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As filed with the Securities and Exchange Commission on November 28, 2018

Registration No. 333-228209

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

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AMENDMENT NO. 1  
TO  
**FORM S-3**  
REGISTRATION STATEMENT  
Under  
The Securities Act of 1933

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**OVASCIENCE, INC.**

(Exact name of registrant as specified in its charter)

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**Delaware**  
(State or other jurisdiction of  
incorporation or organization)

**45-1472564**  
(I.R.S. Employer  
Identification Number)

**9 Fourth Avenue  
Waltham, MA 02451  
(617) 500-2802**

(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

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**Christopher A. Kroeger, M.D., M.B.A.  
President & Chief Executive Officer  
OvaScience, Inc.  
9 Fourth Avenue  
Waltham, MA 02451  
(617) 500-2802**

(Name, address, including zip code, and telephone number, including area code, of agent for service)

---

**Copy to:  
William C. Hicks, Esq.  
Megan N. Gates, Esq.  
Daniel A. Bagliebter, Esq.  
Mintz, Levin, Cohn, Ferris, Glovsky & Popeo, P.C.  
One Financial Center  
Boston, MA 02111  
(617) 542-6000**

**Approximate date of proposed sale to the public:  
From time to time after the effective date of this Registration Statement.**

If the only securities being registered on this form are being offered pursuant to dividend or interest reinvestment plans, please check the following box.

If any of the securities being registered on this form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, other than securities offered only in connection with dividend or interest reinvestment plans, check the following box:

If this form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this form is a registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box.

If this form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting 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. (Check one):

Large accelerated filer

Accelerated filer

Non-accelerated filer

Smaller reporting company   
Emerging Growth Company

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

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#### CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Amount to be Registered(1)	Proposed Maximum Offering Price Per Share(2)	Proposed Maximum Aggregate Offering Price(2)	Amount of Registration Fee
Common stock, par value \$0.001 per share	1,886,574 shares	\$0.77	\$1,452,661.98	\$176.07

- (1) Pursuant to Rule 416(a) of the Securities Act of 1933, as amended, this Registration Statement shall also cover any additional shares of the Registrant's common stock that become issuable by reason of any stock dividend, stock split, recapitalization or other similar transaction effected without receipt of consideration that increases the number of the Registrant's outstanding shares of common stock.
- (2) Estimated in accordance with Rule 457(c) solely for purposes of calculating the registration fee on the basis of the average of the high and low prices of Registrant's common stock as reported on The Nasdaq Capital Market on November 5, 2018. In connection with the initial filing of this Registration Statement on November 6, 2018, the Registrant previously paid the registration fee of \$176.07.

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**The Registrant hereby amends this Registration Statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment which specifically states that this Registration Statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933 or until this Registration Statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.**

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## EXPLANATORY NOTE

This registration statement relates to the resale by the selling stockholders of up to an aggregate of 1,886,574 shares of OvaScience's common stock (the "Shares"). OvaScience, Inc. ("OvaScience") is filing this registration statement in connection with its merger with Millendo Therapeutics, Inc. ("Millendo") pursuant to an Agreement and Plan of Merger and Reorganization, as may be amended from time to time (the "Merger Agreement"), pursuant to which a wholly owned subsidiary of OvaScience will merge with and into Millendo, with Millendo surviving as a wholly owned subsidiary of OvaScience (the "Merger"). At the closing of the Merger (the "Effective Time"), each share of Millendo common stock, par value \$0.001 per share ("Millendo Common Stock") (excluding certain shares to be cancelled pursuant to the Merger Agreement, and shares held by stockholders who have exercised and perfected appraisal rights or dissenters' rights), outstanding immediately prior to the Effective Time will be converted into the right to receive shares of OvaScience common stock, par value \$0.001 per share ("OvaScience Common Stock") equal to an exchange ratio set forth in the Merger Agreement and as described further in this registration statement.

The Shares registered for resale on this registration statement will be sold to the selling stockholders pursuant to a Stock Purchase Agreement, dated November 1, 2018 (as amended from time to time, the "Purchase Agreement"), by and among OvaScience, Millendo and the investors listed therein (the "Investors"). Pursuant to the terms of the Purchase Agreement, the Investors agreed to purchase shares of OvaScience Common Stock for an aggregate purchase price of approximately \$20.0 million as part of a private placement financing (the "Post-Closing Financing"). The consummation of the Post-Closing Financing and the other transactions contemplated by the Purchase Agreement are conditioned upon the satisfaction of the conditions set forth in the Purchase Agreement. OvaScience and the Investors intend to complete the Post-Closing Financing after the Effective Time. Under the terms of the Post-Closing Financing, the Shares issued in the Post-Closing Financing will be issued pursuant to an exemption from the registration requirements of the Securities Act of 1933, as amended. The resale of the Shares by the Investors is being registered for resale on this registration statement.

OvaScience expects this registration statement to become effective prior to the Effective Time of the Merger. Following the Merger, the business of Millendo will continue as the business of the combined organization. Additionally, it has been determined that Millendo will be the accounting acquirer in the Merger, based upon the terms of the Merger Agreement and other factors including: (i) holders of Millendo stock and other persons holding securities convertible, exercisable or exchangeable directly or indirectly for Millendo Common Stock were initially estimated to own at least 82% of OvaScience immediately following the Effective Time, (ii) Millendo will hold the majority (seven of eight) of board seats of the combined company and (iii) Millendo's management will hold all key positions in the management of the combined company. Because of these factors, OvaScience has included herein and has incorporated by reference to information about the Millendo business and operations in this registration statement.

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**The information in this prospectus is not complete and may be changed. A registration statement relating to these securities has been filed with the Securities and Exchange Commission. The selling stockholders may not sell these securities until the Securities and Exchange Commission declares the registration statement effective. This prospectus is not an offer to sell these securities and the selling stockholders named in this prospectus are not soliciting offers to buy these securities in any state where the offer or sale is not permitted.**

**Subject to Completion, dated November 28, 2018**

**Prospectus**



**1,886,574 Shares**

**Common Stock**

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The selling stockholders of OvaScience, Inc. ("OvaScience," "we," "us" or the "Company") listed beginning on page 14 may offer and resell up to 1,886,574 shares of OvaScience common stock, par value \$0.001 per share ("OvaScience Common Stock") under this prospectus. The selling stockholders will acquire these shares pursuant to a Stock Purchase Agreement, dated November 1, 2018 (as amended from time to time, the "Purchase Agreement"), by and among OvaScience, Millendo Therapeutics, Inc. ("Millendo") and the investors listed therein (the "Investors").

Pursuant to the terms of the Purchase Agreement, the Investors agreed to purchase shares of OvaScience Common Stock. On August 9, 2018, the Company announced that it had entered into an Agreement and Plan of Merger and Reorganization, as may be amended from time to time (the "Merger Agreement"), pursuant to which a wholly owned subsidiary of OvaScience will merge with and into Millendo, with Millendo surviving as a wholly owned subsidiary of OvaScience (the "Merger"). At the closing of the Merger (the "Effective Time"), each share of Millendo common stock, par value \$0.001 per share ("Millendo Common Stock") (excluding certain shares to be cancelled pursuant to the Merger Agreement, and shares held by stockholders who have exercised and perfected appraisal rights or dissenters' rights), outstanding immediately prior to the Effective Time will be converted into the right to receive shares of OvaScience Common Stock equal to an exchange ratio, as further discussed in the Merger Agreement (the "Exchange Ratio").

Pursuant to the terms of the Purchase Agreement, the Investors agreed to purchase shares of OvaScience Common Stock for an aggregate purchase price of approximately \$20.0 million as part of a private placement financing (the "Post-Closing Financing"). The consummation of the Post-Closing Financing and the other transactions contemplated by the Purchase Agreement are conditioned upon the satisfaction of the conditions set forth in the Purchase Agreement. OvaScience and the Investors intend to complete the Post-Closing Financing after the Effective Time. Under the terms of the Post-Closing Financing, the Shares issued in the Post-Closing Financing will be issued pursuant to an exemption from the registration requirements of the Securities Act of 1933, as amended. The resale of the Shares by the Investors are being registered for resale on this registration statement.

The selling stockholders (which term as used herein includes their respective donees, transferees or other successors in interest) may sell these shares through public or private transactions at market prices prevailing at the time of sale or at negotiated prices. We will not receive any proceeds from the sale of the shares by the selling stockholders. In addition, the selling stockholders may sell or otherwise dispose of the shares of OvaScience Common Stock offered by this prospectus from time to time on terms to be determined at the time of sale through ordinary brokerage transactions or through any other means described in this prospectus under "Plan of Distribution."

Until October 31, 2018, the OvaScience Common Stock was listed on The Nasdaq Global Market under the symbol "OVAS"; effective October 31, 2018, the listing of the OvaScience Common Stock was transferred to The Nasdaq Capital Market under the symbol "OVAS." The last reported sale price of OvaScience Common Stock on November 27, 2018 was \$0.68 per share. In connection with the Merger, OvaScience has filed an initial listing application with The Nasdaq Capital Market pursuant to Nasdaq's rules for companies conducting a business combination that results in a change of control. After completion of the Merger, OvaScience is expected to be renamed "Millendo Therapeutics, Inc." and is expected to trade on The Nasdaq Capital Market under the symbol "MLND."

The prices at which the selling stockholders may sell all or a portion of the shares will be determined by the prevailing market price for the shares or in negotiated transactions. You are urged to obtain current market quotations for the OvaScience Common Stock.

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**Investing in OvaScience Common Stock is highly speculative and involves a significant degree of risk. See "Risk Factors" beginning on page 11 of this prospectus for a discussion of information that should be considered before making a decision to purchase OvaScience Common Stock.**

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the accuracy or adequacy of the disclosures in this prospectus. Any representation to the contrary is a criminal offense.

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The date of this prospectus is \_\_\_\_\_, 2018.

