and development fees of $1.2 million and $2.5 million for the three and six months ended June 30, 2019, respectively, compared to $0.6 million and $1.2 million for the three and six months ended June 30, 2018, respectively. We had deferred revenue of $0.3 million and $0.8 million at June 30, 2019 and December 31, 2018, respectively.

Strategic Collaboration Agreement

In April 2018, we entered into the Porton Agreement with Porton to license key elements of Codexis' biocatalyst technology for use in Porton's global custom intermediate and API development and manufacturing business. Under the Porton

Agreement, we are eligible to receive annual collaboration fees and research and development revenues. We received an initial collaboration fee of $0.5 million within 30 days of the effective date of the agreement and as of December 31, 2018, we completed the technical transfer. Revenue relating to the functional license provided to Porton was recognized at a point in time when control of the license transferred to the customer in 2018.

Commercial Agreement

In April 2019, we entered into a multi-year commercial agreement with Tate & Lyle under which Tate & Lyle has received an exclusive license to use a suite of Codexis novel performance enzymes in the manufacture of Tate & Lyle's zero-calorie stevia sweetener, TASTEVA® M, and other stevia products. Under the agreement, we will supply Tate & Lyle with its requirements for these enzymes over a multiple year period.

Platform Technology Transfer and License Agreement

In May 2019, we entered into a Platform Technology Transfer and License Agreement (the "Novartis CodeEvolver® Agreement") with Novartis Pharma AG ("Novartis"). The Agreement allows Novartis to use Codexis' proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare. Under the Novartis CodeEvolver® Agreement, we will transfer the protein engineering platform technology to Novartis over approximately 20 months starting with the date on which we commence the technology transfer (the "Technology Transfer Period"). As a part of this technology transfer, our company will provide to Novartis Codexis' proprietary enzymes, proprietary protein engineering protocols and methods, and proprietary software algorithms. In addition, teams of Codexis and Novartis scientists will participate in technology training sessions and collaborative research projects at Codexis' laboratories in Redwood City, California and at a designated Novartis laboratory in Basel, Switzerland. Upon completion of technology transfer, Novartis will have the CodeEvolver® protein engineering platform technology installed at its designated laboratory.

Pursuant to the agreement, we received an upfront payment of $5 million shortly after the effective date of the Novartis CodeEvolver® Agreement. We are entitled to receive an additional $4 million subject to satisfactory completion of the second technology transfer milestone and an additional $5 million upon satisfactory completion of the third technology transfer milestone. In consideration for the continued disclosure and license of improvements to the Codexis technology and materials during a multi-year period that begins on the conclusion of the Technology Transfer Period ("Improvements Term"), Novartis will pay Codexis annual payments which amount to an additional $8 million. Codexis also has the potential to receive quantity-dependent, usage payments for each API that is manufactured by Novartis using one or more enzymes that have been developed or are in development using the CodeEvolver® protein engineering platform technology during the period that begins on the conclusion of the Technology Transfer Period and ends on the expiration date of the last to expire licensed patent. These product-related usage payments, if any, will be paid by Novartis to Codexis for each quarter that Novartis manufactures API using a CodeEvolver®-developed enzyme. The usage payments will be based on the total volume of API produced using the CodeEvolver®-developed enzyme. These usage payments can begin in the clinical stage, and will extend throughout the commercial life of each API. We recognized no revenue for the three and six months ended June 30, 2019. As of June 30, 2019, we had deferred revenue of $5.0 million from the Novartis CodeEvolver® Agreement.

Note 6. Cash Equivalents and Marketable Securities

Cash equivalents and marketable securities at June 30, 2019 and at December 31, 2018 consisted of the following (in thousands):

	June 30, 2019			
	Adjusted Cost	Gross Unrealized Gains (3)	Gross Unrealized Losses (3)	Estimated Fair Value
Money market funds (1)	$ 73,167	$ —	$ —	$ 73,167
Common shares of CO_2 Solutions (2)	563	—	(144)	419
Total	$ 73,730	$ —	$ (144)	$ 73,586

	December 31, 2018			
	Adjusted Cost	Gross Unrealized Gains[3]	Gross Unrealized Losses[3]	Estimated Fair Value
Money market funds [1]	$ 31,225	$ —	$ —	$ 31,225
Common shares of CO_2 Solutions [2]	563	25	—	588
Total	$ 31,788	$ 25	$ —	$ 31,813

[1] Money market funds are classified in cash and cash equivalents on our unaudited condensed consolidated balance sheets.
[2] Common shares of CO_2 Solutions are classified in equity securities on our unaudited condensed consolidated balance sheets.
[3] As a result of adopting ASU 2016-01, "*Financial Instruments-Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities*", in 2018 and thereafter gross unrealized gains and gross unrealized losses related to our investment in CO_2 Solutions were recognized in other expense, in our unaudited condensed consolidated statements of operations.

As of June 30, 2019, the total cash and cash equivalents balance of $93.4 million was comprised of money market funds of $73.2 million and cash of $20.2 million held with major financial institutions worldwide. As of December 31, 2018, the total cash and cash equivalents balance of $53.0 million was comprised of money market funds of $31.2 million and cash of $21.8 million held with major financial institutions worldwide.

In December 2009, we purchased 10,000,000 common shares of CO_2 Solutions, a company based in Quebec, Canada, whose shares are publicly traded in Canada on the TSX Venture Exchange. Our purchase represented approximately 16.6% of CO_2 Solutions' total common shares outstanding at the time of investment and was made in a private placement subject to a four-month statutory resale restriction. This restriction expired on April 15, 2010. Our investment in CO_2 Solutions is recorded at its fair value. See Note 7, "Fair Value Measurements." Through June 30, 2019, we concluded that we did not have the ability to exercise significant influence over CO_2 Solutions' operating and financial policies.

On January 1, 2018, we adopted ASU 2016-01. Upon adoption, we reclassified the $0.5 million net unrealized loss from accumulated other comprehensive loss to our opening accumulated deficit. We recognized unrealized loss of $64 thousand and $0.2 million, respectively, in the three and six months ended June 30, 2019, and unrealized loss of $20 thousand and unrealized gain of $5 thousand, respectively, in the three and six months ended June 30, 2018, related to our investment in CO_2 Solutions, which were included in other expense, net, in the unaudited condensed consolidated statements of operations.

Note 7. Fair Value Measurements

The following tables present the financial instruments that were measured at fair value on a recurring basis at June 30, 2019 and December 31, 2018 by level within the fair value hierarchy (in thousands):

	June 30, 2019			
	Level 1	Level 2	Level 3	Total
Money market funds	$ 73,167	$ —	$ —	$ 73,167
Common shares of CO_2 Solutions	419	—	—	419
Total	$ 73,586	$ —	$ —	$ 73,586

	December 31, 2018			
	Level 1	Level 2	Level 3	Total
Money market funds	$ 31,225	$ —	$ —	$ 31,225
Common shares of CO_2 Solutions	588	—	—	588
Total	$ 31,813	$ —	$ —	$ 31,813

We determine the fair value of Level 1 assets using quoted prices in active markets for identical assets. We estimated the fair value of our investment in 10,000,000 common shares of CO_2 Solutions using the market value of common shares as determined by trading on the TSX Venture Exchange, and we classified our investment in CO_2 Solutions within the fair value hierarchy as Level 1 at June 30, 2019 and December 31, 2018, respectively, using the quoted prices in an active market to determine their fair value.

Note 8. Balance Sheets Details

Inventories

Inventories consisted of the following (in thousands):

	June 30, 2019	December 31, 2018
Raw materials	$ 10	$ 165
Work-in-process	157	47
Finished goods	553	377
Inventories	$ 720	$ 589

Property and Equipment, net

Property and equipment, net consisted of the following (in thousands):

	June 30, 2019	December 31, 2018
Laboratory equipment	$ 22,464	$ 21,328
Leasehold improvements	10,804	10,359
Computer equipment and software	3,772	3,954
Office equipment and furniture	1,402	1,272
Construction in progress	137	939
Property and equipment	38,579	37,852
Less: accumulated depreciation and amortization	(33,267)	(33,093)
Property and equipment, net	$ 5,312	$ 4,759

Goodwill

Goodwill had a carrying value of approximately $3.2 million as of June 30, 2019 and December 31, 2018.

Other Accrued Liabilities

Other accrued liabilities consisted of the following (in thousands):

	June 30, 2019	December 31, 2018
Accrued purchases	$ 2,373	$ 1,492
Accrued professional and outside service fees	1,533	2,020
Deferred rent	—	343
Lease incentive obligation	—	425
Other	153	575
Total	$ 4,059	$ 4,855

Note 9. Stock-Based Compensation

Equity Incentive Plans

In June 2019, our board of directors (the "Board") and stockholders approved the 2019 Incentive Award Plan (the "2019 Plan"). The 2019 Plan supersedes and replaces in its entirety our 2010 Equity Incentive Plan (the “2010 Plan”) which was effective in March 2010, and no further awards will be granted under the 2010 Plan; however, the terms and conditions of the 2010 Plan will continue to govern any outstanding awards thereunder.

The number of shares of our common stock available for issuance under the 2019 Plan is equal to the sum of (i) 7,897,144 shares, and (ii) any shares subject to awards granted under the 2010 Plan that were outstanding as of April 22, 2019 and thereafter terminate, expire, lapse or are forfeited; provided that no more than 14,000,000 shares may be issued upon the

exercise of incentive stock options (“ISOs”). In June 2019, 8.1 million shares authorized for issuance under the 2019 Plan were registered under the Securities Act of 1933, as amended (the “Securities Act”).

The 2019 Plan provides for the grant of stock options, including incentive stock options and nonqualified stock options, stock appreciation rights, restricted stock, restricted stock units, other stock or cash based awards and dividend equivalents to eligible employees and consultants of the Company or any parent or subsidiary, as well as members of the Board.

The 2010 Plan provided for the grant of incentive stock options, non-statutory stock options, restricted stock units ("RSUs"), restricted stock awards ("RSAs"), performance-contingent restricted stock units ("PSUs"), performance based options ("PBOs"), stock appreciation rights, and stock purchase rights to our employees, non-employee directors and consultants.

Stock Options

The option exercise price for incentive stock options is at least 100% of the fair value of our common stock on the date of grant and the option exercise price for non-statutory stock options is at least 85% of the fair value of our common stock on the date of grant, as determined by the Board. If, at the time of a grant, the optionee directly or by attribution owns stock possessing more than 10% of the total combined voting power of all of our outstanding capital stock, the exercise price for these options must be at least 110% of the fair value of the underlying common stock. Stock options granted to employees generally have a maximum term of 10 years and vest over a four year period from the date of grant, of which 25% vest at the end of one year, and 75% vest monthly over the remaining three years. We may grant options with different vesting terms from time to time. Unless an employee's termination of service is due to disability or death, upon termination of service, any unexercised vested options will be forfeited at the end of three months or the expiration of the option, whichever is earlier.

Restricted Stock Units (RSUs)

We also grant employees RSUs, which generally vest over either a three year period with one-third of the shares subject to the RSUs vesting on each yearly anniversary of the vesting commencement date or over a four year period with 25% of the shares subject to the RSU vesting on each yearly anniversary of the vesting commencement date, in each case contingent upon such employee’s continued service on such vesting date. RSUs are generally subject to forfeiture if employment terminates prior to the release of vesting restrictions. We may grant RSUs with different vesting terms from time to time.

Performance-contingent Restricted Stock Units (PSUs) and Performance Based Options (PBOs)

The compensation committee of the Board approved, solely in respect of non-executive employees, delegated to our Chief Executive Officer the authority to approve grants of PSUs. The compensation committee of the Board also approved grants of PBOs and PSUs to our executives. The PSUs and PBOs vest based upon both the successful achievement of certain corporate operating milestones in specified timelines and continued employment through the applicable vesting date. When the performance goals are deemed to be probable of achievement for these types of awards, recognition of stock-based compensation expense commences. Once the number of shares eligible to vest is determined, those shares vest in two equal installments with 50% vesting upon achievement and the remaining 50% vesting on the first anniversary of achievement, in each case, subject to the recipient’s continued service through the applicable vesting date. If the performance goals are achieved at the threshold level, the number of shares eligible to vest in respect of the PSUs and PBOs would be equal to half the number of PSUs granted and one-quarter the number of shares underlying the PBOs granted. If the performance goals are achieved at the target level, the number of shares eligible to vest in respect of the PSUs and PBOs would be equal to the number of PSUs granted and half of the shares underlying the PBOs granted. If the performance goals are achieved at the superior level, the number of shares eligible to vest in respect of the PSUs would be equal to two times the number of PSUs granted and equal to the number of PBOs granted. The number of shares issuable upon achievement of the performance goals at the levels between the threshold and target levels for the PSUs and PBOs or between the target level and superior levels for the PSUs would be determined using linear interpolation. Achievement below the threshold level would result in no shares being eligible to vest in respect of the PSUs and PBOs.

In the first quarter of 2019, we awarded PSUs ("2019 PSUs") and PBOs ("2019 PBOs"), each of which commence vesting based upon the achievement of various weighted performance goals, including revenue growth, strategic advancement of biotherapeutics, cash balance and strategic plan development. As of June 30, 2019, we estimated that the 2019 PSUs and 2019 PBOs performance goals would be achieved at 106% of the target level, and recognized expenses accordingly.

In 2018, we awarded PSUs ("2018 PSUs") and PBOs ("2018 PBOs"), each of which commence vesting based upon the achievement of various weighted performance goals, including core business revenue growth, cash balance, new licensing collaborations, new research and development service revenue arrangements, technology advancement and novel therapeutic enzymes advancement. In the first quarter of 2019, we determined that the 2018 PSUs and 2018 PBOs performance goals had

been achieved at 118% of the target level, and recognized expenses accordingly. Accordingly, one-half of the shares underlying the 2018 PSUs and PBOs vested in the first quarter of 2019 and one-half of the shares underlying the 2018 PSUs and PBOs will vest in the first quarter of 2020, in each case subject to the recipient's continued service on each vesting date.

In 2017, we awarded PSUs ("2017 PSUs") and PBOs ("2017 PBOs"), each of which commence vesting based upon the achievement of various weighted performance goals, including revenue growth, fundraising, service revenue, new platform license revenue, and strategic advancement of biotherapeutics pipeline. In the first quarter of 2018, we determined that the 2017 PSU and PBO performance goals had been achieved at 134.2% of the target level, and recognized expenses accordingly. Accordingly, one-half of the shares underlying the 2017 PSUs and PBOs vested in the first quarter of 2018 and one-half of the shares underlying the 2017 PSUs and PBOs vested in the first quarter of 2019, in each case subject to the recipient's continued service on each vesting date.

Stock-Based Compensation Expense

Stock-based compensation expense is included in the unaudited condensed consolidated statements of operations as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2019	2018	2019	2018
Research and development	$ 403	$ 567	$ 791	$ 1,003
Selling, general and administrative	1,585	1,890	3,260	3,434
Total	$ 1,988	$ 2,457	$ 4,051	$ 4,437

The following table presents total stock-based compensation expense by security type included in the unaudited condensed consolidated statements of operations for the three and six months ended June 30, 2019 and 2018 (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2019	2018	2019	2018
Stock options	$ 581	$ 535	$ 1,135	$ 1,015
RSUs and RSAs	386	436	847	878
PSUs	316	426	707	844
PBOs	705	1,060	1,362	1,700
Total	$ 1,988	$ 2,457	$ 4,051	$ 4,437

As of June 30, 2019, unrecognized stock-based compensation expense, net of expected forfeitures, was $5.2 million related to unvested employee stock options, $1.4 million related to unvested RSUs and RSAs, $1.1 million related to unvested PSUs, and $3.1 million related to unvested PBOs based on current estimates of the level of achievement. Stock-based compensation expense will be recognized through the year of 2023.

Valuation Assumptions

The weighted-average assumptions used to estimate the fair value of employee stock options and PBOs granted were as follows:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2019	2018	2019	2018
		(1)		
Expected term (in years)	5.6	—	5.6	5.6
Volatility	55%	—%	56%	60%
Risk-free interest rate	2.28%	—%	2.48%	2.70%
Dividend yield	—%	—%	—%	—%
Weighted-average estimated fair value of stock options granted	$ 10.02	$ —	$ 11.40	$ 5.02

(1) The Company did not grant employee stock options or PBOs in the three months ended June 30, 2018.

Note 10. Capital Stock

Exercise of Options

For the six months ended June 30, 2019 and 2018, 529,187 and 302,703 shares, respectively, were exercised at a weighted-average exercise price of $5.37 and $6.14 per share, respectively, with net cash proceeds of $2.8 million and $1.9 million, respectively.

Private Offering

In June 2019, we entered into a Securities Purchase Agreement with an affiliate of Casdin pursuant to which we issued and sold to Casdin 3,048,780 shares of our common stock at a purchase price of $16.40 per share. After deducting legal fees of $74 thousand from the Private Offering, our net proceeds were $49.9 million.

In June 2019, we also entered into a Registration Rights Agreement (the "Registration Rights Agreement") with Casdin. Pursuant to the Registration Rights Agreement, we agreed, subject to certain conditions, to prepare and file a registration statement with the Securities and Exchange Commission (the "SEC") within 180 days after the closing of the Private Offering, if we are a "well known seasoned issuer" at such time (210 days if we are not then a "well known seasoned issuer") for purposes of registering the resale of the Shares and any shares of common stock issued as a dividend or other distribution with respect to the Shares. We also agreed, subject to certain conditions, to use our commercially reasonable best efforts to cause this registration statement to become effective within 180 days after the closing of the Private Offering, if we are a "well known seasoned issuer" at such time (210 days we are not then a "well known seasoned issuer"). We further agreed, among other things, to indemnify the selling holders under the registration statement from certain losses, claims, damages and liabilities and to pay all fees and expenses (excluding underwriting discounts and selling commissions) incident to the performance of, or compliance with, our obligations under the Registration Rights Agreement.

The Private Offering was exempt from registration pursuant to the exemption for transactions by an issuer not involving any public offering under Section 4(a)(2) the Securities Act, and Regulation D under the Securities Act.

Note 11. Commitments and Contingencies

Operating Leases

Our headquarters are located in Redwood City, California, where we occupy approximately 107,200 square feet of office and laboratory space in four buildings within the same business park of Metropolitan Life Insurance Company ("MetLife"). Our lease ("Lease") with MetLife includes approximately 28,200 square feet of space located at 200 and 220 Penobscot Drive, Redwood City, California (the "Penobscot Space"), approximately 37,900 square feet of space located at 400 Penobscot Drive, Redwood City, California (the "Building 2 Space"), approximately 11,200 square feet of space located at 501 Chesapeake Drive, Redwood City, California (the "501 Chesapeake Space"), and approximately 29,900 square feet of space located at 101 Saginaw Drive, Redwood City, California (the "Saginaw Space").

We entered into the initial lease with MetLife for a portion of this space in 2004 and the lease has been amended multiple times since then to adjust space and amend the terms of the Lease. The lease amendment ("Seventh Amendment") in October 2016 waived our existing asset retirement obligation for one of our buildings and extended the lease term to January 2022. The various terms for the spaces under the lease have expiration dates that range from January 2020 through January 2022. Beginning in February 2014, we have subleased certain office and laboratory space to different subtenants with separate options to extend the subleases. These subleases will expire in November 2019.

In February 2019, we entered into the eighth amendment to the Lease ("Eighth Amendment") with MetLife to extend the lease terms for the Penobscot Space, the Building 2 Space and the Chesapeake Space for another 88 months. The lease on the Saginaw Space will expire in January 2020. The lease terms for the Penobscot Space and Building 2 Space have an expiration date of May 2027. The lease term for the 501 Chesapeake Space has an expiration date of May 2029.

We incurred $3.6 million of capital improvement costs related to the facilities leased from MetLife through December 31, 2012. During 2011 and 2012, we requested and received $3.1 million of reimbursements from the landlord for the tenant improvement and HVAC allowances for the completed construction. The reimbursements were recorded once cash was received and are amortized on a straight line basis over the term of the lease as a reduction in rent expense. The remaining lease incentive obligations were zero and $0.5 million at June 30, 2019 and December 31, 2018, respectively. Prior to adoption of ASC 842, lease incentive obligation were reflected as liabilities on the unaudited condensed consolidated balance sheets. Upon adoption of ASC 842, lease incentive obligations were cleared to zero to create our right-of-use assets related to operating lease,

reflected on the unaudited condensed consolidated balance sheets. Rent expense for the Redwood City properties is recognized on a straight-line basis over the term of the lease.

We are required to restore certain areas of the Redwood City facilities that we are renting to their original form. We are expensing the asset retirement obligation over the terms of the respective leases. We review the estimated obligation each reporting period and make adjustments if our estimates change. We recorded asset retirement obligations of $0.2 million as of June 30, 2019 and December 31, 2018, respectively, which are included in other liabilities on the unaudited condensed consolidated balance sheets. Accretion expense related to our asset retirement obligations was nominal in the three and six months ended June 30, 2019 and 2018.

Pursuant to the terms of the amended lease agreement, we exercised our right to deliver a letter of credit in lieu of a security deposit. The letter of credit is collateralized by deposit balances held by the bank in the amount of $1.1 million and $0.7 million as of June 30, 2019 and December 31, 2018, respectively. These deposits are recorded as restricted cash on the unaudited condensed consolidated balance sheets.

Rent expense was $1.1 million and $2.3 million during the three and six months ended June 30, 2019, respectively, partially offset by sublease income of $0.3 million and $0.5 million, respectively. Rent expense was $0.8 million and $1.6 million during the three and six months ended June 30, 2018, respectively, partially offset by sublease income of $0.3 million and $0.6 million, respectively.

Finance Leases

In December 2016, we entered into a three-year financing lease agreement with a third party supplier for the purchase of laboratory equipment that was partially financed through a finance lease of approximately $0.4 million. The lease became effective upon delivery of the equipment, which occurred in February 2017, and the term of the lease is three years from the effective date. This financing agreement was accounted for as a finance lease due to the bargain purchase option at the end of the lease.

In April 2017, we entered into a three-year financing lease agreement with a third party supplier for the purchase of information technology equipment for approximately $0.3 million. The effective date of the lease was May 19, 2017 and the term of the lease is three years. This financing agreement was accounted for as a finance lease due to the bargain purchase option at the end of the lease.

Adoption of ASC 842

On January 1, 2019, we adopted ASC 842, using a modified retrospective approach and effective date method per adoption of ASU 2018-11. We completed the full analysis by January, 2019 and we evaluated the right-of-use (ROU) assets and lease obligations using the incremental borrowing rate (IBR) at December 31, 2018 because the implicit rate is not readily determinable in the lease agreement. Upon adoption of ASC 842, all existing leases will be classified as either operating lease or finance lease. All existing leases that were classified as capital leases in accordance with Topic 840 will be classified as finance leases. We recorded $26.6 million of ROU assets and $27.6 million of lease obligations for operating leases, and $0.5 million of ROU assets and $0.3 million of lease obligations for finance leases in the balance sheet at the beginning of 2019.

Practical Expedients, Elections, and Exemptions

We used a practical expedient available under ASC 842-10-65-1(f) that permits us not to reassess whether any expired or existing contracts are or contain leases; not to reassess the lease classification for any expired or existing leases (for example, all existing leases that were classified as operating leases in accordance with ASC 840 will be classified as operating leases, and all existing leases that were classified as capital leases in accordance with ASC 840 will be classified as finance leases); and not to reassess initial direct costs for any existing leases.

On January 1, 2019, we also made an accounting policy election (by class of underlying asset to which the right of use relates) to apply accounting to leases that meet ASC 842's definition of a short-term lease (i.e., the short-term lease exemption). A short-term lease is defined as a lease that, at the commencement date, has a lease term of 12 months or less and does not include an option to purchase the underlying asset that the lessee is reasonably certain to exercise.

The following table shows the reconciliation of right-of-use assets and lease obligations, with balances reflecting the adoption of ASC 842, related to both operating leases and finance leases and gives effect to the modified retrospective adoption

and effective date method of the lease guidance on January 1, 2019 (in thousands):

	Operating leases	Finance Leases
Right-of-use assets, balance at December 31, 2018	$ —	$ —
Changes in the period:		
Right-of-use assets created upon adoption of ASC 842	26,617	493
Right-of-use assets, balance at January 1, 2019	$ 26,617	$ 493
Lease obligations, balance at December 31, 2018	$ —	$ —
Changes in the period:		
Lease obligations created upon adoption of ASC 842	27,562	302
Lease obligations, balance at January 1, 2019	$ 27,562	$ 302

Lease related expenses under non-cancellable finance and operating leases and under non-cancellable subleases as follows (in thousands except discount rate and lease term):

	Three months ended June 30, 2019	Six months ended June 30, 2019
Lease costs		
Finance lease cost:		
Amortization of right-of-use assets	$ 54	$ 109
Interest on lease obligations	3	6
Operating lease cost	1,100	2,278
Sublease income	(254)	(465)
Total lease cost	$ 903	$ 1,928
Other information		
Weighted-average remaining lease term (in years):		
Finance leases		0.8
Operating leases		8.1
Weighted-average discount rate:		
Finance leases		5.0%
Operating leases		6.6%
Cash paid for amounts included in the measurement of lease obligations		
Operating cash flows from operating leases		$ (1,633)
Operating cash flows from finance leases		$ (6)
Financing cash flows from finance leases		$ (119)

As of June 30, 2019, under ASC 842, maturity analysis of annual undiscounted cash flows of the non-cancellable finance and operating leases as follows (in thousands):

Years ending December 31,	Finance Leases	Operating Leases
2019 (remaining 6 months)	$ 126	$ 1,648
2020	61	2,816
2021	—	4,197
2022	—	4,285
2023	—	4,589
2024 and thereafter	—	18,220
Total minimum lease payments [1]	$ 187	$ 35,755
Less: imputed interest	(4)	(8,925)
Lease Obligations	$ 183	$ 26,830

[1] Minimum payments have not been reduced by future minimum sublease rentals of $0.4 million to be received under non-cancellable subleases atJune 30, 2019.

As of December 31, 2018, under ASC 840, maturity analysis of annual undiscounted cash flows of the non-cancellable capital and operating leases as follows (in thousands):

Years ending December 31,	Capital Leases	Operating Leases
2019	$ 252	$ 3,280
2020	61	712
2021	—	490
2022	—	41
2023	—	—
Total minimum lease payments [1]	313	$ 4,523
Less: amount representing interest	(10)	
Present value of capital lease obligations	303	
Less: current portion	(242)	
Long-term portion of capital leases	$ 61	

[1] Minimum payments have not been reduced by future minimum sublease rentals of $0.9 million to be received under non-cancellable subleases.

Other Commitments

We enter into supply and service arrangements in the normal course of business. Supply arrangements are primarily for fixed-price manufacture and supply. Service agreements are primarily for the development of manufacturing processes and certain studies. Commitments under service agreements are subject to cancellation at our discretion which may require payment of certain cancellation fees. The timing of completion of service arrangements is subject to variability in estimates of the time required to complete the work.

The following table provides quantitative data regarding our other commitments. Future minimum payments reflect amounts that we expect to pay including potential obligations under services agreements subject to risk of cancellation by us (in thousands):

Other Commitment Agreement Type	Agreement Date	Future Minimum Payment
Manufacture and supply agreement with expected future payment date of December 2022	April 2016	$ 1,269
Service agreement for clinical trial	December 2017	163
Total other commitments		$ 1,432

Credit Facility

Effective June 30, 2017, we entered into a credit facility (the "Credit Facility") consisting of term loans ("Term Debt") totaling up to $10.0 million, and advances ("Advances") under a revolving line of credit ("Revolving Line of Credit") totaling up to $5.0 million with an accounts receivable borrowing base of 80% of eligible accounts receivable. At June 30, 2019, we have not drawn from the Credit Facility. In September 2018, we entered into a Fourth Amendment to the Credit Facility whereby the draw period on the term debt was extended to September 30, 2019. In January 2019, we entered into a Fifth Amendment to the Credit Facility to allow for Codexis to obtain a letter of credit of up to $1.1 million to secure its obligations under the Lease with MetLife. We may draw on the Term Debt at any time prior to September 30, 2019, subject to customary conditions for funding including, among others, that no event of default exists. We may draw on the Revolving Line of Credit at any time prior to the maturity date. On October 1, 2022, any loans for Term Debt mature and the Revolving Line of Credit terminates. Term Debt bears interest through maturity at a variable rate based on the London Interbank Offered Rate plus 3.60%. Advances under the Revolving Line of Credit bear interest at a variable annual rate equal to the greater of (i) 1.00% above the prime rate and (ii) 5.00%.

The Credit Facility allows for interest-only payments on Term Debt through November 1, 2020. Monthly payments of principal and interest on the Term Debt are required following the applicable amortization date. We may elect to prepay in full the Term Debt and Advances under the Revolving Line of Credit at any time.

Our obligations under the Credit Facility are secured by a lien on substantially all of our personal property other than our intellectual property. The Credit Facility includes a number of customary covenants and restrictions which require us to comply with certain financial covenants including achieving consolidated product revenues levels at minimum levels as set forth in the Credit Facility unless we maintain certain minimum cash levels with the lender in an amount equal to or greater than six times the sum of the average six-month trailing operating cash flow net outlay plus the average monthly principal due and payable in the immediately succeeding three-month period. The Credit Facility places various restrictions on our transferring collateral, incurring additional indebtedness, engaging in mergers or acquisitions, paying dividends or making other distributions, making investments, creating liens, and selling assets and permitted assets to be held at foreign subsidiaries above specified caps, in each case subject to certain exceptions. A failure to comply with these covenants could permit the lender to exercise remedies against us and the collateral securing the Credit Facility, including foreclosure of our properties securing the Credit Facility and our cash. At June 30, 2019, we were in compliance with the covenants for the Credit Facility.

Legal Proceedings

We are not currently a party to any material pending litigation or other material legal proceedings.

