

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

**FORM S-8  
REGISTRATION STATEMENT**  
*UNDER  
THE SECURITIES ACT OF 1933*

**X4 Pharmaceuticals, Inc.**

(Exact name of registrant as specified in its charter)

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

**27-3181608**  
(I.R.S. Employer  
Identification No.)

**955 Massachusetts Avenue, 4th Floor**  
**Cambridge, Massachusetts**  
(Address of Principal Executive Offices)

**02139**  
(Zip Code)

**2015 Employee, Director and Consultant Equity Incentive Plan, as amended**  
(Full title of the plan)

**Paula Ragan, Ph.D.**  
**President and Chief Executive Officer**  
**X4 Pharmaceuticals, Inc.**  
**955 Massachusetts Avenue, 4th Floor**  
**Cambridge, Massachusetts 02139**  
**(857) 529-8300**

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

*Copy to:*

**John J. Cheney, Esq.**  
**Daniel T. Kajunski, Esq.**  
**John P. Condon, Esq.**  
**Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.**  
**One Financial Center**  
**Boston, Massachusetts 02111**  
**(617) 542-6000**  
**Facsimile: (617) 542-2241**

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer   
Non-accelerated filer

Accelerated filer   
Smaller reporting company   
Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of the Securities Act.

**CALCULATION OF REGISTRATION FEE**

Title of Securities to be Registered	Amount to be Registered (1)	Proposed Maximum Offering Price Per Share	Proposed Maximum Aggregate Offering Price	Amount of Registration Fee
Common Stock, \$0.001 par value per share	945,113 shares	\$8.52 to \$21.98 (2)	\$10,168,786.24 (2)	\$1,232.46

- (1) The number of shares of common stock, par value \$0.001 per share (“Common Stock”), of X4 Pharmaceuticals, Inc. (the “Registrant”) stated above consists of the aggregate number of shares which may be sold: (i) upon the exercise of options that have been granted under the Registrant’s 2015 Employee, Director and Consultant Equity Incentive Plan, as amended (the “2015 Plan”); and (ii) upon the exercise of options or issuance of stock-based awards which may hereafter be granted under the 2015 Plan. The maximum number of shares which may be sold upon the exercise of such options or issuance of stock-based awards granted under the 2015 Plan is subject to adjustment in accordance with certain anti-dilution and other provisions of the 2015 Plan. Accordingly, pursuant to Rule 416 under the Securities Act of 1933, as amended (the “Securities Act”), this Registration Statement covers, in addition to the number of shares stated above, an indeterminate number of shares which may be subject to grant or otherwise issuable after the operation of any such anti-dilution and other provisions.
- (2) Estimated solely for the purpose of calculating the amount of the registration fee pursuant to Rule 457(c) and Rule 457(h) promulgated under the Securities Act. The offering price per share and the aggregate offering price for shares: (a) issuable upon the exercise of outstanding options granted under the 2015 Plan are based upon the weighted-average exercise price of such outstanding options; and (b) reserved for future grant or issuance under the 2015 Plan are based on the average of the high and the low price of the Registrant’s Common Stock as reported on the Nasdaq Capital Market as of a date (March 19, 2019) within five business days prior to filing this Registration Statement. The chart below details the calculation of the registration fee:

Securities	Number of Shares	Offering Price Per Share (2)	Aggregate Offering Price
Shares issuable upon the exercise of outstanding options granted under the 2015 Plan	787,875	\$8.52 (2)(a)	\$6,712,695.00
Shares reserved for future grant under the 2015 Plan	157,238	\$21.98 (2)(b)	\$3,456,091.24
Proposed Maximum Aggregate Offering Price			\$10,168,786.24
Registration Fee			\$1,232.46