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**ABOUT THIS PROSPECTUS**

This prospectus is part of a registration statement that we have filed with the Securities and Exchange Commission (the "SEC") pursuant to which the selling stockholders named herein may, from time to time, offer and sell or otherwise dispose of the shares of our common stock covered by this prospectus. You should not assume that the information contained in this prospectus is accurate on any date subsequent to the date set forth on the front cover of this prospectus or that any information we have incorporated by reference is correct on any date subsequent to the date of the document incorporated by reference, even though this prospectus is delivered or shares of common stock are sold or otherwise disposed of on a later date. It is important for you to read and consider all information contained in this prospectus, including the documents incorporated by reference therein, in making your investment decision. You should also read and consider the information in the documents to which we have referred you under the captions "Where You Can Find Additional Information" and "Information Incorporated by Reference" in this prospectus.

We have not authorized any dealer, salesman or other person to give any information or to make any representation other than those contained or incorporated by reference in this prospectus. You must not rely upon any information or representation not contained or incorporated by reference in this prospectus. This prospectus does not constitute an offer to sell or the solicitation of an offer to buy any of our shares of common stock other than the shares of our common stock covered hereby, nor does this prospectus constitute an offer to sell or the solicitation of an offer to buy any securities in any jurisdiction to any person to whom it is unlawful to make such offer or solicitation in such jurisdiction. Persons who come into possession of this prospectus in jurisdictions outside the United States are required to inform themselves about, and to observe, any restrictions as to the offering and the distribution of this prospectus applicable to those jurisdictions.

Unless we have indicated otherwise, or the context otherwise requires, references in this prospectus supplement and the accompanying prospectus to "OvaScience," the "Company," "we," "us" and "our" refer to OvaScience, Inc. and its subsidiaries.

## INFORMATION INCORPORATED BY REFERENCE

We are allowed to incorporate by reference information contained in documents that we file with the SEC. This means that we can disclose important information to you by referring you to those documents and that the information in this prospectus is not complete and you should read the information incorporated by reference for more detail. Information in this prospectus supersedes information incorporated by reference that we filed with the Commission prior to the date of this prospectus, while information that we file later with the SEC will automatically update and supersede the information in this prospectus.

We incorporate by reference the documents listed below and any future filings we will make with the SEC under Section 13(a), 13(c), 14 or 15(d) of the Exchange Act (i) after the date of the initial filing of the registration statement of which this prospectus is a part and prior to effectiveness of such registration statement, and (ii) from the date of this prospectus but prior to the termination of the offering of the securities covered by this prospectus (other than Current Reports or portions thereof furnished under Item 2.02 or 7.01 of Form 8-K):

- Our proxy statement filed on Schedule 14A dated November 5, 2018 in connection with the Company's special meeting of stockholders;
- The supplement to our proxy statement filed on Schedule 14A dated November 19, 2018 in connection with the Company's special meeting of stockholders;
- Our Annual Report on Form 10-K for the fiscal year ended December 31, 2017;
- Our proxy statement on Schedule 14A filed on April 30, 2018 in connection with the Company's annual meeting of stockholders;
- Our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2018, June 30, 2018 and September 30, 2018;
- Our Current Reports on Form 8-K and 8-K/A filed with the SEC on January 3, 2018, January 8, 2018, February 1, 2018, March 15, 2018, May 3, 2018, June 26, 2018, August 9, 2018, November 1, 2018, November 19, 2018 and November 26, 2018 (other than any portions thereof deemed furnished and not filed); and
- The description of our common stock set forth in the registration statement on Form 8-A registering our common stock under Section 12 of the Exchange Act, which was filed with the Commission on April 25, 2013, including any amendments or reports filed for purposes of updating such description.

We will provide to each person, including any beneficial owner, to whom a prospectus is delivered, a copy of any or all of the information that is incorporated by reference in this prospectus but not delivered with this prospectus, including exhibits that are specifically incorporated by reference in such documents. You may request a copy of such documents, which will be provided to you at no cost, by writing or telephoning us at the following address or telephone number:

OvaScience, Inc.  
9 Fourth Avenue  
Waltham, MA 02451  
(617) 500-2802  
Attn: Jonathan Gillis

You should rely only on the information incorporated by reference or provided in this prospectus. We have not authorized anyone to provide you with different information. You should not assume that the information in this prospectus is accurate as of any date other than the date on the front of this document. Any statement contained in a document incorporated in this prospectus will be deemed to

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be modified or superseded for purposes of this prospectus to the extent that a statement contained in this prospectus modifies or supersedes that statement. Any statement that is modified or superseded will not constitute a part of this prospectus, except as modified or superseded.

Copies of the documents incorporated by reference may also be found on our website at [www.ovascience.com](http://www.ovascience.com). Except with respect to the documents expressly incorporated by reference above which are accessible at our website, the information contained on our website is not a part of, and should not be construed as being incorporated by reference into, this prospectus.

The information incorporated herein by reference includes information about Millendo. Following the Effective Time, the business of Millendo will continue as the business of the combined organization. Additionally, it has been determined that Millendo will be the accounting acquirer in the Merger, based upon the terms of the Merger Agreement and other factors including: (i) holders of Millendo stock and other persons holding securities convertible, exercisable or exchangeable directly or indirectly for Millendo Common Stock were initially estimated to own at least 82% of OvaScience immediately following the Effective Time, (ii) Millendo will hold the majority (seven of eight) of board seats of the combined company and (iii) Millendo's management will hold all key positions in the management of the combined company. Because of these factors, OvaScience has incorporated by reference to information about the Millendo business and operations into this prospectus.

## PROSPECTUS SUMMARY

This summary description about us and our business highlights selected information contained elsewhere in this prospectus or incorporated by reference into this prospectus. It does not contain all the information you should consider before investing in our securities. Important information is incorporated by reference into this prospectus. To understand this offering fully, you should read carefully the entire prospectus, including "Risk Factors" and "Cautionary Note Regarding Forward-Looking Statements", together with the additional information described under "Information Incorporated By Reference".

### ABOUT OVASCIENCE, INC. AND MILLENDO THERAPEUTICS, INC.

#### **OvaScience, Inc.**

OvaScience, Inc.  
9 Fourth Avenue  
Waltham, MA 02451  
(617) 500-2802

OvaScience is a company focused on the discovery and development of new treatment options for women and families struggling with infertility. To date OvaScience has been leveraging the breakthrough discovery of egg precursor, or EggPC<sup>SM</sup>, cells to transform the treatment landscape for women's fertility. OvaScience's operations to date have been limited to organizing and staffing the company, business planning, raising capital, acquiring and developing our technology, identifying potential fertility treatments, developing the OvaPrime<sup>SM</sup> treatment, the OvaTure<sup>SM</sup> treatment and the AUGMENT<sup>SM</sup> treatment, introducing AUGMENT in select international in vitro fertilization ("IVF") clinics and determining the regulatory and development path for OvaScience's fertility treatments. OvaScience has generated limited revenues to date, and does not anticipate significant revenues in the near term. In June 2017, OvaScience announced that it would continue to focus on advancing OvaPrime in clinical development and OvaTure in preclinical development and would discontinue ongoing efforts related to the AUGMENT treatment outside of North America. To better align its organization with these strategic priorities, OvaScience restructured its workforce and reduced its workforce by approximately 50%. On January 3, 2018, OvaScience announced a further restructuring of its organization and a workforce reduction of approximately 50%. On May 3, 2018, OvaScience announced that its Board of Directors had approved a corporate restructuring plan furthering its on-going efforts to effectively align its resources.

#### **Millendo Therapeutics, Inc.**

Millendo Therapeutics, Inc.  
301 N. Main Street  
Suite 100  
Ann Arbor, MI 48104  
(734) 845-9000

Millendo is a late-stage biopharmaceutical company focused on developing novel treatments for orphan endocrine diseases where current therapies do not exist or are insufficient. The endocrine system is a collection of glands that secrete hormones into the blood stream to regulate a number of functions, including appetite, metabolism, growth, development and reproduction. Diseases of the endocrine system can cause multiple and varied symptoms, including appetite dysregulation, metabolic dysfunction, obesity, cardiovascular disease, menstrual irregularity, excessive facial and body hair growth, and infertility.

Millendo is currently advancing two product candidates to treat three indications. Millendo's most advanced product candidate, livoletide (AZP-531), is a potential treatment for Prader-Willi syndrome,

or PWS, a rare and complex genetic endocrine disease characterized by hyperphagia, or insatiable hunger, that contributes to serious complications, a significant burden on patients and caregivers and early mortality. In a randomized, double-blind, placebo-controlled Phase 2 clinical trial in 47 patients with PWS, Millendo observed that administration of livoletide once daily was associated with a clinically meaningful improvement in hyperphagia, as well as a reduction in appetite. In a pre-specified analysis of 38 home-resident PWS patients from the Phase 2 trial, Millendo observed a larger and statistically significant decrease in hyperphagia following administration of livoletide as compared to placebo. Millendo expects to initiate a pivotal Phase 2b/3 clinical trial of livoletide in home-resident PWS patients in the first quarter of 2019, with results expected in the first half of 2020. Millendo is also developing nevanimibe (ATR-101) with a primary focus on treating patients with classic congenital adrenal hyperplasia, or CAH, a rare, monogenic adrenal disease that requires lifelong treatment with exogenous cortisol, often at high doses. These chronic high doses of cortisol can result in side effects that include diabetes, obesity, hypertension and psychological problems. When on suboptimal doses of cortisol, female CAH patients can experience male-pattern hair growth, male physical characteristics, infertility and menstrual irregularity, and male CAH patients can experience testicular atrophy, infertility and testicular tumors, making it difficult for physicians to appropriately treat CAH without causing adverse consequences. Millendo recently reported results from its Phase 2 clinical trial of nevanimibe in patients with CAH and initiated a Phase 2b trial in the third quarter of 2018. Millendo is also investigating nevanimibe in a Phase 2 clinical trial for the treatment of patients with endogenous Cushing's syndrome, or CS, a rare endocrine disease characterized by excessive cortisol production from the adrenal glands.

