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

SCHEDULE 14A

**Proxy Statement Pursuant to Section 14(a) of the
Securities Exchange Act of 1934
(Amendment No.)**

Filed by the Registrant Filed by a Party other than the Registrant

Check the appropriate box:

- Preliminary Proxy Statement
- Confidential, for Use of the Commission Only** (as permitted by Rule 14a-6(e)(2))
- Definitive Proxy Statement
- Definitive Additional Materials
- Soliciting Material Under Rule 14a-12

X4 Pharmaceuticals, Inc.

(Name of Registrant as Specified In Its Charter)

(Name of Person(s) Filing Proxy Statement, if other than the Registrant)

Payment of Filing Fee (Check the appropriate box):

- No fee required.
 - Fee computed on table below per Exchange Act Rules 14a-6(i)(1) and 0-11.
 - 1) Title of each class of securities to which transaction applies:

 - 2) Aggregate number of securities to which transaction applies:

 - 3) Per unit price or other underlying value of transaction computed pursuant to Exchange Act Rule 0-11 (set forth the amount on which the filing fee is calculated and state how it was determined):

 - 4) Proposed maximum aggregate value of transaction:

 - 5) Total fee paid:

 - Fee paid previously with preliminary materials.
 - Check box if any part of the fee is offset as provided by Exchange Act Rule 0-11(a)(2) and identify the filing for which the offsetting fee was paid previously. Identify the previous filing by registration statement number, or the Form or Schedule and the date of its filing:
 - 1) Amount previously paid:

 - 2) Form, Schedule or Registration Statement No:

 - 3) Filing party:

 - 4) Date Filed:

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X4 Pharmaceuticals, Inc.
955 Massachusetts Avenue, 4th Floor
Cambridge, MA 02139

May 22, 2019

To Our Stockholders:

You are cordially invited to attend the 2019 annual meeting of stockholders of X4 Pharmaceuticals, Inc. to be held at 10:00 a.m. EDT on Monday, June 17, 2019 at the offices of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., One Financial Center, Boston, Massachusetts 02111.

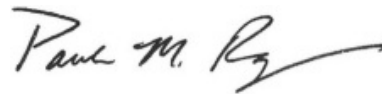
Details regarding the meeting, the business to be conducted at the meeting, and information about X4 Pharmaceuticals, Inc. that you should consider when you vote your shares are described in the accompanying proxy statement.

At the annual meeting, one person will be elected to our board of directors. In addition, we will ask stockholders to ratify the appointment of PricewaterhouseCoopers LLP as our independent registered public accounting firm for our fiscal year ending December 31, 2019. Our board of directors recommends the approval of each of these proposals. Such other business will be transacted as may properly come before the annual meeting.

We hope you will be able to attend the annual meeting. Whether you plan to attend the annual meeting or not, it is important that you cast your vote either in person or by proxy. You may vote over the Internet as well as by telephone or by mail. When you have finished reading the proxy statement, you are urged to vote in accordance with the instructions set forth in the proxy statement. We encourage you to vote by proxy so that your shares will be represented and voted at the meeting, whether or not you can attend.

Thank you for your continued support of X4 Pharmaceuticals, Inc. We look forward to seeing you at the annual meeting.

Sincerely,

A handwritten signature in black ink, appearing to read "Paula M. Ragan", with a long horizontal flourish extending to the right.

Paula Ragan, Ph.D.
President, Chief Executive Officer and Secretary

**X4 Pharmaceuticals, Inc.
955 Massachusetts Avenue, 4th Floor
Cambridge, MA 02139**

May 22, 2019

NOTICE OF 2019 ANNUAL MEETING OF STOCKHOLDERS

TIME: 10:00 a.m. EDT

DATE: June 17, 2019

PLACE: Offices of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., One Financial Center, Boston, MA 02111

PURPOSES:

1. To elect one director to serve a three-year term expiring in 2022;
2. To ratify the appointment of PricewaterhouseCoopers LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2019; and
3. To transact such other business that is properly presented at the annual meeting and any adjournments or postponements thereof.

WHO MAY VOTE:

You may vote if you were the record owner of X4 Pharmaceuticals, Inc. common stock at the close of business on April 29, 2019. A list of stockholders of record will be available at the annual meeting and, during the 10 days prior to the annual meeting, at our principal executive offices located at 955 Massachusetts Avenue, 4th Floor, Cambridge, Massachusetts 02139.

All stockholders are cordially invited to attend the annual meeting. **Whether or not you plan to attend the annual meeting, we urge you to vote and submit your proxy over the Internet or by telephone or mail in order to ensure the presence of a quorum.** You may change or revoke your proxy at any time before it is voted at the meeting.

BY ORDER OF OUR BOARD OF DIRECTORS



Paula Ragan, Ph.D.
President, Chief Executive Officer and Secretary

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**X4 PHARMACEUTICALS, INC.
955 Massachusetts Avenue, 4th Floor
Cambridge, MA 02139**

**PROXY STATEMENT FOR THE X4 PHARMACEUTICALS, INC.
2019 ANNUAL MEETING OF STOCKHOLDERS TO BE HELD ON MONDAY, JUNE 17, 2019**

This proxy statement, along with the accompanying notice of 2019 annual meeting of stockholders, contains information about the 2019 annual meeting of stockholders of X4 Pharmaceuticals, Inc., including any adjournments or postponements of the annual meeting. We are holding the annual meeting at 10:00 a.m., local time, on Monday, June 17, 2019 at the offices of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. located at One Financial Center, Boston, Massachusetts 02111.

In this proxy statement, we refer to X4 Pharmaceuticals, Inc. (formerly Arsanis, Inc.) and its direct and indirect subsidiaries as “the Company,” “we” and “us” and, for periods prior to March 13, 2019, we refer to X4 Therapeutics, Inc. (formerly X4 Pharmaceuticals, Inc.) or its subsidiary as “X4.” For the periods prior to March 13, 2019, we sometimes refer to the Company as “Arsanis.”

This proxy statement relates to the solicitation of proxies by our board of directors for use at the annual meeting.

On or about May 23, 2019, we intend to begin sending this proxy statement, the attached Notice of Annual Meeting of Stockholders and the enclosed proxy card to all stockholders entitled to vote at the annual meeting.

Although not part of this proxy statement, we are also sending, along with this proxy statement, our 2018 annual report, which includes our financial statements for the fiscal year ended December 31, 2018.

**IMPORTANT NOTICE REGARDING THE AVAILABILITY OF PROXY MATERIALS FOR THE
STOCKHOLDER MEETING TO BE HELD ON JUNE 17, 2019**

The notice of 2019 annual meeting of stockholders, this proxy statement, our form of proxy card and our 2018 annual report to stockholders are available for viewing, printing and downloading at www.edocumentview.com/XFOR. To view these materials please have your control number(s) available that appear on your proxy card. On this website, you can also elect to receive future distributions of our proxy statements and annual reports to stockholders by electronic delivery. Additionally, you can find a copy of our Annual Report on Form 10-K, which includes our financial statements for the fiscal year ended December 31, 2018, on the website of the Securities and Exchange Commission, or the SEC, at www.sec.gov, or in the “SEC Filings” section of the “Investors” section of our website at www.x4pharma.com. You may also obtain a printed copy of our Annual Report on Form 10-K, including our financial statements, free of charge, from us by sending a written request to: Corporate Secretary, X4 Pharmaceuticals, Inc., 955 Massachusetts Avenue, 4th Floor, Cambridge, Massachusetts 02139. Exhibits will be provided upon written request and payment of an appropriate processing fee.

IMPORTANT INFORMATION ABOUT THE ANNUAL MEETING AND VOTING

Why is the Company Soliciting My Proxy?

Our board of directors is soliciting your proxy to vote at the 2019 annual meeting of stockholders to be held at the offices of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., on Monday, June 17, 2019, at 10:00 a.m. EDT and any adjournments or postponements of the meeting, which we refer to as the annual meeting. This proxy statement, along with the accompanying Notice of Annual Meeting of Stockholders, summarizes the purposes of the meeting and the information you need to know to vote at the annual meeting.

We have made available to you on the Internet or have sent you this proxy statement, the Notice of Annual Meeting of Stockholders, the proxy card and a copy of our Annual Report on Form 10-K for the fiscal year ended December 31, 2018 because you owned shares of our common stock on the record date. We intend to commence distribution of the proxy materials to stockholders on or about May 23, 2019.

Who May Vote?

Only stockholders who owned our common stock at the close of business on April 29, 2019 are entitled to vote at the annual meeting. On this record date, there were 12,420,778 shares of our common stock outstanding and entitled to vote. Our common stock is our only class of voting stock.

You do not need to attend the annual meeting to vote your shares. Shares represented by valid proxies, received in time for the annual meeting and not revoked prior to the annual meeting, will be voted at the annual meeting. For instructions on how to change or revoke your proxy, see “May I Change or Revoke My Proxy?” below.

How Many Votes Do I Have?

Each share of our common stock that you own entitles you to one vote.

How Do I Vote?

Whether you plan to attend the annual meeting or not, we urge you to vote by proxy. All shares represented by valid proxies that we receive through this solicitation, and that are not revoked, will be voted in accordance with your instructions on the proxy card or as instructed via the Internet or telephone. You may specify whether your shares should be voted FOR or WITHHELD for the nominee for director, and whether your shares should be voted for, against or abstain with respect to the other proposal. If you properly submit a proxy without giving specific voting instructions, your shares will be voted in accordance with our board of directors’ recommendations as noted below. Voting by proxy will not affect your right to attend the annual meeting. If your shares are registered directly in your name through our stock transfer agent, Computershare Trust Company, N.A., or you have stock certificates registered in your name, you may vote:

- **By Internet or by telephone.** Follow the instructions included in the proxy card to vote over the Internet or by telephone.
- **By mail.** If you received a proxy card by mail, you can vote by mail by completing, signing, dating and returning the proxy card as instructed on the card. If you sign the proxy card but do not specify how you want your shares voted, they will be voted in accordance with our board of directors’ recommendations as noted below.
- **In person at the meeting.** If you attend the meeting, you may deliver a completed proxy card in person or you may vote by completing a ballot, which will be available at the meeting.

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Telephone and Internet voting facilities for stockholders of record will be available 24 hours a day and will close at 11:59 p.m. EDT on June 16, 2019.

If your shares are held in “street name” (held in the name of a bank, broker or other holder of record), you will receive instructions from the holder of record. You must follow the instructions of the holder of record in order for your shares to be voted. Telephone and Internet voting also will be offered to stockholders owning shares through certain banks and brokers. If your shares are not registered in your own name and you plan to vote your shares in person at the annual meeting, you should contact your broker or agent to obtain a legal proxy or broker’s proxy card and bring it to the annual meeting in order to vote.

How Does Our Board of Directors Recommend That I Vote on the Proposals?

Our board of directors recommends that you vote as follows:

- “**FOR**” the election of the nominee for director; and
- “**FOR**” the ratification of the appointment of PricewaterhouseCoopers LLP as our independent registered public accounting firm for our fiscal year ending December 31, 2019.

If any other matter is presented at the annual meeting, your proxy provides that your shares will be voted by the proxy holder listed in the proxy in accordance with his or her best judgment. At the time this proxy statement was first made available, we knew of no matters that needed to be acted on at the annual meeting, other than those discussed in this proxy statement.

May I Change or Revoke My Proxy?

If you give us your proxy, you may change or revoke it at any time before the annual meeting. You may change or revoke your proxy in any one of the following ways:

- if you received a proxy card, by signing a new proxy card with a date later than your previously delivered proxy and submitting it as instructed above;
- by re-voting by Internet or by telephone as instructed above;
- by notifying X4 Pharmaceuticals, Inc.’s Corporate Secretary in writing before the annual meeting that you have revoked your proxy; or
- by attending the annual meeting in person and voting in person. Attending the annual meeting in person will not in and of itself revoke a previously submitted proxy. You must specifically request at the annual meeting that it be revoked.

Your most current vote, whether by telephone, Internet or proxy card is the one that will be counted.

What if I Receive More Than One Proxy Card?

You may receive more than one proxy card if you hold shares of our common stock in more than one account, which may be in registered form or held in street name. Please vote in the manner described above under “How Do I Vote?” for each account to ensure that all of your shares are voted.

Will My Shares be Voted if I Do Not Vote?

If your shares are registered in your name or if you have stock certificates, they will not be counted if you do not vote as described above under “How Do I Vote?” If your shares are held in street name and you do not provide voting instructions to the bank, broker or other nominee that holds your shares as described above, the bank, broker or other nominee that holds your shares has the authority to vote your unvoted shares only on the

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ratification of the appointment of our independent registered public accounting firm (Proposal 2) without receiving instructions from you. Therefore, we encourage you to provide voting instructions to your bank, broker or other nominee. This ensures your shares will be voted at the annual meeting and in the manner you desire. A “broker non-vote” will occur if your broker cannot vote your shares on a particular matter because it has not received instructions from you and does not have discretionary voting authority on that matter or because your broker chooses not to vote on a matter for which it does have discretionary voting authority.

What Vote Is Required To Approve Each Proposal and How Are Votes Counted?

Proposal 1: Elect Director

The nominee for director who receives the most votes (also known as a “plurality” of the votes cast) will be elected. You may vote either FOR the nominee or WITHHOLD your vote from the nominee. Votes that are withheld will not be included in the vote tally for the election of the director. Brokerage firms do not have authority to vote customers’ unvoted shares held by the firms in street name for the election of the director. As a result, any shares not voted by a customer will be treated as a broker non-vote. Such broker non-votes will have no effect on the results of this vote.

Proposal 2: Ratify Appointment of Independent Registered Public Accounting Firm

The affirmative vote of the holders of shares of our common stock having a majority in voting power of the votes cast by the holders of all of the shares of our common stock present or represented at the annual meeting and voting affirmatively or negatively on the matter is required to ratify the appointment of our independent registered public accounting firm. Abstentions will have no effect on the results of this vote. Brokerage firms have authority to vote customers’ unvoted shares held by the firms in street name on this proposal. If a broker does not exercise this authority, such broker non-votes will have no effect on the results of this vote. We are not required to obtain the approval of our stockholders to appoint our independent registered public accounting firm. However, if our stockholders do not ratify the appointment of PricewaterhouseCoopers LLP as our independent registered public accounting firm for 2019, the Audit Committee of our board of directors will reconsider its appointment.

Is Voting Confidential?

We will keep all the proxies, ballots and voting tabulations private. We only let our Inspector of Election, Computershare Trust Company, N.A., examine these documents. Management will not know how you voted on a specific proposal unless it is necessary to meet legal requirements. We will, however, forward to management any written comments you make on the proxy card or that you otherwise provide.

Where Can I Find the Voting Results of the Annual Meeting?

The preliminary voting results will be announced at the annual meeting, and we will publish preliminary results, or final results if available, in a Current Report on Form 8-K within four business days of the annual meeting. If final results are unavailable at the time we file the Form 8-K, then we will file an amended Current Report on Form 8-K to disclose the final voting results within four business days after the final voting results are known.

What Are the Costs of Soliciting These Proxies?

We will pay all of the costs of soliciting these proxies. Our directors and employees may solicit proxies in person or by telephone, fax or email. We will pay these employees and directors no additional compensation for

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these services. We will ask banks, brokers and other institutions, nominees and fiduciaries to forward these proxy materials to their principals and to obtain authority to execute proxies. We will then reimburse them for their expenses.

What Constitutes a Quorum for the Annual Meeting?

The presence, in person or by proxy, of the holders of a majority in voting power of the shares of our common stock issued and outstanding and entitled to vote at the annual meeting is necessary to constitute a quorum at the annual meeting. Votes of stockholders of record who are present at the annual meeting in person or by proxy, abstentions, and broker non-votes are counted for purposes of determining whether a quorum exists.

Attending the Annual Meeting

The annual meeting will be held at 10:00 a.m. EDT on Monday, June 17, 2019 at the offices of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., One Financial Center, Boston, Massachusetts 02111. You need not attend the annual meeting in order to vote.

Householding of Annual Disclosure Documents

SEC rules concerning the delivery of annual disclosure documents allow us or your broker to send a single set of our proxy materials to any household at which two or more of our stockholders reside, if we or your broker believe that the stockholders are members of the same family. This practice, referred to as “householding,” benefits both you and us. It reduces the volume of duplicate information received at your household and helps to reduce our expenses. The rule applies to our annual reports, proxy statements and information statements. Once you receive notice from your broker or from us that communications to your address will be “household,” the practice will continue until you are otherwise notified or until you revoke your consent to the practice. Stockholders who participate in householding will continue to have access to and utilize separate proxy voting instructions.

If a broker or other nominee holds your shares and (1) your household received a single set of proxy materials this year, but you would prefer to receive your own copy or you do not wish to participate in householding and would like to receive your own set of our proxy materials in future years or (2) you share an address with another stockholder and together both of you would like to receive only a single set of proxy materials, please contact the broker or other nominee directly and inform them of your request. Be sure to include your name, the name of your brokerage firm and your account number.

Electronic Delivery of Company Stockholder Communications

Most stockholders can elect to view or receive copies of future proxy materials over the Internet instead of receiving paper copies in the mail. You can choose this option and save us the cost of producing and mailing these documents by following the instructions provided on your proxy card or by following the instructions provided when you vote over the Internet.

Description of the Merger Completed in March 2019

Prior to March 13, 2019, we were a clinical-stage biopharmaceutical company known as Arsanis, Inc. that had historically been focused on applying monoclonal antibody immunotherapies to address serious infectious diseases. Arsanis was originally incorporated in the State of Delaware in August 2010.

On March 13, 2019, we completed our business combination with X4 Therapeutics, Inc. (formerly X4 Pharmaceuticals, Inc.), or X4, in accordance with the terms of an Agreement and Plan of Merger, dated as of November 26, 2018, as amended on December 20, 2018 and March 8, 2019, or the Merger Agreement, that we

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entered into with X4 and Artemis AC Corp., a Delaware corporation and our wholly owned subsidiary, or Merger Sub. Pursuant to the terms of the Merger Agreement, Merger Sub merged with and into X4, with X4 continuing as our wholly owned subsidiary and the surviving corporation of the merger, which we refer to as the Merger. At the closing of the Merger, we issued shares of our common stock to X4 stockholders based on an agreed upon exchange ratio, and each option or warrant to purchase X4 capital stock became an option or warrant, respectively, to purchase our common stock, subject to adjustment in accordance with the agreed upon exchange ratio. Following the closing of the Merger, we effected a 6-for-1 reverse stock split of our common stock, or the Reverse Stock Split, our name was changed to X4 Pharmaceuticals, Inc., the business of X4 became our business, and we became a clinical-stage biopharmaceutical company focused on the discovery, development and commercialization of novel therapeutics for the treatment of rare diseases. In connection with the closing of the Merger, our stock began trading on the Nasdaq Capital Market under the symbol “XFOR” on March 14, 2019. Unless otherwise noted, all references to common stock share amounts and prices per share of common stock in this proxy statement reflect the Reverse Stock Split. As used herein, the word “Arsanis” refers to the Company prior to the completion of the Merger.

SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT

The following table sets forth certain information with respect to the beneficial ownership of our common stock as of April 30, 2019 for (a) the executive officers named in the Summary Compensation Table on page 18 of this proxy statement, (b) each of our directors and director nominees, (c) all of our current directors and executive officers as a group and (d) each stockholder known by us to own beneficially more than 5% of our common stock. Beneficial ownership is determined in accordance with the rules of the SEC and includes voting or investment power with respect to the securities. We deem shares of common stock that may be acquired by an individual or group within 60 days of April 30, 2019 pursuant to the exercise of options or warrants to be outstanding for the purpose of computing the percentage ownership of such individual or group, but those shares are not deemed to be outstanding for the purpose of computing the percentage ownership of any other person shown in the table. Except as indicated in footnotes to this table, we believe that the stockholders named in this table have sole voting and investment power with respect to all shares of common stock shown to be beneficially owned by them based on information provided to us by these stockholders. Percentage of ownership is based on 12,420,778 shares of common stock outstanding on April 30, 2019. Unless otherwise noted below, the address of each stockholder below is c/o X4 Pharmaceuticals, Inc., 955 Massachusetts Avenue, 4th Floor, Cambridge, Massachusetts 02139.

	Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned
5% Stockholders		
Biotechnology Value Fund, L.P. and affiliated entities (1)	1,295,867	9.99%
Comorant Asset Management, LP and affiliated entities (2)	940,387	7.6%
Deerfield Management Company, L.P. and affiliated entities (3)	847,500	6.7%
FMR LLC and affiliated entities (4)	1,350,000	10.9%
OrbiMed Advisors LLC and affiliated entities (5)	1,248,993	9.8%
RA Capital Management, LLC and affiliated entities (6)	1,243,703	9.99%
Named Executive Officers, Directors and Director Nominees		
Paula Ragan, Ph.D. (7)	350,016	2.8%
Adam S. Mostafa	—	*
Michael Gray, M.B.A., C.P.A. (8)	84,821	*
David Mantus, Ph.D. (9)	14,498	*
Christopher Stevens, M.D. (10)	—	*
Isaac Blech (11)	70,797	*
Gary J. Bridger, Ph.D.	—	*
David McGirr (12)	5,832	*
René Russo, Pharm.D., BCPS (13)	80,661	*
Murray W. Stewart, M.D.	—	*
Michael S. Wyzga (14)	23,441	*
All directors and current executive officers as a group (9 persons) (15)	625,756	4.9%

* Represents beneficial ownership of less than 1% of the outstanding shares of our common stock.

