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

FORM S-3
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

GENOCEA BIOSCIENCES, INC.
(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction
of incorporation or organization)

51-0596811
(I.R.S. Employer
Identification No.)

100 Acorn Park Drive
Cambridge, Massachusetts 02140
(617) 876-8191
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

William D. Clark
President and Chief Executive Officer
Genocea Biosciences, Inc.
100 Acorn Park Drive
Cambridge, Massachusetts 02140
(617) 876-8191
(Name, address including zip code, and telephone number, including area code, of agent for service)

With copies to:
Marc A. Rubenstein, Esq.
Ropes & Gray LLP
Prudential Tower
800 Boylston St.
Boston, Massachusetts 02199
(617) 951-7000

Approximate date of commencement of proposed sale to the public: From time to time after the effective date of this registration statement.

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

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

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

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

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

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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	<input type="checkbox"/>	Accelerated filer	<input checked="" type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

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 Securities Act.

CALCULATION OF REGISTRATION FEE

Title of Each Class 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	21,390,902	\$ 2.67 (2)	\$ 57,113,708.34	\$ 7,413.36
Common Stock underlying Warrants	45,835,978	\$ 2.25 (3)	\$ 103,130,950.50	\$ 13,386.40
Total	67,226,880		\$ 160,244,658.84	\$ 20,799.76

(1) Pursuant to Rule 416 under the Securities Act of 1933, as amended (the “Securities Act”), the shares of common stock offered hereby also include an indeterminate number of additional shares of common stock as may from time to time become issuable by reason of stock splits, stock dividends, recapitalizations or other similar transactions.

(2) With respect to the shares of common stock offered by the selling stockholders named herein, estimated at \$2.67 per share, the average of the high and low prices as reported on the Nasdaq Capital Market on August 13, 2020, for the purpose of calculating the registration fee in accordance with Rule 457(c) under the Securities Act.

(3) With respect to the warrants offered by the selling stockholders named herein, estimated at \$2.25 per warrant, which is the weighted average exercise price of the warrants, for purposes of calculating the registration fee pursuant to Rule 457(g) under the Securities Act.

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

The information in this prospectus is not complete and may be changed. The selling stockholders may not sell these securities or accept an offer to buy these securities until the Securities and Exchange Commission declares the registration statement effective. This prospectus is not an offer to sell these securities and is not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED AUGUST 18, 2020

PRELIMINARY PROSPECTUS

GENOCEA BIOSCIENCES, INC.
21,390,902 Shares of Common Stock
Warrants to Purchase 45,835,978 Shares of Common Stock

This prospectus relates to the resale or other disposition from time to time of up to (i) 21,390,902 shares of our common stock, par value \$0.001 per share (the "Common Stock"), and (ii) up to 45,835,978 shares of Common Stock upon the exercise of warrants by the selling stockholders identified in this prospectus, including their transferees, pledgees, donees or successors.

The selling stockholders may, from time to time, sell, transfer, or otherwise dispose of any or all of their securities from time to time on any stock exchange, market, or trading facility on which the securities are traded or in private transactions. These dispositions may be at fixed prices, at prevailing market prices at the time of sale, at prices related to the prevailing market price, at varying prices determined at the time of sale, or at negotiated prices. See "Plan of Distribution" which begins on page 11.

We are not offering any shares of our Common Stock for sale under this prospectus. We will not receive any of the proceeds from the sale of common stock by the selling stockholders. However, we will generate proceeds in the event of a cash exercise of the warrants by the selling stockholders. All expenses of registration incurred in connection with this offering are being borne by us. All selling and other expenses incurred by the selling stockholders will be borne by the selling stockholders.

Our common stock is quoted on the Nasdaq Capital Market under the symbol "GNCA." On August 18, 2020, the last reported sale price of our common stock as reported on the Nasdaq Capital Market was \$2.71 per share.

We may amend or supplement this prospectus from time to time by filing amendments or supplements as required. You should read the entire prospectus and any amendments or supplements carefully before you make your investment decision.

Investing in our securities involves risks. See "Risk Factors" on page 3, and any applicable prospectus supplement, and under similar headings in the other documents that are incorporated by reference into this prospectus.

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

Prospectus dated August 18, 2020

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement on Form S-3 that we filed with the Securities and Exchange Commission (the “SEC”) using a “shelf” registration or continuous offering process.

You should read this prospectus and the information and documents incorporated by reference carefully. Such documents contain important information you should consider when making your investment decision. See “Where You Can Find More Information” and “Incorporation of Documents by Reference” in this prospectus.

This prospectus may be supplemented from time to time to add, to update or change information in this prospectus. Any statement contained in this prospectus will be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained in such prospectus supplement modifies or supersedes such statement. Any statement so modified will be deemed to constitute a part of this prospectus only as so modified, and any statement so superseded will be deemed not to constitute a part of this prospectus. You should rely only on the information contained or incorporated by reference in this prospectus, any applicable prospectus supplement or any related free writing prospectus. We have not authorized any other person to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. No dealer, salesperson or other person is authorized to give any information or to represent anything not contained in this prospectus, any applicable prospectus supplement or any related free writing prospectus. This prospectus is not an offer to sell securities, and it is not soliciting an offer to buy securities, in any jurisdiction where the offer or sale is not permitted. You should assume that the information appearing in this prospectus or any prospectus supplement, as well as information we have filed with the SEC that is incorporated by reference, is accurate as of the date on the front of those documents only, regardless of the time of delivery of this prospectus or any applicable prospectus supplement, or any sale of a security. Our business, financial condition, results of operations and prospects may have changed since those dates.

This prospectus contains summaries of certain provisions contained in some of the documents described herein, but reference is made to the actual documents for complete information. All of the summaries are qualified in their entirety by the actual documents. Copies of some of the documents referred to herein have been filed, will be filed or will be incorporated by reference as exhibits to the registration statement of which this prospectus is a part, and you may obtain copies of those documents as described below under “Where You Can Find More Information.”

Unless otherwise stated or the context requires otherwise, references in this prospectus to “Genocea,” the “company” or the “Company,” “we,” “us,” or “our” refer to Genocea Biosciences, Inc. and its consolidated subsidiary unless stated or the context otherwise requires.

