UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 20549

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended June 30, 2019

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from __________ to __________

Commission File Number: 001-37383

Arcadia Biosciences, Inc.
(Exact Name of Registrant as Specified in its Charter)

Delaware **(State or other jurisdiction of incorporation or organization)**	**81-0571538** **(I.R.S. Employer Identification No.)**
202 Cousteau Place, Suite 105 **Davis, CA** **(Address of Principal Executive Offices)**	**95618** **(Zip Code)**

Registrant's telephone number, including area code: (530) 756-7077

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

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	☐	Smaller reporting company	☒
Emerging growth company	☒		

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

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common	RKDA	NASDAQ

As of August 1, 2019, the registrant had 6,266,994 shares of common stock outstanding, $0.001 par value per share.

Arcadia Biosciences, Inc.

FORM 10-Q FOR THE QUARTER ENDED June 30, 2019

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ITEM 1. CONDENSED CONSOLIDATED FINANCIAL STATEMENTS

Arcadia Biosciences, Inc.

Condensed Consolidated Balance Sheets

(Unaudited)

(In thousands, except share data)

	June 30, 2019	December 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	$ 14,646	$ 11,998
Short-term investments	5,381	9,825
Accounts receivable	125	165
Unbilled revenue	—	3
Inventories — current	839	181
Prepaid expenses and other current assets	1,009	704
Total current assets	22,000	22,876
Property and equipment, net	639	395
Right of use asset	2,051	—
Inventories — noncurrent	649	746
Other noncurrent assets	7	7
Total assets	$ 25,346	$ 24,024
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable and accrued expenses	$ 3,265	$ 2,645
Amounts due to related parties	19	29
Unearned revenue — current	15	96
Operating lease liability — current	594	—
Other current liabilities	264	284
Total current liabilities	4,157	3,054
Operating lease liability — noncurrent	1,609	—
Common stock warrant liabilities	8,294	5,083
Other noncurrent liabilities	3,000	3,072
Total liabilities	17,060	11,209
Stockholders' equity:		
Common stock, $0.001 par value—150,000,000 shares authorized as of June 30, 2019 and December 31, 2018; 6,266,994 and 4,774,919 shares issued and outstanding as of June 30, 2019 and December 31, 2018, respectively	47	45
Additional paid-in capital	194,980	191,136
Accumulated deficit	(186,741)	(178,366)
Total stockholders' equity	8,286	12,815
Total liabilities and stockholders' equity	$ 25,346	$ 24,024

See accompanying notes to the unaudited condensed consolidated financial statements.

Arcadia Biosciences, Inc.

Condensed Consolidated Statements of Operations and Comprehensive Income (Loss)

(Unaudited)

(In thousands, except share and per share data)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2019	2018	2019	2018
Revenues:				
Product	$ 162	$ 188	$ 269	$ 249
License	—	90	—	90
Contract research and government grants	41	158	92	311
Total revenues	203	436	361	650
Operating expenses:				
Cost of product revenues	89	271	148	307
Research and development	1,950	1,794	3,456	3,190
Selling, general and administrative	3,145	2,949	5,957	5,570
Total operating expenses	5,184	5,014	9,561	9,067
Loss from operations	(4,981)	(4,578)	(9,200)	(8,417)
Other income, net	101	94	221	132
Initial loss on common stock warrant and common stock adjustment feature liabilities	—	—	—	(4,000)
Change in fair value of common stock warrant and common stock adjustment feature liabilities	9,482	(535)	987	(2,435)
Offering costs	(365)	(1,639)	(365)	(2,543)
Net income (loss) before income taxes	4,237	(6,658)	(8,357)	(17,263)
Income tax benefit (provision)	1	(11)	(18)	(21)
Net income (loss)	$ 4,238	$ (6,669)	$ (8,375)	$ (17,284)
Net income (loss) per share:				
Basic and diluted	$ 0.84	$ (2.02)	$ (1.70)	$ (6.29)
Weighted-average number of shares used in per share calculations:				
Basic and diluted	5,054,812	3,307,667	4,916,116	2,746,931
Other comprehensive income, net of tax				
Unrealized losses on available-for-sale securities	—	—	—	1
Other comprehensive income	—	—	—	1
Comprehensive income (loss)	$ 4,238	$ (6,669)	$ (8,375)	$ (17,283)

See accompanying notes to the unaudited condensed consolidated financial statements.

Arcadia Biosciences, Inc.

Condensed Consolidated Statements of Stockholders' Equity

(Unaudited)

(In thousands, except share data)

	Common Stock		Additional Paid-In Capital	Accumulated Deficit	Accumulated Other Comprehensive (Loss)	Total Stockholders' Equity
	Shares	Amount				
Balance at January 1, 2018	2,134,153	$ 42	$ 175,223	$ (167,257)	$ (1)	$ 8,007
Impact of adoption of Topic 606	—	—	—	2,371	—	2,371
Issuance of shares related to employee stock option exercises	44,354	—	963	—	—	963
Issuance of shares related to employee stock purchase plan	1,122	—	6	—	—	6
Issuance of shares related to Purchase Agreement	1,201,634	1	(1)	—	—	—
Issuance of placement agent warrants related to Purchase Agreement	—	—	526	—	—	526
Common stock adjustment feature	—	—	8,378	—	—	8,378
Issuance of shares related to June 2018 Offering	1,392,345	2	4,976	—	—	4,978
Offering costs related to June 2018 Offering	—	—	(912)	—	—	(912)
Issuance of placement agent warrants related to June 2018 Offering	—	—	427	—	—	427
Stock-based compensation	—	—	1,550	—	—	1,550
Issuance of shares related to reverse stock split	1,311	—	—	—	—	—
Other comprehensive income	—	—	—	—	1	1
Net loss	—	—	—	(13,480)	—	(13,480)
Balance at December 31, 2018	4,774,919	$ 45	$ 191,136	$ (178,366)	$ —	$ 12,815
Issuance of shares related to employee stock purchase plan	2,500	—	8	—	—	8
Issuance of shares related to June 2019 Offering	1,489,575	2	3,301	—	—	3,303
Issuance of placement agent warrants related to June 2019 Offering	—	—	198	—	—	198
Offering costs related to June 2019 Offering	—	—	(474)	—	—	(474)
Stock-based compensation	—	—	811	—	—	811
Other comprehensive income	—	—	—	—	—	—
Net loss	—	—	—	(8,375)	—	(8,375)
Balance at June 30, 2019	6,266,994	$ 47	$ 194,980	$ (186,741)	$ —	$ 8,286

See accompanying notes to the unaudited condensed consolidated financial statements.

Arcadia Biosciences, Inc.

Condensed Consolidated Statements of Cash Flows

(Unaudited)

(In thousands)

	Six Months Ended June 30, 2019	Six Months Ended June 30, 2018
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net loss	$ (8,375)	$ (17,284)
Adjustments to reconcile net loss to cash used in operating activities:		
Initial loss on common stock warrant and common stock adjustment feature liabilities	—	4,000
Change in fair value of common stock warrant and common stock adjustment feature liabilities	(987)	2,435
Offering costs	365	2,543
Depreciation and amortization	77	98
Lease amortization	348	—
Gain on disposal of equipment	—	(3)
Net amortization of investment premium	(82)	(27)
Stock-based compensation	811	656
Changes in operating assets and liabilities:		
Accounts receivable	40	1,051
Unbilled revenue	3	(102)
Inventories	(561)	226
Prepaid expenses and other current assets	(305)	(245)
Accounts payable and accrued expenses	677	(52)
Amounts due to related parties	(10)	(17)
Unearned revenue	(81)	(197)
Operating lease payments	(349)	—
Net cash used in operating activities	(8,429)	(6,918)
CASH FLOWS FROM INVESTING ACTIVITIES:		
Proceeds from sale of property and equipment	—	9
Purchases of property and equipment	(315)	(68)
Purchases of investments	(8,623)	(18,908)
Proceeds from sales and maturities of investments	13,150	3,900
Net cash provided by (used in) investing activities	4,212	(15,067)
CASH FLOWS FROM FINANCING ACTIVITIES:		
Proceeds from issuance of common stock and warrants from June 2019 Offering	7,500	—
Payments of offering costs relating to June 2019 Offering	(619)	—
Proceeds from issuance of common stock and warrants from Purchase Agreement	—	10,000
Payments of offering costs relating to Purchase Agreement	—	(1,305)
Proceeds from issuance of common stock and warrants from June 2018 Offering	—	14,000
Payments of offering costs relating to June 2018 Offering	(24)	(1,134)
Proceeds from exercise of stock options and ESPP purchases	8	966
Net cash provided by financing activities	6,865	22,527
Net increase in cash and cash equivalents	2,648	542
Cash and cash equivalents — beginning of period	11,998	9,125
Cash and cash equivalents — end of period	$ 14,646	$ 9,667
SUPPLEMENTAL DISCLOSURES OF CASH FLOW INFORMATION:		
Cash paid for income taxes	$ 2	$ 24
NONCASH INVESTING AND FINANCING ACTIVITIES:		
Offering costs in accounts payable and accrued expenses at end of period	$ 22	$ 46
Common stock warrants issued to placement agent and included in offering costs related to Purchase Agreement	$ —	$ 526
Common stock warrants issued to placement agent and included in offering costs related to June 2018 Offering	$ —	$ 239
Common stock warrants issued to placement agent and included in offering costs related to June 2019 Offering	$ 86	$ —
Reclassification of common stock adjustment feature liability balance	$ —	$ 8,378
Right of use assets obtained in exchange for new operating lease liabilities	$ 2,328	$ —
Proceeds from sale of fixed assets included in prepaid expenses and other current assets at end of period	$ —	$ 1
Purchases of fixed assets included in accounts payable and accrued expenses	$ 6	$ —

See accompanying notes to the unaudited condensed consolidated financial statements.

1. Description of Business and Basis of Presentation

Organization

Arcadia Biosciences, Inc. (the "Company") was incorporated in Arizona in 2002 and maintains its headquarters in Davis, California, with additional facilities in Phoenix, Arizona, American Falls, Idaho, and Molokai, Hawaii. The Company was reincorporated in Delaware in March 2015.

We are a consumer-driven, agricultural food ingredient company and proven leader in agricultural innovation to improve the quality and nutritional content of crops. We aim to create value across the agricultural production and supply chain beginning with enhanced crop productivity for farmers and ultimately delivering accelerated innovation in nutritional quality consumer foods. We use state of the art gene-editing technology and advanced breeding techniques to naturally enhance the nutritional quality of grains and oilseeds to address the rapidly evolving trends in consumer health and nutrition. In addition, we have developed high value crop productivity traits designed to enhance farm economics.

