As filed with the Securities and Exchange Commission on June 6, 2018.

Registration No. 333-

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

FORM S-1
REGISTRATION STATEMENT
Under
The Securities Act of 1933

DECIPHERA PHARMACEUTICALS, INC.
(Exact name of registrant as specified in its charter)

Delaware	**2834**	**30-1003521**
(State or other jurisdiction of incorporation or organization)	**(Primary Standard Industrial Classification Code Number)**	**(I.R.S. Employer Identification Number)**

500 Totten Pond Road
Waltham, MA 02451
(781) 209-6400
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

Michael D. Taylor, Ph.D.
President & Chief Executive Officer
500 Totten Pond Road
Waltham, MA 02451
(781) 209-6400
(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:

Richard A. Hoffman, Esq. **Edwin M. O'Connor, Esq.** **Goodwin Procter LLP** **100 Northern Avenue** **Boston, Massachusetts 02210** **(617) 570-1000**	**Richard D. Truesdell Jr., Esq.** **Marcel R. Fausten, Esq.** **Davis Polk & Wardwell LLP** **450 Lexington Avenue** **New York, New York 10017** **(212) 450-4000**

Approximate date of commencement of proposed sale to the public:
As soon as practicable after the effective date of this registration statement.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, as amended, check the following box. ☐

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☒ File No. 333-225411

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

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

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

Large accelerated filer	☐	Accelerated filer	☐
Non-accelerated filer	☒ (Do not check if a smaller reporting company)	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 Each Class of Securities to be Registered	Proposed Maximum Aggregate Offering Price(1)	Amount of Registration Fee(2)
Common Stock, par value $0.01 per share	$32,588,125	$4,058

(1) In accordance with Rule 462(b) promulgated under the Securities Act of 1933, as amended, the Registrant is registering an additional amount of securities having a proposed maximum offering price of no more than 20% of the maximum aggregate offering price of the securities eligible to be sold under the related Registration Statement on Form S-1, as amended (File No. 333-225411). Includes the aggregate offering price of shares that may be purchased by the underwriters pursuant to an option to purchase additional shares.

(2) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(o) under the Securities Act of 1933, as amended. Includes the aggregate offering price of shares that may be purchased by the underwriters pursuant to an option to purchase additional shares.

This Registration Statement shall become effective upon filing with the Securities and Exchange Commission in accordance with Rule 462(b) promulgated under the Securities Act.

EXPLANATORY NOTE AND INCORPORATION BY REFERENCE

This Registration Statement relates to the public offering of common stock, par value $0.01 per share, of the Registrant contemplated by the Registration Statement on Form S-1 (File No. 333-225411), initially filed with the Securities and Exchange Commission by the Registrant on June 4, 2018 (as amended, the "Prior Registration Statement"), and is being filed for the sole purpose of registering an increase in the maximum aggregate offering price of $32,588,125 of securities of the same class as were included in the Prior Registration Statement. The contents of the Prior Registration Statement, which was declared effective by the Securities and Exchange Commission on June 6, 2018, and all exhibits thereto are hereby incorporated by reference into this Registration Statement.

The required opinion and consents are listed on an Exhibit Index attached hereto and filed herewith.

EXHIBIT INDEX

Exhibit No.	Exhibit Index
5.1	Opinion of Goodwin Procter LLP
23.1	Consent of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm
23.2	Consent of Goodwin Procter LLP (included in Exhibit 5.1)
24.1**	Power of Attorney

** Previously filed.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant has duly caused this Registration Statement on Form S-1 to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Waltham, Commonwealth of Massachusetts, on June 6, 2018.

DECIPHERA PHARMACEUTICALS, INC.

By: /s/ Michael D. Taylor
Michael D. Taylor, Ph.D.
President and Chief Executive Officer

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement on Form S-1 has been signed by the following person in the capacities and on the date indicated.

Name	Title	Date
/s/ Michael D. Taylor Michael D. Taylor, Ph.D.	President, Chief Executive Officer and Director (Principal Executive Officer)	June 6, 2018
/s/ Thomas P. Kelly Thomas P. Kelly	Chief Financial Officer (Principal Financial and Accounting Officer)	June 6, 2018
* Patricia L. Allen	Director	June 6, 2018
* Edward J. Benz, Jr., M.D.	Director	June 6, 2018
* James A. Bristol, Ph.D.	Director	June 6, 2018
* Steven L. Hoerter	Director	June 6, 2018
* John R. Martin	Director	June 6, 2018
* Liam Ratcliffe, M.D., Ph.D	Director	June 6, 2018
* Michael Ross, Ph.D	Director	June 6, 2018
* Dennis L. Walsh	Director	June 6, 2018

*By: /s/ Michael D. Taylor Michael D. Taylor, Ph.D.	Attorney-in-fact	June 6, 2018

Exhibit 5.1

GOODWIN

Goodwin Procter LLP
100 Northern Avenue
Boston, MA 02210
goodwinlaw.com
+1 617 570 1000

June 6, 2018

Deciphera Pharmaceuticals, Inc.
500 Totten Pond Road
Waltham, MA 02451

Re: Securities Registered under Registration Statement on Form S-1

Ladies and Gentlemen:

We have acted as counsel to you in connection with your filing of (i) a Registration Statement on Form S-1 (File No. 333-225411) (as amended or supplemented, the “Initial Registration Statement”) pursuant to the Securities Act of 1933, as amended (the “Securities Act”), and (ii) a second Registration Statement on Form S-1 filed pursuant to Rule 462(b) promulgated under the Securities Act (the “462(b) Registration Statement,” and together with the Initial Registration Statement, the “Registration Statement”). This opinion letter is furnished to you in connection with your filing of the 462(b) Registration Statement, relating to the registration of the offering by Deciphera Pharmaceuticals, Inc., a Delaware corporation (the “Company”) of up to 632,500 shares (the “Shares”) shares of the Company’s Common Stock, $0.01 par value per share, including Shares purchasable by the underwriters upon their exercise of an option granted to the underwriters by the Company. The Shares are being sold to the several underwriters named in, and pursuant to, an underwriting agreement among the Company and such underwriters (the “Underwriting Agreement”).

We have reviewed such documents and made such examination of law as we have deemed appropriate to give the opinions set forth below. We have relied, without independent verification, on certificates of public officials and, as to matters of fact material to the opinions set forth below, on certificates of officers of the Company.

The opinion set forth below is limited to the Delaware General Corporation Law.

Based on the foregoing, we are of the opinion that the Shares have been duly authorized and, upon issuance and delivery against payment therefor in accordance with the terms of the Underwriting Agreement, the Shares will be validly issued, fully paid and non-assessable.

We hereby consent to the inclusion of this opinion as Exhibit 5.1 to the 462(b) Registration Statement and to the references to our firm under the caption “Legal Matters” in the Initial Registration Statement. In giving our consent, we do not admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations thereunder.

Very truly yours,

/s/ Goodwin Procter LLP

GOODWIN PROCTER LLP

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in this Registration Statement on Form S-1 of our report dated March 28, 2018 relating to the financial statements, which appears in Deciphera Pharmaceuticals, Inc.'s Annual Report on Form 10-K for the year ended December 31, 2017. We also consent to the reference to us under the heading "Experts" in Amendment No. 1 to the Registration Statement on Form S-1 (No. 333-225411) incorporated by reference in this Registration Statement.

/s/ PricewaterhouseCoopers LLP

Boston, Massachusetts
June 6, 2018