(1) Based on information provided in a Schedule 13G filed by Biotechnology Value Fund, L.P. (“BVF”) on April 23, 2019. Consists of (i) 818,595 shares of common stock, including 450,314 shares of common stock issuable upon the exercise of Class A warrants to purchase common stock held by BVF, (ii) 398,209 shares of common stock, including 100,553 shares of common stock issuable upon the exercise of Class A warrants held by Biotechnology Value Fund II, L.P. (“BVF II”), (iii) 53,140 shares of common stock held by Biotechnology Value Trading Fund OS LP (“Trading Fund OS”), and (iv) 25,923 shares of common stock held by a certain BVF Partners L.P. (“Partners”) managed account (the “Partners Managed Account”). BVF, BVF II, Trading Fund OS and the Partners Managed Account hold Class A warrants and pre-funded warrants to purchase common stock which restrict the exercise of such securities to the extent that such exercises would, (i) in the case of the Class A warrants and the pre-funded warrants, cause the number of shares then beneficially owned by the holder, together with its affiliates and other attribution

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parties, to exceed 9.99% of the total number of shares of common stock then outstanding, or (ii) in the case of the pre-funded warrants, cause the combined voting power of our securities beneficially owned by the holder, together with its affiliates, to exceed 9.99% of the combined voting power of all of our securities then outstanding immediately after giving effect to the exercise (together, the "Ownership Caps"). As a result of the Ownership Caps, the following have been excluded from the amounts reported above as beneficially owned: (a) 530,425 shares of common stock issuable upon the exercise of pre-funded warrants held by BVF, (b) 263,257 shares of common stock issuable upon the exercise of Class A warrants and 428,704 shares of common stock issuable upon the exercise of pre-funded warrants held by BVF II, (c) 64,996 shares of common stock issuable upon the exercise of Class A warrants and 76,534 shares of common stock issuable upon the exercise of pre-funded warrants held by Trading Fund OS, and (d) 31,630 shares of common stock issuable upon the exercise of Class A warrants and 37,337 shares of common stock issuable upon the exercise of pre-funded warrants held by the Partners Managed Account. BVF Partners OS Ltd. ("Partners OS"), as the general partner of Trading Fund OS, may be deemed to beneficially own the securities beneficially owned by Trading Fund OS. Partners, as the general partner of BVF, BVF II, the investment manager of Trading Fund OS, and the sole member of Partners OS, may be deemed to beneficially own the securities beneficially owned by BVF, BVF II, Trading Fund OS, and the Partners Managed Account. BVF Inc., as the general partner of Partners, may be deemed to beneficially own the securities beneficially owned by Partners. Mark N. Lampert, as a director and officer of BVF Inc., may be deemed to beneficially own the securities beneficially owned by BVF Inc. Partners OS disclaims beneficial ownership of the securities beneficially owned by Trading Fund OS. Each of Partners, BVF Inc. and Mr. Lampert disclaims beneficial ownership of the securities beneficially owned by BVF, BVF II, Trading Fund OS, and the Partners Managed Account. The address of BVF, BVF II, Partners, BVF, Inc. and Mr. Lampert is 44 Montgomery St., 40th Floor, San Francisco, California 94104 and the address of Trading Fund OS and Partners OS is P.O. Box 309 Ugland House, Grand Cayman, KY1-1104, Cayman Islands.

- (2) Based on information provided in a Schedule 13G filed by Cormorant Asset Management, LP on April 22, 2019. Consists of 747,218 shares of common stock held by Cormorant Global Healthcare Master Fund, LP (the "Master Fund"), 114,379 shares of common stock held by Cormorant Private Healthcare Fund I, LP ("Fund I"), and 78,790 shares of common stock held in a managed account (the "Account"). Cormorant Global Healthcare GP, LLC and Cormorant Private Healthcare GP, LLC serve as the general partners of the Master Fund and Fund I, respectively. Cormorant Asset Management, LP serves as the investment manager to the Master Fund, Fund I and the Account. Bihua Chen serves as the managing member of Cormorant Global Healthcare GP, LLC, Cormorant Private Healthcare GP, LLC and the general partner of Cormorant Asset Management, LP. Each of such reporting persons has disclaimed beneficial ownership of such shares except to the extent of its or his pecuniary interest therein. The address of each of such reporting persons is c/o Cormorant Asset Management, LP, 200 Clarendon Street, 52nd Floor, Boston, Massachusetts 02116.
- (3) Based on information provided in a Schedule 13G filed by James E. Flynn on April 16, 2019. Consists of 565,000 shares of common stock and Class A warrants to purchase 282,500 shares of common stock held by Deerfield Special Situations Fund, L.P., of which Deerfield Management Company, L.P. is the investment advisor and Deerfield Mgmt, L.P. is the general partner. James E. Flynn also shares voting and investment control over the securities held by Deerfield Special Situations Fund, L.P. Notwithstanding the number of shares reported, Deerfield Special Situations Fund, L.P., Deerfield Management Company, L.P., Deerfield Mgmt, L.P. and James E. Flynn disclaim beneficial ownership of the shares of common stock issuable upon exercise of such warrants to the extent that upon such exercise the number of shares beneficially owned by Deerfield Special Situations Fund, L.P. and its affiliates, in the aggregate, would exceed the Ownership Cap. The address of Deerfield Special Situations Fund, L.P., Deerfield Management Company, L.P., Deerfield Mgmt, L.P. and James E. Flynn is 780 Third Avenue, 37th Floor, New York, NY 10017.
- (4) Based on information provided in a Schedule 13G filed by FMR LLC on May 10, 2019. Consists of 1,350,000 shares of common stock. Abigail P. Johnson is a Director, the Chairman and the Chief Executive Officer of FMR LLC. Members of the Johnson family, including Abigail P. Johnson, are the predominant owners, directly or through trusts, of Series B voting common shares of FMR LLC, representing 49% of the voting power of FMR LLC. The Johnson family group and all other Series B shareholders have entered into a shareholders' voting agreement under which all Series B voting common shares will be voted in

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accordance with the majority vote of Series B voting common shares. Accordingly, through their ownership of voting common shares and the execution of the shareholders' voting agreement, members of the Johnson family may be deemed, under the Investment Company Act of 1940, to form a controlling group with respect to FMR LLC. Neither FMR LLC nor Abigail P. Johnson has the sole power to vote or direct the voting of the shares owned directly by the various investment companies registered under the Investment Company Act ("Fidelity Funds") advised by Fidelity Management & Research Company ("FMR Co"), a wholly owned subsidiary of FMR LLC, which power resides with the Fidelity Funds' Boards of Trustees. FMR Co carries out the voting of the shares under written guidelines established by the Fidelity Funds' Boards of Trustees. The address of FMR LLC is 245 Summer Street, Boston, Massachusetts 02210.

- (5) Based on information provided in a Schedule 13G filed by OrbiMed Advisors LLC ("Advisors") on April 19, 2019. Consists of 936,493 shares of common stock held by OrbiMed Private Investments IV, LP ("OPI IV"), and 312,500 shares of common stock issuable upon the exercise of Class A warrants to purchase common stock held by OPI IV. Advisors is an investment advisor and is the Managing Member of OrbiMed Capital GP IV LLC ("GP IV"). GP IV is the sole general partner of OPI IV. As a result, Advisors and GP IV share the power to direct the vote and the disposition of the securities held by OPI IV. Advisors exercises this investment and voting power through a management committee comprised of Carl L. Gordon, Sven H. Borho and Jonathan T. Silverstein. On the basis of these relationships, GP IV and Advisors may be deemed to share beneficial ownership of the securities held by OPI IV. The address of Advisors, OPI IV, GP IV, Carl L. Gordon, Sven H. Borho and Jonathan T. Silverstein is 601 Lexington Avenue, 54th Floor, New York, NY 10022.
- (6) Consists of (i) 1,215,000 shares of common stock held by RA Capital Healthcare Fund, L.P. (the "Fund") and/or a separately managed account (the "Account"), and (ii) 28,703 shares of common stock issuable upon the exercise of Class A warrants to purchase common stock held by the Fund and/or the Account. RA Capital Management, LLC ("RA Capital") is the general partner of the Fund and serves as investment advisor for the Account. Peter Kolchinsky, Ph.D. is the manager of RA Capital. RA Capital and Dr. Kolchinsky share voting and dispositive power with respect to such securities and may be deemed to beneficially own such securities. As a result of the Ownership Caps, (a) 1,107,297 shares of common stock issuable upon the exercise of Class A warrants held by the Fund and/or the Account, (b) 898,873 shares of common stock issuable upon exercise of pre-funded warrants held by the Fund, and (c) 158,127 shares of common stock issuable upon the exercise of pre-funded warrants held by the Account have been excluded from the amounts reported above as beneficially owned. The address of the Fund, RA Capital and Dr. Kolchinsky is c/o RA Capital Management, LLC, 20 Park Plaza, Suite 1200, Boston, MA 02116.
- (7) Consists of 181,366 shares of common stock and 168,650 shares of common stock underlying options held by Dr. Ragan that are exercisable as of April 30, 2019 or will become exercisable within 60 days after such date.
- (8) Mr. Gray is the former President, Chief Executive Officer and Chief Financial Officer of Arsanis. Consists of 41,666 shares of common stock and 43,155 shares of common stock underlying options held by Mr. Gray that are exercisable as of April 30, 2019 or will become exercisable within 60 days after such date.
- (9) Dr. Mantus is the former Chief Development Officer of Arsanis. Consists of 14,498 shares of common stock underlying options held by Dr. Mantus that are exercisable as of April 30, 2019 or will become exercisable within 60 days after such date.
- (10) Dr. Stevens is the former Chief Medical Officer of Arsanis.
- (11) Consists of 70,797 shares of common stock underlying options held by Mr. Blech that are exercisable as of April 30, 2019 or will become exercisable within 60 days after such date.
- (12) Consists of 5,832 shares of common stock underlying options held by Mr. McGirr that are exercisable as of April 30, 2019 or will become exercisable within 60 days after such date.
- (13) Consists of 80,661 shares of common stock underlying options held by Dr. Russo that are exercisable as of April 30, 2019 or will become exercisable within 60 days after such date.
- (14) Consists of 23,441 shares of common stock underlying options held by Mr. Wyzga that are exercisable as of April 30, 2019 or will become exercisable within 60 days after such date.
- (15) See footnotes 7 and 11 through 14 above. E. Lynne Kelley, M.D., our Chief Medical Officer, does not hold any shares of common stock or hold options that are exercisable as of April 30, 2019 or will become exercisable within 60 days after such date.

MANAGEMENT AND CORPORATE GOVERNANCE

Our Board of Directors

Our restated certificate of incorporation, as amended, and our amended and restated by-laws provide that our business is to be managed by or under the direction of our board of directors. Our board of directors is divided into three classes for purposes of election. One class is elected at each annual meeting of stockholders to serve for a three-year term. Our board of directors currently consists of seven members, classified into three classes as follows: (1) René Russo and Isaac Blech constitute a class with a term expiring at the 2019 annual meeting of stockholders; (2) Gary J. Bridger, Ph.D. and Murray Stewart, M.D. constitute a class with a term ending at the 2020 annual meeting of stockholders; and (3) David McGirr, Paula Ragan, Ph.D. and Michael S. Wyzga constitute a class with a term ending at the 2021 annual meeting of stockholders.

On May 13, 2019, our board of directors accepted the recommendation of our nominating and corporate governance committee and voted to nominate René Russo for election at the annual meeting for a term of three years to serve until the 2022 annual meeting of stockholders, and until her successor has been elected and qualified. Mr. Blech will continue to serve as a director through the end of his term, which concludes at the 2019 annual meeting of stockholders, upon which the number of directors constituting our board of directors will be reduced to six (6).

Set forth below are the names of our directors, including the person nominated for election as a director and those directors whose terms do not expire this year, their ages, their offices in the Company, if any, their principal occupations or employment for at least the past five years, the length of their tenure as directors and the names of other public companies in which such persons hold or have held directorships during the past five years as of April 30, 2019. Additionally, information about the specific experience, qualifications, attributes or skills that led to our board of directors' conclusion at the time of filing of this proxy statement that each person listed below should serve as a director is set forth below:

<u>Name</u>	<u>Age</u>	<u>Position with the Company</u>
Paula Ragan, Ph.D.	49	President, Chief Executive Officer, Secretary and Director
Michael S. Wyzga (1)(3)	64	Chairman of the Board of Directors
Isaac Blech (1)(2)	69	Director
Gary J. Bridger, Ph.D. (2)(3)	56	Director
David McGirr (1)(3)	64	Director
René Russo, Pharm.D., BCPS	44	Director
Murray W. Stewart, M.D.	58	Director

- (1) Member of our audit committee.
- (2) Member of our compensation committee.
- (3) Member of our nominating and corporate governance committee.

Paula Ragan, Ph.D. Dr. Ragan has been our President, Chief Executive Officer, Secretary and a member of our board of directors since the closing of the Merger in March 2019. Dr. Ragan has been the President, Chief Executive Officer and a member of the board of directors of X4 since July 2014. She has more than 18 years of experience building companies in the biotechnology industry. From August 2012 to September 2014, Dr. Ragan consulted as Chief Business Officer at Lysosomal Therapeutics Inc., a private biopharmaceutical company, where she led the company's business development activities. Prior to that, from January 2007 to August 2012, Dr. Ragan held leadership roles in corporate development and operations at Genzyme Corporation, a Sanofi company, where she led strategic partnering efforts for Genzyme's Rare Disease business and headed the supply chain planning for Genzyme's flagship commercial products. Other professional roles include business roles at Hydra Biosciences, Oscient Corporation and Celera Corporation. Dr. Ragan received her B.S. from Tufts University and her Ph.D. from Massachusetts Institute of Technology and completed post-doctoral studies at Harvard Medical School. We believe that Dr. Ragan's perspective and experience as our President and Chief

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Executive Officer, which provides the board with historic knowledge, operational expertise and continuity, provides her with the qualifications and skills to serve on our board of directors.

Isaac Blech. Mr. Blech has served as a member of our board of directors since the closing of the Merger in March 2019. Prior to the Merger, Mr. Blech served as a member of the X4 board of directors since July 2015. Mr. Blech played a role in establishing some of the world's leading biotechnology companies, including Celgene Corporation, ICOS Corporation, Pathogenesis Corporation, Nova Pharmaceutical Corporation and Genetics Systems Corporation. These companies are responsible for major advances in oncology, infectious disease and cystic fibrosis. Mr. Blech serves on the boards of directors of Cerecor Inc., ContraFect Corporation, Edge Therapeutics, Inc., SpendSmart Networks, Inc., and Aridis Pharmaceuticals Inc. Mr. Blech is also Vice Chairman of a number of private companies including Centrexion Corporation, Alveo Technologies, Elucida Oncology, Nacuity Pharmaceuticals, Sapience Therapeutics, Inc. and X-VAX Technology, Inc. Mr. Blech received his B.A. from Baruch College. We believe that Mr. Blech's experience as a director of numerous public biotechnology and pharmaceutical companies provides him with the qualifications and skills to serve on our board of directors. As of the annual meeting, Mr. Blech will no longer serve as a member of our board of directors.

Gary J. Bridger, Ph.D. Dr. Bridger has served as a member of our board of directors since the closing of the Merger in March 2019. Prior to the Merger, Dr. Bridger served as a member of the X4 board of directors since October 2018. From February 2015 to December 2017, Dr. Bridger served as a consultant to Xenon Pharmaceuticals Inc., a biopharmaceutical company, where he previously served as the Executive Vice President of Research and Development from January 2013 to February 2015. From October 2013 to October 2015, Dr. Bridger served as a Managing Director at Five Corners Capital Inc. From June 2010 to June 2012, Dr. Bridger served as a venture partner at Venture West Capital Management, a venture capital firm. From November 2006 to December 2007, Dr. Bridger served as Senior Vice President of Research and Development of Genzyme Corporation, a biotechnology company, which was acquired by Sanofi, S.A. In June 1996, Dr. Bridger co-founded AnorMED Inc., a biopharmaceutical company, and was its Vice President of Research and Development and Chief Scientific Officer from 2000 until its acquisition by Genzyme in November 2006. Dr. Bridger has served on the board of directors of Aquinox Pharmaceuticals, Inc. since 2013. Dr. Bridger previously served on the board of directors of Alder BioPharmaceuticals, Inc., a biopharmaceutical company, from 2013 to 2016. Dr. Bridger serves on the scientific advisory board of Alectos Therapeutics Inc., a biopharmaceutical company. Dr. Bridger holds a Ph.D. in Organic Chemistry from the University of Manchester Institute of Science and Technology. We believe that Dr. Bridger's experience as an executive officer or director of several public and private life sciences companies provides him with the qualifications and skills to serve on our board of directors.

David McGirr, M.B.A. Mr. McGirr has served as a member of our board of directors since September 2017. From March 2013 until June 2014, Mr. McGirr was Senior Advisor to the chief executive officer of Cubist Pharmaceuticals, Inc., a biopharmaceutical company where he also served as Senior Vice President and Chief Financial Officer from November 2002 to March 2013. Prior to joining Cubist in 2002, Mr. McGirr was the President and Chief Operating Officer of hippo inc, an internet technology, venture-financed company. From 1996 to 1999, he was the President of GAB Robins North America, Inc., a risk management company, serving also as Chief Executive Officer from 1997 to 1999. Mr. McGirr was a private equity investor from 1995 to 1996. From 1978 to 1995, Mr. McGirr served in various positions within the S.G. Warburg Group, ultimately as Chief Financial Officer, Chief Administrative Officer and Managing Director of S.G. Warburg & Co., Inc., a position held from 1992 to 1995. Mr. McGirr is currently a member of the board of directors of Insmid Incorporated, a publicly traded biopharmaceutical company where he has served since October 2013; Rhythm Pharmaceuticals, Inc., a publicly traded biopharmaceutical company where he has served since November 2015; and Menlo Therapeutics, Inc., a publicly traded biopharmaceutical company where he has served since November 2017. Mr. McGirr also served on the board of directors of Roka Bioscience, Inc., a molecular diagnostics company, from December 2013 to January 2018. Mr. McGirr received a B.Sc. in Civil Engineering from the University of Glasgow and received an M.B.A. from The Wharton School at the University of Pennsylvania. We believe that

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Mr. McGirr's experience as an executive officer or director of a number of public and private pharmaceutical companies provide him with the qualifications and skills to serve on our board of directors.

René Russo, Pharm.D., BCPS. Dr. Russo has served as a member of our board of directors since April 2016 and served as President and Chief Executive Officer of Arsanis from April 2016 to November 2018. Dr. Russo also served as Chief Development Officer of Arsanis from July 2015 until April 2016. Since May 2019, Dr. Russo is serving as the chief executive officer of Akrebia Therapeutics, LLC, a privately held biopharmaceutical company focused on developing immuno-oncology therapeutics. Previously, Dr. Russo served in various roles over an 11-year period at Cubist Pharmaceuticals, Inc., a public pharmaceutical development company, focused on the development and commercialization of infectious disease therapeutics, from 2003 until its acquisition by Merck in May 2015, most recently as its Vice President, Global Medical Affairs. From 1999 to 2004, she held roles of increasing responsibility at Bristol-Myers Squibb where she started her industry career as a Postdoctoral Fellow in Industrial Pharmacy Infectious Diseases. Prior to joining the biotechnology industry, Dr. Russo held clinical positions at Robert Wood Johnson University Hospital and Princeton Hospital. Dr. Russo received her Pharm.D. and B.S. from Rutgers University. We believe that Dr. Russo's expertise and experience as Arsanis's former President and Chief Executive Officer, her perspective and experience as an executive at public and private pharmaceutical companies and her expertise in clinical development and commercialization of therapeutics targeting infectious diseases, provide her with the qualifications and skills to serve on our board of directors.