In February 2012, the Company formed Verdeca LLC ("Verdeca," see Note 5), which is jointly owned with Bioceres Crop Solutions Corp. ("Bioceres"), a U.S. wholly owned subsidiary of Bioceres, S.A., an Argentine corporation. Bioceres, S.A. is an agricultural investment and development cooperative. Verdeca**,** which is consolidated by the Company, was formed to develop and deregulate soybean varieties using both partners' agricultural technologies.

Reverse Stock Split

In January 2018, the Company's board of directors and its shareholders approved a reverse split of 1:20 on the Company's issued and outstanding common stock which became effective on January 23, 2018. All issued and outstanding common stock, options to purchase common stock and per share amounts contained in the condensed consolidated financial statement have been retroactively adjusted to reflect the reverse stock split for all periods presented. The reverse stock split did not change the total number of authorized shares of common stock which remained at one hundred and fifty million shares.

Basis of Presentation and Principles of Consolidation

The accompanying unaudited condensed consolidated financial statements include the accounts of the Company and Verdeca in accordance with accounting principles generally accepted in the United States ("GAAP") for interim financial statements and are in the form prescribed by the Securities and Exchange Commission (the "SEC") in instructions to Form 10-Q and Rule 10-01 of Regulation S-X. In the opinion of management, the accompanying condensed consolidated financial statements reflect all adjustments, consisting of normal recurring adjustments, considered necessary for a fair statement of the Company's financial position, results of operations and cash flows for the periods indicated. All material intercompany accounts and transactions have been eliminated in consolidation. The Company uses a qualitative approach in assessing the consolidation requirement for variable interest entities ("VIEs"). This approach focuses on determining whether the Company has the power to direct the activities of the VIE that most significantly affect the VIE's economic performance and whether the Company has the obligation to absorb losses, or the right to receive benefits, that could potentially be significant to the VIE. For all periods presented, the Company has determined that it is the primary beneficiary of Verdeca, which is a VIE. The Company evaluates its relationships with the VIEs upon the occurrence of certain significant events that affect the design, structure or other factors pertinent to the primary beneficiary determination. Interim results are not necessarily indicative of results for any other interim period or for the full fiscal year. The information included in these condensed consolidated financial statements and notes thereto should be read in conjunction with Management's Discussion and Analysis of Financial Condition and Results of Operations included herein and Management's Discussion and Analysis of Financial Condition and Results of Operations and the consolidated financial statements and notes thereto for the fiscal year ended December 31, 2018 included in the Company's Annual Report on Form 10-K, filed with the SEC on April 1, 2019.

Liquidity, Capital Resources, and Going Concern

As of June 30, 2019, the Company had an accumulated deficit of $186.7 million, cash and cash equivalents of $14.6 million and short-term investments of $5.4 million. For the six months ended June 30, 2019 and the twelve months ended December 31, 2018, the Company had net losses of $8.4 and $13.5 million, and net cash used in operations of $8.4 million and $13.6 million, respectively. The Company believes that its existing cash, cash equivalents and investments will be insufficient to meet its anticipated cash requirements for at least through August 2020, and thus raises substantial doubt about the Company's ability to continue as a going concern. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

The Company may seek to raise additional funds through debt or equity financings. The Company may also consider entering into additional partner arrangements. The sale of additional equity would result in dilution to the Company's stockholders. The incurrence of debt would result in debt service obligations, and the instruments governing such debt could provide for additional operating and financing covenants that would restrict operations. If the Company does require additional funds and is unable to secure adequate additional funding at terms agreeable to the Company, the Company may be forced to reduce spending, extend payment terms with suppliers, liquidate assets, or suspend or curtail planned development programs or operations. Any of these actions could materially harm the business, results of operations and financial condition.

2. Recent Accounting Pronouncements

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*. Based on the new standard, lessees recognize lease assets and lease liabilities for leases classified as operating leases under previous GAAP and disclose qualitative and quantitative information about leasing arrangements with terms longer than 12 months. The adoption required recording right-of-use assets and corresponding lease obligation liabilities for the current operating leases. The Company adopted ASU No. 2016-02 on January 1, 2019. See Note 7.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments – Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*. Additionally, the FASB issued ASU No. 2019-04, *Codification Improvements to Topic 326* in April 2019 and ASU 2019-05, *Financial Instruments — Credit Losses (Topic 326) — Targeted Transition Relief* in May 2019. The amendments affect loans, debt securities, trade receivables, net investments in leases, off-balance-sheet credit exposures, reinsurance receivables, and any other financial assets not excluded from the scope that have the contractual right to receive cash. The amendments in this update will be effective for fiscal years beginning after December 15, 2019, including interim periods within those fiscal years. The Company is currently evaluating the impact of the adoption of ASU No. 2016-13 on its consolidated financial statements.

In August 2016, the FASB issued ASU No. 2016-15, *Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments*. The amendments address cash flow issues such as debt prepayment or debt extinguishment costs and zero-coupon debt instruments. The amendments in this update are effective for fiscal years beginning after December 15, 2018, and interim periods within fiscal years beginning after December 15, 2019. Early adoption is permitted, including adoption in an interim period. The amendments are to be applied using a retrospective transition method to each period presented. If it is impractical to retrospectively apply, it can be applied prospectively as of the earliest date practicable. The Company adopted ASU No. 2016-15 on January 1, 2019 with no material impact to the consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-13 *Fair Value Measurement (Topic 820) – Disclosure Framework – Changes to the Disclosure Requirements for Fair Value Measurement*. The amendments affect any entity required to make disclosures about recurring or nonrecurring fair value measurements. The amendments will be effective for all entities for fiscal years beginning after December 15, 2019. The Company is currently evaluating the impact of the adoption of ASU No. 2018-13 on its consolidated financial statements.

3. Inventory

Raw materials costs consist primarily of SONOVA® Gamma Linolenic Acid ("GLA") Safflower Oil seed production costs incurred by the Company's contracted cooperators. Goods in process costs consist of GoodWheat™ seed and grain production costs incurred primarily by the Company's contracted cooperators. Finished goods inventories consist of GLA oil that is available for sale. Inventory-current is comprised of the total of Goods in process plus a portion GLA oil within Finished Goods, which the Company anticipates to sell within 12 months. The remaining is recorded in Inventory-noncurrent. Inventories consist of the following (in thousands):

	June 30, 2019	December 31, 2018
Raw materials	$ 41	$ 41
Goods in process	637	—
Finished goods	810	886
Inventories	$ 1,488	$ 927

4. Investments and Fair Value of Financial Instruments

Available-for-Sale Investments

The Company classified short-term investments as "available-for-sale." These short-term investments are free of trading restrictions. The investments are carried at fair value, based on quoted market prices or other readily available market information. Unrealized gains and losses, net of taxes, are included in accumulated other comprehensive income, which is reflected as a separate component of stockholder's equity in the Consolidated Balance Sheets. Gains and losses are recognized when realized in the Consolidated Statements of Operations and Comprehensive Income (Loss).

The following tables summarize the amortized cost and fair value of the available-for-sale investment securities portfolio at June 30, 2019 and December 31, 2018, and the corresponding amounts of unrealized gains and losses recognized in accumulated other comprehensive income:

(Dollars in thousands)	Amortized Cost	Unrealized Gains	Unrealized Losses	Estimated Fair Value
June 30, 2019				
Cash equivalents:				
Money market funds	$ 13,571	$ —	$ —	$ 13,571
Corporate securities	449	—	—	449
Short-term investments:				
Corporate securities	600	—	—	600
Commercial paper	4,781	—	—	4,781
Total Assets at Fair Value	$ 19,401	$ —	$ —	$ 19,401

(Dollars in thousands)	Amortized Cost	Unrealized Gains	Unrealized Losses	Estimated Fair Value
December 31, 2018				
Cash equivalents:				
Money market funds	$ 9,902	$ —	$ —	$ 9,902
Commercial paper	1,345	—	—	1,345
Short-term investments:				
Corporate Securities	656	—	—	656
Treasury Bills	1,195	—	—	1,195
Commercial paper	6,776	—	—	6,776
U.S. government securities	1,198	—	—	1,198
Total Assets at Fair Value	$ 21,072	$ —	$ —	$ 21,072

The Company did not have any investment categories that were in a continuous unrealized loss position for more than three months as of June 30, 2019. Unrealized gains and losses amounts would be included in accumulated other comprehensive income or loss; however, none were reported during the periods presented.

As of June 30, 2019, for fixed income securities that were in unrealized loss positions, the Company has determined that (i) it does not have the intent to sell any of these investments, and (ii) it is not more likely than not that it will be required to sell any of these investments before recovery of the entire amortized cost basis. The Company anticipates that it will recover the entire amortized cost basis of such fixed income securities and has determined that no other-than-temporary impairments associated with credit losses were required to be recognized during the three and six months ended June 30, 2019.

Fair Value Measurement

Fair value accounting is applied for all financial assets and liabilities and non-financial assets and liabilities that are recognized or disclosed at fair value in the condensed consolidated financial statements on a recurring basis. Assets and liabilities recorded at fair value in the condensed consolidated financial statements are categorized based upon the level of judgment associated with the inputs used to measure their fair value. Hierarchical levels, which are directly related to the amount of subjectivity associated with the inputs to the valuation of these assets or liabilities, are as follows:

- Level 1 inputs are quoted prices (unadjusted) in active markets for identical assets or liabilities that the Company can access at the measurement date.

- Level 2 inputs are observable inputs other than quoted prices in active markets for identical assets and liabilities, quoted prices for identical or similar assets or liabilities in inactive markets, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.
- Level 3 inputs are unobservable inputs for the asset or liability.

The following table sets forth the fair value of the Company's financial assets as of June 30, 2019 and December 31, 2018:

	Fair Value Measurements at June 30, 2019			
(Dollars in thousands)	Level 1	Level 2	Level 3	Total
Assets at Fair Value				
Cash equivalents:				
Money market funds	$ 13,571	$ —	$ —	$ 13,571
Corporate securities	—	449	—	449
Short-term investments:				
Corporate securities	—	600	—	600
Commercial paper	—	4,781	—	4,781
Total Assets at Fair Value	$ 13,571	$ 5,830	$ —	$ 19,401

	Fair Value Measurements at December 31, 2018			
(Dollars in thousands)	Level 1	Level 2	Level 3	Total
Assets at Fair Value				
Cash equivalents:				
Money market funds	$ 9,902	$ —	$ —	$ 9,902
Commercial paper	—	1,345	—	1,345
Short-term investments:				
Corporate Securities	—	656	—	656
Treasury Bills	1,195	—	—	1,195
Commercial paper	—	6,776	—	6,776
U.S. government securities	1,198	—	—	1,198
Total Assets at Fair Value	$ 12,295	$ 8,777	$ —	$ 21,072

The Company uses the market approach technique to value its financial instruments and there were no changes in valuation techniques during 2019 or 2018. The Company's financial instruments consist primarily of cash and cash equivalents, accounts receivable, short-term investments and accounts payable and accrued liabilities. For accounts receivable, accounts payable and accrued liabilities, the carrying amounts of these financial instruments as of June 30, 2019 and December 31, 2018 were considered representative of their fair values due to their short term to maturity or repayment. Cash equivalents are carried at cost, which approximates their fair value.