ABOUT THE COMPANY

Company Overview

We are a biopharmaceutical company that seeks to discover and develop novel cancer immunotherapies using our ATLAS proprietary discovery platform. The ATLAS platform profiles each patient's CD4⁺ and CD8⁺ T cell immune responses to every potential target or "antigen" in that patient's tumor. We believe that this approach optimizes antigen selection for immunotherapies such as cancer vaccines and cellular therapies. Consequently, we believe that ATLAS could lead to more immunogenic and efficacious cancer immunotherapies.

Our most advanced program is GEN-009, a personalized neoantigen cancer vaccine, for which it is conducting a Phase 1/2a clinical trial. The GEN-009 program uses ATLAS to identify neoantigens, or immunogenic tumor mutations unique to each patient, for inclusion in each patient's GEN-009 vaccine. We are also advancing GEN-011, a neoantigen-specific adoptive T cell therapy program that also relies on ATLAS. In June 2020, we submitted an Investigational New Drug (IND) application to support the initiation of a Phase 1/2 clinical trial. We have received notification from the U.S. Food and Drug Administration (FDA) that the agency has completed its review of our IND application for GEN-011. The FDA informed us that it is placing the IND on clinical hold until it receives additional information pertaining to certain third-party reagents used in the GEN-011 manufacturing process. These reagents are not a component of the final cell therapy product. We intend to work with the FDA to resolve their questions as quickly as possible.

Our principal executive offices are located at 100 Acorn Park Drive, Cambridge, MA 02140, and our telephone number is (617) 876-8191. Our website address is: www.genocoea.com. We have included our website address as a factual reference and do not intend it to be an active link to our website. The information that can be accessed through our website is not part of this prospectus, and investors should not rely on any such information in deciding whether to purchase our common stock.

RISK FACTORS

An investment in our common stock involves risks. Prior to making a decision about investing in our common stock, you should consider carefully the risks together with all of the other information contained or incorporated by reference in this prospectus, including any risks described in the section entitled "Risk Factors" contained in any supplements to this prospectus, in our Annual Report on Form 10-K for the year ended December 31, 2019, in our Quarterly Report on Form 10-Q for the quarter ended March 31, 2020 and in our subsequent filings with the SEC. Each of the referenced risks and uncertainties could adversely affect our business, prospects, operating results and financial condition, as well as adversely affect the value of an investment in our securities. Additional risks not known to us or that we believe are immaterial may also adversely affect our business, operating results and financial condition and the value of an investment in our securities.

DESCRIPTION OF PRIVATE PLACEMENT OF COMMON STOCK AND WARRANTS

On July 24, 2020, we completed a private placement financing transaction (the “Closing”) pursuant to a Securities Purchase Agreement (the “Purchase Agreement”), in which we issued (i) 21,390,902 shares (the “Shares”) of Common Stock, (ii) pre-funded warrants (the “Pre-Funded Warrants”) to purchase 12,222,538 shares of Common Stock (the “Pre-Funded Warrant Shares”), and (iii) warrants (the “Closing Warrants”) to purchase up to 33,613,440 shares of Common Stock (the “Warrant Shares”). The Shares, Pre-Funded Warrants and Closing Warrants (collectively, the “Securities”) were sold at a purchase price of \$2.38 per unit for aggregate gross cash proceeds of approximately \$80 million, excluding transactions costs, fees and expenses. The purchasers of the Shares, Pre-Funded Warrants and Closing Warrants were the selling stockholders named in this prospectus (the “Purchasers”).

Warrants and Pre-Funded Warrants

The material terms and provisions of the Closing Warrants and the Pre-Funded Warrants to purchase shares of Common Stock are summarized below. This summary is subject to and qualified in its entirety by the form of warrant and pre-funded warrant, which were filed with the SEC as exhibits to the Company’s Form 8-K on July 22, 2020.

Exercisability. The holder may exercise the Closing Warrants at any time or from time to time through July 24, 2024. The holder may exercise the Pre-Funded Warrants at any time. There is no expiration date for the Pre-Funded Warrants. As further described under “Selling Stockholders,” notwithstanding the foregoing, certain holders will be prohibited from exercising such warrants into shares of our common stock if, as a result of such exercise, the holder, together with its affiliates, would own more than a specific percentage of the total number of shares of our common stock then issued and outstanding. The Closing Warrants and Pre-Funded Warrants are exercisable, at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice accompanied by payment in full for the number of shares of our common stock purchased upon such exercise (except in the case of a cashless exercise as discussed below).

Exercise Price. The exercise price upon exercise of each Closing Warrant is \$2.25 per share of Common Stock and the exercise price of each Pre-Funded Warrant is \$2.25 per share of Common Stock, of which \$2.24 per share was paid by each purchaser of Pre-Funded Warrants at the Closing. The exercise price of the warrants is subject to appropriate adjustment in the event of stock dividends, subdivisions, stock splits, stock combinations, reclassifications or reorganizations affecting our common stock.

Payment of Exercise Price. The warrant holders have the option to provide payment of the exercise price of the shares being acquired upon exercise of the warrants (i) by wire transfer or cashier’s check, or, in certain circumstances as described below (ii) by cashless exercise.

Cashless Exercise. If at any time there is no effective resale registration statement registering the resale of the Closing Warrants or Pre-Funded Warrants, in lieu of making the cash payment otherwise contemplated to be made to us upon such exercise in payment of the aggregate exercise price, the holder may elect instead to receive upon such exercise the net number of shares of common stock determined according to a formula set forth in the Closing Warrants or Pre-Funded Warrants.

Transferability. Subject to applicable laws and the restriction on transfer set forth in the warrant agreement, the warrants may be transferred at the option of the holders upon surrender of the warrants to the warrant agent together with the appropriate instruments of transfer.

Change of Control Transactions. If, at any time while each Closing Warrant or Pre-Funded Warrant is outstanding, there is a Change of Control, which generally includes a merger or consolidation resulting in the sale of 50% or more of the voting securities of the Company, the sale of all or substantially all of the assets or voting securities of the Company, or other change of control transaction, then the holder has the right thereafter to receive, upon exercise of the Closing Warrant or Pre-Funded Warrant, the same amount and kind of securities, cash or property as it would have been entitled to receive upon the occurrence of such Change of Control if it had been, immediately prior to such Change of Control, the holder of the number of Warrant Shares then issuable upon exercise in full of the Closing Warrant or Pre-Funded Warrant (the “Alternate Consideration”). If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Change of Control, then the holder will be given the same choice as to the Alternate Consideration it receives upon any exercise of the Closing Warrants or Pre-Funded Warrants following such Change of Control.