Murray W. Stewart, M.D. Dr. Stewart has served as a member of our board of directors since March 2019. Dr. Stewart has served as Chief Medical Officer of Rhythm Pharmaceuticals, Inc., a biopharmaceutical company focused on developing and commercializing therapies for the treatment of rare genetic disorders of obesity, since October 2018. He previously served as Head of R&D for Novelion Therapeutics Inc., a biopharmaceutical company focused on developing new standards of care for individuals living with rare disease, where he oversaw global medical affairs for Juxtapid® and Myalept®, two marketed products for rare metabolic diseases, from November 2017 to October 2018. Prior to that, Dr. Stewart was Chief Medical Officer at GlaxoSmithKline (GSK), with global responsibility for patient well-being across the vaccine, pharmaceutical, and consumer business units, from April 2014 to November 2017. During his 18-year career at GSK, Dr. Stewart held multiple research and development leadership roles, including Chief Medical Officer for the pharmaceutical business, Clinical Head of the Biopharma Unit, and Therapy Area Head for metabolic and cardiovascular diseases. Prior to his tenure with GSK, he worked as a consultant physician and honorary senior lecturer at the Diabetes Center in Newcastle upon Tyne in the U.K. Dr. Stewart holds an M.D. from Southampton Medical School and is a Fellow of the Royal College of Physicians. We believe that Dr. Stewart's extensive biopharmaceutical leadership experience, including experience in research, clinical development and regulatory strategy, provide him with the qualifications and skills to serve on our board of directors.

Michael S. Wyzga. Mr. Wyzga has served as a member of our board of directors since the closing of the Merger in March 2019. Prior to the Merger, Mr. Wyzga served as Chairman of the X4 board of directors since July 2018. Mr. Wyzga is currently the President of MSW Consulting Inc., a strategic consulting group focused in the life sciences area. From December 2011 until November 2013, Mr. Wyzga served as President and Chief Executive Officer and a member of the board of directors of Radius Health, Inc., a publicly traded biopharmaceutical company. Prior to that, Mr. Wyzga served in various senior management positions at Genzyme Corporation, a publicly traded global biotechnology company. Mr. Wyzga joined Genzyme in February 1998 and most recently served as Executive Vice President, Finance from May 2003 until November 2011 and as chief financial officer from July 1999 until November 2011. From February 2014 to December 2018, Mr. Wyzga served as a member of the board of directors of Akebia Therapeutics, Inc., a publicly traded biopharmaceutical company, where he was also a member of the compensation committee and chair of the audit committee. Since February 2015, Mr. Wyzga has also served as a member of the board of directors of Exact Sciences Corporation, a publicly traded medical technology company, where he is also a member of the audit and compensation committees. From October 2013 until Oncomed Pharmaceuticals, Inc.'s business combination with Mereo BioPharma Group plc in April 2019, Mr. Wyzga served as a member of the board of directors of Oncomed Pharmaceuticals, Inc., where he was also a member of the audit committee. Since February 2016, Mr. Wyzga has also served as Chairman of the board of directors of GenSight Biologics S.A., a Euronext traded

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biopharmaceutical company. Mr. Wyzga also previously served as a member of the board of directors of Idenix Pharmaceuticals, Inc., a publicly traded biotechnology company that was acquired by Merck in August 2014, where he also served as the chair of the audit committee and a member of the compensation committee, and as a member of the Supervisory Board of Prosensa Holding B.V., a publicly traded biopharmaceutical company, from June 2014 until the Prosensa acquisition by BioMarin Falcon B.V. in December 2014. He received an M.B.A. from Providence College and a B.S. from Suffolk University. We believe that Mr. Wyzga's senior management experience at biopharmaceutical and biotechnology companies, his current and past experience on boards of directors of public companies, and his financial expertise qualify him to serve as a member of our board of directors.

There are no family relationships between or among any of our directors or nominee. The principal occupation and employment during the past five years of each of our directors and nominee was carried on, in each case except as specifically identified above, with a corporation or organization that is not a parent, subsidiary or other affiliate of us. There is no arrangement or understanding between any of our directors or nominee and any other person or persons pursuant to which he or she is to be selected as a director or nominee.

There are no legal proceedings to which any of our directors is a party adverse to us or any of our subsidiaries or in which any such person has a material interest adverse to us or any of our subsidiaries.

Director Independence

Based upon information requested from and provided by each director concerning their background, employment and affiliations, including family relationships, our board of directors has determined that none of Mr. Wyzga, Mr. Blech, Dr. Bridger, Mr. McGirr or Dr. Stewart, currently representing five out of our seven directors, has a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director and that each of these directors is "independent" as that term is defined under Rule 5605(a)(2) of the Nasdaq Marketplace Rules. Dr. Ragan is employed by the Company and is therefore not independent under Nasdaq Marketplace Rules, and Dr. Russo was employed by Arsanis during the past three years and is therefore not independent under Nasdaq Marketplace Rules. In making such determinations, the board of directors considered the relationships that each such nonemployee director or director nominee has with the Company and all other facts and circumstances the board of directors deemed relevant in determining their independence, including the beneficial ownership of our capital stock by each nonemployee director or director nominee.

Committees of the Board of Directors

Our board of directors has established an audit committee, a compensation committee and a nominating and corporate governance committee. Each committee operates under a charter approved by our board of directors. Copies of each committee's charter are posted on the Investors section of our website, which is located at www.x4pharma.com, under the caption "Governance." The composition and function of each of these committees are described below.

Board of Directors and Committee Meetings

During the fiscal year ended December 31, 2018, there were 19 meetings of the board of directors, five meetings of the audit committee, six meetings of the compensation committee and four meetings of the nominating and corporate governance committee. No director attended fewer than 75% of the total number of meetings of the board of directors and of the committee of the board on which he or she served during his or her tenure during fiscal 2018. Dr. Ragan, Mr. Wyzga, Mr. Blech, Dr. Bridger and Dr. Stewart were not elected to our board of directors until the completion of the Merger on March 13, 2019. Our board of directors has adopted a policy that each member of our board of directors make every effort to attend each annual meeting of our stockholders. All except one of Arsanis's directors attended Arsanis's annual meeting of stockholders held in 2018.

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Audit Committee. This committee currently has three members, David McGirr (Chairman), Isaac Blech and Michael S. Wyzga. Dr. Murray is expected to become a member of the audit committee at the annual meeting upon the conclusion of Mr. Blech's term as a director. Our audit committee's role and responsibilities are set forth in the audit committee's written charter and include the authority to retain, terminate and oversee the services of our independent registered public accounting firm. In addition, the audit committee reviews annual financial statements, considers matters relating to disclosure controls and procedures, risk assessment and management and reviews the scope of annual audits. All members of the audit committee satisfy the current independence standards promulgated by the Securities and Exchange Commission and by the Nasdaq Stock Market, as such standards apply specifically to members of audit committees. Our board of directors has determined that Mr. McGirr and Mr. Wyzga are each an "audit committee financial expert," as the Securities and Exchange Commission has defined that term in Item 407 of Regulation S-K. Please also see the report of the audit committee set forth elsewhere in this proxy statement.

A copy of the audit committee's written charter is publicly available on our website at www.x4pharma.com.

Compensation Committee. This committee currently has two members, Isaac Blech (Chairman), and Gary J. Bridger, Ph.D. Dr. Bridger is expected to become Chairman of the compensation committee and Dr. Murray is expected to become a member of the compensation committee at the annual meeting upon the conclusion of Mr. Blech's term as a director. Our compensation committee's role and responsibilities are set forth in the compensation committee's written charter and includes reviewing, approving and making recommendations regarding our compensation policies, practices and procedures to ensure that legal and fiduciary responsibilities of our board of directors are carried out and that such policies, practices and procedures contribute to our success. Our compensation committee also oversees and administers our 2017 Equity Incentive Plan, or 2017 Plan, and the X4 2015 Employee, Director and Consultant Equity Incentive Plan, as amended, or X4 Plan. The compensation committee is responsible for the reviewing and approving, or making recommendations to our board with respect to, the compensation of our chief executive officer and other senior executive officers, and shall conduct its decision making process with respect to the compensation of our chief executive officer without the chief executive officer present. All members of the compensation committee qualify as independent under the definition promulgated by the Nasdaq Stock Market.

In setting base salaries and bonuses and granting equity incentive awards for our executive officers, our compensation committee considers compensation for comparable positions in the market, the historical compensation levels of our executives, individual and corporate performance as compared to our expectations and objectives, our desire to motivate our employees to achieve short- and long-term results that are in the best interests of our stockholders, and a long-term commitment to our company. As part of this process, Dr. Ragan, as our president and chief executive officer, prepares performance evaluations for the other executive officers and recommends annual salary increases, annual stock option awards and cash bonuses to the compensation committee. The compensation committee conducts a performance evaluation of Dr. Ragan. As necessary, the compensation committee consults with the board of directors as to the achievement of corporate objectives that drive contingent compensation awards.

X4 has utilized a compensation consultant with expertise in the local biotechnology market to help assess executive and employee compensation and to help inform X4's compensation strategy, and we expect to engage a compensation consultant in the future.

The processes and procedures followed by Arsanis's compensation committee in 2018 in considering and determining executive and director compensation are described below under the heading "Executive Officer and Director Compensation—Narrative Disclosure to Summary Compensation Table—Arsanis Compensation."

A copy of the compensation committee's written charter is publicly available on our website at www.x4pharma.com.

Nominating and Corporate Governance Committee. This committee currently has three members, Gary J. Bridger, Ph.D. (Chairman), David McGirr and Michael S. Wyzga. Our board of directors has determined that all members of the nominating and corporate governance committee, or nominating committee, qualify as

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independent under the definition promulgated by the Nasdaq Stock Market. The nominating committee's responsibilities are set forth in the nominating committee's written charter and include:

- evaluating and making recommendations to the full board as to the composition, organization and governance of our board of directors and its committees;
- evaluating and making recommendations as to director candidates;
- evaluating current board members' performance;
- overseeing the process for CEO and other executive officer succession planning; and
- developing and recommending governance guidelines for the Company.

Generally, our nominating committee considers candidates for inclusion on the board, including those recommended by stockholder, in accordance with our Criteria for Nomination as a Director appended to our Corporate Governance Guidelines. Threshold criteria include: personal integrity and high ethical standards, business acumen, experience and ability to exercise sound judgment, independence, knowledge of our industry, possible conflicts of interest, diversity, the extent to which the candidate would fill a present need on our board of directors, and concern for the long-term interests of our stockholders. The nominating committee seeks and evaluates candidates such that the backgrounds and qualifications of the directors considered as a group provide a significant breadth of experience, knowledge and abilities that shall assist our board of directors in fulfilling its responsibilities.

Our nominating committee has not adopted a formal diversity policy in connection with the consideration of director nominations or the selection of nominees, but believes that our board, taken as a whole, should embody a diverse set of skills, experiences and backgrounds. In this regard, the nominating committee will consider issues of diversity among its members in identifying and considering nominees for director, and strive where appropriate to achieve a diverse balance of backgrounds, perspectives, experience, age, gender, ethnicity and country of citizenship on our board of directors and its committees. The nominating committee does not make any particular weighting of diversity or any other characteristic in evaluating nominees and directors.

If a stockholder wishes to propose a candidate for consideration as a nominee for election to our board of directors, it must follow the procedures described in our amended and restated by-laws and in "Stockholder Proposals and Nominations for Director" at the end of this proxy statement. In general, persons recommended by stockholders will be considered in accordance with our Criteria for Nomination as a Director appended to our Corporate Governance Guidelines. Any such recommendation should be made in writing to the Nominating and Governance Committee, care of our Corporate Secretary at our principal office and should be accompanied by the following information concerning each recommending stockholder and the beneficial owner, if any, on whose behalf the nomination is made:

- all information relating to such person that would be required to be disclosed in a proxy statement;
- certain biographical and share ownership information about the stockholder and any other proponent, including a description of any derivative transactions in the Company's securities;
- a description of certain agreements, arrangements and understandings between or among the proposing stockholder and any beneficial owner and any other person in connection with such stockholder nomination and the director nominee; and
- a statement whether such stockholder or beneficial owner intends to appear in person or by proxy at the meeting to nominate the person(s) named in its notice; and
- a statement whether or not either such stockholder or beneficial owner intends to deliver a proxy statement and form of proxy to holders of voting shares sufficient to carry the proposal.

The recommendation must also be accompanied by the following information concerning the proposed nominee:

- certain biographical information and share ownership information concerning the proposed nominee;
- all information concerning the proposed nominee required to be disclosed in solicitations of proxies for election of directors;

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- all information concerning compensation or other material monetary agreements, arrangements or understandings during the past three years and any other material relationship between or among the stockholder, beneficial owner and their respective affiliates and each proposed nominee, and his or her affiliates; and
- a description of all relationships between the proposed nominee and the recommending stockholder or any beneficial owner, including any agreements or understandings regarding the nomination.

A copy of the nominating committee's written charter is publicly available on our website at www.x4pharma.com.

Board Leadership Structure and Role in Risk Oversight

The positions of our chairman of the board and chief executive officer are separate. Separating these positions allows our chief executive officer to focus on our day-to-day business, while allowing the chairman of the board to lead the board of directors in its fundamental roles of setting a company's overall strategy and providing advice to and independent oversight of management. Our board of directors recognizes the time, effort and energy that the chief executive officer must devote to her position in the current business environment, as well as the commitment required to serve as our chairman, particularly as the board of directors' oversight responsibilities continue to grow. Our board of directors also believes that this structure ensures a greater role for the independent directors in the oversight of the company and active participation of the independent directors in setting agendas and establishing priorities and procedures for the work of our board of directors. Our board of directors believes its administration of its risk oversight function has not affected its leadership structure.

Although our bylaws do not require the chairman and chief executive officer positions to be separate, our board of directors believes that having separate positions is the appropriate leadership structure for the Company at this time and demonstrates our commitment to good corporate governance.

Risk is inherent with every business, and how well a business manages risk can ultimately determine its success. Our board of directors is actively involved in oversight of risks that could affect the Company. This oversight is conducted primarily by our full board of directors, which has responsibility for general oversight of risks. For example, in determining whether and under what circumstances we will engage in financing transactions or enter into licensing, collaboration or similar arrangements, the board of directors is involved in our management of risks related to our financial condition or of the risks inherent in drug development and commercialization.

As part of its oversight, our board of directors receives reports by each committee chair regarding the committee's considerations and actions. In particular, the audit committee is responsible for discussing the adequacy of our risk management activities with management and our independent registered public accounting firm. The audit committee's primary emphasis is financial risk, including our internal control over financial reporting. In addition, the compensation committee is responsible for considering whether our compensation programs and practices are reasonably likely to have a material adverse effect on us.

At each of its meetings, the board of directors receives business updates from various members of management. These updates may identify matters that have emerged within that member of management's scope of responsibility that involve operational, financial, legal or regulatory risks and, in these cases, the board of directors provides guidance to management. Our board of directors believes that full and open communication between management and the board of directors is essential for effective risk management and oversight.

Stockholder Communications to our Board of Directors

Generally, stockholders who have questions or concerns should contact our Investor Relations department at (857) 529-8300. However, any stockholders who wish to address questions regarding our business directly with our board of directors, or any individual director, should direct his or her questions in writing to the chairman of our board of directors at 955 Massachusetts Avenue, 4th Floor, Cambridge, Massachusetts 02139.

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Communications will be distributed to our board of directors, or to any individual director or directors as appropriate, depending on the facts and circumstances outlined in the communications. Items that are unrelated to the duties and responsibilities of our board of directors may be excluded, such as:

- junk mail and mass mailings;
- resumes and other forms of job inquiries;
- surveys; and
- solicitations or advertisements.

In addition, any material that is unduly hostile, threatening, or illegal in nature may be excluded, in which case it will be made available to any outside director upon request.

Executive Officers

The following table sets forth certain information as of April 30, 2019 regarding each of our executive officers who are not also directors. We have employment agreements with all of our executive officers and all of our executive officers are at-will employees.

<u>Name</u>	<u>Age</u>	<u>Position</u>
Adam S. Mostafa	39	Chief Financial Officer and Treasurer
E. Lynne Kelley	56	Chief Medical Officer

Adam S. Mostafa. Mr. Mostafa has served as our Chief Financial Officer and Treasurer since the closing of the Merger in March 2019. Prior to the Merger, Mr. Mostafa served as X4's Chief Financial Officer since September 2018. Prior to joining X4, Mr. Mostafa served as chief financial officer of Abpro Corporation, a biotechnology company focused on antibody therapeutics, from June 2016 to August 2018. Prior to that, Mr. Mostafa was a managing director in the healthcare investment banking group at Cantor Fitzgerald from January 2015 to May 2016, and from June 2011 to January 2015, Mr. Mostafa was a senior banker in the healthcare investment banking group at Needham & Company. Prior to that, Mr. Mostafa was a vice president in the investment banking group at CRT Capital Group from March 2007 to May 2011, and from September 2003 to March 2007, Mr. Mostafa was a portfolio management associate in the global stock selection group at AQR Capital. Mr. Mostafa began his career as an analyst in the healthcare investment banking group at Salomon Smith Barney. Mr. Mostafa earned an A.B. in Economics from Brown University.

E. Lynne Kelley, M.D. Dr. Kelley has served as our Chief Medical Officer since April 2019. She brings more than a decade of experience directing clinical development and global expansion of novel pharmaceutical products at both emerging and established life sciences companies. Dr. Kelley is a Board Certified General and Vascular Surgeon. Before joining our company, Dr. Kelley was chief medical officer (CMO) of Massachusetts-based biopharmaceutical company Histogenics Corporation from July 2018 to January 2019, where she led the development of restorative cell therapies to replace damaged cartilage and oversaw the completion of a Phase 3 clinical trial and regulatory submission for the company's lead program. Previously, from January 2016 to May 2018, Dr. Kelley served as CMO of Senseonics Holdings, Inc. a company that develops and sells systems to help people with diabetes monitor their glucose levels. She also held leadership positions in clinical development roles at global companies such as Becton, Dickinson and Company, a global medical technology company (from January 2011 to December 2015), Kimberly-Clark Corporation, a company focused on creating essential household products (from January 2008 to December 2011), and Boston Scientific Corporation, a medical device company (from November 2005 to December 2008). Dr. Kelley received her medical degree from Dartmouth Medical School and her bachelor's degree in biology from Boston University. She trained at Dartmouth Hitchcock Hospital and Massachusetts General Hospital, and was a practicing surgeon at Yale University. Dr. Kelley was named Fellow of the American College of Surgeons, was awarded an NIH research grant at Harvard University and the Marco Polo Fellowship studying at Hospital Henri Mondor of the University Paris Hospital System, and has authored numerous articles for peer-reviewed publications.

EXECUTIVE OFFICER AND DIRECTOR COMPENSATION

Summary Compensation Table

The following table shows the total compensation paid or accrued during the fiscal years ended December 31, 2018 and December 31, 2017 to (1) the individuals who served as our Chief Executive Officer during the fiscal year ended December 31, 2018, (2) our two next most highly compensated executive officers who earned more than \$100,000 during the fiscal year ended December 31, 2018 and were serving as executive officers as of such date, and (3) any individual who would otherwise be included in (2) above but for the fact that such individual was not serving as an executive officer of ours as of December 31, 2018. The Summary Compensation Table includes Michael Gray, M.B.A., C.P.A., David Mantus, Ph.D., and Christopher Stevens, M.D., each of whom resigned from their respective positions in connection with the Merger, and René Russo, Pharm.D., BCPS, who resigned from her positions as of November 26, 2018. In addition, we have also included Paula Ragan, Ph.D., our current President, Chief Executive Officer and Secretary following the Merger, and Adam S. Mostafa, our current Chief Financial Officer and Treasurer following the Merger, in the table below, notwithstanding that such persons did not serve as executive officers of the Company during the fiscal year ended December 31, 2018. These executive officers are referred to as our “named executive officers” in this proxy statement.

Name and Principal Position (1)	Year	Salary (\$)	Bonus (\$) (2)	Stock Awards (\$) (3)	Option Awards (\$) (3)	Non-equity Incentive Plan Compensation (\$) (4)	All Other Compensation (\$) (5)	Total (\$)
Paula Ragan, Ph.D. <i>President, Chief Executive Officer and Secretary</i>	2018	380,000	—	—	407,577	133,000	450	921,027
	2017	364,000	—	—	303,422	89,180	576	757,178
Adam S. Mostafa (6) <i>Chief Financial Officer and Treasurer</i>	2018	109,285	—	—	480,789	38,250	90	628,414
Michael Gray, M.B.A., C.P.A. <i>Former President, Chief Executive Officer and Chief Financial Officer</i>	2018	405,193	181,136	1,030,000	1,310,947	—	—	2,927,276
	2017	363,077	231,525	—	262,090	—	—	856,692
David Mantus, Ph.D. <i>Former Chief Development Officer</i>	2018	358,750	—	—	595,885	—	120,250	1,074,885
	2017	313,750	—	—	117,926	—	—	431,676
René Russo, Pharm.D., BCPS <i>Former President and Chief Executive Officer</i>	2018	405,866	—	—	1,906,833	—	1,046,250	3,358,949
	2017	388,750	254,100	—	524,182	—	—	1,167,032
Christopher Stevens, M.D. <i>Former Chief Medical Officer</i>	2018	380,000	—	—	595,885	—	329,333	1,305,218
	2017	380,000	159,600	—	117,937	—	—	657,537

- (1) The amounts reported in this table (i) for Dr. Ragan and Mr. Mostafa, represent amounts earned for service as an executive officer of X4, and (ii) for Mr. Gray, Dr. Mantus, Dr. Russo and Dr. Stevens, represent amounts earned for service as an executive officer of Arsanis.
- (2) Except where noted otherwise, the amounts reported in the “Bonus” column reflect discretionary annual cash bonuses paid to Arsanis’s executive officers for their performance.
- (3) The amounts reported in the “Stock Awards” column and “Option Awards” column reflect the aggregate fair value of stock-based compensation awarded during the year computed in accordance with the provisions of Financial Accounting Standards Board, Accounting Standards Codification Topic 718, or ASC 718. For Dr. Ragan and Mr. Mostafa, see Note 11 to the X4 consolidated financial statements in our Amendment No. 1 to Current Report on Form 8-K/A filed with the SEC on April 3, 2019, and for Mr. Gray, Dr. Mantus, Dr. Russo and

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Dr. Stevens, see Note 12 to the Arsanis consolidated financial statements in Arsanis’s Annual Report on Form 10-K for the year ended December 31, 2018 filed with the SEC on March 11, 2019, regarding assumptions underlying the valuation of equity awards.