In February 2018, Codexis and EnzymeWorks, Inc. (U.S.), Suzhou Hanmei Biotechnology Co. Ltd, d/b/a EnzymeWorks, Inc. (China) (collectively, "EnzymeWorks"), Junhua Tao, and Andrew Tao, reached a confidential settlement concerning the lawsuit filed by us against them in February 2016, in the United States District Court for the Northern District of California. The parties have also stipulated to a judgment of patent infringement of all asserted patents against EnzymeWorks, and a permanent injunction barring any future infringement. The remaining claims against EnzymeWorks, and all claims against Junhua Tao, and Andrew Tao including trade secret misappropriation, breach of contract and voidable transfer have been dismissed with prejudice. This case is completed.

Indemnifications

We are required to recognize a liability for the fair value of any obligations we assume upon the issuance of a guarantee. We have certain agreements with licensors, licensees, and collaborators that contain indemnification provisions. In such provisions, we typically agree to indemnify the licensor, licensee and collaborator against certain types of third party claims. The maximum amount of the indemnifications is not limited. We accrue for known indemnification issues when a loss is probable and can be reasonably estimated. There were no accruals for expenses related to indemnification issues for any periods presented.

Note 12. Related Party Transactions

AstraZeneca PLC

Pam P. Cheng, a member of our board of directors, joined AstraZeneca PLC as Executive Vice President, Operations and Information Technology in June 2015. We sell biocatalyst products to AstraZeneca PLC and its controlled purchasing agents and contract manufacturers.

We recognized $0.4 million in revenue in the three and six months ended June 30, 2019, compared to $55 thousand and $0.4 million in the three and six months ended June 30, 2018 from transactions with AstraZeneca PLC and its controlled purchasing agents and contract manufacturers, respectively. AtJune 30, 2019 and December 31, 2018, we had $0.4 million and $0.2 million of accounts receivables from AstraZeneca, PLC, and its controlled purchasing agents and contract manufacturers, respectively.

Note 13. Segment, Geographical and Other Revenue Information

Segment Information

As discussed in Note 2, "Basis of Presentation and Summary of Significant Accounting Policies," beginning in 2018, we identified our biotherapeutics business as a standalone business segment. Our two reportable business segments as of January 1, 2018, consisted of Performance Enzymes and Novel Biotherapeutics.

We report corporate-related expenses such as legal, accounting, information technology, and other costs that are not otherwise included in our reportable business segments as "Corporate costs." All items not included in income (loss) from operations are excluded from the business segments.

We manage our assets on a total company basis, not by business segment, as the majority of our operating assets are shared or commingled. Our CODM does not review asset information by business segment in assessing performance or allocating resources, and accordingly, we do not report asset information by business segment.

Performance Enzymes

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, and to date this continues to be our largest market served. Our customers, which include many large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development. We have also used the technology to develop customized enzymes for use in other industrial markets. These markets consist of several large industrial verticals, including food and food ingredients, animal feed, flavors, fragrances, and agricultural chemicals. We also use our technology to develop enzymes for customers using NGS and PCR/qPCR for in vitro molecular diagnostic and molecular biology research applications.

Novel Biotherapeutics

We are also targeting new opportunities in the pharmaceutical industry to discover, improve, and/or develop biotherapeutic drug candidates. We believe that our CodeEvolver® protein engineering platform technology can be used to discover novel biotherapeutic drug candidates that will target human diseases that are in need of improved therapeutic interventions. Similarly, we believe that we can deploy our platform technology to improve specific characteristics of a customer’s pre-existing biotherapeutic drug candidate, such as its activity, stability or immunogenicity. Most notable is our lead program for the potential treatment of PKU in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In October 2017, we announced a strategic collaboration with Nestlé Health

Science to advance CDX-6114, our own novel orally administrable enzyme therapeutic candidate for the potential treatment of PKU. In July 2018, we announced that we had dosed the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114, which was conducted in Australia. In November 2018, we announced top-line results from the Phase 1a study in healthy volunteers with CDX-6114. In December 2018, Nestlé Health Science became obligated to pay us an additional $1.0 million within 60 days after the achievement of a milestone relating to formulation of CDX-6114. In January 2019, we received notice from the U.S. Food and Drug Administration (the "FDA") that it had completed its review of our investigational new drug application ("IND") for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive license for the global development and commercialization of CDX-6114 for the management of PKU. The option payment of $3 million was recognized as revenue in the first quarter of 2019 as research and development fees. Upon exercising its option, Nestlé Health Science has assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the second quarter of 2019. For the three and six months ended June 30, 2019 and 2018, all revenues related to the Novel Biotherapeutics segment were generated from our collaborations with Nestlé Health Science.

We have also developed a pipeline of other biotherapeutic drug candidates, which are in preclinical development, and in which we expect to continue to make additional investments with the aim of advancing additional product candidates targeting other therapeutic areas.

Our CODM regularly reviews our segments and the approach provided by management for performance evaluation and resource allocation.

Operating expenses that directly support the segment activity are allocated based on segment headcount, revenue contribution or activity of the business units within the segments, based on the corporate activity type provided to the segment. The expense allocation excludes certain corporate costs that are separately managed from the segments. This provides the CODM with more meaningful segment profitability reporting to support operating decisions and allocate resources.

The following table provides financial information by our reportable business segments along with a reconciliation to consolidated loss before income taxes (in thousands):

	Three months ended June 30, 2019			Three months ended June 30, 2018		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Revenues:						
Product revenue	$ 6,249	$ —	$ 6,249	$ 3,723	$ —	$ 3,723
Research and development revenue	4,340	1,730	6,070	7,442	2,373	9,815
Total revenues	10,589	1,730	12,319	11,165	2,373	13,538
Costs and operating expenses:						
Cost of product revenue	2,772	—	2,772	2,611	—	2,611
Research and development[1]	5,134	2,856	7,990	4,724	2,442	7,166
Selling, general and administrative	2,362	561	2,923	1,729	304	2,033
Total segment costs and operating expenses	10,268	3,417	13,685	9,064	2,746	11,810
Income (loss) from operations	$ 321	$ (1,687)	$ (1,366)	$ 2,101	$ (373)	$ 1,728
Corporate costs [2]			(4,698)			(5,209)
Depreciation and amortization			(427)			(265)
Loss before income taxes			$ (6,491)			$ (3,746)

[1] Research and development expenses exclude depreciation.

[2] Corporate costs include unallocated selling, general and administrative expense, interest income, and other income and expenses.

	Six months ended June 30, 2019			Six months ended June 30, 2018		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Revenues:						
Product revenue	$ 14,236	$ —	$ 14,236	$ 9,886	$ —	$ 9,886
Research and development revenue	6,440	7,225	13,665	12,008	5,686	17,694
Total revenues	20,676	7,225	27,901	21,894	5,686	27,580
Costs and operating expenses:						
Cost of product revenue	7,163	—	7,163	6,436	—	6,436
Research and development[1]	9,576	6,172	15,748	9,790	4,374	14,164
Selling, general and administrative	4,463	1,078	5,541	3,825	450	4,275
Total segment costs and operating expenses	21,202	7,250	28,452	20,051	4,824	24,875
Income (loss) from operations	$ (526)	$ (25)	$ (551)	$ 1,843	$ 862	$ 2,705
Corporate costs[2]			(10,271)			(10,644)
Depreciation and amortization			(802)			(503)
Loss before income taxes			$ (11,624)			$ (8,442)

[1] Research and development expenses exclude depreciation.
[2] Corporate costs include unallocated selling, general and administrative expense, interest income, and other income and expenses.

The following table provides stock-based compensation expense included in income (loss) from operations by segment (in thousands):

	Three months ended June 30, 2019			Three months ended June 30, 2018		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Stock-based compensation	$ 601	$ 197	$ 798	$ 768	$ 83	$ 851

	Six months ended June 30, 2019			Six months ended June 30, 2018		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Stock-based compensation	$ 1,237	$ 338	$ 1,575	$ 1,326	$ 146	$ 1,472

Significant Customers

Customers that each contributed 10% or more of our total revenues were as follows:

	Percentage of Total Revenues for the			
	Three Months Ended June 30,		Six Months Ended June 30,	
	2019	2018	2019	2018
Customer A	35%	27%	38%	38%
Customer B	14%	18%	26%	21%
Customer C	*	34%	*	22%
Customer D	11%	*	*	*

Customers that each contributed 10% or more of our total accounts receivable had the following balances as of the periods presented:

	Percentage of Accounts Receivables as of	
	June 30, 2019	December 31, 2018
Customer A	39%	37%
Customer B	*	17%
Customer D	11%	*
Customer E	15%	*
Customer F	*	16%
Customer G	*	11%

* *Less than 10% of the period presented*

Geographical Information

Geographic revenues are identified by the location of the customer and consist of the following (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2019	2018	2019	2018
Revenues				
Americas	$ 4,076	$ 6,058	$ 6,913	$ 9,655
EMEA	4,741	3,808	12,466	8,800
APAC	3,502	3,672	8,522	9,125
Total revenues	$ 12,319	$ 13,538	$ 27,901	$ 27,580

Identifiable long-lived assets by location and goodwill by reporting unit were as follows:

Long-lived assets:	June 30, 2019	December 31, 2018
United States	$ 30,936	$ 4,759

	As of June 30, 2019 and December 31, 2018		
	Performance Enzymes	Novel Biotherapeutics	Total
Goodwill	$ 2,463	$ 778	$ 3,241

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following management's discussion and analysis of our financial condition and results of operations should be read in conjunction with the unaudited condensed consolidated financial statements and the related notes thereto included elsewhere in this Quarterly Report on Form 10-Q and the audited consolidated financial statements and notes thereto and management's discussion and analysis of financial condition and results of operations for the year ended December 31, 2018 included in our Annual Report on Form 10-K for the year ended December 31, 2018, as filed with the SEC on March 1, 2019 (the "Annual Report"). This Quarterly Report on Form 10-Q contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). These statements include, but are not limited to, expectations regarding our strategy, business plans, financial performance and developments relating to our industry. These statements are often identified by the use of words such as may, will, expect, believe, anticipate, intend, could, should, estimate or continue, and similar expressions or variations. Such forward-looking statements are subject to risks, uncertainties and other factors that could cause actual results and the timing of certain events to differ materially from future results expressed or implied by such forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those set forth in Part II, Item 1A of this Quarterly Report on Form 10-Q and Part I, Item 1A of our Annual Report, as incorporated herein and referenced in Part II, Item 1A of this Quarterly Report on Form 10-Q and elsewhere in this report. The forward-looking statements in this Quarterly Report on Form 10-Q represent our views as of the date of this Quarterly Report on Form 10-Q. We anticipate that subsequent events and developments will cause our views to change. However, while we may elect to update these forward-looking statements at some point in the future, we have no current intention of doing so except to the extent required by applicable law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date subsequent to the date of this Quarterly Report on Form 10-Q.

Business Overview

We discover, develop and sell proteins that deliver value to our clients in a growing set of industries. We view proteins as a vast untapped source of value-creating materials, and we are using our proven technologies, which we have been continuously improving since our inception in 2002, to commercialize an increasing number of novel proteins, both as proprietary Codexis products and in partnership with our customers.

We are a pioneer in the harnessing of computational technologies to drive biology advancements. Since 2002, we have made substantial investments in the development of our CodeEvolver® protein engineering technology platform, the primary source of our competitive advantage. Our technology platform is powered by proprietary, artificial intelligence-based, computational algorithms that rapidly mine our large and continuously growing library of protein variants' performance attributes. These computational outputs enable increasingly reliable predictions for next generation protein variants to be engineered, enabling delivery of targeted performance enhancements in a time-efficient manner. In addition to its computational prowess, our CodeEvolver® protein engineering technology platform integrates additional modular competencies, including robotic high-throughput screening and genomic sequencing, organic chemistry and process development which are all coordinated to create our novel protein innovations.

Our approach to developing commercially viable biocatalytic manufacturing processes begins by conceptually designing the most cost-effective and practical process for a targeted product. We then develop optimized protein catalysts to enable that process design using our CodeEvolver® protein engineering platform technology. Engineered protein catalyst candidates - many thousands for each protein engineering project - are then rapidly screened and validated in high throughput screening under relevant manufacturing operating conditions. This approach results in an optimized protein catalyst enabling cost-efficient processes that typically are relatively simple to run in conventional manufacturing equipment. This also allows for the efficient technical transfer of our process to our manufacturing partners.

The successful embodiment of our CodeEvolver® protein engineering technology platform in commercial manufacturing processes requires well-integrated expertise in a number of technical disciplines. In addition to those directly involved in practicing our CodeEvolver® protein engineering platform technology, such as molecular biology, enzymology, microbiology, cellular engineering, metabolic engineering, bioinformatics, biochemistry and high throughput analytical chemistry, our process development projects also involve integrated expertise in organic chemistry, chemical process development, chemical engineering, fermentation process development and fermentation engineering. Our integrated, multi-disciplinary approach to biocatalyst and process development is a critical success factor for our company.

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, which remains our primary business focus. Our customers, which include several large global

pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development.

We have also used the technology to develop protein catalysts for use in the fine chemicals market. The fine chemicals market consists of several large market verticals, including food and food ingredients, animal feed, flavors, fragrances and agricultural chemicals.

We have also begun using the CodeEvolver® protein engineering technology platform to develop early stage, novel biotherapeutic product candidates, both for our customers and for our own business, most notably our lead program for the potential treatment of phenylketonuria ("PKU") in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In October 2017, we entered into a Global Development, Option and License Agreement (the "Nestlé Agreement") with Nestec Ltd. ("Nestlé Health Science"), to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of PKU. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive license to develop and commercialize CDX-6114.

In April 2018, we entered into a strategic agreement (the "Porton Agreement") with Porton Pharma Solutions, Ltd. ("Porton") to license key elements of our CodeEvolver® protein engineering technology platform to Porton's global custom intermediate and active pharmaceutical ingredients ("API") development and manufacturing business. This gives us access to a wide variety of small and medium-sized pharmaceutical customers.

We are also using our technology to develop enzymes for customers using next generation sequencing ("NGS") and polymerase chain reaction ("PCR/qPCR") for in vitro molecular diagnostic and genomic research applications. Our first enzyme for this application is a DNA ligase which we began marketing to customers in 2018.

In May 2019, we entered into a Platform Technology Transfer and License Agreement (the "Novartis CodeEvolver® Agreement") with Novartis Pharma AG ("Novartis"). The Novartis CodeEvolver® Agreement allows Novartis to use Codexis' proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare.

Business Segments

We manage our business as two business segments: Performance Enzymes and Novel Biotherapeutics.

Performance Enzymes

We initially commercialized our CodeEvolver® protein engineering technology platform and products in the pharmaceuticals market, and to date this continues to be our largest market served. Our customers, which include many large global pharmaceutical companies, use our technology, products and services in their manufacturing processes and process development. We have also used the technology to develop customized enzymes for use in other industrial markets. These markets consist of several large industrial verticals, including food and food ingredients, animal feed, flavors, fragrances, and agricultural chemicals. We also use our technology to develop enzymes for customers using NGS and PCR/qPCR for in vitro molecular diagnostic and molecular biology research applications. In April 2018, we entered into the Porton Agreement related to our strategic collaboration with Porton to license key elements of our world-leading biocatalyst technology for use in Porton's global custom intermediate and API development and manufacturing business.

Novel Biotherapeutics

We are also targeting new opportunities in the pharmaceutical industry to discover, improve, and/or develop biotherapeutic drug candidates. We believe that our CodeEvolver® protein engineering platform technology can be used to discover novel biotherapeutic drug candidates that will target human diseases that are in need of improved therapeutic interventions. Similarly, we believe that we can deploy our platform technology to improve specific characteristics of a customer's pre-existing biotherapeutic drug candidate, such as its activity, stability or immunogenicity. Most notable is our lead program for the potential treatment of PKU in humans. PKU is an inherited metabolic disorder in which the enzyme that converts the essential amino acid phenylalanine into tyrosine is deficient. In October 2017, we announced a strategic collaboration with Nestlé Health Science to advance CDX-6114, our own novel orally administrable enzyme therapeutic candidate for the potential treatment of PKU. In July 2018, we announced that we had dosed the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114, which was conducted in Australia. In November 2018, we announced top-line results from the Phase 1a study in healthy volunteers with CDX-6114. In December 2018, Nestlé Health Science became obligated to pay us an additional $1.0 million within 60 days after the achievement of a milestone relating to formulation of CDX-6114. In January 2019, we received notice from the U.S. Food and Drug Administration (the "FDA") that it had completed its review of our investigational new drug application ("IND") for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending

dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. As a result of the option exercise, we earned a milestone and recognized $3.0 million in revenues in the first quarter of 2019. Upon exercising its option, Nestlé Health Science has assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the second quarter of 2019.

We have also developed a pipeline of other biotherapeutic drug candidates, which are in preclinical development, and in which we expect to continue to make additional investments with the aim of advancing additional product candidates targeting other therapeutic areas.

For further description of our business segments, see Note 13, "Segment, Geographical and Other Revenue Information," in the Notes to Unaudited Condensed Consolidated Financial Statements included in this Quarterly Report on Form 10-Q.

Results of Operations Overview

Revenues decreased to $12.3 million for the second quarter of 2019 from $13.5 million in the second quarter of 2018, primarily due to lower research and development revenue partially offset by higher product revenue. Product revenue for the second quarter of 2019 increased by $2.5 million to $6.2 million from $3.7 million in the second quarter of 2018 primarily due to higher customer demand for enzymes for both generic and branded products.

Research and development revenue decreased by $3.7 million for the second quarter of 2019 to $6.1 million from $9.8 million in the second quarter of 2018, due to prior year completion of services to Tate & Lyle for their sweetener product. The revenue recognition of a software license fee from Merck partially offset the decrease in research and development revenue.

Product gross margins were 56% for the second quarter of 2019, compared to 30% in the same period in 2018, due to improved sales mix. Our profit margins are affected by many factors including the costs of internal and third-party fixed and variable costs, including materials and supplies, labor, facilities and other overhead costs. Profit margin data are used as a management performance measure to provide additional information regarding our results of operations on a consolidated basis.

Research and development expense increased by $0.9 million, or 12%, to $8.3 million for the second quarter of 2019, compared to the second quarter of 2018, primarily due to an increase in costs associated with higher headcount, higher allocable expenses, and increases in lab supplies offset by lower outside services.

Selling, general and administrative expense increased by $0.5 million, or 7%, to $7.9 million for the second quarter of 2019, compared to the second quarter of 2018, primarily due to an increase in costs associated with facilities and headcount, which were partially offset by lower stock-based compensation.

Net loss for the second quarter of 2019 was $6.5 million, representing a net loss of $0.12 per basic and diluted share. This compares to a net loss of $3.7 million, representing a net loss of $0.07 per basic and diluted share for the second quarter of 2018. The increase in net loss for the second quarter of 2019 over the same period of the prior year is primarily related to the absence of research and development services for the project for Tate & Lyle which was completed in the prior year and higher operating expenses.

Cash and cash equivalents increased by $40.4 million to $93.4 million as of June 30, 2019 compared to $53.0 million as of December 31, 2018. Net cash used in operating activities decreased to $7.9 million in the six months ended June 30, 2019 compared to $12.1 million in the six months ended June 30, 2018. We believe that based on our current level of operations, our existing cash, cash equivalents, and equity securities will provide adequate funds for ongoing operations, planned capital expenditures and working capital requirements for at least the next 12 months.

In June 2017, we entered into a loan and security agreement that allows us to borrow up to $10.0 million under a term loan, and up to $5.0 million under a revolving credit facility with 80% of certain eligible accounts receivable as a borrowing base (the "Credit Facility"). Obligations under the Credit Facility are secured by a lien on substantially all of our personal property other than our intellectual property. In September 2018, we entered into a Fourth Amendment to the Credit Facility whereby the draw period on the term debt was extended to September 30, 2019. In January 2019, we entered into a Fifth Amendment to the Credit Facility to allow for Codexis to obtain a letter of credit of up to $1.1 million to secure its obligations under the Lease with MetLife. We may draw on the Term Debt at any time prior to September 30, 2019, subject to customary conditions for funding including, among others, that no event of default exists. As of June 30, 2019, no amounts were borrowed under the Credit Facility and we were in compliance with the covenants for the Credit Facility. See Note 11, "Commitments and Contingencies," in the Notes to Unaudited Condensed Consolidated Financial Statements included in this Quarterly Report on Form 10-Q.

Below is an overview of our results of operations by business segments:

Performance Enzymes

Revenues decreased by $0.6 million, or 5%, to $10.6 million for the three months ended June 30, 2019, compared to the second quarter of 2018 primarily due to research and development revenue for Tate & Lyle in the year-ago period partially offset by an increase in product revenue with higher customer demand for enzymes for both generic and branded products.

Product gross margins were 56% in the three months ended June 30, 2019, compared to 30% in the corresponding period in 2018 due to improved sales mix.

Research and development expense increased by $0.4 million, or 9%, to $5.1 million for the second quarter of 2019, compared to the second quarter of 2018, primarily due to an increase in costs associated with higher headcount, higher allocable expenses, and increases in lab supplies.

Selling, general and administrative expense increased by $0.6 million, or 37% to $2.4 million for the second quarter of 2019, compared to the second quarter of 2018, primarily due to an increase in costs associated with facilities and headcount.

Novel Biotherapeutics

Revenues decreased by $0.6 million, or 27%, to $1.7 million for the three months ended June 30, 2019, compared to the second quarter of 2018 primarily due to a decrease in CDX-6114 development service revenues.

Research and development expense increased by $0.4 million, or 17%, to $2.9 million for the second quarter of 2019, compared to the second quarter of 2018, primarily due to an increase in costs associated with higher headcount partially offset by lower outside services.

Selling, general and administrative expense increased by $0.3 million, or 85%, to $0.6 million for the second quarter of 2019, compared to the second quarter of 2018, primarily due to an increase in costs associated with headcount and facilities, which were partially offset by lower stock-based compensation.

GSK Platform Technology Transfer, Collaboration and License Agreement

In July 2014, we entered into a CodeEvolver® protein engineering platform technology transfer collaboration and license agreement (the "GSK CodeEvolver® Agreement") with GlaxoSmithKline ("GSK"). Pursuant to the terms of the agreement, we granted GSK a non-exclusive license to use the CodeEvolver® protein engineering platform technology to develop novel enzymes for use in the manufacture of GSK's pharmaceutical and health care products.

We received an upfront fee upon the execution of the agreement in July 2014 and milestone payments in each of the years from 2014 through April 2016. We completed the transfer of the CodeEvolver® protein engineering platform technology to GSK in April 2016 and all revenues relating to the technology transfer have been recognized as of April 2016. We have the potential to receive additional cumulative contingent payments that range from $5.75 million to $38.5 million per project based on GSK’s successful application of the licensed technology. We are also eligible to receive royalties based on net sales of GSK’s sales of licensed enzyme products that are currently not being recognized.

Merck Platform Technology Transfer and License Agreement

In August 2015, we entered into a CodeEvolver® platform technology transfer collaboration and license agreement (the "Merck CodeEvolver® Agreement") with Merck, Sharp & Dohme ("Merck"), which allows Merck to use the CodeEvolver® protein engineering technology platform in the field of human and animal healthcare.

We received an upfront license fee upon execution of the Merck CodeEvolver® Agreement, and milestone payments in September 2015 and in September 2016, when we completed the transfer of the engineering platform technology. Additionally, we recognized research and development revenues of $1.0 million and $2.0 million for the three and six months ended June 30, 2019, respectively, compared to $1.0 million and $1.9 million for the three and six months ended June 30, 2018, respectively, for various research projects under our collaborative arrangement.

We have the potential to receive payments of up to a maximum of $15.0 million for each commercial active pharmaceutical ingredient ("API") that is manufactured by Merck using one or more novel enzymes developed by Merck using the CodeEvolver® protein engineering technology platform. The API payments, which are currently not recognized as revenue, are based on quantity of API developed and manufactured by Merck and will be recognized as usage-based royalties.

In January 2019, we entered into an amendment to the Merck CodeEvolver® Agreement whereby we will install certain CodeEvolver® protein engineering technology upgrades into Merck’s platform license installation and maintain those upgrades for a multi-year term. We recognized research and development revenues of $0.9 million for the three and six months ended June 30, 2019 under the amendment.

Global Development, Option and License Agreement and Strategic Collaboration Agreement

In October 2017, we entered into a Global Development, Option and License Agreement (the "Nestlé Agreement") with Nestec Ltd. ("Nestlé Health Science") and, solely for the purpose of the integration and the dispute resolution clauses of the Nestlé Agreement, Nestlé Health Science S.A., to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of PKU.

We received an upfront cash payment of $14.0 million upon the execution of the Nestlé Agreement, a $4.0 million milestone payment after dosing the first subjects in a first-in-human Phase 1a dose-escalation trial with CDX-6114, and a $1.0 million milestone payment upon achievement of a milestone relating to formulation of CDX-6114. The $4.0 million milestone payment that was triggered by the initiation of the trial was received in September 2018 and the $1.0 million milestone payment that was triggered by the achievement of a formulation relating to CDX-6114 was received in February 2019. The upfront payment and the variable consideration relating to the progress payment of $4.0 million and milestone payment of $1.0 million are being recognized over time as the development work is being performed. Revenue is being recognized using a single measure of progress that depicts our performance in transferring control of the services, which is based on the ratio of level of effort incurred to date compared to the total estimated level of effort required to complete all performance obligations under the agreement. We recognized development fees of $0.5 million and $1.7 million for the three and six months ended June 30, 2019, respectively, compared to $1.8 million and $4.5 million for the three and six months ended June 30, 2018, respectively, as research and development revenue. We had deferred revenue related to the development fees attributed to the milestone payment and upfront fees of $0.2 million at June 30, 2019 and $1.9 million at December 31, 2018.

In January 2019, we received notice from the FDA that it had completed its review of our IND for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. The option payment of $3.0 million was recognized revenue in the first quarter of 2019 as research and development fees. Upon exercising its option, Nestlé Health Science has assumed all responsibilities for future clinical development and commercialization of CDX-6114, with the exception of the completion of an extension study, CDX-6114-004, which was substantially completed in the second quarter of 2019. Other potential payments from Nestlé Health Science to us under the Nestlé Agreement include (i) development and approval milestones of up to $85.0 million, (ii) sales-based milestones of up to $250.0 million in the aggregate, which aggregate amount is achievable if net sales exceed $1.0 billion in a single year, and (iii) tiered royalties, at percentages ranging from the middle single digits to low double-digits, of net sales of product.

In addition to the Nestlé Agreement, we and Nestlé Health Science concurrently entered into a Strategic Collaboration Agreement (the "Strategic Collaboration Agreement") pursuant to which we and Nestlé Health Science will collaborate to leverage the CodeEvolver® protein engineering technology platform to develop novel enzymes for Nestlé Health Science's established Consumer Care and Medical Nutrition business areas. Under the Strategic Collaboration Agreement, we received an upfront payment of $1.2 million in 2017 and an incremental $0.6 million payment in September 2018 for additional services. We recognized research and development fees of $1.2 million and $2.5 million for the three and six months ended June 30, 2019, respectively, compared to $0.6 million and $1.2 million for the three and six months ended June 30, 2018, respectively. We had deferred revenue of $0.3 million and $0.8 million at June 30, 2019 and December 31, 2018, respectively.

Strategic Collaboration Agreement

In April 2018, we entered into the Porton Agreement with Porton to license key elements of Codexis' biocatalyst technology for use in Porton's global custom intermediate and API development and manufacturing business. Under the Porton Agreement, we are eligible to receive annual collaboration fees and research and development revenues. We received an initial collaboration fee of $0.5 million within 30 days of the effective date of the agreement and as of December 31, 2018, we completed the technical transfer. Revenue relating to the functional license provided to Porton was recognized at a point in time when control of the license transferred to the customer.

Platform Technology Transfer and License Agreement

In May 2019, we entered into a Platform Technology Transfer and License Agreement (the "Novartis CodeEvolver® Agreement") with Novartis Pharma AG ("Novartis"). The Agreement allows Novartis to use Codexis' proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare. Under the Novartis CodeEvolver® Agreement, we will transfer Codexis' proprietary CodeEvolver® protein engineering platform technology to Novartis over approximately 20 months starting with the date on which we commence the technology transfer (the "Technology Transfer Period"). As a part of this technology transfer, our company will provide to Novartis Codexis' proprietary enzymes, proprietary

protein engineering protocols and methods, and proprietary software algorithms. In addition, teams of Codexis and Novartis scientists will participate in technology training sessions and collaborative research projects at Codexis' laboratories in Redwood City, California and at a designated Novartis laboratory in Basel, Switzerland. Upon completion of technology transfer, Novartis will have the CodeEvolver® protein engineering platform technology installed at its designated laboratory.

Pursuant to the agreement, we received an upfront payment of $5 million shortly after the effective date of the Novartis CodeEvolver® Agreement. We are entitled to receive an additional $4 million subject to satisfactory completion of the second technology transfer milestone and an additional $5 million upon satisfactory completion of the third technology transfer milestone. In consideration for the continued disclosure and license of improvements to the Codexis technology and materials during a multi-year period that begins on the conclusion of the Technology Transfer Period ("Improvements Term"), Novartis will pay Codexis annual payments which amount to an additional $8 million. Codexis also has the potential to receive quantity-dependent, usage payments for each API that is manufactured by Novartis using one or more enzymes that have been developed or are in development using the CodeEvolver® protein engineering platform technology during the period that begins on the conclusion of the Technology Transfer Period and ends on the expiration date of the last to expire licensed patent. These product-related usage payments, if any, will be paid by Novartis to Codexis for each quarter that Novartis manufactures API using a CodeEvolver®-developed enzyme. The usage payments will be based on the total volume of API produced using the CodeEvolver®-developed enzyme. These usage payments can begin in the clinical stage, and will extend throughout the commercial life of each API. We recognized no revenue for the three and six months ended June 30, 2019. As of June 30, 2019, we had deferred revenue of $5.0 million from the Novartis CodeEvolver® Agreement.