#### **Orion Merger Sub, Inc.**

Orion Merger Sub, Inc. ("Merger Sub") is a wholly owned subsidiary of OvaScience, and was formed solely for the purposes of carrying out the Merger.

#### **Recent Events**

On August 9, 2018, OvaScience announced that it had entered into an Agreement and Plan of Merger and Reorganization, as may be amended from time to time with Millendo Therapeutics, Inc. ("Millendo"), pursuant to which Merger Sub will merge with and into Millendo, with Millendo surviving as a wholly owned subsidiary of OvaScience (the "Merger"). The Shares registered for resale on this registration statement will be sold to the selling stockholders pursuant to a Stock Purchase Agreement, dated November 1, 2018 (as amended from time to time, the "Purchase Agreement"), by and among OvaScience, Millendo and the investors listed therein (the "Investors"). Pursuant to the terms of the Purchase Agreement, the Investors agreed to purchase shares of OvaScience Common Stock for an aggregate purchase price of approximately \$20.0 million as part of a private placement financing (the "Post-Closing Financing"). The consummation of the Post-Closing Financing and the other transactions contemplated by the Purchase Agreement are conditioned upon the satisfaction of the conditions set forth in the Purchase Agreement. OvaScience and the Investors intend to complete the Post-Closing Financing after the Effective Time. Under the terms of the Post-Closing Financing, the Shares issued in the Post-Closing Financing will be issued pursuant to an exemption from the registration requirements of the Securities Act of 1933, as amended. The resale of the Shares by the Investors are being registered for resale on this registration statement.

#### **Corporate Information**

OvaScience was incorporated under the laws of the State of Delaware in April 2011 under the name Ovastem, Inc. and changed its name to OvaScience, Inc. in May 2011. OvaScience's principal executive offices are located at 9 4th Avenue, Waltham, Massachusetts 02451, and its telephone number is (617) 500-2802. OvaScience's website address is [www.ovascience.com](http://www.ovascience.com). The information contained on, or that can be accessed through, OvaScience's website is not a part of this registration statement. OvaScience has included OvaScience's website address in this registration statement solely as an inactive textual reference.

**THE OFFERING**

<b>Shares of common stock that may be offered by the selling stockholders</b>	Up to 1,886,574 shares.
<b>Use of Proceeds</b>	We will not receive any proceeds from the sale of the common stock by the selling stockholders.
<b>Offering Price</b>	The selling stockholders may sell all or a portion of their shares through public or private transactions at prevailing market prices or at privately negotiated prices.
<b>Nasdaq Capital Market symbol</b>	<p>Until October 31, 2018, the OvaScience Common Stock was listed on The Nasdaq Global Market under the symbol "OVAS"; effective October 31, 2018, the listing of the OvaScience Common Stock was transferred to The Nasdaq Capital Market under the symbol "OVAS." The last reported sale price of OvaScience Common Stock on November 27, 2018 was \$0.68 per share.</p> <p>OvaScience has filed an initial listing application with The Nasdaq Capital Market pursuant to Nasdaq's rules for companies conducting a business combination that results in a change of control. After completion of the Merger, OvaScience will be renamed "Millendo Therapeutics, Inc." and expects to trade on The Nasdaq Capital Market under the symbol "MLND."</p>
<b>Risk Factors</b>	Investing in our common stock involves a high degree of risk. See "Risk Factors" below.

## DESCRIPTION OF THE MERGER

On August 9, 2018, OvaScience announced that it had entered into an Agreement and Plan of Merger and Reorganization, as may be amended from time to time (the "Merger Agreement") with Millendo under which Millendo will merge with OvaScience in an all-stock transaction (the "Merger"). If the Merger is completed, a wholly owned subsidiary of OvaScience ("Merger Sub") will merge with and into Millendo, with Millendo surviving as a wholly owned subsidiary of OvaScience. In connection with the Merger, holders of OvaScience stock have been asked to approve an amendment to OvaScience's restated certificate of incorporation effecting a reverse stock split of OvaScience Common Stock at a ratio mutually agreed to between OvaScience and Millendo in the range of one new share for every 5 to 15 shares outstanding (the "Reverse Stock Split").

Immediately prior to closing of the Merger (the "Effective Time"), each share of Millendo preferred stock and Millendo class-1 common stock will be converted into Millendo Common Stock. At the Effective Time, each share of Millendo's common stock, par value \$0.001 per share ("Millendo Common Stock") outstanding immediately prior to the Effective Time (excluding shares held by stockholders who have exercised and perfected appraisal rights or dissenters' rights, but including shares of Millendo Common Stock that will be issued pursuant to certain existing Millendo shareholders in a pre-closing private placement of Millendo Common Stock (the "Pre-Closing Financing")) will be converted into the right to receive a number of shares of OvaScience Common Stock based on an exchange ratio set forth in the Merger Agreement (the "Exchange Ratio"). OvaScience will assume all outstanding and unexercised options to purchase shares of Millendo Common Stock (each, a "Millendo Option," and each holder of a Millendo Option, a "Millendo Optionholder") and warrants to purchase Millendo Common Stock, and each such Millendo Options and warrants will be converted into an option or warrant, respectively, to purchase shares of OvaScience Common Stock, with the number of shares of OvaScience Common Stock subject to such option or warrant and the exercise price being appropriately adjusted to reflect the Exchange Ratio.

The final Exchange Ratio will be determined pursuant to a formula described in more detail in the Merger Agreement. As of the date of the execution of the Merger Agreement, it was estimated that immediately after the consummation of the Merger, based solely on the sample Exchange Ratio of 0.1173 set forth below, holders of shares of Millendo Common Stock, Millendo Optionholders and other persons holding securities and rights directly or indirectly convertible, exercisable or exchangeable for Millendo Common Stock (collectively, "Millendo Securityholders") would own approximately 82% of Fully Diluted Closing OvaScience Common Stock, and holders of shares of OvaScience Common Stock, holders of options to purchase shares of OvaScience Common Stock and other persons holding securities and rights directly or indirectly convertible, exercisable or exchangeable for OvaScience Common Stock (collectively, "OvaScience Securityholders") would own approximately 18% of Fully Diluted Closing OvaScience Common Stock (as defined below), subject to adjustment of the Exchange Ratio as set forth in the Merger Agreement.

The percentages set forth above assume that the initial estimate of the Exchange Ratio is not changed; however, the Exchange Ratio is subject to change as set forth in the Merger Agreement. The initial estimate of the Exchange Ratio set forth below assumed (i) that OvaScience would have between \$40 million and \$42 million in net cash immediately prior to Closing, (ii) a Pre-Closing Financing amount of \$30.0 million, (iii) OvaScience outstanding shares and options as of the Closing would be equal to 3,721,460 (on a post reverse stock split basis), (iv) Millendo shares as of the Closing would be equal to 148,171,273 (on a fully-diluted, as-converted basis) and (v) a reverse stock split of every 10 shares of outstanding OvaScience Common Stock being combined and reclassified into one share of OvaScience Common Stock.

The Exchange Ratio is calculated using a formula intended to allocate a percentage of the combined organization to existing Millendo Securityholders. Based on the assumptions described above,

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the Exchange Ratio would have been equal to approximately 0.1173 post-reverse split shares of OvaScience Common Stock for each share of Millendo Common Stock, which Exchange Ratio is subject to change based on the amount of OvaScience net cash, changes in the capitalization of OvaScience or Millendo prior to the Closing and the amount raised by Millendo in the Pre-Closing Financing (and as a result, OvaScience Securityholders and Millendo Securityholders could own more or less of the combined organization). After the initial signing of the Merger Agreement, the valuations for Millendo and OvaScience were reduced.

OvaScience currently estimates that, assuming for this purpose a closing date of November 30, 2018, (i) it will have approximately \$37.6 million in net cash immediately prior to Closing, (ii) the Pre-Closing Financing amount will be approximately \$29.5 million, (iii) OvaScience outstanding shares and options as of the Closing will be equal to 3,727,669 (on a post reverse stock split basis) and (iv) the Millendo shares as of the Closing on a fully diluted and as-converted basis will be equal to 152,629,595. Accordingly, it is currently estimated that the Exchange Ratio at Closing will be approximately 0.1070 and, based solely on such Exchange Ratio, at Closing: (a) Millendo Securityholders as of immediately prior to the Merger (not including the shares issued in the Pre-Closing Financing) will own approximately 67.1% of the Fully Diluted Closing OvaScience Common Stock (as defined below), (b) the shares issued in the Pre-Closing Financing to Millendo Securityholders as of immediately prior to the Merger will represent approximately 13.1% of the Fully Diluted Closing OvaScience Common Stock, (c) the OvaScience Securityholders as of immediately prior to the Merger (excluding for this purpose certain out-of-the-money OvaScience Options) will own approximately 18.6% of the Fully Diluted Closing OvaScience Common Stock, and (d) the shares available for issuance under the Millendo Plan as of immediately prior to the Merger will represent approximately 1.2% of the Fully Diluted Closing OvaScience Common Stock, in each case, subject to adjustment of the Exchange Ratio as set forth in the Merger Agreement and described herein. Additionally, it is anticipated that the Post-Closing Financing (as defined below) will close shortly after the Closing, which would dilute, and thereby reduce, each then existing OvaScience Securityholder's proportionate holdings. Assuming that the Post-Closing Financing closes immediately after the Merger as well as the other aforementioned assumptions, it is expected that (a) Millendo Securityholders as of immediately prior to the Merger (not including the shares issued in the Pre-Closing Financing) will own approximately 61.7% of the Fully Diluted Post-Financing OvaScience Common Stock (as defined below), (b) the shares issued in the Pre-Closing Financing to Millendo Securityholders as of immediately prior to the Merger will represent approximately 12.0% of the Fully Diluted Post-Financing OvaScience Common Stock, (c) the OvaScience Securityholders as of immediately prior to the Merger (excluding for this purpose certain out-of-the-money OvaScience Options) will own approximately 17.1% of the Fully Diluted Post-Financing OvaScience Common Stock, (d) the shares issued in the Post-Closing Financing to the Post-Closing Financing Investor (as defined below) will represent approximately 8.1% of the Fully Diluted Post-Financing OvaScience Common Stock, and (e) the shares available for issuance under the Millendo Plan as of immediately prior to the Merger will represent approximately 1.1% of the Fully Diluted Post-Financing OvaScience Common Stock, in each case, subject to adjustment of the Exchange Ratio as set forth in the Merger Agreement and described herein. "Fully Diluted Closing OvaScience Common Stock" as used herein means (x) Orion Outstanding Shares (as defined in the Merger Agreement, which figure excludes the shares available for issuance under the 2012 Plan and a portion of the out-of-the-money OvaScience Options) plus (y) Company Outstanding Shares (as defined in the Merger Agreement, which figure includes the shares available for issuance under the Millendo Plan). "Fully Diluted Post-Financing OvaScience Common Stock" as used herein means (x) Orion Outstanding Shares (as defined in the Merger Agreement, which figure excludes the shares available for issuance under the 2012 Plan and a portion of the out-of-the-money OvaScience Options) plus (y) Company Outstanding Shares (as defined in the Merger Agreement, which figure includes the shares available for issuance under the Millendo Plan) plus (z) the Post-Closing Financing shares.