- (4) For 2018, represents amounts earned for the 12-month period from January 1, 2018 to December 31, 2018 and paid in 2019, and excludes payments made in 2018 that were earned in 2017. For 2017, represents amounts earned for the 12-month period from January 1, 2017 to December 31, 2017 and paid in 2018, and excludes payments made in 2017 that were earned in 2016.
- (5) The amounts reported in the “All Other Compensation” column reflect for 2018, \$450 for Dr. Ragan and \$90 for Mr. Mostafa, and for 2017, \$576 for Dr. Ragan, in life insurance premiums X4 paid for a term life insurance policy to benefit these executive officers with a face value of \$300,000, and, for 2018, severance paid to René Russo in connection with her separation as Arsanis’s President and CEO and retention bonus amounts accrued as of December 31, 2018 for David Mantus, Ph.D. and Christopher Stevens, M.D.
- (6) Mr. Mostafa’s employment with X4 began on September 5, 2018.

Outstanding Equity Awards at Fiscal Year End 2018

The following table sets forth information regarding outstanding equity awards, which consist of X4 stock options and X4 restricted stock, held by Dr. Ragan and Mr. Mostafa as of December 31, 2018. The share and per share amounts included in this table have not been adjusted to reflect the conversion of the shares in the Merger based on the exchange ratio of 0.5702 and do not reflect the Reverse Stock Split.

Name	Option Awards (1)			
	Number of Shares of X4 Common Stock Underlying Unexercised Options (#) Exercisable	Number of Shares of X4 Common Stock Underlying Unexercised Options (#) Unexercisable	Option Exercise Price (\$)	Option Expiration Date
Paula Ragan, Ph.D.	1,059,935 (2)	— (2)	0.65	1/18/2026
	329,906 (3)	358,594 (3)	0.65	1/23/2027
	— (4)	843,496 (4)	0.67	1/30/2028
Adam S. Mostafa	— (5)	659,067 (5)	0.99	10/3/2028

- (1) Each of the outstanding equity awards in this table was granted pursuant to the X4 2015 Employee, Director and Consultant Equity Incentive Plan, as amended.
- (2) Represents an option to purchase shares of X4 common stock granted on January 19, 2016. As of the date of grant, 33.33% of the shares underlying the option had vested and 2.0833% of the shares underlying the option vested, subject to continued service, on the 15th of each month thereafter until September 15, 2018.
- (3) Represents an option to purchase shares of X4 common stock granted on January 24, 2017. The shares underlying this option vest, subject to continued service, as follows: 25% of the shares vested on January 24, 2018 with the remainder vesting over the next three years in equal monthly installments on the grant day of each succeeding calendar month thereafter.
- (4) Represents an option to purchase shares of X4 common stock granted on January 1, 2018. The shares underlying this option vest, subject to continued service, as follows: 25% of the shares vested on January 1, 2019 with the remainder vesting over the next three years in equal monthly installments on the grant day of each succeeding calendar month thereafter.
- (5) Represents an option to purchase shares of X4 common stock granted on September 5, 2018. The shares underlying this option vest, subject to continued service, as follows: 25% of the shares vest on September 5, 2019, with the remainder vesting over the next three years in equal monthly installments on the grant day of each succeeding calendar month thereafter.

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The following table sets forth information regarding outstanding equity awards, which consist of Arsanis stock options and Arsanis restricted stock, held by Mr. Gray, Dr. Mantus, Dr. Russo and Dr. Stevens as of December 31, 2018. The share and per share amounts included in this table do not reflect the Reverse Stock Split.

Name	Option Awards				Restricted Stock Awards
	Number of Shares of Arsanis Common Stock Underlying Unexercised Options (#) Exercisable	Number of Shares of Arsanis Common Stock Underlying Unexercised Options (#) Unexercisable	Option Exercise Price (\$)	Option Expiration Date	Number of Shares of Restricted Arsanis Common Stock
Michael P. Gray, M.B.A., C.P.A.	—	—	—	—	250,000 (13)(14)
	35,258	16,016 (1)(14)	\$ 9.39	7/20/2026	—
	36,628	61,037 (2)(14)	\$ 4.00	6/18/2027	—
	—	110,000 (3)(14)	\$17.34	3/7/2028	—
David Mantus, Ph.D.	11,599	3,050 (4)	\$ 8.33	2/3/2026	—
	7,327	4,392 (5)	\$ 9.39	7/20/2026	—
	16,481	27,468 (6)	\$ 4.00	6/18/2027	—
	—	50,000 (7)	\$17.34	3/7/2028	—
René Russo, Pharm.D., BCPS	80,889	— (8)	\$ 8.20	7/21/2025	—
	47,757	— (8)	\$ 9.39	7/20/2026	—
	195,331	— (8)	\$ 4.00	6/18/2027	—
	160,000	— (8)	\$17.34	3/7/2028	—
Christopher Stevens, M.D.	16,487	9,882 (9)(10)	\$ 9.39	7/20/2026	—
	16,482	27,466 (11)(10)	\$ 4.00	6/18/2027	—
	—	50,000 (12)(10)	\$17.34	3/7/2028	—

- (1) This option award vests over four years, with 25% of the shares underlying the option vested on March 1, 2017 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (2) This option award vests over four years, with 25% of the shares underlying the option vested on June 19, 2018 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (3) This option award vests over four years, with 25% of the shares underlying the option vested on March 7, 2019 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (4) This option award vests over four years, with 25% of the shares underlying the option vested on October 12, 2016 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (5) This option award vests over four years, with 25% of the shares underlying the option vested on June 1, 2017 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (6) This option award vests over four years, with 25% of the shares underlying the option vested on June 19, 2018 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (7) This option award vests over four years, with 25% of the shares underlying the option vested on March 7, 2019 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (8) In connection with Dr. Russo's stepping down from her position as President and Chief Executive Officer of Arsanis, all unvested stock options held by Dr. Russo vested in full upon her letter agreement with the company, dated as of November 26, 2018, becoming effective and irrevocable as of December 3, 2018. See "Narrative Disclosure to Summary Compensation Table—Arsanis Compensation—Employment and Change in Control Arrangements—Letter Agreement for Dr. René Russo" below for more information.
- (9) This option award vests over four years, with 25% of the shares underlying the option vested on July 20, 2017 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (10) In connection with Dr. Stevens's stepping down from his position as Chief Medical Officer of Arsanis, all unvested stock options held by Dr. Stevens vested in full upon his letter agreement with the company, dated

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as of January 15, 2019, and becoming effective and irrevocable as of January 22, 2019. See “Narrative Disclosure to Summary Compensation Table—Arsanis Compensation—Employment and Change in Control Arrangements—Letter Agreement for Dr. Christopher Stevens” below for more information.

- (11) This option award vests over four years, with 25% of the shares underlying the option vested on June 19, 2018 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (12) This option award vests over four years, with 25% of the shares underlying the option vested on March 7, 2019 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (13) This restricted stock award vests over four years, with 25% of the shares underlying the option vesting on November 27, 2019 and 2.0833% of the shares vesting monthly thereafter, subject to continued service.
- (14) In connection with Mr. Gray stepping down from his position as President and Chief Executive Officer of Arsanis, all unvested stock options and restricted stock held by Mr. Gray vested in full in connection with the closing of the Merger. See “Narrative Disclosure to Summary Compensation Table—Arsanis Compensation—Employment and Change in Control Arrangements—2018 Amended and Restated Employment Agreement for Michael P. Gray” below for more information.

Narrative Disclosure to Summary Compensation Table

X4 Compensation

The material terms of the elements of X4’s executive compensation program for 2018 are described below.

Base Salary

Each named executive officer’s base salary is a fixed component of annual compensation for performing specific duties and functions, and has been established by our board of directors taking into account each individual’s role, responsibilities, skills, and experience.

Non-Equity Incentive Plan Compensation

Our annual bonus program is intended to reward our named executive officers for meeting objective or subjective individual and/or company-wide performance goals for a fiscal year. For 2018 and 2017, X4’s named executive officers received incentive compensation based upon the X4 board of directors’ or X4’s compensation committee’s determination of their respective achievement of and performance with respect to corporate objectives.

Long-Term Equity Incentives

Our equity grant program is intended to align the interests of our named executive officers with those of our stockholders and to motivate them to make important contributions to our performance.

Employment and Change in Control Arrangements

Paula Ragan, Ph.D.

On June 23, 2015, X4 entered into an executive employment agreement with Paula Ragan, Ph.D. Pursuant to the executive employment agreement, Dr. Ragan’s compensation consisted of base salary, annual bonus as determined by the X4 board of directors, equity grants as determined by the X4 board of directors, fringe benefits, vacation and reimbursement of ordinary and reasonable out-of-pocket expenses. In March 2017, Dr. Ragan’s base salary was increased from \$350,000 to \$364,000, and in March 2018, Dr. Ragan’s base salary was increased to \$380,000. Dr. Ragan had an annual target bonus for 2017 and 2018 set at 35% of base salary.

On March 13, 2019, in connection with the closing of the Merger, we entered into an amended and restated executive employment agreement with Paula Ragan, Ph.D., pursuant to which Dr. Ragan agreed to continue

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serving as our Chief Executive Officer. Pursuant to the agreement, Dr. Ragan's compensation consists of base salary at an annual rate approved by the board of directors or an appropriate committee thereof, an annual bonus as determined by the board of directors, but not less than 25% of Dr. Ragan's base salary, fringe benefits, vacation, reimbursement of ordinary and reasonable out-of-pocket expenses and coverage under our Directors' and Officers', or D&O, insurance policies, subject to the terms and conditions of such policies. Dr. Ragan's base salary is currently equal to \$520,000, with an annual target bonus set at 50% of base salary, subject to review and adjustment each year by the board of directors.

If Dr. Ragan's employment is terminated for any reason, Dr. Ragan will be entitled to receive her accrued but unpaid salary, accrued but unused vacation days, the amount of any properly incurred expenses prior to termination not yet reimbursed and other benefits. In addition to the foregoing, if Dr. Ragan's employment is terminated by us without cause or if Dr. Ragan resigns for good reason, each term as defined in the agreement, Dr. Ragan will be entitled to the following: (a) a continuation of base salary for 12 months, (b) a pro-rata portion of Dr. Ragan's at-target annual bonus for the calendar year in which the termination occurs based on the period worked by Dr. Ragan during such calendar year prior to termination, (c) so long as Dr. Ragan is eligible for coverage under our health insurance plan, elects coverage, was covered prior to termination, and elects to exercise her rights under COBRA to continue participation in such plan, we will pay the normal share of costs under such plan until the earlier of 12 months from the date of Dr. Ragan's termination, or the date Dr. Ragan is eligible to receive health benefits through another employer, and (d) Dr. Ragan will become vested in the additional number of outstanding time-based equity awards granted to Dr. Ragan by us that would have otherwise vested had Dr. Ragan remained employed for an additional 12 months after her termination date. In addition, if Dr. Ragan's employment is terminated without cause or if Dr. Ragan resigns for good reason within the one-year period following a change of control, as that term is defined in the agreement, Dr. Ragan will be entitled to automatic vesting in all outstanding time-based equity awards granted to Dr. Ragan by us, subject to the terms and conditions of the agreement. Dr. Ragan agreed to continue to abide by the terms of her non-competition, non-solicitation, non-disclosure and intellectual property agreement.

Adam S. Mostafa

On July 23, 2018, X4 entered into an executive employment agreement with Adam S. Mostafa, pursuant to which Mr. Mostafa agreed to serve as X4's Chief Financial Officer effective as of September 5, 2018. Pursuant to the executive employment agreement, Mr. Mostafa's compensation consisted of base salary, potential annual bonus as determined by the X4 board of directors, a potential equity grant subject to approval by the X4 board of directors, fringe benefits, vacation and reimbursement of ordinary and reasonable out-of-pocket expenses. Mr. Mostafa's initial base salary, which is subject to review and adjustment, was \$340,000. The agreement provided for X4 to pay annual bonuses at X4's sole discretion, as determined by the X4 board of directors, with an annual target bonus set at 35% of base salary. X4 also agreed to grant Mr. Mostafa an option to purchase 659,067 shares of X4 common stock (which share amount has not been adjusted to reflect the conversion of the shares in the Merger based on the exchange ratio of 0.5702 and does not reflect the Reverse Stock Split), subject to approval by the X4 board of directors and subject to certain vesting conditions, which option was granted on October 19, 2018.

On March 13, 2019, in connection with the closing of the Merger, we entered into an amended and restated executive employment agreement with Adam S. Mostafa, pursuant to which Mr. Mostafa agreed to continue serving as our Chief Financial Officer. Pursuant to the agreement, Mr. Mostafa's compensation consists of base salary at an annual rate approved by the board of directors or an appropriate committee thereof, an annual bonus as determined by the board of directors but not less than 25% of Mr. Mostafa's base salary, fringe benefits, vacation, reimbursement of ordinary and reasonable out-of-pocket expenses and coverage under our D&O insurance policies, subject to the terms and conditions of such policies. Mr. Mostafa's base salary is currently equal to \$380,000, with an annual target bonus set at 40% of base salary, subject to review and adjustment each year by the board of directors.

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If Mr. Mostafa's employment is terminated for any reason, Mr. Mostafa is entitled to receive his accrued but unpaid salary, accrued but unused vacation days, the amount of any properly incurred expenses prior to termination not yet reimbursed and other benefits. In addition to the foregoing, if Mr. Mostafa's employment is terminated by us without cause or if Mr. Mostafa resigns for good reason, each term as defined in the agreement, Mr. Mostafa will be entitled to the following: (a) a continuation of base salary for six months, (b) a pro-rata portion of Mr. Mostafa's at-target annual bonus for the calendar year in which the termination occurs based on the period worked by Mr. Mostafa during such calendar year prior to termination, (c) so long as Mr. Mostafa is eligible for coverage under our health insurance plan, elects coverage, was covered prior to termination, and elects to exercise his rights under COBRA to continue participation in such plan, we will pay the normal share of costs under such plan until the earlier of six months from the date of Mr. Mostafa's termination or the date Mr. Mostafa is eligible to receive health benefits through another employer, and (d) Mr. Mostafa will become vested in the additional number of outstanding time-based equity awards granted to Mr. Mostafa by us that would have otherwise vested had Mr. Mostafa remained employed for an additional six months after his termination date. In addition, if Mr. Mostafa's employment is terminated without cause or if Mr. Mostafa resigns for good reason within the one-year period following a change of control, as that term is defined in the agreement, Mr. Mostafa will be entitled to automatic vesting in all outstanding time-based equity awards granted to Mr. Mostafa by us, subject to the terms and conditions of the agreement. Mr. Mostafa agreed to continue to abide by the terms of his non-competition, non-solicitation, non-disclosure and intellectual property agreement.

E. Lynne Kelley, M.D.

On April 22, 2019, we entered into an executive employment agreement with E. Lynne Kelley, M.D., pursuant to which Dr. Kelley agreed to serve as our Chief Medical Officer commencing on April 24, 2019. Pursuant to the executive employment agreement, Dr. Kelley's compensation consists of base salary, potential annual bonus as determined by the board of directors, a potential equity grant subject to approval by the board of directors, fringe benefits, vacation and reimbursement of ordinary and reasonable out-of-pocket expenses. Dr. Kelley's initial base salary, which is subject to review and adjustment, is \$410,000. The agreement provides for the payment of annual bonuses of up to 40% of base salary, as determined at our sole discretion. We also agreed to grant Dr. Kelley an option to purchase 37,170 shares of common stock, subject to approval by the board of directors and subject to certain vesting conditions, which option was granted on April 24, 2019.

If Dr. Kelley's employment is terminated for any reason, Dr. Kelley is entitled to receive her accrued but unpaid salary, accrued but unused vacation days, the amount of any properly incurred expenses prior to termination not yet reimbursed and other benefits. In addition to the foregoing, if Dr. Kelley's employment is terminated by us without cause or if Dr. Kelley resigns for good reason, each term as defined in the agreement, Dr. Kelley will be entitled to the following: (a) a continuation of base salary for six months, (b) a pro-rata portion of Dr. Kelley's at-target annual bonus for the calendar year in which the termination occurs based on the period worked by Dr. Kelley during such calendar year prior to termination, (c) so long as Dr. Kelley is eligible for coverage under our health insurance plan, elects coverage, was covered prior to termination, and elects to exercise her rights under COBRA to continue participation in such plan, we will pay the normal share of costs under such plan until the earlier of six months from the date of Dr. Kelley's termination or the date Dr. Kelley is eligible to receive health benefits through another employer, and (d) Dr. Kelley will become vested in the additional number of outstanding time-based equity awards granted to Dr. Kelley by us that would have otherwise vested had Dr. Kelley remained employed for an additional six months after her termination date. In addition, if Dr. Kelley's employment is terminated without cause or if Dr. Kelley resigns for good reason within the one-year period following a change of control, as that term is defined in the agreement, Dr. Kelley will be entitled to automatic vesting in all outstanding time-based equity awards granted to Dr. Kelley by us, subject to the terms and conditions of the agreement. Dr. Kelley also entered into a non-competition, non-solicitation, non-disclosure and intellectual property agreement with us.

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401(k) Plan

We maintain a defined contribution retirement plan that provides eligible U.S. employees with an opportunity to save for retirement on a tax-advantaged basis. Eligible employees may defer eligible compensation on a pre-tax basis, up to the statutorily prescribed annual limits on contributions under the Internal Revenue Code of 1986, as amended, or the Code. Contributions are allocated to each participant's individual account and are then invested in selected investment alternatives according to the participants' directions. Employees are immediately and fully vested in their contributions. The 401(k) plan is intended to be qualified under Section 401(a) of the Code with the 401(k) plan's related trust intended to be tax exempt under Section 501(a) of the Code. As a tax-qualified retirement plan, contributions to the 401(k) plan and earnings on those contributions are not taxable to the employees until distributed from the 401(k) plan.

Health and Welfare Benefits

All of our full-time employees and certain of our part-time employees are eligible to participate in our employee benefit plans, including our medical, dental, life and long-term disability insurance plans, in each case on the same basis as all of our other employees.

Arsanis Compensation

The material terms of the elements of Arsanis's executive compensation program for 2018 are described below. The share and per share amounts included in this section do not reflect the Reverse Stock Split.

Arsanis's compensation committee set base salaries and bonuses and grants equity incentive awards to its executive officers. In setting base salaries and bonuses and granting equity incentive awards, Arsanis's compensation committee considered compensation for comparable positions in the market, the historical compensation levels of its executives, individual and corporate performance as compared to its expectations and objectives, its desire to motivate its employees to achieve short- and long-term results that are in the best interests of its stockholders, and a long-term commitment to the company. As part of this process, Mr. Gray, as Arsanis's president and chief executive officer, prepared performance evaluations for the other executive officers and recommended annual salary increases, annual stock option awards and cash bonuses to the compensation committee. The compensation committee conducted a performance evaluation of Mr. Gray. The compensation committee consulted with the board of directors as to the achievement of corporate objectives that drive contingent compensation awards.

The compensation committee has the authority to retain compensation consultants and other outside advisors to assist in the evaluation of executive officer compensation.

Base Salary

For 2017, the annualized base salary of each of Arsanis's named executive officers was initially \$350,000 for Mr. Gray, \$310,000 for Dr. Mantus, \$380,000 for Dr. Russo and \$380,000 for Dr. Stevens. In September and October 2017, the board of directors and the compensation committee of the board of directors approved increases in the annualized base salaries of Dr. Russo, Mr. Gray and Mr. Mantus to \$450,000, \$400,000 and \$340,000, respectively, in each case subject to and effective upon the closing of Arsanis's initial public offering and, in the case of Mr. Gray's increase, to be retroactive to September 27, 2017, which was the effective date of Mr. Gray's promotion to the role of Chief Operating Officer and Chief Financial Officer. Mr. Gray previously served as Arsanis's Chief Financial Officer and Chief Business Officer. In June 2018, Arsanis's compensation committee approved an increase to the annualized base salary of Dr. Mantus to \$370,000. In November 2018, Arsanis's compensation committee approved an increase in the annualized base salary of Mr. Gray to \$450,000 effective as of November 27, 2018, which was the effective date of Mr. Gray's promotion to the role of President and Chief Executive Officer.