## EXPLANATORY NOTE

On March 13, 2019, X4 Pharmaceuticals, Inc., formerly known as Arsanis, Inc. (the “Registrant”), completed its business combination with X4 Therapeutics, Inc., formerly known as X4 Pharmaceuticals, Inc. (“X4”), in accordance with the terms of the Agreement and Plan of Merger, dated as of November 26, 2018, as amended, by and among the Registrant, Artemis AC Corp., a wholly owned subsidiary of the Registrant (“Merger Sub”), and X4 (the “Merger Agreement”), pursuant to which Merger Sub merged with and into X4, with X4 surviving as a wholly owned subsidiary of the Registrant (the “Merger”). Following the Merger, on March 13, 2019, the Registrant effected a 1-for-6 reverse stock split of the Registrant’s Common Stock (the “Reverse Stock Split”). Pursuant to the Merger Agreement, the Registrant assumed all options to purchase shares of X4 common stock that were outstanding and unexercised immediately prior to the effective time of the Merger under the 2015 Plan, whether or not vested, with the number of shares subject to such options representing the right to purchase a number of shares of the Registrant’s Common Stock equal to 0.5702 (the “Common Stock Exchange Ratio”) multiplied by the number of shares of X4 common stock previously representing such options, before taking into account the Reverse Stock Split. As a result of the Reverse Stock Split, the number of shares subject to such options and the exercise prices of such options were further adjusted by decreasing the number of shares subject to such options and increasing the exercise price of such options on a 1-for-6 Reverse Stock Split basis. Upon the closing of the Merger, the Registrant also assumed the 2015 Plan.

### PART I

#### INFORMATION REQUIRED IN THE SECTION 10(a) PROSPECTUS

In accordance with the instructional Note to Part I of Form S-8 as promulgated by the Securities and Exchange Commission (the “Commission”), the information specified by Part I of Form S-8 has been omitted from this Registration Statement on Form S-8 for offers of Common Stock pursuant to the 2015 Plan. The documents containing the information specified in Part I will be delivered to the participants in the 2015 Plan covered by this Registration Statement as required by Rule 428(b)(1) under the Securities Act.

### PART II

#### INFORMATION REQUIRED IN THE REGISTRATION STATEMENT

##### **Item 3. Incorporation of Documents by Reference.**

The following documents filed by the Registrant with the Commission are incorporated herein by reference:

- (a) the Registrant’s Annual Report on Form 10-K (File No. 001-38295) for the fiscal year ended December 31, 2018 filed with the Commission on March 11, 2019;
- (b) the Registrant’s Current Reports on Form 8-K (File No. 001-38295) filed with the Commission on January 16, 2019, February 8, 2019, March 1, 2019, March 8, 2019 and March 13, 2019; and
- (c) the description of the Registrant’s Common Stock which is contained in the Registrant’s registration statement on Form 8-A (File No. 001-38295), filed with the Commission on November 15, 2017, including any amendment or report filed for the purpose of updating such description.

All reports and other documents filed by the Registrant after the date hereof pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), prior to the filing of a post-effective amendment which indicates that all securities offered hereby have been sold or which deregisters all securities then remaining unsold, shall be deemed to be incorporated by reference herein and to be part hereof from the date of filing of such reports and documents. Any statement contained in a document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded for the purposes of this Registration Statement to the extent that a statement contained herein or in any other subsequently filed document which also is or is deemed to be incorporated by reference herein modifies or supersedes such statement. Any statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this Registration Statement.

**Item 4. Description of Securities.**

Not applicable.

**Item 5. Interests of Named Experts and Counsel.**

None.

**Item 6. Indemnification of Directors and Officers.**

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

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

Section 145 further provides that to the extent a director or officer of a corporation has been successful on the merits or otherwise in the defense of any action, suit or proceeding referred to in subsections (a) and (b) of Section 145, or in defense of any claim, issue or matter therein, such person shall be indemnified against expenses (including attorneys’ fees) actually and reasonably incurred by such person in connection therewith; that indemnification provided for by Section 145 shall not be deemed exclusive of any other rights to which the indemnified party may be entitled; and the indemnification provided for by Section 145 shall, unless otherwise provided when authorized or ratified, continue as to a person who has ceased to be a director, officer, employee or agent and shall inure to the benefit of such person’s heirs, executors and administrators. Section 145 also empowers the corporation to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise against any liability asserted against such person and incurred by such person in any such capacity, or arising out of his status as such, whether or not the corporation would have the power to indemnify such person against such liabilities under Section 145.

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

The restated certificate of incorporation of the Registrant, as amended, provides that the Registrant will indemnify each person who was or is a party or threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than an action by or in the right of the Registrant), by reason of the fact that he or she is or was, or has agreed to become, the Registrant's director or officer, or is or was serving, or has agreed to serve, at the Registrant's request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise (all such persons being referred to as an Indemnitee), or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding and any appeal therefrom if such Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, the Registrant's best interests, and, with respect to any criminal action or proceeding, he or she had no reasonable cause to believe his or her conduct was unlawful.