Results of Operations

The following table shows the amounts from our unaudited condensed consolidated statements of operations for the periods presented (in thousands):

	Three months ended June 30,		Change		Six months ended June 30,		Change	
	2019	2018	$	%	2019	2018	$	%
Revenues:								
Product revenue	$ 6,249	$ 3,723	$ 2,526	68%	$ 14,236	$ 9,886	$ 4,350	44 %
Research and development revenue	6,070	9,815	(3,745)	(38)%	13,665	17,694	(4,029)	(23)%
Total revenues	12,319	13,538	(1,219)	(9)%	27,901	27,580	321	1 %
Costs and operating expenses:								
Cost of product revenue	2,772	2,611	161	6%	7,163	6,436	727	11 %
Research and development	8,274	7,370	904	12%	16,290	14,548	1,742	12 %
Selling, general and administrative	7,896	7,395	501	7%	16,311	15,141	1,170	8 %
Total costs and operating expenses	18,942	17,376	1,566	9%	39,764	36,125	3,639	10 %
Loss from operations	(6,623)	(3,838)	(2,785)	(73)%	(11,863)	(8,545)	(3,318)	(39)%
Interest income	220	174	46	26%	450	245	205	84 %
Other expenses, net	(88)	(82)	6	7%	(211)	(142)	69	49 %
Loss before income taxes	(6,491)	(3,746)	(2,745)	(73)%	(11,624)	(8,442)	(3,182)	(38)%
Provision for (benefit from) income taxes	16	(11)	27	245%	19	(13)	32	246 %
Net loss	$ (6,507)	$ (3,735)	$ (2,772)	(74)%	$ (11,643)	$ (8,429)	$ (3,214)	(38)%

Revenues

Our revenues are comprised of product revenue and research and development revenue as follows:

- Product revenue consists of sales of protein catalysts, pharmaceutical intermediates, and Codex® Biocatalyst Panels and Kits.
- Research and development revenue includes license, technology access and exclusivity fees, research services fees, milestone payments, royalties, optimization and screening fees.

The following table shows the amounts of our product revenue and research and development revenue from our unaudited condensed consolidated statements of operations for the periods presented (in thousands):

	Three months ended June 30,		Change		Six months ended June 30,		Change	
(In Thousands)	2019	2018	$	%	2019	2018	$	%
Product revenue	$ 6,249	$ 3,723	$ 2,526	68%	$ 14,236	$ 9,886	$ 4,350	44 %
Research and development revenue	6,070	9,815	(3,745)	(38)%	13,665	17,694	(4,029)	(23)%
Total revenues	$ 12,319	$ 13,538	$ (1,219)	(9)%	$ 27,901	$ 27,580	$ 321	1%

Revenues typically fluctuate on a quarterly basis due to the variability in our customers' manufacturing schedules and the timing of our customers' clinical trials. In addition, we have limited internal capacity to manufacture enzymes. As a result, we are dependent upon the performance and capacity of third party manufacturers for the commercial scale manufacturing of the enzymes used in our pharmaceutical and fine chemicals business.

We accept purchase orders for deliveries covering periods from one day up to approximately one year from the date on which the order is placed. However, a majority of the purchase orders can be revised or cancelled by the customer without penalty. Considering these industry practices and our experience, we do not believe the total of customer purchase orders outstanding (backlog) provides meaningful information that can be relied on to predict actual sales for future periods.

Total revenues decreased by $1.2 million and increased by $0.3 million in the three and six months ended June 30, 2019, respectively, compared to the same periods in 2018, primarily due to lower research and development revenue offset by higher product revenue.

Product revenue increased by $2.5 million and $4.4 million in the three and six months ended June 30, 2019, respectively, compared to the same periods in 2018, primarily due to higher customer demand for enzymes for both generic and branded products.

Research and development revenue decreased by $3.7 million and $4.0 million in the three and six months ended June 30, 2019, respectively, compared to the corresponding periods in 2018 primarily due to lower development revenue from Tate & Lyle resulting from the prior year completion of the development work for their sweetener product. The recognition of functional license fee revenue from Nestlé Health Science and recognition of a software license fee from Merck partially offset the decrease in research and development revenue.

Cost and Operating Expenses

Our cost and operating expenses are comprised of cost of product revenue, research and development expense, and selling, general and administrative expense. The following table shows the amounts of our cost of product revenue, research and development expense, and selling, general and administrative expense from our unaudited condensed consolidated statements of operations for the periods presented (in thousands):

	Three months ended June 30,		Change		Six months ended June 30,		Change	
(In Thousands)	**2019**	**2018**	**$**	**%**	**2019**	**2018**	**$**	**%**
Cost of product revenue	$ 2,772	$ 2,611	$ 161	6%	$ 7,163	$ 6,436	$ 727	11%
Research and development	8,274	7,370	904	12%	16,290	14,548	1,742	12%
Selling, general and administrative	7,896	7,395	501	7%	16,311	15,141	1,170	8%
Total costs and operating expenses	$ 18,942	$ 17,376	$ 1,566	9%	$ 39,764	$ 36,125	$ 3,639	10%

Cost of Product Revenue and Product Gross Margin

Our revenues from product revenue are derived entirely from our Performance Enzymes segment. Revenues from the Novel Biotherapeutics segment are from collaborative research and development activities and not from product revenue.

The following table shows the amounts of our product revenue, cost of product revenue, product gross profit and product gross margin from our unaudited condensed consolidated statements of operations for the periods presented (in thousands):

	Three months ended June 30,		Change		Six months ended June 30,		Change	
(In Thousands)	**2019**	**2018**	**$**	**%**	**2019**	**2018**	**$**	**%**
Product revenue	$ 6,249	$ 3,723	$ 2,526	68%	$ 14,236	$ 9,886	$ 4,350	44%
Cost of product revenue	2,772	2,611	161	6%	7,163	6,436	727	11%
Product gross profit	$ 3,477	$ 1,112	$ 2,365	213%	$ 7,073	$ 3,450	$ 3,623	105%
Product gross margin (%)	56%	30%			50%	35%		

Cost of product revenue comprises both internal and third-party fixed and variable costs, including materials and supplies, labor, facilities and other overhead costs associated with our product revenue.

Product gross margins were 56% and 50% in the three and six months ended June 30, 2019, respectively, compared to 30% and 35% in the corresponding periods in 2018 due to improved sales mix.

Research and Development Expenses

Research and development expenses consist of costs incurred for internal projects as well as collaborative research and development activities. These costs primarily consist of (i) employee-related costs, which include salaries and other personnel-related expenses (including stock-based compensation), (ii) various allocable expenses, which include occupancy-related costs,

supplies, and depreciation of facilities and laboratory equipment, and (iii) external costs. Research and development expenses are expensed when incurred.

Research and development expenses increased by $0.9 million, or 12%, during the three months ended June 30, 2019 and increased by $1.7 million, or 12%, during the six months ended June 30, 2019, compared to the same period in 2018, primarily due to an increase in costs associated with higher headcount, higher facilities expenses and allocable expenses, increases in lab supplies and depreciation expense offset by lower outside services.

Selling, General and Administrative Expenses

Selling, general and administrative expenses consist of employee-related costs, which include salaries and other personnel-related expenses (including stock-based compensation), hiring and training costs, consulting and outside services expenses (including audit and legal costs), marketing costs, building lease costs, and depreciation and amortization expense.

Selling, general and administrative expenses increased by $0.5 million, or 7%, during the three months ended June 30, 2019 and $1.2 million, or 8%, during the six months ended June 30, 2019, compared to the same period in 2018, primarily due to an increase in costs associated with headcount and higher facility expense, which were partially offset by a decrease in legal expense.

Interest Income and Other Expense

	Three months ended June 30,		Change		Six months ended June 30,		Change	
(In Thousands)	**2019**	**2018**	**$**	**%**	**2019**	**2018**	**$**	**%**
Interest income	$ 220	$ 174	$ 46	26%	$ 450	$ 245	$ 205	84%
Other expense, net	(88)	(82)	6	7%	(211)	(142)	69	49%
Total other income (expense)	$ 132	$ 92	$ 40	43%	$ 239	$ 103	$ 136	132%

Interest Income

Interest income increased by $46 thousand and $0.2 million for the three and six months ended June 30, 2019, respectively, compared to the same periods in 2018 primarily due to higher interest rates on higher levels of cash and cash equivalents.

Other Expense

Other expense increased by $6 thousand and $69 thousand for the three and six months ended June 30, 2019, respectively, compared to the same periods in 2018, primarily due to an unrealized loss of $0.2 million related to our investment in CO_2 Solutions and expenses due to fluctuations in foreign currency.

Provision for and Benefit from Income Taxes

We recognized an income tax provision of $16 thousand and $19 thousand for the three and six months ended June 30, 2019, respectively. We recognized an income tax benefit of $11 thousand and $13 thousand for the three and six months ended June 30, 2018, respectively. The increase in income tax provision was due to the release of uncertain tax positions related to foreign interest and penalties and income tax attributable to foreign operations. We continue to maintain a full valuation allowance against our net deferred tax assets as we believe that it is more likely than not that the majority of our deferred tax assets will not be realized.

Net loss

The net loss for the second quarter of 2019 was $6.5 million, representing a net loss of $0.12 per basic and diluted share. This compares to a net loss of $3.7 million, representing a net loss of $0.07 per basic and diluted share for the second quarter of 2018. For the six months ended June 30, 2019, the net loss was $11.6 million, representing a net loss of $0.21 per basic and diluted share. This compares to a net loss of $8.4 million, representing a net loss of $0.17 per basic and diluted share for the six months ended June 30, 2018. The increase in net loss for the three and six months ended June 30, 2019 compared to the same period of the prior year is primarily related to the absence of research and development services for the project for Tate & Lyle which was completed in the prior year and higher operating expenses.

Results of Operations by Segment (in thousands, except percentages)

Revenue by segment

	Three months ended June 30,						Change			
	2019			2018			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Revenues:										
Product revenue	$ 6,249	$ —	$ 6,249	$ 3,723	$ —	$ 3,723	$ 2,526	68 %	$ —	— %
Research and development revenue	4,340	1,730	6,070	7,442	2,373	9,815	(3,102)	(42)%	(643)	(27)%
Total revenues	$ 10,589	$ 1,730	$ 12,319	$ 11,165	$ 2,373	$ 13,538	$ (576)	(5)%	$ (643)	(27)%

	Six Months Ended June 30,						Change			
	2019			2018			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Revenues:										
Product revenue	$ 14,236	$ —	$ 14,236	$ 9,886	$ —	$ 9,886	$ 4,350	44 %	$ —	—%
Research and development revenue	6,440	7,225	13,665	12,008	5,686	17,694	(5,568)	(46)%	1,539	27%
Total revenues	$ 20,676	$ 7,225	$ 27,901	$ 21,894	$ 5,686	$ 27,580	$ (1,218)	(6)%	$ 1,539	27%

Revenues from the Performance Enzymes segment decreased by $0.6 million, or 5%, to $10.6 million for the three months ended June 30, 2019, compared to $11.2 million for the three months ended June 30, 2018 primarily due to $4.4 million of research and development revenue from Tate & Lyle in the prior year period, partially offset by an increase of $2.5 million in product revenue with higher customer demand for enzymes for both generic and branded products, a $1.1 million increase in license fees from Merck, and an increase in research and development revenue from various customers. Revenues from the Performance Enzymes segment decreased by $1.2 million, or 6%, to $20.7 million for the six months ended June 30, 2019, compared to $21.9 million for the six months ended June 30, 2018 primarily due to the absence of revenue from Tate & Lyle from the prior year period.

Revenues from the Novel Biotherapeutics segment decreased by $0.6 million, or 27%, to $1.7 million for the three months

ended June 30, 2019, compared to $2.4 million for the three months ended June 30, 2018 primarily due to a decrease in CDX-6114 development service revenues. Revenues from the Novel Biotherapeutics segment increased by $1.5 million, or 27% for the six months ended June 30, 2019, compared to $5.7 million for the six months ended June 30, 2018 primarily due to revenue recognition of a functional license granted to Nestlé Health Science for CDX-6114 for the treatment of PKU. Revenues from the Novel Biotherapeutics segment are derived from research and development revenue relating to the development of our CDX-6114 product candidate in collaboration with Nestlé Health Science, as set forth in the Nestlé Agreement.

Cost and Operating Expenses by Segment

	Three months ended June 30,						Change			
	2019			2018			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Cost of product revenue	$ 2,772	$ —	$ 2,772	$ 2,611	$ —	$ 2,611	$ 161	6%	$ —	—%
Research and development[1]	5,134	2,856	7,990	4,724	2,442	7,166	410	9%	414	17%
Selling, general and administrative[1]	2,362	561	2,923	1,729	304	2,033	633	37%	257	85%
Total segment costs and operating expenses	$ 10,268	$ 3,417	13,685	$ 9,064	$ 2,746	11,810	$ 1,204	13%	$ 671	24%
Corporate costs			4,830			5,301				
Depreciation and amortization			427			265				
Total costs and operating expenses			$ 18,942			$ 17,376				

[1] Research and development expenses and Selling, general and administrative expenses exclude depreciation and amortization of finance leases.

	Six months ended June 30,						Change			
	2019			2018			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Cost of product revenue	$ 7,163	$ —	$ 7,163	$ 6,436	$ —	$ 6,436	$ 727	11 %	$ —	—%
Research and development[1]	9,576	6,172	15,748	9,790	4,374	14,164	(214)	(2)%	1,798	41%
Selling, general and administrative[1]	4,463	1,078	5,541	3,825	450	4,275	638	17 %	628	140%
Total segment costs and operating expenses	$ 21,202	$ 7,250	28,452	$ 20,051	$ 4,824	24,875	$ 1,151	6 %	$ 2,426	50%
Corporate costs			10,510			10,747				
Depreciation and amortization			802			503				
Total costs and operating expenses			$ 39,764			$ 36,125				

[1] Research and development expenses and Selling, general and administrative expenses exclude depreciation and amortization of finance leases.

For a discussion of product cost of revenue, see "*Results of Operations*".

Research and development expense in the Performance Enzymes segment increased $0.4 million, or 9%, to $5.1 million in the second quarter of 2019, compared to the second quarter of 2018. The increase was primarily due to an increase in costs associated with higher headcount, higher allocable expenses, and increases in lab supplies. Research and development expense in the Performance Enzymes segment decreased $0.2 million, or 2%, to $9.6 million in the six months ended June 30, 2019, compared to the corresponding period in 2018. The decrease was primarily due to lower outside services.

Selling, general and administrative expense in the Performance Enzymes segment increased by $0.6 million, or 37%, to $2.4 million in the second quarter of 2019, compared to the second quarter of 2018. Selling, general and administrative expense in the Performance Enzymes segment increased by $0.6 million, or 17%, to $4.5 million in the six months ended June 30, 2019, compared to the corresponding period in 2018. The increase was primarily due to an increase in costs associated with facilities and headcount.

Research and development expense in the Novel Biotherapeutics segment increased by $0.4 million, or 17%, to $2.9 million in the second quarter of 2019, compared to the second quarter of 2018. Research and development expense in the Novel Biotherapeutics segment increased by $1.8 million, or 41%, to $6.2 million in the six months ended June 30, 2019, compared to the corresponding period in 2018. The increase was primarily due to an increase in costs associated with higher headcount partially offset by lower outside services.

Selling, general and administrative expense in the Novel Biotherapeutics segment increased by $0.3 million, or 85%, to $0.6 million in the second quarter of 2019, compared to the second quarter of 2018. Selling, general and administrative expense in the Novel Biotherapeutics segment increased by $0.6 million, or 140%, to $1.1 million in the six months ended June 30, 2019, compared to the corresponding period in 2018. The increase was primarily due to an increase in costs associated with headcount and facilities, which were partially offset by decreases in allocable expenses and lower stock-based compensation.

Liquidity and Capital Resources

Liquidity is the measurement of our ability to meet working capital needs and to fund capital expenditures. We have historically funded our operations primarily through cash generated from operations, stock option exercises and public offerings of our common stock. We also have the ability to borrow up to $15.0 million under our Credit Facility. We actively

manage our cash usage and investment of liquid cash to ensure the maintenance of sufficient funds to meet our working capital needs. The majority of our cash and cash equivalents are held in U.S. banks, and our foreign subsidiaries maintain a limited amount of cash in their local banks to cover their short-term operating expenses.

The following tables summarize our cash and cash equivalents and working capital as ofJune 30, 2019 and December 31, 2018, as well as our statements of cash flows for the three and six months ended June 30, 2019and 2018:

(In Thousands)	June 30, 2019	December 31, 2018
Cash and cash equivalents	$ 93,421	$ 53,039
Working capital	$ 92,750	$ 50,085

	Six months ended June 30,	
(In Thousands)	2019	2018
Net cash used in operating activities	$ (7,909)	$ (12,141)
Net cash used in investing activities	(1,257)	(1,472)
Net cash provided by financing activities	49,851	35,918
Net increase in cash, cash equivalents and restricted cash	$ 40,685	$ 22,305

We have historically experienced negative cash flows from operations as we continue to invest in key technology development projects and improvements to our CodeEvolver® protein engineering technology platform, and expand our business development and collaborations with new customers. Our cash flows from operations will continue to be affected principally by sales and gross margins from licensing our technology to major pharmaceutical companies, product revenue and collaborative research and development services provided to customers, as well as our headcount costs, primarily in research and development. Our primary source of cash flows from operating activities is cash receipts from licensing our technology to major pharmaceutical companies, and our customers for purchases of products and/or collaborative research and development services. Our largest uses of cash from operating activities are for employee-related expenditures, rent payments, inventory purchases to support our product revenue and non-payroll research and development costs.

We are eligible to earn milestone and other contingent payments for the achievement of defined collaboration objectives and certain royalty payments under our collaboration agreements. Our ability to earn these milestone and contingent payments and the timing of achieving these milestones is primarily dependent upon the outcome of our collaborators' research and development activities and is uncertain at this time.

We are actively collaborating with new and existing customers in the pharmaceutical and food industries. We believe that we can utilize our current products and services, and develop new products and services, to increase our revenues and gross margins in future periods.

As of June 30, 2019, we had cash and cash equivalents of$93.4 million and $15.0 million available to borrow under the Credit Facility. Our liquidity is dependent upon our cash and cash equivalents, cash flows provided by operating activities and the continued availability of borrowings under the Credit Facility. In addition, in June 2019, we sold 3,048,780 shares of common stock at a price per share of$16.40 in the private placement resulting in net proceeds of approximately$49.9 million after deducting related legal fees. See Part II, Item 2, "Unregistered Sales of Equity Securities and Use of Proceeds" for additional information.

We believe that based on our current level of operations, our existing cash and cash equivalents will provide adequate funds for ongoing operations, planned capital expenditures and working capital requirements for at least the next 12 months.

However, we may need additional capital if our current plans and assumptions change. Our need for additional capital will depend on many factors, including the financial success of our business, the spending required to develop and commercialize new and existing products, the effect of any acquisitions of other businesses, technologies or facilities that we may make or develop in the future, our spending on new market opportunities, and the potential costs for the filing, prosecution, enforcement and defense of patent claims, if necessary. If our capital resources are insufficient to meet our capital requirements, and we are unable to enter into or maintain collaborations with partners that are able or willing to fund our development efforts or commercialize any products that we develop or enable, we will have to raise additional funds to continue the development of our technology and products and complete the commercialization of products, if any, resulting from our technologies. In addition, we may choose to raise additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. If future financings involve the issuance of equity securities, our existing stockholders would suffer dilution. If we raise debt financing or enter into additional credit facilities, we may be

subject to restrictive covenants that limit our ability to conduct our business. We may not be able to raise sufficient additional funds on terms that are favorable to us, if at all. If we fail to raise sufficient funds and fail to generate sufficient revenues to achieve planned gross margins and to control operating costs, our ability to fund our operations, take advantage of strategic opportunities, develop products or technologies, or otherwise respond to competitive pressures could be significantly limited. If this happens, we may be forced to delay or terminate research or development programs or the commercialization of products resulting from our technologies, curtail or cease operations or obtain funds through collaborative and licensing arrangements that may require us to relinquish commercial rights, or grant licenses on terms that are not favorable to us. If adequate funds are not available, we will not be able to successfully execute our business plan or continue our business.

Cash Flows from Operating Activities

Cash used in operating activities was $7.9 million net for the six months ended June 30, 2019, which resulted from a net loss of $11.6 million for the six months ended June 30, 2019 adjusted for non-cash charges for depreciation of $0.7 million, amortization expense of $1.5 million and stock-based compensation of $4.1 million. Additional cash used by changes in operating assets and liabilities was $2.7 million. Changes in operating assets and liabilities included an increase of $0.9 million in prepaid expenses and other current assets due mainly to stock exercises and a decrease of $1.6 million in accounts payable due to timing of vendor payments.

Cash used in operating activities was $12.1 million net for the six months ended June 30, 2018, which resulted from a net loss of $8.4 million for the six months ended June 30, 2018 adjusted for non-cash charges for depreciation and amortization of $0.5 million and stock-based compensation of $4.4 million. Additional cash used by changes in operating assets and liabilities was $8.6 million. Changes in operating assets and liabilities included decreases of $3.1 million in accounts receivable due mainly to collections from customers and $9.5 million increase in deferred revenue, primarily due to recent recognition of revenue under ASC 606.

Cash Flows from Investing Activities

Cash provided by investing activities was $1.3 million and $1.5 million for the six months ended June 30, 2019 and 2018, respectively, which was primarily attributable to purchase of property and equipment.

Cash Flows from Financing Activities

Cash generated by financing activities was $49.9 million for the six months ended June 30, 2019 which represents $49.9 million of net proceeds from a private placement in June 2019 and $2.8 million of proceeds from exercises of stock options offset by $2.8 million for taxes paid related to net share settlement of equity awards.

Cash provided by financing activities was $35.9 million for the six months ended June 30, 2018 which represents $37.3 million of net proceeds from our public offering in April 2018, partially offset by other items, primarily $3.1 million for taxes paid related to net share settlement of equity awards.

Contractual Obligations

The following table summarizes our significant contractual obligations at June 30, 2019 (in thousands):

	Payments due by period			
(In Thousands)	**Total**	**Less than 1 year**	**1-3 years**	**>4 years**
Finance lease obligations	$ 187	$ 187	$ —	$ —
Operating leases obligations [1]	35,755	2,422	8,291	25,042
Total	$ 35,942	$ 2,609	$ 8,291	$ 25,042

[1] Represents future minimum lease payments under non-cancellable operating leases in effect as of June 30, 2019 for our facilities in Redwood City, California. The minimum lease payments above do not include common area maintenance charges or real estate taxes. In addition, amounts have not been reduced by future minimum sublease rentals of $0.4 million to be received under non-cancellable subleases.

Other Commitments

We have other commitments related to supply and service arrangements entered into the normal course of business. For additional information about other commitments, see Note 11, "Commitments and Contingencies" in the accompanying notes to the unaudited condensed consolidated financial statements. Future minimum payments reflect amounts those obligations are expected to have on our liquidity and cash flows in future period and include obligations subject to risk of cancellation by us (in thousands):

Other Commitment Agreement Type	Agreement Date	Future Minimum Payment
Manufacture and supply agreement with expected future payment date of December 2022	April 2016	$ 1,269
Service agreement for clinical trial	December 2017	163
Total other commitments		$ 1,432

On June 30, 2017, we entered into a credit facility consisting of term loans totaling up to $10.0 million, and advances under a revolving line of credit totaling up to $5.0 million with an accounts receivable borrowing base of 80% of certain eligible accounts receivable. In September 2018, we entered into a Fourth Amendment to the Credit Facility whereby the draw period on the term debt was extended to September 30, 2019. In January 2019, we entered into a Fifth Amendment to the Credit Facility to allow for Codexis to obtain a letter of credit of up to $1.1 million to secure its obligations under the Lease with MetLife. We may draw on the Term Debt at any time prior to September 30, 2019, subject to customary conditions for funding including, among others, that no event of default exists. We may draw on the Revolving Line of Credit at any time prior to the maturity date. On October 1, 2022, any loans for Term Debt mature and the Revolving Line of Credit terminates. Term Debt bears interest through maturity at a variable rate based on the London Interbank Offered Rate plus 3.60%. Advances under the Revolving Line of Credit bear interest at a variable annual rate equal to the greater of (i) 1.00% above the prime rate and (ii) 5.00%. No amounts were drawn down under the credit facility as of June 30, 2019. For additional information about our credit facility, see Note 11, "Commitments and Contingencies" in the accompanying notes to the unaudited condensed consolidated financial statements.

Off-Balance Sheet Arrangements

As of June 30, 2019, we did not have any off-balance sheet arrangements, as defined in Item 303(a)(4) of Regulation S-K as promulgated by the SEC.

Critical Accounting Policies and Estimates

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make judgments, estimates and assumptions in the preparation of our consolidated financial statements and accompanying notes. Actual results could differ from those estimates. There have been no material changes to our critical accounting policies or estimates during the three and six months ended June 30, 2019 from those discussed in our Annual Report on Form 10-K for the year ended December 31, 2018, filed with the SEC on March 1, 2019, except for our critical accounting policies and estimates on leases as a result of our adoption of ASU 2016-02, "*Leases (Topic 842)*" ("ASC 842"), which is detailed below.

Leases

On January 1, 2019, we adopted the provisions of ASU 2016-02, "Leases (Topic 842) ("ASC 842"), which replaces prior lease guidance ("ASC 840"). This guidance establishes a right-of-use ("ROU") model that requires a lessee to record a ROU asset and lease obligations on the balance sheet for all leases with terms longer than 12 months. Leases are classified as either finance or operating, with classification affecting the pattern and classification of expense recognition in our unaudited condensed consolidated statement of operations. We adopted the new standard on January 1, 2019 using a modified retrospective approach and effective date method.

Contract

A contract is or contains a lease if the contract conveys the right to control the use of identified property, plant, or equipment (an identified asset) for a period of time in exchange for consideration. A period of time may be described in terms of the amount of use of an identified asset.

Operating lease and Finance lease

The FASB decided that lessees should apply a dual model. Under the FASB model, lessees will classify a lease as either a finance lease or an operating lease, while a lessor will classify a lease as either a sales-type, direct financing, or operating lease. A lease may meet the lessee finance lease criteria even when control of the underlying asset is not transferred to the lessee (e.g. when the lessor obtains a residual value guarantee from a party other than the lessee). Such leases should be classified as a direct finance lease by the lessor and as an operating lease by the lessee. The dual model does not affect a lessee's initial recognition of assets and liabilities on its balance sheet, but differentiates how a lessee should recognize lease expense in the income statement.

Discount Rate

Lessees and lessors should discount lease payments at the lease commencement date using the rate implicit in the lease. If the information necessary to determine the rate implicit in the lease is not readily available, a lessee should use its incremental borrowing rate.

Lease and nonlease components

We made an accounting policy election to not separate lease and nonlease components. Therefore, a reallocation for nonlease components is not required in transition.

Fixed lease payments

Fixed lease payments are payments required under the lease. They can be either a fixed amount paid at various intervals in a lease or they can be payments that change over time at known amounts. The exercise price of a purchase option should be included in the calculation of lease payments for purposes of lease classification and measurement when exercise is reasonably certain.

Variable lease payments

Variable lease payments are payments made by a lessee to a lessor for the right to use an underlying asset that vary because of changes in facts or circumstances occurring after the commencement date, other than the passage of time. Variable lease payments that depend on an index or a rate should be included in the calculation of lease payments when classifying a lease and in the measurement of the lease obligations. Variable lease payments other than those that depend on an index or a rate should not be included in lease payments for purposes of classification and measurement of the lease, unless those payments are in substance fixed lease payments.

Leasehold improvements

Payments made by lessees for improvements to the underlying asset should be recorded as prepaid rent and included in fixed lease payments if the payment relates to an asset of the lessor.

Lease incentives

Lease incentives are included in the calculation of consideration in the contract, which must be allocated when multiple components exist. However, irrespective of the allocation, lease incentives always reduce the consideration in the contract for a lessee and lessor.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk Management

Our cash flows and earnings are subject to fluctuations due to changes in foreign currency exchange rates, interest rates and other factors. These market risk exposures are disclosed in Part II, Item 7A of our Annual Report on Form 10-K for the year ended December 31, 2018, filed with the SEC on March 1, 2019.

Interest Rate Sensitivity

As of June 30, 2019, we had unrestricted cash and cash equivalents of $93.4 million. As of June 30, 2019, the effect of a hypothetical 10% decrease in market interest rates would decrease the fair value of our interest income by approximately $0.2 million on an annualized basis.

On June 30, 2017, we entered into a credit facility agreement consisting of term loans totaling up to $10.0 million, and advances under a revolving line of credit totaling up to $5.0 million. Draws on the term debt bear interest at a variable rate based on the London Interbank Offered Rate plus 3.60%. Advances under the revolving line of credit bear interest at a variable annual rate equal to the greater of (i) 1.00% above the prime rate and (ii) 5.00%. Increases in these variable interest rates will increase our future interest expense and decrease our results of operations and cash flows. In September 2018, the draw period on the term debt was extended to September 30, 2019. No amounts were drawn down under the credit facility as of June 30, 2019. Our exposure to interest rates risk relates to our 2017 Credit Facility with variable interest rates, where an increase in interest rates may result in higher borrowing costs. Since we have no outstanding borrowings under our 2017 Credit Facility as of June 30, 2019, the effect of a hypothetical 10% change in interest rates would not have any impact on our interest expense.

Equity Price Risk

As described in Note 6, "Cash Equivalents and Marketable Securities" and Note 7, "Fair Value Measurements" to the unaudited condensed consolidated financial statements, we have an investment in common shares of CO_2 Solution Inc., a company based in Quebec, Canada ("CO_2 Solutions"), whose shares are publicly traded in Canada on the TSX Venture Exchange. As of June 30, 2019, the fair value of our investment in CO_2 Solutions' common stock was $0.4 million.