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Arsanis used base salaries to recognize the experience, skills, knowledge and responsibilities required of all its employees, including its named executive officers. None of the Arsanis named executive officers is currently party to an employment agreement or other agreement or arrangement that provides for automatic or scheduled increases in base salary.

Annual Bonus

The board of directors, in its discretion, awarded bonuses to the named executive officers from time to time. Arsanis typically established annual bonus targets based around a set of specified corporate goals for its named executive officers and conducted an annual performance review to determine the attainment of such goals. Arsanis's management would propose bonus awards to the board of directors primarily based on such review process. Arsanis's board of directors would make the final determination of the eligibility requirements for and the amount of such bonus awards.

Equity Incentives

Although Arsanis did not have a formal policy with respect to the grant of equity incentive awards to its executive officers, or any formal equity ownership guidelines applicable to them, Arsanis believed that equity grants provided its executives with a strong link to its long-term performance, create an ownership culture and helped to align the interests of its executives and its stockholders. In addition, Arsanis believed that equity grants with a time-based vesting feature promoted executive retention because this feature would incent its executive officers to remain in its employment during the vesting period. Accordingly, Arsanis's board of directors would periodically review the equity incentive compensation of its named executive officers and from time to time would grant equity incentive awards to them in the form of stock options. In 2017, based upon Arsanis's overall performance, Arsanis granted to Mr. Gray an option to purchase 97,665 shares of its common stock, to Dr. Mantus an option to purchase 43,949 shares of its common stock, to Dr. Russo an option to purchase 195,331 shares of its common stock, and to Dr. Stevens an option to purchase 43,948 shares of its common stock. In 2018, based upon its overall performance, Arsanis granted to Mr. Gray an option to purchase 110,000 shares of its common stock, to Dr. Mantus an option to purchase 50,000 shares of its common stock, to Dr. Russo an option to purchase 160,000 shares of its common stock, and to Dr. Stevens an option to purchase 50,000 shares of its common stock. These share amounts do not reflect the Reverse Stock Split.

Arsanis would use stock options to compensate its executive officers in the form of initial grants in connection with the commencement of employment and also at various times, often but not necessarily annually, if Arsanis performed as expected or better than expected. Prior to Arsanis's initial public offering, the award of stock options to its executive officers was made by its board of directors or compensation committee. None of Arsanis's executive officers is currently party to an employment agreement that provides for automatic award of stock options. Arsanis granted stock options to its executive officers with time-based vesting. The options that Arsanis granted to its executive officers typically become exercisable as to 25% of the shares underlying the option on the first anniversary of the grant date, and as to an additional 1/48th of the original number of shares underlying the option monthly thereafter. Vesting rights cease upon termination of employment and exercise rights cease shortly after termination, except that vesting is fully accelerated upon certain terminations in connection with a change of control (including the Merger) and exercisability is extended in the case of death or disability. Prior to the exercise of an option, the holder has no rights as a stockholder with respect to the shares subject to such option, including no voting rights and no right to receive dividends or dividend equivalents.

Prior to Arsanis's initial public offering, Arsanis historically granted stock options with exercise prices that are equal to the fair market value of its common stock on the date of grant as determined by its board of directors or compensation committee, based on a number of objective and subjective factors. The exercise price of all stock options granted after the closing of Arsanis's initial public offering is equal to the fair market value of shares of its common stock on the date of grant, which is determined by reference to the closing market price of its common stock on the date of grant.

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In addition, in connection with his promotion to the role of President and Chief Executive Officer in November 2018, Arsanis granted to Mr. Gray a restricted stock award with respect to 250,000 shares of its common stock, which share number does not reflect the Reverse Stock Split. The restricted stock award would vest as to 25% of the shares subject to the award on the one-year anniversary of the date of grant, with the remainder vesting in equal monthly installments until the fourth anniversary of the date of grant, subject to Mr. Gray's continued service with the company. The restricted stock award vested in full upon the closing of the Merger.

Employment and Change in Control Arrangements

Arsanis entered into written offer letters with each of its named executive officers. These agreements set forth the terms of the named executive officer's compensation, including his or her initial base salary, severance and annual cash bonus opportunity. In addition, the agreements provide that the named executive officers are eligible to participate in company-sponsored benefit programs that are available generally to all of our employees.

Arsanis also entered into written bonus retention agreements and/or letter agreements with certain of its named executive officers which replaced such named executive officers' prior severance benefits as set forth in their written offer letters, as described below.

2018 Amended and Restated Employment Agreement for Michael P. Gray

In connection with the appointment of Michael P. Gray as President and Chief Executive Officer of Arsanis, on November 26, 2018, Arsanis entered into an amended and restated employment agreement with Mr. Gray, which agreement became effective as of November 27, 2018 and replaced his October 10, 2017 amended and restated letter agreement. We refer to such amended and restated employment agreement as the Gray 2018 agreement. Under the Gray 2018 agreement, Mr. Gray's base salary was \$450,000 per annum and he was entitled to participate in Arsanis's medical and other benefits programs, and was entitled to receive an annual bonus based on his individual performance and the company's performance during the applicable year, all as determined by Arsanis's board of directors in its sole discretion, at a target bonus rate of 55% of his annualized base salary.

The Gray 2018 agreement provides that the vesting of all equity awards granted to Mr. Gray before the closing of Arsanis's initial public offering on November 20, 2017 would accelerate in full upon a "change of control" of the company (as defined in the Gray 2018 agreement and including the Merger). Specifically, on July 20, 2016, Mr. Gray received a grant of options to purchase 51,274 shares of common stock with an exercise price of \$9.39 per share, which vested in full upon the closing of the Merger. On June 19, 2017, Mr. Gray received a grant of options to purchase 97,665 shares of common stock with an exercise price of \$4.00 per share, which vested in full upon the closing of the Merger. The Gray 2018 agreement also provides that, subject to approval of Arsanis's board of directors, Arsanis would grant Mr. Gray a restricted stock award with respect to 250,000 shares of common stock, which grant Arsanis's board of directors did approve, became effective on November 27, 2018 and vested in full upon the closing of the Merger. Pursuant to the terms of the Gray 2018 agreement, Mr. Gray's employment with the company could be terminated at any time, with or without "cause" (as defined in the Gray 2018 agreement and set forth below) by either Mr. Gray or Arsanis. If Arsanis terminated Mr. Gray's employment without cause or Mr. Gray terminated his employment for "good reason" (as defined in the Gray 2018 agreement and set forth below) he would be entitled to (i) 12 months' pay at his then-current base salary, (ii) a portion of the same year's target bonus, pro-rated to reflect the portion of the year elapsed, and (iii) COBRA premium benefits for up to 12 months. If Arsanis terminated Mr. Gray's employment without cause or Mr. Gray terminated his employment for good reason within 18 months following a change of control of the company, Mr. Gray would be entitled to (i) an amount equal to the sum of (x) 1.5 times his then-current base salary and (y) 1.5 times his target bonus for the year of termination, and (ii) COBRA premium benefits for up to 12 months. In addition, on March 7, 2018, Mr. Gray received a grant of options to purchase 110,000 shares of

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common stock with an exercise price of \$17.34 per share. If Arsanis terminated Mr. Gray's employment without cause or Mr. Gray terminated his employment for good reason, each within 18 months following a change of control (including the Merger), this option would vest in full, and the period during which Mr. Gray would be entitled to exercise certain stock options granted to him in June 2017 would be extended for up to two years following his separation date. As a result of his resignation in connection with the Merger, we paid Mr. Gray severance benefits in March 2019 and his outstanding options and restricted stock vested in full. The Gray 2018 agreement also provides for a limitation on payments under the Gray 2018 agreement if limiting the payments would leave Mr. Gray in a better net position than bearing the tax penalties under Section 280G of the Code.

Pursuant to the Gray 2018 agreement:

The following, as determined by Arsanis's board of directors in its reasonable judgment, constitutes "cause" for termination: (i) the commission of, or indictment or conviction for, any felony, or any other crime involving dishonesty; (ii) participation in any fraud, deliberate and substantial misconduct, breach of duty of loyalty or breach of fiduciary duty against the company; (iii) intentional and substantial damage to any property of the company; (iv) failure of performance of Mr. Gray's duties under the Gray 2018 agreement (not attributable to sickness, disability or death) after reasonable written notice no later than 30 days following the occurrence of the failure and a 30-day opportunity to cure, provided, however, that such opportunity to cure shall only apply to any failure that the board of directors, in its reasonable discretion, deems susceptible to cure; or (v) Mr. Gray's breach of any material provision of the Gray 2018 agreement, his Invention, Non-Competition, Non-Solicitation and Non-Disclosure Agreement, or any other agreement to which he and the company are both parties, after reasonable written notice no later than 30 days following the occurrence of the breach and a 30-day opportunity to cure, provided, however, that such opportunity to cure shall only apply to any breach that the board of directors, in its reasonable discretion, deems susceptible to cure, and that any breach by Mr. Gray of his obligations of confidentiality or non-competition under his non-disclosure agreement shall be deemed not susceptible to cure.

The following, if occurring without Mr. Gray's consent, constitutes "good reason" for termination: (i) a material and adverse diminution of Mr. Gray's duties and responsibilities with the company, provided that such change is not in connection with a termination of his employment relationship with the company; (ii) a material diminution of Mr. Gray's then base salary, provided that such change is not in connection with a termination of his employment relationship with the company; (iii) relocation of Mr. Gray's principal place of employment outside a 30 mile radius from Boston, Massachusetts, if such relocation increases his daily commuting distance; or (iv) a material breach by the company of the Gray 2018 agreement.

"Change of control" means the first to occur of any of the following: (i) a merger or consolidation, business combination, acquisition or similar transaction (a "Transaction") in which (A) the company is a constituent party, or (B) a subsidiary of the company is a constituent party and the company issues shares of its capital stock pursuant to such Transaction, except in the case of either clause (A) or (B) any such Transaction involving the company or a subsidiary of the company in which the beneficial owners of the shares of our capital stock outstanding immediately prior to such Transaction continue beneficially to own, immediately following such Transaction, at least a majority by voting power of our capital stock of (x) the surviving or resulting corporation or (y) if the surviving or resulting corporation is a wholly owned subsidiary of another corporation immediately following such Transaction, the parent corporation of such surviving or resulting corporation; (ii) the sale, lease, transfer, exclusive license or other disposition, in a single transaction or series of related transactions, by the company or a subsidiary of the company of all or substantially all the assets of the company and the company's subsidiaries taken as a whole (except in connection with a Transaction not constituting a change of control under clause (i) or where such sale, lease, transfer, exclusive license or other disposition is to a wholly owned subsidiary of the company); or (iii) the sale or transfer, in a single transaction or series of related transactions, by our stockholders of more than 50% by voting power of our then-outstanding capital stock to any person or entity or group of affiliated persons or entities.

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Amended and Restated Letter Agreement and Retention Bonus Agreement for Dr. David Mantus

On November 26, 2018, Arsanis entered into a retention bonus agreement with Dr. David Mantus, Arsanis's Chief Development Officer, which replaced Dr. Mantus's existing severance benefits as set forth in the amended and restated letter agreement, dated October 10, 2017, between Dr. Mantus and us. Dr. Mantus was eligible to receive payment from the company for benefits continuation and any equity acceleration provided by his amended and restated letter agreement. Under his retention bonus agreement, Dr. Mantus was eligible for a retention bonus payment of \$481,000 upon the earliest to occur of the following, subject to Dr. Mantus's continued service with the company on such date: (i) March 31, 2019, (ii) the closing of a "change of control" of the company (as defined in the retention bonus agreement and including the Merger), (iii) the termination of Dr. Mantus's employment by the company without "cause" (as defined in the retention bonus agreement and set forth below), or (iv) Dr. Mantus's death. Dr. Mantus's receipt of the retention bonus payment was conditioned upon his entering into a release of claims agreement in favor of the company. Dr. Mantus's retention bonus was paid in March 2019.

Except as expressly modified by the retention bonus agreement, Dr. Mantus's amended and restated letter agreement remains in full force and effect. Dr. Mantus's amended and restated letter agreement provides that the vesting of all equity awards granted to Dr. Mantus before the closing of Arsanis's initial public offering on November 20, 2017 would accelerate in full upon a "change of control" of the company (as defined in the amended and restated employment agreement), which equity awards vested in full as a result of the Merger. The amended and restated letter agreement also provides Dr. Mantus's employment with us may be terminated at any time, with or without "cause" (as defined in the amended and restated letter agreement and set forth below) by either Dr. Mantus or us. If we terminate Dr. Mantus's employment without cause or Dr. Mantus terminates his employment for "good reason" (as defined in the amended and restated letter agreement and set forth below), he will be entitled to COBRA premium benefits for up to 12 months. If we terminate Dr. Mantus's employment without cause or Dr. Mantus terminates his employment for good reason within 12 months following a change of control of the company, Dr. Mantus will be entitled to (i) COBRA premium benefits for up to 12 months; and (ii) vesting in full of all unvested stock options and other equity awards then held by him. The amended and restated letter agreement also provides for a limitation on payments under the agreement if limiting the payments would leave Dr. Mantus in a better net position than bearing the tax penalties under Section 280G of the Code.

On February 26, 2016, Dr. Mantus received a grant of options to purchase 14,649 shares of our common stock with an exercise price of \$8.33 per share. On July 20, 2016, Dr. Mantus received a grant of options to purchase 11,719 shares of our common stock with an exercise price of \$9.39 per share. On June 19, 2017, Dr. Mantus received a grant of options to purchase 43,949 shares of our common stock with an exercise price of \$4.00 per share. Each of these option grants vested in full upon the closing of the Merger.

On March 7, 2018, Dr. Mantus received a grant of options to purchase 50,000 shares of our common stock with an exercise price of \$17.34 per share. If we terminate Dr. Mantus's employment without cause or Dr. Mantus terminates his employment for good reason, each within 12 months following a change of control, these options will vest in full.

Pursuant to Dr. Mantus's amended and restated letter agreement and retention bonus agreement:

The following, as determined by the board of directors in its reasonable judgment, constitutes "cause" for termination: (i) the commission of, or indictment or conviction for, any felony, or any other crime involving dishonesty; (ii) participation in any fraud, deliberate and substantial misconduct, breach of duty of loyalty or breach of fiduciary duty against the company; (iii) intentional and substantial damage to any property of the company; (iv) failure of performance of Dr. Mantus's duties (not attributable to sickness, disability or death) after reasonable written notice no later than 30 days following the occurrence of the failure and a 30-day opportunity to cure, provided, however, that such opportunity to cure shall only apply to any failure that the our board of directors, in its reasonable discretion, deems susceptible to cure; or (v) Dr. Mantus's breach of any material provision of his amended and restated letter agreement, his Invention, Non-Competition,

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Non-Solicitation and Non-Disclosure Agreement, or any other agreement to which he and the company are both parties, after reasonable written notice no later than 30 days following the occurrence of the breach and a 30-day opportunity to cure, provided, however, that such opportunity to cure shall only apply to any breach that the board of directors, in its reasonable discretion, deems susceptible to cure, and that any breach by Dr. Mantus of his obligations of confidentiality or non-competition under his non-disclosure agreement shall be deemed not susceptible to cure.

“Change of control” means the first to occur of any of the following: (i) a merger or consolidation, business combination, acquisition or similar transaction (a “Transaction”) in which (A) the company is a constituent party, or (B) a subsidiary of the company is a constituent party and the company issues shares of capital stock pursuant to such Transaction, except in the case of either clause (A) or (B) any such Transaction involving the company or a subsidiary of the company in which the beneficial owners of the shares of the company’s capital stock outstanding immediately prior to such Transaction continue beneficially to own, immediately following such Transaction, at least a majority by voting power of the capital stock of (x) the surviving or resulting corporation or (y) if the surviving or resulting corporation is a wholly owned subsidiary of another corporation immediately following such Transaction, the parent corporation of such surviving or resulting corporation; (ii) the sale, lease, transfer, exclusive license or other disposition, in a single transaction or series of related transactions, by the company or a subsidiary of the company of all or substantially all the assets of the company and the company’s subsidiaries taken as a whole (except in connection with a Transaction not constituting a change of control under clause (i) or where such sale, lease, transfer, exclusive license or other disposition is to a wholly owned subsidiary of the company); or (iii) the sale or transfer, in a single transaction or series of related transactions, by the company’s stockholders of more than 50% by voting power of our then-outstanding capital stock to any person or entity or group of affiliated persons or entities.

Pursuant to Dr. Mantus’s amended and restated letter agreement:

The following, if occurring without Dr. Mantus’s consent, constitutes “good reason” for termination: (i) a material and adverse diminution of Dr. Mantus’s duties and responsibilities with the company, provided that such change is not in connection with a termination of his employment relationship with the company; (ii) a material diminution of Dr. Mantus’s then base salary, provided that such change is not in connection with a termination of his employment relationship with the company; (iii) relocation of Dr. Mantus’s principal place of employment outside a 30 mile radius from Boston, Massachusetts, if such relocation increases his daily commuting distance; or (iv) a material breach by the company of Dr. Mantus’s amended and restated letter agreement.

Letter Agreement for Dr. René Russo

In connection with Dr. Russo stepping down from her position as President and Chief Executive Officer of Arsanis, on November 26, 2018, Dr. Russo signed a letter agreement, which upon expiration of a release revocation period replaces Dr. Russo’s existing severance benefits as set forth in the amended and restated letter agreement, dated October 10, 2017, between Dr. Russo and Arsanis. Under the November 2018 letter agreement, in exchange for, among other things, her general release of claims in favor of the company, Dr. Russo is entitled to severance benefits comprised of (i) a lump-sum payment of \$1,046,250; (ii) COBRA premium benefits for up to 18 months; and (iii) the vesting in full of all unvested stock options then held by Dr. Russo. In addition, Arsanis agreed to extend the period during which Dr. Russo may exercise the stock options granted to her in June 2017 for up to two years following her separation date, and also agreed to waive Dr. Russo’s post-employment non-competition obligations.

On July 22, 2015, Dr. Russo received a grant of options to purchase 80,889 shares of common stock with an exercise price of \$8.20 per share. On July 20, 2016, Dr. Russo received a grant of options to purchase 47,757 shares of common stock with an exercise price of \$9.39 per share. On June 19, 2017, Dr. Russo received a grant of options to purchase 195,331 shares of common stock with an exercise price of \$4.00 per share. As described above, Dr. Russo will have the right to exercise this June 2017 option for a period of up to two-years following

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her separation date. On March 7, 2018, Dr. Russo received a grant of options to purchase 160,000 shares of common stock with an exercise price of \$17.34 per share. All unvested stock options held by Dr. Russo vested in full upon her letter agreement becoming effective and irrevocable.

Notwithstanding her stepping down as President and Chief Executive Officer of the company, Dr. Russo's equity awards will remain outstanding in accordance with their terms (subject to the provisions of her letter agreement described above) for so long as she continues to serve as a director of the Company following the Merger.

Letter Agreement for Dr. Christopher Stevens

Effective January 15, 2019, Dr. Stevens stepped down from his position as Chief Medical Officer of Arsanis. In connection with the termination of his employment, Dr. Stevens signed a letter agreement, dated January 15, 2019, which upon expiration of a revocation period replaces Dr. Stevens's existing severance benefits as set forth in the retention bonus agreement, dated November 26, 2018, between Dr. Stevens and Arsanis and the amended and restated letter agreement, dated October 10, 2017, between Dr. Stevens and Arsanis. Under the January 2019 letter agreement, in exchange for, among other things, his general release of claims in favor of the company, Dr. Stevens is entitled to severance benefits comprised of (i) a lump-sum payment of \$494,000; (ii) COBRA premium benefits for up to 12 months; and (iii) the vesting in full of all unvested stock options then held by Dr. Stevens, which will remain exercisable for the period of time set forth in the applicable grant agreement. In addition, we agreed to waive Dr. Stevens's post-employment non-competition obligations.

On July 20, 2016, Dr. Stevens received a grant of options to purchase 26,369 shares of our common stock with an exercise price of \$9.39 per share. On June 19, 2017, Dr. Stevens received a grant of options to purchase 43,948 shares of common stock with an exercise price of \$4.00 per share. On March 7, 2018, Dr. Stevens received a grant of options to purchase 50,000 shares of common stock with an exercise price of \$17.34 per share. All unvested stock options held by Dr. Stevens vested in full upon his letter agreement becoming effective and irrevocable as of January 22, 2019.