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The Closing will occur no later than the second business day after the last of the conditions to the Merger has been satisfied, or at such other time as OvaScience and Millendo agree. OvaScience and Millendo anticipate that the consummation of the Merger will occur in the fourth quarter of 2018. However, because the Merger is subject to a number of conditions, neither OvaScience nor Millendo can predict exactly when the Closing will occur or if it will occur at all. After completion of the Merger, assuming that OvaScience receives the required stockholder approval of its proposal to change the name of the company, OvaScience will be renamed "Millendo Therapeutics, Inc."

On September 25, 2018, OvaScience and Millendo entered into the First Amendment to the Merger Agreement (the "First Amendment"). The First Amendment provides, among other things, that shares of OvaScience Common Stock to be issued in exchange for shares of Millendo Common Stock to be issued in the Pre-Closing Financing would not be registered pursuant to the Registration Statement on Form S-4, originally filed by OvaScience on September 26, 2018. The First Amendment also increased the size of the board of directors of the combined company by one seat. Further, it provides, among other things, that shares of OvaScience Common Stock to be issued in exchange for shares of Millendo Common Stock to be issued to certain of the investors in the Pre-Closing Financing that were not previously stockholders of Millendo would be registered pursuant to a separate resale registration statement on Form S-3.

On November 1, 2018, OvaScience and Millendo entered into the Second Amendment to the Merger Agreement (the "Second Amendment"). The Second Amendment was proposed by Millendo in order to lower Millendo's valuation from \$191.9 million to \$155.0 million in connection with the Post-Closing Financing. The Second Amendment provides that as a result of the reduction in Millendo's valuation, the Pre-Closing Financing, including the conversion of any convertible promissory notes issued after the date of the Second Amendment, would be consummated at a price per share for Millendo Common Stock of not less than \$1.2096. The Second Amendment also provides that Millendo's Valuation would equal the sum of \$155 million plus any proceeds received in the Pre-Closing Financing, and that OvaScience's Valuation would be lowered to \$45.5 million, subject to certain adjustments set forth in the Merger Agreement. The Second Amendment additionally (i) provides that the definition of Millendo outstanding shares used for purposes of the exchange ratio shall include shares of Millendo Common Stock available for issuance under its stock option plans, (ii) provides for an adjustment to the Company's net cash in connection with certain litigation matters, and (iii) revises the definition of the Company's outstanding lease obligations with respect to its principal office space. It also revises certain representations and warranties being made by Millendo.

The description of the Merger Agreement is not complete and is qualified in its entirety by reference to Merger Agreement, which has been filed as an annex to our proxy statement on Schedule 14A, filed with the SEC on November 5, 2018 and which is incorporated by reference herein. See "Where You Can Find Additional Information" and "Information Incorporated by Reference." The representations, warranties and covenants made by us in the Merger Agreement were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties thereto, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were made as of an earlier date. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

## DESCRIPTION OF THE PRIVATE PLACEMENT

On November 1, 2018, OvaScience and Millendo entered into a Stock Purchase Agreement (as may be amended from time to time, the "Purchase Agreement") with certain investors (the "Investors"), which provided for the sale and issuance of shares (the "Shares") of OvaScience Common Stock (the "Post-Closing Financing") for an aggregate purchase price of approximately \$20 million at a per share purchase price of (i) \$1.2096 *divided by* (ii) the Exchange Ratio. The consummation of the Post-Closing Financing and the other transactions contemplated by the Purchase Agreement are conditioned upon the satisfaction of the conditions set forth in the Purchase Agreement. OvaScience and the Investors intend to complete the Post-Closing Financing after the Effective Time. Under the terms of the Post-Closing Financing, the Shares issued in the Post-Closing Financing will be issued pursuant to an exemption from the registration requirements of the Securities Act of 1933, as amended. The resale of the Shares by the Investors are being registered for resale on this registration statement.

On November 28, 2018, OvaScience, Millendo and the Investors entered into the First Amendment to the Purchase Agreement (the "First Amendment to the Purchase Agreement"), pursuant to which the parties agreed to amend certain provisions of the Purchase Agreement that would have allowed the Investors to waive certain conditions to the closing of the Post-Closing Financing. The parties also amended the fee reimbursement provisions.

Concurrently with the execution of the Purchase Agreement, OvaScience entered into a Registration Rights Agreement (as may be amended from time to time, the "Registration Rights Agreement") with the Investors, pursuant to which OvaScience agreed to file, as promptly as reasonably possible after the execution of the Registration Rights Agreement, a registration statement (the "Resale Registration Shelf") with the SEC covering the resale of the shares sold to the Investors in the Post-Closing Financing and to use its reasonable best efforts to have the registration statement declared effective as promptly as practicable following the filing of the Resale Registration Shelf.

Under the Registration Rights Agreement, OvaScience also agreed to use its reasonable best efforts to maintain the effectiveness of the Resale Registration Shelf until the earliest of (a) the date as of which Investors may sell all of their securities covered by the Resale Registration Shelf without restriction pursuant to Rule 144 or (b) all Shares covered by the Resale Registration Shelf otherwise cease to be registrable securities, as defined in the Registration Rights Agreement.

The descriptions of the Purchase Agreement, the First Amendment to the Purchase Agreement and the Registration Rights Agreement are not complete and are qualified in their entirety by reference to the Purchase Agreement, the First Amendment to the Purchase Agreement and the Registration Rights Agreement, each of which have been filed as an exhibit to the registration statement of which this prospectus is a part. See "Where You Can Find Additional Information" and "Information Incorporated by Reference." The representations, warranties and covenants made by us in such agreements were made solely for the benefit of the parties to such agreements, including, in some cases, for the purpose of allocating risk among the parties thereto, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were made as of an earlier date. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

## **RISK FACTORS**

An investment in our common stock involves a high degree of risk. Prior to making a decision about investing in our common stock, you should carefully consider the risks, uncertainties and assumptions discussed under (i) the section entitled "Risk Factors," in our proxy statement on Schedule 14A, filed with the SEC on November 5, 2018 and (ii) Item 1A, "Risk Factors," in our Annual Report on Form 10-K for the fiscal year ended December 31, 2017 filed with the SEC on March 15, 2018, as updated by our subsequent filings with the SEC under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), which are incorporated herein by reference, together with the information in this prospectus and any other information incorporated by reference into this prospectus. See "Where You Can Find Additional Information" and "Information Incorporated by Reference." Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also affect our business, financial condition or results of operations. The occurrence of any of these known or unknown risks might cause you to lose all or part of your investment in our common stock.

## CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This registration statement and the documents incorporated by reference into this registration statement contain forward-looking statements (including within the meaning of Section 21E of the United States Securities Exchange Act of 1934, as amended (the "Exchange Act"), and Section 27A of the Securities Act) concerning OvaScience, Millendo, the proposed Merger and other matters. These statements may discuss goals, intentions and expectations as to future plans, trends, events, results of operations or financial condition, or otherwise, based on current beliefs of the management of OvaScience, as well as assumptions made by, and information currently available to, management. Forward-looking statements generally include statements that are predictive in nature and depend upon or refer to future events or conditions, and include words such as "may," "will," "should," "would," "expect," "plan," "believe," "intend," "look forward," and other similar expressions among others. Statements that are not historical facts are forward-looking statements. Forward-looking statements are based on current beliefs and assumptions that are subject to risks and uncertainties and are not guarantees of future performance. Actual results could differ materially from those contained in any forward-looking statement as a result of various factors, including, without limitation: the risk that the conditions to the closing of the Merger are not satisfied, including the failure to timely or at all obtain stockholder approval for the Merger; uncertainties as to the timing of the consummation of the Merger and the ability of each of OvaScience and Millendo to consummate the Merger; risks and uncertainties as to the ability of the parties to consummate the Post-Closing Financing; risks related to OvaScience's ability to correctly estimate its operating expenses and its expenses associated with the Merger; risks related to the changes in market price of the OvaScience Common Stock relative to the Exchange Ratio; the ability of OvaScience or Millendo to protect their respective intellectual property rights; competitive responses to the Merger; unexpected costs, charges or expenses resulting from the Merger; potential adverse reactions or changes to business relationships resulting from the announcement or completion of the Merger; and legislative, regulatory, political and economic developments. The foregoing review of important factors that could cause actual events to differ from expectations should not be construed as exhaustive and should be read in conjunction with statements that are included herein and elsewhere. OvaScience can give no assurance that the conditions to the Merger will be satisfied. Except as required by applicable law, OvaScience undertakes no obligation to revise or update any forward-looking statement, or to make any other forward looking statements, whether as a result of new information, future events or otherwise.