This investment is exposed to fluctuations in both the market price of CO_2 Solutions' common shares and changes in the exchange rate between the United States dollar and the Canadian dollar. The effect of a 10% adverse change in the market price of CO_2 Solution's common shares as of June 30, 2019 would have been a loss of approximately $42 thousand, recognized as a component of other expense in our unaudited condensed consolidated statements of operations. The effect of a 10% unfavorable change in the exchange rate between the United States dollar and the Canadian dollar as of June 30, 2019 would have been a loss of approximately $42 thousand, recognized as a component of other expense in our unaudited condensed consolidated statements of operations.

ITEM 4. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures and internal controls that are designed to provide reasonable assurance that information required to be disclosed in our Exchange Act reports is recorded, processed, summarized, and reported within the time periods specified in the SEC's rules and forms and that such information is accumulated and communicated to our management, including our principal executive officer and our principal financial and accounting officer, as appropriate, to allow timely decisions regarding required disclosure.

Our management, including our principal executive officer and our principal financial and accounting officer, evaluated the effectiveness of our disclosure controls and procedures as defined by Rules 13a-15(e) and 15d-15(e) of the Exchange Act. Based on this review, our principal executive officer and our principal financial and accounting officer concluded that these disclosure controls and procedures were effective as of June 30, 2019 at the reasonable assurance level.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting identified in connection with the evaluation required by paragraph (d) of Exchange Act Rules 13a-15 or 15d-15 that occurred during our last fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. We implemented internal controls to ensure we adequately evaluated our lease contracts and properly assessed the impact of ASU 2016-02, "Leases (Topic 842)", to facilitate its adoption on January 1, 2019. There were no significant changes to our internal control over financial reporting due to the adoption of this new standard.

Inherent Limitations on Effectiveness of Controls

In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, even if determined effective and no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives to prevent or detect misstatements. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs. 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.

PART II. OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

We are not currently a party to any material pending litigation or other material legal proceedings.

In February 2018, Codexis and EnzymeWorks, Inc. (U.S.), Suzhou Hanmei Biotechnology Co. Ltd, d/b/a EnzymeWorks, Inc. (China) (collectively, "EnzymeWorks"), Junhua Tao, and Andrew Tao, reached a confidential settlement concerning the lawsuit filed by us against them in February 2016, in the United States District Court for the Northern District of California. The parties have also stipulated to a judgment of patent infringement of all asserted patents against EnzymeWorks, and a permanent injunction barring any future infringement. The remaining claims against EnzymeWorks, and all claims against Junhua Tao, and Andrew Tao including trade secret misappropriation, breach of contract and voidable transfer have been dismissed with prejudice. This case is completed.

ITEM 1A. RISK FACTORS

We have included in Part I, Item 1A of our Annual Report on Form 10-K for the year ended December 31, 2018, a description of certain risks and uncertainties that could affect our business, future performance or financial condition (the "Risk Factors"). During the three months ended June 30, 2019, there were no material changes from the disclosure provided in the Form 10-K for the year ended December 31, 2018 with respect to the Risk Factors. Investors should consider the Risk Factors prior to making an investment decision with respect to our stock.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

Private Placement

On June 20, 2019, we entered into a Securities Purchase Agreement (the "Purchase Agreement") with an affiliate of Casdin Capital, LLC (the "Investor"). Pursuant to the Purchase Agreement, we agreed to sell an aggregate of 3,048,780 shares of our common stock (the "Shares") for aggregate gross proceeds of approximately $50.0 million (the "Private Offering"). The purchase price for each Share was $16.40. The Private Offering closed on June 20, 2019.

On June 20, 2019, we also entered into a Registration Rights Agreement (the "Registration Rights Agreement") with the Investor. Pursuant to the Registration Rights Agreement, we agreed, subject to certain conditions, to prepare and file a registration statement with the Securities and Exchange Commission (the "SEC") within 180 days after the closing of the Private Offering, if we are a "well known seasoned issuer" at such time (210 days if we are not then a "well known seasoned issuer") for purposes of registering the resale of the Shares and any shares of common stock issued as a dividend or other distribution with respect to the Shares. We also agreed, subject to certain conditions, to use our commercially reasonable best efforts to cause this registration statement to become effective within 180 days after the closing of the Private Offering, if we are a "well known seasoned issuer" at such time (210 days we are not then a "well known seasoned issuer"). We further agreed, among other things, to indemnify the selling holders under the registration statement from certain losses, claims, damages and liabilities and to pay all fees and expenses (excluding underwriting discounts and selling commissions) incident to the performance of, or compliance with, our obligations under the Registration Rights Agreement.

The Private Offering was exempt from registration pursuant to the exemption for transactions by an issuer not involving any public offering under Section 4(a)(2) the Securities Act of 1933, as amended (the "Securities Act"), and Regulation D under the Securities Act.

Limitations on Dividends and Other Distributions

Effective June 30, 2017, we entered into a credit facility consisting of a term debt note for loans totaling up to $10.0 million, and advances under a revolving line of credit totaling up to $5.0 million. Covenants in the credit facility limit our ability to pay dividends or make other distributions. For additional information see Note 11, "Commitments and Contingencies" in the accompanying notes to the unaudited condensed consolidated financial statements.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES

None.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

ITEM 5. OTHER INFORMATION

Not applicable.

ITEM 6. EXHIBITS

3.1		Amended and Restated Certificate of Incorporation of Codexis, Inc. filed with the Secretary of the State of the State of Delaware on April 27, 2010 and effective as of April 27, 2010 (incorporated by reference to Exhibit 3.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2010, filed on May 28, 2010).
3.2		Certificate of Designations of Series A Junior Participating Preferred Stock of Codexis, Inc., filed with the Secretary of State of the State of Delaware on September 4, 2012 (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on September 4, 2012).
3.3		Amended and Restated Bylaws of Codexis, Inc. effective as of April 27, 2010 (incorporated by reference to Exhibit 3.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2010, filed on May 28, 2010).
4.1		Reference is made to Exhibits 3.1 through 3.3.
10.1		Securities Purchase Agreement, dated as of June 20, 2019, by and between the Company and Casdin Partners Master Fund, L.P. (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed with the SEC on June 20, 2019).
10.2		Registration Rights Agreement, dated as of June 20, 2019, by and between the Company and Casdin Partners Master Fund, L.P. (incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed with the SEC on June 20, 2019).
10.3A		Codexis, Inc. 2019 Incentive Award Plan (incorporated by reference to Exhibit 99.1 to the Company's Registration Statement on Form S-8 (File No. 333-232262) filed with the SEC on June 21, 2019).
10.3B		Form of Restricted Stock Unit Award Grant Notice and Restricted Stock Unit Award Agreement under 2019 Incentive Award Plan (incorporated by reference to Exhibit 99.2 to the Company's Registration Statement on Form S-8 (File No. 333-232262) filed with the SEC on June 21, 2019).
10.3C		Form of Stock Option Grant Notice and Stock Option Agreement under 2019 Incentive Award Plan (incorporated by reference to Exhibit 99.3 to the Company's Registration Statement on Form S-8 (File No. 333-232262) filed with the SEC on June 21, 2019).
10.3D		Form of Stock Option Grant Notice and Stock Option Agreement under 2019 Incentive Award Plan (incorporated by reference to Exhibit 99.4 to the Company's Registration Statement on Form S-8 (File No. 333-232262) filed with the SEC on June 21, 2019).
10.3E		Form of Performance Stock Unit Award Grant Notice and Performance Stock Unit Award Agreement under 2019 Incentive Award Plan (incorporated by reference to Exhibit 99.5 to the Company's Registration Statement on Form S-8 (File No. 333-232262) filed with the SEC on June 21, 2019).
10.3F		Form of Restricted Stock Award Grant Notice and Restricted Stock Award Agreement under 2019 Incentive Award Plan (incorporated by reference to Exhibit 99.6 to the Company's Registration Statement on Form S-8 (File No. 333-232262) filed with the SEC on June 21, 2019).
10.4	†	Platform Technology Transfer and License Agreement, dated May 2, 2019, by and between the Company and Novartis Pharma AG.
31.1		Certification of Principal Executive Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.
31.2		Certification of Principal Financial Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.
32.1		Certification of Principal Executive Officer and Principal Financial Officer Required Under Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, and 18 U.S.C. §1350.

101	The following materials from the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2019, formatted in Inline Extensible Business Reporting Language (iXBRL) includes: (i) Unaudited Condensed Consolidated Balance Sheets at June 30, 2019 and December 31, 2018, (ii) Unaudited Condensed Consolidated Statements of Operations for the Three Months and Six Months Ended June 30, 2019 and 2018, (iii) Unaudited Condensed Consolidated Statements of Stockholders' Equity for the Three Months and Six Months Ended June 30, 2019 and 2018, (iv) Unaudited Condensed Consolidated Statements of Cash Flows for the Six Months Ended June 30, 2019 and 2018, and (v) Notes to Unaudited Condensed Consolidated Financial Statements.
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document
104	The cover page from the Company’s Quarterly Report on Form 10-Q for the quarter ended June 30, 2019, formatted in Inline XBRL.

† Portions of the exhibit, marked by brackets, have been omitted because the omitted information is (i) not material and (ii) would be competitively harmful if publicly disclosed.

SIGNATURES

Pursuant to the requirements 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.

Codexis, Inc.

Date: August 6, 2019

By: /s/ John J. Nicols

John J. Nicols
President and Chief Executive Officer
(principal executive officer)

Date: August 6, 2019

By: /s/ Gordon Sangster

Gordon Sangster
Chief Financial Officer
(principal financial and accounting officer)

[***] Certain information in this document has been excluded pursuant to Regulation S-K, Item 601(b)(10). Such excluded information is not material and would likely cause competitive harm to the registrant if publicly disclosed.

PLATFORM TECHNOLOGY TRANSFER AND LICENSE AGREEMENT

THIS PLATFORM TECHNOLOGY TRANSFER AND LICENSE AGREEMENT (together with any exhibits attached hereto, this "**Agreement**") is made and entered into as of 2 May 2019 (the "**Effective Date**"), by and between Codexis, Inc., a corporation organized and existing under the laws of Delaware ("**Codexis**"), and Novartis Pharma AG, a corporation organized and existing under the laws of Switzerland ("**Novartis**"). Codexis and Novartis are sometimes referred to herein individually as a "**Party**" and collectively as the "**Parties**."

RECITALS

WHEREAS, Codexis possesses expertise in the engineering and optimization of biocatalysts for use in pharmaceutical compound synthesis and manufacture;

WHEREAS, Novartis seeks to develop biocatalytic approaches to synthesize compounds of interest to Novartis and to practice the Platform Technology under the licenses granted by Codexis and in connection with a technology transfer from Codexis; and

WHEREAS, Codexis desires to grant to Novartis such license and perform such technology transfer, on the terms and conditions set forth herein.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing premises and the mutual promises, covenants and conditions contained in this Agreement, the Parties agree as follows:

1. DEFINITIONS. The terms in this Agreement with initial letters capitalized whether used in the singular or the plural, shall have the meaning set forth below. ,

1.1 "**Additional Services**" means any enzyme evolution related services performed by Codexis pursuant to Section 4.1 of this Agreement.

1.2 "**Active Pharmaceutical Ingredient**" or "**API**" means any substance or mixture of substances intended to be used in the manufacture/formulation of a drug (medicinal) product and that, when used in the manufacture/formulation of a drug, becomes an active ingredient of the drug product. Such substances are intended to furnish pharmacological activity or other direct effect in the diagnosis, cure, mitigation, treatment, or prevention of disease or to affect the structure and function of the body.

1.3 **"Affiliate**" means any Person that directly or indirectly is controlled by, controls or is under common control with a Party to this Agreement. For the purposes of this definition, the term "control" (including, with correlative meanings, the terms "controlled by" and "under common control with") as used with respect to a Person means (a) in the case of a corporate entity, direct or indirect ownership of voting securities entitled to cast more than fifty percent (50%) of the votes in the election of directors, (b) in the case

of a non-corporate entity, direct or indirect ownership of more than fifty percent (50%) of the equity interests with the power to direct the management and policies of such entity, or (c) any other arrangement whereby a Person controls or has the right to control the board of directors or equivalent governing body or management of a corporation or other entity; *provided* that, if local Applicable Law restricts foreign ownership, control shall be established by direct or indirect ownership of the maximum ownership percentage that may, under such local Applicable Law, be owned by foreign interests.

1.4 "**Agreement Payments**" means all amounts, fees, royalties, and other payments made by Novartis to Codexis under this Agreement.

1.5 "**Applicable Law**" means all applicable laws, statutes, rules, regulations, ordinances and other pronouncements having the effect of law of any federal, national, multinational, state, provincial, county, city or other political subdivision, government or Regulatory Authority.

1.6 "**Approved Server**" means physical or virtual computer server(s) that are (i) required for the operation of the Codexis Software, (ii) controlled by Novartis or its designated Third Party cloud service provider, and (iii) meet all hardware specifications, software specifications, and other specifications and requirements specified by Codexis for the proper operation of the Codexis Software.

1.7 "**Arising Codexis Enzyme Technology**" means: (a) the amino acid sequence and structure of any Covered Enzyme or Enzyme developed pursuant to Additional Services and (b) structure activity data that describes the structure activity relationship and other characteristics of any Covered Enzyme(s) or Enzyme(s) noted in (a), and in each of (a) and (b), which data and information are Controlled by Codexis. For the avoidance of doubt, Arising Codexis Enzyme Technology shall not include any of the foregoing (a) or (b) developed outside Additional Services.

1.8 "**Arising Codexis Enzyme Technology IP**" means Intellectual Property Rights which have arisen directly from the Arising Codexis Enzyme Technology. For clarity, the Arising Codexis Enzyme Technology IP excludes any Background IP of Novartis, any Arising Novartis Process Technology IP, any Arising Novartis Enzyme Technology IP, and any Novartis API Technology IP.

1.9 "**Arising Codexis Process Technology**" means methods of using Covered Enzyme(s) or Enzyme(s) in compound synthesis, developed during Additional Services under circumstances where Novartis does not Control the Active Pharmaceutical Ingredient which is the subject of the Additional Services and which methods are Controlled by Codexis; *provided* that Arising Codexis Process Technology shall exclude technology that is generally applicable to chemical process development and to the synthesis and scale-up of compounds and that does not specifically require the use or performance of such Covered Enzyme(s) or Enzyme(s).

1.10 "**Arising Codexis Process Technology IP**" means Intellectual Property Rights which have arisen directly from the Arising Codexis Process Technology. For clarity, the Arising Codexis Process Technology IP excludes any Background IP of Novartis, any Arising Novartis Process Technology IP, any Arising Novartis Enzyme Technology IP, and any Novartis API Technology IP.

1.11 "**Arising Novartis Enzyme Technology**" means: (a) the amino acid sequence and structure of any Covered Enzyme or Enzyme developed under a Technology Transfer Project; (b) structure activity data that describes the structure activity relationship and other characteristics of any Covered Enzyme(s) or Enzyme(s) noted in (a); and (c) Technology related to any Covered Enzyme or Enzyme created, developed, or invented (x) solely by Novartis (using the Platform Technology) or jointly by Novartis (using the Platform Technology) and Codexis under a Technology Transfer Project or (y) solely by Novartis (using the Platform Technology) during the Term. For clarity, no Covered Enzyme or Enzyme created, developed, or invented pursuant to Additional Services will be deemed to have been solely developed by Novartis.

1.12 "**Arising Novartis Enzyme Technology IP**" means Intellectual Property Rights which have arisen directly from the Arising Novartis Enzyme Technology. For clarity the Arising Novartis Enzyme Technology IP excludes any Background IP of Novartis, any Background IP of Codexis, any Arising Novartis Process Technology IP, any Arising Codexis Process Technology IP and any Arising Codexis Enzyme Technology IP.

1.13 "**Arising Novartis Process Technology**" means any Process Technology that is created, developed, or invented (a) solely by Novartis (using the Platform Technology) or jointly by Novartis (using the Platform Technology) and Codexis under a Technology Transfer Program or during Additional Services under circumstances where Novartis Controls the Active Pharmaceutical Ingredient which is the subject of the Additional Services or (b) solely by Novartis (using the Platform Technology) during the Term.

1.14 **"Arising Novartis Process Technology IP**" means Intellectual Property Rights which have arisen directly from the Arising Novartis Process Technology. For clarity, the Arising Novartis Process Technology IP excludes any Background IP of Novartis, any Background IP of Codexis, any Arising Codexis Process Technology IP, any Arising Codexis Enzyme Technology IP and any Arising Novartis Enzyme Technology IP.

1.15 "**Background IP**" means any and all Intellectual Property Rights which are Controlled by a Party and (a) exist on the Effective Date and/or (b) arise during the Term independently of the other Party and this Agreement.

1.16 "**Bioconjugate**" means [***].

1.17 "**Biologic**" means [***].

1.18 "**Business Day**" means a day other than Saturday, Sunday or any day on which commercial banks located in New York, New York or Basel, Switzerland are authorized or obligated by Applicable Law to close.

1.19 "**Calendar Quarter**" means the period beginning on the Effective Date and ending on the last day of the calendar quarter in which the Effective Date falls and, thereafter, each successive period of three (3) consecutive calendar months ending on March 31, June 30, September 30 or December 31.

1.20 "**Calendar Year** " means the period beginning on the Effective Date and ending on December 31st of the calendar year in which the Effective Date falls, and thereafter, each successive period of twelve (12) consecutive calendar months commencing on January 1 and ending on December 31.

1.21 "**Claim**" means any claim, demand, cause of action, suit, dispute, proceeding, arbitration, audit, hearing, investigation or inquiry (whether formal or informal).

1.22 "**Codexis Core Patents**" means the Patents set forth on Exhibit 1.22.

1.23 "**Codexis Core Technology**" means those (i) tools, processes and methods Controlled by Codexis; and (ii) generally applicable tools, processes and methods which Codexis has the ability to transfer to or license to Novartis, in each of (i) and (ii) above: (a) which exist as of the Effective Date, (b) used to identify, select, optimize, isolate, modify, engineer, research, develop, make, have made and/or import enzymes, Covered Enzymes and Enzymes, through the recombination and/or rearrangement and/or mutation of genetic material for the creation of genetic diversity, using any methods, including but not limited to Codexis Software, *in silico*, *in vitro*, and and/or *in vivo* technologies, (c) screening techniques, methodologies and/or processes of using the resulting genes and/or proteins to identify and assess their potential utility, (d) gene expression methods applicable in high throughput screening, (e) cultivation of microorganisms, (f) techniques for producing, harvesting, and/or purifying proteins, and (g) including the Codexis Software, in each of (a)–(g) above.

1.24 "**Codexis Core Technology Improvements**" means any Improvement to the Codexis Core Technology practiced by Codexis or any Affiliate of Codexis which are licensed to Novartis under Section 3.2, that is generated by Codexis, or both Parties, or on behalf of Codexis or both Parties, or by Codexis with a Third Party, during the Technology Transfer Period or during the Improvements Term and is Controlled by Codexis, excluding any Improvement to the Codexis Core Technology which arises from Novartis' Background IP. [***].

1.25 "**Codexis Core Technology Improvements IP**" means any and all Intellectual Property Rights which is generated by or on behalf of Codexis or any Affiliate of Codexis or jointly between the Parties or any Affiliate of the Parties which Covers the Codexis Core Technology Improvements. For clarity, the Codexis Core Technology

Improvements IP excludes any Background IP of Novartis, any Arising Novartis Process Technology IP, any Arising Novartis Enzyme Technology IP, and any Novartis API Technology IP.

1.26 "**Codexis Documentation**" means any documentation disclosed by Codexis to Novartis pursuant to Article 2 (including with respect to the Platform Technology and any Improvements), including all documentation relating to the Codexis Methods, the Technology Transfer Plan, and documentation related to the Codexis Software and the documentation described in the Technology Transfer Plan and any and all copies thereof, in whole or in part.

1.27 "**Codexis Enzymes**" means those Covered Enzymes set forth on Exhibit 1.27 which are Controlled by Codexis and transferred to Novartis pursuant to the Technology Transfer Plan and those Covered Enzyme(s), if any, added by Codexis and Novartis as Codexis Enzyme(s) pursuant to Section 3.5.4. For clarity, Codexis Enzymes does not include those Covered Enzymes [***] as set forth on Exhibit 1.27(a).

1.28 "**Codexis Enzyme Patents**" means the Patents set forth on Exhibit 1.28.

1.29 "**Codexis Initial Enzyme(s)**" means any Codexis Enzyme or any Enzyme contained within a Codexis Library which is designated as an Initial Enzyme pursuant to a Technology Transfer Project.

1.30 "**Codexis Library**" means any collection, set or sub-set of expression vectors containing genes Controlled by Codexis that encode for Covered Enzymes, Enzymes or enzymes, transferred to Novartis under the Technology Transfer Plan, for the propagation of additional enzyme stock.

1.31 "**Codexis Materials**" means all biological materials disclosed or transferred to Novartis by Codexis under and specifically in furtherance of this Agreement, including, without limitation, (a) the Codexis Libraries and Codexis Enzymes, and (b) kits and plates generally consisting of multiple, genetically-diverse enzymes that are made commercially available to the general public by Codexis through Codexis' catalog or website, as listed in Appendix I to the Technology Transfer Plan.

1.32 "**Codexis Mayflower Patents**" means the Patents set forth on Exhibit 1.32.

1.33 "**Codexis Methods**" means (a) as of the Effective Date, the methods and protocols listed in Appendix IV of the Technology Transfer Plan, and (b) after the Effective Date, the methods and protocols disclosed by Codexis and drafted by Codexis documenting in sufficient detail to enable a scientist with reasonable skills and experience in the field of protein engineering or biochemistry to practice the Platform Technology. The Codexis Methods shall include the most current and complete procedures used by Codexis

as of the date on which they are disclosed to Novartis with respect to the procedures described therein.

1.34 "**Codexis Software**" means the software components Controlled by Codexis and utilized by Codexis in the Platform Technology as listed on Exhibit 1.34, including all versions and improvements of such software components practiced by Codexis during the Technology Transfer Period and the Improvements Term, in each case solely in executable form.

1.35 "**Commercially Reasonable Efforts**" means, with respect to a Party's obligations under this Agreement, efforts consistent with the efforts and resources normally used by a similarly situated pharmaceutical, biotechnology or technology company in the exercise of its reasonable business discretion relating to the development or commercialization of a product with similar product characteristics that is of similar market potential at a similar stage of development or commercialization, taking into account issues of efficacy, safety, patent and regulatory exclusivity, product profile, anticipated or approved labeling, present and future market potential, competitive market conditions, the proprietary position of the compound or product, the regulatory structure involved, and other technical, legal, scientific, medical or commercial factors, and the profitability of the product, including in light of pricing and reimbursement issues.

1.36 "**Completion of Wave 1**" means the achievement of the Wave 1 Milestone Success Criteria as defined under the Technology Transfer Plan.

1.37 "**Completion of Wave 2**" means the achievement of the Wave 2 Success Criteria as defined under the Technology Transfer Plan.

1.38 "**Completion of Wave 3**" means the achievement of the Wave 3 Success Criteria as defined under the Technology Transfer Plan.

1.39 "**Controlled**" or "**Controls**" means, when used in reference to an item of Technology or to Intellectual Property Rights, the legal authority or right of a Party (whether directly or through any of its Affiliates to the extent a Party has the requisite authority), whether by ownership, assignment or by license, other than pursuant to this Agreement, to grant the right to use such item of Technology or a license or sublicense of such Intellectual Property Rights to the other Party, or to otherwise disclose proprietary or trade secret information to such other Party, without violating any Applicable Law, breaching the terms of any agreement with any Third Party, or misappropriating the proprietary or trade secret information or other Intellectual Property Rights of a Third Party.

1.40 "**Cover**" or "**Covers**" means, a particular item or method encompassed by any Intellectual Property Rights, that, but for a license under or ownership right in such Intellectual Property Rights, the use, making, having made, offering for sale, sale, importation, or other exploitation of such item would infringe or misappropriate such

Intellectual Property Rights (assuming, in the case of pending Patent applications, that such pending Patent applications were issued Patents).

1.41 **"Covered Enzyme(s)**" means any enzyme that is Covered by the Licensed IP.

1.42 "[***]" or "[***]" means [***].

1.43 "**Designated Lab**" means the laboratory(ies) which are located at the Primary Site and designated to implement the Platform Technology.

1.44 "**Developmental Period**" means, for a Therapeutic Product, the [***].

1.45 "**Diagnostic**" means [***].

1.46 "**Dollar**" or "**$**" means the lawful currency of the United States.

1.47 "**enzyme**" (without initial capital) means an immature or mature peptide or protein (including derivatives) with enzymatic or biocatalytic activity.

1.48 "**Enzyme**" means any enzyme which is created from the use of the Platform Technology pursuant to this Agreement.

1.49 "**Excluded Claim**" means a dispute, controversy or claim between the Parties that concerns: (a) the validity or infringement of a patent, trademark or copyright; or (b) any antitrust, anti-monopoly or competition law or regulation, whether or not statutory.

1.50 "**FDA**" means the U.S. Food and Drug Administration, or any successor agency thereto.

1.51 "**Fee Bearing Therapeutic Product**" means a Therapeutic Product for which development was initiated during the Initiation Period.

1.52 **"First Regulatory Approval"** means, [***].

1.53 **"[***]**" means [***].

1.54 "[***]" means[***].

1.55 "**Good Clinical Practices**" or "**GCP**" means the then-current international ethical and scientific quality standards for designing, conducting, recording and reporting trials that involve the participation of human subjects. In the United States, GCP shall be based on Good Clinical Practices established through FDA guidance (including ICH E6) and, outside the United States, GCP shall be based on ICH E6.

1.56 "**Good Laboratory Practices**" or "**GLP**" means the then-current Good Laboratory Practice (or similar standards) for the performance of laboratory activities for pharmaceutical products as are required by applicable Regulatory Authorities or Applicable Law. In the United States, Good Laboratory Practices are established through FDA regulations (including 21 C.F.R. Part 58), FDA guidance, FDA current review and inspection standards and current industry standards.

1.57 "**Good Manufacturing Practices**" or "**GMP**" means the then-current Good Manufacturing Practices for the manufacture of products as are required by applicable Regulatory Authorities or Applicable Law. In the United States, GMP shall be as defined under the rules and regulations of the FDA, as the same may be amended from time to time.

1.58 "**IFRS**" means international financial reporting standards, consistently applied."

1.59 "**Improvement**" means an enhancement, extension, upgrade, improvement, derivative work, or update.

1.60 "**Improvements Term**" means the period commencing upon the completion of the Technology Transfer Period and ending [***], subject to the early termination of this Agreement by Codexis in accordance with Sections 12.2 or 12.3.

1.61 "**Improvements Term Year(s)** " means (a) the period commencing upon the completion of the Technology Transfer Period and ending [***].

1.62 "**Information**" means any and all information and data, including without limitation all Know-How and all other scientific, pre-clinical, clinical, regulatory, manufacturing, marketing, financial and commercial information or data, whether communicated in writing or orally or by any other method, which is provided by one Party to the other Party in connection with this Agreement.

1.63 "**Initial Enzyme**" means the [***] contributed to a Technology Transfer Project which is selected to undergo Initial Enzyme Optimization. Once an Initial Enzyme is selected, such selection may only be changed by mutual written consent of the Parties.

1.64 "**Initial Enzyme Optimization**" means the process of optimizing an Initial Enzyme.

1.65 "**Initial Technology Transfer Inventory**" means all of the items set out in Appendices I, II, III and IV of the Technology Transfer Plan.

1.66 "**Initiation Period**" means the period beginning on the Technology Transfer Period Expiration Date and ending on the date of expiration of the last to expire Patent in the Licensed IP.

1.67 "**In-License Agreements**" means all agreements pursuant to which any Licensed IP is licensed or sublicensed to Codexis from a Third Party and which are listed in Exhibit 1.67.

1.68 "**In-Licensed IP**" means the In-Licensed Patents and any In-Licensed Know-How.

1.69 "**In-Licensed Know-How**" means all Know-How of Third Parties Controlled by Codexis as of the Effective Date and licensed to Codexis pursuant to the In-License Agreements, in each case that Covers the Codexis Documentation, the Codexis Materials, Know-How related to the operation of the Codexis Software (but excluding the Codexis Software itself) or the practice of the Platform Technology.

1.70 "**In-Licensed Patents**" means the Patents set forth on Exhibit 1.70.

1.71 "**Intellectual Property Rights**" means Patents, Know-How and copyrights, including all applications for registration for the foregoing and all other similar proprietary rights as may exist anywhere in the world.

1.72 "**Invention**" means any discovery, invention, contribution, method, finding, or improvement, whether or not patentable, and all related Know-How.

1.73 "**Invoice**" means any invoice submitted to Novartis by Codexis under this Agreement, produced in accordance with Novartis' processing requirements.

1.74 "[***]" means [***].

1.75 "[***]" means [***].

1.76 "**Joint Steering Committee**" or "**JSC**" shall have the meaning set forth in Section 5.1.

1.77 "**Know-How**" means non-public materials and technical information, including techniques, methods, processes, technology, recipes, formulae, designs, equipment configurations and uses, biological samples, compounds and cell lines, and biological, chemical, pharmacological, toxicological, clinical, assay and related trade secrets, manufacturing data, preclinical and clinical data, specifications, ingredients, manufacturing processes, formulation, specifications, sourcing information, quality control and testing procedures, and related know-how and trade secrets and including all of the foregoing related to the operation of the Codexis Software, but in each case excluding the Codexis Software itself.

1.78 "**knowledge of Codexis Senior Management**" means, with respect to any matter in question, that any of Codexis' [***] is actually aware or has actual knowledge of such matter [***].