The Company's Level 3 liabilities, which were measured and recorded on a recurring basis, consist of liabilities related to the March 2018 Purchase Agreement, the June 2018 Offering and the June 2019 Offering described in Note 8. The following table sets forth the establishment of these liabilities, as well as a summary of the changes in the fair value (in thousands):

	(Level 3)			
(Dollars in thousands)	Common Stock Warrant Liability - March 2018 Purchase Agreement	Common Stock Warrant Liability - June 2018 Offering	Common Stock Warrant Liability - June 2019 Offering	Total
Balance as of December 31, 2018	$ 2,354	$ 2,729	$ —	$ 5,083
Common stock and warrants issued in conjunction with June 2019 Offering	—	—	4,198	4,198
Change in fair value	(135)	(84)	(768)	(987)
Balance as of June 30, 2019	$ 2,219	$ 2,645	$ 3,430	$ 8,294

In determining the fair value, the Company uses various valuation approaches within the fair value measurement framework. The valuation methodologies used for the Company's instruments measured at fair value and their classification in the valuation hierarchy are summarized below:

- *Money market funds, treasury bills, and U.S. government securities* – Investments in money market funds, treasury bills, and U.S. government securities are classified within Level 1. At June 30, 2019 and December 31, 2018 these investments were included on the consolidated balance sheets in cash and cash equivalents and short-term investments.
- *Commercial paper, corporate securities* – Investments in commercial paper and corporate securities are classified within Level 2. At June 30, 2019 and December 31, 2018, these investments were included on the consolidated balance sheets as short-term investments. At June 30, 2019, corporate securities were included on the consolidated balance sheets as cash and cash equivalents for those purchased with 90 days or less to maturity from the trade date.
- *March 2018 Purchase Agreement common stock warrant liability* – The Company has outstanding warrants to purchase 1,282,832 shares of common stock that it issued to certain accredited investors and its placement agent on March 22, 2018 (as described in Note 8). The common stock warrants were classified as a liability within Level 3 based on the instrument's adjustment features and a contingent cash payment feature. The estimated fair value of the common stock warrant liability was remeasured at June 30, 2019 utilizing a Black Scholes Merton Model with the changes recorded on the Company's condensed consolidated statements of operations and comprehensive income (loss).
- *June 2018 & June 2019 Offering common stock warrant liabilities* – The Company has outstanding warrants to purchase 1,392,345 and 1,489,575 shares of common stock that it issued to certain accredited investors on June 14, 2018 and June 14, 2019, respectively (as described in Note 8). The common stock warrants are classified as a liability within Level 3 due to a contingent cash payment feature. The estimated fair value of the common stock warrant liabilities was remeasured at June 30, 2019 utilizing a Black Scholes Merton Model with the changes recorded on the Company's condensed consolidated statements of operations and comprehensive income (loss).

5. Variable Interest Entity

In February 2012, the Company formed Verdeca LLC ("Verdeca"), which is equally owned with Bioceres Crop Solutions Corp. ("Bioceres"), a U.S. wholly owned subsidiary of Bioceres, S.A., an Argentine corporation. Bioceres, S.A. is an agricultural investment and development cooperative owned by approximately 300 shareholders, including some of South America's largest soybean growers. Verdeca was formed to develop and deregulate soybean varieties using both partners' agricultural technologies.

The Company determined that a de facto agency relationship between the Company and Bioceres exists. The Company considers qualitative factors in assessing the primary beneficiary which include understanding the purpose and design of the VIE, associated risks that the VIE creates, activities that could be directed by the Company, and the expected relative impact of those activities on the economic performance of the VIE. Based on an evaluation of these factors, the Company concluded that it is the primary beneficiary of Verdeca.

Both the Company and Bioceres incur expenses in support of specific activities, as agreed upon by joint work plans, which apply fair market value to each partner's activities. Unequal contributions of services are equalized by the partners through cash payments. Verdeca is not the primary obligor for these activities performed by the Company or Bioceres. Under the terms of the joint development agreement, the Company has incurred direct expenses and allocated overhead in the amounts of $399,000 and $227,000, for the three months ended June 30, 2019 and 2018, respectively, and $642,000 and $513,000 for the six months ended June 30, 2019 and 2018.

6. Collaborative Arrangements

In August 2017, the Company entered into a collaborative arrangement for the research, development and commercialization of an improved wheat quality trait in North America. This collaborative arrangement is a contractual agreement with Corteva AgriScience ("Corteva") and involves a joint operating activity where both the Company and Corteva are active participants in the activities of the collaboration. The Company and Corteva participate in the research and development, and the Company has the primary responsibility for the intellectual property strategy while Corteva will generally lead the marketing and commercialization efforts. Both parties are exposed to significant risks and rewards of the collaboration and the agreement includes both cost sharing and profit sharing. The activities are performed with no guarantee of either technological or commercial success.

The Company accounts for research and development ("R&D") costs in accordance ASC 730, *Research and Development*, which states R&D costs must be charged to expense as incurred. Accordingly, internal R&D costs are expensed as incurred. Third-party R&D costs are expensed when the contracted work has been performed or as milestone results are achieved.

7. Leases

As of June 30, 2019, the Company leases office space in Davis, CA and Phoenix, AZ, as well as additional buildings, land and equipment. Leases with an initial term of 12 months or less are not recorded on the balance sheet; we recognize lease expense for these leases on a straight-line basis. The Company subleases a portion of the Davis office lease and greenhouse to third parties. The Company does not currently have any finance leases or other material leases that have not yet commenced.

Some leases (the warehouse, greenhouse and a copy machine) include one or more options to renew, with renewal terms that can extend the lease term from one to six years. The exercise of lease renewal options is at the Company's sole discretion.

The Company's lease agreements do not contain any material variable lease payments, material residual value guarantees or material restrictive covenants. Leases consisted of the following (in thousands):

Leases	Classification	June 30, 2019	March 31, 2019
Assets			
Operating lease assets	Right of use asset	$ 2,051	$ 2,193
Total leased assets		$ 2,051	$ 2,193
Liabilities			
Current - Operating	Operating lease liability-current	$ 594	$ 574
Noncurrent - Operating	Operating lease liability-noncurrent	1,609	1,771
Total leased liabilities		$ 2,203	$ 2,345

Lease Cost	Classification	For the Six Months Ended June 30, 2019	For the Three Months Ended June 30, 2019
Operating lease cost	SG&A and R&D Expenses	$ 352	$ 177
Short term lease cost(1)	R&D Expenses	93	45
Sublease income(2)	SG&A and R&D Expenses	(27)	(12)
Net lease cost		$ 418	$ 210

(1) Short term lease cost consists of field trial lease agreements with a lease term of 12 months or less.
(2) Sublease income is recorded as a credit to lease expense.

Lease Term and Discount Rate	June 30, 2019	March 31, 2019
Weighted-average remaining lease term (years)	2.4	2.6
Weighted-average discount rate	7%	7%

8. Private Placement and Registered Direct Offering

Private Placement (2018)

On March 22, 2018, the Company issued 300,752 shares of its common stock ("Common Stock") and warrants to purchase up to 300,752 shares of Common Stock with an initial exercise price equal to $45.75 (the "March 2018 Warrants"), in a private placement (the "March 2018 Private Placement") in accordance with a securities purchase agreement (the "March 2018 Purchase Agreement") entered into with certain institutional and accredited investors (collectively, the "Purchasers") on March 19, 2018. The number of shares of Common Stock, the number and exercise price of the March 2018 Warrants issued to the Purchasers were subject to adjustments as provided in the March 2018 Purchase Agreement. The March 2018 Warrants are immediately exercisable, subject to certain ownership limitations, and expire five years after the date of issuance.

Following the adjustments as provided in the March 2018 Purchase Agreement, the number of shares issued to the Purchasers was 1,201,636, the total number of shares issuable upon exercise of the March 2018 Warrants was 1,282,832 and the per share exercise price of the March 2018 Warrants was $10.7258. These condensed consolidated financial statements reflect these additional issuances.

The aggregate net proceeds received by the Company from the March 2018 Private Placement was $8.7 million, consisting of gross proceeds of $10.0 million less offering costs of $1.3 million. The Company entered into the March 2018 Private Placement to secure additional capital to strengthen its cash resources required to launch its new health and nutrition ingredient product commercialization and production scale-up plans, as well as to continue the deregulation and commercialization of its stress tolerant HB4 soybean trait. More specifically, net proceeds have been and will continue to be used for working capital to fund the continued introgression of quality ingredient traits into elite germ plasm, additional seed bulk-up, increased planting acreage, consumer brand development and a number of other pre-commercialization and commercialization activities.

The adjustment feature for the Common Stock and the March 2018 Warrants were determined to be liabilities based on each instrument's adjustment features and the contingent cash payment feature of the common stock warrants. The liabilities were accounted for at their respective fair values at inception using a Monte Carlo simulation model with the following assumptions: volatility of 100 percent, stock price of $32.52 and risk-free rate of 2.63%. At inception, the fair values of the Common Stock adjustment feature and the March 2018 Warrant liabilities were $3.8 million and $10.2 million, respectively. As the combined value of the liabilities exceeded the $10.0 million of proceeds, no value was assigned to the Common Stock issued and an initial loss of $4.0 million was recognized. The liabilities are marked-to-market and were valued at $15.9 million at March 31, 2018, resulting in an additional loss of $1.9 million in the first quarter of 2018.

In May 2018, following the March 2018 Private Placement's final adjustment, the terms of the March 2018 Warrants and the number of Common Stock shares issuable in the March 2018 Private Placement became known and fixed. As a result, the Common Stock adjustment feature liability was marked-to-market and valued at $8.4 million at May 7, 2018, resulting in an additional loss of $2.4 million recognized in the second quarter of 2018. The Company subsequently reclassified the Common Stock adjustment feature liability's balance of $8.4 million to stockholders' equity. The March 2018 Warrant liability was marked-to-market and valued at $6.3 million at March 31, 2019, resulting in expense of $4.0 million recognized in the first quarter of 2019. The March 2018 Warrant liability was marked-to-market and valued at $2.2 million at June 30, 2019, resulting in income of $4.1 million recognized in the second quarter of 2019 as the contingent cash payment feature was still in effect.