For a discussion of the factors that may cause OvaScience, Millendo or the combined organization's actual results, performance or achievements to differ materially from any future results, performance or achievements expressed or implied in such forward-looking statements, or for a discussion of risks associated with the ability of OvaScience and Millendo to complete the Merger and the effect of the Merger on the business of OvaScience, Millendo and the combined organization, see (i) the section entitled "Risk Factors," in our proxy statement on Schedule 14A, filed with the SEC on November 5, 2018 and (ii) Item 1A, "Risk Factors," in our Annual Report on Form 10-K for the fiscal year ended December 31, 2017 filed with the SEC on March 15, 2018, as updated by our subsequent filings with the SEC under the Exchange Act.

Additional factors that could cause actual results to differ materially from those expressed in the forward-looking statements are discussed in reports filed with the SEC by OvaScience. See the section titled "*Where You Can Find More Information*" in this registration statement. There can be no assurance that the Merger will be completed, or if it is completed, that it will be completed within the anticipated time period or that the expected benefits of the Merger will be realized.

**If any of these risks or uncertainties materialize or any of these assumptions prove incorrect, the results of operations of OvaScience, Millendo or the combined organization could differ materially from the forward-looking statements. All forward-looking statements in this registration statement are current only as of the date on which the statements were made. OvaScience and Millendo do not undertake any obligation to publicly update any forward-looking statement to reflect events or circumstances after the date on which any statement is made, the occurrence of unanticipated events or any new information that becomes available in the future.**

**USE OF PROCEEDS**

We will not receive any of the proceeds from the sale of the common stock by the selling stockholders named in this prospectus. All proceeds from the resale of the shares of our common stock offered by this prospectus will belong to the selling stockholders identified in this prospectus under "Selling Stockholders."

## SELLING STOCKHOLDERS

This prospectus covers the resale by the selling stockholders identified below of up to 1,886,574 shares of our common stock that will be issued to the selling stockholders. The selling stockholders will acquire our securities pursuant to the Post-Closing Financing following the closing of the Merger. See "Prospectus Summary—Description of the Merger" and "Prospectus Summary—Description of the Private Placement." We will not receive any proceeds from the resale of the common stock by the selling stockholders.

To our knowledge, none of the selling stockholders has been an officer or director of ours or any of our predecessors or affiliates within the past three years and no selling stockholder had a material relationship with OvaScience or any of its affiliates within the last three years. Our knowledge is based on information provided by the selling stockholders in connection with the filing of this prospectus, as well as information obtained from relevant Schedule 13D and 13G filings.

The shares registered for resale on this registration statement will be sold to the selling stockholders under the Purchase Agreement, pursuant to which the Investors agreed to purchase shares of OvaScience Common Stock following the closing of the Merger. The table below sets forth information, to our knowledge, for the selling stockholders and other information regarding the beneficial ownership (as determined under Section 13(d) of the Exchange Act and the rules and regulations thereunder) of the shares of OvaScience Common Stock that would be held by the selling stockholders, assuming the closing of the Merger occurred on November 30, 2018.

The percentage of ownership is based on 18,859,542 shares of OvaScience Common Stock expected to be outstanding upon the Closing, including the effect of the Reverse Stock Split, if approved and implemented at a 1:10 ratio, and the Pre-Closing Financing, adjusted as required by the rules promulgated by the SEC to determine beneficial ownership. The following table and the related notes assume that, at the Effective Time, each share of Millendo Common Stock will convert into the right to receive 0.1070 post-Reverse Stock Split shares of OvaScience Common Stock (which is the current estimate of the Exchange Ratio and is subject to change as described elsewhere in this prospectus) and to account for the occurrence of certain events.

The table and footnotes assume that the selling stockholders will sell all of the shares listed. However, because the selling stockholders may sell all or some of their shares under this prospectus from time to time, or in another permitted manner, we cannot assure you as to the actual number of shares that will be sold by the selling stockholders or that will be held by the selling stockholders after completion of any sales. We do not know how long the selling stockholders will hold the shares before selling them. The inclusion of any shares in this table does not constitute an admission of beneficial ownership by the persons named below. The selling stockholders listed below are sorted alphabetically by first name.

Information about the selling stockholders may change over time. Any changed information will be set forth in an amendment to the registration statement or supplement to this prospectus, to the extent required by law.

<u>Name of Selling Stockholder</u>	<u>Shares Beneficially Owned as of the date of this Prospectus</u>		<u>Shares Offered by this Prospectus</u>	<u>Shares Beneficially Owned After the Offering(2)</u>	
	<u>Number</u>	<u>Percent(1)</u>		<u>Number</u>	<u>Percent(1)</u>
Great Point Partners, LLC	1,769,179	9.4%	1,886,574(3)	—	*

\* Less than 1%.

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- (1) Applicable percentage ownership is based on 18,859,542 shares of our common stock outstanding as of November 30, 2018, which includes shares expected to be issued by Millendo as part of the Pre-Closing Financing and by OvaScience in the Post-Closing Financing.
- (2) Assumes the sale of all shares offered pursuant to this prospectus.
- (3) The number of shares offered for resale by this Prospectus is based on an estimated Exchange Ratio of 0.1141, which accounts for potential reductions in OvaScience cash. Currently, the Exchange Ratio is estimated to be 0.1070, which Exchange Ratio is subject to change as described elsewhere in this Prospectus.

## PLAN OF DISTRIBUTION

The selling stockholders, which as used herein includes donees, pledgees, transferees or other successors-in-interest selling shares of common stock or interests in shares of common stock received after the date of this prospectus from a selling stockholder as a gift, pledge, partnership distribution or other transfer, may, from time to time, sell, transfer or otherwise dispose of any or all of their shares of common stock or interests in shares of common stock on any stock exchange, market or trading facility on which the shares are traded or in private transactions. These dispositions may be at fixed prices, at prevailing market prices at the time of sale, at prices related to the prevailing market price, at varying prices determined at the time of sale, or at negotiated prices.

The selling stockholders may use any one or more of the following methods when disposing of shares or interests therein:

- ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- block trades in which the broker-dealer will attempt to sell the shares as agent, but may position and resell a portion of the block as principal to facilitate the transaction;
- purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- an exchange distribution in accordance with the rules of the applicable exchange;
- privately negotiated transactions;
- short sales effected after the date the registration statement of which this Prospectus is a part is declared effective by the SEC;
- through the writing or settlement of options or other hedging transactions, whether through an options exchange or otherwise;
- broker-dealers may agree with the selling stockholders to sell a specified number of such shares at a stipulated price per share;
- a combination of any such methods of sale; and
- any other method permitted by applicable law.

The selling stockholders may, from time to time, pledge or grant a security interest in some or all of the shares of common stock owned by them and, if they default in the performance of their secured obligations, the pledgees or secured parties may offer and sell the shares of common stock, from time to time, under this prospectus, or under an amendment to this prospectus under Rule 424(b)(3) or other applicable provision of the Securities Act amending the list of selling stockholders to include the pledgee, transferee or other successors in interest as selling stockholders under this prospectus. The selling stockholders also may transfer the shares of common stock in other circumstances, in which case the transferees, pledgees or other successors in interest will be the selling beneficial owners for purposes of this prospectus.

In connection with the sale of our common stock or interests therein, the selling stockholders may enter into hedging transactions with broker-dealers or other financial institutions, which may in turn engage in short sales of the common stock in the course of hedging the positions they assume. The selling stockholders may also sell shares of our common stock short and deliver these securities to close out their short positions, or loan or pledge the common stock to broker-dealers that in turn may sell these securities. The selling stockholders may also enter into option or other transactions with broker-dealers or other financial institutions or the creation of one or more derivative securities which require the delivery to such broker-dealer or other financial institution of shares offered by this prospectus, which shares such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction).

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The aggregate proceeds to the selling stockholders from the sale of the common stock offered by them will be the purchase price of the common stock less discounts or commissions, if any. Each of the selling stockholders reserves the right to accept and, together with their agents from time to time, to reject, in whole or in part, any proposed purchase of common stock to be made directly or through agents. We will not receive any of the proceeds from this offering. Upon any exercise of the warrants by payment of cash, however, we will receive the exercise price of the warrants.

The selling stockholders also may resell all or a portion of the shares in open market transactions in reliance upon Rule 144 under the Securities Act of 1933, provided that they meet the criteria and conform to the requirements of that rule.

The selling stockholders and any underwriters, broker-dealers or agents that participate in the sale of the common stock or interests therein may be "underwriters" within the meaning of Section 2(11) of the Securities Act. Any discounts, commissions, concessions or profit they earn on any resale of the shares may be underwriting discounts and commissions under the Securities Act. Selling stockholders who are "underwriters" within the meaning of Section 2(11) of the Securities Act will be subject to the prospectus delivery requirements of the Securities Act.

To the extent required, the shares of our common stock to be sold, the names of the selling stockholders, the respective purchase prices and public offering prices, the names of any agents, dealer or underwriter, any applicable commissions or discounts with respect to a particular offer will be set forth in an accompanying prospectus supplement or, if appropriate, a post-effective amendment to the registration statement that includes this prospectus.

In order to comply with the securities laws of some states, if applicable, the common stock may be sold in these jurisdictions only through registered or licensed brokers or dealers. In addition, in some states the common stock may not be sold unless it has been registered or qualified for sale or an exemption from registration or qualification requirements is available and is complied with.

We have advised the selling stockholders that the anti-manipulation rules of Regulation M under the Exchange Act may apply to sales of shares in the market and to the activities of the selling stockholders and their affiliates. In addition, to the extent applicable we will make copies of this prospectus (as it may be supplemented or amended from time to time) available to the selling stockholders for the purpose of satisfying the prospectus delivery requirements of the Securities Act. The selling stockholders may indemnify any broker-dealer that participates in transactions involving the sale of the shares against certain liabilities, including liabilities arising under the Securities Act.

