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

FORM 10-Q

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

For the quarterly period ended September 30, 2018

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: 001-36042

INTREXON CORPORATION

(Exact name of registrant as specified in its charter)

Virginia	**26-0084895**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification Number)**
20374 Seneca Meadows Parkway Germantown, Maryland	**20876**
(Address of principal executive offices)	**(Zip Code)**

(301) 556-9900

(Registrant's telephone number, including area code)

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

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 x 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 x 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	x	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
Emerging growth company	☐		

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

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

As of October 31, 2018, 137,221,526 shares of common stock, no par value per share, were outstanding.

INTREXON CORPORATION

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Special Note Regarding Forward-Looking Statements

This Quarterly Report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, which statements involve substantial risks and uncertainties. All statements, other than statements of historical facts, included in this Quarterly Report regarding our strategy, future events, future operations, future financial position, future revenue, projected costs, prospects, plans, objectives of management and expected market growth are forward-looking statements. The words "anticipate," "believe," "estimate," "expect," "intend," "may," "plan," "predict," "project," "would" and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. These forward-looking statements include, among other things, statements about:

- our strategy and overall approach to our business model;
- our ability to successfully enter new markets or develop additional products, whether with our collaborators or independently;
- our ability to successfully enter into optimal strategic relationships with our subsidiaries and operating companies that we may form in the future;
- competition from existing technologies and products or new technologies and products that may emerge;
- actual or anticipated variations in our operating results;
- our current and future joint ventures, or JVs, exclusive channel collaborations, or ECCs, license agreements and other collaborations;
- developments concerning our collaborators and licensees;
- actual or anticipated fluctuations in our competitors' or our collaborators' and licensees' operating results or changes in their respective growth rates;
- our cash position;
- market conditions in our industry;
- our ability to protect our intellectual property and other proprietary rights and technologies;
- our ability to adapt to changes in laws, regulations and policies;
- the ability of our collaborators and licensees to adapt to changes in laws, regulations and policies and to secure any necessary regulatory approvals to commercialize any products developed under the ECCs, license agreements and JVs;
- the ability of our collaborators and licensees to protect our intellectual property and other proprietary rights and technologies;
- the ability of our collaborators and licensees to develop and successfully commercialize products enabled by our technologies;
- the rate and degree of market acceptance of any products developed by our subsidiaries, a collaborator under an ECC, or through a JV or license under a license agreement;
- our ability to retain and recruit key personnel;
- the result of litigation proceedings or investigations that we face currently or may face in the future;
- our expectations related to the use of proceeds from our public offerings and other financing efforts;

- our estimates regarding expenses, future revenue, capital requirements and needs for additional financing; and
- the impact of the Tax Cuts and Jobs Act of 2017 on our current and future operating results.

Forward-looking statements may also concern our expectations relating to our subsidiaries and other affiliates. We caution you that the foregoing list may not contain all of the forward-looking statements made in this Quarterly Report.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. We have included important factors in the cautionary statements included in this Quarterly Report, particularly in Part II, Item 1A. "Risk Factors," that could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, JVs or investments that we may make.

You should read this Quarterly Report, the documents that we reference in this Quarterly Report, our Annual Report on Form 10-K for the year ended December 31, 2017, the other reports we have filed with the Securities and Exchange Commission, or SEC, and the documents that we have filed as exhibits to our filings with the SEC completely and with the understanding that our actual future results may be materially different from what we expect. We do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

PART I. FINANCIAL INFORMATION

Item 1. Consolidated Financial Statements

Intrexon Corporation and Subsidiaries
Consolidated Balance Sheets
(Unaudited)

(Amounts in thousands, except share data)	September 30, 2018	December 31, 2017
Assets		
Current assets		
Cash and cash equivalents	$ 82,417	$ 68,111
Restricted cash	6,987	6,987
Short-term investments	164,162	6,273
Equity securities	714	5,285
Receivables		
Trade, net	18,161	19,775
Related parties, net	8,841	17,913
Other	3,305	2,153
Inventory	18,294	20,493
Prepaid expenses and other	7,589	7,057
Total current assets	310,470	154,047
Equity securities, noncurrent	3,983	9,815
Investments in preferred stock	158,421	161,225
Property, plant and equipment, net	122,707	112,674
Intangible assets, net	213,244	232,877
Goodwill	151,276	153,289
Investments in affiliates	17,944	18,870
Other assets	2,370	4,054
Total assets	$ 980,415	$ 846,851

The accompanying notes are an integral part of these consolidated financial statements.

Intrexon Corporation and Subsidiaries
Consolidated Balance Sheets
(Unaudited)

(Amounts in thousands, except share data)	September 30, 2018	December 31, 2017
Liabilities and Total Equity		
Current liabilities		
Accounts payable	$ 8,522	$ 8,701
Accrued compensation and benefits	23,885	6,474
Other accrued liabilities	20,998	21,080
Deferred revenue, including $16,967 and $29,155 from related parties as of September 30, 2018 and December 31, 2017, respectively	38,036	42,870
Lines of credit	200	233
Current portion of long-term debt	546	502
Related party payables	143	313
Total current liabilities	92,330	80,173
Long-term debt, net of current portion, including $30,060 and $0 to related parties as of September 30, 2018 and December 31, 2017, respectively	183,133	7,535
Deferred revenue, net of current portion, including $115,885 and $157,628 from related parties as of September 30, 2018 and December 31, 2017, respectively	136,942	193,527
Deferred tax liabilities, net	9,363	15,620
Other long-term liabilities	3,204	3,451
Total liabilities	424,972	300,306
Commitments and contingencies (Note 16)		
Total equity		
Common stock, no par value, 200,000,000 shares authorized as of September 30, 2018 and December 31, 2017; 137,144,902 and 122,087,040 shares issued and outstanding as of September 30, 2018 and December 31, 2017, respectively	—	—
Additional paid-in capital	1,552,379	1,397,005
Accumulated deficit	(990,080)	(847,820)
Accumulated other comprehensive loss	(22,900)	(15,554)
Total Intrexon shareholders' equity	539,399	533,631
Noncontrolling interests	16,044	12,914
Total equity	555,443	546,545
Total liabilities and total equity	$ 980,415	$ 846,851

The accompanying notes are an integral part of these consolidated financial statements.

Intrexon Corporation and Subsidiaries
Consolidated Statements of Operations
(Unaudited)

(Amounts in thousands, except share and per share data)	Three Months Ended September 30, 2018	Three Months Ended September 30, 2017	Nine Months Ended September 30, 2018	Nine Months Ended September 30, 2017
Revenues				
Collaboration and licensing revenues, including $11,952 and $24,492 from related parties during the three months ended September 30, 2018 and 2017, respectively, and $41,740 and $77,937 during the nine months ended September 30, 2018 and 2017, respectively	$ 14,324	$ 28,155	$ 51,622	$ 89,384
Product revenues	6,829	7,670	23,549	25,780
Service revenues	10,414	9,975	40,379	37,890
Other revenues	881	216	1,839	899
Total revenues	32,448	46,016	117,389	153,953
Operating Expenses				
Cost of products	8,877	8,001	28,046	25,625
Cost of services	6,449	7,013	21,127	21,805
Research and development	44,885	36,472	124,072	104,663
Selling, general and administrative	38,708	39,277	112,872	113,258
Total operating expenses	98,919	90,763	286,117	265,351
Operating loss	(66,471)	(44,747)	(168,728)	(111,398)
Other Income (Expense), Net				
Unrealized and realized appreciation (depreciation) in fair value of equity securities and preferred stock, net	(7,287)	2,175	(27,565)	9,240
Interest expense	(3,999)	(138)	(4,240)	(498)
Interest and dividend income	6,107	5,070	17,323	14,437
Other income (expense), net	1,452	(1,021)	571	4,453
Total other income (expense), net	(3,727)	6,086	(13,911)	27,632
Equity in net loss of affiliates	(2,870)	(2,993)	(9,880)	(11,273)
Loss before income taxes	(73,068)	(41,654)	(192,519)	(95,039)
Income tax benefit	14,322	818	19,535	2,164
Net loss	$ (58,746)	$ (40,836)	$ (172,984)	$ (92,875)
Net loss attributable to the noncontrolling interests	1,422	1,147	4,113	3,123
Net loss attributable to Intrexon	$ (57,324)	$ (39,689)	$ (168,871)	$ (89,752)
Net loss attributable to Intrexon per share, basic and diluted	$ (0.44)	$ (0.33)	$ (1.31)	$ (0.75)
Weighted average shares outstanding, basic and diluted	129,518,989	120,518,885	128,843,991	119,741,291

The accompanying notes are an integral part of these consolidated financial statements.

Intrexon Corporation and Subsidiaries
Consolidated Statements of Comprehensive Loss
(Unaudited)

(Amounts in thousands)	Three Months Ended September 30, 2018	Three Months Ended September 30, 2017	Nine Months Ended September 30, 2018	Nine Months Ended September 30, 2017
Net loss	$ (58,746)	$ (40,836)	$ (172,984)	$ (92,875)
Other comprehensive income (loss):				
Unrealized gain (loss) on investments	(96)	79	(94)	74
Gain (loss) on foreign currency translation adjustments	(914)	7,410	(7,207)	19,405
Comprehensive loss	(59,756)	(33,347)	(180,285)	(73,396)
Comprehensive loss attributable to the noncontrolling interests	1,380	1,129	4,172	3,096
Comprehensive loss attributable to Intrexon	$ (58,376)	$ (32,218)	$ (176,113)	$ (70,300)

The accompanying notes are an integral part of these consolidated financial statements.

Intrexon Corporation and Subsidiaries
Consolidated Statements of Shareholders' and Total Equity
(Unaudited)

(Amounts in thousands, except share data)	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Total Intrexon Shareholders' Equity	Noncontrolling Interests	Total Equity
Balances at December 31, 2017	122,087,040	$ —	$1,397,005	$ (15,554)	$ (847,820)	$ 533,631	$ 12,914	$ 546,545
Cumulative effect of adoption of ASC 606	—	—	—	(104)	26,611	26,507	—	26,507
Stock-based compensation expense	—	—	28,251	—	—	28,251	89	28,340
Shares issued upon vesting of restricted stock units and for exercises of stock options and warrants	66,314	—	262	—	—	262	812	1,074
Shares issued as payment for services	612,117	—	8,404	—	—	8,404	—	8,404
Shares and warrants issued in public offerings, net of issuance costs	6,900,000	—	82,374	—	—	82,374	5,616	87,990
Equity component of convertible debt, net of issuance costs and deferred taxes	—	—	36,868	—	—	36,868	—	36,868
Shares issued pursuant to share lending agreement	7,479,431	—	—	—	—	—	—	—
Adjustments for noncontrolling interests	—	—	(785)	—	—	(785)	785	—
Net loss	—	—	—	—	(168,871)	(168,871)	(4,113)	(172,984)
Other comprehensive loss	—	—	—	(7,242)	—	(7,242)	(59)	(7,301)
Balances at September 30, 2018	137,144,902	$ —	$1,552,379	$ (22,900)	$ (990,080)	$ 539,399	$ 16,044	$ 555,443

The accompanying notes are an integral part of these consolidated financial statements

Intrexon Corporation and Subsidiaries
Consolidated Statements of Cash Flows
(Unaudited)

(Amounts in thousands)	Nine Months Ended September 30, 2018	2017
Cash flows from operating activities		
Net loss	$ (172,984)	$ (92,875)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	25,184	22,881
Loss on disposal of assets, net	4,110	1,311
Write-off of in-process research and development acquired in asset acquisition	8,721	—
Unrealized and realized (appreciation) depreciation on equity securities and preferred stock, net	27,565	(9,240)
Noncash dividend income	(14,575)	(12,303)
Amortization of premiums (discounts) on investments, net	(275)	411
Equity in net loss of affiliates	9,880	11,273
Stock-based compensation expense	28,340	31,949
Shares issued as payment for services	8,404	8,440
Provision for bad debts	1,597	1,093
Accretion of debt discount and amortization of deferred financing costs	2,116	—
Deferred income taxes	(19,335)	(2,294)
Other noncash items	635	(1,848)
Changes in operating assets and liabilities:		
Receivables:		
Trade	399	2,491
Related parties	6,085	(1,073)
Other	(909)	537
Inventory	2,577	3,418
Prepaid expenses and other	(511)	(516)
Other assets	584	(617)
Accounts payable	(731)	(3,756)
Accrued compensation and benefits	17,561	3,291
Other accrued liabilities	1,591	1,554
Deferred revenue	(22,993)	(35,281)
Deferred consideration	—	(313)
Related party payables	(167)	356
Other long-term liabilities	253	1,271
Net cash used in operating activities	(86,878)	(69,840)

The accompanying notes are an integral part of these consolidated financial statements.

Intrexon Corporation and Subsidiaries
Consolidated Statements of Cash Flows
(Unaudited)

(Amounts in thousands)	Nine Months Ended September 30, 2018	2017
Cash flows from investing activities		
Purchases of investments	(178,681)	—
Maturities of investments	20,975	136,300
Purchases of preferred stock and warrants	—	(1,161)
Proceeds from sales of equity securities	217	235
Cash acquired in business combination	—	2,054
Investments in affiliates	(14,139)	(10,639)
Return of investment in affiliate	2,598	—
Cash received (paid) in asset acquisition	15,500	(14,219)
Purchases of property, plant and equipment	(30,354)	(32,675)
Proceeds from sale of assets	1,930	1,423
Issuances of notes receivable	—	(2,400)
Proceeds from repayment of notes receivable	—	1,500
Net cash provided by (used in) investing activities	(181,954)	80,418
Cash flows from financing activities		
Proceeds from issuance of shares and warrants in public offerings, net of issuance costs	87,990	—
Acquisitions of noncontrolling interests	—	(913)
Advances from lines of credit	3,231	4,563
Repayments of advances from lines of credit	(3,264)	(5,149)
Proceeds from long-term debt, net of issuance costs	194,000	285
Payments of long-term debt	(485)	(385)
Payments of deferred consideration for acquisition	—	(8,678)
Proceeds from stock option and warrant exercises	1,074	867
Payment of issuance costs	—	(10)
Net cash provided by (used in) financing activities	282,546	(9,420)
Effect of exchange rate changes on cash, cash equivalents, and restricted cash	578	892
Net increase in cash, cash equivalents, and restricted cash	14,292	2,050
Cash, cash equivalents, and restricted cash		
Beginning of period	75,545	69,594
End of period	$ 89,837	$ 71,644

The accompanying notes are an integral part of these consolidated financial statements.

Intrexon Corporation and Subsidiaries
Consolidated Statements of Cash Flows
(Unaudited)

(Amounts in thousands)	Nine Months Ended September 30, 2018	2017
Supplemental disclosure of cash flow information		
Cash paid during the period for interest	$ 360	$ 534
Cash paid during the period for income taxes	193	497
Significant noncash financing and investing activities		
Stock and warrants issued in business combination	$ —	$ 16,997
Stock issued to acquire noncontrolling interests	—	5,082
Long-term debt issued to a related party in an asset acquisition	30,000	—
Noncash dividend to shareholders	—	22,385
Purchases of property and equipment included in accounts payable and other accrued liabilities	2,088	2,137
Purchases of equipment financed through debt	193	—

The following table provides a reconciliation of the cash, cash equivalents, and restricted cash balances as of September 30, 2018 and December 31, 2017 as shown above:

	September 30, 2018	December 31, 2017
Cash and cash equivalents	$ 82,417	$ 68,111
Restricted cash	6,987	6,987
Restricted cash included in other assets	433	447
Cash, cash equivalents, and restricted cash	$ 89,837	$ 75,545

The accompanying notes are an integral part of these consolidated financial statements.

Intrexon Corporation and Subsidiaries
Notes to Consolidated Financial Statements
(Unaudited)
(Amounts in thousands, except share and per share data)

1. Organization

Intrexon Corporation ("Intrexon"), a Virginia corporation, including through its wholly owned subsidiaries Precigen, Inc. ("Precigen") and ActoBio Therapeutics, Inc. ("ActoBio"), uses synthetic biology to focus on programming biological systems to alleviate disease, remediate environmental challenges, and provide sustainable food and industrial chemicals, which may be accomplished through collaborations and joint ventures. Intrexon's primary domestic operations are in California, Florida, Maryland, and Virginia, and its primary international operations are in Belgium and Hungary. There have been no commercialized products derived from Intrexon's collaborations to date.

Trans Ova Genetics, L.C. ("Trans Ova"), and Progentus, L.C. ("Progentus"), providers of advanced reproductive technologies, including services and products sold to cattle breeders and other producers, are wholly owned subsidiaries with primary operations in Iowa, Maryland, Missouri, New York, Oklahoma, and Texas.

Oxitec Limited ("Oxitec"), a pioneering company in biological insect control solutions, is a wholly owned subsidiary of Intrexon with primary operations in England and Brazil.

Intrexon Produce Holdings, Inc. ("IPHI") is a wholly owned subsidiary of Intrexon. Okanagan Specialty Fruits, Inc. ("Okanagan"), a company that developed and received regulatory approval for the world's first non-browning apple without the use of any artificial additives, is a wholly owned subsidiary of IPHI with primary operations in Canada. Fruit Orchard Holdings, Inc. ("FOHI") is a wholly owned subsidiary of IPHI with primary operations in Washington.

ViaGen, L.C. ("ViaGen"), a provider of genetic preservation and cloning technologies, and Exemplar Genetics, LLC ("Exemplar"), a provider of genetically engineered swine for medical and genetic research, are wholly owned subsidiaries with primary operations in Iowa.

In January 2018, AquaBounty Technologies, Inc. ("AquaBounty"), a company focused on improving productivity in commercial aquaculture, completed an underwritten public offering that resulted in net proceeds of $10,616 after deducting discounts, fees and expenses. As part of this offering, Intrexon purchased $5,000 of additional AquaBounty common stock, reducing its ownership stake from approximately 58% to approximately 53%. As of September 30, 2018, Intrexon owned approximately 52% of AquaBounty.

Intrexon and its consolidated subsidiaries are hereinafter referred to as the "Company."

2. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying interim consolidated financial statements are unaudited and have been prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP"). Certain information and footnote disclosures normally included in the Company's annual financial statements have been condensed or omitted. These interim consolidated financial statements, in the opinion of management, reflect all normal recurring adjustments necessary for fair statement of the Company's financial position as of September 30, 2018 and results of operations and cash flows for the interim periods ended September 30, 2018 and 2017. The year-end consolidated balance sheet data was derived from the Company's audited financial statements but does not include all disclosures required by U.S. GAAP. These interim financial results are not necessarily indicative of the results to be expected for the year ending December 31, 2018, or for any other future annual or interim period. The accompanying interim unaudited consolidated financial statements should be read in conjunction with the audited consolidated financial statements and related notes thereto included in the Company's Annual Report on Form 10-K for the year ended December 31, 2017 ("Annual Report").

The accompanying consolidated financial statements reflect the operations of the Company and its subsidiaries. All intercompany accounts and transactions have been eliminated.

Revenue Recognition

Effective January 1, 2018, the Company applies Accounting Standards Codification ("ASC") Topic 606, *Revenue from Contracts with Customers* ("ASC 606"). Under ASC 606, the Company recognizes revenue when its customer obtains control of the promised goods or services, in an amount that reflects the consideration that the Company expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements that are within the scope of ASC 606, the Company performs the following five steps: (i) identify the contract(s) with a customer, (ii) identify the promises and distinct performance obligations in the contract, (iii) determine the transaction price, (iv) allocate the transaction price to the performance obligations in the contract, and (v) recognize revenue when (or as) the Company satisfies the performance obligations.

The Company's revenue recognition accounting policies for periods prior to January 1, 2018 can be found in the audited consolidated financial statements and related notes thereto included in the Company's Annual Report.

Collaboration and licensing revenues

The Company generates collaboration and licensing revenues through the execution of agreements with collaborators (known as exclusive channel collaborations, "ECC" or "ECCs") and licensing agreements whereby the collaborators or the licensee obtain exclusive access to the Company's proprietary technologies for use in the research, development and commercialization of products and/or treatments in a contractually specified field of use. Generally, the terms of these agreements provide that the Company receives some or all of the following: (i) upfront payments upon consummation of the agreement; (ii) reimbursements for costs incurred by the Company for research and development and/or manufacturing efforts related to specific applications provided for in the agreement; (iii) milestone payments upon the achievement of specified development, regulatory and commercial activities; and (iv) royalties on sales of products arising from the collaboration or licensing agreement. The agreement typically continues in perpetuity unless terminated and each of the Company's collaborators retain a right to terminate the agreement upon providing the Company written notice a certain period of time prior to such termination, generally 90 days.

The Company's collaboration and licensing agreements typically contain multiple promises, including technology licenses, research and development services, and in certain cases manufacturing services. The Company determines whether each of the promises is a distinct performance obligation. As the nature of the promises in the Company's collaboration and licensing agreements are highly integrated and interrelated, the Company typically combines most of its promises into a single performance obligation. Because the Company is performing research and development services during early-stage development, the services are integral to the utilization of the technology license. Therefore, the Company has determined that the technology license and research and development services are typically inseparable from each other during the performance period of its collaboration and licensing agreements. Contingent manufacturing services that may be provided under certain of the Company's agreements are considered to be a separate future contract and not part of the current collaboration or licensing agreement.

At contract inception, the Company determines the transaction price, including fixed consideration and any estimated amounts of variable consideration. The upfront payment received upon consummation of the agreement is fixed and nonrefundable. Variable consideration is subject to a constraint and amounts are included in the transaction price to the extent that it is probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. Variable consideration may include reimbursements for costs incurred by the Company for research and development efforts, milestone payments upon the achievement of certain development, regulatory and commercial activities, and royalties on sales of products arising from the collaboration or licensing agreement. The Company determines the initial transaction price and excludes variable consideration that is otherwise constrained pursuant to the guidance in ASC 606.

The transaction price is allocated to the performance obligations in the agreement based on the standalone selling price of each performance obligation. The Company typically groups the promises in its collaboration and licensing agreements into one performance obligation so the entire transaction price relates to this single performance obligation. The technology license included in the single performance obligation is considered a functional license. However, it is typically combined into a single performance obligation as the Company provides interrelated research and development services along with other obligations over an estimated period of performance. The Company utilizes judgment to determine the most appropriate method to measure its progress of performance under the agreement, primarily based on inputs necessary to fulfill the performance obligation. The Company evaluates its measure of progress to recognize revenue each reporting period and, if necessary, adjusts the measure of performance and related revenue recognition. The Company's measure of performance and revenue recognition involves significant judgment and assumptions, including, but not limited to, estimated costs and timelines to complete its performance

obligations. The Company evaluates modifications and amendments to its contracts to determine whether any changes should be accounted for prospectively or on a cumulative catch-up basis.

Payments received for cost reimbursements for research and development efforts are recognized as revenue as the services are performed, in connection with the single performance obligation discussed above. The reimbursements relate specifically to the Company's efforts to provide services and the reimbursements are consistent with what the Company would typically charge other collaborators for similar services.

Milestone payments are evaluated at the inception of the agreement to determine whether the milestones are considered probable of being achieved. The Company typically determines that the milestones are not probable at inception of the agreement due to the uncertainty of when and if the milestone will be achieved.

Royalties, including sales-based milestones, received under the agreements will be recognized as revenue when sales have occurred because the Company applies the sales- or usage-based royalties recognition exception provided for under ASC 606. The Company determined the application of this exception is appropriate because at the time the royalties are generated, the technology license granted in the agreement is the predominant item to which the royalties relate.

As the Company receives upfront payments in its collaboration and licensing agreements, it evaluates whether any significant financing components exist in its collaboration and licensing agreements. Based on the nature of its collaboration and licensing agreements, there are no significant financing components as the purpose of the upfront payment is not to provide financing. The purpose is to provide the collaborator with assurance that the Company will complete its obligations under the contract or to secure the right to a specific product or service at the collaborator's discretion. In addition, the variable payments generally align with the timing of performance or the timing of the consideration varies on the basis of the occurrence or nonoccurrence of a future event that is not substantially within the control of the collaborator or the Company.

From time to time, the Company and certain collaborators may cancel their agreements, relieving the Company of any further performance obligations under the agreement. Upon such cancellation or when the Company has determined no further performance obligations are required of the Company under an agreement, the Company recognizes any remaining deferred revenue.

Product and service revenues

The Company generates product and service revenues primarily through sales of products and services that are created from technologies developed or owned by the Company. The Company's current offerings include sales of advanced reproductive technologies, including the Company's bovine embryo transfer and in vitro fertilization processes and from genetic preservation and sexed semen processes and applications of such processes to other livestock, as well as sales of livestock and embryos produced using these processes and used in production. As each promised product or service is distinct, the Company recognizes the transaction price as revenue when the customer takes ownership of the promised product or when the promised service is rendered. Payment terms are typically due within 30 days.

Equity Method Investments

The Company accounts for its investments in each of its joint ventures and for its investments in start-up entities backed by the Harvest Intrexon Enterprise Fund I, LP ("Harvest"), a related party, (Note 17) using the equity method of accounting based upon relative ownership interest. The Company's investments in these entities are included in investments in affiliates in the accompanying consolidated balance sheets. See additional discussion related to certain of the Harvest start-up entities in Note 3.

The Company accounts for its investment in Oragenics, Inc. ("Oragenics"), one of its collaborators and a related party, using the fair value option. The fair value of the Company's investment in Oragenics was $1,538 and $3,085 as of September 30, 2018 and December 31, 2017, respectively, and is included as equity securities, noncurrent, in the accompanying consolidated balance sheets. The Company's ownership of Oragenics was 7.9% and 29.4% as of September 30, 2018 and December 31, 2017, respectively. Unrealized appreciation (depreciation) in the fair value of these securities was $(387) and $827 for the three months ended September 30, 2018 and 2017, respectively, and $(1,547) and $(1,610) for the nine months ended September 30, 2018 and 2017, respectively. As of September 30, 2018, Oragenics was no longer considered an equity method investment as the Company's ownership level has significantly decreased during the three months ended September 30, 2018. See Note 7 for additional discussion regarding Oragenics.

Summarized financial data as of September 30, 2018 and December 31, 2017 and for the three and nine months ended September 30, 2018 and 2017, for the Company's equity method investments are shown in the following tables.

	September 30, 2018	December 31, 2017
Current assets	$ 21,044	$ 61,086
Noncurrent assets	27,827	13,598
Total assets	48,871	74,684
Current liabilities	5,324	6,213
Net assets	$ 43,547	$ 68,471

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Revenues	$ 113	$ 58	$ 353	$ 175
Operating expenses	11,621	9,693	30,762	33,128
Operating loss	(11,508)	(9,635)	(30,409)	(32,953)
Other, net	12	(145)	33	37
Net loss	$ (11,496)	$ (9,780)	$ (30,376)	$ (32,916)

Variable Interest Entities

As of September 30, 2018 and December 31, 2017, the Company determined that certain of its collaborators and joint ventures as well as Harvest were variable interest entities ("VIE" or "VIEs"). The Company was not the primary beneficiary for these entities since it did not have the power to direct the activities that most significantly impact the economic performance of the VIEs. The Company's aggregate investment balances of these VIEs as of September 30, 2018 and December 31, 2017 were $179,433 and $185,261, respectively, which represents the Company's maximum risk of loss related to the identified VIEs.

Convertible Notes

The Company allocated the proceeds received in July 2018 from the issuance of Intrexon's 3.50% convertible senior notes due 2023 (the "Convertible Notes") between long-term debt (liability component) and additional paid-in capital (equity component) within the consolidated balance sheet. The original value assigned to long-term debt is the estimated fair value as of the issuance date of a similar debt instrument without a conversion option. The original value assigned to additional paid-in capital represents the value of the conversion option and is calculated by deducting the fair value of the long-term debt from the principal amount of the Convertible Notes and is not remeasured as long as it continues to meet the requirements for equity classification. The original value of the conversion option will accrete to the carrying value of the long-term debt and result in additional non-cash interest expense over the expected life of the Convertible Notes using the effective interest method.

Debt issuance costs related to the Convertible Notes are also allocated between long-term debt and additional paid-in capital based on the original value assigned to each. Debt issuance costs allocated to long-term debt reduced the original carrying value and will accrete to the carrying value of the long-term debt and result in additional non-cash interest expense over the expected life of the Convertible Notes using the effective interest method. Debt issuance costs allocated to additional paid-in capital are recorded as reduction of the original value assigned to the conversion option.

See Note 12 for the further discussion of the Convertible Notes.

Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to both differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases as well as operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in

income in the period that includes the enactment date of the change. Valuation allowances are established when necessary to reduce deferred tax assets to the amount expected to be realized.

The Company identifies any uncertain income tax positions and recognizes the effect of income tax positions only if those positions are more likely than not of being sustained. Recognized income tax positions are measured at the largest amount that is greater than 50% likely of being realized. Changes in recognition or measurement are reflected in the period in which the change in judgment occurs. The Company records interest, if any, related to unrecognized tax benefits as a component of interest expense. Penalties, if any, are recorded in selling, general and administrative expenses.

On December 22, 2017, the Tax Cuts and Jobs Act of 2017 (the "Tax Act") was signed into law and significantly revised U.S. corporate income tax law by, among other things, reducing the corporate income tax rate to 21% effective January 1, 2018, eliminating the corporate alternative minimum tax and implementing a modified territorial tax system that includes a one-time transition tax on deemed repatriated earnings from foreign subsidiaries. The U.S. Securities and Exchange Commission ("SEC") Staff issued Staff Accounting Bulletin No. 118 ("SAB 118") to address the application of U.S. GAAP in situations when a registrant does not have the necessary information available, prepared, or analyzed, including computations, in reasonable detail to complete the accounting for certain income tax effects of the Tax Act. The Company recognized provisional tax impacts related to revaluation of most of the Company's domestic deferred tax assets, the impact of revaluation of those deferred tax assets on the Company's valuation allowance and elimination of the corporate alternative minimum tax, and included those amounts in the consolidated financial statements for the year ended December 31, 2017. The actual impact of the Tax Act may differ from the Company's estimates due to, among other things, changes in interpretations and assumptions made, and guidance that may be issued as a result of the Tax Act.

In addition, the Tax Act implemented a new minimum tax on global intangible low-taxed income ("GILTI"). A company can elect an accounting policy to account for GILTI in either of the following ways:

- As a period charge in the future period in which the tax arises; or
- As part of deferred taxes related to the investment or subsidiary.

The Company has not made a policy decision regarding whether to record deferred taxes under the GILTI regime, and there was no impact to the accompanying consolidated financial statements as of and for the periods ended September 30, 2018.

The accounting is expected to be completed within the one-year measurement period as allowed by SAB 118 for items impacted or introduced by the Tax Act. See Note 13 for discussion of adjustments made to these provisional amounts in the nine months ended September 30, 2018.

Segment Information

While the Company generates revenues from multiple sources, including collaboration agreements, licensing, and products and services primarily associated with bovine reproduction, management is organized around a singular research and development focus to further the development of the Company's underlying synthetic biology technologies. Accordingly, the Company has determined that it operates in one segment. As of September 30, 2018 and December 31, 2017, the Company had $16,984 and $21,837, respectively, of long-lived assets in foreign countries. The Company recognized revenues derived in foreign countries totaling $2,235 and $4,448 for the three months ended September 30, 2018 and 2017, respectively, and $10,389 and $11,773 for the nine months ended September 30, 2018 and 2017, respectively.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates.

Recently Adopted Accounting Pronouncements

The Company adopted ASC 606 for open contracts on January 1, 2018 using the modified retrospective approach. As a result of the adoption of ASC 606, including guidance on contract modifications, the Company recognized a cumulative catch-up adjustment to decrease deferred revenue in the net amount of $26,507 and accumulated deficit in the net amount of $26,611 and to increase accumulated other comprehensive loss in the net amount of $104.

In accordance with ASC 606, the disclosure of the impacted line items upon adoption of ASC 606 on the Company's consolidated statements of operations for the three and nine months ended September 30, 2018 and consolidated balance sheet as of September 30, 2018 was as follows:

	Three Months Ended September 30, 2018			Nine Months Ended September 30, 2018		
	As Reported	Balances Without Adoption of ASC 606	Effect of Change	As Reported	Balances Without Adoption of ASC 606	Effect of Change
Consolidated Statements of Operations						
Collaboration and licensing revenues	$ 14,324	$ 16,210	$ (1,886)	$ 51,622	$ 58,305	$ (6,683)
Net loss	(58,746)	(56,860)	(1,886)	(172,984)	(166,301)	(6,683)
Net loss attributable to Intrexon	(57,324)	(55,438)	(1,886)	(168,871)	(162,188)	(6,683)

	September 30, 2018		
	As Reported	Balances Without Adoption of ASC 606	Effect of Change
Consolidated Balance Sheet			
Liabilities			
Deferred revenue, current	$ 38,036	$ 39,594	$ (1,558)
Deferred revenue, net of current portion	136,942	156,803	(19,861)
Total equity			
Accumulated deficit	(990,080)	(1,010,007)	19,927
Accumulated other comprehensive loss	(22,900)	(22,860)	(40)

In May 2017, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") 2017-09, *Compensation-Stock Compensation (Topic 718) – Scope of Modification Accounting* ("ASU 2017-09"). The provisions of ASU 2017-09 provide guidance about which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting in ASC Topic 718 ("ASC 718"). An entity should account for the effects of a modification unless (a) the fair value of the modified award is the same as the fair value of the original award, (b) the vesting conditions of the modified award are the same as the vesting conditions of the original award and (c) the classification of the modified award as an equity instrument or a liability instrument is the same as the classification of the original award immediately before the original award is modified. The Company adopted this standard effective January 1, 2018, and will apply this guidance to future modifications.

In November 2016, the FASB issued ASU 2016-18, *Statement of Cash Flows (Topic 230) - Restricted Cash (A Consensus of the FASB Emerging Issues Task Force)* ("ASU 2016-18"). The provisions of ASU 2016-18 require amounts generally described as restricted cash and restricted cash equivalents to be included with cash and cash equivalents when reconciling the total beginning and ending balances for the periods presented on the statement of cash flows. The Company adopted this standard effective January 1, 2018. In accordance with the provisions of ASU 2016-18, the "Cash, cash equivalents, and restricted cash" beginning period balance increased by $7,434 for the nine months ended September 30, 2018 in the accompanying consolidated statement of cash flows. The beginning and ending period balances increased by $6,987 and $7,428, respectively, in the accompanying consolidated statement of cash flows for the nine months ended September 30, 2017 from what was previously reported in the Company's Quarterly Report on Form 10-Q for the period ended September 30, 2017.

In October 2016, the FASB issued ASU 2016-16, *Income Taxes (Topic 740) - Intra-Entity Transfers of Assets Other Than Inventory* ("ASU 2016-16"). The provisions of ASU 2016-16 remove the prohibition in ASC Topic 740 against the immediate

recognition of the current and deferred income tax effects of intra-entity transfers of assets other than inventory. The Company adopted this standard effective January 1, 2018, and the implementation of this standard did not have a material impact on the Company's consolidated financial statements.

In August 2016, the FASB issued ASU 2016-15, *Statement of Cash Flows (Topic 230) - Classification of Certain Cash Receipts and Cash Payments* ("ASU 2016-15"). The provisions of ASU 2016-15 address eight specific cash flow issues and how those certain cash receipts and cash payments are presented and classified in the statement of cash flows under ASC Topic 230 and other Topics. The Company adopted this standard effective January 1, 2018, and the implementation of this standard did not have a material impact on the Company's consolidated financial statements.

In January 2016, the FASB issued ASU 2016-01, *Financial Instruments - Overall (Subtopic 825-10) - Recognition and Measurement of Financial Assets and Financial Liabilities* ("ASU 2016-01"). The provisions of ASU 2016-01 make targeted improvements to enhance the reporting model for financial instruments to provide users of financial statements with more decision-useful information, including certain aspects of recognition, measurement, presentation, and disclosure of financial instruments. In February 2018, the FASB issued ASU 2018-03, *Technical Corrections and Improvements to Financial Instruments-Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities*, to clarify certain aspects of the guidance issued in ASU 2016-01. The Company adopted this standard effective January 1, 2018, and the implementation of this standard did not have a material impact on the Company's consolidated financial statements.

Recently Issued Accounting Pronouncements

In October 2018, the FASB issued ASU 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606* ("ASU 2018-17"). The provisions of ASU 2018-18 clarify when certain transactions between collaborative arrangement participants should be accounted for under ASC 606 and incorporates unit-of-account guidance consistent with ASC 606 to aid in this determination. The guidance is effective for annual periods and interim periods within those annual periods beginning after December 15, 2019, with early adoption permitted, and is effective for the Company for the year ending December 31, 2020. The Company is currently evaluating the impact that the implementation of this standard will have on the Company's consolidated financial statements.

In October 2018, the FASB issued ASU 2018-17, *Consolidation (Topic 810): Targeted Improvements to Related Party Guidance for Variable Interest Entities* ("ASU 2018-17"). The provisions of ASU 2018-17 modify the guidance under ASC Topic 810 related to the evaluation of indirect interests held through related parties under common control when determining whether fees paid to decision makers and service providers are variable interests. Indirect interests held through related parties that are under common control are no longer considered to be the equivalent of direct interests in their entirety and instead should be considered on a proportional basis. This guidance more closely aligns with accounting of how indirect interests held through related parties under common control are considered for determining whether a reporting entity must consolidate a VIE. The guidance is effective for annual periods and interim periods within those annual periods beginning after December 15, 2019, with early adoption permitted, and is effective for the Company for the year ending December 31, 2020. The Company is currently evaluating the impact that the implementation of this standard will have on the Company's consolidated financial statements.

In August 2018, the SEC adopted final rules under SEC Release No. 33-10532, *Disclosure Update and Simplification*, to amend certain disclosure requirements that were redundant, duplicative, overlapping, outdated or superseded in light of other SEC disclosure requirements, U.S. GAAP or changes in the information environment. In addition, the amendments added a requirement for interim financial statements to disclose an analysis of changes in each caption of shareholders' equity presented in the balance sheet. Previously, this disclosure was only required in annual financial statements. Under the amendments, the analysis must be provided in a note or separate statement and should be accompanied by a reconciliation of the beginning balance to the ending balance of each period for which a statement of comprehensive income is required to be filed. This final rule was effective on November 5, 2018, except that companies may delay adoption of the rule relating to changes in shareholders' equity until the Form 10-Q for the quarter that begins after November 5, 2018. The Company will apply the amendments relating to changes in shareholders' equity in the Quarterly Report for the period ending March 31, 2019.

In August 2018, the FASB issued ASU 2018-15, *Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract* ("ASU 2018-15"). The provisions of ASU 2018-15 clarify the accounting for implementation costs of a hosting arrangement that is a service contract. The new standard requires an entity (customer) in a hosting arrangement that is a service contract to follow existing internal-use software guidance to determine which implementation costs to capitalize as an asset related to the service contract and which costs to expense. Capitalized implementation costs of a hosting arrangement that is a service contract should be amortized over the term of the hosting arrangement, which might extend beyond the noncancelable period if

there are options to extend or terminate. ASU 2018-15 also specifies the financial statement presentation of capitalized implementation costs and related amortization, in addition to required disclosures for material capitalized implementation costs related to hosting arrangements that are service contracts. The guidance is effective for annual periods and interim periods within those annual periods beginning after December 15, 2019, with early adoption permitted, and is effective for the Company for the year ending December 31, 2020. The Company is currently evaluating the impact that the implementation of this standard will have on the Company's consolidated financial statements.

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurements (Topic 820): Disclosure Framework-Changes to the Disclosure Requirements for Fair Value Measurements* ("ASU 2018-13"). The provisions of ASU 2018-13 modify the disclosures related to recurring and nonrecurring fair value measurements. Disclosures related to the transfer of assets between Level 1 and Level 2 hierarchies have been eliminated and various additional disclosures related to Level 3 fair value measurements have been added, modified or removed. The guidance is effective for annual periods and interim periods within those annual periods beginning after December 15, 2019, but entities are permitted to early adopt either the entire standard or only the provisions that eliminate or modify the requirements. This standard is effective for the Company for the year ending December 31, 2020. The Company is currently evaluating the impact that the implementation of this standard will have on the Company's consolidated financial statements.

In June 2018, the FASB issued ASU 2018-07, *Compensation-Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting* ("ASU 2018-07"). The provisions of ASU 2018-07 expand the scope of ASC 718 to include share-based payment transactions for acquiring goods and services from nonemployees. The guidance is effective for annual periods and interim periods within those annual periods beginning after December 15, 2018, with early adoption permitted no earlier than an entity's adoption date of ASC 606, and is effective for the Company for the year ending December 31, 2019. The Company is currently evaluating the impact that the implementation of this standard will have on the Company's consolidated financial statements.

In February 2018, the FASB issued ASU 2018-02, *Income Statement-Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income* ("ASU 2018-02"). The provisions of ASU 2018-02 allow a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Act. The guidance is effective for annual periods and interim periods within those annual periods beginning after December 15, 2018, with early adoption permitted, and is effective for the Company for the year ending December 31, 2019. The amendments in ASU 2018-02 may be applied either in the period of adoption or retrospectively to each period (or periods) in which the effect of the change in the U.S. federal corporate income tax rate in the Tax Act is recognized. The Company is currently evaluating the impact that the implementation of this standard will have on the Company's consolidated financial statements.

In July 2017, the FASB issued ASU 2017-11, *Earnings Per Share (Topic 260), Distinguishing Liabilities from Equity (Topic 480) and Derivatives and Hedging (Topic 815): I. Accounting for Certain Financial Instruments with Down Round Features; II. Replacement of the Indefinite Deferral for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling Interests with a Scope Exception* ("ASU 2017-11"). The amendments in Part I of ASU 2017-11 change the classification analysis of certain equity-linked financial instruments (or embedded features) with down round features. When determining whether certain financial instruments should be classified as liabilities or equity instruments, a down round feature no longer precludes equity classification when assessing whether the instrument is indexed to an entity's own stock. The amendments also clarify existing disclosure requirements for equity-classified instruments. As a result, a freestanding equity-linked financial instrument (or embedded conversion option) no longer would be accounted for as a derivative liability at fair value as a result of the existence of a down round feature. For freestanding equity-classified financial instruments, the amendments require entities that present earnings per share ("EPS") in accordance with ASC Topic 260 ("ASC 260") to recognize the effect of the down round feature when it is triggered. That effect is treated as a dividend and as a reduction of income available to common shareholders in basic EPS. Convertible instruments with embedded conversion options that have down round features are now subject to the specialized guidance for contingent beneficial conversion features (in Subtopic 470-20, *Debt-Debt with Conversion and Other Options*), including related EPS guidance (in ASC 260). The amendments in Part II of ASU 2017-11 re-characterize the indefinite deferral of certain provisions of ASC Topic 480 that now are presented as pending content in the FASB codification, to a scope exception. Those amendments do not have an accounting effect. The guidance is effective for annual periods and interim periods within those annual periods beginning after December 15, 2018, with early adoption permitted, and is effective for the Company for the year ending December 31, 2019. The Company is currently evaluating the impact that the implementation of this standard will have on the Company's consolidated financial statements.