1.79 "**Licensed Additional Codexis Know-How**" means any and all Know-How which (a) Codexis or any Codexis Affiliate comes to Control during the Technology Transfer Period or during the Improvements Term and which Covers (i) the Platform Technology, (ii) Arising Codexis Enzyme Technology, (iii) Arising Codexis Process Technology, (iv) any Codexis Core Technology Improvements, (v) the Codexis Documentation, or (vi) Codexis Materials and including any Know-How related to the operation of the Codexis Software, but in each case excluding the Codexis Software itself, and (b) Codexis or any Codexis Affiliate comes to Control during the Term and which Covers the [***].

1.80 "**Licensed Additional Codexis Patents**" means any and all Patents which (a) Codexis or any Affiliate comes to Control during the Technology Transfer Period and the Improvements Term and which Covers (i) the Platform Technology, (ii) Arising Codexis Enzyme Technology (iii) Arising Codexis Process Technology, or (iv) any Codexis Core Technology Improvements and (b) Codexis or any Codexis Affiliate comes to Control during the Term and which Covers the [***].

1.81 "**Licensed IP**" means (a) the Licensed Patents, (b) the In-Licensed Patents (c) the Licensed Know-How, (d) the In-Licensed Know-How, (e) the Licensed Additional Codexis Know-How and (f) the Licensed Additional Codexis Patents.

1.82 "**Licensed Know-How**" means any Know-How Controlled by Codexis as of the Effective Date which is disclosed or provided to Novartis pursuant to the Technology Transfer Plan, including the Codexis Documentation, Codexis Materials and Know-How related to the operation of the Codexis Software (but excluding the Codexis Software itself), but only to the extent existing as of the Effective Date.

1.83 "**Licensed Patents**" means the Codexis Core Patents, the Codexis Mayflower Patents and the Codexis Enzyme Patents.

1.84 "**Losses**" means any liability, loss, damage, expense (including reasonable legal expenses, costs of litigation, and attorneys' fees) or judgment, whether for money or equitable relief, of any kind.

1.85 "**Novartis API Technology**" means all Technology (excluding however any Process Technology) of or relating to manufacturing/formulation or processing an Active Pharmaceutical Ingredient, in either case which Technology relates to a specific Active Pharmaceutical Ingredient, including any Novartis Controlled API and any Novartis Non-Controlled API, developed by or for (other than any Technology developed by Codexis on behalf of Novartis or any of its Affiliates) or otherwise Controlled by Novartis, but in each case excluding the Codexis Software.

1.86 "**Novartis API Technology IP**" means all Intellectual Property Rights of any kind or nature in or to any Novartis API Technology.

1.87 "**Novartis Controlled API**" means any Active Pharmaceutical Ingredient that is a Small Molecule or Bioconjugate, but is not a Biologic, where such Active Pharmaceutical Ingredient is owned or Controlled by Novartis and developed and/or manufactured by Novartis using at least one (1) Enzyme.

1.88 "**Novartis Controlled Biocatalyst Field**" means the research, development, and manufacture of Covered Enzymes and Enzymes for use in the human healthcare field solely by Novartis and its Affiliates, or on behalf of Novartis and its Affiliates in accordance with Section 3.2, in the chemical synthesis of Therapeutic Products owned or Controlled by Novartis (including, for clarity, the chemical synthesis of Novartis Controlled APIs for formulation into any Therapeutic Controlled by Novartis), but excluding, in any event, the discovery of any Biologic(s), Therapeutic Enzyme(s), Diagnostic(s), or Vaccine(s), or any sale, lease, license, transfer or use of such Covered Enzymes or Enzymes as a standalone product or a component of a product. [***].

1.89 "[***]" means [***].

1.90 "[***]" means [***].

1.91 "[***]" means [***].

1.92 "**Novartis Non-Controlled API**" means any Active Pharmaceutical Ingredient that is a Small Molecule or Bioconjugate, but is not a Biologic, which is not owned or Controlled by Novartis or by any Third Party and developed and/or manufactured by or for Novartis using at least one (1) Enzyme.

1.93 "**Novartis Non-Controlled Biocatalyst Field**" means the research, development and manufacture of Covered Enzymes and Enzymes for use in the human healthcare field solely by Novartis and its Affiliates, or on behalf of Novartis and its Affiliates in accordance with Section 3.2, in the chemical synthesis of Novartis Non-Controlled APIs, but excluding, for clarity, the discovery of any Biologic(s), Therapeutic Enzyme(s), Diagnostic(s), or Vaccine(s), or any sale, lease, license, transfer or use of such Covered Enzymes or Enzymes as a standalone product or a component of a product. [***].

1.94 "[***]" means [***].

1.95 "**Patent(s)**" means (a) patents and patent applications anywhere in the world, (b) all divisionals, continuations, continuations in-part thereof or any other patent application claiming priority, or entitled to claim priority, directly or indirectly to (i) any such patents or patent applications, or (ii) any patent or patent application from which such patents or patent applications claim, or is entitled to claim, direct or indirect priority, (c) all patents issuing on any of the foregoing anywhere in the world, together with all registrations, reissues, re-examinations, patents of addition, renewals, substitutions, validations, and re-validations, supplemental protection certificates or extensions of any of

the foregoing anywhere in the world, and (d) all provisional and any other priority patent applications filed worldwide.

1.96 "**Person**" means any individual, firm, corporation, partnership, limited liability company, trust, business trust, joint venture, governmental authority, association or other entity.

1.97 "**Phase 1 Clinical Trial**" means a human clinical trial in any country that would satisfy the requirements of 21 CFR 312.21(a).

1.98 "**Platform Technology**" means (a) the Codexis Core Technology, (b) the Codexis Core Technology Improvements, (c) the Codexis Enzymes, and (d) the Codexis Libraries, and in each case, which are provided to Novartis by Codexis under this Agreement.

1.99 "**Primary Site**" means the single Novartis-controlled facility specified in the Technology Transfer Plan to which the Platform Technology will be transferred.

1.100 "**Process Technology**" means any method, process, or other invention pertaining to the use of any Covered Enzyme or Enzyme; *provided* that Process Technology shall exclude Technology that is generally applicable to chemical process development and to the synthesis and scale up of compounds and that does not specifically require the use or performance of a Covered Enzyme, or Enzyme.

1.101 **"Prosecution**" means the preparation, drafting, filing, prosecution (including any interferences, reissue proceedings, reexaminations, inter partes reviews, post-grant reviews, oppositions and Patent office appeals) and maintenance of Patents in the Territory. When used as a verb, "**Prosecute**" means to engage in Prosecution.

1.102 "**Regulatory Approval(s)**" means, with respect to any Therapeutic Product in any jurisdiction, all approvals from any Regulatory Authority necessary for the commercial manufacture, marketing and sale of any product containing such Therapeutic Product in such jurisdiction in accordance with Applicable Law, including without limitation, receipt of pricing and reimbursement approvals, where required.

1.103 "**Regulatory Authority**" means any national or supranational governmental authority, including without limitation, the FDA, which has responsibility in countries in the Territory over the development and/or commercialization of any Therapeutic Product, as applicable.

1.104 "**Regulatory Filings**" means any and all regulatory applications, filings, approvals and associated correspondence required to develop any Therapeutic Product in each country or jurisdiction in the Territory.

1.105 "[***]**"** means the [***]

1.106 "Restricted Enzyme" means any enzyme, or any vector that encodes for any such enzyme, listed in Exhibit 1.106. During the Term, Exhibit 1.106 may be revised in accordance with Section 3.5.4.

1.107 "**ROFR Period**" means, with respect to a given Novartis Controlled API, the period beginning on completion of a (a) Phase 1 Human Clinical Trial for the first Therapeutic Product containing such Novartis Controlled API, or (b) in the case of non-human animals, upon approval by the Center for Veterinary Medicine of the FDA of the first NADA, ANADA or CNADA for such Therapeutic, or, for both (a) and (b), for any Therapeutic Product that is subject to Regulatory Approval outside of the United States, the non-U.S. equivalent(s) of (a) and (b), and ending on the earlier of (x) the date that is five (5) years after the Regulatory Approval for the first such Therapeutic Product, and (y) the termination of this Agreement.

1.108 "[***]**"** means [***].

1.109 "**Small Molecule**" means [***].

1.110 "[***]" means the [***].

1.111 "**Technology**" means Know-How, Inventions, industrial designs, works of authorship, development tools, files, records and data, all emulation and simulation tools and reports, prototypes, sequences, structures, databases and data collections, and all tangible embodiments of the foregoing, *provided, however*, Technology shall not include Codexis Software (or software, source code, object code, graphical user interfaces, application programming interfaces, programs, objects, modules, algorithms, routines or firmware used or utilized in Codexis Software).

1.112 "**Technology Transfer**" means (a) the transfer to Novartis of the Platform Technology, Codexis Documentation, Codexis Software, Codexis Materials, and Improvements thereto which come to be Controlled by Codexis during the Technology Transfer Period, and (b) the training provided to Novartis with respect to the Platform Technology, in each case to be conducted in accordance with the Technology Transfer Plan and Article 2.

1.113 "**Technology Transfer Period**" means the period beginning upon the start of Technology Transfer and ending upon Completion of Wave 3, and is further to be defined in the Technology Transfer Plan.

1.114 "**Technology Transfer Period Expiration Date**" means the earlier of (a) Completion of Wave 3 (in accordance with Section 2.2.7), or (b) twenty (20) months following the Wave 1 Commencement (as defined in Section 2.2.5).

1.115 "**Technology Transfer Plan**" means that plan for the Technology Transfer as mutually agreed between the Parties and set forth in Exhibit 1.115 as of the Effective Date and as may be amended by the Parties during the Technology Transfer Period

in accordance with Section 2.2.2 itemizing each Party's responsibilities and obligations, the activities to be performed by each Party, and a timeline for performance of such activities, in connection with the Technology Transfer from Codexis to Novartis to fully implement the Platform Technology at the Designated Lab.

1.116 "**Technology Transfer Project**" means any Enzyme evolution project that was initiated using an Initial Enzyme during the Technology Transfer Period.

1.117 "**Territory**" means all of the countries in the world, and their territories and possessions.

1.118 "**Therapeutic**" means a compound, molecule, pharmaceutical, drug, biological preparation, or other product for the treatment or prevention of any disease or medically treatable or preventable condition in human healthcare. [***].

1.119 "**Therapeutic Enzyme**" means [***].

1.120 "**Therapeutic Product**" means any Therapeutic owned or Controlled by Novartis or its Affiliates (or their permitted licensees, successors, assigns and transferees) containing a Novartis Controlled API or a Novartis Non-Controlled API.

1.121 "**Third Party**" means any Person other than Novartis and Affiliates of Novartis, and Codexis and Affiliates of Codexis.

1.122 "**United States**" or "**U.S.**" means the United States of America and all its territories and possessions.

1.123 "**U.S. GAAP**" means generally accepted accounting principles adopted by the U.S. Securities and Exchange Commission, consistently applied.

1.124 "**Vaccine**" means [***].

1.125 "**Wave**" means each phase of the Technology Transfer noted as Wave 1, Wave 2 and Wave 3 of the Technology Transfer Plan in force as of the Effective Date, and from time-to-time during the Technology Transfer Period.

1.126 "**Wave 1 Commencement**" means the date on which Codexis begins transferring the Codexis Materials and Codexis screening capabilities to Novartis as more fully outlined in the Technology Transfer Plan.

1.127 **"Western Europe"** means [***].

2. TECHNOLOGY TRANSFER

2.1 Management of Technology Transfer.

2.1.1 **Scientific Lead**. Each Party shall designate in writing within fifteen (15) days after the Effective Date, a "**Scientific Lead**" with all necessary

scientific skill and expertise to fulfil such role in accordance with this Article 2, to be the primary contact for such Party responsible for managing day-to-day communications between the Parties with respect to the technical aspects of the Technology Transfer and other scientific and technical activities (including any Additional Services) set forth in this Agreement, including responsibility for scheduling teleconferences and coordinating meetings and technical support as required hereunder. Each Party may respectively appoint a substitute Scientific Lead to represent it under this Section 2.1.1.

2.1.2 Alliance Manager. Each Party shall designate in writing within fifteen (15) days after the Effective Date, an "**Alliance Manager**" with all necessary business skill and expertise as necessary to be the primary contact for such Party as regards all business development and/or contract-related communications between the Parties for all matters in connection with this Agreement, outside of the purview of the technical matters for which the Scientific Leads are responsible. The Alliance Managers shall be responsible for initially addressing any finance, legal and business issues that may arise. Each Party may respectively appoint a substitute Alliance Manager to represent it under this Section 2.1.2.

2.1.3 Limitations. The Scientific Leads and the Alliance Managers shall not have the authority to amend, modify or waive compliance with this Agreement, through meeting minutes, e-mails or otherwise.

2.2 Technology Transfer.

2.2.1 Technology Transfer Plan. The Parties shall perform the Technology Transfer in Waves during the Technology Transfer Period pursuant to the timelines and in accordance with the responsibilities allocated under the Technology Transfer Plan. Each Party shall perform the activities assigned to such Party under the Technology Transfer Plan at the Primary Site and shall perform all such activities in compliance with Applicable Law. Each Party shall be responsible for all salaries and costs and expenses of their own personnel (including, without limitation, travel and living expenses). Without limiting the foregoing, Codexis shall provide Novartis the Codexis Methods at dates no later than those set forth in the timelines in the Technology Transfer Plan. Codexis shall promptly transfer to Novartis (a) the Initial Technology Transfer Inventory, (b) the Codexis Materials, (c) the Codexis Documentation, and (d) the Codexis Software and other Platform Technology, at dates no later than those set forth in the timelines in Technology Transfer Plan. All Technology Transfer activities shall be performed diligently and in good faith by the Parties. Notwithstanding anything to the contrary, subject to any updates to the Technology Transfer Plan pursuant to Section 2.2.2, Codexis shall not be obligated to transfer to Novartis any information and/or materials not described in the Technology Transfer Plan. [***].

2.2.2 Updates to Technology Transfer Plan. In the event that errors and/or omissions in the Technology Transfer Plan are discovered by Novartis and/or Codexis during the Technology Transfer Period and/or changes in the Technology Transfer

Plan are desired and the Parties, through their representatives on the Joint Steering Committee, agree to update the Technology Transfer Plan pursuant to any reasonable scientific rationale agreed between the Parties to enable Novartis to practice the Platform Technology, the Parties shall then update the Technology Transfer Plan accordingly.

2.2.3 Improvements Arising During Technology Transfer Period. Within [***] after the end of the Calendar Quarters ending June 30 and December 31, Codexis will disclose to Novartis any and all Improvements relating to the Platform Technology which have come to be Controlled by Codexis at any time during the Technology Transfer Period, and which have been identified and are being practiced by Codexis in its own business operations, including, without limitation, all Codexis Core Technology Improvements (including any and all Improvements to the Codexis Methods, the Initial Technology Transfer Inventory and the Codexis Software), Improvements to the Codexis Materials and the Codexis Documentation, Arising Codexis Enzyme Technology, and/or Arising Codexis Process Technology which come to be Controlled by Codexis during the Technology Transfer Period. [***].

2.2.4 Technology Transfer Teams. In order to effect Section 2.2:

(a) Novartis shall identify a Technology Transfer team of personnel and in such numbers as it may so determine (the "**Novartis Team**") to participate in the Technology Transfer. Novartis may change any member(s) of the Novartis Team in its sole discretion at any time. The Novartis Team shall have all reasonable skills and experience to perform the Technology Transfer. [***], Novartis shall remain at all times fully liable for its respective responsibilities with respect to the Technology Transfer.

(b) Codexis shall identify a Technology Transfer team to lead the Novartis Team in the Technology Transfer (the "**Codexis Team**") as detailed in the Technical Transfer Plan. Codexis, in its sole discretion, may change any member(s) of the Codexis Team at any time. Each member of the Codexis Team shall have all necessary scientific experience and expertise to perform the Technology Transfer in accordance with the Technology Transfer Plan. [***]. [***], Codexis shall remain at all times fully liable for its respective responsibilities with respect to the Technology Transfer.

2.2.5 Wave 1 of Technology Transfer Plan. After the Effective Date, the Codexis Team will transfer Codexis Materials and Codexis screening capabilities to Novartis as more fully outlined in the Technology Transfer Plan. Unless mutually agreed in writing by the Parties, Wave 1 Commencement shall occur [***]. Wave 1 will be deemed complete upon Completion of Wave 1.

2.2.6 Wave 2 of Technology Transfer Plan. On an agreed-upon date, the Codexis Team and the Novartis Team will participate in Wave 2 of Technology Transfer activities by enabling Novartis to practice the Platform Technology as more fully

outlined in the Technology Transfer Plan. Wave 2 will be deemed complete upon Completion of Wave 2.

2.2.7 Wave 3 of Technology Transfer Plan. On an agreed-upon date, the Codexis Team and the Novartis Team will participate in Wave 3 of Technology Transfer activities by having the Codexis Team train the Novartis Team on [***] Technology Transfer Project(s) to be approved by the JSC, as more fully outlined in the Technology Transfer Plan. Wave 3 will be deemed complete upon Completion of Wave 3. Wave 3 will be performed at such location(s) specified in the Technology Transfer Plan.

2.2.8 Completion of Technology Transfer. The Technology Transfer will be deemed complete upon the Completion of Wave 1, the Completion of Wave 2 and the Completion of Wave 3. If Completion of Wave 1, Completion of Wave 2 and the Completion of Wave 3 are not achieved on or before twenty (20) months from the Wave 1 Commencement where such non-achievement is proximately caused by decision(s), action(s) or inaction(s) of Novartis, its Affiliates and/or Third Parties controlled by Novartis and/or its Affiliates, the applicable milestone payment(s) set forth in Section 7.2 shall be paid to Codexis in the manner set forth in Section 7.2. In the event either Party reasonably disputes whether or not the Completion of Wave 1 and/or Completion of Wave 2 and/or the Completion of Wave 3 have occurred, the Parties will submit such dispute for resolution in accordance with Article 13.

2.3 Transfers of Materials. In the event that the Parties mutually agree that a transfer of any biopharmaceutical, biological, chemical or other like material ("**Material(s)**") from one Party to the other Party is necessary or desirable to facilitate the Parties' collaborative activities pursuant to this Agreement then, except (i) where Codexis Materials are transferred by Codexis to Novartis pursuant to the Technology Transfer Plan (which in all cases shall be itemized and recorded in writing, such written records to be sent to Novartis for confirmation of receipt of all such items), or (ii) where Materials are transferred by Codexis to Novartis and are identified as a "deliverable" under a Statement of Work, such Materials will be transferred subject to and in accordance with the Statement of Work.

2.4 Designated Lab. [***].

2.5 [***]. [***].

3. LICENSES

3.1 Licenses to Codexis.

3.1.1 [***].

3.1.2 Arising Novartis Enzyme Technology IP. Subject to the terms and conditions of this Agreement (including, for the avoidance of doubt, Article 12), Novartis hereby grants to Codexis a worldwide, exclusive, non-transferable (except as provided in Section 14.8), fully paid-up, royalty-free right and license, with the right to grant sublicenses, under the Arising Novartis Enzyme Technology IP invented using the Platform Technology, [***], solely to improve, make, have made, use, and sell Enzymes for use solely outside of the Novartis Controlled Biocatalyst Field.

3.1.3 Arising Novartis Process Technology IP. Subject to the terms and conditions of this Agreement (including, for the avoidance of doubt, Article 12), Novartis hereby grants to Codexis a worldwide, non-exclusive, non-transferable (except as provided in Section 14.8), fully paid-up, royalty-free right and license, with the right to grant sublicenses, under the Arising Novartis Process Technology IP (excluding, in any event, any Novartis API Technology IP) invented using the Platform Technology for any use solely outside of the Novartis Controlled Biocatalyst Field.

3.2 Licenses to Novartis.

3.2.1 Platform Technology Licenses. Subject to the terms and conditions of this Agreement (including the limitations set forth in Section 3.4), Codexis on behalf of itself and its Affiliates hereby grants to Novartis, during the Term, a nontransferable (except as provided in Section 14.8), right and license, with the right to grant sublicenses to Affiliates, in accordance with, and to the extent permitted under, Section 3.2.7, under the Licensed IP in the Territory, with respect to enzymes, including any enzyme owned or otherwise Controlled by Novartis under this Agreement or otherwise, to use in the Designated Lab the Platform Technology (or any aspect of the Platform Technology) (but excluding the Codexis Software, which shall instead be subject to the license set forth in Section 3.2.2, below), which right and license shall be:

(a) exclusive in the Novartis Controlled Biocatalyst Field; and

(b) non-exclusive in the Novartis Non-Controlled Biocatalyst Field;

in each of Sections 3.2.1(a) and 3.2.1(b), solely to research, develop, use, optimize, modify, isolate, engineer, identify, select, make, have made, import and/or export, Enzymes, other than any Restricted Enzyme. [***].

3.2.2 License to Codexis Software. Subject to the terms and conditions of this Agreement (including, without limitation, the limitations set forth in Section 3.4), Codexis on behalf of itself and its Affiliates hereby grants to Novartis, during the Term, a nontransferable (except as provided in Section 14.8), right and license, sublicensable to Affiliates in accordance with, and to the extent permitted under, Section 3.2.7), to (i) deploy [***] the Codexis Software on Approved Servers, and (ii) access and use [***] the Codexis Software solely from the Designated Lab [***]. [***]. The foregoing license set forth in this Section 3.2.2 shall be:

(a) exclusive in the Novartis Controlled Biocatalyst Field; and

(b) non-exclusive in the Novartis Non-Controlled Biocatalyst Field;

in each of Sections 3.2.2(a) and 3.2.2(b), solely to research, develop, use, optimize, modify, isolate, engineer, identify select, make, have made, import and/or export Enzymes, other than any Restricted Enzyme. The right and license granted herein is not subject to any limitation on the number of simultaneous in-house projects being conducted by Novartis.

3.2.3 Manufacturing Licenses. Subject to the terms and conditions of this Agreement (including, without limitation, the limitations set forth in Sections 3.4), Codexis hereby on behalf of itself and its Affiliates grants to Novartis, during the Term, a non-transferable (except as provided in Section 14.8) right and license, with the right to grant sublicenses to Affiliates, contract manufacturing organizations (CMOs), contract research organizations (CROs), or other contract service organizations in accordance with and to the extent permitted under Section 3.2.7 under the Licensed IP in the Territory, solely to make, have made, import and/or export Enzyme(s) for use in Therapeutic Product(s) or Novartis Controlled API(s) or Novartis Non-Controlled API(s), which right and license shall be:

(a) exclusive in the Novartis Controlled Biocatalyst Field; and

(b) non-exclusive in the Novartis Non-Controlled Biocatalyst Field.

3.2.4 [***]. Under the terms of the licenses granted by Codexis to Novartis under Sections 3.2.1, 3.2.2, and 3.2.3, [***].

3.2.5 Loss of Exclusivity. The exclusive licenses granted by Codexis to Novartis in the Novartis Controlled Biocatalyst Field pursuant to Sections 3.2.1, 3.2.2 and 3.2.3 shall become non-exclusive, on a Therapeutic-by-Therapeutic and country-by-country basis, on the first date that [***].

3.2.6 [***]. [***].

3.2.7 [***]. [***].

3.3 Sublicensing. To the extent that either Party is permitted to grant sublicenses under the licenses granted to it under this Agreement, either Party shall have the right to grant such sublicenses through multiple tiers of sublicensees; *provided* that:

3.3.1 any sublicense agreement between Novartis and a Third Party sublicensee relating to the performance of Novartis' obligations or exercise of Novartis' rights under this Agreement shall include material transfer terms, and non-use and non-disclosure confidentiality terms, that are no less stringent than terms used by Novartis in the ordinary course of Novartis' business in similar transactions involving Novartis' proprietary materials and information of a similar nature;

3.3.2 any such sublicense is consistent with and subject to the terms of this Agreement and shall terminate automatically upon termination of the corresponding license hereunder;

3.3.3 each Party, within [***] after the effective date of any sublicense, shall provide written notice to the other Party of the grant, the date, and the identity of the Third Party of any sublicense to a Third Party;

3.3.4 each Party shall not be relieved of its obligations pursuant to this Agreement as a result of such sublicense; and

3.3.5 any sublicense granted by Novartis shall (a) prohibit the sublicensee from using the Platform Technology for any purpose other than as specified in Section 3.2.1, Section 3.2.2 and Section 3.2.3 and (b) require the sublicensee to destroy all Platform Technology, and all Information of Codexis, in possession of such sublicensee after completion of the sublicensee's obligations under such sublicense.

3.4 Limitations on Licenses.

3.4.1 Restricted Enzymes. With respect to any aspect of Restricted Enzymes for which Codexis has less than fully exclusive, worldwide rights (e.g., co-exclusive, non-exclusive, limited territorial or otherwise restricted rights), the licenses provided in Sections 3.2.1, 3.2.2, 3.2.3 and 3.5.2 shall be limited to the scope of those rights that Codexis Controls.[***].

3.4.2 In-Licensed Patents. With respect to any aspect of the In-Licensed Patents for which Codexis has less than fully exclusive, worldwide rights (e.g., co-exclusive, non-exclusive, limited territorial or otherwise restricted rights), the licenses provided in Sections 3.2.1, 3.2.2, 3.2.3 and 3.5.2 shall be limited to the scope of those rights that Codexis Controls.

3.4.3 Codexis Mayflower Patents. The licenses provided in Sections 3.2.1, 3.2.2, 3.2.3 and 3.5.2 shall be limited as set forth in Exhibit 3.4.3.

3.4.4 No Use for Third Parties.

(a) Novartis shall not use, and shall cause its Affiliates and permitted sublicensees not to use, the Platform Technology to engineer, synthesize, manufacture or otherwise develop or produce any Enzymes, molecules, biologic agents, drug products, therapeutic agents or any other compounds for or on behalf of any Third Party and/or to that Third Party's order or direction. [***].

(b) Novartis shall not use, and shall cause its Affiliates and permitted sublicenses not to use, the Platform Technology to make or have made and sell, offer for sale, lease, barter, donate or otherwise transfer any enzymes or Enzymes to any Third Party. [***].

(c) [***].

3.4.5 Enzyme Supplier. [***].

3.4.6 Codexis Software Restrictions. Codexis retains ownership of all Codexis Software and rights therein and Novartis will maintain the copyright notice and any other notices that appear on the Codexis Software on any copies and any media. Novartis will not (and will not allow any Affiliate or Third Party to) [***] Prior to disposing of any media or apparatus containing any part of the Codexis Software, Novartis shall completely destroy any Codexis Software contained therein. All the limitations and restrictions on Codexis Software in this Agreement shall also apply to any Codexis Documentation for the Codexis Software. Novartis acknowledges and agrees that it will be solely responsible for providing, maintaining, and supporting the Approved Servers.

3.4.7 [***]. [***].

3.4.8 Approved Server. The Approved Server may be located at any site controlled by Novartis or its designated Third Party cloud service provider located within the [***].

3.5 Improvements Term.

3.5.1 Disclosure. Within [***] following each Improvements Term Year during the Improvements Term, Codexis will disclose to Novartis any Codexis Core Technology Improvements IP (including any and all Improvements to the Codexis Methods, the Initial Technology Transfer Inventory and the Codexis Software), Improvements to the Codexis Materials and/or the Codexis Documentation, which have come to be Controlled by Codexis during the applicable Improvements Term Year and which [***] (each an "**Improvements Report**"). All such disclosures, whether initial or subsequent, shall be considered the Information of Codexis.

3.5.2 Grant of Rights. Subject to the terms and conditions of this Agreement (including the limitations set forth in Sections 3.2, 3.2.7 and 3.4), Codexis hereby

on behalf of itself and its Affiliates grants to Novartis a worldwide, non-transferrable (except as permitted under Section 14.8), non-sublicensable (except as permitted in accordance with Sections 3.2.1, 3.2.2 and 3.2.3) license, which license shall be either exclusive, non-exclusive or both as determined in accordance with Sections 3.2.1, 3.2.2 and 3.2.3, under Codexis' rights to Codexis Core Technology Improvements IP and Improvements to the Codexis Materials and/or the Codexis Documentation which have come to be Controlled by Codexis during the applicable Improvements Term Year and which [***]. This license shall become effective as of [***], notwithstanding that Novartis [***].

3.5.3 Installation at Novartis. Novartis shall have the option, exercisable within [***] of the disclosure by Codexis pursuant to Section 3.5.1, to notify Codexis in writing of which [***], if any, that Novartis then wants to install in its own operations. [***].

3.5.4 [***]. [***].

3.5.5 [***]. [***].

3.5.6 [***]. [***].

3.6 Novartis Developed Improvements. During the Term, within [***] after the end of the Calendar Quarters ending June 30 and December 31, Novartis' representative on the Patent Committee will meet and discuss with Codexis' representative on the Patent Committee any Codexis Core Technology Improvements, [***], Arising Novartis Enzyme Technology, and Arising Novartis Process Technology (other than any Novartis API Technology) which Novartis has developed since the last such meeting. Codexis shall have [***] after such meeting and receipt of the initial disclosure regarding such Codexis Core Technology Improvements, [***], Arising Novartis Enzyme Technology, and Arising Novartis Process Technology to request the disclosure of further information and Technology which is Controlled by Novartis. Any disclosures or transfers of Technology from Novartis to Codexis under this Section 3.6 shall be at Codexis' sole expense. [***].

3.7 Public Domain Information and Material. Codexis acknowledges and agrees that Novartis shall be free to utilize, without restriction, any information, material, or other Technology that is (a) within the Platform Technology (including any Improvements thereto) and (b) wholly within the public domain.