The Registrant's restated certificate of incorporation, as amended, also provides that the Registrant will indemnify any Indemnitee who was or is a party to an action or suit by or in the right of the Registrant to procure a judgment in the Registrant's favor by reason of the fact that the Indemnitee is or was, or has agreed to become, the Registrant's director or officer, or is or was serving, or has agreed to serve, at the Registrant's request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise, or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees) and, to the extent permitted by law, amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding and any appeal therefrom, if the Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, the Registrant's best interests, except that no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to the Registrant, unless a court determines that, despite such adjudication but in view of all of the circumstances, he or she is entitled to indemnification of such expenses. Notwithstanding the foregoing, to the extent that any Indemnitee has been successful, on the merits or otherwise, he or she will be indemnified by the Registrant against all expenses (including attorneys' fees) actually and reasonably incurred by him or her or on his or her behalf in connection therewith. If the Registrant does not assume the defense, expenses must be advanced to an Indemnitee under certain circumstances. Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, executive officers or persons controlling the Registrant, in the opinion of the Commission, such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

The Registrant has indemnification agreements with its directors and executive officers, in addition to the indemnification provided for in its restated certificate of incorporation, as amended, and intends to enter into indemnification agreements with any new directors and executive officers in the future.

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

In addition, under the Merger Agreement and subject to applicable law, from the effective time of the Merger (the "Effective Time"), which occurred on March 13, 2019, through the sixth anniversary of the date on which the Effective Time occurs, each of the Registrant and the corporation surviving the Merger between X4 and Merger Sub (the "Surviving Corporation") will, jointly and severally, indemnify and hold harmless each person who is was, as of the date of the Merger Agreement (November 26, 2018), or has been at any time prior to such date, or who becomes prior to the Effective Time, a director or officer of the Registrant, X4 or any of their respective subsidiaries, against all claims, losses, liabilities, damages, judgments, fines and reasonable fees, costs and expenses, including attorneys' fees and disbursements, incurred in connection with any claim, action, suit, proceeding or investigation, whether civil, criminal, administrative or investigative, arising out of or pertaining to the fact that such person is or was a director, officer, employee or agent of the Registrant, X4, or any of their respective subsidiaries (or, while a director or officer of the Registrant, X4 or any of their respective subsidiaries, is or was serving at the request of the Registrant, X4 or any of their respective subsidiaries as a director, officer, employee or agent of another person), whether asserted or claimed prior to, at or after the Effective Time, in each case, to the fullest extent permitted by applicable law. Subject to applicable law, each such director and officer will be entitled to advancement of expenses (including attorneys' fees) incurred in the defense of any such claim, action, suit, proceeding or investigation from

each of the Registrant and the Surviving Corporation following receipt by Arsanis or the Surviving Corporation from such indemnified person of a request therefor; provided that any such person to whom expenses are advanced provides an undertaking, to the extent then required by the DGCL or the applicable governing document of the Registrant or the Surviving Corporation, as applicable, to repay such advances if it is ultimately determined that such person is not entitled to indemnification.

Further, pursuant to the Merger Agreement, for a period of six years following the closing of the Merger (the "Closing"), which occurred on March 13, 2019, the provisions of the Surviving Corporation's certificate of incorporation and bylaws will contain provisions at least as favorable as the provisions relating to the indemnification, advancement of expenses and elimination of liability for monetary damages set forth in the certificate of incorporation and bylaws of X4 and the Registrant immediately before the Effective Time.

Pursuant to the Merger Agreement, the Registrant agreed to either (A) maintain in effect for six years after the Closing, the Registrant's existing directors' and officers' insurance policies in place as of the date of the Merger Agreement (November 26, 2018), or (B) prior to the Closing, purchase a six-year "tail" policy under its own existing directors' and officers' liability insurance policy, with an effective date as of the Closing (provided, that the Registrant may substitute therefor a policy of at least the same coverage containing terms and conditions that are not less favorable in any material respect). In no event, however, will the Registrant be required to expend for an annual premium for such policies more than an amount equal to 200% of the annual premiums paid by the Registrant for such insurance as of the date of the Merger Agreement. During the term of the "tail" policy, however, neither the Registrant nor the Surviving Corporation may take any action following the Closing to cause such "tail" policy to be cancelled or any of its provisions to be amended or waived in any manner that would adversely affect in any material respect the rights of their former and current officers and directors, their heirs or representatives.