Other Agreements

Each of the Arsanis named executive officers entered into a standard form agreement with respect to non-competition, non-solicitation, confidential information and assignment of inventions. Under this agreement, each Arsanis named executive officer agreed not to compete with us during his or her employment and for a period of one year after the termination of his or her employment, not to solicit our employees, consultants, clients or customers during his or her employment and for a period of one year after the termination of his or her employment, and to protect our confidential and proprietary information indefinitely. In addition, under this agreement, each named executive officer has agreed that we own all inventions that are developed by such executive officer during his or her employment with us that are within the field of monoclonal antibody-based therapeutic treatments for infectious diseases. Each named executive officer also agreed to provide us with a non-exclusive, royalty-free, perpetual license to use any prior inventions that such executive officer incorporates into inventions assigned to us under this agreement.

401(k) Retirement Plan

We maintain a defined contribution employee retirement plan for Arsanis's employees, including the named executive officers. The plan is intended to qualify as a tax-qualified 401(k) plan so that contributions to the 401(k) plan, and income earned on such contributions, are not taxable to participants until withdrawn or distributed from the 401(k) plan (except in the case of contributions under the 401(k) plan designated as Roth contributions). Under the 401(k) plan, each employee is fully vested in his or her deferred salary contributions. Employee contributions are held and invested by the plan's trustee as directed by participants. The 401(k) plan

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provides us with the discretion to match employee contributions, but to date we have not provided any employer matching contributions.

Tax Considerations

The compensation committee of our board of directors considers the potential future effects of Section 162(m) of the Code on compensation paid to our named executive officers. Section 162(m) of the Code generally disallows a tax deduction to public companies for compensation in excess of \$1 million paid to each of the company's chief executive officer and the three most highly compensated executive officers (other than the chief executive officer and chief financial officer). Pursuant to tax legislation signed into law on December 22, 2017 (the "Tax Act"), for taxable years beginning after December 31, 2017, the Section 162(m) deduction limitation is expanded so that it also applies to compensation in excess of \$1 million paid to a public company's chief financial officer. Historically, compensation that qualified under Section 162(m) as performance-based compensation was exempt from the deduction limitation. However, subject to certain transition rules, the Tax Act eliminated the qualified performance-based compensation exception. As a result, for taxable years beginning after December 31, 2017, all compensation in excess of \$1 million paid to each of the executives described above (other than certain grandfathered compensation or compensation paid pursuant to certain equity awards granted before or during a transition period following Arsanis's initial public offering) will not be deductible by us.

Director Compensation

Arsanis Director Compensation

Under Arsanis's director compensation program, Arsanis paid its non-employee directors a cash retainer for service on the board of directors and for service on each committee on which the director is a member. The chairman of the board, the lead independent director and the chair of each committee received higher retainers for such service. These fees were payable in arrears in four equal quarterly installments on the last day of each quarter, provided that the amount of such payment would be prorated for any portion of such quarter that the director was not serving on the board of directors, on such committee or in such position. The fees paid to non-employee directors for service on the board of directors, for service as a lead independent director and for service on each committee of the board of directors on which the director is a member were as follows. The share and per share amounts included in this section "Arsanis Director Compensation" do not reflect the Reverse Stock Split.

	Member Annual Fee	Chairman Annual Fee	Lead Independent Director Annual Fee
Board of Directors	\$35,000	\$75,000	\$50,000
Audit Committee	\$ 7,500	\$15,000	—
Compensation Committee	\$ 5,000	\$10,000	—
Nominating and Corporate Governance Committee	\$ 4,000	\$ 8,000	—

Arsanis also reimbursed its non-employee directors for reasonable travel and other expenses incurred in connection with attending meetings of the board of directors and any committee of the board of directors on which they served.

In addition, under Arsanis's director compensation program, Arsanis granted the directors who were in office at the time of the closing of Arsanis's initial public offering, and would grant to new non-employee directors upon their initial election to the board of directors, an option to purchase 25,000 shares of common stock. Each of these options would vest as to 33.3333% of the shares of common stock underlying such option on the first anniversary of the date of grant, with the remainder vesting in equal monthly installments until the third anniversary of the date of grant, subject to the non-employee director's continued service as a director. Further,

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on the dates of each of Arsanis's annual meetings of stockholders, each non-employee director that has served on the board of directors for at least six months will automatically receive, under our 2017 Equity Incentive Plan, or the 2017 Plan, an option to purchase 10,000 shares of common stock. Each of these options would vest in equal monthly installments until the first anniversary of the date of grant (or, if earlier, the date of our next annual meeting of stockholders following the date of grant) unless otherwise provided at the time of grant, subject to the non-employee director's continued service as a director, with full acceleration of vesting upon a change in control of the company. All options issued to non-employee directors under the director compensation program were issued at exercise prices equal to the closing price of the common stock on the date of grant.

Mr. Gray, an Arsanis director who also served as President and Chief Executive Officer and Chief Financial Officer until the closing of the Merger, did not receive any additional compensation for his service as a director. Dr. Russo also served as President and Chief Executive Officer during 2018, until she stepped down from such positions on November 26, 2018. Dr. Russo did not receive any additional compensation for her service as a director. Mr. Gray and Dr. Russo are two of our named executive officers and, accordingly, the compensation that we pay to Mr. Gray and Dr. Russo is discussed under "—Summary Compensation Table" and "—Narrative Disclosure to Summary Compensation Table."

The following table sets forth information regarding compensation earned by Arsanis's non-employee directors during fiscal 2018.

Name	Fees Earned or Paid in Cash (\$)	Option Awards (\$)(1)	Total (\$)
Tillman U. Gerngross, Ph.D.	94,615	111,785	206,400
William Clark, M.B.A.	47,871	111,785	159,656
Carl Gordon, Ph.D., C.F.A.	47,871	111,785	159,656
David McGirr, M.B.A.	56,319	111,785	168,104
Terrance McGuire	48,434	111,785	160,219
Claudio Nessi, Ph.D., M.B.A.	39,423	111,785	151,208
Michael Ross, Ph.D.	45,055	111,785	156,840
Amy Schulman, J.D.	72,088	111,785	183,873

- (1) The amounts reported in the "Option Awards" column reflect the aggregate fair value of stock-based compensation awarded during the year computed in accordance with the provisions of ASC 718. See Note 12 to Arsanis's consolidated financial statements appearing in Arsanis's Annual Report on Form 10-K for the year ended December 31, 2018 filed with the SEC on March 11, 2019, regarding assumptions underlying the valuation of equity awards.

As of December 31, 2018, Arsanis's non-employee directors held the following stock options, all of which were granted under our 2010 Special Stock Incentive Plan, as amended, or the 2010 Plan, our 2011 Stock Incentive Plan, or 2011 Plan, and our 2017 Plan:

Name	Option Awards
Tillman U. Gerngross, Ph.D.	100,484
William Clark, M.B.A.	35,000
Carl Gordon, Ph.D., C.F.A.	35,000
David McGirr, M.B.A.	35,000
Terrance McGuire	35,000
Claudio Nessi, Ph.D., M.B.A.	35,000
Michael Ross, Ph.D.	35,000
Amy Schulman, J.D.	41,482
René Russo	483,977

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Director Compensation Policy Following the Merger

On March 13, 2019, we adopted a director compensation policy based on Arsanis's existing director compensation program. Pursuant to the policy, the annual retainer for non-employee directors is \$35,000 and the annual retainer for the chair of the board of directors is \$75,000. Annual retainers for committee membership are as follows:

Audit committee chairperson	\$15,000
Audit committee member	\$ 7,500
Compensation committee chairperson	\$10,000
Compensation committee member	\$ 5,000
Nominating and corporate governance committee chairperson	\$ 8,000
Nominating and corporate governance committee member	\$ 4,000

These fees are payable in arrears in four equal quarterly installments on the last day of each quarter, provided that the amount of such payment will be prorated for any portion of such quarter that a director is not serving on the our board of directors, on such committee or in such position. Non-employee directors are also reimbursed for reasonable out-of-pocket business expenses incurred in connection with attending meetings of the board of directors and any committee of the board of directors on which they serve and in connection with other business related to the board of directors. Directors may also be reimbursed for reasonable out-of-pocket business expenses authorized by the board of directors or a committee that are incurred in connection with attending conferences or meetings with management in accordance with a travel policy, as may be in effect from time to time.

In addition to the above fees, the board of directors may determine that additional committee fees are appropriate and should be payable for any newly created committee of the board of directors.

In addition, we grant to new non-employee directors upon their initial election to the board of directors, an option to purchase 6,854 shares of our common stock at an exercise price equal to the closing price of our common stock on the date of grant. Each of these options has a term of 10 years from the date of the award and vests as to 33.3333% of the shares of common stock underlying such option on the first anniversary of the date of grant, with the remainder vesting in equal monthly installments of 2.7777% of the shares of common stock underlying such option until the 36-month anniversary of the date of grant, subject to the non-employee director's continued service as a director. This vesting accelerates as to 100% of the shares upon a change in control of the Company.

Further, on the dates of each of our annual meetings of stockholders, each non-employee director that has served on our board of directors for at least six months automatically receives an option to purchase 3,427 shares of our common stock at an exercise price equal to the closing price of our common stock on the date of the grant. Each of these options has a term of 10 years from the date of the award and vests in equal monthly installments of 8.333% of the shares of our common stock underlying such option until the 12-month anniversary of the date of grant (or, if earlier, the date of our next annual meeting of stockholders following the date of grant) unless otherwise provided at the time of grant, subject to the non-employee director's continued service as a director, with 100% acceleration of vesting upon a change in control of the Company.

EQUITY COMPENSATION PLAN INFORMATION

<u>Plan Category</u>	<u>Number of securities to be issued upon exercise of outstanding options, warrants and rights</u>	<u>Weighted average exercise price of outstanding options, warrants and rights</u>	<u>Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))</u>
	(a)	(b)	(c)
Equity compensation plans approved by security holders	1,953,804 (1)	\$10.16 (2)	308,288 (3)
Equity compensation plans not approved by security holders	—	—	—
Total	1,953,804	\$ 10.16	308,288 (4)

- (1) Consists of (i) 103,100 shares to be issued upon exercise of outstanding options under our 2010 Special Stock Incentive Plan, as amended, or the 2010 Plan, as of December 31, 2018, (ii) 967,404 shares to be issued upon exercise of outstanding options under our 2011 Stock Incentive Plan, or 2011 Plan, as of December 31, 2018 and (iii) 883,300 shares to be issued upon exercise of outstanding options under our 2017 Plan as of December 31, 2018.
- (2) Consists of the weighted average exercise price of the 1,953,804 stock options outstanding on December 31, 2018.
- (3) Consists of (i) 308,288 shares that remained available for future issuance under our 2017 Plan as of December 31, 2018, and (ii) 219,111 shares that remained available for future issuance under our 2017 Employee Stock Purchase Plan, or 2017 ESPP, as of December 31, 2018. No shares remained available for future issuance under the 2010 Plan or 2011 Plan as of December 31, 2018.
- (4) Our 2017 Plan has an evergreen provision that allows for an annual increase in the number of shares available for issuance under the 2017 Plan to be added on the first day of each fiscal year, beginning with the fiscal year ended December 31, 2018 and continuing for each fiscal year until, and including, the fiscal year ending December 31, 2027, equal to the least of 1,025,490 shares of our common stock, 4% of the number of shares of our common stock outstanding on the first day of the applicable fiscal year and an amount determined by our board of directors. On January 1, 2019, 582,889 additional shares were reserved for issuance under the 2017 Plan pursuant to this provision. Our 2017 ESPP has an evergreen provision that allows for an annual increase in the number of shares available for issuance under the 2017 ESPP to be added on the first day of each fiscal year, beginning on January 1, 2019 and ending on December 31, 2029, in an amount equal to the least of 512,745 shares of our common stock, 2% of the total number of shares of our common stock outstanding on the first day of the applicable fiscal year and an amount determined by our board of directors. On January 1, 2019, 291,444 additional shares were reserved for issuance under the 2017 ESPP pursuant to this provision. In addition, upon the closing of the Merger on March 13, 2019, we assumed the X4 Plan. As of March 13, 2019, there were options to purchase an aggregate of 751,929 shares of common stock outstanding under the X4 Plan and 217,411 shares of our common stock reserved for future issuance under the X4 Plan.

REPORT OF AUDIT COMMITTEE

The audit committee of our board of directors, which consists entirely of directors who meet the independence and experience requirements of the Nasdaq Stock Market, has furnished the following report:

The audit committee assists our board of directors in overseeing and monitoring the integrity of our financial reporting process, compliance with legal and regulatory requirements and the quality of internal and external audit processes. This committee's role and responsibilities are set forth in our charter adopted by our board of directors, which is available on our website at www.x4pharma.com. This committee reviews and reassesses our charter annually and recommends any changes to our board of directors for approval. The audit committee is responsible for overseeing our overall financial reporting process, and for the appointment, compensation, retention, and oversight of the work of PricewaterhouseCoopers LLP. In fulfilling its responsibilities for the Arsanis, Inc., or Arsanis, financial statements for the fiscal year ended December 31, 2018, the audit committee of Arsanis took the following actions:

- Reviewed and discussed the audited financial statements for the fiscal year ended December 31, 2018 with management and PricewaterhouseCoopers LLP, our independent registered public accounting firm;
- Discussed with PricewaterhouseCoopers LLP the matters required to be discussed in accordance with Auditing Standard No. 1301—*Communications with Audit committees*; and
- Received written disclosures and the letter from PricewaterhouseCoopers LLP regarding its independence as required by applicable requirements of the Public Company Accounting Oversight Board regarding PricewaterhouseCoopers LLP's communications with the audit committee and the audit committee further discussed with PricewaterhouseCoopers LLP its independence. The audit committee of Arsanis also considered the status of pending litigation, taxation matters and other areas of oversight relating to the financial reporting and audit process that the committee determined appropriate.

Based on the Arsanis audit committee's review of the audited financial statements and discussions with management and PricewaterhouseCoopers LLP, the Arsanis audit committee recommended to the Arsanis board of directors that the audited financial statements be included in the Arsanis Annual Report on Form 10-K for the fiscal year ended December 31, 2018 for filing with the SEC.

Members of the X4 Pharmaceuticals, Inc. Audit Committee

David McGirr
Isaac Blech
Michael S. Wyzga

The material in this report is not "soliciting material," is not deemed "filed" with the SEC and is not to be incorporated by reference in any filing of the Company under the Securities Act of 1933, as amended, or the Exchange Act, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

SECTION 16(a) BENEFICIAL OWNERSHIP REPORTING COMPLIANCE

Section 16(a) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, requires our directors and executive officers, and persons who own more than ten percent of a registered class of our equity securities, to file with the SEC initial reports of ownership and reports of changes in ownership of our common stock and other equity securities. Officers, directors and greater than ten percent stockholders are required by SEC regulations to furnish us with copies of all Section 16(a) forms they file.

To our knowledge, based solely on a review of the copies of such reports furnished to us and written representations regarding the filing of required reports, we believe that all Section 16(a) filing requirements applicable to our directors, executive officers and greater-than-ten-percent beneficial owners with respect to fiscal 2018 were met.

CERTAIN RELATIONSHIPS AND RELATED PERSON TRANSACTIONS

Policies and Procedures for Related Person Transactions

Our board of directors has adopted a written related person transaction policy to set forth policies and procedures for the review of any transaction, arrangement or relationship in which our company is a participant, the amount involved exceeds \$120,000, and one of our executive officers, directors, director nominees or 5% stockholders, or their immediate family members, each of whom we refer to as a “related person,” has a direct or indirect material interest.

If a related person proposes to enter into such a transaction, arrangement or relationship, which we refer to as a “related party transaction,” the related person must report the proposed related person transaction to our chief financial officer. The policy calls for the proposed related person transaction to be reviewed and approved by our audit committee. Whenever practicable, the reporting, review and approval will occur prior to entry into the transaction. If advance review and approval is not practicable, the committee will review and, in its discretion, may ratify the related person transaction. The policy also permits the chair of the audit committee to review and, if deemed appropriate, approve proposed related person transactions that arise between committee meetings, subject to ratification by the committee at its next meeting. Any related person transactions that are ongoing in nature will be reviewed annually.

A related person transaction reviewed under this policy will be considered approved or ratified if it is authorized by the audit committee in accordance with the standards set forth in the policy after full disclosure of the related person’s interests in the transaction. As appropriate for the circumstances, the policy provides that the audit committee will review and consider:

- the related person’s interest in the related person transaction;
- the approximate dollar value of the amount involved in the related person transaction;
- the approximate dollar value of the amount of the related person’s interest in the transaction without regard to the amount of any profit or loss;
- whether the transaction was undertaken in the ordinary course of our business;
- whether the terms of the transaction are no less favorable to us than the terms that could have been reached with an unrelated third party;
- the purpose of, and the potential benefits to us of, the transaction; and
- any other information regarding the related person transaction or the related person in the context of the proposed transaction that would be material to investors in light of the circumstances of the particular transaction.

The audit committee may approve or ratify the related person transaction only if the audit committee determines that, under all of the circumstances, the transaction is in our best interests. The audit committee may impose any conditions on the related person transaction as it deems appropriate. The policy also provides that transactions involving compensation of executive officers will be reviewed and approved by our compensation committee in the manner specified in its charter.

Related Person Transactions

In addition to the compensation arrangements with directors and executive officers described elsewhere in this proxy statement, since January 1, 2017, we have engaged in, or currently propose to engage in, the following transactions in which the amount involved exceeds \$120,000 and any of our executive officers, directors, director nominees or 5% stockholders, or their immediate family members, or any person who was in any of those categories at the time of such transaction, had or has a direct or indirect material interest. We believe that all of these transactions were on terms comparable to terms that could have been obtained from unrelated third parties.

Arsanis Related Person Transactions

Services and Facilities Agreement with EveliQure Biotechnologies GmbH

Our subsidiary, Arsanis Biosciences GmbH, leases approximately 1,500 square meters of office and lab space from Marxbox Bauprojekt GmbH & Co. OG. In February 2015, Arsanis Biosciences GmbH entered into a services and facilities agreement with EveliQure Biotechnologies GmbH, or EveliQure, under which Arsanis provided certain laboratory services and sublet approximately 150 square meters of office and lab space. Tamás Henics, the husband of Eszter Nagy, Arsanis's former Chief Scientific Officer and director, serves as Chief Scientific Officer at EveliQure.

On June 28, 2018 and in accordance with the terms of this agreement with EveliQure, Arsanis provided EveliQure with written notice that the services and facilities agreement will terminate and EveliQure will vacate the sublet space no later than December 31, 2018. As of December 31, 2018, Arsanis had vacated the office and lab space and its services and facilities agreement with EveliQure was terminated.

During the years ended December 31, 2018 and 2017, Arsanis received payments from EveliQure under the agreement of \$0.2 million and less than \$0.1 million, respectively. As of December 31, 2018 and 2017, amounts due from EveliQure totaled less than \$0.1 million. These amounts included rental charges as well as amounts attributable to facilities and laboratory services.

Agreements with Adimab, LLC

Arsanis entered into two agreements with Adimab, LLC, or Adimab, the Adimab Collaboration Agreement and the Adimab Option Agreement, under which Arsanis was granted exclusive options to obtain ownership or exclusive worldwide licenses under specified patents relating to the development and commercialization of monoclonal antibodies. Tillman U. Gemgross, Ph.D., the former chairman of Arsanis's board of directors, is a co-founder of Adimab and currently serves as its chief executive officer. The following descriptions of the agreements with Adimab are summaries and are qualified by reference to the underlying agreements.

Adimab Collaboration Agreement

In May 2011, Arsanis entered into a collaboration agreement with Adimab, which, as amended, and together with certain applicable option exercise letters Arsanis sent to Adimab, we refer to as the Adimab Collaboration Agreement. Under the Adimab Collaboration Agreement, Adimab and Arsanis were required to use reasonable efforts to conduct certain research, which Arsanis funded, to discover and optimize antibodies directed against targets selected by Arsanis. Prior to Arsanis's exercise of an option, (1) Arsanis and Adimab each grant the other a non-exclusive license to the relevant intellectual property Arsanis owns to allow each party to carry out its rights and obligations in connection with the research, and (2) except for Adimab's retained right to continue using and licensing its own libraries, each party agrees not to practice or license the patents arising out of the research that it owns for any purpose other than to carry out its rights and obligations in connection with the research.

With respect to each target that was the subject of the research, Arsanis had an exclusive option to obtain, with respect to a specified number of antibodies directed against such target and discovered or optimized by Adimab, (1) ownership of certain patent rights relating to such antibodies and (2) exclusive and non-exclusive licenses, with the right to grant sublicenses, in all human therapeutic, prophylactic and diagnostic areas, which we refer to as the licensed field, under certain patent rights and know-how, to research, develop, make, have made, use, sell, offer to sell, import and export such antibodies and products based on such antibodies (but not for antibody discovery purposes). In addition, upon exercise of each option, certain contractual restrictions on Arsanis's ability to prosecute, practice and license certain patents owned by Arsanis that arose out of the research were eliminated. All of Arsanis's options under the Adimab Collaboration Agreement have expired, or, with respect to multiple targets and hundreds of antibodies, have already been exercised.