We will pay all expenses of the registration of the shares of common stock pursuant to the registration rights agreement, including, without limitation, Securities and Exchange Commission filing fees and expenses of compliance with state securities or "blue sky" laws; *provided, however*, that each selling stockholder will pay all underwriting discounts and selling commissions, if any and any related legal expenses incurred by it. We will indemnify the selling stockholders against certain liabilities, including some liabilities under the Securities Act, in accordance with the registration rights agreement, or the selling stockholders will be entitled to contribution. We may be indemnified by the selling stockholders against civil liabilities, including liabilities under the Securities Act, that may arise from any written information furnished to us by the selling stockholders specifically for use in this prospectus, in accordance with the related registration rights agreement, or we may be entitled to contribution.

We have agreed with the selling stockholders to keep the registration statement of which this prospectus constitutes a part effective until the earlier of (1) such time as all of the shares covered by this prospectus have been disposed of pursuant to and in accordance with the registration statement or (2) the date on which all of the shares may be sold without restriction pursuant to Rule 144 of the Securities Act.

**LEGAL MATTERS**

The validity of the shares of common stock offered in this prospectus has been passed upon for us by Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts.

## EXPERTS

The consolidated financial statements of OvaScience, Inc. appearing in OvaScience, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2017, have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report thereon, included therein, and incorporated herein by reference. Such consolidated financial statements are incorporated herein by reference in reliance upon such report given on the authority of such firm as experts in accounting and auditing.

The consolidated financial statements of Millendo Therapeutics, Inc. as of December 31, 2017 and 2016 and for each of the years then ended that are incorporated by reference in this prospectus and elsewhere in this registration statement have been audited by Ernst & Young LLP, independent auditors, as set forth in their report thereon (which contains an explanatory paragraph describing conditions that raise substantial doubt about the Company's ability to continue as a going concern as described in Note 1 to the consolidated financial statements), included therein, and incorporated herein by reference. Such financial statements are incorporated herein in reliance upon such report given on the authority of such firm as experts in accounting and auditing.

The financial statements of Millendo Therapeutics SAS, which comprise the balance sheet as of December 31, 2016 and the related statements of income and cash flows for the year then ended, and the balance sheet as of December 19, 2017 and the related statements of income and cash flows for the period from January 1 to December 19, 2017, and the related notes to the financial statements that are incorporated by reference in this prospectus and elsewhere in this registration statement have been audited by RSM Rhône-Alpes, as set forth in their report thereon, included therein, and incorporated herein by reference. Such financial statements are incorporated by reference herein in reliance upon such report given on the authority of such firm as experts in accounting and auditing.

#### **WHERE YOU CAN FIND ADDITIONAL INFORMATION**

We are subject to the information requirements of the Exchange Act and we therefore file periodic reports, proxy statements and other information with the SEC relating to our business, financial statements and other matters. The SEC maintains a web site that contains reports, proxy and information statements and other information regarding issuers like us that file electronically with the SEC. The address of the SEC's web site is <http://www.sec.gov>.

This prospectus constitutes part of a registration statement filed under the Securities Act with respect to the shares of common stock covered hereby. As permitted by the SEC's rules, this prospectus omits some of the information, exhibits and undertakings included in the registration statement. You may read and copy the information omitted from this prospectus but contained in the registration statement, as well as the periodic reports and other information we file with the SEC, at the web site of the SEC referred to above. You may also access our filings with the SEC on our web site, which is located at <http://www.ovascience.com>. The information contained on our web site is not part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference.

Statements contained in this prospectus as to the contents of any contract or other document are not necessarily complete, and in each instance we refer you to the copy of the contract or other document filed or incorporated by reference as an exhibit to the registration statement or as an exhibit to our Exchange Act filings, each such statement being qualified in all respects by such reference.

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**1,886,574 Shares**

**Common Stock**

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**PROSPECTUS**

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**PART II**

**INFORMATION NOT REQUIRED IN PROSPECTUS**

**ITEM 14. OTHER EXPENSES OF ISSUANCE AND DISTRIBUTION**

The following table sets forth the fees and expenses incurred and to be incurred in connection with the registration of the securities being registered hereby, all of which will be borne by us. Except for the SEC registration fee, all amounts are estimates.

SEC Registration Fee	\$ 176.07
Accounting Fees and Expenses	\$ 15,000.00
Legal Fees and Expenses	\$ 40,000.00
Printing Expenses	\$ 10,000.00
Miscellaneous Fees and Expenses	\$ 4,823.93
<b>Total</b>	<b>\$ 70,000.00</b>

**ITEM 15. INDEMNIFICATION OF OFFICERS AND DIRECTORS**

Subsection (a) of Section 145 of the General Corporation Law of the State of Delaware ("DGCL"), empowers a corporation to indemnify any person who was or is a party or who is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than an action by or in the right of the corporation) by reason of the fact that the person is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, against expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by the person in connection with such action, suit or proceeding if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation, and, with respect to any criminal action or proceeding, had no reasonable cause to believe the person's conduct was unlawful.

Subsection (b) of Section 145 empowers a corporation to indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action or suit by or in the right of the corporation to procure a judgment in its favor by reason of the fact that the person acted in any of the capacities set forth above, against expenses (including attorneys' fees) actually and reasonably incurred by the person in connection with the defense or settlement of such action or suit if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation, except that no indemnification shall be made in respect of any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that the Court of Chancery or the court in which such action or suit was brought shall determine upon application that, despite the adjudication of liability but in view of all the circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which the Court of Chancery or such other court shall deem proper.

Section 145 further provides that to the extent a director or officer of a corporation has been successful on the merits or otherwise in the defense of any action, suit or proceeding referred to in subsections (a) and (b) of Section 145, or in defense of any claim, issue or matter therein, such person shall be indemnified against expenses (including attorneys' fees) actually and reasonably incurred by such person in connection therewith; that indemnification provided for by Section 145 shall not be deemed exclusive of any other rights to which the indemnified party may be entitled; and the indemnification provided for by Section 145 shall, unless otherwise provided when authorized or ratified, continue as to a person who has ceased to be a director, officer, employee or agent and shall inure to the benefit of such person's heirs, executors and administrators. Section 145 also empowers the

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corporation to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise against any liability asserted against such person and incurred by such person in any such capacity, or arising out of his status as such, whether or not the corporation would have the power to indemnify such person against such liabilities under Section 145.

Section 102(b)(7) of the DGCL provides that a corporation's certificate of incorporation may contain a provision eliminating or limiting the personal liability of a director to the corporation or its stockholders for monetary damages for breach of fiduciary duty as a director, provided that such provision shall not eliminate or limit the liability of a director (i) for any breach of the director's duty of loyalty to the corporation or its stockholders, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) under Section 174 of the DGCL or (iv) for any transaction from which the director derived an improper personal benefit.

OvaScience's restated certificate of incorporation provides that OvaScience shall indemnify and advance expenses to each person who was or is a party or threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether criminal, civil, administrative or investigative, by reason of the fact that he or she is or was, or has agreed to become, a director or officer of OvaScience, or is or was serving, or has agreed to serve, at the request of OvaScience, as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise, or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees), liabilities, losses, judgments, fines, and amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding and any appeal therefrom.

OvaScience has indemnification agreements with its directors, in addition to the indemnification provided for in its restated certificate of incorporation, and intends to enter into indemnification agreements with any new directors in the future.

OvaScience has purchased and intends to maintain insurance on behalf of any person who is or was a director or officer of OvaScience against any loss arising from any claim asserted against him or her and incurred by him or her in any such capacity, subject to certain exclusions.

Pursuant to the terms of the Merger Agreement and subject to applicable law, from the Effective Time through the sixth anniversary of the date on which the Effective Time occurs, OvaScience shall indemnify and hold harmless each person who is now, or has been at any time prior to the date thereof, or who becomes prior to the Effective Time, a director or officer of OvaScience or Millendo, respectively, against all Costs incurred in connection with any claim, action, suit, proceeding or investigation, whether civil, criminal, administrative or investigative, arising out of or pertaining to the fact that such person is or was a director or officer of OvaScience or Millendo, whether asserted or claimed prior to, at or after the Effective Time, in each case, to the fullest extent permitted under the DGCL for directors or officers of Delaware corporations, provided that such officer or director acted in good faith and in a manner such party reasonable believed to be in or not opposed to the best interest of OvaScience or the Surviving Corporation, as applicable, and, with respect to any criminal proceeding, such officer or director had no reasonable cause to believe such conducted was unlawful; provided, further, that, if applicable law so provides, no indemnification against such Costs shall be made in respect of any claim, issue or matter in such proceeding as to which the director or officer shall have been adjudged to be liable to OvaScience or the Surviving Corporation unless and to the extent that the Court of Chancery of the State of Delaware shall determine that such indemnification may be made. Subject to applicable law, each such director and officer will be entitled to advancement of expenses incurred in the defense of any such claim, action, suit, proceeding or investigation from each of OvaScience and the Surviving Corporation, jointly and severally, upon receipt by OvaScience or

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the Surviving Corporation from such director or officer of a request therefor; provided that any such person to whom expenses are advanced provides an undertaking to OvaScience or the Surviving Corporation, as applicable, to the extent then required by the DGCL, to repay such advances if it is ultimately determined that such person is not entitled to indemnification. Such statement or statements shall reasonably evidence the expenses incurred by the directors and officers.

Further, pursuant to the Merger Agreement, the provisions of the OvaScience restated certificate of incorporation and the OvaScience by-laws with respect to indemnification, advancement of expenses and exculpation of present and former directors and officers of OvaScience shall not be amended, modified or repealed for a period of six years from the Effective Time in a manner that would adversely affect the rights thereunder of individuals who, at or prior to the Effective Time, were officers or directors of OvaScience, unless such modification is required by applicable law.