Offering Costs

In connection with the March 2018 Private Placement, the Company paid to a placement agent an aggregate fee equal to $850,000. The Company also granted warrants to purchase a total of 15,038 shares of common stock (the "March 2018 Placement Agent Warrants") that have an exercise price per share equal to $41.5625 and a term of five years. The March 2018 Placement Agent Warrants were issued for services performed by the placement agent as part of the March 2018 Private Placement and were treated as offering costs. The value of the March 2018 Placement Agent Warrants was determined to be $526,000 using the Black-Scholes Merton Model (the "Black-Scholes Model") with input assumptions including the Company's stock price, expected life of the warrants, stock price volatility determined from the Company's historical stock prices and the volatility of a peer group, and the risk-free interest rate for the term of the warrants. The Company incurred additional offering costs totaling $458,000 that consist of direct incremental legal, advisory, accounting and filing fees relating to the March 2018 Private Placement. The offering costs, inclusive of the March 2018 Placement Agent Warrants, totaled $1.8 million, all of which was expensed in 2018.

Registered Direct Offering (2018)

On May 11, 2018, the Company filed a shelf Registration Statement on Form S-3 (File No. 333-224893) with the SEC which was declared effective on June 8, 2018. This registration statement allows the Company to sell any combination of Common Stock, preferred stock, warrants and units consisting of such securities in one or more offerings from time to time having an aggregate initial offering price of $50 million.

On June 11, 2018, the Company entered into agreements with several institutional and accredited investors (the "June 2018 Purchase Agreement") for the purchase of 1,392,345 shares of its common stock at a purchase price of $9.93 per share for gross proceeds of $13.8 million (the "June 2018 Offering"). The 1,392,345 shares of Common Stock sold in the June 2018 Offering were issued pursuant to a prospectus, dated June 8, 2018, and a prospectus supplement dated June 11, 2018, in connection with a takedown from the Company's shelf Registration Statement on Form S-3 (File No. 333-224893). The June 2018 Offering closed on June 14, 2018.

Additionally, in a concurrent private placement (the "June 2018 Private Placement"), the Company issued to the investors unregistered warrants to purchase up to 1,392,345 shares of Common Stock at a purchase price per warrant of $0.125, for gross proceeds of $174,000 (the "June 2018 Warrants"). The June 2018 Warrants, and the shares of Common Stock underlying the June 2018 warrants, have not been registered with the SEC and have an exercise price of $9.94 per share. Subject to certain ownership limitations, the June 2018 Warrants are exercisable upon issuance and expire five and one-half years after the date of issuance.

The aggregate net proceeds received by the Company for the June 2018 Offering were $12.8 million, consisting of gross proceeds of $14.0 million less offering costs of $1.2 million.

The June 2018 Warrants were determined to be a liability as they have a contingent cash payment feature. The June 2018 Warrants were accounted for at their fair value at inception using the Black Scholes Model with the following assumptions: volatility of 108 percent, stock price of $8.20 and risk-free rate of 2.83%. At inception, the fair value of the June 2018 Warrants was $9.0 million and the remaining $5.0 million of the $14.0 million of proceeds was allocated to the Common Stock using the residual method and accounted for as stockholders' equity. The June 2018 Warrants were marked-to-market and valued at $7.3 million at March 31, 2019, resulting in expense of $4.5 million recognized in the first quarter of 2019. The June 2018 Warrants were marked-to-market and valued at $2.6 million at June 30, 2019, resulting in income of $4.6 million recognized in the second quarter of 2019.

Offering Costs

In connection with the June 2018 Offering, the Company paid to a placement agent an aggregate fee equal to $980,000. The Company also granted warrants to purchase a total of 69,617 shares of common stock (the "June 2018 Placement Agent Warrants") that have an exercise price per share equal to $12.568 and a term of five years. The June 2018 Placement Agent Warrants were issued for services performed by the placement agent as part of the June 2018 Offering and were treated as offering costs. The value of the June 2018 Placement Agent Warrants was determined to be $427,000 using the Black-Scholes Model with input assumptions including the Company's stock price, expected life of the warrants, stock price volatility determined from the Company's historical stock prices and the volatility of a peer group, and the risk-free interest rate for the term of the warrants. The Company incurred additional offering costs totaling $226,000 that consist of direct incremental legal, advisory, accounting and filing fees relating to the June 2018 Offering. The offering costs, inclusive of the June 2018 Placement Agent Warrants, totaled $1.6 million and allocated to the June 2018 Warrants and the Common Stock using their relative fair values. A total of $721,000 was allocated to the June 2018 Warrants which was expensed in 2018. The remaining $912,000 was allocated to the common stock and offset to additional paid in capital.

<u>Registered Direct Offering (2019)</u>

On June 12, 2019, the Company entered into a securities purchase agreement with certain institutional and accredited investors (the "June 2019 Purchase Agreement") relating to the offering and sale of 1,489,575 shares of its common stock at a purchase price of $4.91 per share for gross proceeds of $7.31 million (the "June 2019 Offering"). The 1,489,575 shares of Common Stock sold in the June 2019 Offering were issued pursuant to a prospectus, dated June 8, 2018, and a prospectus supplement dated June 12, 2019, in connection with a takedown from the Company's shelf Registration Statement on Form S-3 (File No. 333-224893). The June 2019 Offering closed on June 14, 2019.

Additionally, in a concurrent private placement (the "June 2019 Private Placement"), the Company issued to the investors unregistered warrants to purchase up to 1,489,575 shares of Common Stock at a purchase price per warrant of $0.125, for gross proceeds of $186,000 (the "June 2019 Warrants"). The June 2019 Warrants, and the shares of Common Stock underlying the June 2019 warrants, have not been registered with the SEC and have an exercise price of $5.00 per share. Subject to certain ownership limitations, the June 2019 Warrants are exercisable upon issuance and expire five and one-half years after the date of issuance.

The aggregate net proceeds received by the Company for the June 2019 Offering were $6.9 million, consisting of gross proceeds of $7.5 million less offering costs of $641,000. The Company intends to use the net proceeds from this offering for general corporate purposes, including, but not limited to, hemp germplasm acquisition, breeding and research activities for Arcadia Specialty Genomics™ ("ASG"), the scale-up of GoodWheat™ and for general and administrative expenses.

The June 2019 Warrants were determined to be a liability as they have a contingent cash payment feature. The June 2019 Warrants were accounted for at their fair value at inception using the Black Scholes Model with the following assumptions: volatility of 108 percent, stock price of $3.66 and risk-free rate of 1.88%. At inception, the fair value of the June 2019 Warrants was $4.2 million and the remaining $3.3 million of the $7.5 million of proceeds was allocated to the Common Stock using the residual method and accounted for as stockholders' equity. The June 2019 Warrants were marked-to-market and valued at $3.4 million at June 30, 2019, resulting in income of $0.8 million recognized in the second quarter of 2019.

Offering Costs

In connection with the June 2019 Offering, the Company paid to a placement agent an aggregate fee equal to $525,000. The Company also granted warrants to purchase a total of 74,479 shares of common stock ("June 2019 Placement Agent Warrants") that have an exercise price per share equal to $6.2938 and a term of five years. The June 2019 Placement Agent Warrants were issued for services performed by the placement agent as part of the June 2019 Offering and were treated as offering costs. The value of the June 2019 Placement Agent Warrants was determined to be $198,000 using the Black-Scholes Model with input assumptions including the

Company's stock price, expected life of the warrants, stock price volatility determined from the Company's historical stock prices and the volatility of a peer group, and the risk-free interest rate for the term of the warrants. The Company incurred additional offering costs totaling $115,000 that consist of direct incremental legal, advisory and filing fees relating to the June 2019 Offering. The offering costs, inclusive of the June 2019 Placement Agent Warrants, totaled $0.8 million and were allocated to the June 2019 Warrants and the Common Stock using their relative fair values. A total of $365,000 was allocated to the June 2019 Warrants which was expensed in the second quarter of 2019. The remaining $474,000 was allocated to the common stock and offset to additional paid in capital.

9. Stock-Based Compensation and Warrants

Stock Incentive Plans

The Company has two equity incentive plans: the 2006 Stock Plan ("2006 Plan") and the 2015 Omnibus Equity Incentive Plan ("2015 Plan").

In 2006, the Company adopted the 2006 Plan, which provided for the granting of stock options to executives, employees, and other service providers under terms and provisions established by the Board of Directors. The Company granted non-statutory stock options ("NSOs") under the 2006 Plan until May 2015, when the 2006 Plan was terminated as to future awards. The 2006 Plan continues to govern the terms of options that remain outstanding and were issued under the 2006 Plan. The 2015 Plan became effective in May 2015 and all shares that were reserved, but not issued, under the 2006 Plan were assumed by the 2015 Plan. Upon effectiveness, the 2015 Plan had 154,387 shares of common stock reserved for future issuance, which included 10,637 shares under the 2006 Plan that were transferred to and assumed by the 2015 Plan. The 2015 Plan provides for automatic annual increases in shares available for grant. In addition, shares subject to awards under the 2006 Plan that are forfeited or canceled will be added to the 2015 Plan. The 2015 Plan provides for the grant of incentive stock options ("ISOs"), NSOs, restricted stock awards, stock units, stock appreciation rights, and other forms of equity compensation, all of which may be granted to employees, officers, non-employee directors, and consultants. The ISOs and NSOs will be granted at a price per share not less than the fair value at the date of grant. Options granted generally vest over a four-year period, with 25% vesting at the end of one year and the remaining vesting monthly thereafter; however, the options granted in the third quarter of 2018 vest over a two-year period, vesting monthly on a pro-rated basis. Options granted, once vested, are generally exercisable for up to 10 years after grant.

In June 2019, the shareholders approved an amendment to the Company's 2015 Plan for a one-time increase to the number of shares of common stock that may be issued under the 2015 Plan by 120,000 shares. As of June 30, 2019, a total of 659,786 shares of common stock were reserved for issuance under the 2015 Plan, of which 10,397 shares of common stock are available for future grant. As of June 30, 2019, a total of 61,329 and 649,389 options are outstanding under the 2006 and 2015 Plans, respectively.