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Under the Adimab Collaboration Agreement, for each target for which Arsanis has exercised an option, we are required to use commercially reasonable efforts to develop and commercialize at least one product in major markets. If we do not fulfill these diligence obligations, Adimab may consider it a material breach, allowing Adimab to terminate the agreement with respect to such target and all associated products. We are obligated to pay Adimab royalties at a mid-single-digit percentage of net sales, made by us or our affiliates, of products based on antibodies for which Arsanis exercised its option, or products that use or are based on any antibody discovered or optimized under the agreement, any derivative or modified version of any such antibody, or any sequence information as to any such antibody.

If we (or one of our affiliates with rights under the agreement) undergoes a change in control and, at the time of such change in control, we have not sold or licensed to third parties all of our rights in antibodies for which we are obligated to pay Adimab royalties under the agreement (which rights we refer to as undesignated rights), then we are obligated to either pay Adimab a percentage, in the mid double digits of the payments we receive from that change in control that are reasonably attributable to those undesignated rights and certain patents arising from the collaboration, or require our acquirer and all of its future third party collaborators to pay to Adimab the royalties described above with respect to net sales of all products based on those undesignated rights. As a result of the Merger, this royalty election was made by Arsanis. If we grant rights to a third party under certain patents that are not directed to the antibodies for which we are obligated to pay Adimab royalties, we are also obligated to pay Adimab, in place of royalties or a percentage of payments received from the third party, a lump sum in the high six digits.

If we sell or license to any third party, or otherwise grant rights to any third party to, any of the products for which we are obligated to pay Adimab royalties, either alone or as part of a package including specified patents not directed to these antibodies, we are obligated to pay Adimab either the same royalties on net sales of such products by such third party, or a percentage, ranging from the low double digits to a maximum of less than 30%, of the payments we receive from such third parties that are attributable to such grant of rights. In April 2017, Arsanis entered into a letter agreement with the Gates Foundation (described below), pursuant to which Arsanis licensed to the Gates Foundation certain rights under its ASN100 program.

Notwithstanding the payment obligations described above, we have no payment obligations under the Adimab Collaboration Agreement with respect to sales of certain antibody products if they are sold at cost in developing countries under Arsanis's April 2017 letter agreement with the Bill & Melinda Gates Foundation. However, if such products are sold in developing countries for an amount that exceeds cost, then the amount of such excess over cost will be subject to the royalty payment obligations.

The Adimab Collaboration Agreement will expire on a country-by-country basis twelve years after the first commercial sale in such country of the last product for which we are obligated to pay Adimab royalties in such country under the agreement. We have the right to terminate the agreement for any reason by providing Adimab with a specified amount of prior written notice. Adimab has the right to terminate the agreement if we materially breach the agreement. If Adimab terminates the agreement for our breach, or if we terminate the agreement for our convenience, then we must transfer or license to Adimab certain rights and assets relating to targets and antibodies for which Arsanis exercised its option. Adimab is then obligated to make payments to us with respect to these targets and antibodies that are similar to the payments we were required to make to Adimab during the term of the agreement. Certain of our payment obligations relating to specified products and patents arising from the agreement survive expiration or termination of the agreement. Under the Adimab Collaboration Agreement, as of December 31, 2018, Arsanis had paid Adimab approximately \$4.3 million in the aggregate, consisting of upfront payments and reimbursement for research conducted by Adimab.

Adimab Option and License Agreement

In February 2017, Arsanis entered into an option and license agreement with Adimab, which we refer to as the Adimab Option Agreement. Under the Adimab Option Agreement, Adimab has provided to us certain

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proprietary antibodies against respiratory syncytial virus, or RSV, which we refer to as the initial RSV antibodies, for our evaluation during a specified option period and has granted us an exclusive, non-sublicensable license under certain Adimab patent rights and know-how during the option period to create, research, optimize, make, have made and use the initial RSV antibodies and modified or derivative forms of the initial RSV antibodies.

Under the Adimab Option Agreement, we have an exclusive option, exercisable during the option period upon payment of an option fee to Adimab, to require Adimab to assign to us all rights in up to a specified number of RSV antibodies selected by us, which we refer to as the selected RSV antibodies, and certain patent rights owned by Adimab that cover these antibodies, and to obtain from Adimab a non-exclusive license, with the right to grant sublicenses, under certain other patent rights and know-how owned by Adimab, to research, develop, have developed, make, have made, use, sell, offer to sell, import and export products based on the selected RSV antibodies and modified or derivative forms of the selected RSV antibodies, for all indications and uses except for certain diagnostic uses. If we exercise our option under the agreement, we would be required to use commercially reasonable efforts to develop and commercialize at least one product based on a licensed RSV antibody in major markets.

If we wish to exercise our option under the Adimab Option Agreement, we will be obligated to pay Adimab an option fee of \$0.3 million and make clinical and regulatory milestone payments of up to \$24.4 million. We are obligated to pay Adimab royalties at a mid-single-digit percentage of net sales of products based on the initial RSV antibodies (including modified or derivative forms of those antibodies created by or for us) by us or any of our affiliates, licensees or sublicensees, regardless of whether these products practice any of the assigned or licensed patents or know-how, subject to certain off-set rights and adjustments to the royalty payments described in the agreement, and subject to further carve-outs with respect to sales of products based on licensed RSV antibodies to the extent they are sold at cost in developing countries under the February 2017 Bill & Melinda Gates Foundation, or Gates Foundation, grant agreement, as amended and restated in August 2018, and the August 2018 Gates Foundation grant agreement (described below). However, if such products are sold in developing countries for an amount that exceeds cost, then the amount of such excess will be subject to the royalty payment obligations described in the preceding paragraph.

If we do not exercise our option, the Adimab Option Agreement will expire on our achievement of specified preclinical milestones under our grant agreement with the Gates Foundation, but in any event no later than mid-2019. We have the right to terminate the Adimab Option Agreement for any reason by providing Adimab with a specified amount of prior written notice. Adimab has the right to terminate the agreement if we materially breach the agreement. If Adimab terminates the agreement for our breach, if we terminate the agreement for our convenience or if the agreement expires before we exercise our option, then we must return or destroy certain know-how, including all initial RSV antibodies, and all modified or derivative forms of those antibodies, in our possession other than those for which we have made all payments required under the agreement, assign certain patents covering certain RSV antibodies to Adimab, grant Adimab a non-exclusive, royalty-free license under certain other patents, and grant Adimab a time-limited right of first negotiation to obtain an exclusive license to certain patents and know-how and the transfer and assignment of certain regulatory filings and approvals and other related assets related to products based on licensed RSV antibodies. Certain of our payment obligations relating to specified products arising from the agreement survive expiration or termination of the agreement. During the years ended December 31, 2018 and 2017, Arsanis made payments to Adimab of \$0.1 million and \$0.1 million, respectively, under the Adimab Option Agreement.

Agreements with Bill & Melinda Gates Foundation

February 2017 Grant Agreement and August 2018 Amended and Restated Gates Foundation Grant Agreement

In February 2017, Arsanis entered into a grant agreement with the Gates Foundation pursuant to which the Gates Foundation granted Arsanis up to \$9.3 million to conduct preclinical development of monoclonal

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antibodies for the prevention of RSV infection in newborns, which we refer to as the RSV project. In return, Arsanis agreed to conduct the RSV project in a manner that ensures that the knowledge and information gained from the project will be promptly and broadly disseminated, and that the products, technologies, materials, processes and other intellectual property resulting from the RSV project (which Arsanis collectively refers to as the funded developments) will be made available and accessible at an affordable price to people most in need within developing countries. These obligations survive any expiration or termination of the grant agreement.

To this end, Arsanis granted the Gates Foundation a non-exclusive, perpetual, royalty-free, fully paid up, sublicensable license to make, use, sell, offer to sell, import, distribute, copy, modify, create derivative works, publicly perform and display the funded developments and, to the extent incorporated into a funded development or required to use a funded development, any other technology created outside of the RSV project that was used as part of the RSV project, for the benefit of people in developing countries. Arsanis also agreed to seek prompt publication of data and results developed under the RSV project under “open access” terms and conditions. This license and these publication obligations survive any expiration or termination of the grant agreement.

The grant agreement expires on October 31, 2019. The Gates Foundation can modify, suspend or discontinue any payment under the grant agreement, or terminate the grant agreement, if it is not reasonably satisfied with Arsanis’s progress on the RSV project; if there are significant changes to Arsanis’s leadership or other factors that the Gates Foundation reasonably believes may threaten the RSV project’s success; if Arsanis undergoes a change in control; if there is a change in its tax status; if the RSV project is no longer aligned with the Gates Foundation’s programmatic strategy; or if Arsanis fails to comply with the grant agreement. Any grant funds that have not been used for, or committed to, the RSV project upon the expiration or termination of the agreement must be returned to the Gates Foundation or otherwise used as directed by the Gates Foundation. In August 2018, Arsanis amended and restated the February 2017 grant agreement. The amended and restated grant agreement includes amendments to conform to current Gates Foundation audit, reporting, and other administrative requirements, as well as to make the perpetual Gates Foundation license grant described above irrevocable.

During the years ended December 31, 2018 and 2017, Arsanis recognized grant income of \$0 and \$1.6 million, respectively, under the grant agreement with the Gates Foundation upon incurring qualifying expenses. As of December 31, 2018 and 2017, there were no amounts recorded as unearned income under the grant agreement with the Gates Foundation.

August 2018 Gates Foundation Grant Agreement

In August 2018, Arsanis entered into an additional grant agreement with the Gates Foundation pursuant to which the Gates Foundation granted to Arsanis up to \$1.1 million to conduct preclinical development activities for the RSV project that were not included in the February 2017 grant agreement, as amended and restated in August 2018. In return, Arsanis agreed to conduct the RSV project in a manner that ensures that the knowledge and information gained from the project will be promptly and broadly disseminated, and that the products, technologies, materials, processes and other intellectual property resulting from the RSV project (collectively referred to as the funded developments) will be made available and accessible at an affordable price to people most in need within developing countries. These obligations survive any expiration or termination of the grant agreement.

To this end, Arsanis granted to the Gates Foundation a non-exclusive, perpetual, irrevocable, royalty-free, fully paid up, sublicensable license to make, use, sell, offer to sell, import, distribute, copy, modify, create derivative works, publicly perform and display the funded developments and, to the extent incorporated into a funded development or required to use a funded development, any other technology created outside of the RSV project that was used as part of the RSV project, for the benefit of people in developing countries. Arsanis also agreed to seek prompt publication of data and results developed under the RSV project under “open access” terms and conditions. This license and these publication obligations survive any expiration or termination of the grant agreements.

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During the year ended December 31, 2018, Arsanis recognized grant income of \$1.1 million under the August 2018 grant agreement with the Gates Foundation upon incurring qualifying expenses. Accordingly, unearned income under the August 2018 grant agreement with the Gates Foundation was \$0 as of December 31, 2018. The August 2018 grant agreement expired during the year ended December 31, 2018.

Gates Foundation Letter Agreement and Investment

In April 2017, Arsanis entered into a letter agreement with the Gates Foundation. In connection with the letter agreement, the Gates Foundation purchased 2,464,799 shares of Arsanis's Series D redeemable convertible preferred stock (the "Series D preferred stock"), which converted into 120,363 shares of Arsanis's common stock in connection with Arsanis's initial public offering after giving effect to a one-for-3.4130 reverse stock split and the Reverse Stock Split. Arsanis committed to use the proceeds of \$8.0 million from the investment by the Gates Foundation solely to advance the development of a specified monoclonal antibody program that involved the monoclonal antibodies ASN-1, ASN-2 and ASN-3 and Arsanis's product candidate, ASN100. Under the letter agreement, in addition to the initial project funded by the Gates Foundation with its initial investment, Arsanis also agreed to conduct up to four additional projects to be proposed and to be funded by the Gates Foundation.

The letter agreement contains certain global access obligations as well as requirements relating to Arsanis's use of the funds received from the Gates Foundation investment. In the event that we fail to comply with these obligations or requirements or any related U.S. legal obligations set forth in the letter agreement, the Gates Foundation will have the right, after expiration of a specified cure period, to require us to redeem all of the shares owned by the Gates Foundation or to locate a third party that will purchase such shares. For any redemption or purchase resulting from such default, the shares of our stock held by the Gates Foundation will be redeemed at an amount equal to the greater of the original purchase price (plus specified interest) or the fair market value of such stock on the date of such redemption. The term of the letter agreement continues in perpetuity.

In connection with this letter agreement, Arsanis granted to the Gates Foundation and/or Gates Foundation-supported entities certain licenses, including a non-exclusive, non-terminable, royalty-free (except as required under the Adimab Collaboration Agreement), sublicensable license to products, technologies, materials, processes and other intellectual property developed using funds provided by the Gates Foundation or a Gates Foundation-supported entity, or developed in connection with Arsanis's conduct of any funded project or additional funded project, as well as all of Arsanis's background intellectual property, to utilize and exploit products and services directed at pathogens or other targets subject to any funded project or additional funded project.

The proceeds received from the Gates Foundation in connection with Arsanis's sale and issuance of Series D preferred stock were incurred on qualifying expenses under the letter agreement during the year ended December 31, 2017. During the years ended December 31, 2018 and 2017, Arsanis incurred qualifying expenses of \$0 and \$8.0 million, respectively, under the letter agreement with the Gates Foundation.

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Arsanis 2017 Convertible Note Financing

In January 2017, Arsanis issued and sold an aggregate of \$4,934,981 in convertible promissory notes, or the 2017 Notes. The 2017 Notes accrued interest at a rate of 0.96% per annum, with a maturity date of October 12, 2017, unless earlier converted under the terms of the 2017 Notes. All principal and interest accrued under the 2017 Notes was converted into shares of Arsanis Series D convertible preferred stock in connection with the closing of Arsanis's Series D convertible preferred stock financing in April 2017. Upon completion of Arsanis's initial public offering in November 2017, all the outstanding shares of Arsanis Series D convertible preferred stock automatically converted into shares of Arsanis common stock. The following table sets forth the aggregate principal amount of notes issued and sold to Arsanis's 5% stockholders and their affiliates in this transaction and the cash purchase price for such notes:

<u>Name</u>	Aggregate Principal Amount of 2017 Notes	Cash Purchase Price
Entities affiliated with Polaris Venture Partners (1)	\$1,294,943	\$1,294,943
Entities affiliated with SV Health Investors, LLC (2)	\$1,294,943	\$1,294,943
OrbiMed Private Investments IV, LP (3)	\$1,294,943	\$1,294,943
NeoMed Innovation V, L.P. (4)	\$ 565,147	\$ 565,147
Tillman U. Gemgross, Ph.D. (5)	\$ 250,000	\$ 250,000

- (1) Terrance McGuire and Amy Schulman were members of Arsanis's board of directors and each is an affiliate of Polaris Venture Partners.
- (2) Michael Ross was a member of Arsanis's board of directors who is an affiliate of SV Health Investors, LLC.
- (3) Carl Gordon was a member of Arsanis's board of directors who is an affiliate of OrbiMed Private Investments IV, LP.
- (4) Claudio Nessi was a member of Arsanis's board of directors who is an affiliate of NeoMed Innovation V, L.P.
- (5) Tillman U. Gemgross is the former chairman of Arsanis's board of directors.

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Arsanis Series D Preferred Stock Financing

In April 2017, Arsanis issued and sold an aggregate of 14,220,284 shares of its Series D convertible preferred stock, consisting of (i) 12,323,987 shares sold for an aggregate of \$35,053,178 in cash and conversion of \$4,946,793 in outstanding principal and interest under the 2017 Notes at a price per share of approximately \$3.2457 and (ii) 1,896,297 shares issued upon conversion of \$5,539,344 in outstanding principal and interest under convertible promissory notes issued in April 2016, or the 2016 Notes, at a price per share of approximately \$2.92. Upon completion of Arsanis's initial public offering in November 2017, all the outstanding shares of Series D convertible preferred stock automatically converted into shares of Arsanis common stock. The following table sets forth the aggregate numbers of shares of Arsanis's Series D convertible preferred stock that Arsanis sold to its 5% stockholders and their affiliates in these transactions and the aggregate amount of consideration for such shares:

Name	Shares of Series D Preferred Stock Issued for Cash and upon Conversion of 2017 Notes	Cash Purchase Price	Principal Cancelled under 2017 Notes	Interest Cancelled under 2017 Notes	Shares of Series D Preferred Stock Issued upon Conversion of 2016 Notes	Principal Cancelled under 2016 Notes	Interest Cancelled Under 2016 Notes
Bill & Melinda Gates Foundation	2,464,799	\$7,999,998	—	—	—	—	—
Entities affiliated with Polaris Venture Partners (2)	1,924,752	\$4,949,125	\$1,294,943	\$3,099	307,259	\$891,178	\$6,375
Entities affiliated with SV Health Investors, LLC (3)	1,924,750	\$4,949,125	\$1,294,943	\$3,099	307,262	\$891,178	\$6,375
OrbiMed Private Investments IV, LP (4)	1,924,752	\$4,949,125	\$1,294,943	\$3,099	307,262	\$891,178	\$6,375
NeoMed Innovation V, L.P. (5)	839,938	\$2,159,687	\$ 565,147	\$1,353	112,559	\$326,467	\$2,335
Tillman U. Gemgross, Ph.D. (6)	308,099	\$ 749,399	\$ 250,000	\$ 598	—	—	—

- (1) Terrance McGuire and Amy Schulman were members of Arsanis's board of directors and each is an affiliate of Polaris Venture Partners.
- (2) Michael Ross was a member of Arsanis's board of directors who is an affiliate of SV Health Investors, LLC.
- (3) Carl Gordon was a member of Arsanis's board of directors who is an affiliate of OrbiMed Private Investments IV, LP.
- (4) Claudio Nessi was a member of Arsanis's board of directors who is an affiliate of NeoMed Innovation V, L.P.
- (5) Tillman U. Gemgross was the chairman of Arsanis's board of directors.

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Arsanis's Initial Public Offering

In November 2017, Arsanis completed its initial public offering under which Arsanis issued and sold an aggregate of 4,600,000 shares of its common stock at a price per share of \$10.00, for an aggregate purchase price of \$46.0 million. The following table sets forth the number of shares of our common stock purchased by our directors, executive officers and 5% stockholders and their affiliates in the initial public offering and the aggregate purchase price paid for such shares. The share and per share amounts described in this section "Arsanis's Initial Public Offering" do not reflect the Reverse Stock Split.

<u>Name</u>	<u>Shares of Common Stock Purchased</u>	<u>Aggregate Purchase Price</u>
Entities affiliated with Polaris Venture Partners (1)	500,000	\$ 5,000,000
Entities affiliated with SV Health Investors, LLC (2)	500,000	\$ 5,000,000
OrbiMed Private Investments IV, LP (3)	500,000	\$ 5,000,000
NeoMed Innovation V, L.P. (4)	300,000	\$ 3,000,000
Tillman U. Gemgross, Ph.D. (5)	200,000	\$ 2,000,000
Total	<u>2,000,000</u>	<u>\$20,000,000</u>

- (1) Terrance McGuire and Amy Schulman were members of Arsanis's board of directors and each is an affiliate of Polaris Venture Partners.
- (2) Michael Ross was a member of Arsanis's board of directors who is an affiliate of SV Health Investors, LLC.
- (3) Carl Gordon was a member of Arsanis's board of directors who is an affiliate of OrbiMed Private Investments IV, LP.
- (4) Claudio Nessi was a member of Arsanis's board of directors who is an affiliate of NeoMed Innovation V, L.P.
- (5) Tillman U. Gemgross was the chairman of Arsanis's board of directors.

X4 Related Person Transactions

X4 Series B Preferred Stock Financing

Since November 2017, X4 issued an aggregate of 18,616,569 shares of X4 Series B preferred stock at \$1.88 per share and warrants to purchase an aggregate of 3,504,906 shares of X4 Series B preferred stock for an aggregate purchase price of approximately \$35.0 million, which is referred to as the Series B preferred stock financing. Each share of X4 Series B preferred stock converted automatically into the right to receive shares of our common stock based on the exchange ratio immediately prior to the Merger.

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The following table summarizes the Series B preferred stock and warrants to purchase Series B preferred stock purchased by X4's directors, executive officers and principal stockholders at the time of the Series B preferred stock financing.

<u>Name of Purchaser</u>	<u>Number of Shares of Series B Preferred Stock Purchased</u>	<u>Warrants to Purchase the Number of Shares of Series B Preferred Stock Listed Below</u>	<u>Exercise Price of Warrants</u>	<u>Aggregate Purchase Price</u>	<u>Date of Purchase</u>	<u>Expiration Date of Warrants</u>
Entities affiliated with Cormorant (1)	1,329,788	132,979	\$ 1.88	\$ 2,500,000	November 1, 2017	November 1, 2020
Healthcare Industry (Cayman) A Co., Limited	2,659,574	265,957	\$ 1.88	\$ 5,000,000	September 12, 2018	September 12, 2021

- (1) Consists of 1,094,149 shares of X4 Series B preferred stock and warrants to purchase 109,415 shares of X4 Series B preferred stock issued to Cormorant Private Healthcare Fund I, L.P., 191,490 shares of X4 Series B preferred stock and warrants to purchase 19,149 shares of X4 Series B preferred stock issued to Cormorant Global Healthcare Master Fund, L.P., and 44,149 shares of X4 Series B preferred stock and warrants to purchase 4,415 shares of X4 Series B preferred stock issued to CRMA SPV, L.P.