Events of Failure. In the event that we fail to timely deliver shares of Common Stock to any holder, we are required to make whole any holder who purchases shares of Common Stock to deliver in satisfaction of a sale by such holder of shares of Common Stock issuable upon an exercise of the Closing Warrants or the Pre-Funded Warrants that the holder anticipated

receiving from the Company, as described in the Closing Warrants and Pre-Funded Warrants.

Rights as a Stockholder. Except for the right to participate in certain dividends and distributions and as otherwise provided in the Closing Warrants and the Pre-Funded Warrants or by virtue of a holder's ownership of our common stock, the holders of the Closing Warrants and Pre-Funded Warrants do not have the rights or privileges of holders of our Common Stock, including any voting rights, until they exercise their warrants.

Waivers and Amendments. Any term of the Closing Warrants and Pre-Funded Warrants may be amended or waived with our written consent and the written consent of the holder of such Closing Warrant or Pre-Funded Warrant.

No Fractional Shares. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of the Closing Warrants or Pre-Funded Warrants. As to any fraction of a share which the holder would otherwise be entitled to purchase upon such exercise, we shall cause the warrant agent to, at our option, pay a cash adjustment in respect of such final fraction in an amount equal to such fraction multiplied by the exercise price of the Closing Warrant or Pre-Funded Warrant per whole share or round such fractional share up to the nearest whole share.

DISCLOSURE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus, any prospectus supplement and the other documents we have filed with the SEC that are incorporated herein by reference, contain forward-looking statements that involve substantial risks and uncertainties. All statements, other than statements of historical facts, including statements regarding our strategy, future operations, future financial position, future revenues, projected costs, prospects, plans and objectives of management, are forward-looking statements. The words “anticipate,” “believe,” “estimate,” “expect,” “intend,” “may,” “plan,” “predict,” “project,” “target,” “potential,” “will,” “would,” “could,” “should,” “continue,” and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. In particular, you should consider the numerous risks described in our Annual Report on Form 10-K for the year ended December 31, 2019 and any subsequent Quarterly Reports on Form 10-Q, each incorporated by reference in this prospectus, and in the “Risk Factors” section in any applicable prospectus supplement. See “Where You Can Find More Information.”

Although we believe the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, level of activity, performance or achievements. You should not rely upon forward-looking statements as predictions of future events. Unless required by law, we will not undertake and we specifically disclaim any obligation to release publicly the result of any revisions which may be made to any forward-looking statements to reflect events or circumstances after the date of such statements or to reflect the occurrence of events, whether or not anticipated. In that respect, we wish to caution readers not to place undue reliance on any such forward-looking statements, which speak only as of the date they are made.

This prospectus and the other documents incorporated by reference herein include statistical and other industry and market data that we obtained from industry publications and research, surveys and studies conducted by third parties. Industry publications and third party research, surveys and studies generally indicate that their information has been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. While we believe these industry publications and third party research, surveys and studies are reliable, we have not independently verified such data.

These risks and uncertainties include, among other things:

- our estimates regarding the timing and amount of funds we require to conduct clinical trials for GEN-009 and GEN-011, to continue preclinical studies for our other product candidates and to continue our investments in immuno-oncology;
- our estimates regarding expenses, future revenues, capital requirements, the sufficiency of our current and expected cash resources and our need for additional financing;
- the timing of, and our ability to, obtain and maintain regulatory approvals for our product candidates;
- the effect of the novel coronavirus (COVID-19) pandemic on the economy generally and on our business and operations specifically, including our research and development efforts, our clinical trials and our employees, and the potential disruptions in supply chains and to our third party manufacturers, including the availability of materials and equipment;
- the potential benefits of strategic partnership agreements and our ability to enter into strategic partnership arrangements;
- our intellectual property position;
- the rate and degree of market acceptance and clinical utility of any approved product candidate;
- our ability to quickly and efficiently identify and develop product candidates; and
- our commercialization, marketing and manufacturing capabilities and strategies.

USE OF PROCEEDS

The selling stockholders will receive all of the net proceeds from sales of the Common Stock pursuant to this prospectus. However, in the case of Closing Warrants and Pre-Funded Warrants issued to the selling stockholders pursuant to the Purchase Agreement, upon any exercise of the Closing Warrants and Pre-Funded Warrants for cash, the selling stockholders would pay us an exercise price of \$2.25 and \$0.01 per share of Common Stock, respectively, subject to any adjustment pursuant to the terms of the Closing Warrants and Pre-Funded Warrants. We expect to use any such proceeds to fund continued clinical and program development of our neoantigen vaccine GEN-009 and our neoantigen cell therapy GEN-011, as well as for working capital and other general corporate purposes.

SELLING STOCKHOLDERS

Pursuant to the Purchase Agreement, we agreed to file the registration statement of which this prospectus is a part to cover the resale of the shares of our Common Stock and the shares underlying the Closing Warrants and Pre-Funded Warrants, and to keep such registration statement effective with respect to each selling stockholder until the date on which all of the shares of our Common Stock registered for resale under the registration statement have been disposed of in accordance with such registration statement, disposed of pursuant to Rule 144 under the Securities Act, or can be resold pursuant to Rule 144 without restriction or limitation (including without any limitation as to volume of sales and without the selling stockholder complying with any method of sale requirements or notice requirements under Rule 144). The shares issuable upon exercise of the Closing Warrants and Pre-Funded Warrants will become eligible for sale by the selling stockholders under this prospectus only when the Closing Warrants or Pre-Funded Warrants are exercised. We cannot predict when or whether any of the selling stockholders will exercise their Closing Warrants or Pre-Funded Warrants.