From and after the Effective Time, the Registrant agreed to pay all expenses, including reasonable attorneys' fees, that may be incurred by indemnified persons in connection with their successful enforcement of the rights provided to such persons in the Merger Agreement. All rights to exculpation, indemnification and advancement of expenses for acts or omissions occurring at or prior to the Effective Time, whether asserted or claimed prior to, at or after the Effective Time, existing in favor of the current or former directors, officers or employees, as the case may be, of the Registrant, X4 or any of their respective subsidiaries as provided in their respective certificates of incorporation or by-laws or other organization documents or in any agreement in existence immediately before the Effective Time, will survive the Merger and continue in full force and effect. The director and officer indemnification provisions of the Merger Agreement are intended to be in addition to the rights otherwise available to the current and former officers and directors of the Registrant and X4 by law, charter, statute, bylaw or agreement, and shall operate for the benefit of, and will be enforceable by, each of such indemnified persons, their heirs and their representatives.

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

**Item 7. Exemption from Registration Claimed.**

Not applicable.

**Item 8. Exhibits.**

<u>Exhibit Number</u>	<u>Exhibit Description</u>	<u>Filed Herewith</u>	<u>Incorporated by Reference herein from Form or Schedule</u>	<u>Filing Date</u>	<u>SEC File/Reg. Number</u>
4.1.1	<a href="#">Restated Certificate of Incorporation of the Registrant, filed with the Secretary of State of the State of Delaware on November 20, 2017.</a>		8-K (Exhibit 3.1)	11/20/2017	001-38295
4.1.2	<a href="#">Certificate of Amendment (Reverse Stock Split) to the Restated Certificate of Incorporation of the Registrant, filed with the Secretary of State of the State of Delaware on March 13, 2019.</a>		8-K (Exhibit 3.1)	03/13/2019	001-38295
4.1.3	<a href="#">Certificate of Amendment (Name Change) to the Restated Certificate of Incorporation of the Registrant, filed with the Secretary of State of the State of Delaware on March 13, 2019.</a>		8-K (Exhibit 3.2)	03/13/2019	001-38295
4.2	<a href="#">Amended and Restated By-laws of the Registrant.</a>		8-K (Exhibit 3.2)	11/20/2017	001-38295
4.3	<a href="#">Form of Common Stock Certificate.</a>		8-K (Exhibit 4.1)	03/13/2019	001-38295
5.1	<a href="#">Opinion of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. with respect to the legality of the securities being registered.</a>	X			
23.1	<a href="#">Consent of PricewaterhouseCoopers LLP.</a>	X			
23.2	<a href="#">Consent of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. (included in Exhibit 5.1).</a>	X			
24.1	<a href="#">Powers of Attorney</a> (included on signature page to this registration statement).	X			
99.1@	<a href="#">2015 Employee, Director and Consultant Equity Incentive Plan, as amended.</a>		8-K (Exhibit 10.1.1)	03/13/2019	001-38295
99.2@	<a href="#">Form of Stock Option Agreement under the 2015 Employee, Director and Consultant Equity Incentive Plan, as amended.</a>		8-K (Exhibit 10.1.2)	03/13/2019	001-38295

@ Indicates management contract or compensatory plan.

**Item 9. Undertakings.**

(a) The undersigned Registrant hereby undertakes:

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

*Provided, however,* that paragraphs (1)(i) and (1)(ii) of this section do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the Registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934 that are incorporated by reference in the Registration Statement.

- (2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.
- (3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(b) The undersigned Registrant hereby undertakes that, for purposes of determining any liability under the Securities Act of 1933, each filing of the Registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934 that is incorporated by reference in this Registration Statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.

(c) Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the Registrant pursuant to the indemnification provisions summarized in Item 6, or otherwise, the Registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the Registrant of expenses incurred or paid by a director, officer or controlling person of the Registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.



## SIGNATURES

**The Registrant.** Pursuant to the requirements of the Securities Act of 1933, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Cambridge, Commonwealth of Massachusetts, on March 25, 2019.

### X4 PHARMACEUTICALS, INC.

By: /s/ Paula Ragan, Ph.D.

Paula Ragan, Ph.D.