3.8 No Implied Licenses. No license or other right is or shall be created or granted hereunder by implication, estoppel or otherwise. All licenses and rights are or shall be granted only as expressly provided in this Agreement. All rights not expressly granted by a Party under this Agreement are reserved by such Party and may be used by such Party for any purpose. For clarity, there shall be no implied license or implied other right in favor of Codexis to any Enzyme, and there shall be no implied license or implied other right in favor of Novartis to any Technology or Intellectual Property Rights of Codexis that is not expressly addressed in this Agreement.

4. SERVICES

4.1 Additional Services. At any time during the Term, Codexis and Novartis may mutually agree for Codexis to perform additional enzyme evolution related services for the benefit of Novartis, with the scope, deliverables, fees, and conduct of the Parties with respect to such additional services to be set forth in a mutually agreeable statement of work (each, a "**Statement of Work**") in a form substantially similar to that attached as Exhibit 4.1. During the Technology Transfer Period and the Improvements Term, these Additional Services can [***]. All Additional Services, and the performance thereof by Codexis, will be subject to the terms and conditions of this Agreement, including, without limitation, the provisions of Sections 7.4, 7.5, and 7.6. All Additional Services shall be performed [***] by Codexis. Without limiting the foregoing, Codexis will [***] to accomplish the Additional Services in accordance with any applicable Statement of Work and the terms of this Agreement. [***] In the event that Novartis desires to [***], such [***]. As of the Effective Date, Codexis and Novartis hereby agree[***].

4.2 Subcontracting. Subject to Novartis' compliance with Section 3.2.7 and Codexis' prior written consent, such consent not to be unreasonably withheld, conditioned or delayed, Novartis may perform any of its obligations or exercise any of its rights under this Agreement through one or more Third Party contractors, contract manufacturing organizations (CMOs), contract research organizations (CROs) or other contract service organizations, *provided, however*, Novartis may not subcontract any activities to a Third Party that would permit such a Third Party to receive and/or use the Platform Technology. Subject to Codexis' compliance with Section 3.3, Codexis may perform any of its obligations under a Technology Transfer Project and Article 4 through one or more Third Party contractors, contract service organizations and academic or government collaborators; *provided* that the activities corresponding to such obligations [***].

5. JOINT STEERING COMMITTEE; PATENT COMMITTEE.

5.1 Joint Steering Committee Establishment. Within thirty (30) days after the Effective Date, the Parties shall establish a joint steering committee (the "**Joint Steering Committee**" or "**JSC**") to have overall responsibility for managing and directing the Technology Transfer and Additional Services and to oversee and make certain decisions regarding the Technology Transfer and the Additional Services. The JSC shall also provide a forum for sharing advice, progress and results relating to the activities conducted by the Parties and shall attempt to facilitate the resolution of any disputes between the Parties. At each meeting of the JSC, each Party shall brief the JSC regarding the content, execution and results achieved by such Party with respect to the Technology Transfer and Additional Services. Each Party, through its representatives on the JSC, shall be permitted to provide advice and commentary with respect to the Technology Transfer and Additional Services. The JSC shall have the following specific responsibilities:

5.1.1 oversee, review and provide advice regarding the overall progress of the Technology Transfer and any Additional Services;

5.1.2 coordinate the research activities under a written research plan relating to all Technology Transfer Projects agreed by the Parties and coordinate sharing of results and data arising therefrom;

5.1.3 appoint and oversee subcommittees as it deems appropriate for carrying out activities under this Agreement, including for oversight of any specific aspects of any portion of the Technology Transfer, Additional Services, or other matters;

5.1.4 review the Technology Transfer Plan and any Statements of Work and, if appropriate, propose modifications thereto to the Parties; and

5.1.5 perform any other activities or functions as the Parties may mutually agree in writing.

5.2 Membership; Meetings. The JSC shall be composed of [***] employees from each of Novartis and Codexis and shall meet, in person, by teleconference, or by video-teleconference, at least one (1) time per Calendar Quarter, or more or less often as the Parties shall determine; *provided* that nothing under this Agreement shall prevent the Parties from meeting in person, by teleconference, or by video-teleconference more frequently as may be mutually agreed by the JSC representatives. In-person meetings shall alternate between Codexis and Novartis locations within the United States or Switzerland whenever possible unless otherwise agreed by the Parties. The first such meeting shall be within [***] after the Effective Date. Any member of the JSC may designate a substitute, who shall be an employee of the applicable Party, to attend with prior written notice to the other Party. Ad hoc guests who are subject to written confidentiality obligations at least as stringent as the provisions in Article 10 may be invited to JSC meetings. Each Party may replace its JSC members with other of its employees, at any time, upon written notice to the other Party.

5.3 Decision-Making; Limitations on JSC. Decisions of the JSC shall be made by consensus, including issues concerning technical feasibility and the deployment of Codexis resources, with each Party having collectively one (1) vote in all decisions. The JSC shall have only such powers as are specifically delegated to it in this Agreement, and such powers shall be subject to the terms and conditions set forth herein. Without limiting the generality of the foregoing, the JSC shall have no power to amend this Agreement, the Technology Transfer Plan, or any Statement of Work. The Parties shall be alternately responsible for preparing and circulating minutes, for approval by the non-preparing Party, within [***] after each meeting including but not limited to a list of topics of discussion at the meeting and a list of any actions, decisions or determinations approved and a list of any issues and actions to be resolved. If the JSC is unable to reach a consensus decision on a matter that is within its decision-making authority within [***] after it has met and attempted to reach such decision, then such matter shall be resolved in accordance with Article 13. Any matter not expressly provided for hereunder and any matter relating to any [***], Novartis Controlled API, Novartis Non-Controlled API, Therapeutic Products, Platform Technology (other than certain Improvements with respect thereto), Licensed IP (other than certain Improvements with respect thereto), or Codexis Background IP (other than certain Improvements with respect thereto) shall remain outside of the scope of the JSC.

5.4 Duration of JSC. The JSC shall be automatically disbanded at the end of the Improvements Term or the earlier termination of this Agreement; *provided* that the Parties may, by mutual written agreement, extend the term of the JSC for additional [***] periods after the expiration of the Improvements Term with a separate mutual written agreement required for each such [***] extension.

5.5 Patent Committee

5.5.1 Establishment. Within sixty (60) days after the Effective Date, the Parties shall establish a Patent committee (the "**Patent Committee**") to discuss, oversee and coordinate the Prosecution (or abandonment) of Patents, enforcement of Patents, and defense against claims of infringement of Third Party patents relating to Intellectual Property licensed under Article 3, Sections 2.2.3 and 3.6, including for example Codexis Core Technology Improvements IP, Arising Codexis Enzyme Technology IP, [***], Arising Codexis Process Technology IP, Arising Novartis Enzyme Technology IP and Arising Novartis Process Technology IP, and any related Intellectual Property matters regarding any Inventions made during the Term, including for example, the Licensed Additional Codexis Patents and the Licensed Additional Codexis Know-How; and to provide recommendations to the Parties regarding the Prosecution of such Patents and related Intellectual Property matters. Within [***] after the end of each half year, each Party shall provide the Patent Committee with a report listing all Patents relating to such Parties' utilization of the Platform Technology filed by that Party during that half year.

5.5.2 Membership; Meetings. The Patent Committee shall be composed of [***] from each of Novartis and Codexis knowledgeable in U.S. patent law and the technology areas that are the subject of this Agreement. The Patent Committee shall meet, in person, by teleconference, or by video-teleconference, at least [***] per Calendar Quarter, or more or less often as the Parties shall determine. In-person meetings shall alternate between Codexis and Novartis locations within the United States and Switzerland whenever possible unless otherwise agreed by the Parties. The first such meeting shall be within [***] after the Effective Date. Any member of the Patent Committee may designate a substitute, who shall be an employee of the applicable Party, to attend with prior written notice to the other Party. Ad hoc guests who are subject to written confidentiality obligations at least as stringent as the provisions in Article 10 may be invited to Patent Committee meetings. Each Party may replace its Patent Committee members with other of its employees with the qualifications set forth in this Section 5.5.2, at any time, upon written notice to the other Party.

5.5.3 Decision-Making; Limitations on Patent Committee. Decisions of the Patent Committee shall be made by consensus, with each Party having collectively one (1) vote in all decisions. The Patent Committee shall have only such powers as are specifically delegated to it in this Agreement and such powers shall be subject to the terms and conditions set forth herein. Without limiting the generality of the foregoing, the Patent Committee shall have no power to amend this Agreement, the Technology Transfer Plan or any written research plan. If the Patent Committee is unable to reach a consensus decision on a matter that is within its decision-making authority within [***] after it has met and attempted to reach such decision, then either Party may refer such matter for resolution by the executive officers designated by the Parties for attempted resolution pursuant to

Section 13.1. In the event that the executive officers of each Party are unable to resolve such matter within the time period specified in Section 13.1, then Codexis shall have final decision-making authority with respect to any dispute relating specifically to Restricted Enzymes and Codexis Patents and Novartis shall have final decision-making authority with respect to any dispute relating specifically to Novartis Patents. The Patent Committee shall provide status updates to the JSC when requested as long as the JSC is in existence and, thereafter, to the Parties.

5.5.4 Duration of Patent Committee. The Patent Committee shall endure for the Term and, by mutual agreement, beyond the Term.

6. INTELLECTUAL PROPERTY

6.1 Background Rights. Each Party shall retain all right, title and interest to its Background IP, and, except as expressly set forth in this Agreement, no right or license to Patents or other Intellectual Property Rights is granted by either Party to the other Party.

6.2 Inventorship; Ownership of Technology.

6.2.1 Generally. Inventorship of Inventions and ownership of any other Technology shall be determined by Applicable Law. Subject to and except as set forth in Sections 6.2.2 through 6.2.9, all patentable Inventions invented solely by or on behalf of either Party or jointly by or on behalf of both Parties under this Agreement, and all Intellectual Property Rights therein, shall be owned in accordance with inventorship [***].

6.2.2 Codexis Core Technology Improvements IP. Codexis shall own any and all Codexis Core Technology Improvements and Codexis Core Technology Improvements IP. Novartis hereby assigns to Codexis all of Novartis' right, title and interest in and to the Codexis Core Technology Improvements IP.

6.2.3 Arising Codexis Enzyme Technology IP. Codexis shall own any and all Arising Codexis Enzyme Technology and Arising Codexis Enzyme Technology IP. Novartis hereby assigns to Codexis all of Novartis' right, title and interest in and to the Arising Codexis Enzyme Technology IP.

6.2.4 Arising Novartis Enzyme Technology IP. Novartis shall own any and all Arising Novartis Enzyme Technology and Arising Novartis Enzyme Technology IP. Codexis hereby assigns to Novartis all of Codexis' right, title and interest in and to the Arising Novartis Enzyme Technology IP.

6.2.5 Arising Codexis Process Technology IP. Codexis shall own any and all Arising Codexis Process Technology and Arising Codexis Process Technology IP. Novartis hereby assigns to Codexis all of Novartis' right, title and interest in and to the Arising Codexis Process Technology IP.

6.2.6 Arising Novartis Process Technology IP. Novartis shall own any and all Arising Novartis Process Technology and Arising Novartis Process Technology IP. Codexis hereby assigns to Novartis all of Codexis' right, title and interest in and to the Arising Novartis Process Technology IP.

6.2.7 [***]. [***].

6.2.8 Novartis API Technology IP. Novartis shall own any and all Novartis API Technology and Novartis API Technology IP. Codexis hereby assigns to Novartis all of Codexis' right, title and interest in and to the Novartis API Technology IP.

6.2.9 [***]. [***]:

(a) [***];

(b) [***];

(c) [***];

(d) [***].

[***].

6.3 Further Assurances. Each Party and its Affiliates shall sign and deliver to the other Party all writings and do all such things as may be necessary or appropriate to vest in such other Party all right, title and interest in and to all Codexis Core Technology Improvements IP, [***], Arising Codexis Enzyme Technology IP, Arising Novartis Process Technology IP, [***] and Novartis API Technology IP in accordance with Section 6.2.

6.4 Employees and Agents. Each Party shall ensure that all employees, agents, consultants, contractors and permitted subcontractors performing activities under or contemplated by this Agreement, have assigned or are obligated to assign their interest in any Invention invented in the course of such activities to the Party for which such employee, agent, consultant, contractor or subcontractor is providing its services.

6.5 Prosecution of Patents.

6.5.1 In General. The Patent Committee shall have oversight regarding the Prosecution of Patents disclosing and/or claiming Inventions directly related to Codexis Core Technology Improvements, [***], [***], Arising Novartis Enzyme Technology, Arising Novartis Process Technology, Arising Codexis Enzyme Technology, and Arising Codexis Process Technology, and shall provide recommendations to the Parties to maximize the value of such Patents. To the extent necessary, the Parties agree to cooperate in good faith to coordinate the Prosecution of such Patents, including submissions of Patent applications worldwide (e.g., to coordinate the filing of Patent applications to ensure that the Parties file related applications on the same day). The Parties shall agree in good faith

on a strategy with respect to Prosecution of any Patents disclosing and/or claiming any jointly-owned Inventions.

6.5.2 Codexis Prosecution. As between the Parties, Codexis shall have the sole right, but not the obligation, to Prosecute all Patents disclosing and/or claiming all Codexis Core Technology, [***], Codexis Core Technology Improvements, Codexis Enzymes, Codexis Libraries, Arising Codexis Enzyme Technology and Arising Codexis Process Technology (the " **Codexis Patents**"), in Codexis' sole discretion and at Codexis' sole cost and expense.

6.5.3 Novartis Prosecution. As between the Parties, Novartis shall have the sole right, but not the obligation, to Prosecute all Patents disclosing and/or claiming all Arising Novartis Enzyme Technology, Arising Novartis Process Technology and [***] (collectively, the "**Novartis Patents**"), in Novartis' sole discretion (subject to Section 6.2.9(c)) and at Novartis' sole cost and expense.

6.5.4 Back-Up Rights. If Novartis decides not to Prosecute, or not to continue Prosecuting, any Novartis Patents, Novartis shall provide Codexis with written notice of such decision at least forty-five (45) days prior to the date upon which the subject matter of such Novartis Patent shall lapse or become abandoned. The basis for such decision shall be discussed by the Patent Committee pursuant to Section 6.5.1 and Codexis shall thereupon have the right (but not the obligation) to assume responsibility for Prosecution of such Novartis Patent at Codexis' expense, and with counsel of Codexis' choosing. Effective upon the date Codexis assumes responsibility for Prosecution of such Novartis Patent, and the costs and expenses relating thereto, Novartis hereby assigns any and all interest held by Novartis in, to, and under such Novartis Patent to Codexis.

6.6 Enforcement of Patents.

6.6.1 Notice. If either Party becomes aware of any suspected infringement of any Codexis Patent or Novartis Patent, or any Codexis Patent or Novartis Patent is challenged in any action or proceeding (any of the foregoing, an "**Infringement Action**"), such Party shall notify the other Party's representative on the Patent Committee, and following such notification, the Parties shall confer.

6.6.2 Enforcement. As between the Parties, Novartis will have the first right, but not the obligation, to bring any Infringement Action with respect to any Novartis Patent at its sole cost and expense, and Codexis shall have the sole right, but not the obligation, to bring any Infringement Action with respect to any Codexis Patent at its sole cost and expense.

6.6.3 Procedure for Enforcement.

(a) The non-enforcing Party pursuant to Section 6.6.2 shall reasonably assist the enforcing Party (at the enforcing Party's expense) in any

Infringement Action if so requested, such assistance to be coordinated through the Parties' Patent Committee members, and the non-enforcing Party shall lend its name and be joined as a party plaintiff to such action if reasonably requested by such enforcing Party or required by Applicable Law. The non-enforcing Party shall have the right to participate and be represented in any such action by its own counsel at its own expense. The non-enforcing Party shall cooperate, at the enforcing Party's cost and expense, with the enforcing Party in investigating or terminating any suspected infringement, whether through legal action, negotiation or otherwise, including by producing all reasonably pertinent records, papers, information, samples, specimens and similar items, and directing its employees to testify and grant interviews, upon the request of the enforcing Party. The enforcing Party will keep the non-enforcing Party reasonably informed of the status of the action through the enforcing Party's Patent Committee members.

(b) A settlement, consent judgment or other voluntary final disposition of a suit under this Section 6.6.3 may be entered into by the enforcing Party without the consent of the non-enforcing Party; *provided* that any such settlement, consent judgment or other disposition of any action or proceeding by an enforcing Party under this Article 6 shall not, without the consent of the non-enforcing Party (not to be unreasonably withheld), (a) impose any liability or obligation on the non-enforcing Party, (b) include the grant of any license, covenant or other rights to any Third Party that would conflict with or reduce the scope of the subject matter included under the licenses granted to the non-enforcing Party under this Agreement, (c) conflict with or reduce the scope of the subject matter claimed in any Patent owned by the non-enforcing Party, or (d) adversely affect the interest of the non-enforcing Party in any material respect.

6.6.4 Damages. In the event that a Party exercises the rights conferred under this Section 6.6, and such Party recovers any damages or other sums in such action or in settlement thereof, such damages or other sums recovered shall first be applied to all out-of-pocket costs and expenses incurred by the Parties in connection therewith, including attorneys' fees. If such recovery is insufficient to cover all such costs and expenses of both Parties, it shall be shared in proportion to the total of such costs and expenses incurred by each Party. If, after such reimbursement of the Parties' costs and expenses, any funds shall remain from such damages or other sums recovered, such remaining funds shall be retained by the prosecuting Party.

6.7 Defense Against Third Party Intellectual Property Rights.

6.7.1 Claims of Infringement Relating to Therapeutic Products, Novartis Controlled API or Novartis Non-Controlled API. If a Third Party asserts, or either Party becomes aware of a Third Party's intention to assert, that any Intellectual Property Rights owned or otherwise controlled by the Third Party are infringed by the manufacture, use, sale, offer for sale, import or export of a Therapeutic Product, Novartis Controlled API or Novartis Non-Controlled API in the Territory, the Party first obtaining knowledge of such a claim shall immediately provide the other Party notice of such claim along with the related

facts in reasonable detail. In such event, unless the Parties otherwise agree, as between the Parties, Novartis shall have the sole right, but not the obligation, at its expense, to control the defense of such claim with respect to such Therapeutic Product, Novartis Controlled API or Novartis Non-Controlled API, subject to Codexis' indemnification obligations set forth in Section 11.1.2 and the obligation for Codexis to assume such defense if requested by Novartis. Codexis shall cooperate with Novartis in Novartis' defense of any such claim at Novartis' reasonable request and expense, and Codexis shall have the right to be represented separately by counsel of its own choice, but at its own expense. Notwithstanding anything to the contrary in this Agreement, Novartis shall also control settlement of such claim; *provided, however*, that no settlement with respect to the Licensed IP or Enzymes shall be entered into without the prior consent of Codexis, such consent not to be unreasonably withheld or delayed.

6.7.2 Claims of Infringement Relating to Licensed Rights. If a Third Party asserts, or either Party becomes aware of a Third Party's intention to assert, that a Patent owned or otherwise controlled by the Third Party is infringed by the exercise by Novartis or its Affiliates of any rights licensed to Novartis hereunder (other than by the manufacture, use, sale, offer for sale, import or export of a Therapeutic Product, Novartis Controlled API or Novartis Non-Controlled API in the Territory), the Party first obtaining knowledge of such a claim shall immediately provide the other Party notice of such claim along with the related facts in reasonable detail. In such event, unless the Parties otherwise agree, as between the Parties, Codexis shall have the sole right, but not the obligation, at its expense, to control the defense of such claim. Novartis shall cooperate with Codexis in Codexis' defense of any such claim at Codexis' reasonable request and expense, and Novartis shall have the right to be represented separately by counsel of its own choice, but at its own expense. Notwithstanding anything to the contrary in this Agreement, Codexis shall also control settlement of such claim; *provided, however,* that no settlement shall be entered into without the prior consent of Novartis if such settlement would adversely affect the rights and benefits of, or impose or adversely affect any obligations on, Novartis, such consent not to be unreasonably withheld or delayed.

7. FINANCIAL TERMS

7.1 Upfront Payment. In consideration of the Technology Transfer and licenses granted to Novartis under this Agreement, within [***] after the Effective Date, Novartis shall pay to Codexis a non-creditable, non-refundable upfront payment of five million Dollars ($5,000,000).

7.2 Technology Transfer Milestones. In consideration of the Technology Transfer and licenses granted to Novartis under this Agreement, Novartis shall pay to Codexis, within [***] of Novartis' receipt of an Invoice from Codexis, each of the creditable, non-refundable milestone payments set forth in this Section 7.2 upon achievement of the applicable milestone event.

Technology Transfer Milestone Event	Milestone Payment
Completion of Wave 2	$4,000,000.00
Completion of Wave 3	$5,000,000.00

7.3 Improvements Term Payment. In consideration of the disclosure of the Codexis Core Technology Improvements IP and Improvements to the Codexis Materials and/or the Codexis Documentation pursuant to Section 3.5.1 in the Improvements Report and the license granted under Section 3.5.2 during the Improvements Term, Novartis shall pay to Codexis, within [***] of Novartis' receipt of an Invoice from Codexis, which Invoice will be dated as of the date of delivery of the Improvements Report following [***] Improvements Term Years, the sum of $[***] (total of $8,000,000 during the Improvements Term).

7.4 Quantity Payments.

7.4.1 Quantity Payment Obligation. During the Developmental Period and following First Regulatory Approval of a Fee Bearing Therapeutic Product, Novartis shall pay to Codexis the following amounts based on the quantity of each Novartis Controlled API(s) and each Novartis Non-Controlled API(s) manufactured using at least one (1) Enzyme by or for Novartis, its Affiliates or its or their permitted licensees, successors, assignees or transferees (in accordance with Sections 3.4.4 or 14.8) for use, intended for use or usable in a Fee Bearing Therapeutic Product ("**Quantity Payment**"). The Quantity Payment will be determined based on whether the Novartis Controlled API or Novartis Non-Controlled API is [***] (See Table A) or [***] (See Table B).

Table A: Quantity Payment(s) for Novartis Controlled APIs or Novartis Non-Controlled APIs which are [***]:

A	B	C	D	E
Phase	**Quantity of each Novartis Controlled API or Novartis Non-Controlled API manufactured using at least one (1) Enzyme in its manufacture**	**Quantity Payment for each (a) Novartis Controlled API or (b) Novartis Non-Controlled API ([***]) manufactured using one (1) Enzyme in its manufacture**	**Quantity Payment for each Novartis Non-Controlled API ([***]) manufactured using one (1) Enzyme in its manufacture**	**Quantity Payment Adder for each additional Enzyme used in the manufacture of the Novartis Controlled API or Novartis Non-Controlled API (See Note #2)**
[***]	[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]	[***]

Note #1 *– [***].*

Note #2 *– [***].*

Table B: Quantity Payment(s) for Novartis Controlled APIs or Novartis Non-Controlled APIs which are [***]:

A	B	C	D
Phase	**Quantity of each Novartis Controlled API or Novartis Non-Controlled API manufactured using at least one (1) Enzyme in its manufacture**	**Quantity Payment for each Novartis Controlled API or Novartis Non-Controlled API manufactured using one (1) Enzyme in its manufacture**	**Quantity Payment Adder for each additional Enzyme used in the manufacture of the Novartis Controlled API or Novartis Non-Controlled API**
[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]

Note #1 *– [***].*

The event triggering the obligation of Novartis to make a Quantity Payment to Codexis shall be the manufacture of a Novartis Controlled API or Novartis Non-Controlled API manufactured using at least one (1) Enzyme, notwithstanding that (i) the Novartis Controlled API or Novartis Non-Controlled API manufactured using at least one (1) Enzyme may be placed into inventory for intended future use, (ii) Novartis, its Affiliates or its or their permitted licensees, successors, assigns or transferees have not specifically identified the Novartis Controlled API or Novartis Non-Controlled API manufactured using at least one (1) Enzyme in question as being intended for use in a particular lot of Fee Bearing Therapeutic Product, and/or (iii) Novartis, its Affiliates or its or their permitted licensees, successors, assigns or transferees have not manufactured or sold the Fee Bearing Therapeutic Product.

7.4.2 Reporting Obligation. During the Term, within [***] after the end of each Calendar Year, Novartis shall deliver to Codexis a written notice identifying each (a) Fee Bearing Therapeutic Product and the Novartis Controlled API and/or Novartis Non-Controlled API contained within each Fee Bearing Therapeutic Product and (b) Therapeutic Product (and the Novartis Controlled API and/or Novartis Non-Controlled API contained within each such Therapeutic Product) that (i) [***] and (ii) [***]. The written notice (a form of which is attached as Exhibit 7.4.2) shall include the following for each Fee Bearing Therapeutic Product and Therapeutic Product: (a) the applicable table pursuant to Section 7.4.1; and (b) [***]; and (c) a [***]. During the Term, Codexis may from time to time [***].

7.5 Payment Reports. Beginning with the [***], and at all times thereafter during the Term so long as Novartis, its Affiliates or its permitted licensees, successors, assignees or transferees is manufacturing a Fee Bearing Therapeutic Product, Novartis shall furnish to Codexis a written report, within [***] after the end of each Calendar Quarter, showing the amount of Quantity Payments due for such Calendar Quarter pursuant to Section 7.4. At the same time each payment report is issued, Novartis shall issue Codexis a purchase

order for the Quantity Payments totaled in each payment report ([***]). The foregoing report (a form of which is attached as Exhibit 7.5) shall include:

(a) [***];

(b) [***];

(c) [***];

(d) [***].

The report shall be accompanied by a copy of [***].

7.6 Manner of Payment. All Agreement Payments shall be made in Dollars by wire transfer of immediately available funds to such U.S. bank account as shall be designated by Codexis; *provided, however*, that any notice by Codexis of a change in such account shall not be effective until [***] after receipt thereof by Novartis.

7.7 Right of First Refusal for Enzyme Supply. During the ROFR Period, Codexis shall have a right of first refusal to supply Novartis and its Affiliates with their requirements for Enzyme(s) ([***]) for use in the manufacture of Novartis Controlled API(s) by or for Novartis and its Affiliates in the Novartis Controlled Biocatalyst Field. This right of first refusal shall be against any bona fide offer from a Third Party for the supply of such Enzyme(s) and against self-production of such Enzyme(s) by Novartis and/or its Affiliates.

7.7.1 ROFR for Third Party Enzyme Supply. With respect to Third Party supply of Enzyme(s), Codexis shall have the right to [***] and supply Novartis and its Affiliate(s) their required quantities of Enzyme(s) for those Novartis Controlled API(s) that are solely for use in such Therapeutic Product(s). A "bona fide offer," for purposes of this Section 7.7, must [***]. Prior to entering into any agreement with Codexis for the supply of Enzymes, and prior to obtaining supply of any Enzyme from Codexis, Novartis shall [***]. If Codexis [***]. If Codexis [***]. For clarity, [***], and [***].

7.7.2 ROFR for Captive Supply. With respect to self-production of Enzyme(s) by Novartis or its Affiliates, Codexis shall have the right to meet the terms of Novartis' and its Affiliates' self-production economics and supply Novartis and its Affiliate(s) their required quantities of Enzyme(s) for those Novartis Controlled API(s) that are solely for use in such Therapeutic Product(s). [***]. The foregoing right is contingent on Codexis [***]. Prior to entering into any agreement with Codexis for the supply of Enzymes, and prior to obtaining supply of any Enzyme from Codexis, Novartis shall [***]. If Codexis [***]. For clarity, [***].

7.8 Taxes.

7.8.1 Novartis will make all payments to Codexis under this Agreement without deduction or withholding for taxes, except to the extent that any such deduction or withholding is required by Applicable Law in effect at the time of payment.

7.8.2 Any tax required to be withheld on amounts payable under this Agreement shall be paid promptly by Novartis on behalf of Codexis to the appropriate governmental authority, and Novartis will furnish Codexis with proof of payment of such tax. Any such tax required to be withheld will be borne by Codexis.

7.8.3 Novartis and Codexis will cooperate with respect to all documentation required by any taxing authority or reasonably requested by Novartis to secure a reduction in the rate of applicable withholding taxes. Within [***] after the execution of this Agreement, Codexis will deliver to Novartis an accurate and complete Internal Revenue Service Form W-9.

7.8.4 If Novartis had a duty to withhold taxes in connection with any payment it made to Codexis under this Agreement but Novartis failed to withhold, and such taxes were assessed against and paid by Novartis, then Codexis will reimburse Novartis for such taxes (plus interest) actually paid by Novartis. If Novartis makes a claim under this Section 7.8.4, it will comply with the obligations imposed by Section 7.8.2 as if Novartis had withheld taxes from a payment to Codexis.

7.9 Interest Due. Without limiting any other rights or remedies available to either Party, Novartis shall pay to Codexis interest on any payments that are not paid on or before the date such payments are due under this Agreement at a rate equal to the lesser of (a) [***] above the 1-year LIBOR rate on the date such payment was due to be paid or (b) the maximum applicable legal rate on such date, in either (a) or (b), calculated on the total number of days payment was delinquent.

7.10 Payment Terms. On a quarterly basis, Codexis shall submit an Invoice to Novartis upon receipt of each payment report and purchase order issued pursuant to Section 7.5. Upon receipt of a valid Invoice from Codexis, Novartis shall make net payment to Codexis within [***].

7.11 Reconciliation. In the event that Novartis is determined, as a consequence of an audit conducted by Codexis pursuant to Article 8, to have either:

(a) not paid to Codexis any Agreement Payments with respect to a Novartis Controlled API or Novartis Non-Controlled API for which Agreement Payments are payable; or

(b) underpaid any amounts by more than [***] of the undisputed amounts that should have been paid to Codexis;

(c) whether in the case of (a) or (b), for each occurrence after the first occurrence that Novartis is determined, as a consequence of a separate, independent audit conducted by Codexis pursuant to Section 8.4.1 to have:

(i) not paid to Codexis any Agreement Payments with respect to a Fee Bearing Therapeutic Product for which Agreement Payments are payable; or

(ii) underpaid any amounts by more than [***] of the undisputed amounts that should have been paid to Codexis;

Novartis shall pay to Codexis, within [***] from Invoice by Codexis, (A) the outstanding amount due to Codexis as determined under this Section 7.11, (B) interest due in respect of the amount noted in (A) as determined pursuant to Section 7.9; and (C) the amount calculated to be [***] of the amount noted in (A) above.