We are registering the resale of the above-referenced shares to permit each of the selling stockholders identified below, or their permitted transferees or other successors-in-interest that may be identified in a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part, to resell or otherwise dispose of the shares in the manner contemplated under “Plan of Distribution” in this prospectus (as may be supplemented and amended). This prospectus covers the sale or other disposition by the selling stockholders of up to the total number of shares of Common Stock that may be issued to the selling stockholders pursuant to the Purchase Agreement, plus the total number of shares of Common Stock issuable upon exercise of the Closing Warrants and Pre-Funded Warrants issued to the selling stockholders. Throughout this prospectus, when we refer to the shares of our Common Stock being registered on behalf of the selling stockholders, we are referring to the shares of our Common Stock and the shares underlying the Closing Warrants and Pre-Funded Warrants issued to the selling stockholders pursuant to the Purchase Agreement, and when we refer to the selling stockholders in this prospectus, we are referring to the purchasers under the Purchase Agreement and, as applicable, their permitted transferees or other successors-in-interest that may be identified in a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part.

The selling stockholders may sell some, all or none of their shares. We do not know how long the selling stockholders will hold the shares before selling them, and we currently have no agreements, arrangements or understandings with the selling stockholders regarding the sale or other disposition of any of the shares. The shares of our Common Stock covered hereby may be offered from time to time by the selling stockholders.

When we refer to “selling shareholders” in this prospectus, we mean those persons listed in the table below, as well as their transferees, pledgees or donees or their successors. The information regarding shares beneficially owned after the offering assumes the sale of all shares offered by the selling shareholders. To our knowledge, subject to community property laws where applicable, each person named in the table has sole voting and investment power with respect to the shares of Common Stock set forth opposite such person’s name.

The following table sets forth the name of each selling stockholder, the number and percentage of our Common Stock beneficially owned by the selling stockholders as of July 31, 2020, the number of shares of our Common Stock that may be offered under this prospectus, and the number and percentage of our Common Stock beneficially owned by the selling stockholders assuming all of the shares of our Common Stock registered hereunder are sold. Beneficial ownership is determined in accordance with the rules of the SEC and includes voting or investment power with respect to our Common Stock. Generally, a person “beneficially owns” shares of our Common Stock if the person has or shares with others the right to vote those shares or to dispose of them, or if the person has the right to acquire voting or disposition rights within 60 days. The number of shares of our Common Stock in the column “Number of Shares Offered” represents all of the shares of our Common Stock that a selling stockholder may offer and sell from time to time under this prospectus. For certain selling stockholders, the number of shares of Common Stock into which the Closing Warrants and Pre-Funded Warrants beneficially held by such selling stockholder are exercisable are limited pursuant to the terms of the Closings Warrants and Pre-Funded Warrants to a number of shares of Common Stock which would result in such selling stockholder having aggregate individual beneficial ownership of the total issued and outstanding shares of Common Stock over specified percentage thresholds (collectively, referred to as the “Beneficial Ownership Limitation”).

Name and Address	Prior to Offering		Number of Shares Offered	After Offering	
	Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned		Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned
New Enterprise Associates 16, L.P. 1954 Greenspring Drive, Suite 600 Timonium, MD 21093	15,401,579 (1)	27.22 %	6,302,520	9,099,059	16.63 %
Avoro Life Sciences Fund LLC 110 Greene Street, Suite 800 New York, NY 10012	5,158,217 (2)	9.99 %	33,613,444	—	-%
S.R. One, Limited 161 Washington Street, Suite 500 Conshohocken, PA 19428	5,209,027 (3)	9.99 %	2,521,008	3,676,768	6.96 %
Entities affiliated with BVF Partners L.P. 44 Montgomery Street, 40 th Floor San Francisco, CA 94104	5,204,225 (4)	9.99 %	6,302,520	3,365,566	6.10 %
Citadel Multi-Strategy Equities Master Fund Ltd. 601 Lexington Avenue New York, NY 10022	3,361,344 (5)	6.31 %	3,361,344	—	-%
M. Kingdon Offshore Master Fund L.P. 152 West 57 th Street, 50 th Floor New York, NY 10019	2,604,386 (6)	4.99 %	2,521,008	711,552	1.35 %
Entities affiliated with EcoR1 Capital, LLC 357 Tehama Street, #3 San Francisco, CA 94103	2,597,622 (7)	4.99 %	4,201,680	—	-%
Entities affiliated with Pontifax 14 Shenkar Street, Herzliya, Israel	2,597,622 (8)	4.99 %	4,201,678	—	-%
Entities affiliated with Boxer Capital, LLC 11682 El Camino Real, Suite 320 San Diego, CA 92130	2,521,006 (9)	4.77 %	2,521,006	—	-%
Lincoln Park Capital Fund, LLC 440 N. Wells Street, Suite 410 Chicago, IL 60654	1,793,172 (10)	3.42 %	1,680,672	112,500	*%

*Represents less than 1%.

(1) Based on a Schedule 13D filed with the SEC on August 3, 2020, consists of 10,376,936 shares of Common Stock, a Class C warrant to purchase, subject to certain limitations, up to an aggregate of 3,151,260 shares of Common Stock, a Class A warrant to purchase, subject to certain limitations, up to an aggregate of 1,562,500 shares of Common Stock, and a Class B warrant to purchase, subject to certain limitations, up to an aggregate of 310,883 shares of Common Stock, held by New Enterprise Associates 16, L.P. (NEA 16). NEA Partners 16, L.P. (NEA Partners 16), is the sole general partner of NEA 16. NEA 16 GP, LLC (NEA 16 LLC), is the sole general partner of NEA Partners 16. Forest Baskett, Ali Behbahani, Carmen Chang, Anthony Florence, Jr., Mohamad Makhzoumi, Joshua Makower, Scott D. Sandell, Paul Walker, and Peter Sonsini, are the managers of NEA 16 LLC. NEA Partners 16, NEA 16 LLC and the managers of NEA 16 LLC share voting and dispositive power with regard to the securities held by NEA 16. Each of NEA Partners 16 and NEA 16 LLC as well as each of the managers of NEA 16 LLC disclaims beneficial ownership of all shares held by NEA 16 except to the extent of their actual pecuniary interest therein.