In June 2016, the FASB issued ASU 2016-13, *Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* ("ASU 2016-13"). The provisions of ASU 2016-13 modify the impairment model to utilize an

expected loss methodology in place of the currently used incurred loss methodology, and requires a consideration of a broader range of reasonable and supportable information to inform credit loss estimates. The guidance is effective for annual periods and interim periods within those annual periods beginning after December 15, 2019, with early adoption permitted, and is effective for the Company for the year ending December 31, 2020. The Company is currently evaluating the impact that the implementation of this standard will have on the Company's consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, *Leases (Topic 842)* ("ASU 2016-02"). The provisions of ASU 2016-02 set out the principles for the recognition, measurement, presentation and disclosure of leases for both parties to a contract (i.e. lessees and lessors). The new standard requires lessees to apply a dual approach, classifying leases as either finance or operating leases based on the principle of whether or not the lease is effectively a financed purchase by the lessee. This classification will determine whether lease expense is recognized based on an effective interest method or on a straight-line basis over the term of the lease, respectively. A lessee is also required to record a right-of-use asset and a lease liability for all leases with a term of greater than 12 months regardless of their classification. Leases with a term of 12 months or less will be accounted for in a similar manner as under existing guidance for operating leases today. ASU 2016-02 supersedes the previous lease standard, ASC Topic 840 ("ASC 840"), *Leases*. In July 2018, the FASB issued ASU 2018-10, *Codification Improvements to Topic 842 (Leases)*, and ASU 2018-11, *Leases (Topic 842), Targeted Improvements* ("ASU 2018-11"), which provide (i) narrow amendments to clarify how to apply certain aspects of the new lease standard, (ii) entities with an additional transition method to adopt the new standard, and (ii) lessors with a practical expedient for separating components of a contract. ASU 2018-11 specifically permits an entity to elect an additional transition method to the existing modified retrospective transition requirements. Under the new transition method, an entity could adopt the provisions of ASU No. 2016-02 by recognizing a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption without adjustment to the financial statements for periods prior to adoption. Consequently, an entity's reporting for the comparative periods presented in the financial statements in which it adopts the new leases standard will continue to be in accordance with the previous lease guidance in ASC 840. ASU No. 2018-11 also allows a practical expedient that permits lessors to not separate non-lease components from the associated lease component if certain conditions are present. All of these ASUs related to ASC Topic 842 are effective for annual periods and interim periods within those annual periods beginning after December 15, 2018, and is effective for the Company for the year ending December 31, 2019. The Company is currently evaluating its lease agreements to determine the impact that the implementation of this standard will have on the Company's consolidated financial statements as it relates to the classification of leases under the dual approach and the recognition of a right-of-use asset and a lease liability as well as assessing the adoption method.

3. Mergers and Acquisitions

Asset Acquisition of Certain Harvest Entities

In September 2018, the Company, through its wholly owned subsidiary ActoBio, issued $30,000 of convertible promissory notes to Harvest, a related party, to acquire Harvest's ownership in CRS Bio, Inc., Genten Therapeutics, Inc., and Relieve Genetics, Inc. (collectively the "Harvest entities") (Note 17). The Company also received $15,500 cash in the transaction from the acquisition of the Harvest entities. Prior to the transaction, the Company held a noncontrolling interest in the Harvest entities, with a combined carrying value for all entities of $4,303, and accounted for its ownership using the equity method of accounting. Following the transaction, the Company owns 100% of the equity interests of the Harvest entities including the rights that had been previously licensed to the Harvest entities by the Company. The Harvest entities did not meet the definition of a business and accordingly, the transaction was accounted for as an asset acquisition.

By reacquiring the rights previously licensed to the Harvest entities, the Company is relieved from its obligations under the original ECCs and therefore wrote off deferred revenue of $10,078 as part of the transaction. The remaining value acquired of $8,721 was considered in-process research and development related to the reacquired rights under the ECCs and expensed immediately. No revenues were recognized under the ECCs with these entities during the three months ended September 30, 2018.

See additional discussion of the convertible promissory notes at Note 12.

GenVec Acquisition

In June 2017, pursuant to an Agreement and Plan of Merger (the "GenVec Merger Agreement"), the Company acquired 100% of the outstanding shares of GenVec, Inc. ("GenVec"), a clinical-stage company and pioneer in the development of AdenoVerse gene delivery technology. Pursuant to the GenVec Merger Agreement, the former shareholders of GenVec received an aggregate of 684,240 shares of the Company's common stock and have the right to receive contingent consideration equal to 50% of any milestone or royalty payments received under one of GenVec's collaboration agreements, provided such

payments are received within three years after the closing of the transaction. The Company also assumed warrants held by certain former shareholders of GenVec. The results of GenVec's operations subsequent to the acquisition date have been included in the consolidated financial statements.

The fair value of the total consideration transferred was $17,582. The acquisition date fair value of each class of consideration transferred is presented below:

Common shares	$	15,616
Warrants		1,381
Contingent consideration		585
	$	17,582

The fair value of the shares of the Company's common stock issued was based on the quoted closing price of the Company's common stock immediately prior to the closing of the acquisition. The fair value of the warrants assumed was estimated using the Black-Scholes option-pricing model. The fair value of the contingent consideration was determined using a probability weighted discounted cash flows model and is considered a freestanding financial instrument and recorded at fair value each reporting period. The estimated fair value of assets acquired and liabilities assumed at the acquisition date is shown below:

Cash and cash equivalents	$	2,054
Short-term investments		542
Trade receivables		75
Other receivables		97
Prepaid expenses and other		227
Property and equipment		250
Intangible assets		14,000
Other noncurrent assets		58
Total assets acquired		17,303
Accounts payable		2,158
Accrued compensation and benefits		1,226
Other accrued expenses		856
Other long-term liabilities		92
Deferred tax liabilities		239
Total liabilities assumed		4,571
Net assets acquired		12,732
Goodwill		4,850
Total consideration	$	17,582

The acquired intangible assets include developed technology, the fair value of which was determined using the multi-period excess earning method, which is a variation of the income approach that converts future cash flows to single discounted present value amounts. The intangible assets are being amortized over a useful life of eleven years. Goodwill, which is not deductible for tax purposes, represents the assembled workforce and the anticipated buyer-specific synergies arising from the combination of the Company's and GenVec's technology.

Acquisition-related costs totaling $9 and $507 are included in selling, general and administrative expenses in the accompanying consolidated statements of operations for the three and nine months ended September 30, 2017, respectively.

Condensed Pro Forma Financial Information

GenVec's results of operations subsequent to the acquisition are included in the consolidated statements of operations. The following condensed pro forma financial information for the nine months ended September 30, 2017 is presented as if the acquisition had been consummated on January 1, 2016:

	Nine Months Ended September 30, 2017
	Pro forma
Revenues	$ 154,185
Loss before income taxes	(102,305)
Net loss	(100,330)
Net loss attributable to the noncontrolling interests	3,123
Net loss attributable to Intrexon	(97,207)

4. Investments in Joint Ventures

S & I Ophthalmic

In September 2013, the Company entered into a Limited Liability Company Agreement ("Sun LLC Agreement") with Sun Pharmaceutical Industries, Inc. ("Sun Pharmaceutical Subsidiary"), an indirect subsidiary of Sun Pharmaceutical Industries Ltd. ("Sun Pharmaceutical"), an international specialty pharmaceutical company focused on chronic diseases, to form S & I Ophthalmic, LLC ("S & I Ophthalmic"). The Sun LLC Agreement governed the affairs and the conduct of business of S & I Ophthalmic. S & I Ophthalmic leveraged experience and technology from both the Company and Sun Pharmaceutical. Both the Company and Sun Pharmaceutical Subsidiary made an initial capital contribution of $5,000 in October 2013 for a 50% membership interest in S & I Ophthalmic. S & I Ophthalmic was governed by a board of managers, which had four members, two each from the Company and Sun Pharmaceutical Subsidiary. In 2015, both the Company and Sun Pharmaceutical Subsidiary made subsequent capital contributions of $5,000.

In December 2017, both the Company and Sun Pharmaceutical Subsidiary agreed to dissolve S & I Ophthalmic and terminate the related ECC agreement. In January 2018, the Company received $2,598 upon the dissolution of S & I Ophthalmic, which represented the Company's portion of S & I Ophthalmic's remaining cash after all liabilities were settled.

OvaXon

In December 2013, the Company and OvaScience, Inc. ("OvaScience"), a life sciences company focused on the discovery, development, and commercialization of new treatments for infertility, entered into a Limited Liability Company Agreement ("OvaXon LLC Agreement") to form OvaXon, LLC ("OvaXon"), a joint venture to create new applications for improving human and animal health. Both the Company and OvaScience made an initial capital contribution of $1,500 in January 2014 for a 50% membership interest in OvaXon. OvaXon is governed by the OvaXon board of managers ("OvaXon Board"), which has four members, two each from the Company and OvaScience. In cases in which the OvaXon Board determines that additional capital contributions are necessary in order for OvaXon to conduct business and comply with its obligations, each of the Company and OvaScience has the right, but not the obligation, to make additional capital contributions to OvaXon subject to the OvaXon LLC Agreement. Through September 30, 2018, both the Company and OvaScience have made subsequent capital contributions of $4,350.

In March 2018, the Company and OvaScience agreed to terminate the ECC agreement with OvaScience. The Company and OvaScience are in discussions regarding the future of the OvaXon joint venture and the related ECC agreement.

The Company's investment in OvaXon was $140 and $146 as of September 30, 2018 and December 31, 2017, respectively, and is included in investments in affiliates in the accompanying consolidated balance sheets.

Intrexon Energy Partners

In March 2014, the Company and certain investors (the "IEP Investors"), including an affiliate of Third Security, LLC ("Third Security"), a related party, entered into a Limited Liability Company Agreement that governs the affairs and conduct of

business of Intrexon Energy Partners, LLC ("Intrexon Energy Partners"), a joint venture formed to optimize and scale-up the Company's methane bioconversion platform ("MBP") technology for the production of certain fuels and lubricants. The Company also entered into an ECC with Intrexon Energy Partners providing exclusive rights to the Company's technology for the use in bioconversion, as a result of which the Company received a technology access fee of $25,000 while retaining a 50% membership interest in Intrexon Energy Partners. The IEP Investors made initial capital contributions, totaling $25,000 in the aggregate, in exchange for pro rata membership interests in Intrexon Energy Partners totaling 50%. In addition, Intrexon has committed to make capital contributions of up to $25,000, and the IEP Investors, as a group and pro rata in accordance with their respective membership interests in Intrexon Energy Partners, have committed to make additional capital contributions of up to $25,000, at the request of Intrexon Energy Partners' board of managers (the "Intrexon Energy Partners Board") and subject to certain limitations. As of September 30, 2018, the Company's remaining commitment was $5,132. Intrexon Energy Partners is governed by the Intrexon Energy Partners Board, which has five members. Two members of the Intrexon Energy Partners Board are designated by the Company and three members are designated by a majority of the IEP Investors. The Company and the IEP Investors have the right, but not the obligation, to make additional capital contributions above the initial limits when and if solicited by the Intrexon Energy Partners Board.

The Company's investment in Intrexon Energy Partners was $(506) and $(444) as of September 30, 2018 and December 31, 2017, respectively, and is included in other accrued liabilities in the accompanying consolidated balance sheets.

Intrexon Energy Partners II

In December 2015, the Company and certain investors (the "IEPII Investors"), including Harvest, entered into a Limited Liability Company Agreement that governs the affairs and conduct of business of Intrexon Energy Partners II, LLC ("Intrexon Energy Partners II"), a joint venture formed to utilize the Company's MBP technology for the production of 1,4-butanediol, an industrial chemical used to manufacture spandex, polyurethane, plastics, and polyester. The Company also entered into an ECC with Intrexon Energy Partners II that provides exclusive rights to the Company's technology for use in the field, as a result of which the Company received a technology access fee of $18,000 while retaining a 50% membership interest in Intrexon Energy Partners II. The IEPII Investors made initial capital contributions, totaling $18,000 in the aggregate, in exchange for pro rata membership interests in Intrexon Energy Partners II totaling 50%. In December 2015, the owners of Intrexon Energy Partners II made a capital contribution of $4,000, half of which was paid by the Company. Intrexon has committed to make additional capital contributions of up to $10,000, and the IEPII Investors, as a group and pro rata in accordance with their respective membership interests in Intrexon Energy Partners II, have committed to make additional capital contributions of up to $10,000, at the request of Intrexon Energy Partners II's board of managers (the "Intrexon Energy Partners II Board") and subject to certain limitations. Intrexon Energy Partners II is governed by the Intrexon Energy Partners II Board, which has five members. One member of the Intrexon Energy Partners II Board is designated by the Company and four members are designated by a majority of the IEPII Investors. The Company and the IEPII Investors have the right, but not the obligation, to make additional capital contributions above the initial limits when and if solicited by the Intrexon Energy Partners II Board.

The Company's investment in Intrexon Energy Partners II was $184 and $572 as of September 30, 2018 and December 31, 2017, respectively, and is included in investments in affiliates in the accompanying consolidated balance sheets.

EnviroFlight

In February 2016, the Company entered into a series of transactions involving EnviroFlight, LLC ("Old EnviroFlight"), Darling Ingredients Inc. ("Darling") and a newly formed venture between the Company and Darling ("New EnviroFlight"). New EnviroFlight was formed to generate high-nutrition, low environmental impact animal and fish feed, as well as fertilizer products, from black soldier fly larvae. Through September 30, 2018, both the Company and Darling have made subsequent capital contributions of $14,750.

The Company's investment in New EnviroFlight was $15,286 and $7,092 as of September 30, 2018 and December 31, 2017, respectively, and is included in investments in affiliates in the accompanying consolidated balance sheets.

Intrexon T1D Partners

In March 2016, the Company and certain investors (the "T1D Investors"), including affiliates of Third Security, entered into a Limited Liability Company Agreement that governs the affairs and conduct of business of Intrexon T1D Partners, LLC ("Intrexon T1D Partners"), a joint venture formed to utilize the Company's proprietary ActoBiotics platform to develop and commercialize products to treat type 1 diabetes. The Company also entered into an ECC with Intrexon T1D Partners that provides the exclusive rights to the Company's technology for use in the field, as a result of which the Company received a technology access fee of $10,000 while retaining a 50% membership interest in Intrexon T1D Partners. The T1D Investors

made initial capital contributions, totaling $10,000 in the aggregate, in exchange for pro rata membership interests in Intrexon T1D Partners totaling 50%. Intrexon committed to make capital contributions of up to $5,000, and the T1D Investors, as a group and pro rata in accordance with their respective membership interests in Intrexon T1D Partners, committed to make additional capital contributions of up to $5,000, at the request of Intrexon T1D Partners' board of managers (the "Intrexon T1D Partners Board") and subject to certain limitations. As of September 30, 2018, the Company has satisfied its commitment. Intrexon T1D Partners is governed by the Intrexon T1D Partners Board, which has five members. Two members of the Intrexon T1D Partners Board are designated by the Company and three members are designated by a majority of the T1D Investors. The Company and the T1D Investors have the right, but not the obligation, to make additional capital contributions above these limits when and if solicited by the Intrexon T1D Partners Board.

The Company's investment in Intrexon T1D Partners was $0 and $(943) as of September 30, 2018 and December 31, 2017, respectively, and is included in other accrued liabilities in the accompanying consolidated balance sheets.

5. Collaboration and Licensing Revenue

The Company's collaborations and licensing agreements provide for multiple promises to be satisfied by the Company and typically include a license to the Company's technology platforms, participation in collaboration committees, and performance of certain research and development services. Based on the nature of the promises in the Company's collaboration and licensing agreements, the Company typically combines most of its promises into a single performance obligation because the promises are highly interrelated and not individually distinct. At contract inception, the transaction price is typically the upfront payment received and is allocated to the single performance obligation. The Company has determined the transaction price should be recognized as revenue based on its measure of progress under the agreement primarily based on inputs necessary to fulfill the performance obligation.

The Company recognizes the reimbursement payments received for research and development services in the period when the services are performed. At inception of each collaboration, the Company determines whether any milestone payments are probable and can be included in the transaction price. The milestone payments are typically not considered probable at inception and are therefore constrained under ASC 606. Royalties related to product sales will be recognized when sales have occurred since the royalties relate directly to the technology license granted in the agreement.

See Note 2 for additional discussion of the Company's revenue recognition policy related to collaboration and licensing payments.

The Company determines whether collaborations and licensing agreements are individually significant for disclosure based on a number of factors, including total revenue recorded by the Company pursuant to collaboration and licensing agreements, collaborators or licensees with either majority-owned subsidiaries or equity method investments, or other qualitative factors. Collaboration and licensing revenues generated from consolidated subsidiaries are eliminated in consolidation. Amounts for periods subsequent to January 1, 2018 reflect revenue recognition under ASC 606.

The following tables summarize the amounts recorded as revenue in the consolidated statements of operations for each significant counterparty to a collaboration or licensing agreement for the three and nine months ended September 30, 2018 and 2017.

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
ZIOPHARM Oncology, Inc.	$ 4,826	$ 10,373	$ 13,626	$ 31,322
Oragenics, Inc.	705	475	867	1,519
Fibrocell Science, Inc.	391	1,683	1,015	5,375
Genopaver, LLC	689	1,422	3,076	4,615
S & I Ophthalmic, LLC	—	376	—	751
OvaXon, LLC	—	262	—	1,966
Intrexon Energy Partners, LLC	1,329	1,903	3,345	8,909
Persea Bio, LLC	199	266	714	821
Ares Trading S.A.	1,576	2,356	7,525	8,474
Intrexon Energy Partners II, LLC	754	816	1,685	2,921
Intrexon T1D Partners, LLC	368	1,462	2,399	3,882
Harvest start-up entities (1)	2,691	4,020	11,792	11,835
Other	796	2,741	5,578	6,994
Total	$ 14,324	$ 28,155	$ 51,622	$ 89,384

(1) For the three and nine months ended September 30, 2018 and 2017, revenues recognized from collaborations with Harvest start-up entities include: Thrive Agrobiotics, Inc.; Exotech Bio, Inc.; and AD Skincare, Inc. For the nine months ended September 30, 2018 and the three and nine months ended September 30, 2017, revenues recognized from collaborations with Harvest start-up entities also include Genten Therapeutics, Inc. and CRS Bio, Inc. For the three and nine months ended September 30, 2017, revenues recognized from collaborations with Harvest start-up entities also include Relieve Genetics, Inc.

Other than the termination of the OvaScience ECC in March 2018 (Note 4) and the asset acquisition regarding certain of the Harvest entities in September 2018 (Note 3), there have been no significant changes to the agreements with our collaborators and licensees in the nine months ended September 30, 2018. See also Note 19 for discussion of the Company's collaboration with ZIOPHARM Oncology, Inc. ("ZIOPHARM"). See Note 5 in the Company's Annual Report for additional details of the Company's existing collaboration and licensing agreements.

Deferred Revenue

Deferred revenue primarily consists of consideration received for the Company's collaborations and licensing agreements and prepayments for product and service revenues. Deferred revenue consists of the following:

	September 30, 2018	December 31, 2017
Collaboration and licensing agreements	$ 170,356	$ 231,583
Prepaid product and service revenues	3,119	4,681
Other	1,503	133
Total	$ 174,978	$ 236,397
Current portion of deferred revenue	$ 38,036	$ 42,870
Long-term portion of deferred revenue	136,942	193,527
Total	$ 174,978	$ 236,397

The following table summarizes the remaining balance of deferred revenue associated with upfront and milestone payments for each significant counterparty to a collaboration or licensing agreement as of September 30, 2018 and December 31, 2017, including the estimated remaining performance period as of September 30, 2018.

	Average Remaining Performance Period (Years)	September 30, 2018	December 31, 2017
ZIOPHARM Oncology, Inc.	5.3	$ 51,084	$ 90,496
Oragenics, Inc.	5.7	6,240	6,719
Fibrocell Science, Inc.	6.1	17,846	16,607
Genopaver, LLC	5.5	1,346	1,704
Intrexon Energy Partners, LLC	5.5	13,164	15,625
Persea Bio, LLC	6.3	2,802	3,500
Ares Trading S.A.	5.6	34,608	40,789
Intrexon Energy Partners II, LLC	6.2	14,910	13,833
Intrexon T1D Partners, LLC	6.5	8,760	8,435
Harvest start-up entities (1)	6.4	8,007	18,400
Other	4.5	10,721	14,423
Total		$ 169,488	$ 230,531

(1) As of September 30, 2018 and December 31, 2017, the balance of deferred revenue for collaborations with Harvest start-up entities includes: Thrive Agrobiotics, Inc.; Exotech Bio, Inc.; and AD Skincare, Inc. As of December 31, 2017, the balance of deferred revenue for collaborations with Harvest start-up entities also includes: Relieve Genetics, Inc.; Genten Therapeutics, Inc.; and CRS Bio, Inc. See Note 3 for further discussion of the asset acquisition of certain Harvest entities.

6. Short-term Investments

The Company's investments are classified as available-for-sale. The following table summarizes the amortized cost, gross unrealized gains and losses, and fair value of available-for-sale investments as of September 30, 2018:

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Fair Value
U.S. government debt securities	$ 163,905	$ —	$ (96)	$ 163,809
Certificates of deposit	353	—	—	353
Total	$ 164,258	$ —	$ (96)	$ 164,162

The following table summarizes the amortized cost, gross unrealized gains and losses, and fair value of available-for-sale investments as of December 31, 2017:

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Fair Value
U.S. government debt securities	$ 6,000	$ —	$ (2)	$ 5,998
Certificates of deposit	275	—	—	275
Total	$ 6,275	$ —	$ (2)	$ 6,273

For more information on the Company's method for determining the fair value of its assets, see Note 2 – "Fair Value of Financial Instruments" in the Company's Annual Report.

As of September 30, 2018, all of the available-for-sale investments were due within one year based on their contractual maturities.

Changes in market interest rates and bond yields cause certain investments to fall below their cost basis, resulting in unrealized losses on investments. The unrealized losses of the Company's investments were primarily a result of unfavorable changes in interest rates subsequent to the initial purchase of these investments and were not significant as of September 30, 2018.

As of September 30, 2018 and December 31, 2017, the Company did not consider any of its investments to be other-than-temporarily impaired. When evaluating its investments for other-than-temporary impairment, the Company reviews factors such as the length of time and extent to which fair value has been below its cost basis, the financial condition of the issuer, the Company's ability and intent to hold the security and whether it is more likely than not that it will be required to sell the investment before recovery of its cost basis.

7. Investments in Preferred Stock

Investment in ZIOPHARM Preferred Stock

In June 2016, the Company received 100,000 shares of Series 1 Preferred Stock (the "Preferred Shares") of ZIOPHARM, with a per share stated value of $1,200, as consideration for amending their two previously existing ECC agreements. The Company received a monthly dividend, paid in additional Preferred Shares, equal to $12.00 per Preferred Share held per month divided by the stated value of the Preferred Shares. In conjunction with the license agreement with ZIOPHARM in October 2018 (Note 19), the Company returned to ZIOPHARM all of the Preferred Shares owned or accrued by the Company as of the effective date of the agreement.

The investment in ZIOPHARM preferred stock is categorized as Level 3 as there are significant unobservable inputs and the Preferred Shares are not traded on a public exchange. The fair value of the investment in ZIOPHARM preferred stock is estimated using a probability-weighted expected return ("PWERM") model. The key inputs used in the PWERM model are (i) estimating the future returns for conversion of the Preferred Shares for both product approval and a change in control of ZIOPHARM (the "conversion events") using market data of the change in value for guideline companies as a result of these conversion events; (ii) estimating the expected date and likelihood of each conversion event; and (iii) discounting these estimated future returns using a discount rate for the Preferred Shares considering industry debt issuances originated by public funds and venture capital rates of return. A significant change in unobservable inputs discussed above could result in a significant impact on the fair value of the Company's investment in ZIOPHARM preferred stock. The fair value of the Company's investment in ZIOPHARM preferred stock, including additional Preferred Shares received as dividends, was $158,122 and $160,832 as of September 30, 2018 and December 31, 2017, respectively. During the three months ended September 30, 2018 and 2017, the Company received an additional 3,847 and 3,414 Preferred Shares and recognized $4,649 and $4,311 of dividend income in the accompanying consolidated statements of operations, respectively. During the nine months ended September 30, 2018 and 2017, the Company received an additional 11,205 and 9,943 Preferred Shares and recognized $14,539 and $12,276 of dividend income in the accompanying consolidated statements of operations, respectively.

Investment in Fibrocell Preferred Stock

In March 2017, Fibrocell Science, Inc. ("Fibrocell"), one of the Company's collaborators and a related party, sold Series A Convertible Preferred Stock (the "Convertible Preferred Shares"), convertible into shares of Fibrocell common stock, and warrants to purchase shares of Fibrocell common stock to certain institutional and accredited investors, including the Company and affiliates of Third Security. The Company paid $1,161 in exchange for 1,161 Convertible Preferred Shares and warrants to acquire 99,769 shares of Fibrocell common stock. The share data reflect a 1-for-5 reverse stock split of Fibrocell's common stock effective May 25, 2018. The Convertible Preferred Shares are convertible at any time at the election of the Company and accrue dividends at 4% per annum, compounded quarterly, increasing the stated value of the shares. The investment in Fibrocell preferred stock is categorized as Level 3 as there are significant unobservable inputs and the Convertible Preferred Shares are not traded on a public exchange. The fair value of the investment in Fibrocell preferred stock is estimated using a conversion plus dividend approach utilizing the trading value of the underlying common stock and an estimated premium for the preferred stock dividend and other preferences. Market price volatility of Fibrocell's common stock and a significant change in the estimated preferred stock premium could result in a significant impact to the fair value of the investment in Fibrocell preferred stock. As of September 30, 2018 and December 31, 2017, the fair value of the Company's investment in Fibrocell preferred stock totaled $299 and $393, respectively. See Note 17 for additional discussion of the warrants.

Investment in Oragenics Preferred Stock

In November 2017, concurrent with Oragenics closing a preferred stock private placement, the Company exchanged a promissory note, including accrued interest, purchased from Oragenics in May 2017 and receivables due from Oragenics totaling $3,385 for Oragenics Series C preferred stock ("Series C Preferred Stock"). The Series C Preferred Stock is non-voting and non-convertible and is redeemable in whole or part at any time by Oragenics in cash. The Series C Preferred Stock accrues an annual 12% dividend payable in additional Series C Preferred Stock through May 10, 2019, and after such date, the annual dividend increases to 20%. Additionally, the Company and Oragenics amended certain future payment terms under its ECCs, as discussed in Note 5 of the Company's Annual Report. As of September 30, 2018 and December 31, 2017, based on the most recent financial information available on Oragenics, the Company concluded that there was no value to its investment in Oragenics preferred stock.

Changes in the Fair Value of Investments in Preferred Stock

The following table summarizes the changes in the Level 3 investments in preferred stock during the nine months ended September 30, 2018.

	Nine Months Ended September 30, 2018
Beginning balance	$ 161,225
Dividend income from investments in preferred stock	14,575
Net unrealized depreciation in the fair value of the investments in preferred stock	(17,379)
Ending balance	$ 158,421

8. Fair Value Measurements

The carrying amount of cash and cash equivalents, restricted cash, receivables, prepaid expenses and other current assets, accounts payable, accrued compensation and benefits, other accrued liabilities, and related party payables approximate fair value due to the short maturity of these instruments.

Assets

The following table presents the placement in the fair value hierarchy of financial assets that are measured at fair value on a recurring basis, including the items for which the fair value option has been elected, at September 30, 2018:

	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	September 30, 2018
Assets				
U.S. government debt securities	$ —	$ 163,809	$ —	$ 163,809
Equity securities	3,591	1,106	—	4,697
Preferred stock	—	—	158,421	158,421
Other	—	653	—	653
Total	$ 3,591	$ 165,568	$ 158,421	$ 327,580

The following table presents the placement in the fair value hierarchy of financial assets that are measured at fair value on a recurring basis, including the items for which the fair value option has been elected, at December 31, 2017:

	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	December 31, 2017
Assets				
U.S. government debt securities	$ —	$ 5,998	$ —	$ 5,998
Equity securities	10,537	4,563	—	15,100
Preferred stock	—	—	161,225	161,225
Other	—	850	—	850
Total	$ 10,537	$ 11,411	$ 161,225	$ 183,173

The method used to estimate the fair value of the Level 1 assets in the tables above is based on observable market data as these equity securities are publicly-traded. The method used to estimate the fair value of the Level 2 short-term investments in the tables above is based on professional pricing sources for identical or comparable instruments, rather than direct observations of quoted prices in active markets. The method used to estimate the fair value of the Level 2 equity securities in the tables above is based on the quoted market price of the publicly-traded security, adjusted for a discount for lack of marketability. The methods used to estimate the fair value of the Level 3 assets are discussed in Note 7.

There were no transfers between levels of the fair value hierarchy during the nine months ended September 30, 2018.

Liabilities

The carrying values of the Company's long-term debt, excluding the Convertible Notes as discussed below, approximates fair value due to the length of time to maturity and/or the existence of interest rates that approximate prevailing market rates.

The calculated fair value of the Convertible Notes (Note 12) is approximately $237,000 as of September 30, 2018 and is based on the most recent third party trade of the instrument as of the balance sheet date. The fair value of the Convertible Notes are classified as Level 2 within the fair value hierarchy as there is not an active market for the Convertible Notes, however, third party trades of the instrument are considered observable inputs. The Convertible Notes are reflected at amortized cost on the accompanying consolidated balance sheet which was $145,839 as of September 30, 2018.

The Company's contingent consideration liabilities from previous acquisitions are measured on a recurring basis and were $585 at September 30, 2018 and December 31, 2017. These fair value measurements were based on significant inputs not observable in the market and thus represented a Level 3 measurement. A significant change in unobservable inputs could result in a significant impact on the fair value of the Company's contingent consideration liabilities. The contingent consideration liabilities are remeasured to fair value at each reporting date until the contingencies are resolved, and those changes in fair value are recognized in earnings. There were no changes in the fair value of the Level 3 liabilities during the nine months ended September 30, 2018.

9. Inventory

Inventory consists of the following:

	September 30, 2018	December 31, 2017
Supplies, embryos and other production materials	$ 3,368	$ 2,673
Work in process	4,578	4,767
Livestock	8,453	11,040
Feed	1,895	2,013
Total inventory	$ 18,294	$ 20,493

10. Property, Plant and Equipment, Net

Property, plant and equipment consist of the following:

	September 30, 2018	December 31, 2017
Land and land improvements	$ 12,373	$ 11,767
Buildings and building improvements	18,533	18,183
Furniture and fixtures	1,716	2,515
Equipment	72,126	65,863
Leasehold improvements	25,281	25,277
Breeding stock	4,827	3,832
Computer hardware and software	11,490	10,128
Trees	10,635	6,642
Construction and other assets in progress	18,658	14,113
	175,639	158,320
Less: Accumulated depreciation and amortization	(52,932)	(45,646)
Property, plant and equipment, net	$ 122,707	$ 112,674

During the three and nine months ended September 30, 2018, the Company recorded losses of $85 and $5,057, respectively, on disposal of certain leasehold improvements, equipment, and other fixed assets in conjunction with the closing of one of its research and development facilities in Brazil.

Depreciation expense was $3,614 and $2,989 for the three months ended September 30, 2018 and 2017, respectively, and $10,712 and $8,623 for the nine months ended September 30, 2018 and 2017, respectively.

11. Goodwill and Intangible Assets, Net

The changes in the carrying amount of goodwill for the nine months ended September 30, 2018 are as follows:

Balance at December 31, 2017	$ 153,289
Foreign currency translation adjustments	(2,013)
Balance at September 30, 2018	$ 151,276

The Company had $13,823 of accumulated impairment losses as of September 30, 2018 and December 31, 2017.

Intangible assets consist of the following as of September 30, 2018:

	Gross Carrying Amount	Accumulated Amortization	Net
Patents, developed technologies and know-how	$ 257,318	$ (56,551)	$ 200,767
Customer relationships	10,700	(7,346)	3,354
Trademarks	6,800	(3,148)	3,652
In-process research and development	5,471	—	5,471
Total	$ 280,289	$ (67,045)	$ 213,244

Intangible assets consist of the following as of December 31, 2017:

	Gross Carrying Amount	Accumulated Amortization	Net
Patents, developed technologies and know-how	$ 263,615	$ (44,954)	$ 218,661
Customer relationships	10,700	(6,383)	4,317
Trademarks	6,800	(2,567)	4,233
In-process research and development	5,666	—	5,666
Total	$ 286,781	$ (53,904)	$ 232,877

The balance of in-process research and development includes certain in-process research and development technology acquired in the Company's acquisition of Oxitec in September 2015, and amortization will begin once certain regulatory approvals have been obtained for the in-process programs.

Amortization expense was $4,689 and $5,001 for the three months ended September 30, 2018 and 2017, respectively, and $14,472 and $14,258 for the nine months ended September 30, 2018 and 2017, respectively.

12. Lines of Credit and Long-Term Debt

Lines of Credit

Trans Ova has a $5,000 revolving line of credit with First National Bank of Omaha, which matures on May 1, 2019. The line of credit bears interest at the greater of 2.95% above the London Interbank Offered Rate or 3.00%, and the actual rate was 5.06% as of September 30, 2018. As of September 30, 2018, there was no outstanding balance. The amount available under the line of credit is based on eligible accounts receivable and inventory up to the maximum principal amount. The line of credit is collateralized by certain of Trans Ova's assets and contains certain restricted covenants that include maintaining minimum tangible net worth and working capital and maximum allowable annual capital expenditures. Trans Ova was in compliance with these covenants as of September 30, 2018.

Exemplar has a $700 revolving line of credit with American State Bank, which matures on October 30, 2019. As of September 30, 2018, the line of credit bore interest at 5.25% per annum. As of September 30, 2018, there was an outstanding balance of $200.

Long-Term Debt

Long-term debt consists of the following:

	September 30, 2018	December 31, 2017
Convertible debt	$ 175,899	$ —
Notes payable	4,667	5,010
Royalty-based financing	2,147	2,132
Other	966	895
Long-term debt	183,679	8,037
Less current portion	546	502
Long-term debt, less current portion	$ 183,133	$ 7,535

Convertible Debt

Intrexon Convertible Notes

In July 2018, Intrexon completed a registered underwritten public offering of $200,000 aggregate principal amount of Convertible Notes and issued the Convertible Notes under an indenture (the "Base Indenture") between Intrexon and The Bank of New York Mellon Trust Company, N.A., as trustee, as supplemented by the First Supplemental Indenture (together with the

Base Indenture, the "Indenture"). Intrexon received net proceeds of $193,958 after deducting underwriting discounts and offering expenses of $6,042.

The Convertible Notes are senior unsecured obligations of Intrexon and bear interest at a rate of 3.50% per year, payable semiannually in arrears on January 1 and July 1 of each year beginning on January 1, 2019. The Convertible Notes mature on July 1, 2023, unless earlier repurchased or converted. The Convertible Notes are convertible into cash, shares of Intrexon's common stock or a combination of cash and shares, at Intrexon's election. The initial conversion rate of the Convertible Notes is 58.6622 shares of Intrexon common stock per $1,000 principal amount of Convertible Notes (equivalent to an initial conversion price of approximately $17.05 per share of common stock). The conversion rate is subject to adjustment upon the occurrence of certain events, but will not be adjusted for any accrued and unpaid interest. In addition, following certain corporate events that occur prior to the maturity date as defined in the Indenture, Intrexon will increase the conversion rate for a holder who elects to convert its Convertible Notes in connection with such a corporate event in certain circumstances. Prior to April 1, 2023, the holders may convert the Convertible Notes at their option only upon the satisfaction of the following circumstances:

- During any calendar quarter commencing after the calendar quarter ending on September 30, 2018, if the last reported sales price of Intrexon's common stock for at least 20 trading days (whether or not consecutive) during the last 30 consecutive trading days of the immediately preceding calendar quarter is greater than or equal to 130% of the conversion price on each applicable trading day;

- During the five business day period after any five consecutive trading day period in which the trading price, as defined in the Indenture, for the Convertible Notes is less than 98% of the product of the last reported sales price of Intrexon's common stock and the conversion rate for the Convertible Notes on each such trading day; or

- Upon the occurrence of specified corporate events as defined in the Indenture.

None of the above events allowing for conversion prior to April 1, 2023 occurred during the three months ended September 30, 2018. On or after April 1, 2023 until June 30, 2023, holders may convert their Convertible Notes at any time. Intrexon may not redeem the Notes prior to the maturity date.

If Intrexon undergoes a fundamental change, as defined in the Indenture, holders of the Convertible Notes may require Intrexon to repurchase for cash all or any portion of their Convertible Notes at a fundamental change repurchase price equal to 100% of the principal amount of the Convertible Notes to be repurchased, plus accrued and unpaid interest to, but excluding, the fundamental change repurchase date. The Indenture contains customary events of default, as defined in the agreement, and, if any of the events occur, could require repayment of a portion or all of the Convertible Notes, including accrued and unpaid interest. Additionally, the Indenture provides that Intrexon shall not consolidate with or merge with or into, or sell, convey, transfer or lease all or substantially all of its properties and assets to, another entity, unless (i) the surviving entity is organized under the laws of the United States and such entity expressly assumes all of Intrexon's obligations under the Convertible Notes and the Indenture; and (ii) immediately after such transaction, no default or event of default has occurred and is continuing under the Indenture.

The net proceeds received from the issuance of the Convertible Notes were initially allocated between long-term debt, the liability component, at $143,723 and additional paid-in capital, the equity component, at $50,235. Additional paid-in capital was further reduced by $13,367 of deferred taxes resulting from the difference between the carrying amount and the tax basis of the Convertible Notes that is created by the equity component (Note 13). As of September 30, 2018, the outstanding principal balance on the Convertible Notes was $200,000 and the carrying value of long-term debt was $145,839. The effective interest rate on the Convertible Notes, including amortization of the long-term debt discount and debt issuance costs, is 11.02%. As of September 30, 2018, the unamortized long-term debt discount and debt issuance costs totaled $54,161.

Total interest expense related to the Convertible Notes was $3,847 for the three and nine months ended September 30, 2018, which consists of $1,731 interest expense to be paid in cash and $2,116 of non-cash interest expense. Accrued cash interest of $1,731 is included in other accrued liabilities on the accompanying consolidated balance sheet as of September 30, 2018.

ActoBio Convertible Notes

In September 2018, ActoBio issued $30,000 of convertible promissory notes (the "ActoBio Notes") to a related party in conjunction with an asset acquisition with Harvest (Note 3). The ActoBio Notes have a maturity date of September 6, 2020, accrue interest at 3.0% compounded annually, are convertible into shares of ActoBio common stock at any time by the holder, and are automatically convertible in shares of ActoBio common stock upon the closing of certain financing events as defined in

the ActoBio Notes. If the ActoBio Notes have not been converted to ActoBio common stock by the maturity date, ActoBio can pay the principal and accrued interest in cash or with shares of Intrexon common stock at its election. There are no embedded features that are required to be separated from the debt host and accounted for separately, so the ActoBio Notes are recorded at $30,000. Interest expense for the three and nine months ended September 30, 2018 was $60. As of September 30, 2018, the carrying value of the ActoBio Notes, including accrued interest, was $30,060.

Notes Payable

Trans Ova has a note payable to American State Bank, which matures in April 2033 and has an outstanding principal balance of $4,581 as of September 30, 2018. Trans Ova pays monthly installments of $39, which includes interest at 3.95%. The note payable is collateralized by certain of Trans Ova's real estate and non-real estate assets.

Royalty-based Financing

AquaBounty has a royalty-based financing grant from the Atlantic Canada Opportunities Agency, a Canadian government agency, to provide funding of a research and development project. The total amount available under the award was $2,225, which AquaBounty claimed over a five year period. All amounts claimed by AquaBounty must be repaid in the form of a 10% royalty on any products commercialized out of this research and development project until fully paid. Because the timing of commercialization is subject to additional regulatory considerations, the timing of repayment is uncertain. As of the date of the acquisition by Intrexon in March 2013, AquaBounty had claimed $1,952 of the available funds and this amount was recorded at its acquisition date fair value of $1,107. The Company accretes the difference of $845 between the face value of amounts drawn and the acquisition date fair value over the expected period of repayment. Subsequent to the acquisition date, AquaBounty claimed the remaining balance available under the grant, resulting in total long-term debt of $2,147 as of September 30, 2018.

Future Maturities

Future maturities of long-term debt are as follows:

2018	$	210
2019		449
2020		30,463
2021		832
2022		375
2023		200,389
Thereafter		2,974
Total	$	235,692

The AquaBounty royalty-based financing grant is not included in the table above due to the uncertainty of the timing of repayment.

13. Income Taxes

Tax provisions for interim periods are calculated using an estimate of actual taxable income or loss for the respective period, rather than estimating the Company's annual effective income tax rate, as the Company is currently unable to reliably estimate its income for the full year. For the three and nine months ended September 30, 2018, the Company had U.S. taxable loss of approximately $39,100 and $104,400, respectively, and recorded $31 of current domestic income tax benefit and $82 of current domestic income tax expense, respectively. For the three and nine months ended September 30, 2018, the Company recognized $45 and $282, respectively, of current foreign income tax benefit. For the three and nine months ended September 30, 2017, the Company had U.S. taxable income of approximately $3,930 and $23,680, respectively, and recorded $78 and $473, respectively, of current domestic income tax expense. For the three and nine months ended September 30, 2017, the Company recognized $121 and $343, respectively, of current foreign income tax benefit. For the three and nine months ended September 30, 2018, the Company recorded deferred tax benefit of $14,246 and $19,335, respectively. Of these amounts, $13,367 relates to deferred tax benefits recognized from the reversal of valuation allowances on current year domestic operating losses in the same amount as the deferred taxes recorded as a direct reduction of additional paid-in capital related to the issuance of the Convertible Notes (Note 12). The Company considered amounts recorded directly to shareholders' equity in evaluating the need

for a valuation allowance on deferred tax assets related to continuing operations. For the three and nine months ended September 30, 2017, the Company recorded deferred tax benefit of $775 and $2,294, respectively. The Company's net deferred tax assets, excluding certain deferred tax liabilities totaling $9,363, are offset by a valuation allowance due to the Company's history of net losses combined with an inability to confirm recovery of the tax benefits of the Company's losses and other net deferred tax assets. In assessing the realizability of deferred tax assets, management considers whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. Management considers the scheduled reversal of deferred tax liabilities, projected future taxable income and tax planning strategies in making this assessment.

As of September 30, 2018, the Company has loss carryforwards for U.S. federal income tax purposes of approximately $357,000 available to offset future taxable income, and federal and state research and development tax credits of approximately $7,900, prior to consideration of annual limitations that may be imposed under Section 382 of the Internal Revenue Code of 1986, as amended. These carryforwards will begin to expire in 2022. As of September 30, 2018, the Company's direct foreign subsidiaries have foreign loss carryforwards of approximately $159,700, most of which do not expire.

In 2017, the Company recorded a net provisional income tax benefit of $2,185 upon enactment of the Tax Act, which is comprised of several items. Amounts related to the remeasurement of most of the Company's domestic deferred tax assets as a result of the U.S. corporate rate change to 21% as part of the Tax Act were $87,473, which was fully offset by a reduction in the Company's valuation allowance. The Company's net U.S. deferred tax liability that is not offset by a valuation allowance was similarly written down, and the Company recorded a provisional deferred tax benefit of $1,730. The Company also recorded a provisional current tax benefit of $455, subsequently reduced to $13 in the three and nine months ended September 30, 2018, related to the expected refundability of accumulated corporate minimum tax credits. The Company has provisionally estimated its transition tax exposure to be zero, as any accumulated earnings in foreign subsidiaries are offset by accumulated deficits in other foreign subsidiaries. The provisional amounts recorded are subject to further refinement within the measurement period prescribed by SAB 118. As a result, the recorded amounts are subject to change, possibly materially, due to, among other things, changes in interpretations of the Tax Act, any legislative action to address questions that arise because of the Tax Act, any changes in accounting standards for income taxes or related interpretations in response to the Tax Act, or any updates or changes to estimates the Company utilized to provisionally compute the transition impact. No other adjustments to these provisional amounts were recorded during the nine months ended September 30, 2018.

14. Shareholders' Equity

Issuances of Common Stock

In January 2018, Intrexon closed a public offering of 6,900,000 shares of its common stock, including 1,000,000 shares of common stock purchased by affiliates of Third Security. The net proceeds of the offering were $82,374, after deducting underwriting discounts of $3,688 and offering expenses of $188, all of which were capitalized.