X4 also paid Maxim Partners LLC, or Maxim, fees and reimbursement of expenses of approximately \$2.8 million as placement agent for the Series B preferred stock financing, pursuant to a letter agreement between X4 and Maxim, dated as of July 6, 2017, as amended on February 13, 2018. As additional compensation, X4 issued warrants to purchase shares of X4 Series B preferred stock to Maxim. The first warrant was issued on December 28, 2017, was exercisable for 1,219,815 shares of X4 Series B preferred stock, had an exercise price of \$1.88 per share, and expires on December 28, 2027. The second warrant was issued on September 12, 2018, was exercisable for 212,765 shares of X4 Series B preferred stock, had an exercise price of \$1.88 per share, and expires on September 12, 2028. The letter agreement was terminated, effective as of May 16, 2018. In connection with the termination of the letter agreement, X4 agreed to pay Maxim a fee of \$25,000 for expenses incurred after December 31, 2017. In addition, X4 and Maxim agreed that if, within 12 months of termination of the letter agreement, we complete a private financing or capital raising activity with certain other qualified investors, X4 would be required to pay Maxim certain agreed upon fee amounts. In connection with the Merger, the warrants exercisable for X4 Series B preferred stock became warrants to exercisable for our common stock at an agreed upon exchange ratio. The exercise price was also adjusted according to the exchange ratio.

X4 Series Seed Preferred Stock Repurchase

In October 2017, X4 entered into a stock repurchase agreement with the Estate of Henri Termeer (the "Termeer Estate"), a founder of X4, pursuant to which X4 agreed to repurchase 598,975 shares of X4 Series Seed preferred stock from the Termeer Estate at an aggregate repurchase price of \$1,126,073. Alan E. Walts, Ph.D., a former director of X4 elected by the holders of X4 Series Seed preferred stock, serves as a business advisor to the Termeer Estate and receives a monthly consulting fee for such services. Dr. Walts does not have any voting or investment control over the securities held by the Termeer Estate and recused himself from the discussions with respect to this repurchase. The repurchase was settled in January 2018.

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X4 Investors' Rights, Voting and Co-sale Agreements

In connection with X4's preferred stock financings, X4 entered into investors' rights, voting and right of first refusal and co-sale agreements containing registration rights, information rights, voting rights and rights of first refusal, among other things, with certain holders of X4 preferred stock and certain holders of X4 common stock. In accordance with and pursuant to the terms of the Merger Agreement, these stockholder agreements terminated upon the closing of the Merger.

X4 Agreements with X4 Directors

Gary J. Bridger, Ph.D.

On November 14, 2017, X4 entered into an independent contractor agreement with Gary J. Bridger, Ph.D. pursuant to which Dr. Bridger agreed to provide X4 with strategic advice in support of our research and development programs in oncology and WHIM syndrome. The agreement provided for an initial term of six months, which was renewed in accordance with its terms for an additional six months and expired in November 2018. The independent contractor agreement included standard assignment of invention, confidentiality and indemnification provisions. In consideration for the provision of consulting services pursuant to the agreement, Dr. Bridger was paid approximately \$105,000.

On October 4, 2018, X4 entered into a letter agreement with Dr. Bridger, pursuant to which Dr. Bridger agreed to serve as a member of the board of directors of X4. This letter agreement superseded the independent contractor agreement described above. Pursuant to the letter agreement, X4 granted Dr. Bridger an option to purchase 226,983 shares of X4 common stock to vest pursuant to the terms of the X4 Plan and a separate non-qualified stock option agreement. The letter agreement also specified that Dr. Bridger would be entitled to receive an annual grant of an option to purchase shares of X4 common stock at the level set for independent directors by the board of directors, if any. X4 also agreed to reimburse Dr. Bridger for expenses for which he received prior approval. Either X4 or Dr. Bridger may terminate the letter agreement at any time, for any reason, by giving the other 30 days' prior written notice. In connection with the Merger, the option to purchase shares of X4 common stock became an option to purchase shares of our common stock.

Alan E. Walts, Ph.D.

On November 27, 2016, X4 entered into a letter agreement with its former director Alan E. Walts, Ph.D. to outline the applicable terms of his role as a member of the X4 board of directors. Pursuant to the letter agreement, X4 and Dr. Walts acknowledged that X4 had previously granted Dr. Walts an option to purchase 70,000 shares of X4 common stock, at an exercise price of \$0.65 per share, to vest pursuant to the terms of the X4 Plan and a separate non-qualified stock option agreement previously entered into by and between X4 and Dr. Walts. The letter agreement also specified that Dr. Walts would be entitled to receive an annual grant of an option to purchase shares of X4 common stock at the level set for independent directors by the X4 board of directors, if any. X4 also agreed to reimburse Dr. Walts for expenses for which he received prior approval from X4. The letter agreement included standard assignment of invention and confidentiality provisions. Either X4 or Dr. Walts was entitled to terminate the letter agreement at any time, for any reason, by giving the other 30 days' prior written notice. Dr. Walts resigned as a director of X4 upon the completion of the Merger.

Michael Gilman, Ph.D.

On November 27, 2016, X4 entered into a letter agreement with its former director Michael Gilman to outline the applicable terms of his role as a member of the X4 board of directors. Pursuant to the letter agreement, X4 and Dr. Gilman acknowledged that X4 had previously granted Dr. Gilman options to purchase 70,000 and 8,000 shares of X4 common stock, at an exercise price of \$0.65 per share, to vest pursuant to the terms of the X4 Plan and a separate non-qualified stock option agreement previously entered into by and between X4 and Dr. Gilman. The letter agreement also specified that Dr. Gilman would be entitled to receive an annual

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grant of an option to purchase shares of X4 common stock at the level set for independent directors by the X4 board of directors, if any. X4 also agreed to reimburse Dr. Gilman for expenses for which he receives prior approval from X4. The letter agreement included standard assignment of invention, confidentiality and indemnification provisions. Either X4 or Dr. Gilman was entitled to terminate the letter agreement at any time, for any reason, by giving the other 30 days' prior written notice. Dr. Gilman resigned as a director of X4 upon the completion of the Merger.

Nancy Lurker

On September 20, 2016, X4 entered into a letter agreement with its former director Nancy Lurker pursuant to which Ms. Lurker agreed to serve as Chairwoman of the X4 board of directors. Pursuant to the letter agreement, X4 granted Ms. Lurker an option to purchase 175,000 shares of X4 common stock to vest pursuant to the terms of the X4 Plan and a separate non-qualified stock option agreement previously entered into by and between X4 and Ms. Lurker. The letter agreement also specified that Ms. Lurker would be entitled to receive an annual grant of an option to purchase shares of X4 common stock at the level set for independent directors by the X4 board of directors, if any. X4 also agreed to reimburse Ms. Lurker for expenses for which she received prior approval from X4. The letter agreement included standard assignment of invention, confidentiality and indemnification provisions. Either X4 or Ms. Lurker was entitled to terminate the letter agreement at any time, for any reason, by giving the other 30 days' prior written notice. Ms. Lurker resigned from the X4 board of directors as of January 21, 2018.

Shares of Our Common Stock Issued in the Merger

On March 13, 2019, we completed the Merger and effected the Reverse Stock Split. In connection with the Merger, Paula Ragan, Ph.D., our President and Chief Executive Officer, received 181,366 shares of common stock in exchange for 1,870,000 shares of X4 common stock and 38,451 shares of X4 Series Seed preferred stock, as adjusted for the Reverse Stock Split. In addition, the following table sets forth the options to purchase X4 common stock held by our directors and executive officers that became exercisable for our common stock in connection with the Merger:

<u>Name</u>	<u>Number of Shares of X4 Common Stock Underlying X4 Options (#)</u>	<u>X4 Option Exercise Price (\$)</u>	<u>Number of Shares of Post-Merger Common Stock Underlying Post-Merger Options (#)</u>	<u>Post- Merger Option Exercise Price (\$)</u>
Paula Ragan, Ph.D.	1,059,935	0.65	100,729	6.84
	688,500	0.65	65,430	6.84
	843,496	0.67	80,160	7.08
Adam S. Mostafa	659,067	0.99	62,633	10.44
Michael S. Wyzga	740,000	0.99	70,324	10.44
Isaac Blech	744,967	0.65	70,796	6.84
Gary J. Bridger, Ph.D.	226,983	0.99	21,570	10.44

PROPOSAL NO. 1:

ELECTION OF DIRECTORS

On May 13, 2019, our board of directors nominated René Russo for election at the annual meeting. Our board of directors currently consists of seven (7) members, classified into three classes as follows: René Russo and Isaac Blech constitute Class II, with a term ending at the 2019 annual meeting of stockholders; Gary J. Bridger, Ph.D. and Murray Stewart, M.D. constitute Class III, with a term ending at the 2020 annual meeting of stockholders; and Paula Ragan, Ph.D., Michael S. Wyzga and David McGirr constitute Class I, with a term ending at the 2021 annual meeting of stockholders. Mr. Blech will continue to serve as a director until the end of his term, which concludes at the annual meeting, upon which the size of our board will be reduced to consist of six (6) members.

At each annual meeting of stockholders, directors are elected for a full term of three years to succeed those directors whose terms are expiring.

Our board of directors has voted to nominate René Russo for election at the annual meeting for a term of three years to serve until the 2022 annual meeting of stockholders, and until her successor is elected and qualified. The Class III directors (Gary J. Bridger, Ph.D. and Murray Stewart, M.D.) and the Class I directors (Paula Ragan, Ph.D., Michael S. Wyzga and David McGirr) will serve until the annual meetings of stockholders to be held in 2020 and 2021, respectively, and each director will hold office until his or her successor has been elected and qualified or until his or her earlier death, resignation or removal.

Unless authority to vote for the nominee is withheld, the shares represented by the enclosed proxy will be voted **FOR** the election of René Russo as a director. In the event that Ms. Russo becomes unable or unwilling to serve, the shares represented by the enclosed proxy will be voted for the election of such other person as our board of directors may recommend in the nominee's place. We have no reason to believe that the nominee will be unable or unwilling to serve as a director.

A plurality of the shares voted **FOR** the nominee at the annual meeting is required to elect the nominee as a director.

THE BOARD OF DIRECTORS RECOMMENDS THE ELECTION OF RENÉ RUSSO AS A DIRECTOR, AND PROXIES SOLICITED BY THE BOARD OF DIRECTORS WILL BE VOTED IN FAVOR THEREOF UNLESS A STOCKHOLDER HAS INDICATED OTHERWISE ON THE PROXY.

PROPOSAL NO. 2:

RATIFICATION OF APPOINTMENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The audit committee has appointed PricewaterhouseCoopers LLP, as our independent registered public accounting firm, to audit our financial statements for the fiscal year ending December 31, 2019. The board of directors proposes that the stockholders ratify this appointment. PricewaterhouseCoopers LLP audited our financial statements for the fiscal years ended December 31, 2018 and 2017 and audited the financial statements of X4 for the fiscal years ended December 31, 2018 and 2017. We expect that representatives of PricewaterhouseCoopers LLP will be present at the annual meeting, will be able to make a statement if they so desire, and will be available to respond to appropriate questions.

In deciding to appoint PricewaterhouseCoopers LLP, the audit committee reviewed auditor independence issues with PricewaterhouseCoopers LLP and concluded that PricewaterhouseCoopers LLP has no commercial relationship with the Company that would impair its independence for the fiscal year ending December 31, 2019.

Arsanis Audit Fees and Services

The following table presents fees for professional audit services rendered by PricewaterhouseCoopers LLP for the audit of Arsanis's annual financial statements for the years ended December 31, 2018 and December 31, 2017 as well as fees billed for other services rendered by PricewaterhouseCoopers LLP during those periods.

Fee Category	2018	2017
Audit Fees (1)	\$731,372	\$1,437,218
Audit-Related Fees (2)	—	—
Tax Fees (3)	—	—
All Other Fees (4)	1,800	—
Total Fees	<u>\$733,172</u>	<u>\$1,437,218</u>

- (1) "Audit Fees" consist of fees billed for professional services performed by PricewaterhouseCoopers LLP for the audit of Arsanis's annual financial statements, the review of interim financial statements, and related services that are normally provided in connection with registration statements. Included in 2017 Audit Fees are fees of \$926,309 billed in connection with Arsanis's initial public offering, which closed in November 2017, and fees billed in connection with the filing of registration statements. Included in 2018 Audit Fees are fees of \$188,372 billed in connection with the filing of registration statements.
- (2) "Audit-Related Fees" consist of fees billed by an independent registered public accounting firm for assurance and related services that are reasonably related to the performance of the audit or review of Arsanis's financial statements and which are not reported under "Audit Fees." There were no such fees incurred in 2018 or 2017.
- (3) "Tax Fees" consist of fees primarily related to tax compliance and consulting. There were no such fees incurred in 2018 or 2017.
- (4) "All Other Fees" relate to fees for access to the PricewaterhouseCoopers LLP online accounting research and financial disclosure tools.

There were no services that were approved by the audit committee pursuant to Rule 2-01(c)(7)(i)(C) (relating to the approval of a *de minimis* amount of non-audit services after the fact but before completion of the audit).

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X4 Audit Fees and Services

The following table presents fees for professional audit services rendered by PricewaterhouseCoopers LLP for the audit of X4's annual financial statements for the years ended December 31, 2018 and December 31, 2017 as well as fees billed for other services rendered by PricewaterhouseCoopers LLP during those periods.

Fee Category	2018	2017
Audit Fees (1)	\$1,112,232	\$185,000
Audit-Related Fees (2)	—	—
Tax Fees (3)	8,150	7,250
All Other Fees (4)	900	—
Total Fees	<u>\$1,121,282</u>	<u>\$192,250</u>

- (1) "Audit Fees" consist of fees billed for professional services performed by PricewaterhouseCoopers LLP for the audit of X4's annual financial statements, the review of interim financial statements, and related services that are normally provided in connection with registration statements. Included in 2018 Audit Fees are fees of \$542,232 incurred through December 31, 2018 in connection with SEC and other regulatory filings related to the Merger.
- (2) "Audit-Related Fees" consist of fees billed by an independent registered public accounting firm for assurance and related services that are reasonably related to the performance of the audit or review of X4's financial statements and which are not reported under "Audit Fees." There were no such fees incurred in 2018 or 2017.
- (3) "Tax Fees" consist of fees primarily related to tax compliance and consulting.
- (4) "All Other Fees" relate to fees for access to the PricewaterhouseCoopers LLP online accounting research and financial disclosure tools.

Policy on Audit Committee Pre-Approval of Audit and Permissible Non-Audit Services of Independent Public Accountant

Consistent with SEC policies regarding auditor independence, the audit committee has responsibility for appointing, setting compensation for and overseeing the work of our independent registered public accounting firm. In recognition of this responsibility, the audit committee has established a policy to pre-approve all audit and permissible non-audit services provided by our independent registered public accounting firm.

Prior to engagement of an independent registered public accounting firm for the next year's audit, management will submit an aggregate of services expected to be rendered during that year for each of four categories of services to the audit committee for approval.

1. **Audit** services include audit work performed in the preparation of financial statements, as well as work that generally only an independent registered public accounting firm can reasonably be expected to provide, including comfort letters, statutory audits, consents in connection with registration statements, and attest services and consultation regarding financial accounting and/or reporting standards.
2. **Audit-Related** services are for assurance and related services that are traditionally performed by an independent registered public accounting firm, including due diligence related to mergers and acquisitions, employee benefit plan audits, and special procedures required to meet certain regulatory requirements.
3. **Tax** services include all services performed by an independent registered public accounting firm's tax personnel, except those services specifically related to the audit of the financial statements, and include fees in the areas of tax compliance, tax planning and tax advice.
4. **Other Fees** are those associated with services not captured in the other categories. We generally do not request such services from our independent registered public accounting firm.

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Prior to engagement, the audit committee pre-approves these services by category of service. The fees are budgeted and the audit committee requires our independent registered public accounting firm and management to report actual fees versus the budget periodically throughout the year by category of service. During the year, circumstances may arise when it may become necessary to engage our independent registered public accounting firm for additional services not contemplated in the original pre-approval. In those instances, the audit committee requires specific pre-approval before engaging our independent registered public accounting firm.

The audit committee may delegate pre-approval authority to one or more of its members. The member to whom such authority is delegated must report, for informational purposes only, any pre-approval decisions to the audit committee at its next scheduled meeting.

In the event the stockholders do not ratify the appointment of PricewaterhouseCoopers LLP as our independent registered public accounting firm, the audit committee will reconsider its appointment.

The affirmative vote of the holders of shares of our common stock having a majority in voting power of the votes cast by the holders of all of the shares of our common stock present or represented at the annual meeting and voting affirmatively or negatively on the matter is required to ratify the appointment of our independent registered public accounting firm.

OUR BOARD OF DIRECTORS RECOMMENDS A VOTE TO RATIFY THE APPOINTMENT OF PRICEWATERHOUSECOOPERS LLP AS OUR INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM, AND PROXIES SOLICITED BY OUR BOARD OF DIRECTORS WILL BE VOTED IN FAVOR OF SUCH RATIFICATION UNLESS A STOCKHOLDER INDICATES OTHERWISE ON THE PROXY.

CODE OF BUSINESS CONDUCT AND ETHICS

We have adopted a code of business conduct and ethics that applies to all of our employees, including our chief executive officer and chief financial and accounting officer. We have posted a copy of the code of business conduct and ethics on our website at www.x4pharma.com. Disclosure regarding any amendments to, or waivers from, provisions of the code of business conduct and ethics that apply to our directors, principal executive officer or principal financial officer will be included in a Current Report on Form 8-K within four business days following the date of the amendment or waiver, unless website posting or the issuance of a press release of such amendments or waivers is then permitted by the rules of the Nasdaq Stock Market.

OTHER MATTERS

Our board of directors knows of no other business which will be presented to the annual meeting. If any other business is properly brought before the annual meeting, proxies will be voted in accordance with the judgment of the persons named therein.

STOCKHOLDER PROPOSALS AND NOMINATIONS FOR DIRECTOR

To be considered for inclusion in the proxy statement relating to our 2020 annual meeting of stockholders, we must receive stockholder proposals (other than for director nominations) no later than January 24, 2020. To be considered for presentation at the 2020 annual meeting of stockholders, although not included in the proxy statement, proposals (including director nominations that are not requested to be included in our proxy statement) must be received no earlier than February 18, 2020 and no later than March 19, 2020. Proposals that are not received in a timely manner will not be voted on at the 2020 annual meeting of stockholders. If a proposal is received on time, the proxies that management solicits for the meeting may still exercise discretionary voting authority on the proposal under circumstances consistent with the proxy rules of the SEC. All stockholder proposals should be marked for the attention of Corporate Secretary, X4 Pharmaceuticals, Inc., 955 Massachusetts Avenue, 4th Floor, Cambridge, Massachusetts 02139.

Cambridge, Massachusetts
May 22, 2019

2019 Annual Meeting Admission Ticket

2019 Annual Meeting of X4 Pharmaceuticals, Inc. Shareholders

Monday June 17, 2019, 10:00 a.m. EDT

Offices of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.,
One Financial Center, Boston, MA 02111

Upon arrival, please present this admission ticket and photo identification at the registration desk.

Important notice regarding the Internet availability of proxy materials for the Annual Meeting of Shareholders.
The material is available at: www.investorvote.com/XFOR



▼ IF VOTING BY MAIL, SIGN, DETACH AND RETURN THE BOTTOM PORTION IN THE ENCLOSED ENVELOPE. ▼

Proxy – X4 Pharmaceuticals, Inc.



Notice of 2019 Annual Meeting of Stockholders

Proxy Solicited by Board of Directors for Annual Meeting – June 17, 2019

Paula Ragan, Ph.D. and Adam S. Mostafa, or any of them, each with the power of substitution, are hereby authorized to represent and vote the shares of the undersigned, with all the powers which the undersigned would possess if personally present, at the Annual Meeting of Stockholders of X4 Pharmaceuticals, Inc. to be held on June 17, 2019 or at any postponement or adjournment thereof.

Shares represented by this proxy will be voted by the stockholder. If no such directions are indicated, the Proxies will have authority to vote FOR the election of the Board of Directors and FOR item 2.

In their discretion, the Proxies are authorized to vote upon such other business as may properly come before the meeting.

(Items to be voted appear on reverse side)

C Non-Voting Items

Change of Address – Please print new address below.

Comments – Please print your comments below.