(2) Consists of 5,084,184 shares of common stock and 74,033 shares of common stock issuable upon the exercise of warrants held by Avoro Life Sciences Fund LLC ("Avoro Life Sciences"). Excludes 28,455,227 shares of common stock issuable upon the exercise of warrants, which are not exercisable within 60 days of July 31, 2020 by virtue of the beneficial ownership limitation described below. The number of shares of common stock into which the warrants are convertible is limited to that number of shares of common stock which would result in the stockholders, together with its affiliates, having an aggregate beneficial ownership of no more than 9.99% of the total issued and outstanding shares of common stock. Avoro Capital Advisors LLC ("Avoro Capital") is the investment advisor for Avoro Life Sciences, and Behzad Aghazadeh serves as the portfolio manager and controlling person of Avoro Capital.

(3) Consists of 4,626,389 shares of common stock and 582,638 shares of common stock issuable upon the exercise of warrants. Excludes 988,749 shares of common stock issuable upon the exercise of warrants, which are not exercisable within 60 days of July 31, 2020 by virtue of the beneficial ownership limitation described below. The number of shares of common stock into which the warrants are convertible is limited to that number of shares of common stock

which would result in the stockholders, together with its affiliates, having an aggregate beneficial ownership of no more than 9.99% of the total issued and outstanding shares of common stock. These shares and warrants are held directly by S.R. One, Limited, an indirect wholly-owned subsidiary of GlaxoSmithKline plc.

(4) Consists of 2,432,842 shares of common stock held of record by Biotechnology Value Fund, L.P. (“BVF”), 1,820,285 shares of common stock held of record by Biotechnology Value Fund II, L.P. (“BVF2”), 317,042 shares of common stock held of record by Biotechnology Value Trading Fund OS LP (“Trading Fund OS”), and 99,489 shares of common stock held of record by MSI BVF SPV L.L.C. Also includes 534,567 shares of common stock issuable upon exercise of warrants held by the above referenced BVF entities. Excludes 4,463,861 shares of common stock issuable upon the exercise of warrants, which are not exercisable within 60 days of July 31, 2020 by virtue of the beneficial ownership limitation described below. The number of shares of common stock into which the warrants are convertible is limited to that number of shares of common stock which would result in the stockholders, together with its affiliates, having an aggregate beneficial ownership of no more than 9.99% of the total issued and outstanding shares of common stock.

(5) Consists of 1,680,672 shares of common stock and 1,680,672 shares of common stock issuable upon the exercise of warrants to Citadel Multi-Strategy Equities Master Fund Ltd. (“Citadel”). Citadel Advisors LLC (“Citadel Advisors”) acts as the portfolio manager of Citadel. Citadel Advisors Holdings LP (“CAH”) is the sole member of Citadel Advisors. Citadel GP LLC (“CGP”) is the general partner of CAH. Mr. Kenneth Griffin is the President and Chief Executive Officer of CGP and owns a controlling interest in CGP and may be deemed to share voting and dispositive power over the shares held by Citadel. The address for Citadel is c/o Citadel Advisors LLC, 601 Lexington Avenue, New York, NY 10022.

(6) Consists of 1,972,056 shares of common stock and 632,330 shares of common stock issuable upon the exercise of warrants to M. Kingdon Offshore Master Fund L.P. Excludes 628,174 shares of common stock issuable upon the exercise of warrants, which are not exercisable within 60 days of July 31, 2020 by virtue of the beneficial ownership limitation described below. The number of shares of common stock into which the warrants are convertible is limited to that number of shares of common stock which would result in the stockholders, together with its affiliates, having an aggregate beneficial ownership of no more than 4.99% of the total issued and outstanding shares of common stock. Mark Kingdon is the Managing Member of Kingdon GP, LLC, which is the general partner of M. Kingdon Offshore Master Fund L.P.

(7) Consists of 2,100,840 shares of common stock and 496,782 shares of common stock issuable upon the exercise of warrants, collectively held by to EcoR1 Capital Fund Qualified, LP and EcoR1 Capital Fund, LP, (“the EcoR1 Funds”). For the above referenced entities, this excludes 1,604,058 shares of common stock issuable upon the exercise of warrants, which are not exercisable within 60 days of July 31, 2020 by virtue of the beneficial ownership limitation described below. The number of shares of common stock for which the warrants are convertible is limited to that number of shares of common stock which would result in the stockholders, together with its affiliates, having an aggregate beneficial ownership of no more than 4.99% of the total issued and outstanding shares of common stock. The EcoR1 Funds are managed by EcoR1 Capital, LLC., which is managed by Oleg Nodelman.

(8) Consists of 2,100,839 shares of common stock and 496,783 shares of common stock issuable upon the exercise of warrants collectively held by Pontifax (Israel) V L.P., Pontifax (China) V L.P., Pontifax (Cayman) V L.P. and Pontifax Late Stage Fund L.P. Excludes 1,604,056 shares of common stock issuable upon the exercise of warrants to the above referenced entities, which are not exercisable within 60 days of July 31, 2020 by virtue of the beneficial ownership limitation described below. The number of shares of common stock into which the warrants are convertible is limited to that number of shares of common stock which would result in the stockholders, together with its affiliates, having an aggregate beneficial ownership of no more than 4.99% of the total issued and outstanding shares of common stock.

(9) Consists of 1,134,453 shares of common stock and 1,134,453 shares of common stock issuable upon the exercise of warrants to Boxer Capital, LLC, and 126,050 shares of common stock and 126,050 shares of common stock issuable upon the exercise of warrants to MVA Investors, LLC. Boxer Asset Management Inc. is the managing member and majority owner of Boxer Capital, LLC. Joseph Lewis is the sole indirect owner and controls Boxer Asset Management Inc. MVA Investors, LLC is the independent, personal investment vehicle of certain employees of Boxer Capital, LLC. MVA Investors, LLC is the independent, personal investment vehicle of certain employees of Boxer Capital, LLC.

(10) Consists of 890,336 shares of common stock and 902,836 shares of common stock issuable upon the exercise of warrants. Josh Scheinfeld and Jonathan Cope, as principals of Lincoln Park Capital Fund, LLC, are deemed to be

beneficial owners of all shares of common stock owned by Lincoln Park Capital Fund, LLC. Messrs. Schienfeld and Cope have shared voting and dispositive power over such shares.