Share Lending Agreement

Concurrently with the offering of the Convertible Notes (Note 12), Intrexon entered into a share lending agreement (the "Share Lending Agreement") with J.P. Morgan Securities LLC (the "Share Borrower") pursuant to which Intrexon loaned and delivered 7,479,431 shares of its common stock (the "Borrowed Shares") to the Share Borrower. The Share Lending Agreement will terminate, and the Borrowed Shares will be returned to Intrexon within five business days of such termination, upon (a) termination by the Share Borrower or (b) the earliest to occur of (i) October 1, 2023 and (ii) the date, if any, on which the Share Lending Agreement is either mutually terminated or terminated by one party upon a default by the other party. The Borrowed Shares were offered and sold to the public at a price of $13.37 per share under a registered offering (the "Borrowed Shares Offering"). Intrexon did not receive any proceeds from the sale of the Borrowed Shares to the public. The Share Borrower or its affiliates received all the proceeds from the sale of the Borrowed Shares to the public. Affiliates of Third Security purchased all of the shares of common stock in the Borrowed Shares Offering.

The Share Lending Agreement was entered into at fair value and met the requirements for equity classification. Therefore, the value is netted against the issuance of the Borrowed Shares in additional paid-in capital. Additionally, the Borrowed Shares are not included in the denominator for loss per share attributable to Intrexon shareholders unless the Share Borrower defaults on the Share Lending Agreement.

Components of Accumulated Other Comprehensive Loss

The components of accumulated other comprehensive loss are as follows:

	September 30, 2018	December 31, 2017
Unrealized loss on investments	$ (96)	$ (2)
Loss on foreign currency translation adjustments	(22,804)	(15,552)
Total accumulated other comprehensive loss	$ (22,900)	$ (15,554)

15. Share-Based Payments

The Company records the fair value of stock options and restricted stock units ("RSUs") issued to employees and nonemployees as of the grant date as stock-based compensation expense. Stock-based compensation expense for employees and nonemployees is recognized over the requisite service period, which is typically the vesting period. Stock-based compensation costs included in the consolidated statements of operations are presented below:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Cost of products	$ 14	$ 30	$ 64	$ 86
Cost of services	51	82	207	242
Research and development	1,681	2,383	7,315	7,018
Selling, general and administrative	6,386	9,562	20,754	24,603
Total	$ 8,132	$ 12,057	$ 28,340	$ 31,949

Intrexon Stock Option Plans

In April 2008, Intrexon adopted the 2008 Equity Incentive Plan (the "2008 Plan") for employees and nonemployees pursuant to which Intrexon's board of directors granted share based awards, including stock options, to officers, key employees and nonemployees. Upon the effectiveness of the 2013 Omnibus Incentive Plan (the "2013 Plan"), no new awards may be granted under the 2008 Plan. As of September 30, 2018, there were 414,754 stock options outstanding under the 2008 Plan.

Intrexon adopted the 2013 Plan for employees and nonemployees pursuant to which Intrexon's board of directors may grant share based awards, including stock options and shares of common stock, to employees, officers, consultants, advisors, and nonemployee directors. The 2013 Plan became effective upon the closing of the Company's initial public offering in August 2013, and as of September 30, 2018, there were 20,000,000 shares authorized for issuance under the 2013 Plan, of which 10,745,770 stock options and 980,758 RSUs were outstanding and 5,310,530 shares were available for grant.

Stock option activity was as follows:

	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (Years)
Balances at December 31, 2017	11,382,747	$ 28.99	7.32
Granted	1,174,839	15.04	
Exercised	(41,314)	(6.33)	
Forfeited	(808,086)	(21.41)	
Expired	(547,662)	(27.40)	
Balances at September 30, 2018	11,160,524	28.23	6.79
Exercisable at September 30, 2018	7,177,315	30.15	6.02

During the nine months ended September 30, 2018, Intrexon granted 1,069,126 RSUs with a weighted average grant date fair value of $13.84 per share, of which 25,000 have vested and 980,758 remain outstanding and unvested as of September 30, 2018.

Intrexon currently uses authorized and unissued shares to satisfy share award exercises.

In October 2015, the compensation committee and the independent members of Intrexon's board of directors approved a compensation arrangement whereby the Company's Chief Executive Officer ("CEO") would receive a monthly salary. Previously, the CEO did not receive compensation for his services as an employee of the Company other than through his participation in the Company's Annual Executive Incentive Plan, which became effective January 1, 2015. Pursuant to the compensation agreement, the CEO receives a base salary of $200 per month payable in fully vested shares of Intrexon common stock with such shares subject to a three-year lock-up on resale. The monthly number of shares of common stock is calculated based on the closing price on the last trading day of each month and the shares are issued pursuant to the terms of a Restricted Stock Unit Agreement ("RSU Agreement") that was executed between Intrexon and the CEO pursuant to the terms of the 2013 Plan. The RSU Agreement became effective in November 2015, and had an initial term of twelve months. The independent members of Intrexon's board of directors, with the recommendation of the compensation committee of the board of directors, subsequently approved extensions of the RSU Agreement through March 31, 2019, all of which are on the same terms as the original RSU Agreement. The fair value of the shares issued as compensation for services is included in selling, general and administrative expenses in the Company's consolidated statements of operations and totaled $499 and $480 for the three months ended September 30, 2018 and 2017, respectively, and $1,468 and $1,428 for the nine months ended September 30, 2018 and 2017, respectively.

AquaBounty Stock Option Plans

In March 2016, AquaBounty's board of directors adopted the AquaBounty 2016 Equity Incentive Plan ("AquaBounty 2016 Plan") to replace the AquaBounty 2006 Equity Incentive Plan ("AquaBounty 2006 Plan"). The AquaBounty 2016 Plan provides for the issuance of incentive stock options, non-qualified stock options and awards of restricted and direct stock purchases to directors, officers, employees, and consultants of AquaBounty. The AquaBounty 2016 Plan was approved by AquaBounty's shareholders at its annual meeting in April 2016. Upon the effectiveness of the AquaBounty 2016 Plan, no new awards may be granted under the AquaBounty 2006 Plan.

As of September 30, 2018, there were 339,964 options outstanding under both AquaBounty plans, of which 271,467 were exercisable, at a weighted average exercise price of $7.09 per share.

16. Commitments and Contingencies

Operating Leases

The Company leases certain facilities and equipment under noncancelable operating leases. The equipment leases are renewable at the option of the Company. At September 30, 2018, future minimum lease payments under operating leases having initial or remaining noncancelable lease terms in excess of one year are as follows:

2018	$	1,508
2019		9,417
2020		9,577
2021		8,904
2022		8,072
2023		7,009
Thereafter		31,330
Total	$	75,817

Rent expense, including other facility expenses, was $3,286 and $3,165 for the three months ended September 30, 2018 and 2017, respectively, and $9,874 and $7,772 for the nine months ended September 30, 2018 and 2017, respectively.

Purchase Commitments

As of September 30, 2018, the Company had outstanding contractual purchase commitments of $8,826, which primarily relate to amounts that will be paid in 2018, 2019, and 2020 upon delivery of commercial non-browning apple trees.

Contingencies

In March 2012, Trans Ova was named as a defendant in a licensing and patent infringement suit brought by XY, LLC ("XY") alleging that certain of Trans Ova's activities breached a 2004 licensing agreement and infringed on patents that XY allegedly owned. Trans Ova filed a number of counterclaims in the case. In Colorado District Court, the matter proceeded to a jury trial in January 2016. The jury determined that XY and Trans Ova had each breached the licensing agreement and that Trans Ova had infringed XY's patents. In April 2016, the court issued its post-trial order, awarding $528 in damages to Trans Ova and $6,066 in damages to XY. The order also provided Trans Ova with a compulsory license to XY's technology, subject to an ongoing royalty obligation. Both parties appealed the district court's order, which appeal was decided in May 2018 by the Court of Appeals for the Federal Circuit. The Court denied Trans Ova's appeal of its claims for antitrust, breach of contract and patent invalidity (except as to one patent, for which the Court affirmed invalidity in a separate, same-day ruling in a third-party case). The Court considered the issue of willfulness to be moot since the district court did not award damages for the willfulness finding. Finally, the Court remanded the district court's calculation of the ongoing royalty and instructed the district court to re-calculate the ongoing royalty in light of post-verdict economic factors.

Since the inception of the 2004 agreement, Trans Ova has remitted payments to XY pursuant to the terms of that agreement, or pursuant to the terms of the April 2016 court order, and has recorded these payments in cost of services in the consolidated statements of operations for the respective periods. For the period from inception of the 2004 agreement through the court's April 2016 order, aggregate royalty and license payments were $3,170, of which $2,759 had not yet been deposited by XY. In 2016, the Company recorded expense of $4,228 representing the excess of the net damages awarded to XY, including prejudgment interest, over the liability previously recorded by Trans Ova for uncashed checks previously remitted to XY. In August 2016, Trans Ova deposited the net damages amount, including prejudgment interest, into the court's treasury, to be held until the appeals process is complete and final judgment amounts are determined. As of September 30, 2018, this amount is included in restricted cash on the accompanying consolidated balance sheet. In December 2016, Trans Ova elected to void the outstanding checks discussed above, and these amounts have been reclassified to other accrued liabilities on the accompanying consolidated balance sheets as of September 30, 2018 and December 31, 2017.

In December 2016, XY filed a complaint for patent infringement and trade secret misappropriation against Trans Ova in the District Court of Waco, Texas. Since the claims in this 2016 complaint directly relate to the 2012 licensing dispute and patent issues, Trans Ova filed and was granted a motion for change of venue to Colorado District Court. Trans Ova also filed a motion to dismiss, from which the Court recently dismissed nine of the twelve counts of the complaint. Presently, three counts for patent infringement remain pending. Trans Ova and the Company could elect to enter into a settlement agreement in order to avoid the further costs and uncertainties of litigation.

In January 2017, the Division of Enforcement of the SEC informed the Company of an investigation that the Company believes concerned certain issues raised by a previously disclosed consolidated putative shareholder class action lawsuit that was dismissed on November 1, 2017, and a previously disclosed shareholder derivative action that was dismissed on January 25, 2018. In September 2018, the Division of Enforcement informed the Company that it had concluded its investigation of these matters and that the Division of Enforcement does not intend to recommend enforcement action against the Company based on the investigation.

The Company may become subject to other claims, assessments and governmental investigations from time to time in the ordinary course of business. Such matters are subject to many uncertainties and outcomes are not predictable with assurance. The Company accrues liabilities for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. As of September 30, 2018 and December 31, 2017, the Company does not believe that any such matters, individually or in the aggregate, will have a material adverse effect on the Company's business, financial condition, results of operations, or cash flows.

17. Related Party Transactions

Third Security and Affiliates

The Company's CEO and Chairman of the board of directors is also the Senior Managing Director and CEO of Third Security and owns 100% of the equity interests of Third Security. In November 2015, the independent members of Intrexon's board of directors, with the recommendation of the audit committee of the board of directors, approved the execution of a Services

Agreement ("Services Agreement") with Third Security pursuant to which Third Security provides the Company with certain professional, legal, financial, administrative, and other support services necessary to support the Company and its CEO. As consideration for providing these services, Third Security is entitled to a fee of $800 per month to be paid in the form of fully-vested shares of the Company's common stock. The number of shares of common stock is calculated based on the closing price of the Company's common stock on the 15th day of each month. The payments made by the Company under the Services Agreement constitute, in the aggregate, an award under the 2013 Plan and are subject to the terms of the 2013 Plan (Note 15). The Services Agreement had a term of one year, can be terminated by the Company at any time, and may be extended only by agreement of the parties, including approval of a majority of the independent members of Intrexon's board of directors. The independent members of Intrexon's board of directors, with the recommendation of the audit committee of the board of directors, subsequently approved extensions of the Services Agreement through January 1, 2019. For the three months ended September 30, 2018 and 2017, the Company issued 166,143 shares and 118,828 shares, respectively, with values of $2,417 and $2,251, respectively, to Third Security as payment for services pursuant to the Services Agreement. For the nine months ended September 30, 2018 and 2017, the Company issued 466,460 shares and 329,649 shares, respectively, with values of $6,522 and $6,506, respectively, to Third Security as payment for services pursuant to the Services Agreement. In addition to the foregoing Services Agreement, the Company reimburses Third Security for certain out-of-pocket expenses incurred on the Company's behalf, and the total expenses incurred by the Company under this arrangement were $16 and $4 for the three months ended September 30, 2018 and 2017, respectively, and $33 and $428 for the nine months ended September 30, 2018 and 2017, respectively.

See also Note 15 regarding compensation arrangements between the Company and its CEO.

In October 2017, the Company entered into a Preferred Stock Equity Facility ("Preferred Stock Facility") with an affiliate of Third Security ("Third Security Affiliate"). Under the Preferred Stock Facility, the Company could, from time to time at its sole and exclusive option, issue and sell to the Third Security Affiliate, up to $100,000 of newly issued Series A Redeemable Preferred Stock ("Series A Preferred Stock"). In conjunction with the Company's July 2018 registered underwritten public offering of Convertible Notes (Note 14), the Preferred Stock Facility was terminated. No shares of Series A Preferred Stock had been issued under the Preferred Stock Facility.

The Company also subleases certain administrative offices to Third Security. The significant terms of the lease mirror the terms of the Company's lease with the landlord, and the Company recorded sublease income of $22 and $10 for the three months ended September 30, 2018 and 2017, respectively, and $66 and $32 for the nine months ended September 30, 2018 and 2017, respectively.

Transactions with ECC Parties

In addition to entities controlled by Third Security, any entity in which the Company holds equity securities, including securities received as upfront or milestone consideration, and which also are party to a collaboration with the Company are considered to be related parties.

The Company holds a promissory note convertible into shares of Fibrocell common stock ("convertible note") and warrants to purchase shares of Fibrocell common stock. As of September 30, 2018 and December 31, 2017, the value of the convertible note and warrants totaled $300 and $575, respectively, and is included in other assets on the accompanying consolidated balance sheets. See Note 7 for additional discussion of the Company's investments in Fibrocell.

Other Related Parties

In June 2015, the Company entered into an agreement with Harvest, an investment fund sponsored by Harvest Capital Strategies, LLC, and a related party based on ownership in the fund by affiliates of Third Security. Harvest was established to invest in life science research and development start-up opportunities that the Company offered to Harvest with exclusive rights of first-look and first negotiation. Based on this agreement, Harvest established six new collaboration entities, each of which entered into an ECC with the Company in a designated field. The terms of such ECCs were negotiated between the Company and Harvest. As consideration for providing exclusive rights of first-look and first negotiation for start-up opportunities, the Company received a portion of the management fee collected by the fund sponsor of Harvest. These fees are included in other income in the accompanying consolidated statements of operations and totaled $613 and $1,839 for the three and nine months ended September 30, 2017, respectively. In September 2017, the commitment period for Harvest was terminated and, as a result, the agreement with Harvest terminated. The termination of the agreement had no effect on the existing collaborations with Harvest-controlled entities. See Note 3 for further discussion of the asset acquisition of certain Harvest entities.

18. Net Loss per Share

The following table presents the computation of basic and diluted net loss per share:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
Historical net loss per share:				
Numerator:				
Net loss attributable to Intrexon	$ (57,324)	$ (39,689)	$ (168,871)	$ (89,752)
Denominator:				
Weighted average shares outstanding, basic and diluted	129,518,989	120,518,885	128,843,991	119,741,291
Net loss attributable to Intrexon per share, basic and diluted	$ (0.44)	$ (0.33)	$ (1.31)	$ (0.75)

The following potentially dilutive securities as of September 30, 2018 and 2017, have been excluded from the above computations of diluted weighted average shares outstanding for the three and nine months then ended as they would have been anti-dilutive:

	September 30,	
	2018	2017
Convertible debt	13,507,746	—
Options	11,160,524	12,641,770
Restricted stock units	980,758	—
Warrants	133,264	133,264
Total	25,782,292	12,775,034

19. Subsequent Events

In October 2018, the Company, through its wholly owned subsidiary Precigen, entered into a license agreement (the "License Agreement") with ZIOPHARM, which terminated and replaced the terms of the original ZIOPHARM ECC, including amendments. Pursuant to the terms of the License Agreement, the Company granted ZIOPHARM an exclusive, worldwide, royalty-bearing, sub-licensable license to research, develop and commercialize (i) products utilizing the Company's RheoSwitch gene switch ("RTS") to express IL-12 (the "IL-12 Products") for the treatment of cancer, (ii) chimeric antigen receptor ("CAR") products directed to (a) CD19 for the treatment of cancer (the "CD19 Products"), and (b) a second target, subject to the rights of Ares Trading S.A. ("Ares Trading") to pursue such target under the License and Collaboration Agreement entered into between the Company and Ares Trading (the "Merck Agreement"), and (iii) T-cell receptor ("TCR") products (the "TCR Products") designed for neoantigens for the treatment of cancer or the treatment and prevention of human papilloma virus ("HPV") to the extent that the primary reason for such treatment or prevention is to prevent cancer, which is referred to as the HPV Field. The Company has also granted ZIOPHARM an exclusive, worldwide, royalty-bearing, sub-licensable license for certain patents relating to the Company's *Sleeping Beauty* technology to research, develop and commercialize TCR Products for both neoantigens and shared antigens for the treatment of cancer and in the HPV Field. ZIOPHARM will be solely responsible for all aspects of the research, development and commercialization of the exclusively licensed products for the treatment of cancer. ZIOPHARM is required to use commercially reasonable efforts to develop and commercialize IL-12 Products and CD19 Products, and after a two-year period, the TCR Products. The Company also granted ZIOPHARM an exclusive, worldwide, royalty-bearing, sub-licensable license to research, develop and commercialize products utilizing an additional construct that expresses RTS IL-12 (the "Gorilla IL-12 Products") for the treatment of cancer and in the HPV Field. ZIOPHARM is responsible for all development costs associated with each of the licensed products, other than Gorilla IL-12 Products. ZIOPHARM and the Company will share the development costs and operating profits for Gorilla IL-12 Products, with ZIOPHARM responsible for 80% of the development costs and receiving 80% of the operating profits, and the Company responsible for the remaining 20% of the development costs and receiving 20% of the operating profits, except that ZIOPHARM will bear all development costs and the Company will share equally in operating profits for Gorilla IL-12 Products in the HPV Field.

In consideration of the licenses and other rights granted by the Company, ZIOPHARM will pay the Company an annual license fee of $100 and has agreed to reimburse the Company up to $1,000, payable in four quarterly installments, with respect to historical Gorilla IL-12 Products. ZIOPHARM will make milestone payments, payable upon the initiation of later stage clinical trials and upon the approval of exclusively licensed products in various jurisdictions, totaling up to an additional $52,500 for each of four exclusively licensed products, up to an aggregate of $210,000. In addition, ZIOPHARM will pay the Company tiered royalties ranging from low-single digits to high-single digits on the net sales derived from the sales of any approved IL-12 Products and CAR products. ZIOPHARM will also pay the Company royalties ranging from low-single digits to mid-single digits on the net sales derived from the sales of any approved TCR Products, up to maximum royalty amount of $100,000 in the aggregate. ZIOPHARM will also pay the Company 20% of any sublicensing income received by ZIOPHARM relating to the licensed products.

The Company will retain rights to research, develop and commercialize CAR products for all other targets, subject to the rights of Ares Trading to pursue such target under the Merck Agreement. In addition, the Company may research, develop and commercialize products for the treatment of cancer, outside of the products exclusively licensed to ZIOPHARM. The Company will pay ZIOPHARM royalties ranging from low-single digits to mid-single digits on the net sales derived from the sale of the Company's CAR products, up to $100,000. The Company will also be entitled to receive from ZIOPHARM reimbursement of costs incurred to transition the necessary knowledge and materials for ZIOPHARM programs for a period of up to one year from the effective date.

The Company has agreed that, during the term of the License Agreement, it will not use the licensed intellectual property to research, develop or commercialize any exclusive product for the treatment of cancer. In addition, for a three year period following the effective date of the License Agreement, the Company will not research or develop products utilizing regulatable switches that control expression of IL-12 or TCR products designed for neoantigens, in each case for the treatment or prevention of cancer. The Company has agreed to amend the research and development agreement between the Company, ZIOPHARM, and the University of Texas MD Anderson Cancer Center or otherwise make arrangements in order to ensure that all of its benefits and rights therewith vest in ZIOPHARM from the Effective Date of the License Agreement. As between the parties, the Company has agreed to perform all of the obligations of ZIOPHARM under the Merck Agreement, other than an obligation of exclusivity thereunder and ZIOPHARM will remain responsible for all payments owed to Ares Trading with respect to CD19 and the other target under the Merck Agreement as a result of ZIOPHARM's, its affiliates' or its sublicensees' exploitation of CAR products. Further, the Company is entitled to receive all rights and financial considerations with respect to all other CAR products, subject to the CAR royalties due to ZIOPHARM for such products. The License Agreement will terminate on a product-by-product and/or country-by-country basis upon the expiration of the later to occur of (i) the expiration of the last to expire patent claim for a licensed product, or (ii) 12 years after the first commercial sale of a licensed product in such country. In addition, ZIOPHARM may terminate the License Agreement on a country-by-country or program-by-program basis following written notice to the Company, and either party may terminate the License Agreement following notice of a material breach.

Pursuant to the License Agreement, the 2016 Securities Issuance Agreement between the Company and ZIOPHARM was terminated as of the effective date of the License Agreement, all of the benefits, rights, obligations and liabilities thereunder immediately ceased and terminated and the Company returned to ZIOPHARM all of the Preferred Shares owned by the Company as of the Effective Date. The Company's investment in ZIOPHARM preferred stock was valued at $158,122 as of September 30, 2018.

The Company will record the effects of the transaction during the fourth quarter of 2018. The Company is still evaluating the accounting impact but anticipates an impact to earnings resulting from the difference between the fair value of the Preferred Shares returned to ZIOPHARM and the reduction in deferred revenue expected to arise from the curtailment of the Company's obligation to perform services for ZIOPHARM.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following "Management's Discussion and Analysis of Financial Condition and Results of Operations" should be read in conjunction with the unaudited financial information and the notes thereto included in this Quarterly Report on Form 10-Q, or Quarterly Report, and our Annual Report on Form 10-K for the year ended December 31, 2017, or Annual Report.

The following discussion contains forward-looking statements that reflect our plans, estimates and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements and you are cautioned not to place undue reliance on forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this Quarterly Report, particularly in "Special Note Regarding Forward-Looking Statements" and "Risk Factors." The forward-looking statements included in this Quarterly Report are made only as of the date hereof.

Overview

At present rates of global industrialization and population growth, food and energy supplies and environmental and healthcare resources are becoming more scarce and/or costly. We believe it is not a viable option for mankind to continue on this path — new solutions will be necessary to preserve and globally expand a high quality of life. We believe that synthetic biology is a solution.

We believe we are a leader in the field of synthetic biology, focusing on programming biological systems to alleviate disease, remediate environmental challenges, and provide sustainable food and industrial chemicals. Synthetic biology involves the tightly controlled expression of natural and engineered genes (DNA segments) in a variety of animal, plant and microorganismal hosts. Our historical approach primarily involved an exclusive channel collaboration, or ECC, model in which we served principally as the technology engine for a partner experienced in a given commercial arena. As our experience has deepened, we have moved toward more joint ventures, or JVs, and the self-development of projects we view as particularly compelling and within our increasing areas of expertise.

Synthetic biology is a rapidly evolving discipline that applies engineering principles to biological systems to enable rational, design-based control of cellular function for a specific purpose. Using our suite of proprietary and complementary technologies, we design, build and regulate gene programs, which are DNA sequences that consist of key genetic components. A single gene program or a complex, multi-genic program is fabricated and stored within a DNA vector. Vectors are segments of DNA used as a vehicle to transmit genetic information. DNA vectors can, in turn, be introduced into cells in order to generate a simple or complex cellular system, which are the basic and complex cellular activities that take place within a cell and the interaction of those systems in the greater cellular environment. It is these genetically modified cell systems that can be used to produce biological effector molecules, or be employed directly to enable the development of new and improved products and manufacturing processes across a variety of end markets, including health, food, energy, environment, and consumer. Our synthetic biology capabilities include the ability to precisely control the amount, location and modification of biological molecules to control the function and output of living cells and optimize for desired results at an industrial scale.

Working with our subsidiaries, JVs, and collaborators, we seek to create more effective, less costly and more sustainable solutions than can be provided through current industry practices. Our technologies combine the principles of precision engineering, statistical modeling, automation and production at an industrial scale. We efficiently engineer precise and complex gene programs across many cell types. We apply the engineering principle of a design-build-test-learn continuum, through which we accumulate knowledge about the characteristics and performance of gene programs and cell lines. This process of continuous learning allows us to enhance our ability to design and build improved and more complex gene programs and cellular systems.

We believe our technologies are broadly applicable across many diverse end markets, including some end markets that have failed to recognize the applicability of synthetic biology or failed to efficiently utilize biologically-based processes to produce products. To enable us to maximize the number of these markets we could address, we devised a strategy that allowed us to focus on our core expertise in synthetic biology while developing many different commercial product candidates via collaborations in a broad range of industries or end markets. Historically, we built our business primarily around the formation of ECCs. An ECC is an agreement with a collaborator to develop products based on technologies in a specifically defined field. We have sought collaborators with expertise within a specific industry sector and the commitment to provide resources for the commercialization of products within that industry sector. Through our ECCs, we provide expertise in the engineering of gene programs and cellular systems, and our collaborators are responsible for providing market and product development expertise, as well as sales and marketing capabilities. In addition, we have sometimes executed a research collaboration to develop an early-stage program pursuant to which we received reimbursement for our development costs but the exclusive commercial rights, and related access fees, were deferred until completion of an initial research program.

This ECC strategy allowed us to leverage our capabilities and capital across numerous product development programs and a broader landscape of end markets than we would have been capable of addressing on our own. The strategy also allowed us to participate in the potential upside from products that are enabled by our technologies across an extensive range of industries, without the need for us to invest considerable resources in bringing individual products to market. We presently are party to a number of these collaborations which are in varying stages, from research and development of product candidates to monitoring the progress of our collaborator in their further development and the potential commercialization of product candidates enabled through our collaborations.

Over time, our strategy has evolved away from ECC-type collaborations to relationships and structures that provide us with more control and ownership over the development process and commercialization path. In these new relationships and structures, we bear more of the responsibility to fund the projects and execute on product candidate development. For example, in October 2018, through our wholly owned subsidiary, Precigen Therapeutics, Inc., or Precigen, we entered into a license agreement, or the License Agreement, with ZIOPHARM Oncology, Inc., or ZIOPHARM, which terminated and replaced the terms of the original ECC, including amendments, with ZIOPHARM. The License Agreement gives us development and commercialization control over certain products previously licensed to ZIOPHARM. See "Notes to the Consolidated Financial Statements (Unaudited) - Note 19" appearing elsewhere in this Quarterly Report.

In certain strategic circumstances, we may enter into a JV with a third-party collaborator whereby we may contribute access to our technology, cash or both into the JV, which we will jointly control with our collaborator. Pursuant to a JV agreement, we may be required to contribute additional capital to the JV, and we may be able to receive a higher financial return than we would normally receive from an ECC to the extent that we and our collaborator are successful in developing one or more products. For a discussion of our JVs, see the "Notes to the Consolidated Financial Statements (Unaudited) - Note 4" appearing elsewhere in this Quarterly Report. Additionally, we are increasing the resources we are expending internally on early-stage proof of concept programs where we believe we can leverage our competitive edge in gene program creation and host cell and genome expertise. We are also seeking to partner more mature programs and capabilities or later-stage assets. In this way, we endeavor to leverage our capital resources and ultimately hope to realize significant value from our mature assets.

As we consider the broad potential applications of our synthetic biology technologies, and consistent with the evolution of our business strategy, we have acquired a number of ventures that are already enabling products that benefit from the application of synthetic biology. Our strategy contemplates the continued acquisition of product-focused companies that we believe may leverage our technologies and expertise in order to expand their respective product applications. We believe that the acquisition of these types of companies allows us to develop and commercialize innovative products and create significant value.

Consistent with the ongoing evolution of our strategy, from principally utilizing ECCs to seeking a more diverse approach to leverage our technology assets, we routinely consider ways to organize our business and the grouping of our assets to facilitate strategic opportunities.

Our operating subsidiaries

To derive value from the broad potential applications of our synthetic biology technologies, and consistent with the evolution of our business strategy, we routinely consider ways to organize our business to facilitate strategic opportunities. For example, effective January 1, 2018, we transferred substantially all of our gene and cell therapy assets for human health under a newly-formed wholly owned subsidiary, Precigen, and we consolidated therapeutic applications of our proprietary ActoBiotics platform under ActoBio Therapeutics, Inc., or ActoBio. In addition, we have acquired a number of ventures that are already enabling products that benefit from the application of synthetic biology and that we now operate as subsidiaries. Our strategy contemplates the continued formation and acquisition of such operating subsidiaries. As these enterprises develop, we will determine whether to maintain full ownership, introduce investors via either private or public financing, or seek strategic options to partner or divest the businesses.

Primary wholly owned operating subsidiaries

Precigen, Inc.

Precigen is a fully-integrated gene and cell therapy company committed to delivering precision medicines through innovation that puts patients first. Utilizing platform technologies owned by Precigen or licensed from Intrexon Corporation, or Intrexon, for programming and engineering genetic code, Precigen is developing and investigating next-generation therapeutics to enable patient-focused, cost-effective treatments to address unmet medical needs in the areas of oncology, autoimmune disorders, and emerging specialty therapy areas. Precigen is designing investigational therapies intended to be controllable and targeted, with a broad pipeline of internal and partnered programs, all of which are at the preclinical or clinical stages.

ActoBio Therapeutics, Inc.

ActoBio is pioneering a new class of microbe-based ActoBiotics biopharmaceuticals that enable expression and local delivery of disease-modifying therapeutics. The ActoBiotics platform produces biologics through oral or topical administration with treatment applications across many diseases including oral, gastrointestinal, and autoimmune/allergic disorders. We believe this cost-effective approach to development will provide safer and more efficacious treatments than injectable biologics. ActoBio, which is party to a number of our ECC agreements, has a strong research and development pipeline with the latest stage candidate in Phase 2b clinical trials and an extensive portfolio of candidates ready for clinical development across a number of potential indications.

Trans Ova Genetics, L.C.

Trans Ova Genetics, L.C., or Trans Ova, is internationally recognized as a provider of industry-leading bovine reproductive technologies. Intrexon and Trans Ova are building upon Trans Ova's original platform with a goal of achieving higher levels of delivered value to dairy and beef cattle producers. Progentus, L.C., or Progentus, a wholly owned subsidiary of Trans Ova, is a provider of bovine embryos. ViaGen, L.C., or ViaGen, a wholly owned subsidiary of Trans Ova, is a provider of cloning technology for livestock species. Exemplar Genetics, LLC, or Exemplar, a wholly owned subsidiary through the combined ownership of Trans Ova, ViaGen and us, is committed to enabling the study of life-threatening human diseases through the development of miniswine research models and services, as well as enabling the production of cells and organs in its genetically engineered swine, for human therapeutic use.

Okanagan Specialty Fruits, Inc.

Okanagan Specialty Fruits, Inc. and its affiliates, or Okanagan, is the pioneering agricultural company behind the world's first non-browning apple without the use of any artificial additives. Okanagan is scaling up its commercial supplies of non-browning apples and developing new commercial tree fruit varieties intended to provide benefits to the entire supply chain, from growers to consumers.

Oxitec Limited

Oxitec Limited, or Oxitec, is a pioneering company in biological insect control solutions. Oxitec is developing products that use genetic engineering to control insect pests that spread disease and damage crops. Among the applications of its platform, which uses advanced genetics and molecular biology, Oxitec has developed innovative solutions for controlling *Aedes aegypti*, a mosquito that is a known vector for the transmission of infectious disease including dengue fever, chikungunya, and Zika. Oxitec is pursuing regulatory and commercial approvals for its insect solutions in a number of countries, including the United States, Brazil, and the Cayman Islands.

Primary majority-owned operating subsidiary

AquaBounty Technologies, Inc.

AquaBounty Technologies, Inc., or AquaBounty, of which we owned approximately 58 percent as of December 31, 2017, is focusing on improving productivity in commercial aquaculture, including the development of the AquAdvantage Salmon, an Atlantic salmon that has been genetically enhanced to reach market size in less time than conventionally farmed Atlantic salmon and approved by the Food and Drug Administration. In January 2018, AquaBounty raised $12.0 million through an underwritten public offering, in which we participated by investing $5 million. As a result of this transaction and subsequent exercises of associated warrants, our ownership has decreased to approximately 52 percent as of September 30, 2018. In the future, our ownership stake in AquaBounty may drop below 50 percent, which may result in our deconsolidating AquaBounty.

Mergers, acquisitions, and technology in-licensing

We may augment our suite of proprietary technologies through mergers or acquisitions of technologies, which would then become available to new or existing ventures, including operating subsidiaries, JVs, and collaborations. Among other things, we may pursue technologies that we believe will be generally complementary to our existing technologies and also meet our desired return on investment and other economic criteria. In certain cases, such technologies may already be applied in the production of products or services and in these cases we may seek to expand the breadth or efficacy of such products or services through the use of our technologies. See "Notes to the Consolidated Financial Statements (Unaudited) - Note 3" appearing elsewhere in this Quarterly Report for further discussion of mergers, acquisitions or significant technology in-licensing activities in 2018.

Financial overview

We have incurred significant losses since our inception. We anticipate that we may continue to incur significant losses for the foreseeable future, and we may never achieve or maintain profitability. Outside of collaboration and license fee payments and sales of products and services, which vary over time, we have not generated significant revenues, including revenues or royalties from product sales by us or our collaborators. Certain of our consolidated subsidiaries require regulatory approval and/or commercial scale-up before they may commence significant product sales and operating profits.

We expect our future capital requirements will be substantial, particularly as we continue to develop our business and expand our synthetic biology technology platform. In January 2018, we closed a public offering of 6,900,000 shares of our common stock, including 1,000,000 shares of common stock purchased by affiliates of Third Security, LLC, or Third Security, the net proceeds of which were $82.4 million, after deducting underwriting discounts and commissions and offering expenses paid by us. Additionally, in July 2018, we closed a public offering of $200 million aggregate principal amount of 3.50 percent convertible senior notes due 2023, or the Convertible Notes. We believe that our existing cash and cash equivalents, short-term investments, and cash expected to be received from our current collaborators and for sales of products and services provided by our consolidated subsidiaries will enable us to fund our operating expenses and capital expenditure requirements for at least the next 12 months. In conjunction with the closing of the Convertible Notes, the Preferred Stock Equity Facility, or Preferred Stock Facility, with an affiliate of Third Security, pursuant to which we had an option to issue up to $100 million of Series A Redeemable Preferred Stock, or Series A Preferred Stock, was terminated. No shares of Series A Preferred Stock were issued under the Preferred Stock Facility.

Sources of revenue

Historically, we have derived our collaboration and licensing revenues through agreements with counterparties for the development and commercialization of products enabled by our technologies. Generally, the terms of these collaborations provide that we receive some or all of the following: (i) technology access fees upon signing; (ii) reimbursements of costs incurred by us for our research and development and/or manufacturing efforts related to specific applications provided for in the collaboration; (iii) milestone payments upon the achievement of specified development, regulatory and commercial activities; and (iv) royalties on sales of products arising from the collaboration.

Our technology access fees and milestone payments may be in the form of cash or securities of the collaborator. Our collaborations contain multiple arrangements and we typically defer revenues from the technology access fees and milestone payments received and recognize such revenues in the future over the anticipated performance period. We are also entitled to sublicensing revenues in those situations where our collaborators choose to license our technologies to other parties.

From time to time, we and certain collaborators may cancel the agreements, relieving us of any further performance obligations under the agreement. Upon such cancellation or when we determine no further performance obligations are required of us under an agreement, we may recognize any remaining deferred revenue.

We generate product and service revenues primarily through sales of products or services that are created from technologies developed or owned by us. Our primary current offerings include sales of advanced reproductive technologies, including our bovine embryo transfer and in vitro fertilization processes and from genetic preservation and sexed semen processes and applications of such processes to other livestock, as well as sales of livestock and embryos produced using these processes and used in production. We recognize revenue when the customer takes ownership of the promised product or when the promised service is completed.

In future periods, our revenues will depend in part on our ability to partner our more mature programs and capabilities, the number of collaborations to which we are party, the advancement and creation of programs within our collaborations and the extent to which our collaborators bring products enabled by our technologies to market. For example, as a result of the execution of the License Agreement with ZIOPHARM in October 2018, we expect our future revenues to decrease due to the expected curtailment of our obligation to perform research and development services for ZIOPHARM. Our revenues will also depend upon our ability to maintain or improve the volume and pricing of our current product and service offerings and to develop and scale up production of new offerings from the various technologies of our subsidiaries. Our future revenues may also include additional revenue streams we may acquire through mergers and acquisitions. In light of our limited operating history and experience, there can be no assurance as to the timing, magnitude and predictability of revenues to which we might be entitled.

Cost of products and services

Cost of products and services includes primarily labor and related costs, drugs and supplies used primarily in the embryo transfer and in vitro fertilization processes, livestock and feed used in production, and facility charges, including rent and depreciation. Fluctuations in the price of livestock and feed have not had a significant impact on our operating margins and no derivative financial instruments are used to mitigate the price risk.

Research and development expenses

We recognize research and development expenses as they are incurred. Our research and development expenses consist primarily of:

- salaries and benefits, including stock-based compensation expense, for personnel in research and development functions;
- fees paid to consultants and contract research organizations who perform research on our behalf and under our direction;
- costs related to laboratory supplies used in our research and development efforts;
- costs related to certain in-licensed technology rights or reacquired in-process research and development;
- depreciation of leasehold improvements and laboratory equipment;
- amortization of patents and related technologies acquired in mergers and acquisitions; and
- rent and utility costs for our research and development facilities.

We have no individually significant research and development projects and our research and development expenses primarily relate to either the costs incurred to expand or otherwise improve our multiple platform technologies, the costs incurred to develop a specific application of our technologies in support of current or prospective partners, or costs incurred to expand or otherwise improve our products and services. Research and development expenses, including costs for preclinical and clinical development, incurred for programs we support pursuant to an ECC agreement are typically reimbursed by the partner at cost and all other research and development programs may be terminated or otherwise deferred at our discretion. The amount of our research and development expenses may be impacted by, among other things, the number of ECCs and the number and size of programs we may support on behalf of an ECC.

The table below summarizes our research and development expenses incurred to expand or otherwise improve our multiple platform technologies, the costs incurred to develop a specific application of our technologies in support of current or prospective partners, or costs incurred to expand or otherwise improve our products and services for the three and nine months ended September 30, 2018 and 2017. Other research and development expenses for these periods include indirect salaries and overhead expenses that are not allocated to either expanding or improving our multiple platform technologies, specific applications of our technologies in support of current or prospective partners, or expanding or improving our product and services offerings. Additionally, other research and development expenses for the three and nine months ended September 30, 2018 include an $8.7 million expense related to in-process research and development reacquired as part of an asset acquisition in September 2018, which was immediately expensed. Other research and development expenses for the nine months ended September 30, 2018 also include approximately $5.3 million of one-time costs associated with closing one of Oxitec's Brazilian subsidiary's leased research and development facilities as we decentralized operations previously conducted in this facility.

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2018	2017	2018	2017
	(In thousands)			
Expansion or improvement of our platform technologies	$ 5,056	$ 3,652	$ 13,565	$ 10,476
Specific applications of our technologies in support of current and prospective partners	18,676	19,363	55,440	56,369
Expansion or improvement of our product and service offerings	6,027	6,917	21,729	20,030
Other	15,126	6,540	33,338	17,788
Total research and development expenses	$ 44,885	$ 36,472	$ 124,072	$ 104,663

We expect that our research and development expenses will increase as we enter into new collaborations, develop our own proprietary programs, expand our offerings, and reacquire previously licensed rights for our own development. We believe these increases will likely include increased costs related to the hiring of additional personnel in research and development functions, increased costs paid to consultants and contract research organizations and increased costs related to laboratory supplies. Research and development expenses may also increase as a result of ongoing research and development operations that we might assume through mergers and acquisitions.

Selling, general and administrative expenses

Selling, general and administrative, or SG&A, expenses consist primarily of salaries and related costs, including stock-based compensation expense, for employees in executive, operational, finance, sales and marketing, information technology, legal and corporate communications functions. Other significant SG&A expenses include rent and utilities, insurance, accounting and legal services and expenses associated with obtaining and maintaining our intellectual property.

SG&A expenses may increase in the future to support our expanding operations as we explore new partnering opportunities and continue to develop our proprietary programs. These increases would likely include costs related to the hiring of additional personnel and increased fees for business development functions, costs associated with defending us in litigation matters, the costs of outside consultants and other professional services. SG&A expenses may also increase as a result of ongoing operations that we might assume through mergers and acquisitions.

Other income (expense), net

We hold equity securities and preferred stock received and/or purchased from certain collaborators. Other than investments accounted for using the equity method discussed below, we elected the fair value option to account for our equity securities and preferred stock held in these collaborators. These equity securities and preferred stock are recorded at fair value at each reporting date. Unrealized appreciation (depreciation) resulting from fair value adjustments are reported as other income (expense) in the consolidated statements of operations. As such, we bear the risk that fluctuations in the securities' share prices may significantly impact our results of operations. In conjunction with the License Agreement in October 2018, all of our ZIOPHARM preferred shares were retired.

Interest expense is expected to increase in future periods as we incur interest expense related to the Convertible Notes issued in July 2018.

Interest income consists of interest earned on our cash and cash equivalents and short-term and long-term investments. Dividend income consists of the monthly preferred stock dividends received from our investments in preferred stock. Dividend income is expected to decrease in future periods as a result of the retirement of our ZIOPHARM preferred shares.

In September 2017, the commitment period for Harvest Intrexon Enterprise Fund I, LP, or Harvest, was terminated and, as a result, the agreement with Harvest terminated. The termination of the agreement had no effect on the existing collaborations with Harvest-controlled entities. Through September 2017, as consideration for providing exclusive rights of first-look and first negotiation, we received a portion of the management fee collected by the fund sponsor of Harvest for our obligation to provide Harvest with investment proposals that were suitable for pursuit by a start-up. These fees are included in other income.

Equity in net income (loss) of affiliates

Equity in net income or loss of affiliates is our pro-rata share of our equity method investments' operating results, adjusted for accretion of basis difference. We account for investments in our JVs and start-up entities backed by Harvest using the equity method of accounting since we have the ability to exercise significant influence, but not control, over the operating activities of these entities.

Results of operations

Comparison of the three months ended September 30, 2018 and the three months ended September 30, 2017

The following table summarizes our results of operations for the three months ended September 30, 2018 and 2017, together with the changes in those items in dollars and as a percentage:

	Three Months Ended September 30,		Dollar Change	Percent Change
	2018	2017		
	(In thousands)			
Revenues (1)				
Collaboration and licensing revenues (2)	$ 14,324	$ 28,155	$ (13,831)	(49.1)%
Product revenues	6,829	7,670	(841)	(11.0)%
Service revenues	10,414	9,975	439	4.4 %
Other revenues	881	216	665	>200%
Total revenues	32,448	46,016	(13,568)	(29.5)%
Operating expenses				
Cost of products	8,877	8,001	876	10.9 %
Cost of services	6,449	7,013	(564)	(8.0)%
Research and development	44,885	36,472	8,413	23.1 %
Selling, general and administrative	38,708	39,277	(569)	(1.4)%
Total operating expenses	98,919	90,763	8,156	9.0 %
Operating loss	(66,471)	(44,747)	(21,724)	48.5 %
Total other income (expense), net	(3,727)	6,086	(9,813)	(161.2)%
Equity in loss of affiliates	(2,870)	(2,993)	123	(4.1)%
Loss before income taxes	(73,068)	(41,654)	(31,414)	75.4 %
Income tax benefit	14,322	818	13,504	>200%
Net loss	(58,746)	(40,836)	(17,910)	43.9 %
Net loss attributable to noncontrolling interests	1,422	1,147	275	24.0 %
Net loss attributable to Intrexon	$ (57,324)	$ (39,689)	$ (17,635)	44.4 %

(1) Revenues in 2018 are accounted for under Accounting Standards Codification, or ASC, 606, *Revenue from Contracts with Customers*, or ASC 606, and revenues in 2017 are accounted for under ASC 605, *Revenue Recognition*, or ASC 605. We adopted ASC 606 on January 1, 2018 using the modified retrospective method, which applies the changes in accounting prospectively and does not restate prior periods.