President and Chief Executive Officer

## SIGNATURES AND POWER OF ATTORNEY

We, the undersigned officers and directors of X4 Pharmaceuticals, Inc., hereby severally constitute and appoint Paula Ragan, Ph.D. and Adam S. Mostafa, and each of them singly (with full power to each of them to act alone), our true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution in each of them for him or her and in his or her name, place and stead, and in any and all capacities, to sign any and all amendments (including post-effective amendments) to this Registration Statement on Form S-8 of X4 Pharmaceuticals, Inc., and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises, as full to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them or their or his or her substitute or substitutes may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement has been signed below by the following persons in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Paula Ragan, Ph.D.</u> Paula Ragan, Ph.D.	President, Chief Executive Officer and Director (principal executive officer)	March 25, 2019
<u>/s/ Adam S. Mostafa</u> Adam S. Mostafa	Chief Financial Officer and Treasurer (principal financial officer and principal accounting officer)	March 25, 2019
<u>/s/ Michael S. Wyzga</u> Michael S. Wyzga	Chairman of the Board of Directors	March 25, 2019
<u>/s/ Isaac Blech</u> Isaac Blech	Director	March 25, 2019
<u>/s/ Gary J. Bridger, Ph.D.</u> Gary J. Bridger, Ph.D.	Director	March 25, 2019
<u>/s/ David McGirr</u> David McGirr	Director	March 25, 2019
<u>/s/ René Russo, Pharm.D., BCPS</u> René Russo, Pharm.D., BCPS	Director	March 25, 2019



One Financial Center  
 Boston, MA 02111  
 617-542-6000  
 www.mintz.com

March 25, 2019

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

Ladies and Gentlemen:

We have acted as legal counsel to X4 Pharmaceuticals, Inc., a Delaware corporation (the "Company"), in connection with the preparation and filing with the Securities and Exchange Commission (the "Commission") of a Registration Statement on Form S-8 (the "Registration Statement"), pursuant to which the Company is registering the issuance under the Securities Act of 1933, as amended (the "Securities Act"), of an aggregate of 945,113 shares ("Shares") of the Company's common stock, \$0.001 par value per share ("Common Stock"), in accordance with the terms of the 2015 Employee, Director and Consultant Equity Incentive Plan, as amended (the "Plan"). This opinion is being rendered in connection with the filing of the Registration Statement with the Commission. All capitalized terms used herein and not otherwise defined shall have the respective meanings given to them in the Registration Statement.

In connection with this opinion, we have examined the Company's Restated Certificate of Incorporation and Amended and Restated By-laws, each as amended to date and currently in effect; such other records of the corporate proceedings of the Company and certificates of the Company's officers as we have deemed relevant; and the Registration Statement and the exhibits thereto.

In our examination, we have assumed the genuineness of all signatures, the legal capacity of natural persons, the authenticity of all documents submitted to us as originals, the conformity to original documents of all documents submitted to us as copies, the authenticity of the originals of such copies, and the truth and correctness of any representations and warranties contained therein. In addition, we have assumed that the Company will receive any required consideration in accordance with the terms of the Plan.

Our opinion expressed herein is limited to the General Corporation Law of the State of Delaware and we express no opinion with respect to the laws of any other jurisdiction. No opinion is expressed herein with respect to the qualification of the Shares under the securities or blue sky laws of any state or any foreign jurisdiction.

Please note that we are opining only as to the matters expressly set forth herein, and no opinion should be inferred as to any other matters. This opinion is based upon currently existing statutes, rules, regulations and judicial decisions, and we disclaim any obligation to advise you of any change in any of these sources of law or subsequent legal or factual developments which might affect any matters or opinions set forth herein.

Based upon the foregoing, we are of the opinion that the Shares, when issued and delivered in accordance with the terms of the Plan, will be validly issued, fully paid and non-assessable.

BOSTON

LONDON

LOS ANGELES

NEW YORK

SAN DIEGO

SAN FRANCISCO

WASHINGTON

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.

March 25, 2019

Page 2

We understand that you wish to file this opinion with the Commission as an exhibit to the Registration Statement in accordance with the requirements of Item 601(b)(5) of Regulation S-K promulgated under the Securities Act, and we hereby consent thereto. In giving this consent, we do not admit that we are within the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations of the Commission promulgated thereunder.

Very truly yours,

/s/ Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.

**CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM**

We hereby consent to the incorporation by reference in this Registration Statement on Form S-8 of X4 Pharmaceuticals, Inc. (formerly known as Arsanis, Inc.) of our report dated March 11, 2019 relating to the financial statements, which appears in Arsanis, Inc.'s Annual Report on Form 10-K for the year ended December 31, 2018.

/s/ PricewaterhouseCoopers LLP  
Boston, Massachusetts  
March 25, 2019