PLAN OF DISTRIBUTION

The selling stockholders, which as used herein includes donees, pledgees, transferees or other successors-in-interest selling shares of Common Stock previously issued and the shares of Common Stock issuable upon exercise of the Closing Warrants or Pre-Funded Warrants or interests in shares of Common Stock received after the date of this prospectus from a selling stockholder as a gift, pledge, partnership distribution or other transfer, may, from time to time, sell, transfer or otherwise dispose of any or all of their shares of Common Stock or interests in shares of Common Stock on any stock exchange, market or trading facility on which the shares are traded or in private transactions. The selling stockholders may sell their shares of our Common Stock pursuant to this prospectus at fixed prices, at prevailing market prices at the time of sale, at prices related to the prevailing market price, at varying prices determined at the time of sale, or at negotiated prices.

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

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

If the selling stockholders effect such transactions by selling shares of Common Stock to or through underwriters, broker-dealers or agents, such underwriters, broker-dealers or agents may receive commissions in the form of discounts, concessions or commissions from the selling stockholders or commissions from purchasers of the shares of Common Stock for whom they may act as agent or to whom they may sell as principal (which discounts, concessions or commissions as to particular underwriters, broker-dealers or agents may be in excess of those customary in the types of transactions involved).

Broker-dealers engaged by the selling stockholders may arrange for other brokers-dealers to participate in sales. Broker-dealers may receive commissions or discounts from the selling stockholders (or, if any broker-dealer acts as agent for the purchaser of securities, from the purchaser) in amounts to be negotiated.

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

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

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

The selling stockholders also may resell all or a portion of the shares of Common Stock in open market transactions in reliance upon Rule 144 under the Securities Act, provided that they meet the criteria and conform to the requirements of that rule. In addition, the selling stockholders may transfer the shares of Common Stock by other means not described in this prospectus.

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

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

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

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

Once sold under the registration statement of which this prospectus forms a part, the shares of Common Stock will be freely tradable in the hands of persons other than our affiliates.

We have agreed to indemnify the selling stockholders against liabilities, including liabilities under the Securities Act and state securities laws, relating to the registration of the shares offered by this prospectus.

We will pay all expenses of the registration of the shares of Common Stock, including, without limitation, SEC filing fees. We have agreed with the selling stockholders to keep the registration statement of which this prospectus constitutes a part effective until such time as the shares offered by the selling stockholders have been effectively registered under the Securities Act and disposed of in accordance with such registration statement, the shares offered by the selling stockholders have been disposed of pursuant to Rule 144 under the Securities Act or the shares offered by the selling stockholders may be resold pursuant to Rule 144 without restriction or limitation (including without any limitation as to volume of sales and without the selling stockholder complying with any method of sale requirements or notice requirements under Rule 144).

LEGAL MATTERS

The validity of the issuance of the securities offered hereby will be passed upon for us by Ropes & Gray LLP, Boston, Massachusetts.

EXPERTS

The consolidated financial statements of Genocea Biosciences, Inc. appearing in Genocea Biosciences, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2019, have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report thereon, (which contains an explanatory paragraph describing conditions that raise substantial doubt about the Company's ability to continue as a going concern as described in Note 1 to the consolidated financial statements), included therein, and incorporated herein by reference. Such financial statements are incorporated herein by reference in reliance upon such report given on the authority of such firm as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

This prospectus is part of a registration statement we filed with the SEC. This prospectus does not contain all of the information set forth in the registration statement and the exhibits to the registration statement. For further information with respect to us and the Common Stock we are offering under this prospectus, we refer you to the registration statement and the exhibits and schedules filed as a part of the registration statement. Neither we nor any agent, underwriter or dealer has authorized any person to provide you with different information. We are not making an offer of Common Stock in any state where the offer is not permitted. You should not assume that the information in this prospectus is accurate as of any date other than the date on the front page of this prospectus, regardless of the time of delivery of this prospectus or any sale of Common Stock offered by this prospectus.

We file annual, quarterly and current reports, proxy statements and other information with the SEC. The SEC maintains a website that contains reports, proxy statements and other information regarding issuers that file electronically with the SEC, including us. The address of the SEC website is www.sec.gov.

We maintain a website at www.genocea.com. Information contained in, or accessible through, our website is not a part of, and is not incorporated into, this prospectus, and you should not consider it part of this prospectus.

INCORPORATION OF DOCUMENTS BY REFERENCE

The SEC allows us to "incorporate by reference" into this prospectus the information we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus, and information in documents that we file later with the SEC will automatically update and supersede information in this prospectus. We incorporate by reference into this prospectus the documents listed below and any future filings made by us with the SEC under Section 13(a), 13(c), 14 or 15(d) of the Exchange Act, except for information "furnished" under Items 2.02, 7.01 or 9.01 on Form 8-K or other information "furnished" to the SEC which is not deemed filed and not incorporated in this prospectus, until the termination of the offering of securities described in the applicable prospectus supplement. We hereby incorporate by reference the following documents:

- our Annual Report on Form 10-K for the year ended December 31, 2019, as filed with the SEC on February 13, 2020;
- the information specifically incorporated by reference into our Annual Report on Form 10-K for the year ended December 31, 2019 from our definitive proxy statement on Schedule 14A, as filed with the SEC on April 20, 2020;
- our Current Reports on Form 8-K filed with the SEC on May 22, 2020, June 2, 2020, June 19, 2020 and July 22, 2020; and
- description of our Common Stock contained in our Registration Statement on Form 8-A, as filed with the SEC on January 30, 2014, as supplemented by the description of our common stock contained in Exhibit 4.8 in our Annual Report on Form 10-K for the year ended December 31, 2019, as filed with the SEC on February 13, 2020, including any amendment or report filed for the purpose of updating such description.

Any statement contained in a document incorporated or deemed to be incorporated by reference in this prospectus will be deemed modified, superseded or replaced for purposes of this prospectus to the extent that a statement contained in this prospectus modifies, supersedes or replaces such statement.

You may request a copy of these filings, at no cost, by writing or telephoning us at the following address:

Investor Relations
100 Acorn Park Drive, 5th Floor
Cambridge, Massachusetts 02140
(617) 876-8191
email address: ir@genocoea.com

Copies of these filings are also available, without charge, on the SEC's website at www.sec.gov and on our website at www.genocoea.com as soon as reasonably practicable after they are filed electronically with the SEC. The information contained on our website is not a part of this prospectus.