8. RECORDS RETENTION AND AUDIT RIGHTS

8.1 Records Retention. Novartis shall keep, and shall cause each of its Affiliates to keep, complete and accurate records (books of accounting shall be maintained in accordance with U.S. GAAP), for the following periods:

(a) for purposes of verifying Novartis' and its Affiliates' compliance with Article 3, Section 7.3 and Section 7.7, for the immediately preceding [***]; and

(b) for purposes of verifying the accuracy of payment reports and purchase orders submitted by Novartis (for its own behalf, and on behalf of its Affiliates and Third Party licensees, successors, transferees and assignees) pursuant to Section 7.5, for a period of [***] after the Calendar Year during which the payment report (and supporting documentation) and purchase order were issued.

As Novartis is responsible for the payment of Quantity Payments due under Section 7.4.1 and for submitting payment reports and purchase orders pursuant to Section 7.5 for Novartis Controlled API(s) and Novartis Non-Controlled API(s) manufactured by or for permitted Third Party licensees, successors, assignees and transferees, Novartis shall be responsible for collecting from permitted Third Party licensees, successors, assignees and transferees and maintaining for the periods set forth in this Section 8.1 all books and records that are reasonably necessary for Novartis to demonstrate compliance with Sections 7.4.1 and 7.5.

8.2 Technical Audit Right.

8.2.1 If Codexis has a reasonable basis for believing that Quantity Payment(s) are due on Novartis Controlled API(s) and/or Novartis Non-Controlled API(s) manufactured using at least one (1) Enzyme by or for Novartis, its Affiliates or its

or their permitted licensees, successors, assignees or transferees for use, intended for use or usable in a Fee Bearing Therapeutic Product, Codexis may notify Novartis of its belief in writing. [***]. Results of such investigation shall be made available in writing to both Novartis and Codexis; *provided* that [***]. Any materials examined by such designee shall be deemed Novartis' Confidential Information, which may not be disclosed by such designee to any Third Party. Novartis may require such designee to enter into an appropriate written agreement obligating it to be bound by obligations of confidentiality and restrictions on use of such Confidential Information that are no less restrictive than the obligations set forth in Article 10. If, as a result of any such investigation, such designee determines that Quantity Payment(s) are due on Novartis Controlled API(s) and/or Novartis Non-Controlled API(s) manufactured using at least one (1) Enzyme by or for Novartis, its Affiliates or its or their permitted licensees, successors, assignees or transferees for use, intended for use or usable in a Fee Bearing Therapeutic Product, then Novartis shall (a) [***], (b) [***] and (c) [***].

8.2.2 [***].

8.3 [***] Audit Right

8.3.1 If Codexis has a reasonable basis for believing that Novartis has failed to comply with its obligations under Sections [***], upon the written request of Codexis, [***], Novartis shall [***]. For the avoidance of doubt, [***].

8.3.2 [***]. All such audits shall be conducted during normal business hours and upon reasonable advance notice and shall be limited to the books and records of Novartis and its Affiliates reasonably related to the area of inquiry. Codexis shall treat all such records subject to review under this Section 8.3.2 in accordance with the confidentiality and non-use provisions of this Agreement, and shall cause its accounting firm (and associated experts) to enter into an acceptable confidentiality agreement with Novartis obligating it to retain all such information in confidence pursuant to such confidentiality agreement.

8.4 Financial Audit Right.

8.4.1 Upon the written request of Codexis and not more than once in each Calendar Year, Novartis shall permit Codexis, [***]to audit Novartis' and its Affiliates' compliance with [***]. For the avoidance of doubt, Codexis' exercise of its audit rights set forth above shall be limited to only once per Calendar Year, [***]. Once an audit is complete (including any extensions of the audit to allow for investigation of issues revealed by the audit), Codexis shall [***].

8.4.2 [***] All such audits shall be conducted during normal business hours and upon reasonable advance notice and shall be limited [***] Codexis shall treat all such records subject to review under this Section 8.4.2 in accordance with the

confidentiality and non-use provisions of this Agreement, and shall cause its accounting firm (and associated experts) to enter into an acceptable confidentiality agreement with Novartis obligating it to retain all such information in confidence pursuant to such confidentiality agreement.

8.4.3 All such audit(s) shall be limited to the applicable time periods specified in Section 8.1.

8.4.4 [***]. Any materials examined by such designee shall be deemed Novartis' Information, which may not be disclosed by such designee to any Third Party. If, as a result of any such investigation, such designee determines that such product constitutes a Fee Bearing Therapeutic Product, then Novartis shall (a) make all payments required to be made to Codexis under Section 7.3 with respect to such Fee Bearing Therapeutic Product that occurred prior to the date the Parties received such results within [***] after the date the Parties received such results, and shall be responsible for any such payments with respect to such Fee Bearing Therapeutic Product thereafter and (b) pay interest on all late payments in accordance with Section 7.9.

8.4.5 [***]. Results of any such examination shall be made available to both Novartis and Codexis. The independent, certified public accounting firm shall disclose to Codexis only the amounts that the independent, certified public accounting firm believes to be due and payable hereunder to Codexis and details concerning any discrepancy from the amount paid and the amount due, and shall disclose no other information revealed in such audit. Any and all records examined by such independent, certified public accounting firm shall be deemed Novartis' Information, which may not be disclosed by said independent, certified public accounting firm to any Third Party. If, as a result of any inspection of the books and records of Novartis, it is shown that payments under this Agreement were less than the amount that should have been paid, then Novartis shall (i) make all payments required to be made to Codexis to eliminate any discrepancy revealed by such inspection within [***] and (ii) pay interest on all late payments in accordance with Section 7.9. In the event that the audit demonstrates a net overpayment by Novartis, Novartis shall withhold such overpayment from future Quantity Payments.

8.4.6 Codexis shall pay for such audits, except that in the event that the audited amounts reveal an underpayment, or complete failure to pay with respect to Novartis Controlled API(s) and/or Novartis Non-Controlled API(s) for which Agreement Payments are payable, by Novartis [***] of the undisputed amounts that should have been paid during the period in question as per the audit, Novartis shall pay Codexis' out-of-pocket costs of the audit (including the fees and expenses of the independent, certified public accounting firm).

8.4.7 [***].

9. REPRESENTATIONS, WARRANTIES, AND COVENANTS; DISCLAIMERS; LIMITATION OF LIABILITY

9.1 Mutual Representations and Warranties. Each Party represents and warrants to the other Party as of the Effective Date, that:

9.1.1 such Party is duly organized, validly existing, and in good standing under the Applicable Law of the jurisdiction of its incorporation and has full corporate power and authority to enter into this Agreement and to carry out the provisions hereof;

9.1.2 execution of this Agreement and the performance by such Party of its obligations hereunder have been duly authorized;

9.1.3 this Agreement has been duly executed and delivered on behalf of such Party, and constitutes a legal, valid, binding obligation of such Party, enforceable against it in accordance with the terms hereof;

9.1.4 the performance of this Agreement by such Party does not create a breach or default under any other agreement to which it is a party, which breach or default would adversely affect the other Party;

9.1.5 the execution, delivery, and performance of this Agreement by such Party does not conflict with any agreement, instrument, or understanding, oral or written, to which it is a party or by which it is bound, nor violate any Applicable Law of any court, governmental body or administrative or other agency having jurisdiction over such Party; and

9.1.6 no government authorization, consent, approval, license, exemption, filing or registration with any court or governmental department, commission, board, bureau, agency or instrumentality, domestic or foreign, under any Applicable Law currently in effect, is or will be necessary for, or in connection with, the transaction contemplated by this Agreement or any other agreement or instrument executed in connection herewith, or for the performance by such Party of its obligations under this Agreement and such other agreements, except as may be required to obtain applicable Regulatory Approvals or Regulatory Filings related to the development of any Therapeutic Product; and

9.2 Mutual Representations and Warranties (FDA). Each Party represents and warrants to the other Party as of the Effective Date and throughout the term that with specific regard to each Party's performance of their respective obligations to the other Party under this Agreement, such Party has not employed and, to its knowledge, has not used a contractor or consultant that has employed any individual or entity (a) debarred by the FDA (or subject to a similar sanction of any other applicable Regulatory Authority), (b) who is the subject of an FDA debarment investigation or proceeding (or similar proceeding of any other applicable Regulatory Authority), or (c) has been charged with or convicted under

Applicable Law of the United States for conduct relating to the development or approval, or otherwise relating to the regulation of any product under the Generic Drug Enforcement Act of 1992, in each case, in the conduct of its activities prior to the Effective Date.

9.3 Additional Representations and Warranties of Codexis. Codexis, on behalf of itself and its Affiliates, hereby represents and warrants to Novartis that, except as otherwise disclosed in writing by Codexis to Novartis and accepted in writing by Novartis, as of the Effective Date:

9.3.1 [***];

9.3.2 Codexis is the sole and exclusive owner of the Licensed Patents and the Licensed Know-How and has the full authority to grant the full and unencumbered scope of rights and licenses (other than as set forth in Exhibit 1.28) granted to Novartis under this Agreement;

9.3.3 to the knowledge of Codexis Senior Management, no licenses under any Third Party Intellectual Property Rights are necessary for Codexis to grant to Novartis the licenses hereunder (other than licenses to commercially available software or open source software such as, by way of example only, [***] or [***]);

9.3.4 the Licensed Patents are all of the Patents Controlled by Codexis that are (i) necessary to practice the Platform Technology; and (ii) which Cover the practice of the Platform Technology;

9.3.5 the Licensed Know-How and the In-Licensed Know-How account for all of the Know-How Controlled by Codexis that is (i) necessary to practice the Platform Technology; and (ii) which Cover the practice of the Platform Technology;

9.3.6 neither Codexis nor any of its Affiliates has granted any right, license or interest to any Third Party relating to or under the Licensed IP or to the Platform Technology that would conflict or would otherwise be inconsistent with any of the rights, licenses or interests granted to Novartis under this Agreement;

9.3.7 the Licensed Know-How (other than In-Licensed Know How) were generated either by employees or contractors of Codexis, and in each case the terms of employment or engagement of such employees or contractors vested in Codexis all right, title and interest in and to any Know-How generated by them or has obtained or has the legal right to obtain assignments of all such Licensed Know-How;

9.3.8 to the knowledge of Codexis Senior Management, no Third Party has rights in the Licensed Patents, the Licensed Know-How or the Platform Technology that would adversely affect Novartis' rights under this Agreement;

9.3.9 [***];

9.3.10 [***];

9.3.11 [***];

9.3.12 in respect of each of the In-License Agreements, to the knowledge of Codexis Senior Management:

(a) each of the In-License Agreements is in full force and effect and neither Codexis nor its Affiliates have materially breached or received any written or oral notice of any breach or any written or oral notice of the intent to terminate under any of the In-License Agreements;

(b) each sublicense granted to Novartis has been granted to Novartis pursuant to the terms of each respective In-License Agreement;

(c) each of the In-License Agreements disclosed to Novartis is true, accurate and not misleading as to the terms thereof that have not been redacted; and

(d) Exhibit 1.67 sets forth a true and complete list of all In-License Agreements;

9.3.13 [***];

9.3.14 the license limitations in Section 3.4.3 with respect to the Codexis Mayflower Patents are exhaustive, complete, accurate and not misleading; and

9.3.15 certain of the inventions claimed in the In-Licensed Patents, the Codexis Core Technology IP and the Intellectual Property Rights therein, have been made with funds provided by the U.S. government, and that with respect thereto the U.S. government retains a non-exclusive license as set forth in 35 U.S.C. § 202 and, as a result, this Agreement is subject to all of the terms and conditions of 35 U.S.C. § 200 et seq., which sets forth additional obligations with regard to inventions made with U.S. government funds and products based thereon, including a preference for manufacture in the U.S. pursuant to 35 U.S.C. § 204.

9.4 Mutual Covenants. Each Party hereby covenants to the other Party that:

9.4.1 all employees of such Party or its Affiliates, and all agents, consultants, contractors and subcontractors (as provided in Section 4.2) of such Party or its Affiliates performing any activities under a research plan under a Technology Transfer Project (including, in the case of Codexis, any Additional Services) shall be under the obligation to assign all right, title and interest in and to their inventions and discoveries, whether or not patentable, if any, to such Party as the sole owner thereof;

9.4.2 such Party shall perform its obligations and activities under this Agreement (including, in the case of Codexis, the Additional Services) in

compliance with Applicable Law and industry standards, including, without limitation, GLP, GCP and GMP, in each case as applicable under Applicable Law of the country and the state and local government wherein such activities are conducted, and with respect to the care, handling and use in research and development activities hereunder of any non-human animals by or on behalf of such Party, shall at all times comply (and shall ensure compliance by any of its subcontractors) with Applicable Law, and also with the standards in the pharmaceutical industry for the development and manufacture of pharmaceutical products, and (b) with individuals who are appropriately trained and qualified;

9.4.3 with specific regard to each Party's performance of their respective obligations to the other Party under this Agreement, neither Party shall employ (or, to its knowledge, use any contractor or consultant that employs) any individual or entity (a) debarred by the FDA (or subject to a similar sanction of any other applicable Regulatory Authority), (b) who is the subject of an FDA debarment investigation or proceeding (or similar proceeding of any other applicable Regulatory Authority), or (c) has been charged with or convicted under any Applicable Law of the United States for conduct relating to the development, approval or otherwise relating to the regulation of any product under the Generic Drug Enforcement Act of 1992, in each case, in the conduct of its activities under this Agreement; and

9.4.4 neither Party shall, during the Term, grant any right or license to any Third Party relating to any of the Intellectual Property Rights it Controls that would conflict or interfere with any of the rights or licenses granted to the other Party hereunder.

9.5 Additional Covenants of Novartis. Novartis hereby covenants to Codexis that:

9.5.1 all Novartis employees and contractors that will have access to Codexis Confidential Information and/or Platform Technology shall be subject to confidentiality obligations with Novartis subjecting the employee or contractor to Novartis' maintenance, non-disclosure, and non-use obligations under Article 10;

9.5.2 any financial information contained in any Novartis report delivered pursuant to Article 7 will be generated using the same financial reporting system, using the same data, and in the same manner that Novartis uses to generate financial information for Novartis' public reporting obligations; and

9.5.3 during the Term, Novartis shall not, and Novartis shall cause its Affiliates and its permitted sublicensees to not, challenge the validity, scope or enforceability of or otherwise oppose any Patents included within the Licensed IP in any country, [***].

9.6 Additional Covenants of Codexis. Codexis hereby covenants to Novartis that:

9.6.1 with respect to each In-License Agreement, Codexis shall maintain and keep each In-License Agreement in full force and effect under each In-License Agreement's respective terms for the term of the In-Licensed IP licensed pursuant to such In-License Agreement;

9.6.2 Codexis shall not amend any such In-License Agreement in a manner that adversely affects Novartis' rights under this Agreement and/or imposes any additional obligations upon Novartis not disclosed to Novartis under the In-License Agreements;

9.6.3 Codexis, pursuant to the terms of the In-License Agreements, shall pay any and all annual license fees due to all Third Party licensors during the Term required to maintain each In-License Agreement; *provided, however*, that nothing contained herein shall require Codexis to be responsible for Losses arising from the breach of any In-License Agreements by Novartis as a sublicensee; and

9.7 DISCLAIMERS

9.7.1 CODEXIS DISCLAIMER. EXCEPT AS EXPRESSLY SET FORTH IN SECTIONS 9.1, 9.2 9.3, 9.4 AND 9.6, CODEXIS MAKES NO REPRESENTATIONS, WARRANTIES OR COVENANTS OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ANY CODEXIS INFORMATION, CODEXIS PATENTS, CODEXIS CORE TECHNOLOGY, CODEXIS CORE TECHNOLOGY IMPROVEMENTS, [***], ARISING CODEXIS ENZYME TECHNOLOGY ARISING CODEXIS PROCESS TECHNOLOGYOR ANY LICENSE GRANTED BY CODEXIS HEREUNDER, OR WITH RESPECT TO THE PRODUCTS. EXCEPT AS EXPRESSLY SET FORTH IN SECTIONS 9.1, 9.2, 9.3, 9.4 AND 9.6, NOTHING IN THIS AGREEMENT SHALL BE CONSTRUED AS A REPRESENTATION OR WARRANTY THAT ANY PATENT OR OTHER PROPRIETARY RIGHTS INCLUDED IN THE CODEXIS PATENTS ARE VALID OR ENFORCEABLE OR THAT USE OF THE CODEXIS PATENTS, CODEXIS CORE TECHNOLOGY, CODEXIS CORE TECHNOLOGY IMPROVEMENTS, [***], ARISING CODEXIS ENZYME TECHNOLOGY AND ARISING CODEXIS PROCESS TECHNOLOGY CONTEMPLATED HEREUNDER [***].

9.7.2 NOVARTIS DISCLAIMER. EXCEPT AS EXPRESSLY SET FORTH IN SECTIONS 9.1, 9.2, 9.4 AND 9.5, NOVARTIS MAKES NO REPRESENTATIONS, WARRANTIES OR COVENANTS OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ANY NOVARTIS INFORMATION OR ANY LICENSE GRANTED BY NOVARTIS HEREUNDER. EXCEPT AS EXPRESSLY

SET FORTH IN SECTIONS 9.1, 9.2, 9.4 AND 9.5, NOTHING IN THIS AGREEMENT SHALL BE CONSTRUED AS A REPRESENTATION OR WARRANTY THAT ANY PATENT OR OTHER PROPRIETARY RIGHTS INCLUDED IN THE [***], ARISING NOVARTIS ENZYME TECHNOLOGY OR ARISING NOVARTIS PROCESS TECHNOLOGY ARE VALID OR ENFORCEABLE OR THAT THE USE OF THE [***], ARISING NOVARTIS ENZYME TECHNOLOGY OR ARISING NOVARTIS PROCESS TECHNOLOGY CONTEMPLATED HEREUNDER [***].

9.7.3 LIMITATION OF LIABILITY. EXCEPT FOR A BREACH OF [***], OR CLAIMS OF A THIRD PARTY THAT ARE SUBJECT TO INDEMNIFICATION UNDER ARTICLE 11, NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY WITH RESPECT TO ANY SUBJECT MATTER OF THIS AGREEMENT, WHETHER UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY, FOR ANY INCIDENTAL, INDIRECT, SPECIAL, EXEMPLARY, PUNITIVE, MULTIPLE OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST PROFITS, LOSS OF USE, DAMAGE TO GOODWILL OR LOSS OF BUSINESS.

10. CONFIDENTIALITY

10.1 Nondisclosure Obligation. All Information disclosed by one Party to the other Party hereunder shall, during the Term and for a period of [***] years thereafter, be (a) maintained in confidence by the receiving Party and (b) shall not be disclosed to any Third Party or (c) used for any purpose except as permitted by this Agreement (it being understood that this clause (c) shall not create or imply any rights or licenses not expressly granted under this Agreement) without the prior written consent of the disclosing Party, except to the extent that such Information:

10.1.1 is known by the receiving Party at the time of its receipt, and not through a prior disclosure by the disclosing Party, as documented by the receiving Party's business records;

10.1.2 is in the public domain by use and/or publication before its receipt from the disclosing Party, or thereafter enters the public domain through no fault of the receiving Party;

10.1.3 is subsequently disclosed to the receiving Party by a Third Party who may lawfully do so and is not under an obligation of confidentiality to the disclosing Party; or

10.1.4 is developed by the receiving Party independently of Information received from the disclosing Party, as documented by the receiving Party's business records.

Any combination of features or disclosures shall not be deemed to fall within the foregoing exclusions merely because individual features are published or available to the general public or in the rightful possession of the receiving Party unless the combination itself and principle of operation are published or available to the general public or in the rightful possession of the receiving Party.

10.2 Authorized Disclosure. The receiving Party may disclose Information belonging to the disclosing Party, and Information deemed to belong to both Parties under the terms of this Agreement, to the extent and only to extent) such disclosure is reasonably necessary in the following instances the receiving Party may disclose Information belonging to the disclosing Party, and Information deemed to belong to both Parties under the terms of this Agreement, to the extent and only to extent) such disclosure is reasonably necessary in the following instances:

10.2.1 Prosecuting Patents;

10.2.2 to a Regulatory Authority in order to obtain Patents or to gain or maintain Regulatory Approval, but such disclosure may be only to the extent reasonably necessary to obtain Patents or Regulatory Approval;

10.2.3 prosecuting or defending litigation, including responding to a subpoena in a Third Party litigation;

10.2.4 subject to Section 10.5, complying with Applicable Law (including the rules and regulations of the Securities and Exchange Commission or any national securities exchange) and with judicial process, if in the reasonable opinion of the receiving Party's counsel, such disclosure is necessary for such compliance; and

10.2.5 disclosure, solely on a "need to know basis," to Affiliates, sublicensees, potential or actual acquirers, merger partners, or assigns permitted under Section 14.8, permitted subcontractors, investment bankers, investors, lenders or other potential financial partners, and their and each of the Parties' respective directors, employees, consultants, contractors and agents, each of whom prior to disclosure must be bound by written obligations of confidentiality and non-use no less restrictive than the obligations set forth in this Article 10; *provided, however*, that in each of the above situations, the receiving Party shall remain responsible for any failure by any Person who receives Information pursuant to this Section 10.2.5 to treat such Information as required under this Article 10.

If and whenever any Information is disclosed in accordance with this Section 10.2, such disclosure shall not cause any such Information to cease to be confidential, except to the extent that such disclosure results in a public disclosure of such Information (other than by breach of this Agreement). Where reasonably possible and subject to Section 10.4 and other than pursuant to Section 10.2.5, the receiving Party shall notify the disclosing Party of the receiving Party's intent to make such disclosure pursuant to this Section.

If a Party is required by judicial or administrative process to disclose Information that is subject to the non-disclosure provisions of this Section 10.2, such Party shall promptly inform the other Party of the disclosure that is being sought in order to provide the other Party an opportunity to challenge or limit the disclosure obligations. Information that is disclosed by judicial or administrative process shall remain otherwise subject to the confidentiality and non-use provisions of this Section 10.2, and the Party disclosing Information pursuant to law or court order shall take all steps reasonably necessary, including without limitation obtaining an order of confidentiality, to ensure the continued confidential treatment of such Information.

10.3 Terms of this Agreement. The Parties acknowledge that this Agreement and all of the respective terms of this Agreement shall be treated as Information of both Parties, except that Exhibits [***] are Information of Codexis.

10.4 Securities. In the event either Party proposes to file with the Securities and Exchange Commission or the securities regulators of any state or other jurisdiction a registration statement or any other disclosure document which describes or refers to the terms and conditions of this Agreement under the Securities Act of 1933, as amended, the Securities Exchange Act of 1934, as amended, or any other securities Applicable Law, the Party shall notify the other Party of such intention and shall provide such other Party with a copy of the relevant portions of the proposed filing prior to such filing (and any revisions to such portions of the proposed filing a reasonable time prior to the filing thereof), including any exhibits thereto relating to the terms and conditions of this Agreement, and shall use reasonable efforts to obtain confidential treatment of the terms and conditions of this Agreement that such other Party reasonably requests be kept confidential, and shall only disclose Information that it is advised by counsel is legally required to be disclosed. No such notice shall be required under this Section 10.4 if the description of or reference to this Agreement contained in the proposed filing has been included in any previous filing made by either Party hereunder or otherwise approved by the other Party.

10.5 Publicity/Use of Names.

10.5.1 Upon execution of this Agreement, Codexis shall issue the press release mutually agreed upon by the Parties and set forth in Exhibit 10.5.1. Any disclosure that is required by Applicable Law (including the Securities Act of 1933, as amended, and the Securities Exchange Act of 1934, as amended), or the rules of a securities exchange or the Securities and Exchange Commission or the securities regulations of any state or other jurisdiction, may be made by Codexis or Novartis; *provided* that any such required disclosure will not contain any Information of, respectively, Novartis or Codexis and, if disclosure of such information is required by Applicable Law or such rules or regulations, the Parties will comply with Sections 10.2 and 10.5, as applicable, and will use reasonable efforts to minimize such disclosure and obtain confidential treatment for any such information that is disclosed to a governmental agency. Codexis may publicly disclose

any information that has previously been disclosed in accordance with this Section 10.5.1 without any requirement to receive Novartis' approval thereof or to provide Novartis with an opportunity to review such disclosure.

10.5.2 Codexis agrees to provide to Novartis a copy of any public announcement regarding this Agreement or the subject matter thereof within a reasonable period of time under the circumstances prior to its scheduled release, which period of time shall not be less than fifteen (15) Business Days where practicable, for Novartis' review. Except as otherwise required by Applicable Law, Codexis shall remove any Information of Novartis that Novartis deems to be inappropriate for disclosure. Codexis agrees not to use the name or trademark of Novartis, its Affiliates, or its employees, without the prior written consent of Novartis, except that Codexis may disclose that Novartis is a licensee of Codexis hereunder.

10.5.3 Novartis may make public announcements and publications regarding any Novartis Controlled API, Novartis Non-Controlled API or Therapeutic Product in its sole discretion, and such announcement or publication shall not be subject to this Section 10.5. In addition, Novartis may publish scientific papers and make scientific presentations; *provided, however*, that such publications and presentations do not include the Information of Codexis.

10.6 Existing CDA. The Parties entered into a confidential disclosure agreement dated as of [***] (the "**Confidential Disclosure Agreement**"). If any terms or conditions set forth in this Article 10 conflict with or are inconsistent with the terms and conditions of the Confidential Disclosure Agreement with respect to any information disclosed thereunder that would be considered Information hereunder, this Article 10 will govern over the Confidential Disclosure Agreement with respect to such information to the extent of such conflict or inconsistency. Subject to the foregoing, the Confidential Disclosure Agreement shall remain in full force and effect, in accordance with its terms, with respect to information disclosed thereunder to the extent such information would not be considered Information hereunder.

11. INDEMNITY AND INSURANCE

11.1 Codexis Indemnity.

11.1.1 Codexis shall indemnify, defend and hold harmless Novartis and its Affiliates, and their respective officers, directors, employees, agents, licensors, and their respective successors, heirs and assigns, and representatives (the "**Novartis Indemnitees**"), from and against any and all Losses from Claims from Third Party(ies), to the extent arising out of or relating to, directly or indirectly: (a) the negligence, recklessness or wrongful intentional acts or omissions of Codexis, its Affiliates, and sublicensees (excluding Novartis) and its or their respective directors, officers, employees and agents, in connection with Codexis' performance of its obligations or exercise of its

rights under this Agreement, or (b) any breach by Codexis of any representation, warranty or covenant set forth in this Agreement; including for each of clauses (a) and (b), claims and threatened claims based on (i) product liability, bodily injury, risk of bodily injury, death or property damage or (ii) the failure to comply with Applicable Law; *provided, however*, that Codexis' indemnification obligations under this Section 11.1.1 will not apply to any such Losses to the extent (A) such Losses are finally determined by a court or tribunal of competent jurisdiction to be attributable to any Novartis Indemnitee having committed an act or acts of negligence, recklessness or willful misconduct, (B) such Losses result from any breach by Novartis of any representation, warranty or covenant set forth in this Agreement, or (C) Novartis is required to indemnify Codexis pursuant to Section 11.2.

11.1.2 Subject to the limitations set forth in Section 11.1.3, Codexis shall indemnify, defend and hold harmless Novartis Indemnitees from and against any and all Losses from Claims from Third Party(ies) [***]; provided, however, that Codexis' indemnification obligations under this Section 11.1.2 will not apply to any such Losses to the extent (A) such Losses are finally determined by a court or tribunal of competent jurisdiction to be attributable to any Novartis Indemnitee having committed an act or acts of negligence, recklessness or willful misconduct, (B) such Losses result from any breach by Novartis of any representation, warranty or covenant set forth in this Agreement, or (C) Novartis is required to indemnify Codexis pursuant to Section 11.2 for such Losses. [***].

11.1.3 Codexis' indemnification obligations under Section 11.1.2 will be limited as follows: [***].

11.2 Novartis Indemnity. Novartis shall indemnify, defend, and hold harmless Codexis and its Affiliates, and their respective officers, directors, employees, agents, licensors, and their respective successors, heirs and assigns, and representatives (the "**Codexis Indemnitees**"), from and against any and all Losses from Claims from Third Party(ies) to the extent arising out of or relating to, directly or indirectly: (a) the negligence, recklessness or wrongful intentional acts or omissions of Novartis, its Affiliates, and sublicensees and its or their respective directors, officers, employees and agents, in connection with Novartis' performance of its obligations or exercise of its rights under this Agreement; (b) any breach by Novartis of any representation, warranty or covenant set forth in this Agreement; (c) [***]; *provided, however*, that Novartis' indemnification obligations under this Section 11.2 will not apply to any such Losses to the extent (A) such Losses are finally determined by a court or tribunal of competent jurisdiction to be attributable to any Codexis Indemnitee having committed an act or acts of negligence, recklessness or willful misconduct, (B) such Losses result from any breach by Codexis of any representation, warranty or covenant set forth in this Agreement, or (C) Codexis is required to indemnify Novartis pursuant to Section 11.1.