A summary of activity under the stock incentive plans is as follows (in thousands, except share data and price per share):

	Shares Subject to Outstanding Options	Weighted-Average Exercise Price Per Share	Aggregate Intrinsic Value
Outstanding — Balance at December 31, 2018	530,044	$ 35.53	$ —
Options granted	184,071	5.15	
Options exercised	—	—	
Options forfeited	(1,350)	4.45	
Options expired	(2,047)	58.41	
Outstanding — Balance at June 30, 2019	710,718	$ 27.62	$ —
Vested and expected to vest — June 30, 2019	698,356	$ 27.91	$ —
Exercisable —June 30, 2019	298,208	$ 50.10	$ —

As of June 30, 2019, there was $1.4 million of unrecognized compensation cost related to unvested stock-based compensation grants that will be recognized over the weighted-average remaining recognition period of 2.2 years.

The fair value of stock option awards to employees, executives, directors, and other service providers was estimated at the date of grant using the Black-Scholes Model with the following weighted-average assumption. There were 184,071 and 44,910 options granted during the six months ended June 30, 2019 and 2018, respectively.

	Three Months Ended June 30,		Six Months Ended June 30,	
	2019	2018	2019	2018
Expected term (years)	7.34	9.06	7.14	8.43
Expected volatility	97%	92%	99%	94%
Risk-free interest rate	2.04%	2.95%	2.06%	2.90%
Dividend yield	—	—	—	—

Employee Stock Purchase Plan

The Company's 2015 Employee Stock Purchase Plan ("ESPP") became effective on May 14, 2015. The ESPP allows eligible employees to purchase shares of the Company's common stock at a discount of up to 15% of their eligible compensation through payroll deductions, subject to any plan limitations. The ESPP provides for six-month offering periods, and at the end of each offering period, employees are able to purchase shares at 85% of the lower of the fair market value of the Company's common stock on the first trading day of the offering period or on the last trading day of the offering period. As of June 30, 2019, the number of shares of common stock reserved for future issuance under the ESPP is 108,864. The ESPP provides for automatic annual increases in the shares available for purchase beginning on January 1, 2016. As of June 30, 2019, 9,353 shares had been issued under the ESPP. The Company recorded $3,800, $400, $8,100 and $1,600 of compensation expense for the three and six months ended June 30, 2019 and 2018, respectively.

Warrants

As of June 2019, the Company has 4,469,040 common stock warrants outstanding with a weighted average exercise price of $8.48. The expiration of the warrants ranges from March 2023 to December 2024.

On December 2013, the Company issued warrants to Mahyco International to purchase 3,784 shares of common stock, exercisable as of the issuance date, at an exercise price of $330.40 per share. These warrants expired on December 11, 2018.

In connection with the Series D preferred stock financing in the first half of 2014, the Company issued warrants, exercisable as of the issuance date, to the Series D preferred stock investors to purchase an aggregate of 61,397 shares of common stock at an exercise price of $363.20 per share and to the placement agents to purchase 1,674 shares of common stock at $268.80. Of the 63,071 warrants issued, 1,759 expired on March 28, 2019 and the remaining 61,312 expired in the second quarter of 2019.

As of June 2019, 1,297,870 common stock warrants are outstanding that were issued in the March 2018 Private Placement. Of the total, 1,282,832 shares have a purchase price of $10.7258 and the remaining 15,038 common stock warrants have an exercise price of $41.5625. See Note 8.

As of June 2019, 1,461,962 common stock warrants are outstanding in accordance with the June 2018 Offering. Of the total, 1,392,345 shares have a purchase price of $9.94 and the remaining 69,617 common stock warrants have an exercise price of $12.568. See Note 8.

In connection with a professional services agreement with Corner Health, LLC, a nonaffiliated third party, executed in April 2019, the Company issued 45,154 warrants ("Service Warrants") at an exercise price of $6.18. The Service Warrants vest ratably over 12 months and are set to expire in five years from the date of issuance. The Service Warrants are cancelable immediately prior to a change of control subsequent to the termination/expiration of the advisory agreement. The Company also issued 100,000 performance-based warrants ("Performance Warrants") at an exercise price of $6.18 and vest in 1/6 increments upon the achievement of a qualifying milestone as defined within the agreement. The Performance Warrants are set to expire in five years from the date of issuance and are cancelable immediately prior to a change of control subsequent to the sixth month anniversary of the termination/expiration of the advisory agreement.

The Corner Health Service and Performance Warrants were determined to be equity instruments. The Service and Performance Warrants were measured on the grant date using the Black Scholes Model with the following assumptions: volatility of 112.5 percent, stock price of $6.18 and risk-free rate of 2.37%. At the grant date, the fair value of the Service and Performance Warrants were $224,000 and $497,000, respectively. Compensation expense associated with the Service Warrants is recognized ratably over the service period (i.e. one-year term). There is no current compensation expense associated with the Performance Warrants as it is not yet probable that any such awards will vest. The Company will reassess probability each reporting period. For the Service Warrants, $44,000 of stock compensation was recognized in the second quarter of 2019.

In June 2019, concurrent with the June 2019 Offering and pursuant to the June 2019 Purchase Agreement, the Company commenced a private placement whereby it issued and sold warrants (“June 2019 Warrants”) exercisable for an aggregate of 1,489,575 shares of common stock, which represents 100% of the shares of common stock sold in the June 2019 Offering, with a purchase price of $0.125 per underlying warrant share and with an exercise price of $5.00 per share (the “June 2019 Private Placement”). The June 2019 Warrants are exercisable upon issuance and will expire five and a half years from the date of issuance. The Company also issued warrants to the placement agents to purchase a total of 74,479 shares of common stock with an exercise price equal to $6.2938. The placement agent warrants are exercisable upon issuance and will expire five years from the date of issuance. As of June 2019, all 1,564,054 common stock warrants are outstanding in accordance with the June 2019 Offering. See Note 8.

10. Income Taxes

Income tax expense during interim periods is based on applying an estimated annual effective income tax rate to year-to-date income, plus any significant unusual or infrequently occurring items that are recorded in the interim period. The computation of the annual estimated effective tax rate at each interim period requires certain estimates and significant judgment including, but not limited to, the expected operating income for the year, projections of the proportion of income earned and taxed in various jurisdictions, permanent and temporary differences, and the likelihood of recovering deferred tax assets generated in the current year. The accounting estimates used to compute the provision for income taxes may change as new events occur, more experience is obtained, additional information becomes known, or as the tax environment changes.

The interim financial statement provision for income taxes expense is different from the amounts computed by applying the United States federal statutory income tax rate of 21%. The Company’s effective tax rate was 0.0% and -0.2% for the three and six months ended June 30, 2019 and -0.1% for the three and six months ended June 30, 2018. The difference between the effective tax rate and the federal statutory rate of 21% was primarily due to the full valuation allowance recorded on the Company’s net deferred tax assets and foreign withholding taxes.

The Company may have experienced an ownership change under IRC Section 382 as a result of the common shares issued in connection with the March 2018 Private Placement or in the June 2018 and June 2019 Offerings. Such an ownership change may limit the Company’s ability to utilize its net operating loss carryforwards prior to expiration. Given the full valuation allowance, such a limitation would not impact the deferred tax asset balance as currently recorded.

As of June 30, 2019, there have been no material changes to the Company’s uncertain tax positions.

11. Contingent Liability Related to the Anawah Acquisition

On June 15, 2005, the Company completed its agreement and plan of merger and reorganization with Anawah, Inc. (“Anawah”), to purchase the food and agricultural research company through a non-cash stock purchase. Pursuant to the merger with Anawah, and in accordance with the ASC 805 - Business Combinations, the Company incurred a contingent liability not to exceed $5.0 million. This liability represents amounts to be paid to Anawah’s previous stockholders for cash collected on revenue recognized by the Company upon commercial sale of certain specific products developed using technology acquired in the purchase. As of December 31, 2010, the Company ceased activities relating to three of the six Anawah product programs, thus, the contingent liability was reduced to $3.0 million. During the third quarter of 2016, one of the programs previously accrued for was abandoned and another program previously abandoned was reactivated. As of June 30, 2019, the Company continues to pursue three development programs using this technology and believes that the contingent liability is probable. As a result, $3.0 million remains on the Condensed Consolidated Balance Sheet as an other noncurrent liability.

12. Net Loss per Share

Basic net loss per share is calculated by dividing net loss by the weighted-average number of common shares outstanding during the period and excludes any dilutive effects of stock-based awards and warrants. Diluted net loss per share is computed giving effect to all potentially dilutive common shares, including common stock issuable upon exercise of stock options and warrants. For the three and six months ended June 30, 2019, all potentially dilutive common shares were determined to be anti-dilutive after evaluation.

Securities that were not included in the diluted per share calculations because they would be anti-dilutive were as follows *(in shares):*

	For the three and six months ended June 30,	
	2019	2018
Options to purchase common stock	710,718	283,259
Warrants to purchase common stock	4,469,040	2,826,687
Total	5,179,758	3,109,946

13. Related-Party Transactions

The Company's related parties include Moral Compass Corporation ("MCC") and the John Sperling Foundation ("JSF"). The rights to the intellectual property owned by Blue Horse Labs, Inc. ("BHL") were assigned to its sole shareholder, the John Sperling Revocable Trust ("JSRT") due to BHL's dissolution and then subsequently to JSF. JSF is deemed a related party of the Company because MCC, the Company's largest stockholder, and JSF share common officers and directors.

JSF receives a single digit royalty from the Company when revenue has been collected on product sales or for license payments from third parties that involve certain intellectual property developed under research funding originally from BHL. Royalty fees due to JSF were $19,000 and $29,000 as of June 30, 2019 and December 31, 2018, respectively, and are included in the Condensed Consolidated Balance Sheets as amounts due to related parties.

14. Subsequent Events

On July 26, 2019, the Company filed a Form S-1 to register 1,564,054 common stock warrants issued in connection with the private placement completed on June 14, 2019 (File No. 333-232858).

On August 9, 2019, the Company entered into a joint venture agreement with Legacy Ventures Hawaii, LLC to grow, extract, and sell hemp products. The new partnership, Archipelago Ventures™ Hawaii, LLC, joins the Company's extensive genetic expertise and resources with Legacy's experience in extraction and sales. The two partners have committed to a combined initial capital contribution of $5 million and initial sales are expected in late 2019. See the Form 8-K filed on August 9, 2019 (File No. 001-37383) for additional details.

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Special Note Regarding Forward-Looking Statements

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our unaudited condensed consolidated financial statements and the related notes to those statements included herein. In addition to historical financial information, this report contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those discussed in the forward-looking statements. The statements contained in this report that are not purely historical are forward-looking statements within the meaning of Section 27A of the Securities Act and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. Forward-looking statements are often identified by the use of words such as, but not limited to, "anticipate," "believe," "can," "continue," "could," "estimate," "expect," "intend," "may," "plan," "project," "seek," "should," "strategy," "target," "will," "would" and similar expressions or variations intended to identify forward-looking statements. These statements are based on the beliefs and assumptions of our management based on information currently available to management. Such forward-looking statements are subject to risks, uncertainties and other important factors that could cause actual results and the timing of certain events to differ materially from future results expressed or implied by such forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those identified below and those discussed in the section titled "Risk Factors" included in the most recent Annual Report on Form 10-K filed by the Company. Furthermore, such forward-looking statements speak only as of the date of this report. Except as required by law, we undertake no obligation to update any forward-looking statements to reflect events or circumstances after the date of such statements.