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 14. Other Expenses of Issuance and Distribution

The following table sets forth an estimate of the fees and expenses relating to the issuance and distribution of the securities being registered hereby, other than underwriting discounts and commissions, all of which shall be borne by the Registrant. All of such fees and expenses, except for the SEC registration fee, are estimated:

SEC registration fee	\$	20,800
Legal fees and expenses	\$	191,686
Accounting fees and expenses	\$	10,000
Miscellaneous fees and expenses	\$	5,157,514
Total	\$	5,380,000

Item 15. Indemnification of Officers and Directors.

Section 102 of the Delaware General Corporation Law permits a corporation to eliminate the personal liability of its directors or its stockholders for monetary damages for a breach of fiduciary duty as a director, except where the director breached his or her duty of loyalty, failed to act in good faith, engaged in intentional misconduct or knowingly violated a law, authorized the payment of a dividend or approved a stock repurchase in violation of Delaware corporate law or obtained an improper personal benefit. Our certificate of incorporation provides that no director shall be personally liable to us or our stockholders for monetary damages for any breach of fiduciary duty as a director, notwithstanding any provision of law imposing such liability, except to the extent that the Delaware General Corporation Law prohibits the elimination or limitation of liability of directors for breaches of fiduciary duty.

Section 145 of the Delaware General Corporation Law provides that a corporation has the power to indemnify a director, officer, employee or agent of the corporation and certain other persons serving at the request of the corporation in related capacities against expenses (including attorneys' fees), judgments, fines and amounts paid in settlements actually and reasonably incurred by the person in connection with an action, suit or proceeding to which he or she is party or is threatened to be made a party by reason of such position, if such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the best interests of the corporation, and, in any criminal action or proceeding, had no reasonable cause to believe his or her conduct was unlawful, except that, in the case of actions brought by or in the right of the corporation, 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 corporation unless and only to the extent that the Court of Chancery or other adjudicating court determines that, despite the adjudication of liability but in view of all of the circumstances of the case, such person is fairly and reasonably entitled to indemnification for such expenses which the Court of Chancery or such other court shall deem proper.

Our certificate of incorporation provides that we 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 us) by reason of the fact that he or she is or was, or has agreed to become, our director or officer, or is or was serving, or has agreed to serve, at our 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, our 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.

Our certificate of incorporation also provides that we will indemnify any Indemnitee who was or is a party to an action or suit by or in the right of us to procure a judgment in our favor by reason of the fact that the Indemnitee is or was, or has agreed to become, our director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee or, 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, our 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 us, 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 us against all expenses (including attorneys' fees) actually and reasonably incurred by him or her or on his or her behalf in connection therewith. If we don't assume the defense, expenses must be advanced to an Indemnitee under certain circumstances.

We have entered into indemnification agreements with our directors. In general, these agreements provide that we will indemnify the director to the fullest extent permitted by law for claims arising in his or her capacity as a director of our company or in connection with his or her service at our request for another corporation or entity. The indemnification agreements also provide for procedures that will apply in the event that a director makes a claim for indemnification and establish certain presumptions that are favorable to the director.

We maintain a general liability insurance policy which covers certain liabilities of our directors and officers arising out of claims based on acts or omissions in their capacities as directors or officers.

Item 16. Exhibits.

Exhibit Number	Description of Document
3.1	Fifth Amended and Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, File No. 001-36289, filed on February 12, 2014)
3.2	Certificate of Amendment to the Amended and Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, File No. 001-36289, filed on June 25, 2018)
3.3	Certificate of Amendment to the Amended and Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, File No. 001-36289, filed on May 21, 2019)
3.4	Certificate of Amendment to Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, File No. 001-36289, filed on June 2, 2020)
3.5	Certificate of Correction to the Certificate of Amendment to the Restated Certificate of Incorporation of Genoecea Biosciences, Inc. (incorporated by reference to Exhibit 3.5 to the Company's Quarterly Report on Form 10-Q, File No. 001-36289, filed on July 23, 2020)
4.1	Form of Common Stock Certificate (incorporated by reference to Exhibit 4.1 to the Company's Registration Statement on Form S-1, File No. 333-193043, filed on December 23, 2013)
4.2	Form of Pre-Funded Warrant (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K, File No. 001-36289, filed on July 22, 2020)
4.3	Form of Warrant (incorporated by reference to Exhibit 4.2 to the Company's Form 8-K, File No. 001-36289, filed on July 22, 2020)
10.1	Form of Purchase Agreement (incorporated by reference to Exhibit 10.1 to the Company's Form 8-K, File No. 001-36289, filed on July 22, 2020)
5.1	Opinion of Ropes & Gray LLP (filed herewith)
23.1	Consent of Ernst & Young LLP (filed herewith)
23.2	Consent of Ropes & Gray LLP (included in Exhibit 5.1)
24.1	Power of Attorney (included on signature page)

Item 17. Undertakings.

The undersigned registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

(i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;

(ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing,

any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20 percent 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 the undertakings set forth in paragraphs (1)(i), (1)(ii) and (1)(iii) above 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 this registration statement or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of this registration statement.

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

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

(4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser:

(i) Each prospectus filed by the registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and

(ii) Each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5), or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii), or (x) for the purpose of providing the information required by Section 10(a) of the Securities Act of 1933 shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which that prospectus relates, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof. *Provided, however,* that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such effective date, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such effective date.

(5) That, for the purpose of determining liability of the registrant under the Securities Act of 1933 to any purchaser in the initial distribution of the securities, the undersigned registrant undertakes that in a primary offering of securities of the undersigned registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser: (i) any preliminary prospectus or prospectus of the undersigned registrant relating to the offering required to be filed pursuant to Rule 424; (ii) any free writing prospectus relating to the offering prepared by or on behalf of the undersigned registrant or used or referred to by the undersigned registrant; (iii) the portion of any other free writing prospectus relating to the offering containing material information about the undersigned registrant or its securities provided by or on behalf of the undersigned registrant; and (iv) any other communication that is an offer in the offering made by the undersigned registrant to the purchaser.