11.3 Indemnification Procedure. A claim to which indemnification applies under Section 11.1 or Section 11.2 shall be referred to herein as an "Indemnification Claim." If any Person or Person (collectively, the "Indemnitee") intends to claim indemnification

under this Article 11, the Indemnitee shall notify the other Party (the "**Indemnitor**") in writing promptly upon becoming aware of any claim that may be an Indemnification Claim (it being understood and agreed, however, that the failure by an Indemnitee to give such notice shall not relieve the Indemnitor of its indemnification obligation under this Agreement, except and only to the extent that the Indemnitor is actually prejudiced as a result of such failure to give notice). The Indemnitor shall have the right to assume and control the defense of the Indemnification Claim at its own expense with counsel selected by the Indemnitor and reasonably acceptable to the Indemnitee; *provided, however,* that an Indemnitee shall have the right to retain its own counsel, with the fees and expenses to be paid by the Indemnitor, if representation of such Indemnitee by the counsel retained by the Indemnitor would be inappropriate due to actual or potential conflicting interests between such Indemnitee and the Indemnitor; *provided* that the Indemnitor shall not be obligated to pay the fees of more than one counsel retained by all Indemnitees. If the Indemnitor does not assume the defense of the Indemnification Claim as described in this Section 11.1.3 above, the Indemnitee may defend the Indemnification Claim, but shall have no obligation to do so. The Indemnitee shall not settle or compromise the Indemnification Claim without the prior written consent of the Indemnitor, and the Indemnitor shall not settle or compromise the Indemnification Claim in any manner which would have an adverse effect on the Indemnitee's interests (including any rights under this Agreement), without the prior written consent of the Indemnitee, which consent, in each case, shall not be unreasonably withheld or delayed. The Indemnitee shall reasonably cooperate with the Indemnitor at the Indemnitor's reasonable expense and shall make available to the Indemnitor all pertinent information under the control of the Indemnitee, which information shall be subject to Article 10.

11.4 Insurance. Each Party shall maintain at all times during the Term commercial general liability insurance and product liability insurance in respect of any Claim from a Third Party, as contemplated in Section 11.1.1 and Section 11.2, from a recognized, creditworthy insurance company, with coverage limits of at least [***] per such Claim from such Third Party. With respect to Novartis, such product liability insurance shall include coverage for any Claims from Third Party(ies) subject to Section 11.2 in respect of any Novartis Controlled API or Novartis Non-Controlled API or Therapeutic Product undergoing clinical trials. The minimum level of insurance set forth herein shall not be construed to create a limit on either Party's liability hereunder. Within ten (10) days following reasonable written request from either Party, the other Party shall furnish to the requesting Party a certificate of insurance evidencing such coverage. In the case of a material modification or cancellation of such coverage, each Party shall notify the other Party as soon as reasonably practicable and provide the other Party with a new certificate of insurance evidencing that such Party's coverage meets the requirements of this Section 11.4. Notwithstanding the aforementioned, each Party may elect to self-insure or re-insure all of parts of the limits described above and, in such event, this Section 11.4 shall apply to such self-insurance or re-insurance arrangements *mutatis mutandis*.

12. TERM AND TERMINATION.

12.1 Term. This Agreement shall become effective on the Effective Date and shall remain in effect unless and until terminated pursuant to Section 12.2, Section 12.3 or Section 12.4, or by mutual agreement of the Parties. The period from the Effective Date until the date of termination of this Agreement shall be the "**Term.**"

12.2 Termination for Material Breach. Either Party (the "**Non-Breaching Party**") may, without prejudice to any other remedies available to it at law or in equity, terminate this Agreement, in its entirety, in the Non-Breaching Party's sole discretion in the event the other Party (the "**Breaching Party**") has materially breached this Agreement, and such material breach has continued for sixty (60) days (the "**Cure Period**") after written notice thereof is provided to the Breaching Party by the Non-Breaching Party, such notice describing the alleged material breach in sufficient detail to put the Breaching Party on notice. If at the end of the Cure Period, the Breaching Party can demonstrate that it is actively seeking to remedy such material breach, then at the Breaching Party's request and with the consent of the Non-Breaching Party (not to be unreasonably withheld), the Non-Breaching Party shall grant an additional forty-five (45) days for the Breaching Party to remedy such breach.

12.3 Insolvency or Bankruptcy. To the extent permitted under Applicable Law, either Party may terminate this Agreement, (a) if, at any time, the other Party files in any court or agency pursuant to any statute or regulation of any state or country, a petition in bankruptcy or insolvency or for reorganization or for an arrangement or for the appointment of a receiver or trustee of the Party or of substantially all of its assets, or (b) if the other Party is served with an involuntary petition against it, filed in any insolvency proceeding, and such petition shall not be dismissed within [***] after the filing thereof, or (c) if the other Party shall propose or be a party to any dissolution or liquidation, or (d) if the other Party shall make an assignment of substantially all of its assets for the benefit of creditors. Each Party agrees to give the other Party prompt notice of the foregoing events giving rise to termination under this Section 12.3. All rights and licenses granted under or pursuant to any section of this Agreement are and shall otherwise be deemed to be for purposes of Section 365(n) of Title 11, United States Code (the "**Bankruptcy Code**") licenses of rights to "intellectual property" as defined in Section 101(35A) of the Bankruptcy Code. The Parties shall retain and may fully exercise all of their respective rights and elections under the Bankruptcy Code. All materials required to be delivered by the non-bankrupt Party under this Agreement (including all manufacturing information) shall be considered to be "embodiments" of such intellectual property for purposes of Section 365(n) of the Bankruptcy Code. Upon the bankruptcy of any Party, the non-bankrupt Party shall further be entitled to a complete duplicate of, or complete access to, any intellectual property licensed to the non-bankrupt Party, and such, if not already in its possession, shall be promptly delivered to the non-bankrupt Party, unless the bankrupt Party elects to continue, and continues, to perform all of its obligations under this Agreement. All written agreements

entered into in connection with the Parties' performance under this Agreement from time to time shall be considered agreements "supplementary" to this Agreement for purposes of Section 365(n) of the Bankruptcy Code.

12.4 Novartis Termination at Will. At any time after Wave 1, Novartis may terminate this Agreement in its entirety at any time upon providing ninety (90) days' written notice to Codexis at any time and for any reason or for no reason at all. [***] If Novartis terminates this Agreement pursuant to this Section 12.4 prior to receipt by Codexis of the Milestone Payment associated with the Completion of Wave 2 as contemplated by Section 7.2, in addition to the provisions of Section 12.5.2, Novartis shall pay to Codexis the sum of $9,000,000.00. If Novartis terminates this Agreement pursuant to this Section 12.4 after the receipt by Codexis of the Milestone Payment associated with the Completion of Wave 2 but prior to receipt by Codexis of the Milestone Payment associated with the Completion of Wave 3 as contemplated by Section 7.2, in addition to the provisions of Section 12.5.2, Novartis shall pay to Codexis the sum of $5,000,000.00.

12.5 Consequences of Termination.

12.5.1 In General. Termination of this Agreement for any reason shall not (a) release either Party from any obligation that has accrued prior to the effective date of such termination; (b) preclude either Party from claiming any other damages, compensation, or relief that it may be entitled to upon such termination; (c) terminate any right to obtain performance of any obligation provided for in this Agreement that shall survive termination; or (d) in any way alter, reduce, diminish, eliminate or expunge either Party's rights to freely use any Enzymes it owns, post termination. Upon any termination of this Agreement, each Party shall return to the other Party and cease using all Information of such other Party; *provided* that the legal department of each Party may retain one (1) copy of such Information and the Party having received the Information of the disclosing Party shall not be required to destroy any securely stored computer files that contain the disclosing Party's Information created during automatic system back-ups, *provided* that the Information so retained remains subject to the confidentiality and non-use obligations set forth in this Agreement and the computer files are not readily accessible to the receiving Party's employees.

12.5.2 Effects of Termination.

(a) Upon any permitted termination of this Agreement by Codexis pursuant to Section 12.2 or 12.3, or termination by Novartis pursuant to Section 12.4, (i) the rights and licenses granted to Novartis in Sections [***] shall immediately terminate, and Novartis shall, within [***] after the effective date of such termination, return or cause to be returned to Codexis the Platform Technology to the extent in tangible form, (ii) [***], and (iii) [***]. In the event of termination by Codexis pursuant to Section 12.2 for breach by Novartis or its Affiliates of its obligations under Section 9.5.3, the licenses granted to Novartis pursuant to Section [***] and Section [***] shall immediately terminate,

and Novartis shall, within [***] after the effective date of such termination, return or cause to be returned to Codexis the Platform Technology to the extent in tangible form.

(b) Upon any permitted termination of this Agreement by Novartis pursuant to Section 12.2 [***] all rights and licenses granted to Codexis hereunder shall immediately terminate, and Codexis shall, within [***] after the effective date of such termination return or cause to be returned to Novartis all Technology and Information of Novartis in tangible form, and all substances or compositions delivered or provided by Novartis, as well as any other material provided by Novartis in any medium.

(c) Upon any permitted termination of this Agreement by Novartis pursuant to Section 12.3 (i) the licenses granted to Novartis pursuant to Sections [***] shall survive and all payment and reporting obligations hereunder (including, without limitation, those set forth in Article 7) and records retention and audit rights set forth in Article 8 shall survive; and (ii) all rights and licenses granted to Codexis hereunder shall survive.

12.5.3 Codexis Audit Right on Novartis Breach; Termination; Divestment. In the event of termination of this Agreement by Codexis pursuant to Section 12.2 or 12.3, or by Novartis pursuant to Section 12.4, or if Novartis sells, leases, loans, provides or otherwise divests to any Third Party any facility or business unit that practices or otherwise uses any Codexis Core Technology, Codexis Core Technology Improvements or other Technology related to Covered Enzymes or Enzymes, Novartis shall provide to Codexis, within [***] after the effective date of such termination, or within [***] after the effective date of such divestment, as applicable, a certification signed by a duly authorized executive or non-executive officer of Novartis, certifying that all Codexis proprietary materials, information, and technology in custody or control of Novartis or sublicensee of Novartis, or at the divested facility or business unit, has been destroyed (including, without limitation, all Codexis Software). In addition, Codexis shall have a right to conduct an audit to determine that all Codexis materials, information, and/or technology have been destroyed and that such destruction is complete (the "**Termination and Divestment Audit Right**"). [***] Novartis may require such designee to enter into an appropriate written agreement obligating it to be bound by obligations of confidentiality and restrictions on use of such Information that are comparable to the obligations set forth in Article 10. The Termination and Divestment Audit Right shall continue until the earlier of (a)[***] after the effective date of termination of this Agreement by Codexis pursuant to Section 12.2 or 12.3, or by Novartis pursuant to Section 12.4, or (b) until a designee determines, pursuant to the Codexis' exercise of the Termination and Divestment Audit Right, that all Codexis materials, information, and/or technology has been destroyed. All reasonable expenses arising from the first audit shall be at Codexis' expense, and all subsequent audits, if any, shall be at Novartis' expense.

12.6 Survival.

12.6.1 The following provisions shall survive, as well as any other provision which by its terms or by the context thereof is intended to survive,

termination of this Agreement: Article 1 (Definitions), Article 6 (Intellectual Property), Article 10 (Confidentiality) (for the time period set forth in Section 10.1, Article 14 (Miscellaneous), and Sections 3.3, 3.4.1, 3.4.2, 3.4.3, 3.4.4, 9.7, 11.1, 11.2, 11.3, 12.5 and 12.6;

12.6.2 Article 8 (Records and Audit Rights) and Sections 3.1, 3.2, 3.5.2, 0, 7.5, 7.6, 7.8, 7.9, 7.10 and 7.11 shall survive termination in accordance with Section 12.5.2;

12.6.3 Section 3.6 shall survive termination solely to the extent that Sections 3.2 and/or 3.5.2 survive termination in accordance with Section 12.5.2;

12.6.4 Section 7.7 shall survive termination if the Agreement is terminated by Codexis pursuant to Sections 12.2 or 12.3 or by Novartis pursuant to Section 12.4.

Except as otherwise expressly provided, all other rights, licenses and obligations shall terminate upon termination of this Agreement.

13. DISPUTE RESOLUTION.

13.1 Resolution by Executive Officers. The Parties agree that the procedures set forth in this Article 13 shall be the exclusive mechanism for resolving any dispute, controversy, or claim, which are not Excluded Claims, (each, a "**Dispute**") between the Parties that may arise from time to time pursuant to this Agreement relating to any Party's rights and/or obligations. Except as otherwise provided in this Agreement, in the event of any Dispute between the Parties in connection with this Agreement, the construction hereof, or the rights, duties or liabilities of either Party hereunder, the Parties shall first attempt in good faith to resolve such Dispute by negotiation and consultation between themselves. In the event that such Dispute is not resolved on an informal basis within ten (10) Business Days, either Party may, by written notice to the other Party, refer the Dispute to the executive officers designated by the Parties for attempted resolution. Such officers, or their designees, shall attempt in good faith to promptly resolve such Dispute within thirty (30) Business Days thereafter. In the event that any matter is not resolved under the foregoing provisions, each Party may, at its sole discretion, seek resolution of such matter in accordance with Section 13.2.

13.2 Arbitration. Any Dispute referred for arbitration shall be finally resolved by binding arbitration before a panel of three (3) arbitrators appointed in accordance with the Rules of Arbitration of the International Chamber of Commerce ("ICC") in effect at the time the proceeding is initiated. The Emergency Arbitrator Provisions shall not apply. The Expedited Procedure Provisions shall not apply. If the issues in Dispute involve scientific, technical or commercial matters, then any arbitrator chosen under this Agreement shall have educational training and industry experience sufficient to demonstrate a reasonable level of relevant scientific, technical and commercial knowledge relevant to the subject

matter of the Dispute. All proceedings and communications as part of the arbitration shall be in English. Following selection of the third arbitrator, the arbitrators shall use all reasonable efforts to complete the arbitration proceedings and render an award within six (6) months after the last arbitrator is appointed. In any such arbitration, the following additional procedures shall apply:

13.2.1 Panel. Within thirty (30) days after a Party demands arbitration, each Party shall select one (1) arbitrator and the third chosen by the two (2) Party-chosen arbitrators. If either, or both, of Novartis or Codexis fails to choose an arbitrator within thirty (30) days after receiving notice of commencement of arbitration or if the two arbitrators fail to choose a third arbitrator within thirty (30) days after their appointment, then either or both Parties shall immediately request that the ICC select the remaining number of arbitrators to be selected, which arbitrator(s) shall have an appropriate background, experience and expertise in the subject matter at issue in the Dispute. The place of arbitration shall be [***].

13.2.2 Injunctive Relief. Either Party may apply to the arbitrators for interim injunctive relief until the arbitration decision is rendered or the Dispute is otherwise resolved. Either Party may, without waiving any right or remedy under this Agreement, seek from any court having jurisdiction any injunctive or provisional relief necessary to protect the rights or property of that Party pending resolution of the Dispute pursuant to this Article 13. The arbitrators shall have no authority to award punitive or any other type of damages not measured by a Party's compensatory damages.

13.2.3 Costs and Expenses. Each Party will share equally the cost and expenses of the panel selected in Section 13.2.1 and any administrative fees unless in each case the arbitrators agree otherwise, which they are hereby empowered, authorized and instructed to do if they determine that to be fair and appropriate. Each Party shall bear its own costs and expenses and attorneys' fees in connection with any such arbitration or other legal action or proceeding; *provided, however,* that the prevailing Party in any such arbitration, action or proceeding, upon entry of a final, unappealable decision, shall be entitled to recover from the other Party the actual costs, expenses and reasonable attorneys' fees (including all related costs and expenses) incurred by such prevailing Party in connection with such action or proceeding and in connection with obtaining and enforcing any judgment or order thereby obtained.

13.2.4 Confidentiality. Except to the extent necessary to confirm an award or decision or as may be required by Applicable Law, or the requirement of any exchange on which a Party's shares are traded, neither Party nor any arbitrator may disclose the existence or results of any arbitration without the prior written consent of both Parties. In no event shall any arbitration be initiated after the date when commencement of a legal or equitable proceeding based on the Dispute would be barred by the applicable New York statute of limitations.

13.2.5 Breach of the Agreement. In the event of a Dispute involving the alleged breach of this Agreement (including, without limitation, whether a Party has satisfied its diligence obligations hereunder), (a) neither Party may terminate this Agreement under Section 12.2 until resolution of the Dispute pursuant to this Article 13 and (b) if the arbitrators render a decision that a breach of this Agreement has occurred, the arbitrators shall have no authority to modify the right of the non-breaching Party to terminate this Agreement in accordance with Section 12.2**.**

13.2.6 Performance. Any disputed performance or suspended performance pending the resolution of a Dispute that the arbitrators determine to be required to be performed by a Party shall be completed within a reasonable time period following the final decision of the arbitrators.

13.2.7 Binding Decision. The decision of the arbitrators shall be the sole, exclusive and binding remedy between the Parties regarding the determination of all Disputes presented. The arbitrators shall prepare and deliver to the Parties a written, reasoned opinion conferring their decision. Judgment on the award so rendered may be entered in any court having competent jurisdiction thereof. Any monetary payment to be made by a Party pursuant to a decision of the arbitrators shall be made in Dollars, free of any tax or other deduction.

13.3 Confidentiality, Patent and Excluded Claims. Notwithstanding anything in this Agreement to the contrary, any and all issues regarding (a) breach or threatened breach of a Party's confidentiality obligations under this Agreement, (b) the ownership, scope, construction, validity and enforceability of any Patent, or (c) any other Excluded Claims, shall be determined in a court and under the laws of a competent jurisdiction.

13.4 [***]. [***].

14. MISCELLANEOUS.

14.1 Regulatory Responsibilities and Costs. As between the Parties, Novartis shall prepare, file, maintain and own all Regulatory Filings and related submissions with respect to all Therapeutic Products and shall bear the cost of such preparation, filing, maintenance and ownership. As between the Parties, Novartis shall be solely responsible for communicating with the FDA and/or any other Regulatory Authority in any country or jurisdiction regarding all Therapeutic Products.

14.2 Commercialization Responsibilities and Costs. As between the Parties, Novartis shall be solely responsible for all commercialization activities relating to Therapeutic Products, at Novartis' sole cost and expense, and shall have sole decision-making authority with respect to the foregoing. For clarity, nothing in this Agreement shall require Novartis to develop or commercialize any minimum number of Therapeutic Products or limit the number of Therapeutic Products that Novartis may develop or commercialize.

14.3 Party Employees. Notwithstanding anything to the contrary under this Agreement, under no circumstance would any employee, contractor, contingent worker or consultant of a Party be considered an employee, contractor, contingent worker or consultant of the other Party. The Party who sends any employee, contractor, contingent worker or consultant to work at the other Party's premises shall assume all liability for such employees, contractors, contingent workers or consultants working at the other Party's premises and shall procure that its employees, contractors, contingent workers or consultants comply with all security, health and safety and other policies applicable to occupiers of the hosting Party's premises.

14.4 Non-Solicitation. During the period beginning on the Effective Date and ending on the date that is [***] (the "**Non-Solicitation Period**"), neither Party shall directly or indirectly, solicit or attempt to solicit any person acting in a scientific role who is or was an employee or contractor of the other Party or such other Party's Affiliates during the Non-Solicitation Period, or in any other way directly or indirectly seek to solicit, induce, bring about, influence, promote, facilitate, or encourage any such individual to work for such Party; *provided* that the foregoing shall not restrict a Party or its Affiliates from advertising employment opportunities in any manner that does not directly target the other Party or its Affiliates or from hiring or employing any person who responds to such generalized public advertisements.

14.5 Severability. If any one or more of the provisions contained in this Agreement is held invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions contained herein shall not in any way be affected or impaired thereby, unless the absence of the invalidated provision(s) adversely affects the substantive rights of the Parties. The Parties shall in such an instance use reasonable efforts to replace the invalid, illegal or unenforceable provision(s) with valid, legal and enforceable provision(s) which, insofar as practical, implement the purposes of this Agreement.

14.6 Notices. All notices which are required or permitted hereunder shall be in writing and sufficient if delivered personally, sent by nationally-recognized overnight courier or sent by registered or certified mail, postage prepaid, return receipt requested, addressed as follows:

if to Codexis, to:	Codexis, Inc. 200 Penobscot Drive Redwood City, CA 94063 Attention: [***] Telephone: [***] Email: [***]
and:	Codexis, Inc. 200 Penobscot Drive Redwood City, CA 94063 Attention: [***] Telephone: [***] Email: [***]
if to Novartis, to:	Novartis Pharma AG Asklepios 8 Novartis Campus CH-4056 Basel Switzerland Attention: [***] Telephone: [***] Email: [***]
And	Novartis Pharma AG Forum 2 Novartis Campus CH-4056 Basel Switzerland Attention: [***] Telephone:[***] Email: [***]

or to such other address(es) as the Party to whom notice is to be given may have furnished to the other Party in writing in accordance herewith. Any such notice shall be deemed to have been given: (a) when delivered if personally delivered (or if delivered or sent on a non-business day, then on the next business day); (b) on the business day after dispatch if sent by nationally-recognized overnight courier; or (c) on the fifth (5th) business day following the date of mailing, if sent by mail.

14.7 Force Majeure. Except for the payment of money, neither Party shall be held liable to the other Party nor be deemed to have defaulted under or breached this Agreement for failure or delay in performing any obligation under this Agreement to the extent such failure or delay is caused by or results from causes beyond the reasonable control of the affected Party, potentially including, but not limited to, embargoes, war, acts of war (whether war be declared or not), acts of terrorism, insurrections, riots, civil commotions, strikes, lockouts or other labor disturbances, fire, floods, or other acts of God,

or acts, omissions or delays in acting by any governmental authority or the other Party. The affected Party shall notify the other Party of such force majeure circumstances as soon as reasonably practical, and shall promptly undertake Commercially Reasonable Efforts to cure such force majeure circumstances.

14.8 Assignment. Except as provided in this Section 14.8, this Agreement may not be assigned or otherwise transferred, nor may any right or obligation hereunder be assigned or transferred, by either Party without the consent of the other Party; *provided, however*, that either Party may, without such consent, assign this Agreement and its rights and obligations hereunder, in whole or in part, to an Affiliate or in connection with the transfer or sale of all or substantially all of its assets related to the subject matter of this Agreement, or in the event of its merger or consolidation or change in control or similar transaction. This Agreement shall inure to the benefit of and be binding on the Parties' successors and assigns. Any attempted assignment not in accordance with this Section 14.8 shall be void. Any permitted assignee shall assume all assigned obligations of its assignor under this Agreement.

14.9 Waivers and Modifications. The waiver by either Party hereto of any right hereunder, or of any failure of the other Party to perform, or of any breach by the other Party, shall not be deemed a waiver of any other right hereunder or of any other breach by or failure of such other Party whether of a similar nature or otherwise. No waiver, modification, release or amendment of any obligation under or provision of this Agreement shall be valid or effective unless in writing and signed by both Parties.

14.10 Applicable Law. This Agreement shall be governed by and construed in accordance with the laws of the State of New York and the patent laws of the United States without reference to any rules of conflict of laws or renvoi, and excludes (a) the United Nations Convention on Contracts for the International Sales of Goods; (b) the 1974 Convention on the Limitation Period in the International Sale of Goods (the "**1974 Convention**"); (c) the Protocol amending the 1974 Convention, done at Vienna April 11, 1980; and (d) the Uniform Computer Information Transactions Act; *provided, however*, that with respect to matters involving the enforcement, validity or scope of Intellectual Property Rights, the laws of the applicable country shall apply.

14.11 Independent Contractors. It is expressly agreed that Codexis and Novartis shall be independent contractors and that the relationship between the two Parties shall not constitute a partnership, joint venture or agency. Neither Codexis nor Novartis shall have the authority to make any statements, representations or commitments of any kind, or to take any action, which shall be binding on the other Party, without the prior written consent of the other Party.

14.12 Entire Agreement. This Agreement, together with the Exhibits hereto, contains the entire understanding of the Parties with respect to the subject matter hereof. Any other express or implied agreements and understandings, negotiations, writings

and commitments, either oral or written, in respect to the subject matter hereof are superseded by the terms of this Agreement. The Exhibits to this Agreement are incorporated herein by reference and shall be deemed a part of this Agreement. This Agreement may be amended, or any term hereof modified, only by a written instrument duly executed by authorized representative(s) of both Parties hereto. Notwithstanding anything to the contrary in the foregoing, and subject to Section 10.6 hereof, the Confidential Disclosure Agreement shall remain in full force and effect with respect to the subject matter thereof and information disclosed thereunder.

14.13 Counterparts. This Agreement may be signed in any number of counterparts (facsimile and electronic transmission included), each of which shall be deemed an original, but all of which shall constitute one and the same instrument. After facsimile or electronic transmission, the parties agree to execute and exchange documents with original signatures.

14.14 Waiver of Rule of Construction. Each Party has had the opportunity to consult with counsel in connection with the review, drafting and negotiation of this Agreement. Accordingly, the rule of construction that any ambiguity in this Agreement shall be construed against the drafting Party shall not apply.

14.15 Certain Conventions. Any reference in this Agreement to an Article, Section, subsection, paragraph, clause, Exhibit shall be deemed to be a reference to an Article, Section, subsection, paragraph, clause, or Exhibit, of or to, as the case may be, this Agreement, unless otherwise indicated. Unless the context of this Agreement otherwise requires, (a) words of any gender include each other gender, (b) words such as “herein”, “hereof”, and “hereunder” refer to this Agreement as a whole and not merely to the particular provision in which such words appear, (c) words using the singular shall include the plural, and vice versa.

14.16 Headings. The captions to the several Articles, Sections and subsections hereof are not a part of this Agreement, but are merely for convenience to assist in locating and reading the several Articles and Sections hereof.

14.17 Cumulative Remedies. No remedy referred to in this Agreement is intended to be exclusive, but each shall be cumulative and in addition to any other remedy referred to in this Agreement or otherwise available under law.

14.18 References. Unless the context requires otherwise, (a) any definition of or reference to any agreement, instrument or other document herein shall be construed as referring to such agreement, instrument or other document as from time to time amended, supplemented or otherwise modified (subject to any restrictions on such amendments, supplements or modifications set forth herein or therein), (b) any reference to Applicable Law herein shall be construed as referring to such Applicable Law as from time

to time enacted, repealed or amended, and (c) any reference herein to any Person shall be construed to include the Person's successors and assigns.

[Signature Page Follows]

IN WITNESS WHEREOF, the Parties have caused this Platform Technology Transfer and License Agreement to be executed by their respective duly authorized officers as of the Effective Date.

Codexis, Inc.

By: /s/ John Nicols

Name: John Nicols

Title: President and CEO

Novartis Pharma AG

By: /s/ Reto Fischer

Name: Dr. Reto Fischer

Title: Global Head Technical R&D

Novartis Pharma AG

By: /s/ Melanie K. Martin

Name: Melanie K. Martin

Title: Head of Legal TRD

Exhibit 1.22

Codexis Core Patents

(Listing of Patents included in the definition of Codexis Core Patents (Section 1.22))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.27

Codexis Enzymes

(Listing of Codexis Enzymes included in the definition of Codexis Enzymes (Section 1.27))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.27(a)

Exceptions to Codexis Enzymes

(Listing of certain Covered Enzymes which are not Codexis Enzymes (Section 1.27))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.28

Codexis Enzyme Patents

(Listing of Patents included in the definition of Codexis Enzyme Patents (Section 1.28))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.32

Codexis Mayflower Patents

(Listing of Patents included in the definition of Codexis Mayflower Patents (Section 1.32))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.34

Codexis Software

(Listing of software included in the definition of Codexis Software (Section 1.34))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.67

In-License Agreements

(Listing of in-license patent agreements included in the definition
of In-License Agreements (Section 1.67))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.70

In-Licensed Patents

(Listing of Patents included in the definition of In-Licensed Patents (Section 1.70))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.106

Restricted Enzymes

(Listing of enzyme, or any vector that encodes for any such enzyme, included in the definition of Restricted Enzyme(s) (Section 1.106))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 1.115

Technology Transfer Plan

(Written plan by which Codexis will (a) transfer to Novartis of the Platform Technology, Codexis Documentation, Codexis Software, Codexis Materials, and Improvements thereto which come to be Controlled by Codexis during the Technology Transfer Period, and (b) train Novartis with respect to the Platform Technology)

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 3.4.3

Mayflower Patent Limitations

(Limitations on licenses provided in Sections 3.2.1, 3.2.2, 3.2.3 and 3.5.2
with respect to the Codexis Mayflower Patents)

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 3.4.5

Codexis Enzyme Suppliers

(List of entities included in the definition of
Third Party Enzyme Suppliers (Section 3.4.5))

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 4.1

Additional Services

(Form of Statement of Work under Section 4.1)

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 7.4.2

Written Notice Form

(Form of written notice under Section 7.4.2)

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 7.5

Payment Report Form

(Form of written notice under Section 7.5)

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 10.5.1

Press Release

(Press Release entitled “Codexis Announces CodeEvolver Technology Transfer and License Agreement with Global Pharmaceutical Leader” issued by Codexis, Inc. on May 15, 2019)

Omitted pursuant to Regulation S-K, Item 601(a)(5)

Exhibit 31.1

CERTIFICATION

I, John J. Nicols, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Codexis, Inc.;

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(s) 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(s) 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: August 6, 2019

/s/ John J. Nicols

John J. Nicols

President and Chief Executive Officer
(principal executive officer)

Exhibit 31.2

CERTIFICATION

I, Gordon Sangster, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Codexis, Inc.;

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(s) 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(s) 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: August 6, 2019

/s/ Gordon Sangster

Gordon Sangster
Senior Vice President and Chief Financial Officer
(principal financial and accounting officer)

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of Codexis, Inc. (the "Company") on Form 10-Q for the fiscal quarter ended June 30, 2019, as filed with the Securities and Exchange Commission (the "Report"), John J. Nicols, President and Chief Executive Officer of the Company and Gordon Sangster, Senior Vice President and Chief Financial Officer of the Company, respectively, do each hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- The information in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: August 6, 2019

/s/ John J. Nicols

John J. Nicols

President and Chief Executive Officer
(principal executive officer)

/s/ Gordon Sangster

Gordon Sangster
Senior Vice President and Chief Financial Officer
(principal financial and accounting officer)