(2) Including $11,952 and $24,492 from related parties for the three months ended September 30, 2018 and 2017, respectively.

Collaboration and licensing revenues

The following table shows the collaboration and licensing revenues recognized for the three months ended September 30, 2018 and 2017, together with the changes in those items.

	Three Months Ended September 30,		Dollar Change
	2018	2017	
	(In thousands)		
ZIOPHARM Oncology, Inc.	$ 4,826	$ 10,373	$ (5,547)
Oragenics, Inc.	705	475	230
Fibrocell Science, Inc.	391	1,683	(1,292)
Genopaver, LLC	689	1,422	(733)
S & I Ophthalmic, LLC	—	376	(376)
OvaXon, LLC	—	262	(262)
Intrexon Energy Partners, LLC	1,329	1,903	(574)
Persea Bio, LLC	199	266	(67)
Ares Trading S.A.	1,576	2,356	(780)
Intrexon Energy Partners II, LLC	754	816	(62)
Intrexon T1D Partners, LLC	368	1,462	(1,094)
Harvest Start-up Entities (1)	2,691	4,020	(1,329)
Other	796	2,741	(1,945)
Total	$ 14,324	$ 28,155	$ (13,831)

(1) For the three months ended September 30, 2018 and 2017, revenues recognized from collaborations with Harvest start-up entities include: Thrive Agrobiotics, Inc.; Exotech Bio, Inc.; and AD Skincare, Inc. For the three months ended September 30, 2017, revenues recognized from collaborations with Harvest start-up entities also include Relieve Genetics, Inc.; Genten Therapeutics, Inc.; and CRS Bio, Inc.

Collaboration and licensing revenues decreased $13.8 million, or 49 percent, from the three months ended September 30, 2017 due to (i) a decrease in research and development services for certain of our ECCs as we redeployed certain resources towards supporting prospective new platforms and partnering opportunities and began to focus more on the further development of relationships and structures that provide us with more control and ownership over the development process and commercialization path, (ii) a decrease in research and development services for certain of our ECCs as a result of program progression where our collaborators have taken responsibility of the execution of the programs, (iii) changes in revenue recognition for upfront and milestone payments under the new ASC 606 revenue standard whereby revenues are recognized based on the amount of services we perform for our collaborators, and (iv) the mutual termination of our second ECC with ZIOPHARM for the treatment of graft-versus-host disease in December 2017.

Product revenues and gross margin

Product revenues were consistent period over period. Gross margin on products declined in the current period as a result of increased operating costs associated with new product offerings and cloned products.

Service revenues and gross margin

Service revenues were consistent period over period. Gross margin on services improved in the current period as a result of pricing changes and an increase in the number of embryos produced per bovine in vitro fertilization cycle performed due to improved production results.

Research and development expenses

Research and development expenses increased $8.4 million, or 23 percent, over the three months ended September 30, 2017. Current period research and development expenses include $8.7 million expense related to in-process research and development reacquired from certain Harvest start-up entities as part of an asset acquisition in September 2018.

Selling, general and administrative expenses

SG&A expenses were consistent period over period although there were offsetting changes within individual components. Legal and professional fees decreased $2.9 million primarily due to decreased fees incurred for regulatory and other consultants. However, salaries, benefits and other personnel costs increased $2.6 million primarily due to increased compensation expenses related to performance and retention incentives for SG&A employees, partially offset by decreased share-based compensation expense as a result of certain 2014 stock option grants becoming fully vested in March 2018 and the impact of forfeited options from former employees.

Total other income (expense), net

Total other income (expense), net, decreased $9.8 million, or 161 percent, from the three months ended September 30, 2017. This decrease was primarily attributable to decreases in fair market value of our equity securities portfolio, investments in preferred stock, and other convertible instruments and an increase in interest expense associated with our Convertible Notes issued in July 2018.

Comparison of the nine months ended September 30, 2018 and the nine months ended September 30, 2017

The following table summarizes our results of operations for the nine months ended September 30, 2018 and 2017, together with the changes in those items in dollars and as a percentage:

	Nine Months Ended September 30,		Dollar Change	Percent Change
	2018	2017		
	(In thousands)			
Revenues (1)				
Collaboration and licensing revenues (2)	$ 51,622	$ 89,384	$ (37,762)	(42.2)%
Product revenues	23,549	25,780	(2,231)	(8.7)%
Service revenues	40,379	37,890	2,489	6.6 %
Other revenues	1,839	899	940	104.6 %
Total revenues	117,389	153,953	(36,564)	(23.8)%
Operating expenses				
Cost of products	28,046	25,625	2,421	9.4 %
Cost of services	21,127	21,805	(678)	(3.1)%
Research and development	124,072	104,663	19,409	18.5 %
Selling, general and administrative	112,872	113,258	(386)	(0.3)%
Total operating expenses	286,117	265,351	20,766	7.8 %
Operating loss	(168,728)	(111,398)	(57,330)	51.5 %
Total other income (expense), net	(13,911)	27,632	(41,543)	(150.3)%
Equity in loss of affiliates	(9,880)	(11,273)	1,393	(12.4)%
Loss before income taxes	(192,519)	(95,039)	(97,480)	102.6 %
Income tax benefit	19,535	2,164	17,371	>200%
Net loss	(172,984)	(92,875)	(80,109)	86.3 %
Net loss attributable to noncontrolling interests	4,113	3,123	990	31.7 %
Net loss attributable to Intrexon	$ (168,871)	$ (89,752)	$ (79,119)	88.2 %

(1) Revenues in 2018 are accounted for under ASC 606, and revenues in 2017 are accounted for under ASC 605. We adopted ASC 606 on January 1, 2018 using the modified retrospective method, which applies the changes in accounting prospectively and does not restate prior periods.

(2) Including $41,740 and $77,937 from related parties for the nine months ended September 30, 2018 and 2017, respectively.

Collaboration and licensing revenues

The following table shows the collaboration and licensing revenues recognized for the nine months ended September 30, 2018 and 2017, together with the changes in those items.

	Nine Months Ended September 30,		Dollar Change
	2018	2017	
	(In thousands)		
ZIOPHARM Oncology, Inc.	$ 13,626	$ 31,322	$ (17,696)
Oragenics, Inc.	867	1,519	(652)
Fibrocell Science, Inc.	1,015	5,375	(4,360)
Genopaver, LLC	3,076	4,615	(1,539)
S & I Ophthalmic, LLC	—	751	(751)
OvaXon, LLC	—	1,966	(1,966)
Intrexon Energy Partners, LLC	3,345	8,909	(5,564)
Persea Bio, LLC	714	821	(107)
Ares Trading S.A.	7,525	8,474	(949)
Intrexon Energy Partners II, LLC	1,685	2,921	(1,236)
Intrexon T1D Partners, LLC	2,399	3,882	(1,483)
Harvest Start-up Entities (1)	11,792	11,835	(43)
Other	5,578	6,994	(1,416)
Total	$ 51,622	$ 89,384	$ (37,762)

(1) For the nine months ended September 30, 2018 and 2017, revenues recognized from collaborations with Harvest start-up entities include: Thrive Agrobiotics, Inc.; Exotech Bio, Inc.; AD Skincare, Inc.; Genten Therapeutics, Inc.; and CRS Bio, Inc. For the nine months ended September 30, 2017, revenues recognized from collaborations with Harvest start-up entities also include Relieve Genetics, Inc.

Collaboration and licensing revenues decreased $37.8 million, or 42 percent, from the nine months ended September 30, 2017 due to (i) a decrease in research and development services for certain of our ECCs as we redeployed certain resources towards supporting prospective new platforms and partnering opportunities and began to focus more on the further development of relationships and structures that provide us with more control and ownership over the development process and commercialization path, (ii) a decrease in research and development services for certain of our ECCs as a result of program progression where our collaborators have taken responsibility of the execution of the programs, (iii) changes in revenue recognition for upfront and milestone payments under the new ASC 606 revenue standard whereby revenues are recognized based on the amount of services we perform for our collaborators, and (iv) the mutual termination of our second ECC with ZIOPHARM for the treatment of graft-versus-host disease in December 2017.

Product revenues and gross margin

Product revenues decreased $2.2 million, or 9 percent, from the nine months ended September 30, 2017. The decrease in product revenues was primarily due to lower customer demand for live calves, cows previously used in production, and cloned products. These decreases were partially offset by increased customer demand for pregnant recipients. Gross margin on products declined in the current period as a result of the lower product sales and increased operating costs associated with new product offerings and cloned products.

Service revenues and gross margin

Service revenues increased $2.5 million, or 7 percent, over the nine months ended September 30, 2017. The increase in service revenues and gross margin thereon relates to pricing changes and an increase in the number of embryos produced per bovine in vitro fertilization cycle performed due to improved production results.

Research and development expenses

Research and development expenses increased $19.4 million, or 19 percent, over the nine months ended September 30, 2017. Current period research and development expenses include (i) $8.7 million expense related to in-process research and development reacquired from certain Harvest start-up entities as part of an asset acquisition in September 2018 which was immediately expensed and (ii) $5.3 million of one-time costs associated with closing one of Oxitec's Brazilian subsidiary's leased research and development facilities as we decentralized operations previously conducted in this facility. Research and development consultants and lab supplies increased $3.1 million primarily due to increased expenses from contract research organizations and consultants providing services for both programs being developed internally and with certain of our ECCs. Depreciation and amortization increased $2.1 million primarily as a result of depreciation expense on research and development assets and the amortization of developed technology acquired from GenVec, Inc. in June 2017.

Selling, general and administrative expenses

SG&A expenses were consistent period over period although there were offsetting changes within individual components. Legal and professional fees decreased $7.5 million primarily due to (i) decreased legal fees associated with ongoing litigation and (ii) decreased fees incurred for regulatory and other consultants. However, salaries, benefits and other personnel costs increased $6.9 million primarily due to increased compensation expenses related to performance and retention incentives for SG&A employees.

Total other income (expense), net

Total other income (expense), net, decreased $41.5 million, or 150 percent, from the nine months ended September 30, 2017. This decrease was primarily attributable to decreases in fair market value of our equity securities portfolio, investments in preferred stock, and other convertible instruments.

Liquidity and capital resources

Sources of liquidity

We have incurred losses from operations since our inception and as of September 30, 2018, we had an accumulated deficit of $990.1 million. From our inception through September 30, 2018, we have funded our operations principally with proceeds received from private and public offerings, cash received from our collaborators and through product and service sales made directly to customers. As of September 30, 2018, we had cash and cash equivalents of $82.4 million and short-term investments of $164.2 million. Cash in excess of immediate requirements is typically invested primarily in money market funds and U.S. government debt securities in order to maintain liquidity and preserve capital.

We currently generate cash receipts primarily from technology access fees, reimbursement of research and development services performed by us and sales of products and services.

Cash flows

The following table sets forth the significant sources and uses of cash for the periods set forth below:

	Nine Months Ended September 30,	
	2018	2017
	(In thousands)	
Net cash provided by (used in):		
Operating activities	$ (86,878)	$ (69,840)
Investing activities	(181,954)	80,418
Financing activities	282,546	(9,420)
Effect of exchange rate changes on cash, cash equivalents, and restricted cash	578	892
Net increase in cash, cash equivalents and restricted cash	$ 14,292	$ 2,050

Cash flows from operating activities:

During the nine months ended September 30, 2018, our net loss was $173.0 million, which includes the following significant noncash expenses totaling $112.2 million: (i) $28.3 million of stock-based compensation expense, (ii) $27.6 million of noncash net unrealized and realized losses on our equity securities and preferred stock, (iii) $25.2 million of depreciation and amortization expense, (iv) $9.9 million of equity in net loss of affiliates, (v) $8.7 million of expense related to the reacquired in-process research and development in an asset acquisition, (vi) $8.4 million of shares issued as payment for services, and (vii) $4.1 million of losses on disposals of long-lived assets. These expenses were partially offset by $14.6 million of noncash dividend income and $19.3 million of noncash deferred tax benefits. Additionally, we had a $3.7 million net decrease in our operating assets and liabilities. During the nine months ended September 30, 2017, our net loss was $92.9 million, which includes the following significant noncash expenses totaling $74.5 million: (i) $31.9 million of stock-based compensation expense, (ii) $22.9 million of depreciation and amortization expense, (iii) $11.3 million of equity in net loss of affiliates, and (iv) $8.4 million of shares issued as payment for services. These expenses were partially offset by $12.3 million of noncash dividend income and $9.2 million of noncash net unrealized and realized gains on our equity securities and preferred stock. Additionally, we had a $28.6 million net increase in our operating assets and liabilities.

Cash flows from investing activities:

During the nine months ended September 30, 2018, we used $178.7 million for purchase of short-term investments, $30.4 million for purchases of property, plant and equipment and $14.1 million for investments in our JVs, and we received proceeds of $21.0 million from the maturity of short-term investments, $15.5 million in an asset acquisition, and $2.6 million from the return of the balance from an investment in an affiliate that was dissolved. During the nine months ended September 30, 2017, we received proceeds of $136.3 million from the maturity of short-term investments, and we used $32.7 million for purchases of property, plant and equipment, $14.2 million for the purchase of a land-based aquaculture facility by AquaBounty, and $10.6 million for investments in our JVs.

Cash flows from financing activities:

During the nine months ended September 30, 2018, we received $194.0 million net proceeds from the issuance of long-term debt in July and $88.0 net proceeds from public financings in January. During the nine months ended September 30, 2017, we paid $8.7 million of deferred consideration to former shareholders of an acquired business.

Future capital requirements

We established our strategy and business model of commercializing our technologies through collaborations with development expertise in 2010, and we consummated our first collaboration in January 2011. We believe that our efforts to partner our more mature programs and capabilities, to continue to consummate collaborations across our various industries, and to secure debt or equity financing for certain of our operating subsidiaries will result in additional capital in the future.

We believe that our existing cash and cash equivalents, short-term investments, and cash expected to be received from our current collaborators and for sales of products and services provided by our consolidated subsidiaries will enable us to fund our operating expenses and capital expenditure requirements for at least the next 12 months.

We have based our estimates on assumptions that may prove to be wrong, and we may use our available capital resources sooner than we currently expect. Our future capital requirements will depend on many factors, including:

- progress in our research and development programs, as well as the magnitude of these programs;
- the timing, receipt and amount of any payments received in connection with strategic transactions;
- the timing, receipt and amount of upfront, milestone and other payments, if any, from present and future collaborators, if any;
- the timing, receipt and amount of sales and royalties, if any, from our potential products;
- our ability to maintain or improve the volume and pricing of our current product and service offerings and to develop new offerings, including those that may incorporate new technologies;

- the timing and capital requirements to scale up our various product and service offerings and customer acceptance thereof;
- our ability to maintain and establish additional collaborative arrangements and/or new strategic initiatives;
- the timing of regulatory approval of products of our collaborations and operations;
- the resources, time and cost required for the preparation, filing, prosecution, maintenance and enforcement of patent claims;
- investments we may make in current and future collaborators, including JVs;
- strategic mergers and acquisitions, including both the upfront acquisition cost as well as the cost to integrate, maintain, and expand the strategic target; and
- the costs associated with legal activities, including litigation, arising in the course of our business activities and our ability to prevail in any such legal disputes.

Until such time, if ever, as we can regularly generate positive operating cash flows, we may finance our cash needs through a combination of equity offerings, debt financings, government or other third-party funding, strategic alliances and licensing arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of our common shareholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our common shareholders. Debt financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through government or other third-party funding, marketing and distribution arrangements or other strategic transactions, collaborations, or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or to grant licenses on terms that may not be favorable to us.

Contractual obligations and commitments

The following table summarizes our significant contractual obligations and commitments as of September 30, 2018 and the effects such obligations are expected to have on our liquidity and cash flows in future periods:

	Total	Less Than 1 Year	1 - 3 Years	3 - 5 Years	More Than 5 Years
			(In thousands)		
Operating Leases	$ 75,817	$ 8,418	$ 18,844	$ 15,384	$ 33,171
Purchase commitments	8,826	4,048	4,778	—	—
Convertible debt	230,060	—	30,060	200,000	—
Cash interest payable on convertible debt	34,981	6,981	14,000	14,000	—
Long-term debt, excluding convertible debt	5,632	546	1,256	757	3,073
Contingent consideration	585	—	585	—	—
Total	$ 355,901	$ 19,993	$ 69,523	$ 230,141	$ 36,244

In addition to the obligations in the table above, as of September 30, 2018 we also have the following significant contractual obligations described below.

In conjunction with the formation of our JVs, we committed to making future capital contributions of at least $35.0 million to the JVs, subject to certain conditions and limitations. As of September 30, 2018, our remaining capital contribution commitments to our JVs were $15.1 million. These future capital contributions are not included in the table above due to the uncertainty of the timing and amounts of such contributions.

We are party to in-licensed research and development agreements with various academic and commercial institutions where we could be required to make future payments for annual maintenance fees as well as for milestones and royalties we might receive upon commercial sales of products that incorporate their technologies. These agreements are generally subject to termination by us and therefore no amounts are included in the tables above. At September 30, 2018, we also had research and development commitments with third parties totaling $15.9 million that had not yet been incurred.

In January 2015, we and ZIOPHARM jointly entered into a license agreement with the University of Texas MD Anderson Cancer Center, or MD Anderson, whereby we received an exclusive license to certain technologies owned by MD Anderson. As a result of the new license with ZIOPHARM ("Notes to the Consolidated Financial Statements (Unaudited) - Note 19" appearing elsewhere in this Quarterly Report), ZIOPHARM receives access to these technologies pursuant to the terms of the new license. We and ZIOPHARM are obligated to reimburse MD Anderson for out of pocket expenses for maintaining patents covering the licensed technologies. These reimbursements are not included in the table above due to the uncertainty of the timing and amounts of such reimbursements.

As part of our August 2014 acquisition of Trans Ova, we agreed to pay a portion of certain cash proceeds received from the litigation with XY, LLC. These amounts are not included in the table above due to the uncertainty of whether and when any amounts may be due.

In conjunction with a prior transaction associated with Trans Ova's subsidiary, ViaGen, in September 2012, we may be obligated to make certain future contingent payments to the former equity holders of ViaGen, up to a total of $3.0 million if certain revenue targets, as defined in the share purchase agreement, are met. This amount is not included in the table above due to the uncertainty of when we will make any of these future payments, if ever.

In January 2009, AquaBounty was awarded a grant to provide funding of a research and development project from the Atlantic Canada Opportunities Agency, a Canadian government agency. Amounts claimed by AquaBounty must be repaid in the form of a 10 percent royalty on any products commercialized out of this research and development project until fully paid. Because the timing of commercialization is subject to additional regulatory considerations, the timing of repayment is uncertain. AquaBounty claimed all amounts available under the grant, resulting in total long-term debt of $2.1 million on our consolidated balance sheet as of September 30, 2018. This amount is not included in the table above due to the uncertainty of the timing of repayment.

Net operating losses

As of September 30, 2018, we had net operating loss carryforwards of approximately $357.0 million for U.S. federal income tax purposes available to offset future taxable income, and U.S. federal and state research and development tax credits of approximately $7.9 million, prior to consideration of annual limitations that may be imposed under Section 382 of the Internal Revenue Code of 1986, as amended, or Section 382. These carryforwards begin to expire in 2022. Our direct foreign subsidiaries have foreign loss carryforwards of approximately $159.7 million, most of which do not expire. Excluding certain deferred tax liabilities totaling $9.4 million, our remaining net deferred tax assets, which primarily relate to these loss carryforwards, are offset by a valuation allowance due to our history of net losses.

As a result of our past issuances of stock, as well as due to prior mergers and acquisitions, certain of our net operating losses have been subject to limitations pursuant to Section 382. As of September 30, 2018, Intrexon has utilized all net operating losses subject to Section 382 limitations, other than those losses inherited via acquisitions. As of September 30, 2018, approximately $41.9 million of domestic net operating losses were inherited via acquisitions and are limited based on the value of the target at the time of the transaction. Future changes in stock ownership may also trigger an ownership change and, consequently, a Section 382 limitation.

The Tax Cuts and Jobs Act of 2017 introduced certain limitations on utilization of net operating losses that are generated after 2017, generally limiting utilization of those losses to 80 percent of future annual taxable income. However, losses generated after 2017 will generally have an indefinite carryforward period.

Off-balance sheet arrangements

We did not have during the periods presented, and we do not currently have, any off-balance sheet arrangements, other than operating leases and purchase commitments as mentioned above, as defined under Securities and Exchange Commission, or SEC, rules.

Critical accounting policies and estimates

Our management's discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which we have prepared in accordance with generally accepted accounting principles in the United States, or U.S. GAAP. The preparation of these consolidated financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, as well as the reported revenues and expenses during the reporting periods. We evaluate these estimates and judgments on an ongoing basis. We base our estimates on historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Our actual results may differ from these estimates under different assumptions or conditions.

There have been no material changes to our critical accounting policies from those described in "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in our Annual Report, except as follows:

Revenue Recognition

Effective January 1, 2018, we apply ASC 606. Under ASC 606, we recognize revenue when our customer obtains control of the promised goods or services, in an amount that reflects the consideration that we expect to receive in exchange for those goods or services. To determine revenue recognition for arrangements that are within the scope of ASC 606, we perform the following five steps: (i) identify the contract(s) with a customer, (ii) identify the promises and distinct performance obligations in the contract, (iii) determine the transaction price, (iv) allocate the transaction price to the performance obligations in the contract, and (v) recognize revenue when (or as) we satisfy the performance obligations.

Our revenue recognition accounting policies for periods prior to January 1, 2018 can be found in the audited consolidated financial statements and related notes thereto included in our Annual Report.

Collaboration and licensing revenues

We generate collaboration and licensing revenues through the execution of agreements with collaborators, known as ECCs, and licensing agreements whereby the collaborators or the licensee obtain exclusive access to our proprietary technologies for use in the research, development and commercialization of products and/or treatments in a contractually specified field of use. Generally, the terms of these agreements provide that we receive some or all of the following: (i) upfront payments upon consummation of the agreement; (ii) reimbursements for costs incurred by us for research and development and/or manufacturing efforts related to specific applications provided for in the agreement; (iii) milestone payments upon the achievement of specified development, regulatory and commercial activities; and (iv) royalties on sales of products arising from the collaboration or licensing agreement. The agreement typically continues in perpetuity unless terminated and each of our collaborators retains a right to terminate the agreement upon providing us written notice a certain period of time prior to such termination, generally 90 days.

Our collaboration and licensing agreements typically contain multiple promises, including technology licenses, research and development services, and in certain cases manufacturing services. We determine whether each of the promises is a distinct performance obligation. As the nature of the promises in our collaboration and licensing agreements are highly integrated and interrelated, we typically combine most of our promises into a single performance obligation. Because we are performing research and development services during early-stage development, the services are integral to the utilization of the technology license. Therefore, we have determined that the technology license and research and development services are typically inseparable from each other during the performance period of our collaboration and licensing agreements. Contingent manufacturing services that may be provided under certain of our agreements are considered to be a separate future contract and not part of the current collaboration or licensing agreement.

At contract inception, we determine the transaction price, including fixed consideration and any estimated amounts of variable consideration. The upfront payment received upon consummation of the agreement is fixed and nonrefundable. Variable consideration is subject to a constraint and amounts are included in the transaction price to the extent that it is probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. Variable consideration may include reimbursements for costs incurred by us for research and development efforts, milestone payments upon the achievement of certain development, regulatory and commercial activities, and royalties on sales of products arising from the collaboration or licensing agreement. We determine the initial transaction price and exclude variable consideration that is otherwise constrained pursuant to the guidance in ASC 606.

The transaction price is allocated to the performance obligations in the agreement based on the standalone selling price of each performance obligation. We typically group the promises in our collaboration and licensing agreements into one performance obligation so the entire transaction price relates to this single performance obligation. The technology license included in the single performance obligation is considered a functional license. However, it is typically combined into a single performance obligation as we provide interrelated research and development services along with other obligations over an estimated period of performance. We utilize judgment to determine the most appropriate method to measure our progress of performance under the agreement, primarily based on inputs necessary to fulfill the performance obligation. We evaluate our measure of progress to recognize revenue each reporting period and, if necessary, adjust the measure of performance and related revenue recognition. Our measure of performance and revenue recognition involves significant judgment and assumptions, including, but not limited to, estimated costs and timelines to complete our performance obligations. We evaluate modifications and amendments to our contracts to determine whether any changes should be accounted for prospectively or on a cumulative catch-up basis.

Payments received for cost reimbursements for research and development efforts are recognized as revenue as the services are performed, in connection with the single performance obligation discussed above. The reimbursements relate specifically to our efforts to provide services and the reimbursements are consistent with what we would typically charge other collaborators for similar services.

Milestone payments are evaluated at the inception of the agreement to determine whether the milestones are considered probable of being achieved. We typically determine that the milestones are not probable at inception of the agreement due to the uncertainty of when and if the milestone will be achieved.

Royalties, including sales-based milestones, received under the agreements will be recognized as revenue when sales have occurred because we apply the sales- or usage-based royalties recognition exception provided for under ASC 606. We determined the application of this exception is appropriate because at the time the royalties are generated, the technology license granted in the agreement is the predominant item to which the royalties relate.

As we receive upfront payments in our collaboration and licensing agreements, we evaluate whether any significant financing components exist in our collaboration and licensing agreements. Based on the nature of our collaboration and licensing agreements, there are no significant financing components as the purpose of the upfront payment is not to provide financing. The purpose is to provide the collaborator with assurance that we will complete our obligations under the contract or to secure the right to a specific product or service at the collaborator's discretion. In addition, the variable payments generally align with the timing of performance or the timing of the consideration varies on the basis of the occurrence or nonoccurrence of a future event that is not substantially within the control of the collaborator or us.

From time to time, we and certain collaborators may cancel our agreements, relieving us of any further performance obligations under the agreement. Upon such cancellation or when we have determined no further performance obligations are required of us under an agreement, we recognize any remaining deferred revenue.

Product and service revenues

We generate product and service revenues primarily through sales of products and services that are created from technologies developed or owned by us. Our current offerings include sales of advanced reproductive technologies, including our bovine embryo transfer and in vitro fertilization processes and from genetic preservation and sexed semen processes and applications of such processes to other livestock, as well as sales of livestock and embryos produced using these processes and used in production. As each promised product or service is distinct, we recognize the transaction price as revenue when the customer takes ownership of the promised product or when the promised service is rendered. Payment terms are typically due within 30 days.

Recent accounting pronouncements

For information with respect to recent accounting pronouncements and the impact of these pronouncements on our consolidated financial statements, see "Notes to the Consolidated Financial Statements (Unaudited) - Note 2" appearing elsewhere in this Quarterly Report.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

The following sections provide quantitative information on our exposure to interest rate risk, stock price risk, and foreign currency exchange risk. We make use of sensitivity analyses, which are inherently limited in estimating actual losses in fair value that can occur from changes in market conditions.

Interest rate risk

We had cash, cash equivalents and short-term investments of $246.6 million and $74.4 million at September 30, 2018 and December 31, 2017, respectively. Our cash and cash equivalents and short-term investments consist of cash, money market funds, U.S. government debt securities, and certificates of deposit. The primary objectives of our investment activities are to preserve principal, maintain liquidity and maximize income without significantly increasing risk. Our investments consist of U.S. government debt securities and certificates of deposit, which may be subject to market risk due to changes in prevailing interest rates that may cause the fair values of our investments to fluctuate. We believe that a hypothetical 100 basis point increase in interest rates would not materially affect the fair value of our interest-sensitive financial instruments and any such losses would only be realized if we sold the investments prior to maturity.

Investments in publicly traded companies' common stock

We have common stock investments in several publicly traded companies that are subject to market price volatility. We have adopted the fair value method of accounting for these investments, except for our investment in AquaBounty as further described below, and therefore, have recorded them at fair value at the end of each reporting period with the unrealized gain or loss recorded as a separate component of other income, net for the period. As of September 30, 2018 and December 31, 2017, the original aggregate cost basis of these investments was $100.1 million and $102.6 million, respectively, and the market value was $4.7 million and $15.1 million, respectively. The fair value of these investments is subject to fluctuation in the future due to the volatility of the stock market, changes in general economic conditions and changes in the financial conditions of these companies. The fair value of these investments as of September 30, 2018 would be approximately $5.2 million and $3.8 million, respectively, based on a hypothetical 10 percent increase or 20 percent decrease in the value of the investments. The fair value of these investments as of December 31, 2017 would be approximately $16.6 million and $12.1 million, respectively, based on a hypothetical 10 percent increase or 20 percent decrease in the value of the investments.

The common stock of AquaBounty is traded on the NASDAQ Stock Market. As of September 30, 2018, we owned 6,700,738 shares, or approximately 52 percent. The fair value of our investment in AquaBounty as of September 30, 2018 and December 31, 2017 was $21.5 million and $18.2 million, respectively, based on AquaBounty's quoted closing price on the NASDAQ Stock Market. The fair value of our investment in AquaBounty as of September 30, 2018 would be approximately $23.7 million and $17.2 million, respectively, based on a hypothetical 10 percent increase or 20 percent decrease in the share price of AquaBounty. The fair value of our investment in AquaBounty as of December 31, 2017 would be approximately $20.0 million and $14.6 million, respectively, based on a hypothetical 10 percent increase or 20 percent decrease in the share price of AquaBounty.

Investments in publicly traded companies' preferred stock

We have preferred stock investments in several publicly traded companies, most of which may be converted to common stock in the future. We have adopted the fair value method of accounting for these investments whereby the value of preferred stock is adjusted to fair value as of each reporting date. As of September 30, 2018 and December 31, 2017, the original cost basis of these investments, including dividends, was $162.9 million and $148.3 million, respectively, and the fair value of these investments was $158.4 million and $161.2 million, respectively. The fair value of these investments is subject to fluctuation in the future due to, among other things, the likelihood and timing of conversion of the preferred stock into common stock, the volatility of each company's common stock, and changes in general economic and financial conditions of these companies. The fair value of these investments as of September 30, 2018 would be approximately $174.2 million and $126.7 million, respectively, based on a hypothetical 10 percent increase or 20 percent decrease in the value of the investments. The fair value of these investments as of December 31, 2017 would be approximately $177.3 million and $129.0 million, respectively, based on a hypothetical 10 percent increase or 20 percent decrease in the value of the investments. In October 2018, we retired our ZIOPHARM preferred shares which had a fair value as of September 30, 2018 of $158.1 million.

Foreign currency exchange risk

We have international subsidiaries in Belgium, Brazil, Canada, England, and Hungary. These subsidiaries' assets, liabilities, and current revenues and expenses are denominated in their respective foreign currency. We do not hedge our foreign currency

exchange rate risk. The effect of a hypothetical 10 percent change in foreign currency exchange rates applicable to our business would not have a material impact on our consolidated financial statements.

Item 4. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our principal executive and financial officers, evaluated the effectiveness of our disclosure controls and procedures as of September 30, 2018. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, or Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Our principal executive and financial officers have concluded that, as of September 30, 2018, our disclosure controls and procedures were not effective because of the material weakness in internal control over financial reporting described below.

Material Weakness in Internal Control Over Financial Reporting

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the annual or interim financial statements will not be prevented or detected on a timely basis.

We did not maintain effective internal controls related to the adoption of ASC 606. Specifically, we did not design controls which were sufficiently precise to identify and account for the impacts of adopting ASC 606 on our open ECCs, including gross versus net presentation for payments pursuant to one of the Company's contracts, the guidance for contract modifications to a contract that had been modified prior to the adoption of ASC 606, and the measurement of progress for performance obligations satisfied over time. This control deficiency resulted in the misstatement of accumulated deficit, deferred revenue, and collaboration and licensing revenues, and restatement of the Company's consolidated financial statements for the quarter ended March 31, 2018.

Additionally, this control deficiency could result in a misstatement of the aforementioned account balances or disclosures that would result in a material misstatement to the annual or interim consolidated financial statements that would not be prevented or detected. Accordingly, our management has determined that this control deficiency constitutes a material weakness.

Changes in Internal Control Over Financial Reporting

As described below, we have begun to implement changes to our controls and procedures to address the material weakness in our internal controls over financial reporting. Other than the changes noted below, there have been no changes in our internal control over financial reporting during the three months ended September 30, 2018, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management's Plan for Remediation of Material Weakness

Management's planned actions to address the material weakness described above include (a) engagement of third-party technical accounting advisors on any future complex matters which fall within the scope of ASC 606, (b) design and implementation of a more precise review framework whereby our advisors will provide a more detailed assessment of how ASC 606 applies to all key elements of our contracts with customers and (c) design procedures for a comprehensive review of such deliverables and conclusions by management via a sufficiently detailed analysis of the relevant contracts, amendments, accounting guidance and related interpretations.

PART II. OTHER INFORMATION

Item 1. Legal Proceedings

From time to time, we are involved in litigation or legal matters, including governmental investigations. While the outcome of these matters cannot be predicted with certainty, we do not currently expect that any ongoing matters will have a material adverse effect on our business or financial position. However, should one or more of these matters be resolved in a manner different than our current expectation, the effect on our operations or financial position could be material.

We previously disclosed that in January 2017, the Division of Enforcement of the SEC informed us of an investigation that we believe concerned certain issues raised by a previously disclosed consolidated putative shareholder class action lawsuit that was dismissed on November 1, 2017, and a previously disclosed shareholder derivative action that was dismissed on January 25, 2018. In September 2018, the Division of Enforcement informed us that it had concluded its investigation of these matters and that the Division of Enforcement does not intend to recommend enforcement action against us based on the investigation.

Item 1A. Risk Factors

As disclosed in "Item 1A. Risk Factors" in our Annual Report, there are a number of risks and uncertainties that may have a material effect on the operating results of our business and our financial condition. There are no additional material updates or changes to our risk factors since the filing of our Annual Report, except as follows:

Servicing our debt requires a significant amount of cash, and we may not have sufficient cash flow from our business to pay our substantial debt.

Our ability to make scheduled payments of the principal of, to pay interest on or to refinance our indebtedness, including the Convertible Notes, depends on our future performance, which is subject to economic, financial, competitive and other factors beyond our control. Our business may not continue to generate cash flow from operations in the future sufficient to service our debt and make necessary capital expenditures. If we are unable to generate such cash flow, we may be required to adopt one or more alternatives, such as selling assets, restructuring debt or obtaining additional equity capital on terms that may be onerous or highly dilutive. Our ability to refinance our indebtedness will depend on the capital markets and our financial condition at such time. We may not be able to engage in any of these activities or engage in these activities on desirable terms, which could result in a default on our debt obligations.

In addition, the Convertible Notes are our obligations exclusively and are not guaranteed by any of our operating subsidiaries. A substantial portion of our consolidated assets is held by our subsidiaries. Accordingly, our ability to service our debt, including the Convertible Notes, depends on the results of operations of our subsidiaries and upon the ability of such subsidiaries to provide us with cash, whether in the form of dividends, loans or otherwise, to pay amounts due on our obligations, including the Convertible Notes. Our subsidiaries are separate and distinct legal entities and have no obligation, contingent or otherwise, to make payments on the Convertible Notes or to make any funds available for that purpose. In addition, dividends, loans or other distributions to us from such subsidiaries may be subject to contractual and other restrictions and are subject to other business considerations.

Despite our current debt levels, we may still incur substantially more debt or take other actions that would intensify the risks discussed above.

Despite our current consolidated debt levels, we and our subsidiaries may be able to incur substantial additional debt in the future, subject to the restrictions contained in our debt instruments, some of which may be secured debt. We are not restricted under the terms of the indenture governing the Convertible Notes from incurring additional debt, securing existing or future debt, recapitalizing our debt or taking a number of other actions that are not limited by the terms of the indenture governing the Convertible Notes that could have the effect of diminishing our ability to make payments on the Convertible Notes when due.

We may not have the ability to raise the funds necessary to settle conversions of the Convertible Notes in cash or to repurchase the Convertible Notes upon a fundamental change, and our future debt may contain limitations on our ability to pay cash upon conversion or repurchase of the Convertible Notes.

Holders of Convertible Notes have the right to require us to repurchase their Convertible Notes upon the occurrence of a fundamental change at a fundamental change repurchase price equal to 100 percent of the principal amount of the Convertible Notes to be repurchased, plus accrued and unpaid interest, if any. In addition, upon conversion of the Convertible Notes, unless we elect to deliver solely shares of our common stock to settle such conversion (other than paying cash in lieu of delivering any fractional share), we will be required to make cash payments in respect of the Convertible Notes being converted. However, we

may not have enough available cash or be able to obtain financing at the time we are required to make repurchases of Convertible Notes surrendered therefor or Convertible Notes being converted. In addition, our ability to repurchase the Convertible Notes or to pay cash upon conversions of the Convertible Notes may be limited by law, by regulatory authority or by agreements governing our future indebtedness. Our failure to repurchase Convertible Notes at a time when the repurchase is required by the indenture or to pay any cash payable on future conversions of the Convertible Notes as required by the indenture would constitute a default under the indenture. A default under the indenture or the fundamental change itself could also lead to a default under agreements governing our future indebtedness. If the repayment of the related indebtedness were to be accelerated after any applicable notice or grace periods, we may not have sufficient funds to repay the indebtedness and repurchase the Convertible Notes or make cash payments upon conversions thereof.

The conditional conversion feature of the Convertible Notes, if triggered, may adversely affect our financial condition and operating results.

In the event the conditional conversion feature of the Convertible Notes is triggered, holders of Convertible Notes will be entitled to convert the Convertible Notes at any time during specified periods at their option. If one or more holders elect to convert their Convertible Notes, unless we elect to satisfy our conversion obligation by delivering solely shares of our common stock (other than paying cash in lieu of delivering any fractional share), we would be required to settle a portion or all of our conversion obligation through the payment of cash, which could adversely affect our liquidity. In addition, even if holders do not elect to convert their Convertible Notes, we could be required under applicable accounting rules to reclassify all or a portion of the outstanding principal of the Convertible Notes as a current rather than long-term liability, which would result in a material reduction of our net working capital.

The accounting for convertible debt securities that may be settled in cash, such as the Convertible Notes, could have a material effect on our reported financial results.

In May 2008, the Financial Accounting Standards Board, or FASB, issued FASB Staff Position No. APB 14-1, *Accounting for Convertible Debt Instruments That May Be Settled in Cash Upon Conversion (Including Partial Cash Settlement)*, which has subsequently been codified as ASC Subtopic 470-20, *Debt with Conversion and Other Options*, or ASC 470-20. Under ASC 470-20, an entity must separately account for the liability and equity components of the convertible debt instruments (such as the Convertible Notes) that may be settled entirely or partially in cash upon conversion in a manner that reflects the issuer's economic interest cost. The effect of ASC 470-20 on the accounting for the Convertible Notes is that the equity component is required to be included in the additional paid-in capital section of shareholders' equity on our consolidated balance sheet, and the value of the equity component would be treated as original issue discount for purposes of accounting for the debt component of the Convertible Notes. As a result, we record a greater amount of non-cash interest expense in current periods presented as a result of the amortization of the discounted carrying value of the Convertible Notes to their face amount over the term of the Convertible Notes. We report lower net income in our financial results because ASC 470-20 requires interest to include both the current period's amortization of the debt discount and the instrument's coupon interest, which could adversely affect our reported or future financial results, the trading price of our common stock and the trading price of the Convertible Notes.

In addition, under certain circumstances, convertible debt instruments (such as the Convertible Notes) that may be settled entirely or partly in cash are currently accounted for utilizing the treasury stock method, the effect of which is that the shares issuable upon conversion of the Convertible Notes are not included in the calculation of diluted earnings per share except to the extent that the conversion value of the Convertible Notes exceeds their principal amount. Under the treasury stock method, for diluted earnings per share purposes, the transaction is accounted for as if the number of shares of common stock that would be necessary to settle such excess, if we elected to settle such excess in shares, are issued. We cannot be sure that the accounting standards in the future will continue to permit the use of the treasury stock method. If we are unable to use the treasury stock method in accounting for the shares issuable upon conversion of the Convertible Notes, then our diluted earnings per share would be adversely affected.

The issuance of our common stock pursuant to a share lending agreement, including sales of the shares that we lend, and other market activity related to the share lending agreement may lower the market price of our common stock.

In connection with our offering of the Convertible Notes in July 2018, we entered into a share lending agreement with J.P. Morgan Securities LLC (which we refer to when acting in this capacity as the "share borrower"), the underwriter for our offering, pursuant to which we agreed to lend up to 7,479,431 shares of our common stock to the share borrower.

We have been informed by the share borrower that it or one of its affiliates intends to use the short position created by the share loan and the concurrent short sales of the borrowed shares to facilitate transactions by which investors in the Convertible Notes, or the Convertible Notes Investors, may hedge their investments through short sales or privately negotiated derivatives transactions.

The existence of the share lending agreement in connection with the offering of the borrowed shares, the short sales of our common stock effected in connection with the sale of the Convertible Notes and the related derivatives transactions, or any unwind of such short sales or derivatives transactions, could cause the market price of our common stock to be lower over the term of the share lending agreement than it would have been had we not entered into that agreement, due to the effect of the increase in the number of outstanding shares of our common stock or otherwise. For example, in connection with any cash settlement of any such derivative transaction, the share borrower or its affiliates may purchase shares of our common stock and the Convertible Notes Investors may sell shares of our common stock, which could temporarily increase, temporarily delay a decline in, or temporarily decrease, the market price of our common stock. The market price of our common stock could be further negatively affected by these or other short sales of our common stock, including other sales by the Convertible Notes Investors hedging their investment therein.

Adjustments by the Convertible Notes Investors of their hedging positions in our common stock and the expectation thereof may have a negative effect on the market price of our common stock.

The borrowed shares are used by the Convertible Notes Investors to establish hedged positions with respect to our common stock through short sale transactions or privately negotiated derivative transactions. The number of borrowed shares may be more or less than the number of shares that will be needed in such hedging transactions. Any buying or selling of shares of our common stock by those Convertible Notes Investors to adjust their hedging positions may affect the market price of our common stock.

In addition, the existence of the Convertible Notes may also encourage short selling by market participants because the conversion of the Convertible Notes could depress our common stock price. The price of our common stock could be affected by possible sales of our common stock by the Convertible Notes Investors who view the Convertible Notes as a more attractive means of equity participation in us and by hedging or arbitrage trading activity that we expect to occur involving our common stock. This hedging or arbitrage trading activity could, in turn, affect the market price of the Convertible Notes.

Changes in the accounting guidelines relating to the borrowed shares or our inability to classify the borrowed shares as equity could decrease our reported earnings per share and potentially our common stock price.

Because the borrowed shares (or identical shares) must be returned to us when the share lending agreement terminates pursuant to its terms (or earlier in certain circumstances), we believe that under U.S. GAAP, as presently in effect, assuming the borrowed shares issued pursuant to the share lending agreement are classified as equity under U.S. GAAP, the borrowed shares will not be considered outstanding for the purpose of computing and reporting our earnings per share. If accounting guidelines were to change in the future or we are unable to classify the borrowed shares issued pursuant to the share lending agreement as equity, we may be required to treat the borrowed shares as outstanding for purposes of computing earnings per share, our reported earnings per share would be reduced and our common stock price could decrease, possibly significantly.

If we experience a significant breach of data security or disruption in our information systems, our business could be adversely affected.