From and after the Effective Time, (i) the Surviving Corporation shall fulfill and honor in all respects the obligations of Millendo to each person who is or has served as a director or officer of Millendo as of immediately prior to the Closing pursuant to any indemnification provisions under the Millendo certificate of incorporation or Millendo bylaws and pursuant to any indemnification agreements between Millendo and such directors and officers, with respect to claims arising out of matters occurring at or prior to the Effective Time and (ii) OvaScience shall fulfill and honor in all respects the obligations of OvaScience to each person who is or has served as a director or officer of OvaScience as of immediately prior to the Closing pursuant to any indemnification provisions under the OvaScience Charter or OvaScience Bylaws and pursuant to any indemnification agreements between OvaScience and such directors and officers that were in effect prior to the date of the Merger Agreement, with respect to claims arising out of matters occurring at or prior to the Effective Time.

The Merger Agreement also provides that OvaScience shall maintain directors' and officers' liability insurance policies commencing at the closing time of the Merger, on commercially available terms and conditions with coverage limits customary for U.S. public companies similar situated to OvaScience. In addition, OvaScience shall purchase, prior to the Effective Time, a six-year prepaid "D&O tail policy" for the non-cancellable extension of the directors' and officers' liability coverage of OvaScience's existing directors' and officers' insurance policies and OvaScience's existing fiduciary liability insurance policies, in each case, for a claims reporting or discovery period of at least six years from and after the Effective Time.

From and after the Effective Time, OvaScience shall pay all expenses, including reasonable attorneys' fees, that are incurred by indemnified persons in connection with their successful enforcement of the rights provided to such persons in the Merger Agreement. The director and officer indemnification provisions of the Merger Agreement are intended to be in addition to the rights otherwise available to the current and former officers and directors of OvaScience and Millendo by law, charter, statute, bylaw or agreement, and shall operate for the benefit of, and shall be enforceable by, each of such indemnified persons, their heirs and their representatives.

In the event OvaScience or the Surviving Corporation or any of their respective successors or assigns (i) consolidates with or merges into any other person and shall not be the continuing or surviving corporation or entity of such consolidation or merger, or (ii) transfers all or substantially all of its properties and assets to any person, then, and in each such case, proper provision shall be made so that the successors and assigns of OvaScience or the Surviving Corporation, as the case may be, shall succeed to the indemnification obligations set forth in the Merger Agreement. OvaScience shall cause the Surviving Corporation to perform all of the director and officer indemnification obligations of the Surviving Corporation under the Merger Agreement.

**ITEM 16. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES**

A list of exhibits filed herewith is contained in the exhibit index that immediately precedes the signatures to this registration statement and is incorporated herein by reference.

**ITEM 17. UNDERTAKINGS**

The undersigned registrant hereby undertakes:

- (1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:
  - (i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;
  - (ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Securities and Exchange Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and
  - (iii) To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

Provided however, that paragraphs (1)(i), (1)(ii) and (1)(iii) of this section do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the registrant pursuant to section 13 or section 15(d) of the Securities Exchange Act of 1934 that are incorporated by reference in the registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of the registration statement.

(2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

- (4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser:
  - (i) If the registrant is relying on Rule 430B:
    - (A) Each prospectus filed by the registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and
    - (B) Each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5), or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii), or (x) for the purpose of providing the

information required by Section 10(a) of the Securities Act of 1933 shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which that prospectus relates, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof. Provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such effective date, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such effective date; or

- (ii) If the registrant is subject to Rule 430C, each prospectus filed pursuant to Rule 424(b) as part of a registration statement relating to an offering, other than registration statements relying on Rule 430B or other than prospectuses filed in reliance on Rule 430A, shall be deemed to be part of and included in the registration statement as of the date it is first used after effectiveness. Provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such first use, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such date of first use.

The undersigned registrant hereby undertakes that, for purposes of determining any liability under the Securities Act of 1933, each filing of the registrant's annual report pursuant to section 13(a) or section 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by a director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act of 1933 and will be governed by the final adjudication of such issue.

## EXHIBIT INDEX

The following exhibits are filed as part of this Registration Statement:

<u>Exhibit No.</u>	<u>Description</u>
2.1	<a href="#"><u>Agreement and Plan of Merger and Reorganization, dated as of August 8, 2018, by and among OvaScience, Inc., Orion Merger Sub, Inc. and Millendo Therapeutics, Inc. (incorporated by reference from Annex A to Amendment No. 1 to the Registration Statement on Form S-4, as filed with the Securities and Exchange Commission on November 1, 2018, File No. 333-227547).</u></a>
2.2	<a href="#"><u>First Amendment to Agreement and Plan of Merger and Reorganization, dated as of August 8, 2018, by and among OvaScience, Inc., Orion Merger Sub, Inc. and Millendo Therapeutics, Inc. (incorporated by reference from Annex A to Amendment No. 1 to the Registration Statement on Form S-4, as filed with the Securities and Exchange Commission on November 1, 2018, File No. 333-227547).</u></a>
2.3	<a href="#"><u>Second Amendment to Agreement and Plan of Merger and Reorganization, dated as of August 8, 2018, by and among OvaScience, Inc., Orion Merger Sub, Inc. and Millendo Therapeutics, Inc. (incorporated by reference from Annex A to Amendment No. 1 to the Registration Statement on Form S-4, as filed with the Securities and Exchange Commission on November 1, 2018, File No. 333-227547).</u></a>
4.1	<a href="#"><u>Restated Certificate of Incorporation of OvaScience, Inc. (incorporated by reference from the Current Report on Form 8-K filed by the Registrant on April 30, 2013, File No. 001-35890).</u></a>
4.2	<a href="#"><u>Third Amended and Restated Bylaws, as amended, of OvaScience, Inc. (incorporated by reference from the Current Report on Form 8-K filed by the Registrant on August 9, 2018, File No. 001-35890).</u></a>
4.3	<a href="#"><u>Specimen Stock Certificate evidencing shares of Common Stock of OvaScience, Inc. (incorporated by reference to the Registration Statement on Form S-1 filed by the registrant on August 29, 2012, File No. 333-183602).</u></a>
4.4	<a href="#"><u>Registration Rights Agreement, dated November 1, 2018, by and among OvaScience, Inc. and the persons listed on Schedule A thereto (incorporated by reference from Exhibit 10.46 to Amendment No. 1 to the Registration Statement on Form S-4, as filed with the Securities and Exchange Commission on November 1, 2018, File No. 333-227547).</u></a>
4.5	<a href="#"><u>Stock Purchase Agreement, dated November 1, 2018, by and among OvaScience, Inc., the purchasers set forth on Schedule I thereto and Millendo Therapeutics, Inc. (incorporated by reference from Exhibit 10.45 to Amendment No. 1 to the Registration Statement on Form S-4, as filed with the Securities and Exchange Commission on November 1, 2018, File No. 333-227547).</u></a>
4.6	<a href="#"><u>Second Amended and Restated Investor Rights Agreement by and among Millendo Therapeutics, Inc. and certain of its stockholders, dated December 19, 2017 (incorporated by reference from Exhibit 4.6 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
4.7	<a href="#"><u>First Amendment to Second Amended and Restated Investor Rights Agreement, dated October 24, 2018 (incorporated by reference from Exhibit 4.7 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>

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<u>Exhibit No.</u>	<u>Description</u>
4.8	<a href="#"><u>Shareholders and Option Agreement, by and between Millendo Therapeutics, Inc. and Otonnale SAS, dated December 19, 2017 (incorporated by reference from Exhibit 4.8 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
4.9	<a href="#"><u>First Amendment to Shareholders and Option Agreement, dated September 28, 2018 (incorporated by reference from Exhibit 4.9 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
4.10*	<a href="#"><u>First Amendment to Stock Purchase Agreement, dated November 28, 2018, by and among OvaScience, Inc., the purchasers set forth on Schedule I thereto and Millendo Therapeutics, Inc.</u></a>
5.1	<a href="#"><u>Opinion of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. regarding the validity of the securities (incorporated by reference from Exhibit 5.1 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
10.1	<a href="#"><u>Lease Agreement, by and between Millendo Therapeutics, Inc. and 301 N. Main Street, L.L.C., dated December 31, 2015 (incorporated by reference from Exhibit 10.1 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
10.2	<a href="#"><u>Lease Extension and Modification Agreement, by and between Millendo Therapeutics, Inc. and 301 N. Main Street, L.L.C., dated November 30, 2017 (incorporated by reference from Exhibit 10.2 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
10.3	<a href="#"><u>Lease Extension and Modification Agreement, by and between Millendo Therapeutics, Inc. and 301 N. Main Street, L.L.C., dated October 22, 2018 (incorporated by reference from Exhibit 10.3 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
10.4#	<a href="#"><u>Amendment No. 1 to the Attercor, Inc. (n/k/a Millendo Therapeutics, Inc.) 2012 Stock Plan, dated December 17, 2015 (incorporated by reference from Exhibit 10.4 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
10.5#	<a href="#"><u>Millendo Therapeutics, Inc. Amendment to 2012 Stock Plan, dated June 21, 2018 (incorporated by reference from Exhibit 10.5 to the Registration Statement on Form S-3, as filed with the Securities and Exchange Commission on November 6, 2018, File No. 333-228209).</u></a>
23.1*	<a href="#"><u>Consent of Ernst &amp; Young LLP, Independent Registered Public Accounting Firm to OvaScience, Inc.</u></a>
23.2*	<a href="#"><u>Consent of Ernst &amp; Young LLP, Independent Auditors to Millendo Therapeutics, Inc.</u></a>
23.3*	<a href="#"><u>Consent of RSM Rhône-Alpes, Independent Auditors to Millendo Therapeutics SAS</u></a>

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<u>Exhibit No.</u>	<u>Description</u>
23.4	<a href="#">Consent of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. (included in Exhibit 5.1)</a>
24.1	<a href="#">Power of Attorney (included on the signature page of this Registration Statement filed on November 6, 2018)</a>

\* Filed herewith.

# Indicates a management contract or compensatory plan, contract or arrangement.





## OVASCIENCE, INC.

## FIRST AMENDMENT TO STOCK PURCHASE AGREEMENT

This **FIRST AMENDMENT TO STOCK PURCHASE AGREEMENT** (this "**Amendment**") is made effective as of November 28, 2018 among **OVASCIENCE, INC.**, a Delaware corporation ("**OvaScience**"), **MILLENDO THERAPEUTICS, INC.**, a Delaware corporation (the "**Company**"), and the Purchasers (as defined in the Agreement (as defined below)) whose names are set forth on the signature pages hereto.