Solely for convenience, the trademarks, service marks and trade names referred to in this report may appear without the ®, TM, or SM symbols, but such references do not constitute a waiver of any rights that might be associated with the respective trademarks, service marks, or trade names.

Overview

We are a consumer-driven, agricultural food ingredient company. We aim to create value across the agricultural production and supply chain beginning with enhanced crop productivity for farmers and ultimately delivering accelerated innovation in nutritional quality foods to consumers. We use state of the art gene-editing technology and advanced breeding techniques to naturally enhance the nutritional quality of grains and oilseeds to address the rapidly evolving trends in consumer health and nutrition. In addition, we have developed a broad pipeline of high value crop productivity traits designed to enhance farm economics.

Consumers are demanding food companies provide healthier, high quality foods, naturally and sustainably produced with greater ingredient simplicity and transparency. Now, more than ever, consumers are paying premium pricing to satisfy their dietary health requirements, such as higher fiber and lower gluten in grains, healthier oils and fewer processed ingredients. Consumer food companies recognize this shift but cannot rely upon the legacy ag-supply chain and traditional crop breeding techniques to meet these demands. Conventional and transgenic breeding processes can take between nine and 13 years to bring new food varieties or quality traits to market, causing consumer food companies to search for alternative means to satisfy the evolving customer demands. The need for rapid product differentiation at the consumer level has opened up a premium food market opportunity that is becoming one of the fastest growing segments in the food industry.

To address this large and growing demand, we are building on our industry leading scientific expertise and advanced plant breeding and transformation technologies developed over the past 15 years, to directly edit the plant genome without introducing foreign DNA, to produce nutrient-dense crops for use in the major foods we eat. By employing gene editing technology and our TILLING platform, we believe we can reduce the time to market for novel ingredient traits by half, thereby providing consumer food companies a steady and reliable source of cost effective, healthy natural food options.

In 2018, we launched our GoodWheat™ brand, a non-genetically modified (non-GM) portfolio of wheat products that enables food manufacturers to differentiate their consumer-facing brands. The brand launch is a key element of the company's go-to-market strategy to achieve greater value for its innovations by participating in downstream consumer revenue opportunities. We designed the brand to make an immediate connection with consumers that products made with GoodWheat™ meet their demands for healthier wheat options that also taste great. The GoodWheat™ brand encompasses our current and future non-GM wheat portfolio of high fiber Resistant Starch (RS) and Reduced Gluten wheat varieties, as well as future wheat innovations. In October 2018, the U.S. Patent and Trademark Office granted us a patent for extended shelf life wheat, the newest trait in our non-genetically modified wheat portfolio. This new trait was designed to promote whole wheat consumption by improving the shelf life and taste of whole grain wheat products.

In April 2019, we received two new patents on our high fiber Resistant Starch wheat, one for bread wheat and one for durum (pasta) wheat. These two patents have claims that strengthen our intellectual property for our Resistant Starch portfolio of products.

We expect to market GoodWheat™ products in the latter part of this year. Increased fiber consumption is well recognized as a way to improve gut health and to control excessive weight gain. Concurrently, we are developing three additional wheat varieties, a reduced gluten wheat, an extended shelf life wheat and a superior yielding wheat. In the American diet, each day more than 500 calories come from wheat products, 25 percent of the FDA's recommended daily caloric intake for a woman and 20 percent for a man. We believe these varieties have broad application in the global wheat market which the USDA (US Department of Agriculture) estimated to be 758 million metric tons for the 2017/2018 production year, which roughly equates to $208 billion farm gate value (i.e. market value net of selling costs).

In years to come, we expect to achieve enhanced nutritional characteristics within a number of other broad acre crops using advanced breeding and gene-editing techniques. Targets include but are not limited to higher fiber, longer shelf life and enhanced protein in crops other than wheat.

Another aspect of our business is improving farmer productivity through the development of more robust crop varieties, by developing specific crop traits designed to counteract the detrimental impact of environmental stresses on harvest yields. Traditional genetic modification (GM) trait development has concentrated on crops where the combination of large acreage and high input costs (such as chemical costs for pest and weed control) create significant economic value for herbicidal or insecticidal traits. However, far more deleterious to crop yields are abiotic stresses, such as drought, heat, nutrient deficiency, water scarcity, and soil salinity, and remains largely unpenetrated by the GM seed industry today. For example, industry estimates indicate greater than 80 percent of wheat yield loss and 65 percent of corn yield loss globally are lost due to abiotic factors. These stresses are prevalent in most agricultural environments with varying degrees of severity and often have material consequences on crop production, quality, and farmers' incomes.

We devoted much of our early research to building a comprehensive array of abiotic stress traits. Furthermore, through out-licensing arrangements with our commercialization partners, many of our traits have been bred into several global crops, including rice, wheat, and soybeans, and we have demonstrated significant yield improvements in multiple years of field testing. However, due to the global variability in acceptance of GM traits from one territory to the next, the commercial timing and ultimate value of these innovations is difficult to predict.

Regardless of the timing and degree of commercial success of our historical GM traits, the technical achievements they represent has established the company as a world-class plant transformation organization.

Balancing our near-term revenue goals with long-term value capture, we will continue to provide active support to our commercial partners working to advance our high value traits through development and deregulation for commercialization.

While we seek patent protection on our technologies and traits, we have structured our commercial agreements so that we receive our percentage of additional commercial value whether or not patent protection is in effect at any particular time or place. Nearly all of our agreements provide access to our traits, and our right to receive a share of commercial value, continue for a set number of years after products containing our traits are commercialized. While the exclusive rights afforded by patents may enable our commercial partners to realize greater commercial value attributable to our traits, our right to receive a portion of that increased commercial value is not dependent on the existence of patent rights in a particular geography.

Our commercial strategy is to migrate forward in the ag-food supply chain from the farmer and seed company to the consumer food company. Due to our early stage focus on the development of abiotic stress traits, we have historically been commercially aligned with farmers and seed companies. However, by also establishing commercial relationships with consumer food companies and developing consumer brand awareness of our high value premium ingredients, we expect to be better positioned to garner a greater share of our product's value proposition. Consumer food companies are looking to simplify their food ingredient formulations and consumer are demanding "clean labeling" in their foods, paying more for foods having fewer artificial ingredients and more natural, recognizable and healthy ingredients. A 2017 survey by PR agency Ingredient Communications found that 73 percent of consumers are happy to pay a higher retail price for a food or drink product made with ingredients they recognize. Because we increase nutrient density directly in the primary grains and oils, we provide the mechanism for food formulation simplification naturally, cost effectively and in a time-frame to meet evolving consumer demands. Our branding strategy is to link consumer's health and nutrition appreciation with the nutrients we source directly from the farm, enabling us to share premium economics throughout the ag-food supply chain.

This forward migration in the ag-food supply chain will require that we build additional organizational capabilities and industry expertise. For instance, we are expanding our in-house commercial grain production and logistics resources for greater scale capacity to bring our products to market. We are also developing product branding strategies to build customer brand recognition and loyalty.

Since our inception, we have devoted substantially all our efforts to research and development activities, including the discovery, development, and testing of our traits and products in development incorporating our traits. To date, we have not generated revenues from sales of our commercial products, other than limited revenues from our SONOVA products. We do receive revenues from fees associated with the licensing of our traits to commercial partners. Our long-term business plan and growth strategy is based in part on our expectation that revenues from products that incorporate our traits will comprise a significant portion of our future revenues.

We have never been profitable and had an accumulated deficit of $186.7 million as of June 30, 2019. We incurred net losses of $8.4 million and $17.3 million for the six months ended June 30, 2019 and 2018, respectively. We expect to incur substantial costs and expenses before we obtain any revenues from the sale of seeds or ingredients incorporating our traits. As a result, our losses in future periods could become even more significant, and we may need additional funding to support our operating activities.

Arcadia Specialty Genomics™

In February 2019, we established ASG a new strategic business unit dedicated to developing and commercializing genetic improvements targeting plant content, quality, climate resiliency and overall yield in hemp, a new crop for the company. ASG conducts its business in only federal and state markets in which its activities are legal.

The recent passage of the U.S. Agriculture Improvement Act of 2018 – also known as the Farm Bill – confirmed the federal legalization of hemp, the term given to non-psychoactive hemp containing less than 0.3% tetrahydrocannabinol (THC). It also included provisions for legalizing on a federal level hemp's cultivation, transport and sale for the first time in more than 75 years. Hemp, previously considered a Schedule 1 drug and banned as an agricultural crop, lacks substantive plant biology research and suffers from suboptimal genetics, highly fragmented germplasm and rampant inconsistencies. As with our wheat and soybean products, we plan to create hemp-based solutions that allow farmers to be more productive and enable consumer packaged goods companies to differentiate their brands in the marketplace. In the near term, our focus will be on acquiring federal and state licensure in key geographies to launch our research and pilot programs, for which began operations in early 2019.

In August 2019, we formed a new joint venture to serve the Hawaiian and Asian markets, Archipelago Ventures™ Hawaii, LLC ("Archipelago"). This new venture between ASG and Legacy Ventures Hawaii ("Legacy") combines ASG's extensive genetic expertise and seed innovation history with Legacy's growth capital and strategic advisory in the Hawaiian markets. Additionally, Legacy brings to the partnership years of proven success in extraction, product formulation and sales of cannabinol oil and distillate products through its equity partner, Vapen CBD. Legacy was originally formed to be a vehicle for its partners to pursue hemp via CBD opportunities within the Hawaiian islands. Legacy's primary objective is to build world class cGMP extraction facilities to allow Hawaiian farmers an outlet for maximizing their profits growing hemp and converting to high grade CBD, as well as other high-value compounds. Legacy's equity partner, Vapen CBD, is a wholly owned subsidiary of Vapen™ MJ Ventures which is a publicly traded cannabis operator based in Phoenix, Arizona listed on both the Canadian and Frankfurt exchanges. Vapen CBD is focused exclusively on the processing of high-quality, non-THC cannabinoid like CBD. Vapen CBD will be responsible for the construction and operation of our Hawaiian hemp extraction facilities. This joint venture creates a vertically integrated supply chain, from seed to sale, we believe the first of its kind in Hawaii. ASG selected the best partners and capabilities required to achieve three critically important strategic imperatives: (1) ensure a reliable supply chain during critical scale up of the global hemp market, a major risk mitigation for success, (2) ensure high quality throughout the supply chain, from genetics to the field and field to the customer and (3) ensure being well-positioned to address the unique needs and opportunities of the Hawaiian market. Archipelago has committed to an aggressive commercialization schedule, expanding hemp production acres in compliance with Hawaii's Department of Agriculture industrial hemp pilot program pursuant to the 2014 Farm bill and to be transitioned to the 2018 Farm bill when implemented over the next 12 – 18 months. The Hemp Business Journal estimates the hemp CBD market – the primary non-psychoactive compound in hemp – totaled $190 million in 2018. By 2022, the Brightfield Group, a hemp and CBD market research firm, projects sales to reach $22 billion.