We rely on various information systems to manage our operations and to store information, including sensitive data such as confidential business information and personally identifiable information. These systems could be vulnerable to interruption or malfunction, including due to events beyond our control, and to unauthorized access, computer hackers, ransomware, viruses and other security problems. Failure of these systems or any significant breach of our data security could have an adverse effect on our business and may materially adversely affect our operating results and financial condition.

Data security breaches could result in loss or misuse of information, which could, in turn, result in potential regulatory actions or litigation, including material claims for damages, compelled compliance with breach notification laws, interruption to our operations, damage to our reputation or could otherwise have a material adverse effect on our business, financial condition and operating results. Companies throughout our industry have been increasingly subject to a wide variety of security incidents, cyber-attacks and other attempts to gain unauthorized access to networks or sensitive information. While we have implemented and continue to implement cybersecurity safeguards and procedures, we may be unable to implement adequate protective measures. As cyber threats continue to evolve, we may be required to expend additional resources to enhance our cybersecurity measures or to investigate or remediate any vulnerabilities or breaches.

In addition, our information systems are complex and include software that is internally developed, software licensed from third parties and hardware purchased from third parties. These products may contain internal errors or defects, particularly when first introduced or when new versions or enhancements are released.

Although we maintain insurance to protect ourselves in the event of a breach or disruption of our information systems, we cannot ensure that the coverage is adequate to compensate for any damages that may be incurred.

Additionally, in evaluating our risks, readers also should carefully consider the risk factors discussed in our Annual Report, which could materially affect our business, financial condition or operating results, in addition to the other information set forth in this report and in our other filings with the SEC.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds

From July 1, 2018 through September 30, 2018, we issued 166,143 unregistered shares of our common stock as payment under the Services Agreement entered into and effective as of November 1, 2015, as amended, by and between us and Third Security as previously discussed in our Current Report on Form 8-K filed on January 2, 2018. We issued these shares of common stock in reliance on exemptions from registration under Section 4(a)(2) of the Securities Act.

Item 3. Defaults on Senior Securities

None.

Item 4. Mine Safety Disclosures

Not applicable.

Item 5. Other Information

None.

Item 6. Exhibits

Exhibit No.	Description
4.1*	Base Indenture, dated July 3, 2018, by and between Intrexon Corporation and The Bank of New York Mellon Trust Company, N.A. (incorporated by reference to Exhibit 4.1 to Intrexon Corporation's Current Report on Form 8-K filed on July 3, 2018 with the Securities and Exchange Commission).
4.2*	First Supplemental Indenture (including the form of 3.50% convertible senior notes due 2023), dated July 3, 2018, by and between Intrexon Corporation and The Bank of New York Mellon Trust Company, N.A. (incorporated by reference to Exhibit 4.2 to Intrexon Corporation's Current Report on Form 8-K filed on July 3, 2018 with the Securities and Exchange Commission).
10.1**#	License Agreement, dated October 5, 2018, by and between Precigen, Inc. and ZIOPHARM Oncology, Inc.
31.1	Certification of Randal J. Kirk, Chairman and Chief Executive Officer (Principal Executive Officer) of Intrexon Corporation, pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Rick L. Sterling, Chief Financial Officer (Principal Financial Officer) of Intrexon Corporation, pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1**	Certification of Randal J. Kirk, Chairman and Chief Executive Officer (Principal Executive Officer) of Intrexon Corporation, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2**	Certification of Rick L. Sterling, Chief Financial Officer (Principal Financial Officer) of Intrexon Corporation, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.0	Interactive Data File (Quarterly Report on Form 10-Q, for the quarterly period ended September 30, 2018, formatted in XBRL (eXtensible Business Reporting Language)). Attached as Exhibit 101.0 to this Quarterly Report on Form 10-Q are the following documents formatted in XBRL: (i) the Consolidated Balance Sheets as of September 30, 2018 and December 31, 2017, (ii) the Consolidated Statements of Operations for the three and nine months ended September 30, 2018 and 2017, (iii) the Consolidated Statements of Comprehensive Loss for the three and nine months ended September 30, 2018 and 2017, (iv) the Consolidated Statements of Shareholders' and Total Equity for the nine months ended September 30, 2018, (v) the Consolidated Statements of Cash Flows for the nine months ended September 30, 2018 and 2017, and (vi) the Notes to Consolidated Financial Statements.

* Previously filed.

** Furnished herewith.

Portions of the exhibit (indicated by asterisks) have been omitted pursuant to a confidential treatment order granted by the Securities and Exchange Commission.

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.

Intrexon Corporation
(Registrant)

Date: November 8, 2018

By: /s/ Rick L. Sterling
Rick L. Sterling
Chief Financial Officer
(Principal Financial and Accounting Officer)

Exhibit 10.1

EXCLUSIVE LICENSE AGREEMENT

This **Exclusive License Agreement** (the "**Agreement**") is entered into as of October 5, 2018 (the "**Effective Date**") by and between **ZIOPHARM Oncology, Inc.**, a Delaware corporation, with its principal place of business at 1180 Avenue of the Americas, 19th Floor, New York, NY 10036 ("**Ziopharm**"), and **Precigen, Inc.**, a Delaware corporation, with its principal place of business at 20358 Seneca Meadows Parkway, Germantown, MD 20876 ("**Precigen**"), a wholly owned subsidiary of Intrexon Corporation, a Virginia corporation, with its principal place of business at 20374 Seneca Meadows Parkway, Germantown, MD 20876 ("**Intrexon**"). Ziopharm and Precigen are sometimes referred to herein individually as a "**Party**" and collectively as the "**Parties**". Intrexon is a party to: the Recitals; Section 2.2, Section 3.4, Article 13 and Section 14.13 of this Agreement.

RECITALS

Whereas, Precigen possesses certain intellectual property related to Licensed Products (as defined below);

Whereas, Ziopharm is a biopharmaceutical company focused on development of immuno-oncology products;

Whereas, Intrexon and Ziopharm are parties to certain agreements that, by this Agreement, are being terminated and/or amended;

Whereas, in consideration of Ziopharm entering into this Agreement, Intrexon has agreed to forfeit, return, contribute and transfer to Ziopharm all shares of Ziopharm's Series 1 Preferred Stock held by or payable to Intrexon as of the date of this Agreement;

Whereas, in connection with the termination of the 2011 Stock Purchase Agreement (as defined below), Randal J. Kirk has agreed to resign from Ziopharm's board of directors and all committees thereof effective upon the Effective Date; and

Whereas, in connection with the Parties entering into this Agreement, the Parties have agreed to release each other and certain related parties from certain claims that either such Party may have under any prior agreement or arrangement between the Parties.

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

ARTICLE 1
DEFINITIONS

1.1 "**2011 Registration Rights Agreement**" means that certain Registration Rights Agreement, by and between Ziopharm and Intrexon, dated as of January 12, 2011.

1.2 "**2011 Stock Purchase Agreement**" means that certain Stock Purchase Agreement, by and between Ziopharm and Intrexon, dated as of January 6, 2011, as amended by that certain Amendment to Stock Purchase Agreement dated February 1, 2011.

1.3 "**2015 MDACC License**" means that certain License Agreement by and among Intrexon, Ziopharm and MDACC with an effective date of January 13, 2015, as amended, and as assigned by Intrexon and assumed by Precigen effective as of January 1, 2018.

1.4 "**2016 Securities Issuance Agreement**" means that certain Securities Issuance Agreement, by and between the Ziopharm and Intrexon, dated as of June 29, 2016.

1.5 "**2018 MDACC License**" means that certain License Agreement by and among Precigen, Ziopharm and MDACC with an effective date of January 8, 2018, as amended.

1.6 "**AAA**" has the meaning set forth in Section 12.2.

1.7 "**AAA Rules**" has the meaning set forth in Section 12.2.

1.8 "**Accessory Material Agents**" means those materials as set forth in a letter agreement dated as of the date hereof by and between the Parties for use in the Field with Licensed Products.

1.9 "**Activator Ligand**" means (i) veledimex and all formulations covered by the Drug Master File, (ii) changes to the subject matter described in (i) made by Ziopharm to advance a Licensed Product ("**Ziopharm Veledimex Alterations**"), and (iii) [*****] formulations of veledimex that include [*****] solely to the extent such formulations have been generated prior to the Effective Date.

1.10 "**Adenovirus Production Patents**" means Schedules 5 and 6 of the Licensed Intellectual Property in Exhibit B.

1.11 "**Affiliate**" means, with respect to a particular Party or other entity, a person, corporation, partnership, or other entity that controls, is controlled by or is under common control with such Party or other entity. For the purposes of this definition, the word "control" (including, with correlative meaning, the terms "controlled by" or "under common control with") means the actual power, either directly or indirectly through one or more intermediaries, to direct or cause the direction of the management and policies of such entity, whether by the ownership of fifty percent (50%) or more of the voting stock of such entity, or by contract or otherwise.

1.12 "**Agreed Services**" shall have the meaning set forth in Section 4.5(a).

1.13 "**Assigned Contracts**" shall have the meaning set forth in Section 3.2(a).

1.14 "**Bankrupt Party**" has the meaning set forth in Section 14.2(a).

1.15 "[*****] **CAR Products**" means any biological product, process or therapy developed under or arising from the [*****] ([*****]) CAR Program that is comprised of a CAR that is directed to [*****], including all forms, formulations, presentations, doses, administrations and package configurations.

1.16 "[*****] **CAR Program**" means a program(s) of Research and Development focused on using CAR cells directed to [*****].

1.17 "**Business Day**" means a day other than Saturday, Sunday or any day that banks in New York, New York, USA are required or permitted to be closed.

1.18 "**CAR-T Cap**" shall have the meaning set forth in Section 6.6(c).

1.19 "**CAR-T License**" shall have the meaning set forth in Section 1.91.

1.20 "**CAR-T Products**" means any biological product, process or therapy that is comprised of a CAR-T other than CD19 or [*****].

1.21 "**CAR-T Royalty Term**" shall have the meaning set forth in Section 6.6(e).

1.22 "**CD19 CAR Products**" means any biological product, process or therapy developed under or arising from the CD19 CAR Program that is comprised of a CAR that is directed to CD19, including all forms, formulations, presentations, doses, administrations and package configurations. CD19 CAR Products include all product candidates currently under Development by Ziopharm (and Precigen and its Affiliates) as of the Effective Date that contain a CAR that targets CD19.

1.23 "**CD19 CAR Program**" means a program(s) of Research and Development focused on using CAR cells directed to CD19.

1.24 "**Certificate of Designation**" means the Ziopharm's Certificate of Designation, Preferences and Rights of the Series 1 Preferred Stock, dated as of June 29, 2016.

1.25 "**Change of Control**" means, with respect to a Party: (a) the sale of all or substantially all of its assets or all of its assets relating to a Licensed Product; (b) a merger, reorganization or consolidation involving such Party in which the holders of the voting securities of such Party outstanding immediately prior thereto cease to beneficially own at least fifty percent (50%) of the combined voting power of the surviving entity, directly or indirectly, immediately after such merger, reorganization or consolidation; or (c) a transaction in which an entity or individual, or group of entities and/or individuals acting in concert, acquires more than fifty percent (50%) of the voting equity securities of such Party.

1.26 "**Chimeric Antigen Receptor**" or "**CAR**" means [*****]. For the avoidance of doubt, [*****]. For clarity CARs include CAR-Ts.

1.27 "**Chimeric Antigen Receptor T-Cell**" or "**CAR-T**" means (i) a T-Cell having a Chimeric Antigen Receptor, or (ii) a T-Cell under switch control having a Chimeric Antigen Receptor and any Activator Ligands or antibodies that are administered to control such T-Cells irrespective of whether such Activator Ligands and antibodies are packaged with and/or delivered with such T-cell directed to a Chimeric Antigen Receptor, or (iii) any component sold as a kit, such as a device, delivery system or therapy scheme for (i) or (ii) to modify such T-Cell including one or more polypeptides or nucleic acids encoding a CAR.

1.28 "**Claims**" has the meaning set forth in Section 9.1.

1.29 "**Combination Product**" means: (a) a pharmaceutical product that consists of a Licensed Product (or CAR-T Product, as applicable) and at least one other clinically active ingredient that is not a Licensed Product (or CAR-T Product, as applicable); or (b) any combination of a Licensed Product (or CAR-T Product, as applicable) and another pharmaceutical product that contains at least one other clinically active ingredient that is not a Licensed Product (or CAR-T Product, as applicable), where such products are not formulated together but are sold together as a single product and invoiced as one product. The other clinically active ingredient(s) in clause (a) and the other pharmaceutical product(s) in clause (b) are each referred to as the "**Other Product(s)**".

1.30 "**Commercialization**" means the marketing, promotion, sale and/or distribution of products in the Territory, and all related manufacturing activities not included in the definition of Development. Commercialization shall include commercial activities conducted in preparation for Licensed Product launch. "**Commercialize**" has a correlative meaning.

1.31 "**Commercialization Costs**" means, with respect to (i) the Gorilla IL-12 Products in the HPV Field, or (ii) the Gorilla IL-12 Products in the Field, but outside of the HPV Field the following costs incurred by or on behalf of Ziopharm or its Affiliates that are directly allocable to the Commercialization of such product, in all cases determined in accordance with GAAP consistently and strictly applied: (a) Manufacturing Costs; (b) Sales and Marketing Costs; (c) Distribution Costs; (d) Third Party Payments; (e) trademark and patent prosecution costs; (f) costs of patient assistance and indigent/expanded access programs with respect to such Gorilla IL-12 Product (g) import duties and similar charges for Gorilla IL-12 Products sold, to the extent not recovered as a Manufacturing Cost; (h) amounts written off by reason of uncollectible debts, to the extent consistent with Ziopharm's business practices for its other products; (i) costs of developing Information and data specifically intended for national accounts, managed care organizations and group purchasing organizations with respect to a Gorilla IL-12 Product; (j) costs of conducting advisory board meetings or other consultant programs, other than internal FTE costs, the purpose of which is to obtain advice and feedback related to Commercialization of a Gorilla IL-12 Product and (k) all Regulatory Costs. To the extent that any of the foregoing expenses apply to both the Gorilla IL-12 Product and other Licensed Products, such costs shall be reasonably allocated. Notwithstanding the foregoing, Commercialization Costs shall exclude (i) any Gorilla Development Costs; and (ii) income tax liabilities and corporate overhead costs of Ziopharm.

1.32 "**Commercially Reasonable Efforts**" means, with respect to the efforts and resources to be expended, or considerations to be undertaken by Ziopharm with respect to any objective, activity, or decision to be undertaken hereunder with respect to the Development or Commercialization of an IL-12 Product, CD19 CAR Product or TCR Exclusive Product, the reasonable efforts and resources to accomplish such objective, activity or decision that would be comparable with the efforts and resources that a similarly situated biopharmaceutical company would normally use in the exercise of its reasonable business discretion to accomplish a similar objective taking into account: (i) expected and actual issues of efficacy, safety and manufacturing, and expected and actual approved labeling, including the discovery of unanticipated toxicity or any material adverse event or condition relating to the safety or efficacy of any such IL-12 Product, CD19 CAR Product or TCR Exclusive Product; (ii) the expected and actual competitiveness of alternative products (including generic or biosimilar products) under development or sold in the marketplace; (iii) adverse changes in the targeted market conditions which affect the market potential of such IL-12 Product, CD19 CAR Product or TCR Exclusive Product; (iv) the expected and actual product profile of such IL-12 Product, CD19 CAR Product or TCR Exclusive Product, taking into account the existence of failed or inconclusive clinical studies; (v) the nature and extent of expected and actual market exclusivity (including patent coverage, regulatory and other exclusivity) of such IL-12 Product, CD19 CAR Product or TCR Exclusive Product; (vi) the likelihood of Regulatory Approval given the regulatory structure involved, including regulatory or data exclusivity; and (vii) changes in clinical or regulatory strategy justified by compliance with the requirements of regulatory feedback from any Regulatory Authority. Commercially Reasonable Efforts shall take into account the stage of Development, product profile and expected Regulatory Approval and commercial success of each IL-12 Product, CD19 CAR Product or TCR Exclusive Product and shall not necessarily require Ziopharm to Develop each type of an IL-12 Product, CD19 CAR Product or TCR Exclusive Product.

1.33 "**Confidential Information**" of a Party means any and all Information of such Party that is disclosed to the other Party under this Agreement, whether in oral, written, graphic, or electronic form. In addition, all Information disclosed by Intrexon pursuant to the Ziopharm Agreement shall be deemed to be Precigen's Confidential Information disclosed hereunder, and all Information disclosed by Ziopharm pursuant to the Ziopharm Agreement shall be deemed to be Ziopharm's Confidential Information disclosed hereunder; provided that any use or disclosure of any Information that is authorized under Section 10.2 shall not be restricted by, or be deemed a violation of, the surviving confidentiality provisions under the Ziopharm Agreement.

1.34 "**Consent**" shall have the meaning set forth in Section 4.5(c).

1.35 "**Construct**" means the RTS switch that controls expression of IL-12 included in Accessory Material Agents.

1.36 "**Control**" means, with respect to any material, Information, or intellectual property right, that a Party (a) owns or (b) has a license (other than a license granted to such Party under this Agreement) to such material, Information, or intellectual property right and, in each case, has the ability to grant to the other Party access, a license, or a sublicense (as applicable) to the foregoing on the terms and conditions set forth in this Agreement without violating the terms of any then-existing agreement or other legally enforceable arrangement with any Third Party.

1.37 "**Cover**" means, with respect to a claim of a Patent and a product, that such claim would be infringed, absent a license, by the manufacture, use, offer for sale, sale or importation of such product (considering claims of patent applications to be issued as then pending). "**Covering**" and "**Covered**" shall have a correlative meaning.

1.38 "**Covering Claim**" has the meaning set forth in Section 6.5(c).

1.39 "**Competing Program**" has the meaning set forth in Section 2.2.

1.40 "**Development**" means all activities that relate to the pre-clinical and clinical development of a product or to (a) obtaining, maintaining or expanding Regulatory Approval of a product, or (b) developing

the ability to manufacture clinical and commercial quantities of a product. This includes: (i) preclinical testing, toxicology, and clinical trials; (ii) preparation, submission, review, and development of data or information for the purpose of submission to a Governmental Authority to obtain, maintain or expand Regulatory Approval of a product; and (iii) manufacturing process development and scale-up, bulk production and fill/finish work associated with the supply of a product for preclinical testing and clinical trials, and related quality assurance and technical support activities. "**Develop**" and "**Developed**" have a correlative meaning.

1.41 "**Development Costs**" means the actual costs and expenses, including internal and out-of-pocket costs and expenses, that are incurred by or on behalf of Ziopharm in undertaking the Development of the Gorilla IL-12 Products which costs and expenses are directly attributable to (a) any FTE costs incurred in connection with the performance of such Development activities, which shall be determined in accordance with the FTE Rate multiplied by the number of hours devoted by employees solely to conducting such Development activities, and (b) the actual amounts paid to a Third Party for specific external activities applicable to the Development of the Gorilla IL-12 Products in the Field and/or for obtaining supplies of Gorilla IL-12 Product or any raw materials or intermediates for the conduct of such Development in the Field.

1.42 "**Development Credit**" has the meaning set forth in Section 6.2(a)(ii).

1.43 "**Dispute**" has the meaning set forth in Section 12.1.

1.44 **"Distribution Costs**" means the following out-of-pocket costs incurred by Ziopharm or its Affiliates or for its account that are directly allocable to the distribution of (a) the Gorilla IL-12 Products in the HPV Field, or (b) the Gorilla IL-12 Products in the Field, but outside of the HPV Field determined in accordance with GAAP, consistently and strictly applied: (i) handling and transportation to fulfill orders (but excluding such costs to the extent they are treated as a deduction in the definition of Net Sales); and (ii) customer services, including order entry, billing and adjustments, inquiry and credit and collection with respect to such Gorilla IL-12 Product.

1.45 "**Dollar**" means a U.S. dollar, and "**$**" shall be interpreted accordingly.

1.46 "**EMA**" means the European Medicines Agency or any successor entity.

1.47 "**Exclusive Products**" means (a) TCR Exclusive Products, (b) CD19 CAR Products, (c) [*****] CAR Products, and (d) IL-12 Products. For clarity, Exclusive Products include all forms, formulations, presentations, doses, administrations and package configurations thereof.

1.48 "**Exclusive Program**" means, as applicable, (a) the TCR Exclusive Program, (b) the CD19 CAR Program, (c) the [*****] CAR Program and (d) the Human IL-12 Program.

1.49 "**Exclusive Royalty-Bearing Products**" means (a) CD19 CAR Products, (b) [*****] CAR Products, and (c) Human IL-12 Products.

1.50 "**Executive Officer**" means, with respect to Precigen, its President or CEO, and with respect to Ziopharm, its CEO.

1.51 "**Existing Gorilla IL-12 CRADA**" means that certain Cooperative Research and Development Agreement by and between Precigen and the National Cancer Institute dated February 28, 2018, including all amendments thereto and any research plans thereunder.

1.52 "**Existing TCR CRADA**" means that certain Cooperative Research and Development Agreement by and between Precigen and the National Cancer Institute dated October 6, 2016, including all amendments thereto and any research plans thereunder.

1.53 "**FD&C Act**" means the U.S. Federal Food, Drug and Cosmetic Act, as amended.

1.54 "**FDA**" means the U.S. Food and Drug Administration or any successor entity.

1.55 "**Field**" means (a) use of a Licensed Products (including TCR Products or Gorilla IL-12 Products), for Treatment of cancer in humans, including solid and hematological cancers, and (b) use of TCR Products or Gorilla IL-12 Products, in the HPV Field. Except to the extent permitted under clause (b), the

Field shall not include the prophylaxis or amelioration of conditions or symptoms associated with cancer or infectious disease which may result in cancer.

1.56 "**First Commercial Sale**" means, with respect to a product, the first sale on a commercial basis to a Third Party of such product in a given regulatory jurisdiction after Regulatory Approval has been obtained in such jurisdiction for such product.

1.57 "**FTE Rate**" means $[*****] per hour.

1.58 "**GAAP**" means the U.S. generally accepted accounting principles, consistently applied.

1.59 "**Gamma Delta T Cells**" means T-Cells expressing gamma delta TCRs.

1.60 "**Gorilla Agreed Budget**" has the meaning set forth in Section 5.2(c).

1.61 "**Gorilla Development Activities"** means those Research and Development activities with respect to the Gorilla IL-12 Products conducted by or on behalf of Ziopharm.

1.62 "**Gorilla Development Budget**" means a detailed budget for all Gorilla Development Costs, which shall be included as a part of the Gorilla Development Plan, and which shall be reviewed by the JDC in accordance with Section 5.3(b)(i). Unless otherwise agreed, the Gorilla Development Budget shall be allocated on a calendar quarterly basis.

1.63 "**Gorilla Development Costs**" means the Development Costs in respect of the Gorilla IL-12 Products in the Field, but not the HPV Field.

1.64 "**Gorilla Development Plan**" means that certain development plan for the conduct of the Gorilla Development Activities as determined by Ziopharm in accordance with this Agreement.

1.65 "**Gorilla IL-12 Construct**" means the specific [*****] Construct which expresses RTS IL-12, included in Accessory Material Agents, and any derivatives, modifications or improvements thereto generated as a result of the conduct of the Gorilla IL-12 Program by or on behalf of Ziopharm after the Effective Date.

1.66 "**Gorilla IL-12 Products**" means any biological product, process or therapy Developed under the Gorilla IL-12 Program that is comprised of the Gorilla IL-12 Construct, including all forms, formulations, presentations, doses, administrations and package configurations.

1.67 "**Gorilla IL-12 Program**" means a program(s) of Research and Development dependent on use of the Gorilla IL-12 Construct.

1.68 "**Gorilla Inventions**" has the meaning set forth in Section 7.1(b).

1.69 "**Gorilla Patents**" has the meaning set forth in Section 7.1(b).

1.70 "**Governmental Authority**" means any multi-national, federal, state, local, municipal, provincial or other governmental authority of any nature (including any governmental division, prefecture, subdivision, department, agency, bureau, branch, office, commission, council, court or other tribunal).

1.71 "**HPV Field**" means, the treatment and prevention of human papillomavirus (HPV) infection and/or *in vivo* replication or proliferation solely to the extent the primary reason for such treatment or prevention is to prevent cancer**.**

1.72 "**Human IL-12 Products**" means any biological product, process or therapy Developed under the Human IL-12 Program, including all forms, formulations, presentations, doses, administrations and package configurations.

1.73 "**Human IL-12 Program**" means a program(s) of Research and Development focused on the use of the human clinical adenovirus to express Constructs.

1.74 "**IL-12 Combination Patent**" means patent family [*****] as detailed on Schedule 4 of the Licensed Intellectual Property in Exhibit B.

1.75 "**IL-12 Products**" means the Human IL-12 Products and the Gorilla IL-12 Products.

1.76 "**IL-12 Program**" means, as applicable, the Human IL-12 Program or the Gorilla IL-12 Program.

1.77 "**IND**" means (a) an Investigational New Drug Application as defined in the FD&C Act and applicable regulations promulgated thereunder by the FDA, or (b) the equivalent application to the equivalent

agency in any other regulatory jurisdiction, the filing of which is necessary to initiate or conduct clinical testing of a pharmaceutical product in humans in such jurisdiction.

1.78 "**Indemnified Party**" has the meaning set forth in Section 9.3.

1.79 "**Indemnifying Party**" has the meaning set forth in Section 9.3.

1.80 "**Information**" means any data, results, technology, in any tangible or intangible form, including know-how, trade secrets, practices, techniques, methods, processes, inventions, developments, specifications, formulations, formulae, algorithms, technology, test data (including biological and chemical, biochemical, clinical test data and data resulting from non-clinical studies), CMC information, stability data and other study data and procedures.

1.81 "**Initial Technology Transfer**" has the meaning set forth in Section 4.1(a).

1.82 "**Initial Ziopharm Technology Transfer"** has the meaning set forth in Section 4.1(b).

1.83 "**Initiation**" means, with respect to a clinical trial, first dosing of the third subject in such clinical trial.

1.84 "**Joint Development Committee**" or "**JDC**" means the committee formed by the Parties as described in Section 5.3.

1.85 "**Joint Press Release**" has the meaning set forth in Section 10.4(b).

1.86 "**Laws**" means all 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, domestic or foreign.

1.87 "**Licensed Intellectual Property**" means the Licensed Know-How and Licensed Patents and any Ziopharm Veledimex Alterations.

1.88 "**Licensed Know-How**" means all Information Controlled by Precigen or its Affiliates as of the Effective Date that (a) is reasonably required or useful to advance Licensed Products and (i) was generated by or on behalf of Precigen or its Affiliates and was actually provided to and/or used by or on behalf of Ziopharm or its Affiliates in connection with a Program as of, or prior to, the Effective Date (as evidenced by such Party's or its Affiliates' contemporaneous records) or (ii) was actually generated by or on behalf of Ziopharm or its Affiliates or (b) is reasonably required to manufacture the Activator Ligand or Accessory Material Agents.

1.89 "**Licensed Patent**" means (a) any patent or patent application listed on Exhibit B, together with all continuations, divisions, continuations-in-part, re-examinations, reissues, substitutions, confirmations, registrations, re-validations, patent term extensions, supplementary protection certificates, certificates of invention, and applications for certificates of invention, or the like, of any such patents and patent applications, and (b) any patent application filed after the Effective Date solely to the extent that such patent application Covers Licensed Know-How that is both in existence as of the Effective Date and necessary to use the Accessory Material Agents or Activator Ligands in connection with the Research, Development, manufacture or Commercialization of a Licensed Product in the Field.

1.90 "**Licensed Product**" means any Exclusive Product or Non-Exclusive Product and "Licensed Products" collectively means all Exclusive Products and Non-Exclusive Products.

1.91 "**Licensing Income**" means [*****]:

(a) [*****]

(b) [*****]

(c) [*****]; and

(d) [*****].

1.92 "**MAA**" means an application to the appropriate Regulatory Authority for approval to market a Licensed Product (but excluding Pricing Approval) in any particular jurisdiction, including an NDA in the U.S.

1.93 "**Makeup Payment**" has the meaning set forth in Section 6.7.

1.94 "**Manufacturing Costs**" means, with respect to (a) the Gorilla IL-12 Products in the HPV Field, or (b) the Gorilla IL-12 Products in the Field, but outside of the HPV Field, the costs of manufacturing such Gorilla IL-12 Product which Gorilla IL-12 Product is either: (x) supplied to a Party by a Third Party; or (y) manufactured directly by a Party or its Affiliate, in each case to the extent such costs are directly allocable to the Development or Commercialization of such Gorilla IL-12 Product in the Territory, as further described below and in accordance with generally accepted accounting principles in the U.S. (**"US GAAP"**). Manufacturing Costs shall be included in Commercialization Costs on a "cost of sales" basis as such Gorilla IL-12 Product is sold, or Development Costs on a usage basis as clinical supplies are used, as the case may be, in each case via standard costs and reconciliation for variances to standard cost and inventory write-offs. In the event that a Party performs any of its manufacturing and supply obligations through one or more Affiliates, any inter-company amounts or fees paid for any such services for Gorilla IL-12 Product or any intermediate used therein by such Party shall not be included in calculating Manufacturing Costs and only those costs directly incurred by such Affiliate shall be so included.

(i) For costs in **subsection (x)**, Manufacturing Costs means: (1) the amount paid to such a Third Party (excluding any Third Party Payments); plus (2) the relevant manufacturing Party's reasonable direct and identifiable internal costs and out-of-pocket costs, incurred or accrued (including any prepayments) by the manufacturing Party in connection with inventory write-offs, variances, manufacturing process improvements, storage, freight, manufacturing scale-up, manufacturing site qualification, materials, quality assurance and quality control (including testing), supply chain management, capital equipment, similar activities comprising the manufacturing Party's oversight of the manufacturing process of the Third Party, and any value-added tax or similar tax due for amounts paid to such Third Party, but excluding costs otherwise included within Development Costs.

(ii) For costs in **subsection (y)**, Manufacturing Costs means the "standard cost" per unit, including variances to standard costs and inventory write-offs. This standard cost shall include the cost of materials, labor, and other direct and identifiable variable costs incurred or accrued by the manufacturing Party in connection with the manufacture of a Gorilla IL-12 Product, manufacturing process improvements, storage, freight, manufacturing scale-up, manufacturing site qualification, quality assurance and quality control (including testing), supply chain management, and costs of equipment, plant operations and plant support services necessary to produce a Gorilla IL-12 Product, but excluding costs otherwise included within Development Costs. These costs of plant operations and support services shall include utilities, maintenance, engineering, safety, human resources, finance, plant management and other similar activities, including idle plant capacity reserved specifically for the Gorilla IL-12 Product based on anticipated Gorilla IL-12 Product volumes in the ensuing twelve (12) months. Costs that cannot be identified to a specific activity supporting manufacturing of a Gorilla IL-12 Product, such as charges for corporate overhead or excess capacity not specifically reserved for the Gorilla IL-12 Product as described above, shall be excluded from the determination of Manufacturing Costs.

1.95 "**MDACC Research Agreement**" means certain Research and Development Agreement by and among Intrexon, Ziopharm and The University of Texas M.D. Anderson Cancer Center ("**MDACC**") with an effective date of August 17, 2015, and any amendments or statements of work thereto.

1.96 "**MDACC Sponsored Research Agreement**" means that certain Sponsored Research Agreement by and between Precigen, Ziopharm and MDACC with an effective date of April 9, 2018, and any amendments thereto.

1.97 "**Merck Agreement**" means that certain License and Collaboration Agreement by and among Intrexon, Ziopharm and Ares Trading S.A., a corporation organized and existing under the laws of Switzerland, having offices at Zone Industrielle de L'Ouriettaz, 1170 Aubonne, Switzerland ("**Ares Trading**") effective March 27, 2015, as amended.

1.98 "**NDA**" means a New Drug Application, as defined in the FD&C Act, as amended, and applicable regulations promulgated thereunder by the FDA.

1.99 "**Neo-antigens**" means any [*****].

1.100 "**Net Sales**" means, [*****]:

(a) [*****];

(b) [*****];

(c) [*****];

(d) [*****]; and

(e) [*****].

[*****].

[*****].

[*****].

[*****]:

(i) [*****].

(ii) [*****].

(iii) [*****].

1.101 "**New Product Marks**" has the meaning set forth in Section 7.9.

1.102 "**NK Cells**" means natural killer cells.

1.103 "**NK Cells and Gamma Delta T Cell Products**" means any pharmaceutical or biological product, process or therapy developed under or arising from the NK Cells and Gamma Delta T Cell Program, including all forms, formulations, presentations, doses, administrations and package configurations.

1.104 "**NK Cells and Gamma Delta T Cell Program**" means a program(s) of Research and Development focused on NK Cells and Gamma Delta T Cells.

1.105 "**Non-Exclusive Products**" means (a) NK Cells and Gamma Delta T Cell Products, and (b) TCR Non-Exclusive Products, in each case as generated or Developed by Ziopharm. For clarity, Non-Exclusive Products include all forms, formulations, presentations, doses, administrations and package configurations thereof.

1.106 "**Obligations**" has the meaning set forth in Section 14.13.

1.107 "**Oncology**" means the treatment or prevention of a human patient who has received a cancer diagnosis.

1.108 "**Operating Profit (or Loss)**" means, with respect to (a) the Gorilla IL-12 Products in the HPV Field, or (b) the Gorilla IL-12 Products in the Field, but outside of the HPV Field all Received Amounts with respect to such Gorilla IL-12 Product during such specified period, less the sum of (a) Commercialization Costs and (b) Development Costs incurred by Ziopharm during such time period. For sake of clarity, Operating Profit (or Loss) shall be determined prior to application of any income taxes, and if such terms are used individually, "**Operating Profit**" shall mean a positive Operating Profit (or Loss), and "**Operating Loss**" shall mean a negative Operating Profit (or Loss).

1.109 "**Original Preferred Shares**" means those certain 100,000 shares of Series 1 Preferred Stock issued to Intrexon on or about July 1, 2016 pursuant to the 2016 Securities Issuance Agreement.

1.110 "**Overpaying Party**" has the meaning set forth in Section 6.7.

1.111 "**Patents**" means (a) pending patent applications, issued patents, utility models and designs; (b) reissues, substitutions, confirmations, registrations, validations, re-examinations, continuations, continued prosecution applications, continuations-in-part, or divisions of or to any of the foregoing; and (c)

extensions, renewals or restorations of any of the foregoing by existing or future extension, renewal or restoration mechanisms, including supplementary protection certificates or the equivalent thereof.

1.112 "**Phase 3 Clinical Trial**" means a human clinical trial of a Licensed Product with a defined dose or a set of defined doses of such Licensed Product designed to ascertain efficacy and safety of such Licensed Product for the purpose of enabling the preparation and submission of Regulatory Approval to the competent Regulatory Authorities in a country of the Territory, as further defined in 21 C.F.R. § 312.21(c) for the U.S., as amended from time to time, or the corresponding foreign regulations.

1.113 "**PIK Shares**" means those shares of Series 1 Preferred Stock payable by Ziopharm as a monthly dividend to the holders of Series 1 Preferred Stock pursuant to Article B, Section 1 of the Certificate of Designation.

1.114 "**Potential Claims**" has the meaning set forth in Section 3.4(a).

1.115 "**Precigen Impact Situation**" has the meaning set forth in Section 7.4(a).

1.116 "**Precigen Indemnitees**" has the meaning set forth in Section 9.2.

1.117 "**Preferred Shares**" means the Original Preferred Shares plus all PIK Shares accrued, paid or payable to Intrexon as of the date of this Agreement.

1.118 "**Pricing Approval**" means such governmental approval, agreement, determination or decision establishing prices for a product that can be charged and/or reimbursed in regulatory jurisdictions where the applicable Governmental Authorities approve or determine the price and/or reimbursement of pharmaceutical products.

1.119 "**Product Infringement**" has the meaning set forth in Section 7.5(a).

1.120 "**Program**" means, as applicable, the IL-12 Program, the TCR Program, [*****] CAR Program, CD19 CAR Program, and NK Cells and Gamma Delta T Cell Program.

1.121 "**Proposed Terms**" has the meaning set forth in Section 12.2.

1.122 "**Qualified IPO**" has the meaning set forth in Section 14.13.

1.123 "**Received Amounts**" means with respect to (a) the Gorilla IL-12 Products in the HPV Field, or (b) the Gorilla IL-12 Products in the Field, but outside of the HPV Field, all consideration received by Ziopharm and its Affiliates on account thereof, including the sum of (i) worldwide Net Sales of the applicable Gorilla IL-12 Products during the applicable period by Ziopharm and its Affiliates (but not, for clarity, Sublicensees), and (ii) any royalties or other payments received by Ziopharm or its Affiliates based on sales of the relevant Gorilla IL-12 Products by its Sublicensees pursuant to a sublicense granted by Ziopharm or its Affiliates under the Licensed Intellectual Property (excluding, for clarity, any Sublicensing Income).

1.124 "**Regulatory Approval**" means all approvals, including, if applicable, Pricing Approvals reasonably acceptable to the selling Party, that are necessary for the commercial sale of product in the applicable field in a given country or regulatory jurisdiction.

1.125 "**Regulatory Authority**" means, in a particular country or jurisdiction, any applicable Governmental Authority involved in granting Regulatory Approval in such country or jurisdiction.

1.126 "**Regulatory Costs**" means costs incurred to prepare Gorilla IL-12 Product regulatory submissions to obtain and/or maintain Regulatory Approval and to comply with post-Regulatory Approvals requirements of a Regulatory Authority, including FDA user and other fees, reporting and regulatory affairs activities, and recalls and withdrawals for Gorilla IL-12 Products (other than costs for Gorilla IL-12 Products that are deductible from Net Sales or that are included as Development Costs), but excluding internal FTE costs.

1.127 "**Regulatory Exchange Agreement**" has the meaning set forth in Section 4.7.

1.128 "**Regulatory Materials**" means regulatory applications, submissions, notifications, communications, correspondence, registrations, Regulatory Approvals and/or other filings made to, received from or otherwise conducted with a Regulatory Authority in order to Develop, manufacture, market, sell or otherwise Commercialize a Licensed Product in a particular country or jurisdiction.

1.129 "**Releasees**" has the meaning set forth in Section 3.4(a).

1.130 "**Released Claims**" has the meaning set forth in Section 3.4(a).

1.131 "**Reporting Product**" has the meaning set forth in Section 4.6.

1.132 "**Research**" means non-clinical studies of a product conducted before the filing of an IND for such product.

1.133 "**Royalty Term**" has the meaning set forth in Section 6.5(c).

1.134 "**Sales and Marketing Costs**" means, with respect to (a) the Gorilla IL-12 Products in the HPV Field, or (b) the Gorilla IL-12 Products in the Field, but outside of the HPV Field, and to the extent incurred by Ziopharm or its Affiliates, the reasonable internal FTE and out-of-pocket costs that are directly allocable to the sales and marketing of a Gorilla IL-12 Product, including: (i) activities directed to the advertising of a Gorilla IL-12 Product; (ii) costs of advertising, public relations and medical education agencies with respect to a Gorilla IL-12 Product; (iii) speaker programs with respect to a Gorilla IL-12 Product, including the training of such speakers; (iv) developing and providing training packages, promotional literature, samples, promotional materials and other selling materials with respect to a Gorilla IL-12 Product; (v) developing and performing market research with respect to a Gorilla IL-12 Product and developing branding, communications and life cycle management plans; (vi) conducting symposia and opinion leader development activities with respect to a Gorilla IL-12 Product; (vii) developing reimbursement programs with respect to a Gorilla IL-12 Product.

1.135 "**Second ECP Amendment**" has the meaning set forth in Section 1.162.

1.136 "**Series 1 Preferred Stock**" means Ziopharm's Series 1 preferred stock, par value $0.001 per share.

1.137 "**Sleeping Beauty Intellectual Property**" means patent families [*****] and [*****] as detailed on Schedule 3 of the Licensed Intellectual Property in Exhibit B.

1.138 [*****].

1.139 "**Sublicensee**" means any Third Party granted a sublicense, covenant not to sue, forbearance agreement, co-promotion agreement or other similar arrangement (a "**Sublicense**") by Ziopharm to the rights licensed to Ziopharm under Section 2.1(a) or Section 2.1(b).

1.140 "**Sublicensing Income**" means any [*****]:

(a) [*****];

(b) [*****];

(c) [*****]; and

(d) [*****].

1.141 "**Support Memorandum**" has the meaning set forth in Section 12.2.

1.142 "**Switch Intellectual Property**" means Schedules 1 and 2 of the Licensed Intellectual Property in Exhibit B.

1.143 "**T-Cell**" means a T-lymphocyte, including alpha beta T cells and gamma delta T cells.

1.144 "**TCR**" means T-cell receptor complex.

1.145 "**TCR Exclusive Products**" means any biological product, process or therapy that includes a TCR for a Neo-antigen, including all forms, formulations, presentations, doses, administrations and package configurations.

1.146 "**TCR Exclusive Program**" means a program(s) of Research and Development focused on Developing TCRs designed for Neo-antigens.

1.147 "**TCR Non-Exclusive Products**" means any biological product, process or therapy that is comprised of a TCR, other than a TCR Exclusive Product, including all forms, formulations, presentations, doses, administrations and package configurations.

1.148 "**TCR Products**" means TCR Non-Exclusive Products and TCR Exclusive Products.

1.149 "**Term**" has the meaning set forth in Section 11.1.

1.150 "**Terminated Products**" has the meaning set forth in Section 11.4(a).

1.151 "**Territory**" means all countries of the world.

1.152 "**Third Party**" means any entity other than Precigen or Ziopharm or an Affiliate of either of them.

1.153 "**Third Party Licenses**" has the meaning set forth in Section 2.1(e).

1.154 "**Third Party Payment**" any payment made by Ziopharm or its Affiliates to any Third Party in respect of any license to any Patent owned or controlled by a Third Party that that is reasonably necessary to practice the subject matter claimed in the Licensed Patents in connection with the Development, manufacture or Commercialization of (a) the Gorilla IL-12 Products in the HPV Field, or (b) the Gorilla IL-12 Products in the Field, but outside of the HPV Field, as applicable.

1.155 "**Trademark**" means any word, name, symbol, color, shape, designation or device or any combination thereof, including any trademark, service mark, trade name, trade dress, brand name, product configuration, domain name, logo, design or business symbol, that functions as an identifier of source, origin or membership, whether or not registered, and all statutory and common law rights therein, and all registrations and applications therefor, together with all goodwill associated with, or symbolized by, any of the foregoing.

1.156 "**Transition Period**" shall have the meaning set forth in Section 4.5(a).

1.157 "**Transition Services**" shall have the meaning set forth in Section 4.5(a).

1.158 "**Treat**" means delivery of a therapy to a human patient who has received a cancer diagnosis for the treatment of that cancer, including the prevention of the reoccurrence of any such cancer. "**Treatment**" has its correlative meaning.

1.159 "**U.S.**" means the United States of America, including all possessions and territories thereof.

1.160 "**Underpaying Party**" has the meaning set forth in Section 6.7.

1.161 "**Valid Claim**" means (a) a claim of an issued, unexpired patent within the Licensed Patents that has not been revoked, disclaimed, abandoned or held invalid or unenforceable by a court or other body of competent jurisdiction in an unappealed or unappealable decision and (b) a claim of any patent application within a Licensed Patent, which claim was pending as of the Effective Date and has an effective priority date that is less than five years prior to the then-current date.

1.162 "**Ziopharm Agreement**" means that certain Exclusive Channel Partner Agreement by and between Intrexon and Ziopharm, dated January 6, 2011, as amended by the First Amendment to Exclusive Channel Partner Agreement effective September 13, 2011; the Second Amendment to the Exclusive Channel Partner Agreement effective March 27, 2015 (the "**Second ECP Amendment**") and the Third Amendment to Exclusive Channel Partner Agreement effective June 29, 2016, as assigned by Intrexon to Precigen.