(6) 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 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each

filing of an employee benefit plan's annual report pursuant to Section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by 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 Securities Act of 1933 and will be governed by the final adjudication of such issue.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-3 and has duly caused this Form S-3 to be signed on its behalf by the undersigned, thereunto duly authorized, in Cambridge, Massachusetts, on the 18th day of August, 2020.

GENOCEA BIOSCIENCES, INC.

By: /s/ WILLIAM CLARK
William Clark
President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints William D. Clark and Diantha Duvall as his or her true and lawful attorney-in-fact and agent, with full power of substitution and resubstitution, for him or her and in his or her name, place, and stead, in any and all capacities, to sign any and all amendments (including post-effective amendments) to this Registration Statement, and to file the same, with all exhibits thereto, and other documents in connection therewith with the Securities and Exchange Commission, granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or his 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 by the following persons in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ WILLIAM CLARK</u> William Clark	President and Chief Executive Officer and Director (Principal Executive Officer)	August 18, 2020
<u>/s/ DIANTHA DUVALL</u> Diantha Duvall	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	August 18, 2020
<u>/s/ KENNETH BATE</u> Kenneth Bate	Director	August 18, 2020
<u>/s/ ALI BEHBAHANI</u> Ali Behbahani	Director	August 18, 2020
<u>/s/ KATRINE BOSLEY</u> Katrine Bosley	Director	August 18, 2020
<u>/s/ RONALD COOPER</u> Ronald Cooper	Director	August 18, 2020
<u>/s/ MICHAEL HIGGINS</u> Michael Higgins	Director	August 18, 2020
<u>/s/ GISELA SCHWAB</u> Gisela Schwab, M.D.	Director	August 18, 2020
<u>/s/ GEORGE SIBER</u> George Siber, M.D.	Director	August 18, 2020

**ROPES
& GRAY** ROPES & GRAY LLP
PRUDENTIAL TOWER
800 BOYLSTON STREET
BOSTON, MA 02199-3600
WWW.ROPESGRAY.COM

August 18, 2020

Genocea Biosciences, Inc.
Cambridge Discovery Park
100 Acom Park Drive, 5th Floor
Cambridge, MA 02140

Re: Registration Statement on Form S-3

Ladies and Gentlemen:

We have acted as counsel to Genocea Biosciences, Inc., a Delaware corporation (the "Company") in connection with the registration statement on Form S-3 (the "Registration Statement") to be filed with the Securities and Exchange Commission (the "Commission") under the Securities Act of 1933, as amended (the "Act"), on the date hereof. The Registration Statement relates to the offer and sale, from time to time by certain stockholders of the Company identified in the Registration Statement, of (i) up to 21,390,902 shares of the Company's common stock, \$0.001 par value (the "Common Stock"), and (ii) up to 45,835,978 shares of Common Stock issuable upon the exercise of warrants (the "Warrants"). The Common Stock and Warrants were sold pursuant to that certain Securities Purchase Agreement among the Company and the purchasers (the "Purchasers") named therein (the "Purchase Agreement").

Pursuant to the Purchase Agreement, the Company issued 21,390,902 shares of Common Stock (the "Shares") and Warrants to purchase up to 45,835,978 shares of Common Stock (the "Warrant Shares").

In connection with this opinion letter, we have examined such certificates, documents and records and have made such investigation of fact and such examination of law as we have deemed appropriate in order to enable us to render the opinions set forth herein. In conducting such investigation, we have relied, without independent verification, upon certificates of officers of the Company, public officials and other appropriate persons.

The opinions expressed below are limited to the laws of the State of New York and the Delaware General Corporation Law.

Based upon and subject to the foregoing, we are of the opinion that the Shares have been duly authorized and validly issued, fully paid and non-assessable. We are of the opinion

that the Warrants have been duly authorized and have been validly issued, fully paid and non-assessable and are binding obligations of the Company, enforceable in accordance with their terms, subject to applicable bankruptcy, insolvency and similar laws affecting creditors' rights generally, concepts of reasonableness and equitable principles of general applicability, provided that we express no opinion as to the validity, legally binding effect or enforceability of any provision in the Warrants that requires or relates to adjustments to the exercise price at a price or in an amount that a court would determine in the circumstances under applicable law to be commercially unreasonable or a penalty or forfeiture. As of the date hereof, the Warrant Shares have been duly authorized and reserved for issuance pursuant to the terms of the Warrants and, when issued and delivered upon exercise of the Warrants and against payment of the consideration set forth therein, will be validly issued, fully paid and non-assessable.

In connection with the opinion expressed above, we have assumed that each party to the Warrants has been duly incorporated and is validly existing under the laws of the jurisdiction of its organization. In addition, we have assumed that the execution, delivery and performance by each party thereto of the Warrants (a) are within its corporate powers, (b) do not contravene or constitute a default under the certificate of incorporation or bylaws or other constitutive documents of such party, (c) require action by or in respect of, or filing with, any governmental body, agency or official and (d) do not contravene, or constitute a default under, any provisions of applicable law or regulation or any judgment, injunction, order or decree or any agreement or other instrument binding upon such party, provided that we make no such assumption to the extent we have specifically opined as to such matters with respect to the Company.

In addition, we have also assumed that (i) the Registration Statement and any amendments thereto will have become effective and comply with all applicable laws and no stop order suspending the Registration Statement's effectiveness will have been issued and remain in effect, in each case, at the time the Common Stock or Warrants Shares are offered and sold as contemplated by the Registration Statement and (ii) all Common Stock and Warrant Shares will be offered and sold in compliance with applicable federal and state securities laws and in the manner stated in the Registration Statement and the applicable prospectus supplement.

We hereby consent to your filing of this opinion as an exhibit to the Registration Statement and to the use of our name therein under the caption "Legal Matters." In giving such consent, we do not thereby 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 of the Commission thereunder.

Very truly yours,

/s/ Ropes & Gray LLP
Ropes & Gray LLP

Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption "Experts" in this Registration Statement (Form S-3) and related Prospectus of Genocera Biosciences, Inc. for the registration of shares of common stock and common stock underlying warrants and to the incorporation by reference therein of our report dated February 13, 2020, with respect to the consolidated financial statements of Genocera Biosciences, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2019, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Boston, Massachusetts
August 18, 2020