The ASG research and development activities are rapidly progressing in both our Hawaii Industrial Hemp Pilot Program with the first hemp harvest in Molokai, as well as breeding advances with our research activities in California. ASG recently harvested its first hemp crop in Hawaii with positive results, having achieved a milestone towards the commercial production of hemp flower for CBD extraction. The ASG research & development facility located in Molokai has demonstrated the capability to successfully grow and harvest multiple hemp varieties for eventual flower and CBD production. This milestone represents the first successful hemp harvest on Molokai and one of the first in all of Hawaii, which positions ASG as a leader in developing this industry in Hawaii. Furthermore, this milestone assures the next phase of ASG's growth in the Hawaiian market by establishing varieties that can deliver commercial grade performance without exceeding the 0.3% THC threshold that defines legal industrial hemp. ASG is entering the next phase of growth in Hawaii which includes rapid ramp-up of hemp flower production acreage and the establishment of processing and extraction facilities through Archipelago in accordance with forthcoming regulations.

The ASG hemp breeding program has achieved multiple milestones which lay the foundation for our expansion of hemp breeding research activities in the U.S. The indoor growth facilities are operational in Davis, establishing breeding procedures that can be replicated in each of our research locations. The internal platform to analyze cannabinoid and terpene profiles are operational, enabling our breeding program to select lines with altered potency and/or composition. The ASG analytical laboratory added critical CO_2 extraction capabilities enabling rapid evaluation of lines and allowing for new innovations. In July 2019, the breeding team achieved a major milestone with the creation of the first ASG proprietary variety developed in-house. This is an important milestone evidencing ASG's proven technological competencies in plant transformation realized in hemp and sets the stage for expansion of our breeding operations, acceleration of varietal development and genetic optimization. As was the intention from the onset, ASG has adopted an aggressive germplasm acquisition strategy that has resulted in the development of a germplasm library containing improved genetic variation sufficient to fuel a robust breeding pipeline.

In addition to progress in the laboratory and in the field, ASG continues to evaluate other potential sources of near-term hemp revenue opportunities, including meeting with a number of U.S. growers looking to begin or ramp up their hemp operations. As such, ASG has implemented seed production operations targeting select varieties for specific regions and expects to begin serving that market possibly as soon as the spring of 2020.

Components of Our Statements of Operations Data

Revenues

We derive our revenues from product revenues, licensing agreements, contract research agreements, and government grants. Given our acute focus on the near-term commercialization of our nutritional ingredient traits and products, we do not intend to continue pursuing contract research agreements and government grant projects at the levels we have historically. Over the next six months, we expect these revenues to decline as our current contract research agreements and government grant projects conclude and are not replaced. Concurrently, as we introduce our new nutritional ingredient traits and products to the market, we expect revenues to increase from such activities. Furthermore, with the implementation of ASC Topic 606, future license revenues will no longer include the amortization of deferred up-front license fees from existing license agreements.

Product Revenues

Our product revenues to date have consisted solely of sales of our SONOVA products. We generally recognize revenue from product sales upon sale to our third-party distributors or customers. Our revenues fluctuate depending on the timing of orders from our customers and distributors.

License Revenues

Our license revenues to date consist of up-front, nonrefundable license fees, annual license fees, and subsequent milestone payments that we receive under our research and license agreements. We have historically recognized nonrefundable up-front license fees and guaranteed, time-based payments as revenue proportionally over the expected development period. With the implementation of ASC Topic 606, revenue generated from up-front license fees will be recognized upon execution of the agreement. We recognize annual license fees when it is probable that a material reversal will not occur.

Milestone fees are variable consideration that is initially constrained and recognized only when it is probable that such amounts would not be reversed. The Company assesses when achievement of milestones are probable in order to determine the timing of revenue recognition for milestone fees. Milestones typically consist of significant stages of development for our traits in a potential commercial product, such as achievement of specific technological targets, completion of field trials, filing with regulatory agencies, completion of the regulatory process, and commercial launch of a product containing our traits. Given the seasonality of agriculture and time required to progress from one milestone to the next, achievement of milestones is inherently uneven, and our license revenues are likely to fluctuate significantly from period to period.

Contract Research and Government Grant Revenues

Contract research and government grant revenues consist of amounts earned from performing contracted research primarily related to breeding programs or the genetic engineering of plants for third parties. Contract research revenue will continue to be accounted for as a single performance obligation for which revenues are recognized over time using the input method (e.g. costs incurred to date relative to the total estimated costs at completion). In addition, we are entitled to receive a portion of the revenues generated from sales of products that incorporate our seed traits. Products expected to result from such contract research are in various stages of the product development cycle and we expect to generate revenues from the sale of any such products in as soon as the next two to four years.

We receive payments from government entities in the form of government grants. Government grant revenue will continue to be accounted for as a single performance obligation for which revenues are recognized over time using the input method (e.g. costs incurred to date relative to the total estimated costs at completion). Our obligation with respect to these agreements is to perform the research on a best-efforts basis. Given the nature and uncertain timing of receipt of government grants and timing of eligible research and development expenses, such revenues are likely to fluctuate significantly from period to period.

Operating Expenses

Cost of Product Revenues

Cost of product revenues relates to the sale of our SONOVA products and consists of in-licensing and royalty fees, any adjustments or write-downs to inventory, as well as the cost of raw materials, including inventory and third-party services costs related to procuring, processing, formulating, packaging, and shipping our SONOVA products.

Research and Development Expenses

Research and development expenses consist of costs incurred in the discovery, development, and testing of our products and products in development incorporating our traits. These expenses consist primarily of employee salaries and benefits, fees paid to subcontracted research providers, fees associated with in-licensing technology, land leased for field trials, chemicals and supplies, and other external expenses. These costs are expensed as incurred. Additionally, we are required from time to time to make certain milestone payments in connection with the development of technologies in-licensed from third parties. We expense these milestone payments at the time the milestone is achieved and deemed payable. Our research and development expenses may fluctuate from period to period as a result of the timing of various research and development projects.

Selling, General, and Administrative Expenses

Selling, general, and administrative expenses consist primarily of employee costs, professional service fees, and overhead costs. Our selling, general, and administrative expenses may fluctuate from period to period. In connection with our commercialization activities for our consumer ingredient products, we expect to increase our investments in sales and marketing and business development.

Other Income, Net

Other income, net, consists of interest income and the amortization of investment premium and discount on our cash and cash equivalents and investments.

Initial Loss on Common Stock Warrant and Common Stock Adjustment Feature Liabilities

Initial loss on common stock warrant and common stock adjustment feature liabilities is comprised of the loss associated with the initial recognition of the common stock warrant and common stock adjustment feature liabilities associated with the March 2018 Private Placement at their respective fair values.

Change in the Estimated Fair Value of Common Stock Warrant and Common Stock Adjustment Feature Liabilities

Change in the estimated fair value of common stock warrant liabilities and common stock adjustment feature liability is comprised of the fair value remeasurement of the liabilities associated with the March 2018 Private Placement and the June 2018 and June 2019 Offerings.

Offering Costs

Offering costs consists of the costs incurred with the issuance of Common Stock and the March 2018 Warrants in connection with the March 2018 Private Placement. Also included are costs incurred with the June 2018 and 2019 Offerings and Private Placements that have been allocated to the common stock warrant liability. Costs include placement agent, legal, advisory, accounting and filing fees.

Income Tax Benefit (Provision)

Our income tax provision has not been historically significant, as we have incurred losses since our inception. The provision for income taxes consists of state and foreign income taxes. Due to cumulative losses, we maintain a valuation allowance against our U.S. deferred tax assets as of June 30, 2019 and 2018. We consider all available evidence, both positive and negative, including but not limited to, earnings history, projected future outcomes, industry and market trends and the nature of each of the deferred tax assets in assessing the extent to which a valuation allowance should be applied against our U.S. deferred tax assets.

Results of Operations

Comparison of the Three Months Ended June 30, 2019 and 2018

	Three Months Ended June 30, 2019	Three Months Ended June 30, 2018	$ Change	% Change
	(In thousands except percentage)			
Revenues:				
Product	$ 162	$ 188	$ (26)	(14)%
License	—	90	(90)	(100)%
Contract research and government grants	41	158	(117)	(74)%
Total revenues	203	436	(233)	(53)%
Operating expenses:				
Cost of product revenues	89	271	(182)	(67)%
Research and development	1,950	1,794	156	9%
Selling, general and administrative	3,145	2,949	196	7%
Total operating expenses	5,184	5,014	170	3%
Loss from operations	(4,981)	(4,578)	(403)	9%
Other income, net	101	94	7	7%
Change in fair value of common stock warrant liabilities and common stock adjustment feature liability	9,482	(535)	10,017	1872%
Offering costs	(365)	(1,639)	1,274	(78)%
Net income (loss) before income taxes	4,237	(6,658)	10,895	164%
Income tax benefit (provision)	1	(11)	12	109%
Net income (loss)	$ 4,238	$ (6,669)	$ 10,907	164%

Revenues

Product revenues accounted for 80% and 43% of our total revenues in the three months ended June 30, 2019 and 2018, respectively. Our product revenues from sales of our SONOVA products decreased by $26,000, or 14%, three months ended June 30, 2019 compared to the same period in 2018, due to the timing of orders.

License revenues accounted for 0% and 21% of our total revenues in the three months ended June 30, 2019 and 2018, respectively. A milestone was achieved during the second quarter of the prior year that was not achieved in the second quarter of 2019. Additionally, there were no license agreements executed in 2018 and 2019.

Contract research and government grant revenues accounted for 20% and 36% of our total revenues for the three months ended June 30, 2019 and 2018, respectively. Our contract research and government grant revenues decreased by $117,000, or 74%, in the three months ended June 30, 2019 compared to the same period in 2018. The decrease was primarily driven by the completion of agreements and grants during 2018, as well as less activity for existing grants. Given our acute focus on the near-term commercialization of our nutritional ingredient traits and products, we do not intend to continue pursuing contract research agreements and government grant projects at the levels we have historically. We expect these revenues to continue to decline as our current contract research agreements and government grant projects conclude and are not replaced.