1.163 "**Ziopharm Gorilla Inventions**" has the meaning set forth in Section 7.1(b).

1.164 "**Ziopharm Gorilla Patents**" has the meaning set forth in Section 7.1(b).

1.165 "**Ziopharm Indemnitees**" has the meaning set forth in Section 9.1.

ARTICLE 2
LICENSES AND EXCLUSIVITY

2.1 **License to Ziopharm for Licensed Products**.

(a) **License to Ziopharm for Exclusive Products**. Precigen hereby grants Ziopharm (i) an exclusive (even as to Precigen and its Affiliates except as provided in Section 2.1(c) below), royalty-bearing license, with the right to sublicense through multiple tiers in accordance with Section 2.1(d), under the Licensed Intellectual Property (other than the Switch Intellectual Property and the Adenovirus Production Patents) to research, develop, make, have made, use, sell, have sold, offer for sale and import Exclusive Products in the Field in the Territory, (ii) a non-exclusive license, with the right to sublicense in accordance with Section 2.1(d), under the Switch Intellectual Property to research, develop, make, have made, use, sell, have sold, offer for sale and import Exclusive Products in the Field in the Territory and (iii) a non-exclusive

license, with right to sublicense in accordance with Section 2.1(d), under the Adenovirus Production Patents to research, develop, make, have made, use, sell, have sold, offer for sale and import IL-12 Products in the Field in the Territory. For clarity, the foregoing license grant includes the right to make and have made Activator Ligands and Accessory Material Agents for use in connection with Licensed Products in the Field.

(b) **License to Ziopharm for Accessory Material Agents and Non-Exclusive Products**. Precigen hereby grants Ziopharm (i) a non-exclusive, royalty-bearing license, with the right to sublicense through multiple tiers in accordance with Section 2.1(d), under the Licensed Intellectual Property to research, develop, make, have made, use, sell, have sold, offer for sale and import Non-exclusive Products in the Field in the Territory and (ii) an exclusive license, with the right to sublicense in accordance with Section 2.1(d), under the Sleeping Beauty Intellectual Property to research, develop, make, have made, use, sell, have sold, offer for sale and import TCR Non-Exclusive Products in the Field in the Territory. For clarity, the foregoing license grant includes the right to make and have made Activator Ligands and Accessory Material Agents for use in connection with Licensed Products in the Field.

(c) **Precigen Retained Rights**. Notwithstanding the rights granted to Ziopharm in Section 2.1(a) and 2.1(b), Precigen may research, develop, manufacture and commercialize (i) products outside of the Exclusive Products in the Field in the Territory (subject to the grant of the exclusive license under the Sleeping Beauty Intellectual Property with respect to TCR Non-exclusive Products in the Field) and (ii) products outside the Field. Further, Precigen retains the right to practice the Licensed Intellectual Property in the Field in the Territory solely (i) as necessary to support the Gorilla Development Activities to the extent in connection with its activities under the JDC or as specifically agreed pursuant to the Gorilla Development Plan in accordance with the terms of this Agreement and (ii) to perform any Transition Service pursuant to this Agreement.

(d) **Sublicenses; Assignments**.

(i) Ziopharm may grant sublicenses through multiple tiers, under any or all of the rights granted in Section 2.1(a) and Section 2.1(b) to its Affiliates.

(ii) Ziopharm may grant sublicenses through multiple tiers, under any or all of the rights granted in Section 2.1(a) and Section 2.1(b) (other than the Switch Intellectual Property), to Third Parties upon written notice to Precigen solely to the extent reasonably necessary for contract manufacturing activities or Commercialization of Licensed Products with respect to any Licensed Product developed by or on behalf of Ziopharm or its Affiliates. Notwithstanding the foregoing, the Switch Intellectual Property may be sublicensed under this Section 2.1(d)(ii) solely to the extent such is for use in conjunction with a specific Licensed Product.

(iii) In addition, solely with respect to any Exclusive Product or any TCR Non-Exclusive Product, Ziopharm shall also have the right to grant sublicenses through multiple tiers under any or all of the rights granted in Section 2.1(a) and Section 2.1(b) (other than the Switch Intellectual Property) to Third Parties upon written notice to Precigen in connection with any Research, Development or Commercialization collaboration of such Exclusive Product or TCR Non-Exclusive Products. Notwithstanding the foregoing, the Switch Intellectual Property may be sublicensed under this Section 2.1(d)(iii) solely to the extent such is for use in conjunction with a specific Exclusive Product or specific TCR Non-Exclusive Product.

(iv) Except as set forth above, Ziopharm shall not have the right to sublicense any or all of the rights granted under this Agreement to Third Parties to Research, Develop, manufacture or Commercialize products of Third Parties without Precigen's prior written consent.

(v) Each agreement in which Ziopharm grants a sublicense shall be consistent with the relevant terms and conditions of this Agreement. Ziopharm shall remain responsible for the compliance of its Sublicensees with the terms and conditions of this Agreement.

(vi) In addition to the foregoing, Ziopharm shall have the right to [*****].

(e) **Third Party Licenses**. All Licensed Intellectual Property licensed to Precigen from a Third Party and sublicensed to Ziopharm under this Agreement are subject to and subordinate to the terms of the applicable license agreements with Third Parties set forth on Exhibit F (the "**Third Party Licenses**"). Each Party will fully comply with the terms of any such Third Party License, and Ziopharm shall remain solely responsible for the payment of any royalty, milestone, and other payment obligations, if any, due to Third Parties in connection with exercise of the licenses granted to Ziopharm under this Agreement. Ziopharm shall make all such payments timely in accordance with the terms of the applicable Third Party license. Precigen covenants not to, without the prior written consent of Ziopharm, amend any Third Party License in such a manner that would diminish the rights granted to Ziopharm under this Agreement, materially change any obligations under such Third Party License that would impact Ziopharm hereunder or increase any payment obligation of Ziopharm pursuant to such Third Party License.

2.2 **Exclusivity**. Each of Precigen and Intrexon hereby covenants that, during the Term, neither it nor its Affiliates will (a) grant or offer any license or other rights to a Third Party, or otherwise discuss or negotiate with any Third Party the terms of any such license or rights, or (b) conduct any activities, whether independently or with or for the benefit of a Third Party, in each case of (a) and (b) with respect to the use of any Licensed Intellectual Property to research, develop, manufacture or commercialize any Exclusive Product in the Field or with respect to the use of any Sleeping Beauty Intellectual Property as Covered by [*****] and [*****] to research, develop, manufacture or commercialize any TCR Product in the Field. In addition, (i) for a period of three (3) years following the Effective Date, Precigen shall not, either itself or through an Affiliate or Sublicensee, research, develop, manufacture or commercialize any biological product, process or therapy that is comprised of a regulatable switch that controls expression of IL-12 that is expressed by any viral vector for Oncology, and (ii) for a period of three (3) years following the Effective Date research, develop, manufacture or commercialize one or more TCRs designed for Neo-antigens for Oncology (each, a "**Competing Program**"). Notwithstanding the foregoing, the foregoing limitation with respect to any Competing Program shall not apply to a Third Party that acquires Precigen or its Affiliates if at the time of the acquisition the Acquired Party had an ongoing Competing Program, provided that none of the intellectual property of Precigen is thereafter used for, or incorporated into, the Competing Program.

2.3 **Development Responsibilities**. Ziopharm will have the exclusive right to conduct, and be solely responsible for all aspects of, the Research, Development and manufacture of Licensed Products and setting the regulatory strategy for seeking Regulatory Approvals (including any Pricing Approvals) for Licensed Products in the Field in the Territory.

2.4 **Regulatory Responsibilities**. Ziopharm shall have the exclusive right to prepare and shall own all Regulatory Materials (including all INDs, BLAs, NDAs, MAAs and Regulatory Approvals) for each Licensed Product in the Field in the Territory. Precigen shall not submit any Regulatory Materials for Licensed Products in the Field in the Territory without the prior written consent of Ziopharm. Except as expressly requested by Ziopharm in writing, Precigen shall not communicate with respect to the Licensed Products in the Field with any Regulatory Authority, unless so required to comply with applicable Laws, in which case Precigen shall promptly notify Ziopharm of such requirement under applicable Laws and, to the extent practicable and permitted under applicable Laws, shall submit any proposed communication to Ziopharm for prior approval or, if not practicable or permitted, shall provide Ziopharm with a copy or summary thereof as soon as reasonably practicable thereafter.

2.5 **Commercialization Responsibilities**. Ziopharm will have the exclusive right to conduct, and be solely responsible for all aspects of, the Commercialization of Licensed Products in the Field in the Territory, including: (a) developing and executing a commercial launch and pre-launch plan, (b) negotiating with applicable Governmental Authorities regarding the price and reimbursement status of Licensed Products; (c) marketing and promotion; (d) booking sales and distribution and performance of related services; (e) handling all aspects of order processing, invoicing and collection, inventory and receivables; (f) providing

customer support, including handling medical queries, and performing other related functions; (g) conforming its practices and procedures to applicable Laws relating to the marketing, detailing and promotion of Licensed Products in the Territory; and (h) manufacturing of Licensed Products for commercial use.

2.6 **Diligence**.

(a) **Development and Commercialization**.

(i) As of the Effective Date, Ziopharm shall use Commercially Reasonable Efforts to (A) Develop, including seeking Regulatory Approval for CD19 CAR Products and IL-12 Products in the Field (other than the HPV Field) in the Territory and (B) to Commercialize each CD19 CAR Product and IL-12 Product for which it has obtained Regulatory Approval in the Field (other than the HPV Field) in the Territory.

(ii) Starting as of the second (2^{nd}) anniversary of the Effective Date, Ziopharm shall use Commercially Reasonable Efforts to (A) Develop, including seeking Regulatory Approval for TCR Exclusive Products in the Field in the Territory (other than the HPV Field) and (B) to Commercialize each TCR Exclusive Product for which it has obtained Regulatory Approval in the Field (other than the HPV Field) in the Territory.

(b) **No Other Obligation to Develop or Commercialize**. Notwithstanding anything contained in this Agreement to the contrary, except as expressly set forth in Section 2.6(a), Ziopharm shall have no obligation to further Develop or Commercialize Licensed Products and shall not be liable to Precigen or its Affiliates for any failure to do so.

2.7 **No Implied Licenses**. Except as explicitly set forth in this Agreement, neither Party shall be deemed by estoppel or implication to have granted the other Party any license or other right to any intellectual property of such Party. Precigen specifically reserves all rights not expressly granted to Ziopharm under this Agreement.

ARTICLE 3
EXISTING AGREEMENTS

3.1 **Termination of Ziopharm Agreement**. The Parties hereby agree to terminate the Ziopharm Agreement. All rights and licenses granted by Intrexon to Ziopharm under the Ziopharm Agreement and all rights and licenses granted by Ziopharm to Intrexon, such rights and licenses assigned by Intrexon to Precigen, under the Ziopharm Agreement shall terminate. For clarity, the Parties acknowledge and agree that the provisions of Section 10.4 of the Ziopharm Agreement shall not apply to this termination of the Ziopharm Agreement by mutual written consent. Any provisions of the Second ECP Amendment that survive termination of the Ziopharm Agreement as a result of Section 5.3 of the Second ECP Amendment shall terminate upon the earlier of termination of the Merck Agreement and the provision of Merck's consent to the transfer of all of Ziopharm's obligations and right, title and interest in the Merck Agreement to Precigen as set forth in Section 3.3. Section 6.1 of the Second ECP Amendment shall not survive termination of the Ziopharm Agreement. In the event of any conflict between the surviving terms of the Ziopharm Agreement and the terms of this Agreement, the terms of this Agreement shall control, except with respect to any Section, including but not limited to Sections 3.3 and 6.1 of the Second ECP Amendment as related to the Merck Agreement until such termination of the Merck Agreement. Notwithstanding, anything to the contrary, Ziopharm as a condition of entering this Agreement remains obligated to pay all outstanding invoices generated under the Ziopharm Agreement incurred through the Effective Date of this Agreement.

3.2 **Assignment of Assigned Contracts**.

(a) **MDACC Research Agreement and 2015 MDACC License**.

(i) Precigen, on behalf of itself and its Affiliates (including Intrexon), hereby agrees to use diligent good faith efforts to amend the MDACC Research Agreement or otherwise make such arrangements as are reasonably necessary to ensure that the full benefit of all future contractual rights under

the MDACC Research Agreement vest in Ziopharm and Precigen shall secure future rights for Ziopharm equivalent to those it would enjoy from having the MDACC Research Agreement assigned to it as of the Effective Date.

(ii) Precigen, on behalf of itself and its Affiliates (including Intrexon), hereby agrees to use diligent good faith efforts to assign to Ziopharm the future right, title and interest in new patents that would otherwise be licensed to Precigen under the 2015 MDACC License after the Effective Date and to make such arrangements as are reasonably necessary to ensure that the full benefit of the future contractual rights under the 2015 MDACC License vest in Ziopharm.

(iii) Notwithstanding the above, Precigen shall retain rights to all intellectual property and materials received through the MDACC Research Agreement and 2015 MDACC License prior to the Effective Date, such right being licensed herein as part of the Licensed Intellectual Property.

(iv) Additionally, prior to the amendment of the MDACC Research Agreement and 2015 MDACC License, Precigen, on behalf of itself and its Affiliates (including Intrexon), hereby agrees, within five (5) Business Days after the Effective Date, to notify MDACC of this Agreement and request that (x) MDACC, on a going forward basis, provide to Ziopharm and not Precigen or its Affiliates information related to Exclusive Programs that is required to be provided to Precigen or Intrexon under either the MDACC Research Agreement or the 2015 MDACC License, and (y) MDACC permit Precigen (or Intrexon) to appoint employees of Ziopharm (rather than Precigen or Intrexon) to any joint steering committee under the MDACC Research Agreement and 2015 MDACC License. Upon the assent by MDACC to such request, Precigen shall appoint two individuals designated by Ziopharm to any such joint steering committee.

(b) **Assigned Contracts**.

(i) Precigen, on behalf of itself and its Affiliates (including Intrexon), hereby agrees to use diligent good faith efforts to assign to Ziopharm all of its right, title and interest in, the 2018 MDACC License, the Existing TCR CRADA and the MDACC Sponsored Research Agreement (collectively, the "**Assigned Contracts**"). The Assigned Contracts shall automatically be amended to include any additional contracts that the Parties agree to assign to Ziopharm as part of the Transition Services. Precigen shall not unreasonably withhold consent to assign to Ziopharm any contract that relates to the Licensed Products in the Field in the Territory. Without limiting the generality of the foregoing, until such date as the Existing TCR CRADA is assigned to Ziopharm, Precigen, on behalf of itself and its Affiliates (including Intrexon), shall (a) promptly provide Ziopharm with all information provided by NCI with respect to any option granted under the TCR Existing CRADA and (b) solely at the request of Ziopharm, elect to exercise an option under the Existing TCR CRADA and allow Ziopharm full control to negotiate the terms of the resulting license agreement directly with NCI.

(ii) If despite Precigen's diligent good faith efforts it is not able to assign any Assigned Contract, then Precigen and Ziopharm shall make such arrangements as are reasonably necessary to ensure that the full benefit of the contractual rights under such agreement vest in Ziopharm and Precigen shall secure rights for Ziopharm equivalent to those it would enjoy from having such agreement assigned to it. Without limiting the generality of the foregoing, Precigen shall amend the Existing Gorilla IL-12 CRADA to remove all provisions relating to the Gorilla IL-12 Construct or shall terminate the Existing Gorilla IL-12 CRADA as it relates to the Gorilla IL-12 Construct.

(iii) Additionally, prior to the amendment of the Assigned Contracts, Precigen, on behalf of itself and its Affiliates, hereby agrees, within five (5) Business Days after the Effective Date, to notify MDACC and NCI of the existence of this Agreement and request that (x) MDACC and NCI, as applicable, on a going forward basis, provide to Ziopharm and not Precigen or its Affiliates information related to the Assigned Contracts that is required to be provided to Precigen or its Affialites under either any such Assigned Contract, and (y) MDACC and NCI, as applicable, permit Precigen (or Intrexon) to appoint employees of Ziopharm (rather than Precigen or Intrexon) to any joint steering committee under any such

Assigned Contract. Upon the assent by NCI and MDACC to such request, Precigen shall appoint two individuals designated by Ziopharm to any such joint steering committee.

3.3 **Relinquishment of Rights and Obligations under Merck Agreement**. Precigen, on behalf of itself and its Affiliates (including Intrexon), hereby agrees to use diligent good faith efforts to obtain Ares Trading's consent to the transfer of all of Ziopharm's obligations and right, title and interest in the Merck Agreement to Intrexon or its' Affiliate. As between the Parties, from and after the Effective Date, Precigen agrees to perform all obligations of Ziopharm under the Merck Agreement (other than the obligation of exclusivity set forth in Section 2.5 of the Merck Agreement), and, other than the obligation of exclusivity set forth in Section 2.5 of the Merck Agreement, Ziopharm shall not be responsible for any obligations under the Merck Agreement. For clarity, Section 6.7 addresses Ziopharm's sole ongoing payment obligation related to the payments owed to Ares Trading by Intrexon under Section 4.5(e) of the Merck Agreement. Nothing in this Agreement shall prohibit, and Ziopharm shall have the right to negotiate a separate agreement with Ares Trading regarding obtaining rights to any intellectual property rights owned or controlled by Ares Trading relating to [*****]. Promptly following the Effective Date, the Parties shall cooperate in good faith, on Precigen's request and at Precigen's cost, to transfer all activities and rights related to CD33 under the Merck Agreement to Precigen, including the Existing Viral CD33 Trial, as set forth in Article 4.

3.4 **Mutual Release and Covenant Not to Sue**.

(a) The Parties, on behalf of themselves, their predecessors, successors, direct and indirect parent companies, direct and indirect subsidiary companies, companies under common control with any of the foregoing, affiliates and assigns, and its and their past, present, and future officers, directors, shareholders, interest holders, members, partners, attorneys, agents, employees, insurers, managers, representatives, assigns and successors in interest, and all persons acting by, through, under or in concert with them, and each of them, hereby release and discharge the other Parties, together with their predecessors, successors, direct and indirect parent companies, direct and indirect subsidiary companies, companies under common control with any of the foregoing, affiliates and assigns and its and their past, present, and future officers, directors, shareholders, interest holders, members, partners, attorneys, agents, employees, managers, representatives, assigns and successors in interest, and all persons acting by, through, under or in concert with them, and each of them (the Parties' "**Releasees**", as applicable), from all known and unknown charges, complaints, claims, grievances, liabilities, obligations, promises, agreements, controversies, damages, actions, causes of action, suits, rights, demands, costs, losses, debts, penalties, fees, wages, medical costs, pain and suffering, mental anguish, emotional distress, expenses (including attorneys' fees and costs actually incurred) and punitive damages, of any nature whatsoever, known or unknown, which either Party has, or may have had, against the other Party, whether or not apparent or yet to be discovered, or which may hereafter develop ("**Potential Claims**"), for any acts or omissions, prior to the Effective Date, related to or arising from the Ziopharm Agreement, including but not limited to the Second ECP Amendment, the Merck Agreement, the MDAAC Research Agreement, and each other agreement between Ziopharm and either Precigen or Intrexon, except for any Potential Claims arising from any provisions that survive the termination of the Ziopharm Agreement and the Second ECP Amendment in accordance with Section 3.1 of this Agreement (the "**Released Claims**"). For avoidance of doubt, the Released Claims shall not include any Potential Claims: (a) for acts or omissions that occur on or after the Effective Date; (b) related to or arising from any provisions that survive the termination of the Ziopharm Agreement and the Second ECP Amendment in accordance with Section 3.1 of this Agreement; or (c) related to or arising from any rights or obligations set forth in this Agreement.

(b) Each Party agrees and hereby covenants that it will not, directly or indirectly, on its own behalf or acting on behalf of or through any other person or entity, initiate or maintain any lawsuit, arbitration or other proceeding, whether legal or equitable, against any other Party or its Releasees, arising from or related to the Released Claims.

ARTICLE 4
TECHNOLOGY AND INVENTORY TRANSFER; REGULATORY

4.1 **Transfer of Licensed Know-How; Ongoing Transfers**.

(a) **Initial Precigen Transfer to Ziopharm**. At the request of Ziopharm, provided that such request is made within forty-five (45) days after the Effective Date and provided further that such information is not already in the possession of Ziopharm, Precigen shall reasonably provide Ziopharm with (i) complete and accurate copies of all Licensed Know-How in writing and existence as of the Effective Date and (ii) any Accessory Material Agents and/or Activator Ligands, in each case, that is in Precigen's possession and Control and that Ziopharm determines (in its reasonable discretion) will be reasonably necessary or useful for Ziopharm to practice the licenses granted to Ziopharm in Section 2.1(a) and 2.1(b), including any Accessory Material Agents set forth in the letter agreement referenced in Section 1.8, but excluding any manufacturing-related Licensed Know-How to the extent the transfer of the same requires the consent of a Third Party, which transfer shall be performed under Section 4.1(c) (the "**Initial Technology Transfer**"). Precigen shall reasonably cooperate with Ziopharm in good faith to identify any Licensed Know-How that would be necessary or useful for the Development and Commercialization of Licensed Products hereunder or the practice of the licenses granted to Ziopharm pursuant to Sections 2.1(a) and 2.1(b) and to allocate any Accessory Material Agents and/or Activator Ligands for use, as between the Parties.

(b) **Initial Ziopharm Transfer to Precigen**. At the request of Precigen, provided that such request is made within forty-five (45) days after the Effective Date and provided further that such information is not already in the possession of Precigen, Ziopharm shall reasonably provide Precigen with (i) complete and accurate copies of all material Information in writing and existence as of the Effective Date and (ii) any Accessory Material Agents and/or Activator Ligands, in each case, that is in Ziopharm's possession and Control (including that which is in MDACC's possession that Ziopharm can, without payment or undue effort, cause to be provided to Precigen) and that Precigen determines (in its reasonable discretion) will be reasonably necessary or useful for Precigen to practice its retained rights under the Licensed Intellectual Property, but excluding any manufacturing-related Information to the extent the transfer of the same requires the consent of a Third Party, which transfer shall be performed under Section 4.1(d) and excluding any Information that is not related to the Licensed Products (the "**Initial Ziopharm Technology Transfer**"). Ziopharm shall reasonably cooperate with Precigen in good faith to identify any Information described in this Section 4.1(b) that would be necessary or useful the practice of Precigen's retained rights under the Licensed Intellectual Property and to allocate any Accessory Material Agents and/or Activator Ligands for use, as between the Parties.

(c) **Manufacture Technology Transfer to Ziopharm**. Notwithstanding, but without limiting Section 4.1(a) or 4.5(c), Ziopharm acknowledges that the transfer of certain Licensed Know-How is related to the manufacture of Licensed Products, Activator Ligand, and Accessory Material Agents, including manufacturing and controls information and biologic manufacturing and process development technology, and such technology or Information may be subject to the consent of one or more Third Party contract manufactures. Precigen shall use commercially reasonable efforts to obtain any such consents required for the transfer of any such manufacturing related Information and, upon obtaining such consent, to transfer such manufacturing-related Licensed Know-How to Ziopharm to enable Ziopharm to manufacture Licensed Products, Activator Ligand and Accessory Material Agents. Ziopharm shall reasonably cooperate with Precigen in connection with such consent and transfer.

(d) **Manufacture Technology Transfer to Precigen**. Notwithstanding, but without limiting Section 4.1(b) or 4.5(c), Precigen acknowledges that the transfer of certain Information described in Section 4.1(b) is related to the CD33 trial and Accessory Material Agents, including manufacturing and controls information and biologic manufacturing and process development technology, and such technology or Information may be subject to the consent of one or more Third Party contract manufactures. Ziopharm

shall use commercially reasonable efforts to obtain any such consents required for the transfer of any such manufacturing related Information and, upon obtaining such consent, to transfer such manufacturing-related Information to Precigen to enable Precigen to advance CD33 and Accessory Material Agents. Precigen shall reasonably cooperate with Ziopharm in connection with such consent and transfer.

4.2 **Technology Transfer Costs**. Other than as may be agreed as a Transition Service hereunder, each Party requesting transfer under Section 4.1 shall reimburse the other Party's out-of-pocket expenses and FTE costs incurred to perform any technology transfer, including any amounts paid in consideration for manufacturing support following such technology transfer. Each Party shall invoice the other Party on a monthly basis for the foregoing costs incurred by, and shall pay the amount invoiced within thirty (30) days after the date of any such invoice.

4.3 **IL-12 Product Supply**.

(a) **Inventory Transfer**. On Ziopharm's reasonable request following the Effective Date, Precigen shall transfer to Ziopharm or its designee some or all of its inventory of IL-12 Products (including all final product, drug substance, intermediates, works-in-process, formulation materials, reference standards, drug product clinical reserve samples, packaged retention samples, and the like) that is then in the possession or Control of Precigen or its Affiliates or sublicensees and in quantities reasonably requested by Ziopharm; provided that Ziopharm shall pay Precigen a price equal to Precigen's historical cost plus [*****] percent ([*****]%) for any such transferred IL-12 Product.

4.4 **Assumption of Supply**. On Ziopharm's reasonable request, Precigen shall, and shall cause its Affiliates and sublicensees to, reasonably cooperate with Ziopharm to facilitate orderly transition of the manufacture of IL-12 Products to Ziopharm or its designee, including by assigning or amending as appropriate, upon request of Ziopharm, any agreements or arrangements with Third Party contract manufacturers to Ziopharm or, to the extent any such Third Party agreement or arrangement is not assignable to Ziopharm, reasonably cooperating with Ziopharm to facilitate the entry by Ziopharm into a contract directly with such contract manufacturer(s).

4.5 **Transition Services**.

(a) **Transition Services**. Precigen agrees to provide or cause to be provided to Ziopharm the services listed on Exhibit C (the "**Agreed Services**"). Without limiting the foregoing, for a period of thirty (30) days following the Effective Date, Ziopharm shall have an opportunity to identify additional activities that Precigen was performing with respect to the Licensed Product or the Development thereof as of the Effective Date that it would like Precigen to continue to perform under this Agreement for a specified period to enable the smooth transition of activities in relation to the Licensed Products to Ziopharm. Upon identification of such activities by Ziopharm, Precigen shall reasonably determine whether it can continue to provide such services and, upon Precigen's consent (which shall not be unreasonably withheld), the Parties shall include such activities as Agreed Services hereunder and shall update Exhibit C to reflect the same. In no event shall any Agreed Services continue for a period longer than one (1) year without the prior written consent of Precigen, which consent may be withheld at Precigen's sole discretion. Without limiting the foregoing, for a period of one (1) year from the Effective Date (or such later date agreed by the Parties in writing) (the "**Transition Period**"), Ziopharm may request that Precigen provide or continue to perform additional services related to any Licensed Product other than the Agreed Services, including, as applicable, the (i) transition to Ziopharm or its designee some or all of any clinical or non-clinical trials for a Licensed Products in the Field and the activities related to or supporting such trials, (ii) the continued conduct of any non-clinical or clinical trials for any Licensed Product in the Field, for a reasonable period of time requested by Ziopharm, (iii) ongoing services related to the manufacturing of Licensed Products or (iv) the termination or wind-down of non-clinical or clinical trials; in each case as requested by Ziopharm, (the "**Additional Services**" and together with the Agreed Services, the "**Transition Services**"). The Parties will negotiate terms for the provision of such Additional Services, provided that, for clarity, Precigen will not be obligated to

provide any Additional Services unless Precigen consents to do so, which consent may be withheld at Precigen's sole discretion. Precigen agrees that is shall perform all Transition Services in the same or substantially similar manner, in all material respects, in which Precigen generally performs or has performed similar services for its own product development business, provided that, unless otherwise agreed in writing (including as may be agreed and forth on Exhibit C for a specific Transition Service), Precigen's obligations to perform any Transition Services shall not extend beyond the Transition Period.

(b) **Service Fees; Invoicing**. Any and all service fees charged by Precigen, either directly, through its Affiliates or through Third Party contractors shall (i) with respect to the Agreed Services, be set forth in Exhibit C and (ii) with respect to the Additional Services, be agreed by the Parties in writing. Unless otherwise agreed by the Parties in writing, or as set forth on Exhibit C with respect to payment for specific Agreed Services, Precigen will aggregate and invoice in a single invoice each month all of its service fees for any Transition Services that are payable by Ziopharm for the Transition Services performed in such month. Precigen's service fees will be invoiced monthly, in arrears, and Ziopharm shall pay all undisputed invoices within thirty (30) days of the date of receipt of such invoice.

(c) **Third Party Consents**. Without limiting Section 4.3(a) , Precigen shall use commercially reasonable efforts to obtain any waivers, permits, consents or similar approvals from any Third Parties or Governmental Authorities that are reasonably necessary for Precigen to perform or Ziopharm to receive the Transition Services, as applicable (each a "**Consent**"). Ziopharm shall be solely responsible for the costs paid to any Third Party or Governmental Authority in respect of obtaining any such Consent; provided, however, that Precigen shall notify Ziopharm in advance of any known costs associated with obtaining such Consents and obtain Ziopharm's written approval of such consent fee prior to Precigen agreeing to pay such fee and prior to Ziopharm being liable for any such fee. If, after thirty (30) days using its commercially reasonable efforts, or such longer period as may be requested by Ziopharm, Precigen is unable to obtain any Consent, the Parties shall work together in good faith to agree upon a commercially reasonable alternative arrangement in respect of such Transition Service for which a Consent is required but has not been obtained to the maximum extent possible and shall then perform any such alternative as a Transition Service hereunder.

(d) **Third Party Contracts**. Precigen shall, to the extent reasonably possible utilize any Third Party contracts on behalf of Ziopharm in the performance of the Transition Services, and Ziopharm agrees to comply with the terms of any Third Party contract to the extent relevant to the receipt of a Transition Service, provided that Ziopharm has received prior written notification of the terms of such Third Party contract, and provided, further, that, following receipt of notification of such terms, Ziopharm may opt to not receive the relevant Transition Service rather than comply with such terms. Where a Third Party contract is required in order for the provision of the Transition Services and such Third Party contract expires or is terminated by the relevant Third Party, then Precigen shall use all reasonable efforts to perform the relevant Transition Services itself or to provide a substitute of similar (but no lower) quality and reputation, with the costs of retaining such substitute borne solely by Precigen, unless otherwise agreed.

(e) **Intellectual Property**. Ownership of all inventions and intellectual property developed by or on behalf of Precigen in the performance of transition services shall be determined in accordance with Section 7.1(c).

(f) **Early Termination**. Prior to the expiration of the Transition Period and subject to any limitations set forth on Exhibit C with respect to specific Transition Services, Ziopharm may elect to terminate Precigen's provision of certain of the Transition Services by delivering written notice of such election to Precigen. Such termination of the applicable Transition Services will be effective no earlier than thirty (30) calendar days following Precigen's receipt of such notice, unless Precigen consents to a shorter period. Upon any termination or reduction of any Transition Service and subject to any rights or obligations

that have accrued prior to termination, neither Party shall have any further obligation to the other Party in respect of the Transition Services that have been terminated.

4.6 **Regulatory or Third Party Action or Inspection**. Each Party shall immediately notify the other Party as promptly as reasonably possible following becoming aware of any Regulatory Authority inspections relating to (a) in the case of Precigen, any of its products that utilizes or incorporates any technology that is also used or incorporated in any Licensed Product, and (b) in the case of Ziopharm, a Licensed Product that, in either case of (a) or (b) is reasonably likely to have an impact on the other Party (each of (a) and (b), a "**Reporting Product**" of such Party). To the extent permitted by applicable Law, each Party shall have the right to be present at any such inspections and shall have the opportunity to provide, review and comment on any responses that may be required, in each case, to the extent applicable to such Party's Reporting Product(s). In the event a Party does not receive prior notice of any such inspection, the Party shall notify the other Party as soon as practicable after such inspection and shall provide the other Party with copies of all materials, correspondence, statements, forms and records received or generated pursuant to any such inspection to the extent permitted by applicable Law and to the extent related to such other Party's Reporting Product(s). In addition to such obligations with respect to Regulatory Authority inspections, each Party shall immediately notify the other Party of any material Information it receives regarding any threatened or pending action or communication by or from any Regulatory Authority that is reasonably likely to materially and adversely affect the regulatory status of any Reporting Product(s) of such other Party; provided, that such Party is permitted to disclosure such material Information, including under applicable Law..

4.7 **Rights of Reference**. Within sixty (60) days following the Effective Date, the Parties will negotiate in good faith and agree in writing to a separate agreement setting forth the terms pursuant to which each Party would grant to the other Party the right to reference and use the Drug Master Files (DMFs) or other regulatory filings of such Party (the "**Regulatory Exchange Agreement**"). The Parties acknowledge that the Regulatory Exchange Agreement shall be subject to the agreement of the Parties in all respects, including with respect to the permitted scope of such reference and use rights, including with respect to specific products, development stages, fields of use, specific entities or persons and territories.

ARTICLE 5
GORILLA IL-12 PROGRAM; JOINT DEVELOPMENT COMMITTEE

5.1 **General; Performance Standards**. Subject to the terms and conditions of this Agreement, Ziopharm shall be responsible for the Development of the Gorilla IL-12 Products pursuant to and in accordance with the Gorilla Development Plan. As set forth in additional detail herein, Ziopharm shall be responsible for 80% of the Gorilla Development Costs and Precigen shall be responsible for 20% of the Gorilla Development Costs (which, for clarity are only with respect to the Gorilla IL-12 Products for use in the Field but not the HPV Field) and the Parties shall share in the Operating Profit (or Loss) for Gorilla IL-12 Products in accordance with Section 6.2(a) and 6.2(b), as applicable.

5.2 **Gorilla IL-12 Product-Development**.

(a) **Responsibility; Historical Efforts**. Ziopharm shall have the exclusive right to Develop the Gorilla IL-12 Product(s) in Field, in accordance with the Gorilla Development Plan, as may be amended from time to time. In recognition of Precigen's historical efforts with respect to the research and development of Gorilla IL-12 Products, Ziopharm shall reimburse Precigen for certain costs incurred by or on behalf of Precigen or its Affiliates as set forth in Section 6.2(d).

(b) **Gorilla Development Plan**. Within sixty (60) days following the Effective Date, the Parties shall prepare the initial Gorilla Development Plan for review by the JDC, which shall include all activities with respect to the Development of the Gorilla IL-12 Products through [*****]. In preparation of such meeting, Precigen shall provide Ziopharm with all Information in Precigen's possession or Control reasonably related to the Development of the Gorilla IL-12 Products. Following agreement on the initial

Gorilla Development Plan, from time-to-time, but at least in connection with the submission of a new Gorilla Development Budget in accordance with Section 5.2(c), Ziopharm shall prepare updates to the Gorilla Development Plan and shall submit such updates to the JDC for review and comment. Once agreed, the initial Development Plan shall be attached to this Agreement as Exhibit A.

(c) **Gorilla Development Budget**. The initial Gorilla Development Budget covering all Gorilla Development Activities set forth in the initial Gorilla Development Plan shall be provided by Ziopharm to the JDC for review and comment along with the initial Gorilla Development Plan. The Parties (through the JDC) shall, subject to the remainder of this Section agree on such initial Gorilla Development Budget. No later than October 1 of each calendar year following the initial calendar year during the Term, Ziopharm shall submit an updated Gorilla Development Budget to Precigen (through the JDC) for review and approval. Notwithstanding the foregoing, if the JDC cannot agree on the initial Gorilla Development Budget or any updated Gorilla Development Budget, then the matter will be referred for resolution in accordance with Section 5.3(e), provided further that if the Executive Officers cannot agree on the Gorilla Development Budget, then the JDC shall identify that portion of the budget on which there is agreement for cost sharing (such portion, the "**Gorilla Agreed Budget**"). For the avoidance of doubt, Ziopharm shall have no final decision making authority with respect to the amounts set forth in any Gorilla Agreed Budget, which must be agreed by the JDC, provided further that any Gorilla Development Costs incurred by or on behalf of Ziopharm that are in excess of the Gorilla Agreed Budget shall be subject to off-set against amounts otherwise owed to Precigen in accordance with Section 6.2(b).

(d) **Development Costs**. Except as set forth in Section 6.2(b), Ziopharm shall bear all Gorilla Development Costs and all cost of any Development of any Gorilla IL-12 Products in the HPV Field.

5.3 **Joint Development Committee**.

(a) **Formation; Composition**. Within 20 days after the Effective Date, the parties shall establish a Joint Development Committee composed of two (2) representatives of each Party, each of whom shall have appropriate technical credentials, experience, knowledge, and authority within such party's organization to make the decisions required of the JDC. Each Party may change its representatives to the JDC from time to time in its sole discretion, effective upon written notice to the other party of such change. The JDC will be chaired by Ziopharm, which shall designate one of its JDC representatives as chairperson.

(b) **Responsibilities and Authority**. The JDC's overall responsibility shall be to oversee the conduct of the Gorilla IL-12 Program and Development of the Gorilla IL-12 Products and to encourage and facilitate ongoing cooperation and communication between the Parties. In particular, the JDC shall:

(i) periodically review and provide comments to the Gorilla Development Plans and Gorilla Development Budgets, including, in the event that the Parties do not agree on the initial or updated Gorilla Development Budget(s) agreeing on the Gorilla Agreed Budget, as set forth in Section 5.2(c);

(ii) discuss the protocol for the first phase 1 trial for any Gorilla IL-12 Product hereunder including, without limitation, the endpoint and goals of such trial, which shall be set forth in the Gorilla Development Plan;

(iii) monitor the progress of Gorilla Development Activities, and review and discuss the results thereof;

(iv) discuss and attempt to address scientific or technical issues arising in the course of the Gorilla Development Activities; and

(v) perform such other duties as are specifically delegated to the JDC in this Agreement or otherwise agreed by the Parties.

(c) **Meetings.** The JDC shall meet as deemed necessary by the members of the JDC. The JDC may meet in person or by means of telecommunication (telephone, video, or web conferences). The location of in-person JDC meetings will be mutually agreed by the Parties in good faith. Each party shall be responsible for all of its own expenses of participating in JDC meetings.

(d) **Minutes.** Ziopharm shall be responsible for preparing definitive minutes of each JDC meeting. The chairperson shall circulate a draft of the minutes of each meeting to all members of the JDC for comments within 30 days after such meeting. Such minutes shall provide a description, in reasonable detail, of the discussions at the meeting and shall document all actions and determinations approved by the JDC at such meeting. Without limiting the generality of the foregoing, any amendment or update to the Gorilla Development Plan that is approved at a JDC meeting (including the Gorilla Development Budget therein and, if applicable the Gorilla Agreed Budget), and any pre-clinical or clinical study protocol or any amendment thereto that is approved at a JDC meeting shall be attached to the minutes of such meeting. The Parties shall promptly discuss any comments on such minutes and finalize the minutes no later than the date of the next JDC meeting.

(e) **Decision-Making.** Subject to Section 5.2(c) and Section 5.3(f) the decisions of the JDC shall be made by unanimous vote, with each party's representatives on the JDC collectively having one vote. No vote of the JDC may be taken unless at least one of each party's representatives is present for the vote. Each party shall be responsible for ensuring that, at all times, its representatives on the JDC act reasonably and in good faith in carrying out their respective responsibilities hereunder.

(f) **JDC Dispute Resolution.** If the JDC cannot reach consensus with regard to any matter within its authority within ten (10) Business Days after such matter has been brought to the JDC's attention, then such matter shall be referred to the Chief Executive Officer of Precigen and the Chief Executive Officer of Ziopharm, who shall each designate a member of their Party's Board of Directors, after which the Parties' Chief Executive Officers and the appointed members from the Parties' respective Board of Directors shall promptly meet and attempt in good faith to resolve such issue within 30 days from the date upon which such matter is referred to them. In the event that the parties respective executives are unable to resolve such issue within thirty (30) days of the issue being referred to them, then, subject to Section 5.2(c), and 5.3(g), Ziopharm's representatives on the JDC shall have the final decision making authority.

(g) **Limitation on Authority.** The JDC shall have only such rights, powers and authority as are expressly delegated to it under this Agreement and the JDC shall not be a substitute for the rights of the Parties hereunder. Notwithstanding any other provision of this Agreement to the contrary, the JDC shall not have any right, power or authority:

(h) to determine any issue in a manner that would conflict with the express terms and conditions of this Agreement; or

(i) to modify or amend the terms and conditions of this Agreement.

ARTICLE 6
COMPENSATION

6.1 **Annual Licensing Payments**. Within five (5) Business Days after the Effective Date and each anniversary of the Effective Date during the Term, Ziopharm shall pay to Precigen an annual license payment of one hundred thousand Dollars ($100,000).

6.2 **Gorilla IL-12 Products**.

(a) **Profit and Loss Share in Field (but not the HPV Field**).

(i) **Profit Share for Gorilla IL-12 Products in Field but outside of the HPV Field**. Subject to Section 6.2(a)(ii), the Parties shall share all Operating Profits and all Operating Losses with respect to the Development and Commercialization of each Gorilla IL-12 Product in the Field (but not in the HPV Field, which is addressed in Section 6.2(b)) on the basis of twenty percent (20%) to Precigen and eighty percent (80%) to Ziopharm, provided that Ziopharm shall be entitled to deduct from any amount owed to Precigen under this Section 6.2(a)(i) any amount of Development Credit accrued by Ziopharm (as described in Section 6.2(a)(ii)).

(ii) **Development Credit**. The Parties agree that Precigen's obligation to bear twenty percent (20%) of all Operating Losses in respect of the Gorilla IL-12 Program shall not require Precigen to make payments in respect of Gorilla Development Costs in excess of twenty percent (20%) of the amounts set forth in any agreed Gorilla Development Budget, or, if the Parties cannot agree on the Gorilla Development Budget, the Gorilla Agreed Budget. However, in the event that the Gorilla Development Costs exceed such agreed amounts, Ziopharm shall be entitled to deduct from any payment of Precigen's share of any Operating Profits pursuant to Section 6.2(a)(i) an amount equal to [*****] percent ([*****]%) of the difference between the amount set forth in the agreed Gorilla Development Budget or, if applicable, the Gorilla Agreed Budget and the Gorilla Development Costs actually incurred (such amounts the "**Development Credit**"). For clarity, Ziopharm may carry over any Development Credits that accrue in any calendar quarter to any subsequent calendar quarter.

(b) **Profit Share for Gorilla IL-12 Products in HPV Field**. Precigen will have the right commencing on the Effective Date to receive from Ziopharm fifty percent (50%) of all Operating Profits (if any) with respect to the Commercialization of each Gorilla IL-12 Product in the HPV Field. For the avoidance of doubt, with respect to any calendar quarter for which Ziopharm reports an Operating Loss with respect to Gorilla IL-12 Products in the HPV Field, Ziopharm will bear all of such Operating Losses.

(c) **Profit Share Payments**. Any amounts owed by Precigen pursuant to Section 6.2(a)(i) or Section 6.2(b) shall be payable in accordance with Section 6.5(g).

(d) **Historical Costs**. In consideration for historical costs incurred by or on behalf of Precigen and its Affiliates associated with historical development efforts directed to Gorilla IL-12 Products, Ziopharm shall pay to Precigen a total of one million dollars ($1,000,000) to cover historical expenses including out of pocket expenses and internal FTE costs, payable in calendar quarterly installments, as follows: within fifteen (15) days following each of (i) December 31, 2018, (ii) March 31, 2019, (iii) June 30, 2019 and (iv) September 30, 2019, Precigen shall issue an invoice to Ziopharm for two hundred and fifty thousand dollars ($250,000), which Ziopharm shall pay the undisputed amounts set forth on each invoice within thirty (30) days following Ziopharm's receipt thereof. Precigen shall provide Ziopharm with documented evidence of such historical expenses thirty (30) days prior to the first required payment hereunder.