## RECITALS

**WHEREAS**, the Company, OvaScience and the Purchaser are parties to that certain Stock Purchase Agreement dated as of November 1, 2018 (as amended from time to time, the "**Agreement**"), pursuant to which the Purchasers party thereto agreed to purchase certain shares of OvaScience's common stock;

**WHEREAS**, any term of the Agreement may be amended and the observance of any term of this Agreement may be waived (either generally or in a particular instance and either retroactively or prospectively), only with the written consent of the Company, OvaScience (such consent not to be unreasonably withheld, delayed or conditioned) and the Purchasers; and

**WHEREAS**, the undersigned represent the parties capable of causing a valid amendment to the Agreement.

**NOW, THEREFORE**, in consideration of the foregoing recitals, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree to amend the Agreement as follows:

**1. Section 2.1 of the Agreement.**

Section 2.1 of the Agreement shall be deleted in its entirety and replaced with the following text:

**"The Closing.** The closing of the sale and purchase of the Shares under this Agreement (the "**Closing**") shall take place upon the satisfaction of the conditions set forth in Sections 5 and 6, through the electronic exchange of documents and signature pages or at such other time or place as OvaScience and Purchasers may mutually agree (such date is hereinafter referred to as the "**Closing Date**")."

**2. The preamble to Section 5 of the Agreement.**

The preamble to Section 5 of the Agreement shall be deleted in its entirety and replaced with the following text:

**"CONDITIONS TO PURCHASERS' OBLIGATIONS AT THE CLOSING.** The obligations of each Purchaser to purchase Shares at the Closing are subject to the fulfillment by the Company and OvaScience, on or before the Closing, of each of the following conditions, which fulfillment shall be evidenced by delivery to Purchaser immediately prior to Closing of a certificate to such effect executed by an officer of the Company or OvaScience, as applicable:"

**3. Section 8.9 of the Agreement.**

Section 8.9 of the Agreement shall be deleted in its entirety and replaced with the following text:

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**“Amendments.** Any term of this Agreement may be amended and the observance of any term of this Agreement may be waived (other than a Purchaser closing condition, which may not be waived), either generally or in a particular instance and either retroactively or prospectively, only with the written consent of OvaScience, the Company and the affected Purchaser. Each of the Purchasers acknowledges and agrees that (i) none of the Shares will be registered on a Form S-4 and will only be registered pursuant to the Registration Statement and (ii) the terms and conditions of the Merger Agreement may be amended or modified or any provision waived in accordance with its terms and that, subject to Section 5.4 hereof, any such amendment, modification or waiver shall not impact or modify the obligations of any Purchaser to purchase Shares or otherwise hereunder. Without limiting the generality of the foregoing, each Purchaser shall have the right to allocate its purchase amount among its Affiliates in such amounts as it determines in its discretion and Schedule I shall be updated correspondingly; provided, however, no such allocation shall relieve such Purchaser of any liabilities or obligations it may have pursuant to this Agreement.”

**4. Section 8.14 of the Agreement.**

Section 8.14 of the Agreement shall be deleted in its entirety and replaced with the following text:

**“Delays or Omissions.** No delay or omission to exercise any right, power, or remedy accruing to any Purchaser, upon any breach or default of OvaScience or the Company under this Agreement shall impair any such right, power, or remedy of such Purchaser nor shall it be construed to be a waiver of any such breach or default, or an acquiescence in such breach or default, or of or in any similar breach or default occurring after such breach or default; nor shall any permitted waiver of any single breach or default be deemed a waiver of any other breach or default occurring before or after such breach or default. Any permit, consent, or approval of any kind or character on the part of any Purchaser of any breach or default under this Agreement or any waiver on the part of any Purchaser of any provisions of this Agreement, other than a Purchaser closing condition, must be made in writing and shall be effective only to the extent specifically set forth in such writing. All remedies, either under this Agreement or by law or otherwise afforded to any Purchaser shall be cumulative and not alternative.”

**5. Section 8.17 of the Agreement.**

Section 8.17 of the Agreement shall be deleted in its entirety and replaced with the following text:

**“Rights of Purchasers.** Each Purchaser shall have the absolute right to exercise or refrain from exercising any right or rights that such Purchaser may have by reason of this Agreement, OvaScience’s certificate of incorporation, the Bylaws, or at law or in equity, including without limitation the right to enter into an agreement with OvaScience for the purpose of modifying this Agreement, and such Purchaser shall not incur any liability to any other Purchaser or holder of Shares with respect to exercising or refraining from exercising any such right or rights.”

**6. Section 8.20 of the Agreement.**

Section 8.20 of the Agreement is amended by replacing “\$35,000” with “\$45,000”.

**7. The First Sentence of Section 8.22 of the Agreement.**

The first sentence of Section 8.22 of the Agreement shall be deleted in its entirety and replaced with the following text:

**“Commitment Date.** This Agreement may be terminated and the sale and purchase of the Shares abandoned (i)(x) at any time prior to the Closing and prior to the termination of the Merger Agreement, by

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mutual written consent of OvaScience, the Company and any Purchaser listed on Schedule I hereto, (but solely with respect to himself, herself or itself only) and (y) at any time prior to the Closing and following the termination of the Merger Agreement, by either OvaScience, the Company or any Purchaser listed on Schedule I hereto (with respect to himself, herself or itself only), (ii)(x) if the Closing has not been consummated on or prior to 5:00 p.m., New York City time, on February 8, 2019, by any Purchaser listed on Schedule I hereto (with respect to himself, herself or itself only), upon written notice to OvaScience and the Company, and (y) if the Closing has not been consummated on or prior to 5:00 p.m., New York City time, on February 8, 2020, by either the Company or OvaScience, upon written notice to the Purchasers listed on Schedule I hereto, or (iii) by either OvaScience, the Company or any Purchaser listed on Schedule I (with respect to himself, herself or itself only) upon written notice to the other parties if consummation of the transactions contemplated hereby would violate any nonappealable order, degree or judgment of any Governmental Authority having competent jurisdiction or violate any stock exchange rule; *provided, however*, that the right to terminate this Agreement under this Section 8.22 shall not be available to any Person whose failure to comply with its obligations under this Agreement has been the cause of or resulted in the failure of the Closing to occur on or before such time.”

**8. Continuing Effect of Agreement.** All other provisions of the Agreement remain in full force and effect and unmodified by this Amendment.

**9. Entire Agreement; Amendment.** This Amendment, together with the Agreement, constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes and merges all prior agreements or understandings, whether written or oral, with respect to the subject matter hereof. This Amendment may be amended or modified in the same manner as the Agreement notwithstanding that the parties to such amendment, modification or waiver are not party to this Amendment.

**10. Counterparts.** This Amendment may be executed in two or more counterparts, each of which will be deemed an original, but all of which together will constitute one and the same instrument. Counterparts may be delivered via facsimile, electronic mail (including pdf or any electronic signature complying with the U.S. federal E-SIGN Act of 2000, Uniform Electronic Transactions Act or other applicable law) or other transmission method and any counterpart so delivered will be deemed to have been duly and validly delivered and be valid and effective for all purposes.

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IN WITNESS WHEREOF, the parties have executed this **FIRST AMENDMENT TO STOCK PURCHASE AGREEMENT** as of the date first set forth above.

**MILLENDO THERAPEUTICS, INC.**

By: /s/ Julia Owens  
Name: Julia Owens  
Title: Chief Executive Officer

**OVASCIENCE, INC.**

By: /s/ Christopher Kroeger  
Name: Christopher Kroeger  
Title: President and Chief Executive Officer

**GREAT POINT PARTNERS, LLC.**

By: /s/ Tavi Yehudai  
Name: Tavi Yehudai  
Title: Managing Director

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[QuickLinks](#) -- Click here to rapidly navigate through this document

**Exhibit 23.1**

**Consent of Independent Registered Public Accounting Firm**

We consent to the reference to our firm under the caption "Experts" in Amendment No. 1 to the Registration Statement (Form S-3 No. 333-228209) and related Prospectus of OvaScience, Inc. for the registration of 1,886,574 shares of its common stock and to the incorporation by reference therein of our reports dated March 15, 2018, with respect to the consolidated financial statements of OvaScience, Inc. and the effectiveness of internal control over financial reporting of OvaScience Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2017, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Boston, Massachusetts

November 28, 2018

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QuickLinks

[Exhibit 23.1](#)

[Consent of Independent Registered Public Accounting Firm](#)

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**Exhibit 23.2**

**Consent of Independent Auditors**

We consent to the reference to our firm under the caption "Experts" and to the use of our report dated May 4, 2018, with respect to the consolidated financial statements of Millendo Therapeutics, Inc. incorporated by reference in the Registration Statement (Amendment No. 1 to Form S-3 No. 333-228209) and related Prospectus of OvaScience, Inc. for the registration of 1,886,574 shares of its common stock.

/s/ Ernst & Young LLP

Grand Rapids, Michigan

November 28, 2018

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QuickLinks

[Exhibit 23.2](#)

[Consent of Independent Auditors](#)

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**Exhibit 23.3**

**Consent of Independent Auditor**

We consent to the incorporation by reference in this Registration Statement on Form S-3 (Amendment No. 1 to Form S-3 No. 333-228209) of Ovascience, Inc. of our report dated May 4, 2018, relating to the financial statements of Millendo Therapeutics SAS (formerly named Alizé Pharma), appearing in the proxy statement filed on Schedule 14A, which is incorporated by reference in this Registration Statement.

We also consent to the reference to our firm under the heading "Experts" in such Registration Statement.

Lyon, November 28, 2018

Le Commissaire aux comptes  
/s/ RSM Rhône-Alpes

Gaël Dhalluin  
Partner

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QuickLinks

[Exhibit 23.3](#)

[Consent of Independent Auditor](#)