6.3 **Development Milestone Payments**. On an Exclusive Program-by-Exclusive Program basis, Ziopharm shall notify Precigen within thirty (30) days after the first achievement by Ziopharm or its Affiliates of the following development milestone events for each Exclusive Program. Thereafter, Precigen shall invoice Ziopharm for the corresponding milestone payment, and Ziopharm shall pay each such invoice within thirty (30) days after receipt thereof. No milestone payments shall be due pursuant to this Section 6.2 as a result of achievement of any milestone event by a Sublicensee.

Development Milestone Event	Milestone Payment
Initiation of the first [*****] Clinical Trial	[*****] Dollars ($[*****])
First Regulatory Approval in [*****]	[*****] Dollars ($[*****])
First Regulatory Approval by [*****]	[*****] Dollars ($[*****])
First Regulatory Approval in [*****]	[*****] Dollars ($[*****])
Total	**Fifty-two million five hundred thousand Dollars ($52,500,000)**

Each milestone payment is payable one time only for each Exclusive Program, regardless of the number of times the corresponding event is achieved by an Exclusive Product in each Exclusive Program and regardless of the number of Exclusive Products in each Exclusive Program to achieve such event. Under no circumstances shall Ziopharm be obligated to pay Precigen more than fifty-two million five hundred thousand Dollars ($52,500,000) pursuant to this Section 6.2 for each Exclusive Program or more than [*****]Dollars ($[*****]) in total for all four Exclusive Programs under this Agreement.

6.4 **Sublicensing Income**. Ziopharm shall pay to Precigen twenty percent (20%) of all Sublicensing Income received by Ziopharm from each Sublicensee in accordance with Section 6.5(g).

6.5 **Ziopharm Royalties on Licensed Products**.

(a) **Exclusive Royalty-Bearing Products**. Subject to Section 6.5(d) and Section 6.5(e) on an Exclusive Royalty-Bearing Product-by-Exclusive Royalty-Bearing Product basis, Ziopharm shall pay to Precigen royalties on aggregate annual Net Sales of all Exclusive Royalty-Bearing Products sold by Ziopharm or its Affiliates in the Field in the Territory during the applicable Royalty Term, as calculated by multiplying the applicable royalty rate by the corresponding amount of incremental Net Sales of each Exclusive Royalty-Bearing Product in the Field in the Territory in each calendar year.

Royalty Tier	Annual Net Sales of each Exclusive Royalty-Bearing Product in the Territory	Royalty Rate
1	For that portion of annual aggregate Net Sales of each Exclusive Royalty-Bearing Product less than or equal to [*****] Dollars ($[*****])	[*****]%
2	For that portion of annual aggregate Net Sales of Exclusive Royalty-Bearing Product greater than [*****] Dollars ($[*****]) and less than or equal to [*****] Dollars ($[*****])	[*****]%
3	For that portion of annual aggregate Net Sales of Exclusive Royalty-Bearing Product greater than [*****] Dollars ($[*****])	[*****]%

For example, if aggregate annual Net Sales of a particular Exclusive Royalty-Bearing Product in the Field in the Territory is $1.3 billion in a particular calendar year and aggregate annual Net Sales of a different Exclusive Royalty-Bearing Product in the Field in the Territory is $200 million in the same calendar year, then royalties payable by Ziopharm equal ([*****]% of $[*****]) + ([*****]% of $[*****]) + ([*****]% of $[*****]) + ([*****]% of $[*****]) = $[*****]. For clarity, Net Sales of an Exclusive Royalty-Bearing Product in all indications shall be grouped together for the purpose of determining royalties owed under this Section 6.5(a).

(b) **Non-Exclusive Products and TCR Products**. Subject to Section 6.5(d) and Section 6.5(e), on a Licensed Product-by-Licensed Product basis, Ziopharm shall pay to Precigen royalties on aggregate annual Net Sales of all Non-Exclusive Products and TCR Products sold by Ziopharm or its Affiliates in the Field in the Territory during the applicable Royalty Term, as calculated by multiplying the applicable royalty rate by the corresponding amount of incremental Net Sales of each Non-Exclusive Product and TCR Product in the Field in the Territory in each calendar year.

Royalty Tier	Annual Net Sales of each Non-Exclusive Product and TCR Product in the Territory	Royalty Rate
1	For that portion of annual aggregate Net Sales of each Non-Exclusive Product and TCR Product less than or equal to [*****] Dollars ($[*****])	[*****]%
2	For that portion of annual aggregate Net Sales of each Non-Exclusive Product and TCR Product greater than [*****] Dollars ($[*****])and less than or equal to [*****] Dollars ($[*****])	[*****]%
3	For that portion of annual aggregate Net Sales of each Non-Exclusive Product and TCR Product greater than [*****] Dollars ($[*****])	[*****]%

For example, if aggregate annual Net Sales of a particular Non-Exclusive Product or TCR Product in the Field in the Territory is $1.3 billion in a particular calendar year and annual Net Sales of a different Non-Exclusive Product or TCR Product in the Field in the Territory is $200 million in the same calendar year, then royalties payable by Ziopharm equal ([*****]% of $[*****]) + ([*****]% of $[*****]) + ([*****]%

of $[*****]) + ([*****]% of $[*****]) = $[*****]. For clarity, Net Sales of a particular Non-Exclusive Product or Net Sales of a particular TCR Product, as applicable, in all indications shall be grouped together for the purpose of determining royalties owed under this Section 6.5(b).

(c) **Royalty Term.** Ziopharm shall pay royalties under this Section 6.5, on a country-by-country and Licensed Product-by-Licensed Product basis, on Net Sales during the period of time beginning on the First Commercial Sale of such Licensed Product in such country and continuing until the later of: (i) the expiration or abandonment of the last-to-expire Valid Claim in such country Covering such Licensed Product (a "**Covering Claim**" in such country for such Licensed Product) and (ii) twelve (12) years after the First Commercial Sale of such Licensed Product in such country (the "**Royalty Term**").

(d) **TCR Product Royalty Cap**. The total payments owed by Ziopharm under Section 6.5(b) as a result of Net Sales of TCR Products combined shall not exceed one hundred million Dollars ($100,000,000).

(e) **Covering Claim Reduction**. The royalty rates set forth in Section 6.5(a) and Section 6.5(b) applicable to the Net Sales of any Licensed Product in any country will be reduced by [*****] percent ([*****]%) during any period of the Royalty Term when there exists no Covering Claim for such Licensed Product in such country and there is no Regulatory Exclusivity for such Licensed Product in such country.

(f) **Reserved**

(g) **Reports and Payments**. Within [*****] ([*****]) days after the end of each calendar quarter during the Royalty Term, Ziopharm shall (i) deliver to Precigen a statement, on a country-by-country and Licensed Product-by-Licensed Product basis, of the amount of Sublicensing Income received during such calendar quarter and gross sales and Net Sales of Licensed Products during the applicable calendar quarter and a calculation of the amount of royalty payment due on such sales for such calendar quarter; and (ii) pay all royalty payments, Sublicensing Income payments and Makeup Payments due to Precigen for such calendar quarter. In addition, with respect to any payments owed on account of Gorilla IL-12 Products, along with the royalty report, Ziopharm shall provide Precigen with a reasonably detailed statement of its Development Costs and a reasonably detailed statement of its Commercialization Costs (or in each case an estimate of any portions thereof where actuals are not known as of such time) for each Gorilla IL-12 Product as well as the a summary of the total Received Amounts allocable to such Gorilla IL-12 Product in such calendar quarter and the total amount owed to or payable by Precigen on account thereof, including whether any Development Credits were generated during such quarter or applied to amounts payable in such calendar quarter and whether any remaining Development Credits exist. Any net payment owed from Ziopharm to Precigen in respect of Operating Profits shall be paid within [*****] ([*****]) days following the delivery of the profit sharing report (i.e. within [*****] ([*****]) days after the end of the calendar quarter). The undisputed portion of any net payment owed from Precigen to Ziopharm in respect of Operating Loss shall be paid within [*****] ([*****]) days following the delivery of the profit sharing report.

6.6 **Precigen Licensing Income and Royalties on CAR-T Products**.

(a) **Precigen Licensing Income**. Subject to Section 6.6(c) and Section 6.6(d), in the event Precigen grants a CAR-T License to one or more licensees, Precigen shall pay to Ziopharm [*****] percent ([*****]%) of all Licensing Income received by Precigen from such licensee in accordance with Section 6.6(f).

(b) **CAR-T Royalties**. Subject to Section 6.6(c) and Section 6.6(d), Precigen shall pay to Ziopharm a [*****] percent ([*****]%) royalty on Net Sales of all CAR-T Products sold by Precigen or its Affiliates for use in Oncology in the Territory during the applicable CAR-T Royalty Term.

(c) **CAR-T Cap**. Subject to Section 6.6(d), the total payments owed by Precigen under Section 6.6(a) and Section 6.6(b) combined shall not exceed one hundred million Dollars ($100,000,000) (the "**CAR-T Cap**").

(d) **CAR-T Royalty Reduction and CAR-T Cap Reduction**. In the event Precigen or its Affiliates are obligated to [*****], then the royalty rate pursuant to Section 6.6(a) shall be reduced to [*****] percent ([*****]%) and the CAR-T Cap shall be reduced to [*****]Dollars ($[*****]).

(e) **CAR-T Royalty Term**. Precigen shall pay royalties under this Section 6.6, on a country-by-country and CAR-T Product-by-CAR-T Product basis, on Net Sales during the period of time beginning on the First Commercial Sale of such CAR-T Product in such country and continuing until the later of: (i) the expiration or abandonment of the last-to-expire Valid Claim in such country Covering such CAR-T Product and (ii) twelve (12) years after the First Commercial Sale of such CAR-T Product in such country (the "**CAR-T Royalty Term**").

(f) **Reports and Payments**. Within [*****] ([*****]) days after the end of each calendar quarter during the Royalty Term or during the term of any CAR-T License, Precigen shall (i) deliver to Ziopharm a statement, on a country-by-country and CAR-T Product-by-CAR-T Product basis, of the amount of Licensing Income received during such calendar quarter and gross sales and Net Sales of CAR-T Products during the applicable calendar quarter and a calculation of the amount of royalty payment due on such sales for such calendar quarter; and (ii) pay all royalty payments, Licensing Income payments and Makeup Payments due to Ziopharm for such calendar quarter.

6.7 **Payments under Merck Agreement.** Ziopharm shall remain responsible for all payments owed to Merck under Section 4.5(e) of the Merck Agreement as a result of Ziopharm's, its Affiliates' or Sublicensees' exploitation of CAR-T Products. Precigen shall remain responsible for all payments owed to Merck under Section 4.5(e) of the Merck Agreement as a result of Precigen's, its Affiliates or licensees' exploitation of CAR-T Products. Notwithstanding the foregoing, in the event that one Party (the "**Overpaying Party**") pays more than fifty percent (50%) of the One-Time Intrexon Program Option Fee (as defined under the Merck Agreement), then the other Party (the "**Underpaying Party**") shall pay the Overpaying Party [*****]percent ([*****]%) of all Net Sales of Licensed Products (in the case of Ziopharm as the Underpaying Party) or CAR-T Products (in the case of Precigen as the Underpaying Party), as applicable, (such makeup payments, the "**Makeup Payments**") until the total of the payments towards the One-Time Intrexon Program Option Fee made by the Underpaying Party pursuant to the Merck Agreement plus the Makeup Payments equals fifty percent (50%) of the One-Time Intrexon Program Option Fee.

6.8 **Foreign Exchange**. The rate of exchange to be used in computing the amount of currency equivalent in Dollars of Net Sales invoiced in other currencies shall be the applicable spot exchange rate sourced from Reuters/Bloomberg, or such other source agreed to by both Parties.

6.9 **Manner and Place of Payment**. All payments owed under this Agreement shall be made by wire transfer in immediately available funds to a bank and account designated in writing by the Party receiving the payment.

6.10 **Records; Audits**. Ziopharm and its Affiliates will maintain complete and accurate records in reasonably sufficient detail to permit Precigen to confirm the accuracy of (a) the calculation of Operating Profits (or Loss) under Section 6.2 (including any Development Credits accrued with respect thereto), (b) the Sublicensing Income payments under Section 6.4, (c) the calculation of royalty payments under Section 6.5 and (d) the calculation of any Makeup Payments under Section 6.7. Precigen and its Affiliates will maintain complete and accurate records in reasonably sufficient detail to permit Ziopharm to confirm the accuracy of (i) the calculation of Development Costs or Operating Profits (or Loss) under Section 6.2, (ii) the Licensing Income payments under Section 6.6(a), (iii) the calculation of royalty payments under Section 6.6(b) and (iv) the calculation of any Makeup Payments under Section 6.7. Upon reasonable prior notice, such records shall be available during regular business hours for a period of three (3) years from the end of the calendar year to which they pertain for examination, not more often than once each calendar year, by an independent certified public accountant selected by the auditing Party and reasonably acceptable to the audited Party, for the sole purpose of verifying the accuracy of the financial reports furnished by the other Party

pursuant to this Agreement. Any such auditor shall enter into a confidentiality agreement with the audited Party and shall not disclose the audited Party's Confidential Information, except to the extent such disclosure is necessary to verify the accuracy of the financial reports furnished by the audited Party or the amount of payments due by one Party to the other Party under this Agreement. Any amounts shown to be owed but unpaid shall be paid, and any amounts showed to be overpaid will be refunded, within forty-five (45) days from the accountant's report. The auditing Party shall bear the full cost of such audit unless such audit discloses an underpayment or overcharge by the audited Party of more than [*****] percent ([*****]%) of the amount due, in which case the audited Party shall bear the full cost of such audit.

6.11 **Taxes**.

(a) **Taxes on Income.** Each Party shall be solely responsible for the payment of all taxes imposed on its share of income arising directly or indirectly from the efforts of the Parties under this Agreement.

(b) **Tax Cooperation.** The Parties agree to cooperate with one another and use reasonable efforts to reduce or eliminate tax withholding or similar obligations in respect of annual licensing payments, royalties, milestone payments, licensing income payments and other payments made by either Party under this Agreement. To the extent either Party is required to deduct and withhold taxes on any payment to the other Party, the paying Party shall pay the amounts of such taxes to the proper Governmental Authority in a timely manner and promptly transmit to the other Party an official tax certificate or other evidence of such withholding sufficient to enable the other Party to claim such payment of taxes. The other Party shall provide the paying Party any tax forms that may be reasonably necessary in order for the paying Party not to withhold tax or to withhold tax at a reduced rate under an applicable bilateral income tax treaty. Each Party shall provide the other with reasonable assistance to enable the recovery, as permitted by applicable Laws, of withholding taxes, value added taxes, or similar obligations resulting from payments made under this Agreement, such recovery to be for the benefit of the Party bearing such withholding tax or value added tax. To the extent any such amounts are so deducted or withheld, and paid over to the appropriate Governmental Authority, such amounts shall be treated for all purposes under this Agreement as having been paid to the person to whom such amounts would otherwise have been paid.

ARTICLE 7
INTELLECTUAL PROPERTY MATTERS

7.1 **Ownership of Inventions**.

(a) **Activities by Ziopharm.** Unless provided for otherwise herein, Ziopharm shall own all Information and inventions, whether or not patentable, made in the course of Ziopharm's Research, Development, manufacture and Commercialization of Licensed Products after the Effective Date.

(b) **Gorilla IL-12 Program Inventions**. All Information and inventions, whether or not patentable, made in the course of Ziopharm's performance of activities under the Gorilla Development Plan, including all intellectual property rights therein (collectively, "**Gorilla Inventions**") and all Patents claiming Gorilla Inventions ("**Gorilla Patents**") shall be solely and exclusively owned by Ziopharm, if made (i) solely by employees, agents, or independent contractors of Ziopharm or (ii) (A) solely by employees, agents, or independent contractors of Precigen or (B) jointly by employees, agents or independent contractors of each Party (in each case of (A) and (B), with Precigen's involvement being limited to participation at JDC meetings) (such Gorilla Inventions under (i) and (ii), the "**Ziopharm Gorilla Inventions**" and such Gorilla Patents under (i) and (ii), the "**Ziopharm Gorilla Patents**"). Precigen hereby assigns to Ziopharm any and all right, title and interest it may have in any Ziopharm Gorilla Inventions, and agrees to take such further actions reasonably requested by Ziopharm to evidence such assignment. Precigen will require all of its employees,

consultants agents and contractors, and will cause its Affiliates and subcontractors to require all of their employees, consultants agents and contractors to assign all Ziopharm Gorilla Inventions that are conceived, generated or otherwise made by such employees, consultants agents and contractors to it, respectively, for further assignment according to the ownership principles described in this Section 7.1(b).

(c) **Transition Services Inventions**. Any Information and inventions, whether or not patentable that Precigen or its Affiliates may solely or jointly conceive, develop or reduce to practice, or cause to be conceived, developed or reduced to practice, in the performance of the Transition Services (including the use or manufacture thereof), including any and all intellectual property rights (including moral rights) inherent therein and appurtenant thereto, (collectively, "**Service Inventions**"), shall be solely and exclusively owned by Precigen. Precigen hereby grants to Ziopharm under any all right, title and interest it may have in any Service Inventions to Ziopharm solely for practice of any or all of the rights granted to Ziopharm in Section 2.1(a) and Section 2.1(b). Precigen will ensure that all individuals providing Transition Services have or will prior to providing any Transition Service enter into an inventions assignment agreement whereby, to the fullest extent permitted under applicable Law, all such Service Inventions are assigned to Precigen.

(d) **Ziopharm Veledimex Alterations**. Precigen shall own all Ziopharm Veledimex Alterations, whether or not patentable, made in the course of Ziopharm's Research, Development, manufacture and Commercialization of Licensed Products after the Effective Date. Ziopharm hereby assigns to Precigen any and all right, title and interest it may have in any Ziopharm Veledimex Alterations, and agrees to take such further actions reasonably requested by Precigen to evidence such assignment. Ziopharm will require all of its employees, consultants agents and contractors, and will cause its Affiliates and subcontractors to require all of their employees, consultants agents and contractors to assign all Ziopharm Veledimex Alterations that are conceived, generated or otherwise made by such employees, consultants agents and contractors to it, respectively, for further assignment according to the ownership principles described in this Section 7.1(d). For clarity, any Ziopharm Veledimex Alterations are part of the Licensed Intellectual Property and are within the scope of the license to Ziopharm set forth in Section 2.1.

7.2 **Inventorship Procedure**. Inventorship shall be determined in accordance with U.S. patent laws. All such determinations shall be documented to ensure that any divisional or continuation patent applications reflect appropriate inventorship.

7.3 **Disclosure of Inventions**. Precigen shall promptly disclose to Ziopharm all Service Inventions.

7.4 **Prosecution of Licensed Patents**.

(a) **Generally**. Subject to Section 7.4(b), as between the Parties, Precigen shall have the right, but not the obligation, to prepare, file, prosecute and maintain the Licensed Patents in the Territory. As between the Parties, Precigen shall bear all costs incurred by Precigen in connection with the preparation, filing, prosecution or maintenance of any Licensed Patent. Precigen shall consult with Ziopharm and keep Ziopharm reasonably informed of the status of the Licensed Patents and shall promptly provide Ziopharm with copies of all material correspondence received from any patent authority in connection therewith to the extent not publicly available. In addition, Precigen shall timely provide Ziopharm with drafts of all proposed filings and correspondence to any patent authority with respect to the Licensed Patents in the Field for Ziopharm's review and comment prior to the submission of such proposed filings and correspondence. Precigen shall confer with Ziopharm and incorporate Ziopharm's comments prior to submitting such filings and correspondence, provided, that Ziopharm's comments do not require Precigen to take any action in connection with the Licensed Patents that could reasonably be expected to adversely affect Precigen's or its Affiliate's Development or Commercialization of (i) products (other than Licensed Products) claimed by such Licensed Patent inside or outside the Field in the Territory or (ii) Licensed Products claimed by such Licensed Patent outside the Field in the Territory (a "**Precigen Impact Situation**"). If in either Party's

opinion, a Precigen Impact Situation could arise, such Party will promptly notify the other Party and the Parties shall discuss in good faith. Precigen shall have final decision authority with respect to whether or not to incorporate such comments.

(b) **New Patent Applications**. Notwithstanding Section 7.4(a), if after consultation with Ziopharm, Precigen agrees that a new patent application (including, with respect to Sleeping Beauty Intellectual Property, a divisional application) should be filed based on the Licensed Know-How, such patent applications shall be deemed Licensed Patents subject to further prosecution and maintenance in accordance with Section 7.4(a). Precigen shall reasonably consult with Ziopharm regarding the drafting and filing of such new patent applications and shall reasonably consider any comments provided by Ziopharm related thereto. For the avoidance of doubt, Precigen shall have authority with respect to such new patent applications (or divisional application) filing, prosecution and maintenance decisions in accordance with Section 7.4(a).

(c) **Abandonment**. If Precigen decides anywhere in the Territory to abandon any Licensed Patent, Ziopharm may assume Precigen's rights and responsibilities under this Section 7.4 with respect to such Licensed Patent, and in connection with assuming such rights and responsibilities, Ziopharm may apply for any extension (including a supplementary protection certificate or equivalent thereof) and Ziopharm will thereafter be responsible for the prosecution and maintenance of such Licensed Patent in the Territory.

(d) **Cooperation.** Each Party shall provide the other Party all reasonable assistance and cooperation, at the other Party's request and expense, in the patent prosecution efforts provide above in this Section 7.4, including providing any necessary powers of attorney, executing any other required documents or instruments for such prosecution, and making its personnel with appropriate scientific expertise available to assist in such efforts.

7.5 **Enforcement of Licensed Patents.**

(a) **Notification**. If either Party becomes aware of (i) any existing or threatened infringement of the Licensed Patents in the Field in the Territory (including the filing of an ANDA under Section 505(j) of the FD&C Act or an application under Section 505(b)(2) of the FD&C Act naming a Licensed Product as a reference listed drug and including a certification under Section 505(j)(2)(A)(vii)(IV) or 505(b)(2)(A)(IV), respectively), or (ii) a declaratory judgment action against any Licensed Patent in the Territory in connection with any infringement described in clause (i) (each of (i) and (ii), a "**Patent Infringement**"), it shall promptly notify the other Party in writing to that effect, and the Parties will consult with each other regarding any actions to be taken with respect to such Patent Infringement.

(b) **Enforcement Rights.** For any Patent Infringement, each Party shall share with the other Party all Information available to it regarding such actual or alleged infringement. With respect to any Patent Infringement with a product that competes with an Exclusive Product in the Field (a "**Product Infringement**"), Ziopharm shall have the first right, but not the obligation, to bring an appropriate suit or take other action against any person or entity engaged in, or to defend against, such Product Infringement, at Ziopharm's cost and expense. Ziopharm shall not settle any such suit or action in any manner that would reasonably be expected to (i) create a Precigen Impact Situation anywhere in the Territory, (ii) require Precigen to incur any liability or (iii) require Precigen to make any payments, in each case without the prior written consent of Precigen. If Ziopharm does not, within one hundred eighty (180) days after its receipt or delivery of notice under Section 7.5(a), commence a suit to enforce the Licensed Patents against such Product Infringement, take other action to terminate such Product Infringement or initiate a defense against such Product Infringement, Precigen shall have the right, but not the obligation, to commence such a suit or take such an action or defend against such Product Infringement in the Territory at its own cost and expense. In such event, Ziopharm shall take appropriate actions in order to enable Precigen to commence a suit or take the actions set forth in the preceding sentence. Precigen shall not settle any such suit or action in any manner that would reasonably be expected to adversely affect Ziopharm's Development or Commercialization of

Exclusive Products in the Field in the Territory or the scope of Ziopharm's license under Section 2.1(a) or Section 2.1(b) anywhere in the Territory without the prior written consent of Ziopharm.

(c) **Collaboration**. Each Party shall provide to the enforcing Party reasonable assistance in such enforcement, at such enforcing Party's request and expense, including joining such action as a party plaintiff if required by applicable Laws to pursue such action. The enforcing Party shall keep the other Party regularly informed of the status and progress of such enforcement efforts and shall reasonably consider the other Party's comments on any such efforts. The non-enforcing Party shall be entitled to separate representation in such matter by counsel of its own choice and at its own expense, but such Party shall at all times cooperate fully with the enforcing Party.

(d) **Expenses and Recoveries**. The Party bringing or defending a claim, suit or action under Section 7.5(b) shall be solely responsible for any expenses incurred by such Party as a result of such claim, suit or action. If such Party recovers monetary damages in such claim, suit or action, such recovery shall be allocated first to the reimbursement of any expenses incurred by the Parties in such litigation, and any remaining amounts shall be allocated as follows: (i) if Ziopharm is the enforcing or defending Party, the remaining amounts will be retained by Ziopharm, except that all such amounts shall be attributable to lost sales of Licensed Products shall be included in Net Sales subject to the royalty payment by Ziopharm to Precigen pursuant to Section 6.5(a) or Section 6.5(b), as applicable, and (ii) if Precigen is the enforcing or defending Party, Precigen shall retain all amounts.

7.6 **Orange Book Listing**. Upon a Party's receipt of a notice of allowance (or equivalent) of an applicable Licensed Patent, Precigen shall promptly provide Ziopharm with all information reasonably required by Ziopharm to list such Licensed Patent in the Orange Book maintained by the FDA or similar or equivalent patent listing source, if any, in other countries in the Territory. Ziopharm shall have the sole right to determine which Licensed Patent or other Patent shall be included in the Orange Book for Licensed Products.

7.7 **Patent Term Extensions**. Precigen will cooperate with Ziopharm, at Ziopharm's request, in seeking and obtaining patent term extensions (including any pediatric exclusivity extensions as may be available) or supplemental protection certificates or their equivalents in any country with respect to any Exclusive Royalty-Bearing Products. If elections with respect to obtaining such patent term extensions are to be made, Ziopharm shall have the sole right to make such elections.

7.8 **Personnel Obligations**. Prior to beginning work under this Agreement relating to any Development of a Licensed Product, or conducting any Gorilla Development Activities or Transition Services, each employee, agent or independent contractor of both Parties and their Affiliates shall be bound by invention assignment obligations that are consistent with the obligations of each Party in this Article 7, including: (a) promptly reporting any invention, discovery, process or other intellectual property right; (b) assigning to each Party, as applicable, all of his or her right, title and interest in and to any invention, discovery, process or other intellectual property right; (c) cooperating in the preparation, filing, prosecution, maintenance and enforcement of any Patent; (d) performing all acts and signing, executing, acknowledging and delivering any and all documents required for effecting the obligations and purposes of this Agreement; and (e) complying with obligations of confidentiality and non-use consistent with those contained in this Agreement.

7.9 **Trademarks**.

(a) **Existing Trademarks**. Within thirty (30) days of the Effective Date, the Parties shall enter into a trademark license agreement pursuant to which Precigen shall grant to Ziopharm a non-exclusive license under the Trademarks Controlled by Precigen and its Affiliates as of the Effective Date and set forth on Exhibit G hereto, that relate to the Licensed Intellectual Property or Licensed Products solely to promote, market, sell, offer for sale, import and distribute Licensed Products in the Field in the Territory in accordance with the terms of this Agreement. Ziopharm further agrees that in connection with the Commercialization of any Licensed Products hereunder that incorporate the Switch Intellectual Property, that the origins of any

such technology will be properly attributed to Precigen, and Precision hereby grants Ziopharm to make such attributions under any appropriate Trademarks of Precigen. The Parties shall discuss in good faith any Trademark usage describing such Switch Intellectual Property in connection with the Commercialization of any Licensed Products hereunder prior to the use thereof.

(b) **New Product Marks**. Ziopharm and its Affiliates and Sublicensees shall have the right to brand the Licensed Products in the Territory using any Trademarks it determines appropriate for the Licensed Products, which may vary by country or within a country (the "**New Product Marks**"), provided that Ziopharm shall not, and shall ensure that its Affiliates and Sublicensees will not, make any use of the trademarks or house marks of Precigen (including Precigen's corporate name) or any trademark confusingly similar thereto. As between the Parties, Ziopharm shall own all rights in the New Product Marks and shall register and maintain, in its discretion and at its own cost and expense, the New Product Marks in the countries and regions in the Territory that it determines to be appropriate. Ziopharm shall have the sole right, in its discretion and at its expense, to defend and enforce the New Product Marks. Notwithstanding the foregoing, Ziopharm shall not rebrand any portion of the Licensed Intellectual Property that is the subject of a Trademark Controlled by Precigen or its Affiliates as of the Effective Date and set forth on Exhibit G hereto.

ARTICLE 8
REPRESENTATIONS AND WARRANTIES

8.1 **Mutual Representations and Warranties**. Each Party hereby represents and warrants to the other Party as follows:

(a) **Corporate Existence**. As of the Effective Date, it is a company or corporation duly organized, validly existing, and in good standing under the Laws of the jurisdiction in which it is incorporated.

(b) **Corporate Power, Authority and Binding Agreement**. As of the Effective Date, (i) it has the corporate power and authority and the legal right to enter into this Agreement and perform its obligations hereunder; (ii) it has taken all necessary corporate action on its part required to authorize the execution and delivery of this Agreement and the performance of its obligations hereunder; and (iii) this Agreement has been duly executed and delivered on behalf of such Party, and constitutes a legal, valid, and binding obligation of such Party that is enforceable against it in accordance with its terms.

(c) **No Conflicts**. It has not entered into any agreement with any Third Party that is in conflict with the rights granted to any other Party under this Agreement, and has not taken and shall not take any action that would in any way prevent it from granting the rights granted to any other Party under this Agreement, or that would otherwise materially conflict with or adversely affect any other Party's rights under this Agreement.

8.2 **Additional Representations and Warranties of Precigen**. Precigen represents and warrants and, as applicable, covenants to Ziopharm as follows, as of the Effective Date:

(a) **Title; Encumbrances.** Precigen has the full and legal rights and authority to license to Ziopharm the Licensed Intellectual Property free and clear from any mortgages, pledges, liens, security interests, conditional and installment sale agreements, encumbrances, charges or claims of any kind;

(b) **Notice of Infringement.** Precigen has not received any written notice or threat from any Third Party asserting or alleging that any Research, manufacture or Development of Licensed Products by Precigen prior to the Effective Date infringed or would infringe the intellectual property rights of such Third Party;

(c) **Notice of Misappropriation.** Precigen has not received any written notice or threat from any Third Party asserting or alleging that any Research, manufacture or Development of Licensed Products by Precigen prior to the Effective Date misappropriated the intellectual property rights of such Third Party;

(d) **Intellectual Property Rights**. The Licensed Patents on Exhibit B, includes all intellectual property rights Controlled by Precigen and its Affiliates that are reasonably necessary for the Development and Commercialization of the Human IL-12 Program, Gorilla IL-12 Program (including [******]) and CD-19 Program in the current state that exists as of the Effective Date by Ziopharm in accordance with the terms of this Agreement;

(e) **Third Party Infringement**. To Precigen's knowledge, no Third Party is infringing or has infringed any Licensed Patents or has misappropriated any Licensed Know-How;

(f) **No Proceeding.** There are no pending, and to Precigen's knowledge, no threatened, adverse actions, suits or proceedings (including interferences, reissues, reexaminations, cancellations, oppositions, nullity actions, invalidation actions or post-grant reviews) against Precigen or its Affiliates involving the Licensed Intellectual Property or Licensed Products; and

(g) **Gorilla Program.** The presentation provided by Precigen to Ziopharm, dated September 18, 2018, represents pre-clinical data of the Gorilla IL-12 Construct.

8.3 **Mutual Covenants**.

(a) **No Debarment**. In the course of the Research and Development by under the Gorilla Development Plan or the Research and Development by Ziopharm of Licensed Products, neither Party shall use any employee or consultant who has been debarred by any Regulatory Authority or, to such Party's knowledge, is the subject of debarment proceedings by a Regulatory Authority. Each Party shall notify the other Party promptly upon becoming aware that any of its employees or consultants has been debarred or is the subject of debarment proceedings by any Regulatory Authority.

(b) **Compliance**. Each Party and its Affiliates shall comply in all material respects with all applicable Laws in the Research, Development and Commercialization of Licensed Products and performance of its obligations under this Agreement, including, to the extent applicable to such Party and its activities hereunder, the statutes, regulations and written directives of the FDA, the EMA and any Regulatory Authority having jurisdiction in the Territory, the FD&C Act, the Prescription Drug Marketing Act, the Federal Health Care Programs Anti-Kickback Law, 42 U.S.C. 1320a-7b(b), the statutes, regulations and written directives of Medicare, Medicaid and all other health care programs, as defined in 42 U.S.C. § 1320a-7b(f), and the Foreign Corrupt Practices Act of 1977, each as may be amended from time to time.

(c) **No Conflicts**. Each Party shall not enter into any agreement with any Third Party that is in conflict with the rights, licenses and obligations under this Agreement, and has not taken and shall not take any action that would in any way prevent it from granting the rights granted to the other Party under this Agreement.

8.4 **Disclaimer**. EXCEPT AS EXPRESSLY STATED IN THIS AGREEMENT, NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, WHETHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, OR NON-MISAPPROPRIATION OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS, ARE MADE OR GIVEN BY OR ON BEHALF OF A PARTY, AND ALL REPRESENTATIONS AND WARRANTIES, WHETHER ARISING BY OPERATION OF LAW OR OTHERWISE, ARE HEREBY EXPRESSLY EXCLUDED.

ARTICLE 9
INDEMNIFICATION

9.1 **Indemnification by Precigen**. Precigen shall defend, indemnify, and hold Ziopharm and its Affiliates and their respective officers, directors, employees, and agents (the "**Ziopharm Indemnitees**") harmless from and against any and all damages or other amounts payable to a Third Party claimant, as well

as any reasonable attorneys' fees and costs of litigation incurred by such Ziopharm Indemnitees, resulting from any claims, suits, proceedings or causes of action brought by such Third Party (collectively, "**Claims**") against such Ziopharm Indemnitee to the extent arising from or based on (a) the Research or Development of the Gorilla IL-12 Products by or on behalf of Precigen or its Affiliates prior to the Effective Date, (b) the Merck Agreement (other than a breach by Ziopharm of any of its obligations under the Merck Agreement), (c) the breach of any of Precigen's obligations, representations or warranties under this Agreement, or (d) the willful misconduct or negligent acts of Precigen, its Affiliates, or the officers, directors, employees, or agents of Precigen or its Affiliates. The foregoing indemnity obligation shall not apply to the extent that (i) the Ziopharm Indemnitees fail to comply with the indemnification procedures set forth in Section 9.3 and Precigen's defense of the relevant Claims is prejudiced by such failure, or (ii) any Claim arises from or is based on any activity set forth in Section 9.2(c) or 9.2(d) for which Ziopharm is obligated to indemnify the Precigen Indemnitees under Section 9.2.

9.2 **Indemnification by Ziopharm**. Ziopharm shall defend, indemnify, and hold Precigen, Intrexon and their Affiliates and their respective officers, directors, employees, and agents (the "**Precigen Indemnitees**") harmless from and against damages or other amounts payable to a Third Party claimant, as well as any reasonable attorneys' fees and costs of litigation incurred by such Precigen Indemnitees, resulting from any Claims against such Precigen Indemnitee to the extent arising from or based on (a) the Development or Commercialization of Licensed Products by or on behalf of Ziopharm or its Affiliates or Sublicensees (other than by Precigen), (b) Ziopharm's breach of any of its obligations under the Merck Agreement, (c) the breach of any of Ziopharm's obligations, representations or warranties under this Agreement, (d) the willful misconduct or negligent acts of Ziopharm, its Affiliates, or the officers, directors, employees, or agents of Ziopharm or its Affiliates, or (e) Ziopharm's breach of any Assigned Contracts or the MDACC Research Agreement or 2015 MDACC License, each as amended pursuant to the Agreement. The foregoing indemnity obligation shall not apply to the extent that (i) the Precigen Indemnitees fail to comply with the indemnification procedures set forth in Section 9.3 and Ziopharm's defense of the relevant Claims is prejudiced by such failure, or (ii) any Claim arises from or is based on any activity set forth in Section 9.1(c) or 9.1(d) for which Precigen is obligated to indemnify the Ziopharm Indemnitees under Section 9.1.

9.3 **Indemnification Procedures**. The Party claiming indemnity under this Section 9.3 (the "**Indemnified Party**") shall give written notice to the Party from whom indemnity is being sought (the "**Indemnifying Party**") promptly after learning of such Claim. The Indemnified Party shall provide the Indemnifying Party with reasonable assistance, at the Indemnifying Party's expense, in connection with the defense of the Claim for which indemnity is being sought. The Indemnified Party may participate in and monitor such defense with counsel of its own choosing at its sole expense; provided, however, the Indemnifying Party shall have the right to assume and conduct the defense of the Claim with counsel of its choice. The Indemnifying Party shall not settle any Claim without the prior written consent of the Indemnified Party, not to be unreasonably withheld, unless the settlement involves only the payment of money. So long as the Indemnifying Party is actively defending the Claim in good faith, the Indemnified Party shall not settle or compromise any such Claim without the prior written consent of the Indemnifying Party. If the Indemnifying Party does not assume and conduct the defense of the Claim as provided above, (a) the Indemnified Party may defend against, consent to the entry of any judgment, or enter into any settlement with respect to such Claim in any manner the Indemnified Party may deem reasonably appropriate (and the Indemnified Party need not consult with, or obtain any consent from, the Indemnifying Party in connection therewith), and (b) the Indemnifying Party shall remain responsible to indemnify the Indemnified Party as provided in this Section 9.3.

9.4 **Limitation of Liability**. NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, PUNITIVE, OR INDIRECT DAMAGES ARISING FROM OR RELATING TO ANY BREACH OF THIS AGREEMENT, REGARDLESS OF ANY NOTICE

OF THE POSSIBILITY OF SUCH DAMAGES. NOTWITHSTANDING THE FOREGOING, NOTHING IN THIS SECTION 9.4 IS INTENDED TO OR SHALL LIMIT OR RESTRICT THE INDEMNIFICATION RIGHTS OR OBLIGATIONS OF ANY PARTY UNDER SECTION 9.1 OR 9.2 OR DAMAGES AVAILABLE FOR BREACH OF ARTICLE 10.

9.5 **Insurance**. Each Party shall procure and maintain insurance, including product liability insurance, consistent with normal business practices of prudent companies similarly situated at all times during which any Licensed Product is being clinically tested in human subjects or commercially distributed or sold by such Party and for the three (3) year period thereafter. It is understood that such insurance shall not be construed to create a limit of either Party's liability with respect to its indemnification obligations under this Section 9.5. Each Party shall provide the other Party with written evidence of such insurance upon request. Each Party shall provide the other Party with written notice at least thirty (30) days prior to the cancellation or non-renewal of such insurance.

ARTICLE 10
CONFIDENTIALITY

10.1 **Confidentiality**. Each Party agrees that, during the Term and for a period of ten (10) years thereafter, it shall keep confidential and shall not publish or otherwise disclose and shall not use for any purpose other than as provided for in this Agreement (which includes the exercise of any rights or the performance of any obligations hereunder) any Confidential Information furnished to it by the other Party pursuant to this Agreement, except to the extent expressly authorized by this Agreement or otherwise agreed in writing by the Parties; provided, however, that any Confidential Information that is considered a "trade secret" shall remain subject to the confidentiality provisions herein for so long as such Confidential Information maintains its "trade secret" status. The foregoing confidentiality and non-use obligations shall not apply to any portion of the other Party's Confidential Information that the receiving Party can demonstrate by competent written proof:

(a) was already known to the receiving Party or its Affiliate, other than under an obligation of confidentiality, at the time of disclosure by the other Party;

(b) was generally available to the public or otherwise part of the public domain at the time of its disclosure to the receiving Party;

(c) became generally available to the public or otherwise part of the public domain after its disclosure and other than through any act or omission of the receiving Party in breach of this Agreement;

(d) was disclosed to the receiving Party or its Affiliate by a Third Party who has a legal right to make such disclosure and who did not obtain such information directly or indirectly from the other Party; or

(e) was independently discovered or developed by the receiving Party or its Affiliate without access to or aid, application or use of the other Party's Confidential Information, as evidenced by a contemporaneous writing.

10.2 **Authorized Disclosure**. Notwithstanding the obligations set forth in Section 10.1, a Party may disclose the other Party's Confidential Information and the terms of this Agreement to the extent such disclosure is reasonable necessary in the following instances:

(a) filing, prosecuting, or maintaining Patents as permitted by this Agreement;

(b) prosecuting or defending litigation as permitted by this Agreement;

(c) disclosure to its and its Affiliates' employees, agents, consultants and contractors, on a need-to-know basis for the sole purpose of performing its obligations or exercising its rights under this

Agreement; provided that in each case, the disclosees are bound by written obligations of confidentiality and non-use consistent with those contained in this Agreement; or

(d) disclosure to potential and actual: investors, acquirors (of part or all of the shares and/or assets of a Party or an Affiliate), collaborators, licensors, licensees and sublicensees and other financial or commercial partners, solely for the purpose of evaluating or carrying out an actual or potential investment, acquisition, collaboration, license or sublicense; provided that in each case, the discloses are bound by written obligations of confidentiality and non-use consistent with those contained in this Agreement (provided that the term of such obligations may be shorter); or

(e) to comply with applicable Laws, including regulations promulgated by applicable security exchanges, court order, administrative subpoena or order; provided that the Party subject to such Laws shall promptly notify the other Party of such required disclosure and shall use reasonable efforts to obtain, or to assist the other Party in obtaining, a protective order preventing or limiting the required disclosure.

Notwithstanding the foregoing, if a Party is required to make a disclosure of the other Party's Confidential Information pursuant to Section 10.2(e), such Party shall notify the other Party of such required disclosure as far in advance as reasonably practicable (and in no event less than fifteen (15) Business Days prior to the anticipated date of disclosure) to provide the non-disclosing Party opportunity to review and comment upon the disclosure.

10.3 **Technical Publication.** Neither party may publish peer reviewed manuscripts, or provide other forms of public disclosure including abstracts and presentations, of results of studies carried out under the Gorilla Development Plan, or pertaining to an Exclusive Royalty-Bearing Products, without the prior written consent of the other Party. Precigen or Ziopharm will submit the manuscript of any proposed publication to respective parties at least sixty (60) calendar days before publication, and Precigen or Ziopharm shall have the right to review and comment upon the publication in order to protect either Party's Confidential Information. Upon either Party's request, publication may be delayed up to sixty (60) additional calendar days to enable Precigen or Ziopharm to secure adequate intellectual property protection of either Party's Confidential Information that would otherwise be affected by the publication. Upon request, Confidential Information shall be removed from the publication unless (i) inclusion of such information is required to satisfy disclosure or reporting obligations, or (ii) such information does not relate only to Exclusive Royalty-Bearing Products and does not relate to Accessory Material Agents.

10.4 **Publicity; Terms of Agreement**.

(a) The Parties agree that the material terms of this Agreement are the Confidential Information of both Parties, subject to the special authorized disclosure provisions set forth in this Section 10.4 or Section 10.2. In addition, a Party may disclose such terms to the extent reasonably necessary to be disclosed to any bona fide potential or actual investor, acquiror or merger partner for the sole purpose of evaluating an actual or potential investment, acquisition or merger; provided that in connection with such disclosure, such Party shall inform each disclosee of the confidential nature of such Confidential Information and ensure that each such disclosee is contractually obligated to treat such Confidential Information as confidential.

(b) On or as promptly as possible following the Effective Date, the Parties agree to issue a joint press release substantially in a form agreed by the Parties as set forth in Exhibit D (the "**Joint Press Release**"). Except for the Joint Press Release and the talking points agreed by the parties for use in connection with investor relations, earning calls and the like, neither Party shall make any public announcements concerning the material terms of this Agreement without the other Party's prior written consent. Each such press release shall contain appropriate references to the other Party if so requested. A Party commenting on such a proposed press release shall provide its comments, if any, within three (3) Business Days after receiving the press release for review. Neither Party shall be required to seek the permission of the other Party to repeat

any information that has already been publicly disclosed by such Party, or by the other Party, in accordance with this Section 10.4(b), provided such information remains accurate as of such time.

(c) The Parties acknowledge that either or both Parties may be obligated to file under applicable Laws a copy of this Agreement with the U.S. Securities and Exchange Commission or other Governmental Authorities. Each Party shall be entitled to make such a required filing, provided that it requests confidential treatment of the commercial terms and sensitive technical terms hereof and thereof to the extent such confidential treatment is reasonably available to such Party. In the event of any such filing, each Party will provide the other Party with a copy of this Agreement marked to show provisions for which such Party intends to seek confidential treatment and shall reasonably consider and incorporate the other Party's reasonable comments thereon to the extent consistent with the legal requirements, with respect to the filing Party, governing disclosure of material agreements and material information that must be publicly filed.

ARTICLE 11
TERM AND TERMINATION

11.1 **Term**. This Agreement shall become effective on the Effective Date and, unless earlier terminated pursuant to this Article 11 shall remain in effect on a Licensed Product-by-Licensed Product and country-by-country basis, until the expiration of the Royalty Term of such Licensed Product in such country (the "**Term**"). Upon the expiration of the Royalty Term for a Licensed Product in a particular country, the licenses granted by Precigen to Ziopharm under Section 2.1(a), Section 2.1(b) and Section 7.9(a) with respect to such Licensed Product and related Trademarks and such country shall become fully-paid, royalty free and irrevocable.

11.2 **Unilateral Termination by Ziopharm.** Ziopharm may terminate this Agreement, on a country-by-country or Program-by-Program basis or in its entirety, for any or no reason upon ninety (90) days' written notice to Precigen.

11.3 **Termination by Either Party for Breach.**

(a) **Breach.** Subject to Section 11.3(b), each Party shall have the right to terminate this Agreement upon written notice to the other Party if such other Party materially breaches its obligations under this Agreement and, after receiving written notice from the non-breaching Party identifying such material breach in reasonable detail, fails to cure such material breach within sixty (60) days from the date of such notice; provided that if such breach is not reasonably capable of cure within such sixty (60)-day period, the breaching Party may submit a reasonable cure plan prior to the end of such sixty (60)-day period, in which case the other Party shall not have the right to terminate this Agreement for so long as the breaching Party is using Commercially Reasonable Efforts to implement such cure plan.

(b) **Disputed Breach.** If the alleged breaching Party disputes in good faith the existence or materiality of a breach specified in a notice provided by the other Party in accordance with Section 11.3(a), and such alleged breaching Party provides the other Party notice of such dispute within such sixty (60)-day period, then the non-breaching Party shall not have the right to terminate this Agreement under Section 11.3(a) unless and until the arbitrators, in accordance with Section 12.2, has determined that the alleged breaching Party has materially breached the Agreement and that such Party fails to cure such breach within sixty (60) days following such arbitrators' decision. During the pendency of such dispute, all of the terms and conditions of this Agreement shall remain in effect and the Parties shall continue to perform all of their respective obligations hereunder. Except with respect to breaches of payment obligations, the Parties agree that a breach with respect to a Licensed Product shall not itself be deemed to be a breach with respect to other Licensed Products and any termination of this Agreement shall be limited to the Licensed Product or Licensed Products

for which a Party breached its obligations hereunder. Nothing in this Section 11.3 shall limit a Party's ability to seek remedies available under this Agreement in law or equity.

11.4 **Effect of Termination**. Upon any termination (but not expiration) of this Agreement, with respect to one or more countries, one or more Programs, or in its entirety, all licenses granted to Ziopharm under this Agreement shall terminate for the applicable terminated countries or applicable Programs (or, if this Agreement is terminated in its entirety, for the Territory), and the following shall apply:

(a) **Assignment and License of Exclusive Product Patents**. Unless the termination was by Ziopharm pursuant to Section 11.3, Ziopharm shall assign to Precigen all of Ziopharm's right, title, and interest in and to any Patents owned by Ziopharm to the extent solely and exclusively Covering the Exclusive Products for use in the Field. In the event Ziopharm owns or Controls Patents that Cover the Exclusive Products for use in the Field and other compounds technologies or uses for the Exclusive Products outside of the Field, then Ziopharm shall not assign such Patents to Precigen, but shall, and hereby does, grant to Precigen an exclusive, irrevocable, royalty-free license to use such Patents solely to Develop and Commercialize such Exclusive Products for use in the Field in the form that such Exclusive Products exist as of the effective date of termination (such Exclusive Products, the "**Terminated Products**"). The assignments and licenses granted to Precigen pursuant to this Section 11.4(a) are subject to Precigen paying Ziopharm royalties on the Net Sales (as such term is modified to apply to sales by Precigen, its Affiliates and sublicensees) of all Terminated Products in the Field at a rate of [*****] percent ([*****]%), provided that once the cumulative royalties for all Terminated Products paid by Precigen pursuant to this Section 11.4(a) equal [*****] percent ([*****]%) of Ziopharm's reasonable documented costs and expenses incurred in the Research, Development, manufacture and Commercialization of Terminated Products during the Term up to the termination date with respect to such Terminated Products. Such royalty payments pursuant to this Section 11.4(a) shall be paid on a Terminated Product-by-Terminated Product and country-by-country basis from the First Commercial Sale of such Terminated Product in such country until the later of (i) the expiration of the last to expire Valid Claim (as such term is modified to apply to the Patents assigned or licensed to Precigen) in such country that Covers such Terminated Product (or any intermediate or component thereof) and (ii) twelve (12) years after the First Commercial Sale of such Terminated Product in such country. Provided such Termination is not due to breach by Ziopharm under this Agreement.

(b) **Negotiation Right.** In addition, Ziopharm shall negotiate in good faith with Precigen, and shall assist Precigen in any good faith negotiations with applicable Third Parties, to permit Precigen the opportunity to obtain license to any Patents owned by Ziopharm or Third Parties Covering the Exclusive Products but that was not assigned or licensed to Precigen pursuant to Section 11.4(a), in which case the Parties may enter into a separate agreement or an amendment to this Agreement to reflect any such agreed terms.

11.5 **Survival**. Termination or expiration of this Agreement shall not affect any rights or obligations of the Parties under this Agreement that have accrued prior to the date of termination or expiration. Notwithstanding anything to the contrary, the following provisions shall survive any expiration or termination of this Agreement: Articles 1 (to the extent definitions are used in the following sections or portions thereof), 9, 10, 12, and 14 (other than Section 14.5) and individual Sections: 2.7, 3.2 (solely with respect to any rights that have accrued prior to expiration or termination), 3.3 (with respect to Ziopharm's responsibility under the Merck Agreement), 3.4, 4.5(b) (with respect to Transition Services properly performed prior to the effective date of termination or expiration), 6.2 (solely to the extent required to make final reconciliations on Operating Profits (or Losses) incurred prior to expiration or termination), 6.4 (solely with respect to Sublicensing Income received prior to the effective date of termination or expiration), 6.5 (solely to the extent required to make final reconciliations on Net Sales of Exclusive Royalty-Bearing Products achieved prior to expiration or termination), 6.7 (solely to the extent required to make final reconciliations of amounts owed prior to the effective date of termination or expiration), 6.8-6.11 (solely as applicable to payments made

following termination or expiration), 7.1, 7.2, 8.4, 11.1, 11.4 and 11.5. If this Agreement is terminated with respect to a given Licensed Product, but not in its entirety, then following such termination the foregoing provisions of this Agreement shall remain in effect with respect to the Licensed Product(s) for which the termination is applicable (to the extent they would survive and apply in the event the Agreement expires or is terminated in its entirety) and all provisions not surviving in accordance with the foregoing shall terminate with respect to the relevant Licensed Product for which the termination applies, as applicable, upon the effective date of termination thereof.

ARTICLE 12
DISPUTE RESOLUTION

12.1 **Disputes.** It is the objective of the Parties to establish procedures to facilitate the resolution of disputes arising under this Agreement in an expedient manner by mutual cooperation and without resort to litigation. In the event of any disputes, controversies or differences which may arise between the Parties out of or in relation to or in connection with this Agreement (other than disputes arising from the JDC), including, without limitation, any alleged failure to perform, or breach, of this Agreement, or any issue relating to the interpretation or application of this Agreement (each, a "**Dispute**"), then upon the request of either Party by written notice, the Parties agree to meet and discuss in good faith a possible resolution thereof, which good faith efforts shall include at least one in-person meeting between the Executive Officers of each Party. If the matter is not resolved within thirty (30) days following the written request for discussions, either Party may then invoke the provisions of Section 12.2. For the avoidance of doubt, any disputes, controversies or differences arising from the JDC pursuant to Article 5 shall be resolved solely in accordance with Article 5.

12.2 **Arbitration.** Any Dispute that is not resolved pursuant to Section 12.1 shall, subject to Section 12.10, be shall resolved by binding arbitration administered by the American Arbitration Association ("**AAA**") (or its successor entity) in accordance with the then current Commercial Rules of the American Arbitration Association including the Procedures for Large, Complex Commercial Disputes (including the Optional Rules for Emergency Measures of Protection) (the "**AAA Rules**"), except as modified in this Agreement, which AAA Rules are deemed to be incorporated by reference into this clause. The decision rendered in any such arbitration will be final, binding and unappealable. The arbitration shall be conducted by a panel of three (3) arbitrators appointed in accordance with the AAA Rules, none of whom shall be a current or former employee or director, or a then-current stockholder, of either Party, their respective Affiliates or any Sublicensee. The place of arbitration shall be New York, New York, U.S., and all proceedings and communications shall be in English. It is the intention of the Parties that discovery, although permitted as described herein, will be limited except in exceptional circumstances. The arbitrators will permit such limited discovery necessary for an understanding of any legitimate issue raised in the arbitration, including the production of documents. No later than thirty (30) days after selection of the arbitrators, the Parties and their representatives shall hold a preliminary meeting with the arbitrators, to mutually agree upon and thereafter follow procedures seeking to assure that the arbitration will be concluded within six (6) months from such meeting. Failing any such mutual agreement, the arbitrators will design and the Parties shall follow procedures to such effect.

12.3 **Governing Law.** This Agreement shall be governed by and construed under the substantive laws of the State of New York, excluding any conflicts or choice of law rule or principle that might otherwise refer construction or interpretation of this Agreement to the substantive law of another jurisdiction.

12.4 **Award.** Any award to be paid by one Party to the other Party as determined by the arbitrator(s) as set forth above under Section 12.2 shall be promptly paid in United States dollars free of any tax, deduction

or offset; and any costs, fees or taxes incident to enforcing the award shall, to the maximum extent permitted by law, be charged against the losing Party. Each Party agrees to abide by the award rendered in any arbitration conducted pursuant to this Section 12.4, and agrees that, subject to the United States Federal Arbitration Act, 9 U.S.C. §§ 1-16, judgment may be entered upon the final award in any United States District Court located in New York and that other courts may award full faith and credit to such judgment in order to enforce such award. The award shall include interest from the date of any damages incurred for breach of the Agreement, and from the date of the award until paid in full, at a rate fixed by the arbitrator(s). With respect to money damages, nothing contained herein shall be construed to permit the arbitrator(s) or any court or any other forum to award consequential, incidental, special, punitive or exemplary damages. By entering into this agreement to arbitrate, the Parties expressly waive any claim for consequential, incidental, special, punitive or exemplary damages. The only damages recoverable under this Agreement are direct compensatory damages.

12.5 **Costs.** Each Party shall bear its own legal fees. The arbitrator(s) shall assess his or her costs, fees and expenses against the Party losing the arbitration.

12.6 **Injunctive Relief.** Nothing in this Article 12 will preclude either Party from seeking equitable relief or interim or provisional relief from a court of competent jurisdiction, including a temporary restraining order, preliminary injunction or other interim equitable relief, concerning a dispute either prior to or during any arbitration if necessary to protect the interests of such Party or to preserve the status quo pending the arbitration proceeding. For the avoidance of doubt, nothing in this Section 12.6 shall otherwise limit a breaching Party's opportunity to cure a material breach as permitted in accordance with Section 11.3.

12.7 **Confidentiality.** The arbitration proceeding shall be confidential and the arbitrator(s) shall issue appropriate protective orders to safeguard each Party's Confidential Information. Except as required by law, no Party shall make (or instruct the arbitrator(s) to make) any public announcement with respect to the proceedings or decision of the arbitrator(s) without prior written consent of the other Party. The existence of any dispute submitted to arbitration, and the award, shall be kept in confidence by the Parties and the arbitrator(s), except as required in connection with the enforcement of such award or as otherwise required by applicable law.

12.8 **Survivability.** Any duty to arbitrate under this Agreement shall remain in effect and be enforceable after termination of this Agreement for any reason.

12.9 **Jurisdiction**. For the purposes of this Article 12, the Parties acknowledge their diversity and agree to accept the jurisdiction of any United States District Court located in New York for the purposes of enforcing or appealing any awards entered pursuant to this Article 12 and for enforcing the agreements reflected in this Article 12 and agree not to commence any action, suit or proceeding related thereto except in such courts.

12.10 **Patent and Trademark Disputes.** Notwithstanding any other provisions of this Article 12, any dispute, controversy or claim relating to the scope, validity, enforceability or infringement of any Licensed Patents shall be submitted to a court of competent jurisdiction in the country in which such Patent was filed or granted.

ARTICLE 13
SHARE FORFEITURE AND AGREEMENT TERMINATIONS

13.1 **Series 1 Preferred Forfeiture**. Subject to the terms and conditions of this Agreement, Intrexon and its Affiliates are forfeiting, returning, contributing and transferring unto Ziopharm and Ziopharm is accepting from Intrexon, all of the Preferred Shares held by Intrexon and its Affiliates as of the Effective Date. Intrexon and its Affiliates agree to, and hereby do, forfeit, return, contribute, transfer and, as necessary, assign to Ziopharm all of Intrexon's and its Affiliates right, title and interest to and in the Preferred Shares held by Intrexon and its Affiliates as of the date hereof (including any right to receive PIK Shares as of the

date hereof or in the future, whether or not accrued or payable as of the date hereof) without any payment of cash or additional consideration by Ziopharm.

13.2 **Forfeiture Closing**. The closing of the forfeiture, return, contribution and transfer of the Preferred Shares pursuant to Section 13.1 shall occur simultaneously with the execution and delivery of this Agreement. Concurrently with the execution of this Agreement, Intrexon shall deliver to Ziopharm an Assignment by the Parties this Agreement. Concurrently with the execution of this Agreement, Intrexon shall deliver to Ziopharm an Assignment Separate from Certificate for the Preferred Shares in the form attached to this Agreement as Exhibit E executed by Intrexon in favor of Ziopharm. Ziopharm shall instruct its transfer agent to immediately cancel the Preferred Shares on Ziopharm's books and the Preferred Shares shall be automatically and immediately cancelled and retired.

13.3 **Representations and Warranties**. Intrexon hereby represents and warrants as follows:

(a) Intrexon is the legal and beneficial owner of the Preferred Shares with good and valid title thereto, free and clear of all security interests, liens, pledges or encumbrances other than restrictions imposed by the Certificate of Designation or upon transfer under applicable federal and/or state securities law. As of the date hereof, Intrexon and its Affiliates beneficially own 130,849 shares of Series 1 Preferred Stock and 210 shares of Series 1 Preferred Stock have accrued and are currently payable to Intrexon and its Affiliates as PIK Shares.

(b) Intrexon has the requisite power and authority to enter into and perform this Agreement and to forfeit, return, contribute, transfer and deliver the Preferred Shares in the manner provided in this Agreement. The execution, delivery and performance of this Agreement by Intrexon and the consummation by it of the transactions contemplated hereby have been duly authorized by all necessary corporate action, and no further consent or authorization of Intrexon or its board of directors, stockholders or other governing body is required. When executed and delivered by Intrexon, this Agreement shall constitute a valid and binding obligation of Intrexon, enforceable against Intrexon in accordance with its terms, except as such enforceability may be limited by applicable bankruptcy, insolvency, reorganization, moratorium, liquidation, conservatorship, receivership or similar laws relating to, or affecting generally the enforcement of, creditor's rights and remedies or by other equitable principles of general application.

(c) The execution, delivery and performance of this Agreement by Intrexon and the consummation by Intrexon of the transactions contemplated hereby do not and will not (i) violate any provision of Intrexon's charter or organizational documents (ii) conflict with, or constitute a default (or an event which with notice or lapse of time or both would become a default) under, or give to others any rights of termination, amendment, acceleration or cancellation of, any agreement, mortgage, deed of trust, indenture, note, bond, license, lease agreement, instrument or obligation to which Intrexon is a party or by which Intrexon's properties or assets are bound, or (iii) result in a violation of any federal, state, local or foreign statute, rule, regulation, order, judgment or decree (including federal and state securities laws and regulations) applicable to Intrexon or by which any property or asset of Intrexon are bound or affected, except, in all cases, other than violations (with respect to federal and state securities laws) above, for such conflicts, defaults, terminations, amendments, acceleration, cancellations and violations as would not, individually or in the aggregate, materially and adversely affect Intrexon's ability to perform its obligations under this Agreement.

13.4 **Termination of Purchase Agreement**. Effective immediately, Ziopharm and Intrexon hereby terminate the 2011 Stock Purchase Agreement and acknowledge and agree that the 2011 Stock Purchase Agreement shall have no further force or effect and that all of the benefits, rights, obligations and liabilities of the parties thereunder shall immediately cease and terminate.

13.5 **Termination of Registration Rights Agreement**. Effective immediately, Ziopharm and Intrexon hereby terminate the 2011 Registration Rights Agreement and acknowledge and agree that the 2011 Registration Rights Agreement shall have no further force or effect and that all of the benefits, rights, obligations and liabilities of the parties thereunder shall immediately cease and terminate.

13.6 **Termination of Securities Issuance Agreement**. Effective immediately, Ziopharm and Intrexon hereby terminate the 2016 Securities Purchase Agreement and acknowledge and agree that the 2016 Securities Purchase Agreement shall have no further force or effect and that all of the benefits, rights, obligations and liabilities of the parties thereunder shall immediately cease and terminate.

13.7 **Conditions**. The obligations of Ziopharm under this Agreement are subject to (i) the delivery by Intrexon of an Assignment Separate from Certificate for the Preferred Shares in the form attached to this Agreement as Exhibit E and (ii) the delivery by Randal J. Kirk of written notice to Ziopharm of his resignation from Ziopharm's board of directors effective as of the Effective Date.

ARTICLE 14
MISCELLANEOUS

14.1 **Entire Agreement; Amendment**. This Agreement, including the Exhibits hereto, and the Related Agreements sets forth the complete, final and exclusive agreement and all the covenants, promises, agreements, warranties, representations, conditions and understandings between the Parties hereto with respect to the subject matter hereof and supersedes, as of the Effective Date, all prior and contemporaneous agreements and understandings between the Parties with respect to the subject matter hereof. There are no covenants, promises, agreements, warranties, representations, conditions or understandings, either oral or written, between the Parties other than as are set forth in this Agreement or the Related Agreements. No subsequent alteration, amendment, change or addition to this Agreement shall be binding upon the Parties unless reduced to writing and signed by an authorized officer of each Party.

14.2 **Rights in Bankruptcy**.

(a) To the extent permitted under applicable Law, all rights and licenses granted under or pursuant to this Agreement by one Party to the other are, for all purposes of Title 11 of the United States Code ("**Title 11**"), licenses of rights to "intellectual property" as defined in Title 11, and, in the event that a case under Title 11 is commenced by or against either Party (the "**Bankrupt Party**"), the other Party shall have all of the rights set forth in Section 365(n) of Title 11 to the maximum extent permitted thereby. All rights of the Parties under this Section 14.2 and under Section 365(n) of Title 11 are in addition to and not in substitution of any and all other rights, powers, and remedies that each party may have under this Agreement, Title 11, and any other applicable Laws. The non-Bankrupt Party shall have the right to perform the obligations of the Bankrupt Party hereunder with respect to such intellectual property, but neither such provision nor such performance by the non-Bankrupt Party shall release the Bankrupt Party from any such obligation or liability for failing to perform it.

(b) The Parties agree that they intend the foregoing non-Bankrupt Party rights to extend to the maximum extent permitted by law and any provisions of applicable contracts with Third Parties, including for purposes of Title 11, (i) the right of access to any intellectual property (including all embodiments thereof) of the Bankrupt Party or any Third Party with whom the Bankrupt Party contracts to perform an obligation of the Bankrupt Party under this Agreement, and, in the case of the Third Party, which is necessary for the Development, Regulatory Approval and manufacture of Licensed Products and (ii) the right to contract directly with any Third Party described in (i) in this sentence to complete the contracted work.

(c) Any intellectual property provided pursuant to the provisions of this Section 14.2 shall be subject to the licenses set forth elsewhere in this Agreement and the payment obligations of this Agreement, which shall be deemed to be royalties for purposes of Title 11.

14.3 **Force Majeure**. Both Parties shall be excused from the performance of their obligations under this Agreement to the extent that such performance is prevented by force majeure and the nonperforming Party promptly provides notice of the prevention to the other Party. Such excuse shall be continued so long as the condition constituting force majeure continues and the nonperforming Party takes reasonable efforts to remove the condition. For purposes of this Agreement, force majeure shall include conditions beyond the

control of the Parties, including an act of God, war, civil commotion, terrorist act, labor strike or lock-out, epidemic, failure or default of public utilities or common carriers, destruction of production facilities or materials by fire, earthquake, storm or like catastrophe, and failure of plant or machinery (provided that such failure could not have been prevented by the exercise of skill, diligence, and prudence that would be reasonably and ordinarily expected from a skilled and experienced person engaged in the same type of undertaking under the same or similar circumstances). Notwithstanding the foregoing, a Party shall not be excused from making payments owed hereunder because of a force majeure affecting such Party. If a force majeure persists for more than ninety (90) days, then the Parties will discuss in good faith the modification of the Parties' obligations under this Agreement in order to mitigate the delays caused by such force majeure.

14.4 **Notices**. Any notice required or permitted to be given under this Agreement shall be in writing, shall specifically refer to this Agreement, and shall be addressed to the appropriate Party at the address specified below or such other address as may be specified by such Party in writing in accordance with this Section 14.4, and shall be deemed to have been given for all purposes (a) when received, if hand-delivered or sent by confirmed facsimile or a reputable courier service, or (b) five (5) Business Days after mailing, if mailed by first class certified or registered airmail, postage prepaid, return receipt requested.

If to Precigen:

20358 Seneca Meadows Parkways
Germantown, MD 20876
Attn: President

With copies to (which shall not constitute notice):

Intrexon Corporation
20374 Seneca Meadows Parkway
Germantown, MD 20876
Attn: Chief Legal Officer

Hogan Lovells US LLP
100 International Drive, Suite 2000
Baltimore, MD 21202
Attn: Asher M. Rubin and William I. Intner

If to Ziopharm:

ZIOPHARM Oncology, Inc.
One First Avenue, Parris Building #34
Navy Yard Plaza, Boston, MA 02129
Attn: General Counsel
Fax: 617-241-2855

With a copy to (which shall not constitute notice):

Cooley LLP
One Freedom Square
Reston Town Center
11951 Freedom Drive
Reston, VA 20190-5656 USA
Attn: Kenneth J. Krisko

Fax: 703-456-8100

14.5 **No Strict Construction; Headings**. This Agreement has been prepared jointly by the Parties and shall not be strictly construed against either Party. Ambiguities, if any, in this Agreement shall not be construed against any Party, irrespective of which Party may be deemed to have authored the ambiguous provision. The headings of each Article and Section in this Agreement have been inserted for convenience of reference only and are not intended to limit or expand on the meaning of the language contained in the particular Article or Section. Except where the context otherwise requires, the use of any gender shall be applicable to all genders, and the word "or" is used in the inclusive sense (and/or). The term "including" as used herein means including, without limiting the generality of any description preceding such term.

14.6 **Assignment**. Neither Party may assign or transfer this Agreement or any rights or obligations hereunder without the prior written consent of the other, which consent shall not be unreasonably withheld or delayed, except that a Party may make such an assignment or transfer without the other Party's consent (a) to its Affiliates, (b) to a Third Party in connection with the transfer or sale of all or substantially all of the business or assets of such Party to which this Agreement relates, whether by merger, consolidation, divesture, restructure, sale of stock, sale of assets or otherwise or (c) to a Third Party in connection with the transfer or sale of all or substantially all of the business or assets of such Party relating to a Licensed Product, whether by merger, consolidation, divesture, restructure, sale of stock, sale of assets or otherwise. Any successor or assignee of rights and/or obligations permitted hereunder shall, in writing to the other Party, expressly assume performance of such rights and/or obligations. Any permitted assignment shall be binding on the successors of the assigning Party. Any assignment or attempted assignment by either Party in violation of the terms of this Section 14.6 shall be null, void and of no legal effect.

14.7 **Performance by Affiliates**. Each Party may discharge any obligations and exercise any right hereunder through any of its Affiliates. Each Party hereby guarantees the performance by its Affiliates of such Party's obligations under this Agreement, and shall cause its Affiliates to comply with the provisions of this Agreement in connection with such performance. Any breach by a Party's Affiliate of any of such Party's obligations under this Agreement shall be deemed a breach by such Party, and the other Party may proceed directly against such Party without any obligation to first proceed against such Party's Affiliate.

14.8 **Further Actions**. Each Party agrees to execute, acknowledge and deliver such further instruments, and to do all such other acts, as may be necessary or appropriate in order to carry out the purposes and intent of this Agreement.

14.9 **Severability**. If any one or more of the provisions of this Agreement is held to be invalid or unenforceable by any court of competent jurisdiction from which no appeal can be or is taken, the provision shall be considered severed from this Agreement and shall not serve to invalidate any remaining provisions hereof. The Parties shall make a good faith effort to replace any invalid or unenforceable provision with a valid and enforceable one such that the objectives contemplated by the Parties when entering this Agreement may be realized.

14.10 **No Waiver**. Any delay in enforcing a Party's rights under this Agreement or any waiver as to a particular default or other matter shall not constitute a waiver of such Party's rights to the future enforcement of its rights under this Agreement, except with respect to an express written and signed waiver relating to a particular matter for a particular period of time.

14.11 **Independent Contractors**. Each Party shall act solely as an independent contractor, and nothing in this Agreement shall be construed to give either Party the power or authority to act for, bind, or commit the other Party in any way. Nothing herein shall be construed to create the relationship of partners, principal and agent, or joint-venture partners between the Parties.

14.12 **Counterparts.** This Agreement may be executed in one (1) or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

14.13 **Intrexon Guarantee**. Intrexon hereby unconditionally guarantees and undertakes to Ziopharm that Precigen will duly and punctually observe and perform all the undertakings, covenants and obligations of Precigen under this Agreement and under any agreements between the Parties (or any of them) which are expressly supplemental to this Agreement or which this Agreement requires to be executed (the "**Obligations**") to the intent that if Precigen (or any assignee or successor in interest thereto) shall fail for whatever reason so to observe and perform any Obligations, Intrexon shall be liable to perform the same in all respects as if Intrexon was the party principally bound thereby in place of Precigen on demand from Ziopharm, provided that Intrexon shall be deemed to have any defenses or excuses for nonperformance that Precigen would have had to such Obligations. The liability of Intrexon under this Agreement shall be as primary obligor as regards Ziopharm and not merely as surety and no modification, variation or addition to any of the Obligations, no time or other indulgence given by Ziopharm to Precigen nor any neglect, failure or forbearance on the part of Ziopharm to enforce the performance or observance of any of the Obligations shall in any way release, lessen or affect the liability of Intrexon. This is a continuing guarantee and Intrexon's undertakings under this Agreement shall remain in full force and effect until the earlier of (a) a Qualified IPO of Precigen, (b) a Qualified Change of Control, (c) a Qualified Private Financing, and (d) final performance in full of the Obligations. In addition, until the earlier of (i) the termination of this guarantee or (ii) the end of the Term, Intrexon will not divest, restructure, reorganize or reclassify Precigen with any intent in whole or in part to avoid, reduce or eliminate its obligations under this Agreement. As used herein, "**Qualified IPO**" means an initial public offering of shares of Precigen's common stock through which Precigen raises at least [*****] dollars ($[*****]) and lists Precigen's common stock for sale in the public market; "**Qualified Change of Control**" means a transaction or series of transactions through which Intrexon controls less than fifty percent (50%) of the equity of Precigen provided that Precigen or its parent entity following such transaction or transactions has a market cap of at least [*****] dollars ($[*****]), and "**Qualified Private Financing**" means a transaction or series of transactions involving the sale of shares of Precigen's stock (common or preferred) to Third Parties through which Precigen raises at least [*****] dollars ($[*****]).

{Signature page follows}

In Witness Whereof, the Parties have executed this Exclusive License Agreement by their duly authorized officers as of the Effective Date.

Ziopharm Oncology, Inc.

By: /s/ Laurence J.N. Cooper

Name: Laurence J.N. Cooper

Title: Chief Executive Officer

Precigen, Inc.

By: /s/ Donald P. Lehr

Name: Donald P. Lehr

Title: Director

Solely for the purposes of the Recitals, Section 2.2, Section 3.4, Article 13 and Section 14.13:

Intrexon Corporation

By: /s/ Donald P. Lehr

Name: Donald P. Lehr

Title: Chief Legal Officer

List of Exhibits:

Exhibit A
Initial Gorilla Development Plan

[*To be Attached Following Effective Date*]

Portions herein identified by [*****] have been omitted pursuant to a request for confidential treatment under Rule 24b-2 of the Securities Exchange Act of 1934, as amended. A complete copy of this document has been filed separately with the Securities and Exchange Commission.

Exhibit B
Licensed Patents

Schedule 1

[*****] Patents and Patent Applications

INTREXON DOCKET NO	TITLE	PRIORITY DATE	COUNTRY	SERIAL NO	FILE DATE	PATENT NO	ISSUE DATE	GENERAL DESCRIPTION
[*****]	[*****]	[*****]	[*****]	[*****]	[*****]	[*****]	[*****]	[*****]
[*****]	[*****]	[*****]	[*****]	[*****]	[*****]			[*****]
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
			[*****]	[*****]	[*****]	[*****]	[*****]	
[*****]	[*****]	[*****]	[*****]	[*****]	[*****]			[*****]
			[*****]	[*****]	[*****]	[*****]	[*****]	
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Schedule 2

[*****] Patents and Patent Applications

INTREXON DOCKET NO	TITLE	PRIORITY DATE	COUNTRY	SERIAL NO	FILE DATE	PATENT NO	ISSUE DATE	GENERAL DESCRIPTION
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Schedule 3

[*****] Patents and Patent Applications

INTREXON DOCKET NO	TITLE	PRIORITY DATE	COUNTRY	SERIAL NO	FILE DATE	PATENT NO	ISSUE DATE	GENERAL DESCRIPTION
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Schedule 4

[*****] Patents and Patent Applications

INTREXON DOCKET NO	TITLE	PRIORITY DATE	COUNTRY	SERIAL NO	FILE DATE	PATENT NO	ISSUE DATE	GENERAL DESCRIPTION
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Schedule 5

[*****] Patents and Patent Applications

INTREXON DOCKET NO	TITLE	PRIORITY DATE	COUNTRY	SERIAL NO	FILE DATE	PATENT NO	ISSUE DATE	GENERAL DESCRIPTION
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Schedule 6

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INTREXON DOCKET NO	TITLE	PRIORITY DATE	COUNTRY	SERIAL NO	FILE DATE	PATENT NO	ISSUE DATE	GENERAL DESCRIPTION
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Exhibit C
Transition Services - Agreed Services
[See Attached]

[*****]

Exhibit D
Form of Press Release
[See Attached]

Ziopharm and Precigen Redefine Relationships, Announce New License Agreement

Ziopharm to Host Conference Call Today at 8 a.m.

BOSTON and GERMANTOWN, MD, October 9, 2018 - Ziopharm Oncology, Inc. (Nasdaq: ZIOP) and Precigen, Inc., a wholly-owned subsidiary of Intrexon Corporation (Nasdaq: XON), today announced a new definitive license agreement to replace all existing agreements between the companies that will provide Ziopharm with certain exclusive and non-exclusive rights to technology controlled by Precigen, Inc.

Through the new agreement, Ziopharm will primarily focus its resources on developing its Controlled IL-12 and *Sleeping Beauty* (SB) T-cell receptor (TCR) platform technologies which have the capability to treat solid tumors, while Intrexon further establishes Precigen as a therapeutics company concentrating on immuno-oncology, autoimmune and infectious disease therapies. Both companies will be better positioned to independently focus on their respective platforms and markets with full developmental and financial controls.

With this exclusive license, Ziopharm now has full developmental control and exclusivity utilizing *Sleeping Beauty* for TCRs targeted towards neoantigens and public antigens. The existing Cooperative Research and Development Agreement (CRADA) with the National Cancer Institute related to SB-generated T cells expressing TCRs to target neoantigens buried within solid tumors will be transferred to Ziopharm, and Ziopharm will maintain this exclusive relationship with the NCI for this program. Ziopharm will build on its IL-12 platform utilizing Precigen's RheoSwitch® gene switch with both the existing human adenovirus program and now with rights to pursue next-generation viral technologies. Using the SB system, Ziopharm will continue to advance its CD19-specific chimeric antigen receptor (CAR) program, while retaining rights to a second, unnamed CAR target. Precigen gains exclusive rights for all other CAR-T therapies, including CD33-specific CAR-T therapies, subject to the agreement with Merck KGaA.

"This is a new day for Ziopharm, as we have the power and flexibility to advance IL-12 and *Sleeping Beauty*-generated TCRs ," said Ziopharm Chief Executive Officer Laurence Cooper, M.D., Ph.D. "We now have focused the company on the two platforms to drive the most shareholder value and transitioned a significant portion of our CAR-T program to Precigen. The ability of both Ziopharm and Precigen to autonomously execute their respective operating plans on their independent platforms, while sharing in future economics, enables both parties to undertake more efficient 'divide and conquer' drug-development plans to the benefit of all constituents."

In partial consideration for the termination of the former agreements, in addition to the grant of the revised limited exclusive license, the companies agree that Ziopharm will retire all outstanding shares of its Series 1 Preferred Stock held by Intrexon, including any accrued dividends, valued at approximately $156.9 million, as of Sept. 30, 2018. Additionally, the companies have terminated Intrexon's contractual right to a seat on Ziopharm's board. Randal J. Kirk, Chairman and Chief Executive Officer of Intrexon, who has served as a director on the board of Ziopharm since 2011, has stepped down from that position, effective immediately, and Ziopharm plans to fill all vacant seats in the near term.

"In 2011 with Ziopharm, we entered into our first exclusive collaboration and therewith granted a field that was far broader than any other. Today's announcement is about seeing Ziopharm's tighter focus and about our desire to invest in Precigen. We believe that Ziopharm will succeed under the license to develop and bring to market important new cancer therapeutics, and we look forward to enjoying benefits from these while we continue our investments in Precigen," commented Mr. Kirk.

Ziopharm will receive a low single digit, capped royalty on Precigen products in the field of point-of-care (P-O-C) CAR T-cell therapies. Precigen will receive milestone payments on late-stage regulatory events as well as commercial royalties in the low to high single-digit range for certain CAR and IL-12 targets that Ziopharm develops. Precigen will receive capped commercial royalties in low- to mid-single digits for the TCR products that Ziopharm develops. Further details on the terms of the transaction will be available within SEC filings respectively filed by Intrexon and Ziopharm.

Ziopharm Clinical Programs Update
Ziopharm today updated guidance on the timing of its response to the request for more information from the U.S. Food and Drug Administration (FDA) regarding the clinical hold placed on the investigational new drug (IND) application for its third-generation Phase 1 trial to evaluate CD19-specific CAR-T therapies under P-O-C technology. Ziopharm expects to respond to the FDA's request for information in the second half of 2019.

Ziopharm also affirmed its guidance on the planned Phase 1 trial to evaluate SB-modified TCRs to treat solid tumors. As disclosed in Ziopharm's second quarter business update, the IND application for this Phase 1 trial, which is being led by and conducted at the National Cancer Institute, remains on track to be submitted in the fourth quarter of 2018 followed by enrollment of patients beginning in 2019, pending regulatory clearance.

Conference Call and Slide Webcast
Ziopharm will host a webcast and conference call today, October 9, at 8 a.m. ET. The call can be accessed by dialing 1-844-309-0618 (U.S. and Canada) or 1-661-378-9465 (international). The passcode for the conference call is 9789556. To access the slides and live webcast or the subsequent archived recording, visit the "Investors Events and Presentations" section of the Ziopharm website at www.ziopharm.com. The webcast will be recorded and available for replay on the Company's website for two weeks.

About Ziopharm Oncology, Inc.
Ziopharm Oncology is a Boston-based biotechnology company focused on the development of next-generation immunotherapies utilizing gene- and cell-based therapies to treat patients with cancer. Ziopharm is focused on the development of two platform technologies designed to deliver safe, effective and scalable cell- and viral-based therapies for the treatment of multiple cancer types: Controlled IL-12 and *Sleeping Beauty* for genetically modifying cells. These programs are being advanced in collaboration with MD Anderson Cancer Center and the National Cancer Institute.

About Precigen: Advancing Medicine with Precision™
Founded in 2017, Precigen is a dedicated discovery and clinical stage biopharmaceutical company advancing the next generation of gene and cellular therapies using precision technology to target the most urgent and intractable diseases in oncology, autoimmune disorders, and emerging specialty therapy areas. Our technologies enable us to find innovative solutions for affordable biotherapeutics in a controlled manner. Precigen operates as an innovation engine progressing a preclinical and clinical pipeline of well-differentiated unique therapies toward clinical proof-of-confidence and commercialization. Precigen was founded as a wholly-owned subsidiary of Intrexon Corporation (Nasdaq: XON) and leverages Intrexon's proprietary technology platforms to advance human health. Learn more about Precigen at www.precigentherapeutics.com.

About Intrexon Corporation
Intrexon Corporation (Nasdaq: XON) is Powering the Bioindustrial Revolution with Better DNA™ to create biologically-based products that improve the quality of life and the health of the planet. Intrexon's integrated technology suite provides its partners across diverse markets with industrial-scale design and development of complex biological

systems delivering unprecedented control, quality, function, and performance of living cells. We call our synthetic biology approach Better DNA®, and we invite you to discover more at www.dna.com or follow us on Twitter at @Intrexon, on Facebook, and LinkedIn.

Trademarks

Intrexon, RheoSwitch, Powering the Bioindustrial Revolution with Better DNA, and Better DNA are trademarks of Intrexon and/or its affiliates. Other names may be trademarks of their respective owners.

Forward-Looking Statements Disclaimer

This press release contains forward-looking statements as defined in the Private Securities Litigation Reform Act of 1995, as amended. Forward-looking statements are statements that are not historical facts, and in some cases can be identified by terms such as "may," "will," "could," "expects," "plans," "anticipates," and "believes." These statements include, but are not limited to, statements regarding Ziopharm's and Intrexon's goals, expectations, financial or other projections, intentions or beliefs, including statements regarding Ziopharm's and Intrexon's business and strategic plans; the expected benefits of the strategic transaction, such as creating shareholder value, growth potential, market profile, enhanced competitive position and flexibility; the progress and timing of the development of Ziopharm's research and development programs, including the expected timing for its response to the U.S. FDA and of the filing of its IND applications; the timing for the initiation and readouts of Ziopharm's upcoming clinical trials; expected additions to Ziopharm's board of directors; and statements regarding future performance. Although Ziopharm's and Intrexon's management teams believe that the expectations reflected in such forward-looking statements are reasonable, investors are cautioned that forward-looking information and statements are subject to various risks and uncertainties, many of which are difficult to predict and generally beyond the control of Ziopharm and Intrexon, that could cause actual results and developments to differ materially from those expressed in, or implied or projected by, the forward-looking information and statements. These risks and uncertainties include among other things, the uncertainties inherent in research and development, future clinical data and analysis, including whether any of Ziopharm's and Intrexon' product candidates will advance further in the preclinical research or clinical trial process, including receiving clearance from the U.S. Food and Drug Administration or equivalent foreign regulatory agencies to conduct clinical trials and whether and when, if at all, they will receive final approval from the U.S. FDA or equivalent foreign regulatory agencies and for which indication; the strength and enforceability of Ziopharm's and Intrexon's intellectual property rights; Ziopharm's ability to attract qualified board candidates; competition from other pharmaceutical and biotechnology companies as well as risk factors discussed or identified in the public filings with the Securities and Exchange Commission made by Ziopharm and Intrexon, including those risks and uncertainties listed in Ziopharm's and Intrexon's annual reports on Form 10-K for the year ended December 31, 2017 and subsequent Quarterly Reports on Form 10-Q filed by Ziopharm and Intrexon with the Securities and Exchange Commission. We are providing this information as of October 9, 2018, and neither Ziopharm nor Intrexon undertake any obligation to update or revise the information contained in this press release whether as a result of new information, future events or any other reason.

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For more information contact:

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Exhibit E
Form of Assignment Separate from Certificate for the Preferred Shares

[See Attached]

Confidential

ASSIGNMENT SEPARATE FROM CERTIFICATE

Pursuant to that certain Exclusive License Agreement by and among the undersigned ("***Transferor***"), ZIOPHARM Oncology, Inc. (the "***Company***") and Precigen, Inc., dated October 5, 2018, Transferor hereby irrevocably assigns and transfers to the Company 131,059 shares of Series 1 Preferred Stock of the Company standing in Transferor's name on the Company's books and does hereby irrevocably constitute and appoint both the Company's Secretary and American Stock Transfer & Trust Company, LLC, or either of them, to transfer said stock on the books of the Company with full power of substitution in the premises.

Dated: October 5, 2018

INTREXON CORPORATION

By: _____

Name:

Title:

Exhibit F
Third Party Licenses

- Exclusive License Agreement by and between the University of Pittsburgh - Of the commonwealth System of Higher Education and Intrexon Corporation, effective as of February 1, 2008, as amended August 29, 2008, April 3, 2009 and October 25, 2012.

Exhibit G

Common Law and Registered Trademarks Related to this Agreement

Adenoverse™

Intrexon®

RheoSwitch®

RheoSwitch Therapeutic System®

RTS®

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Randal J. Kirk, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Intrexon Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 8, 2018

/s/ RANDAL J. KIRK

Randal J. Kirk

Chairman and Chief Executive Officer

(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Rick L. Sterling, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Intrexon Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 8, 2018

/s/ RICK L. STERLING

Rick L. Sterling

Chief Financial Officer

(Principal Financial 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

I, Randal J. Kirk, Chairman and Chief Executive Officer of Intrexon Corporation (the "Company"), do hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

- the Quarterly Report on Form 10-Q of the Company for the quarter ended September 30, 2018 (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

- the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: November 8, 2018

/s/ RANDAL J. KIRK
Randal J. Kirk
Chairman and Chief Executive Officer
(Principal Executive Officer)

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

This certification accompanies the Form 10-Q to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Registrant under the Securities Act of 1933 or the Securities Exchange Act of 1934 (whether made before or after the date of the Form 10-Q), irrespective of any general incorporation language contained in such filing.

Exhibit 32.2

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

I, Rick L. Sterling, Chief Financial Officer of Intrexon Corporation (the "Company"), do hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

- the Quarterly Report on Form 10-Q of the Company for the quarter ended September 30, 2018 (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

- the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: November 8, 2018

/s/ RICK L. STERLING
Rick L. Sterling
Chief Financial Officer
(Principal Financial Officer)

A signed original of this written statement required by Section 906, or other document authenticating, acknowledging or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

This certification accompanies the Form 10-Q to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Registrant under the Securities Act of 1933 or the Securities Exchange Act of 1934 (whether made before or after the date of the Form 10-Q), irrespective of any general incorporation language contained in such filing.