Cost of Product Revenues

Cost of product revenues decreased by $182,000, or 67%, in the three months ended June 30, 2019 compared to the three months ended June 30, 2018. This was due to a write down of GLA inventory recorded in the second quarter of 2018.

Research and Development

Research and development expenses increased by $156,000, or 9%, in the three months ended June 30, 2019 compared to the three months ended June 30, 2018. The increase was primarily driven by higher employee-related expenses and additional ASG costs as new activities ramp up.

Selling, General, and Administrative

Selling, general, and administrative (SG&A) expenses increased by $196,000, or 7%, in the three months ended June 30, 2019 compared to the three months ended June 30, 2018. The increase was primarily driven by higher marketing and public relations activity, as well as increased employee and recruiting expenses due to the growth of the commercial development and legal teams. These increases were partially offset by lower intellectual property legal fees.

Other Income, Net

Other income, net, of $101,000 for the three months ended June 30, 2019 was consistent with $94,000 recognized for the three months ended June 30, 2018.

Change in the Estimated Fair Value of Common Stock Warrant Liabilities and Common Stock Adjustment Feature Liability

Change in the estimated fair value of $9.5 million for the three months ended June 30, 2019 includes the fair value remeasurement of the warrants issued with the March 2018 Purchase Agreement, the June 2018 Offering, and the June 2019 Offering. The estimated fair value of the March 2018 Warrants decreased by $4.1 million, the estimated fair value of the June 2018 Offering Warrants decreased by $4.6 million, and the estimated fair value of the June 2019 Offering Warrants decreased by $0.8 million, all three driven by the decrease in the Company's stock price.

Change in the estimated fair value of $535,000 for the three months ended June 30, 2018 includes the March 2018 Purchase Agreement's common stock adjustment feature liability's final fair value remeasurement on May 7, 2018 and common stock warrant liability fair value remeasurement on June 30, 2018, combined with the June 2018 Offering common stock warrants estimated fair value remeasurement on June 30, 2018. See Note 8.

Offering Costs

There were $365,000 of offering costs in the three months ended June 30, 2019, comprised of the placement agent fees, placement agent warrants, advisory fees, and legal and accounting fees related to the June 2019 Offering. See Note 8. Offering costs for the three months ended June 30, 2018 of $1.6 million was comprised of $929,000 associated with the March 2018 Private Placement and $709,000 related to the June 2018 Offering.

Income Tax Benefit (Provision)

Income tax benefit for the three months ended June 30, 2019 was $1,000 as compared to the $11,000 recorded for three months ended June 30, 2018. The Company recognized net income during the three months ended June 30, 2019 versus net loss during the three months ended June 30, 2018.

Results of Operations

Comparison of the Six Months Ended June 30, 2019 and 2018

	Six Months Ended June 30, 2019	Six Months Ended June 30, 2018	$ Change	% Change
	(In thousands except percentage)			
Revenues:				
Product	$ 269	$ 249	$ 20	8%
License	—	90	(90)	(100)%
Contract research and government grants	92	311	(219)	(70)%
Total revenues	361	650	(289)	(44)%
Operating expenses:				
Cost of product revenues	148	307	(159)	(52)%
Research and development	3,456	3,190	266	8%
Selling, general and administrative	5,957	5,570	387	7%
Total operating expenses	9,561	9,067	494	5%
Loss from operations	(9,200)	(8,417)	(783)	9%
Other income, net	221	132	89	67%
Initial loss on common stock warrant and common stock adjustment feature liabilities	—	(4,000)	4,000	(100)%
Change in fair value of common stock warrant liabilities and common stock adjustment feature liability	987	(2,435)	3,422	141%
Offering costs	(365)	(2,543)	2,178	(86)%
Net loss before income taxes	(8,357)	(17,263)	8,906	(52)%
Income tax provision	(18)	(21)	3	(14)%
Net loss	$ (8,375)	$ (17,284)	$ 8,909	(52)%

Revenues

Product revenues accounted for 75% and 38% of our total revenues in the six months ended June 30, 2019 and 2018, respectively. Our product revenues from sales of our SONOVA products increased by $20,000, or 8%, in the six months ended June 30, 2019 compared to the same period in 2018, due to the timing of orders.

License revenues accounted for 0% and 14% of our total revenues in the six months ended June 30, 2019 and 2018, respectively. There were no agreements executed in 2018 and 2019, and a milestone was determined to be probable of achievement by a licensee and the applicable fee of $90,000 was recognized in the second quarter of 2018.

Contract research and government grant revenues accounted for 25% and 48% of our total revenues for the six months ended June 30, 2019 and 2018, respectively. Our contract research and government grant revenues decreased by $219,000, or 70%, in the six months ended June 30, 2019 compared to the same period in 2018. The decrease was primarily driven by the completion of agreements and grants during 2018, as well as less activity for existing grants. Given our acute focus on the near-term commercialization of our nutritional ingredient traits and products, we do not intend to continue pursuing contract research agreements and government grant projects at the levels we have historically. We expect these revenues to continue to decline as our current contract research agreements and government grant projects conclude and are not replaced.

Cost of Product Revenues

Cost of product revenues decreased by $159,000, or 52%, in the six months ended June 30, 2019 compared to the six months ended June 30, 2018. This was due to a write-down in the second quarter of 2018 that was not present in 2019.

Research and Development

Research and development expenses increased by $266,000, or 8%, in the six months ended June 30, 2019 compared to the six months ended June 30, 2018. The increase was primarily driven by the timing of Verdeca studies and activities and higher employee-related expenses due to the expansion of the commercial agricultural operations and ASG teams, as well as external ASG costs. The increase was partially offset by the reduction in GoodWheat™ field research costs as current activities are inventoried in support of commercial sales.

Selling, General, and Administrative

Selling, general, and administrative (SG&A) expenses increased by $387,000, or 7%, in the six months ended June 30, 2019 compared to the six months ended June 30, 2018. The increase was driven by higher employee expenses relating primarily to the growth of the commercial development and legal teams, as well as increased consulting, marketing and public relations activity. These increases were partially offset by lower intellectual property legal fees.

Other Income, Net

Other income, net, of $221,000 for the six months ended June 30, 2019 was an increase of $89,000, or 67%, in income when compared to other income for the six months ended June 30, 2018. The increase was primarily related to the higher investment balance in 2019.

Initial Loss on Common Stock Warrant and Common Stock Adjustment Feature Liabilities

Initial loss on common stock warrant and common stock adjustment feature liabilities of $4.0 million is comprised of the non-cash loss associated with the initial recognition of the March 2018 Warrants and Common Stock adjustment feature liabilities associated with the March 2018 Private Placement at estimated fair values of $10.2 million and $3.8 million, respectively. The combined fair value of $14 million less $10 million of proceeds yields the $4.0 million initial loss. There was no such loss in the second quarter of 2019.

Change in the Estimated Fair Value of Common Stock Warrant Liabilities and Common Stock Adjustment Feature Liability

Change in the estimated fair value of $987,000 million for the six months ended June 30, 2019 includes the fair value remeasurement of the March 2018 Warrants issued with the March 2018 Purchase Agreement and the June 2018 and June 2019 Offerings. The estimated fair value of the March 2018 Warrants decreased by $135,000, the estimated fair value of the June 2018 Offering Warrants decreased by $84,000, and the estimated fair value of the June 2019 Offering Warrants decreased by $768,000, all three driven by the decrease in the Company's stock price.

Change in the estimated fair value of common stock warrant liabilities and common stock adjustment feature liability of $2.4 million for the six months ended June 30, 2018 resulted from the fair value remeasurements of the March 2018 Purchase Agreement liabilities at March 31, 2018 and the final remeasurement of the common stock adjustment feature on May 7, 2018, combined with remeasurement of the June 2018 Offering liability and the March 2018 Purchase Agreement common stock warrant liability on June 30, 2018. The estimated fair value of the March 2018 Purchase Agreement common stock adjustment feature increased by $4.6 million, the estimated fair value of the March 2018 Purchase Agreement common stock warrants decreased by $2.2 million, and the estimated fair value of the June 2018 Offering common stock warrants increased by $42,000. The March 2018 Purchase Agreement common stock adjustment feature liability was released to equity following the final fair value remeasurement. See Note 8.

Offering Costs

There was $365,000 offering costs in the six months ended June 30, 2019 is comprised of the placement agent fees, placement agent warrants, advisory fees, and legal and accounting fees related to the June 2019 Offering. See Note 8. Offering costs for the six months ended June 30, 2018 of $2.5 million was comprised of $1.8 million associated with the March 2018 Private Placement and $709,000 related to the June 2018 Offering.

Income Tax Provision

Income tax provision of $18,000 for the six months ended June 30, 2019 was consistent with the $21,000 recorded for six months ended June 30, 2018.

Seasonality

We and our commercial partners operate in different geographies around the world and conduct field trials used for data generation, which must be conducted during the appropriate growing seasons for particular crops and markets. Often, there is only one crop-growing season per year for certain crops and markets. Similarly, climate conditions and other factors that may influence the sales of our products may vary from season to season and year to year. In particular, weather conditions, including natural disasters such as heavy rains, hurricanes, hail, floods, tornadoes, freezing conditions, drought, or fire, may affect the timing and outcome of field trials, which may delay milestone payments and the commercialization of products incorporating our seed traits. In the future, sales of commercial products that incorporate our seed traits will vary based on crop growing seasons and weather patterns within particular regions.

The level of seasonality in our business overall is difficult to evaluate at this time due to our relatively early stage of development, our relatively limited number of commercialized products, our expansion into new geographical markets, and our introduction of new products and traits.

Liquidity, Capital Resources, and Going Concern

We have funded our operations primarily with the net proceeds from our initial public offering and private placements of equity and debt securities. Our principal use of cash is to fund our operations, which are primarily focused on completing development and commercializing our product quality seed traits. This includes replicating field trials, coordinating with our partners on their development programs, and scaling harvest production of wheat, hemp, and soy. As of June 30, 2019, we had cash and cash equivalents of $14.6 million and short-term investments of $5.4 million. For the six months ended June 30, 2019 and the twelve months ended December 31, 2018, the Company had net losses of $8.4 and $13.5 million, and net cash used in operations of $8.4 million and $13.6 million, respectively. The majority of the income in the second quarter of 2019 was due to the $9.5 million of non-cash warrant income resulting from the quarterly remeasurement of the common stock warrant liabilities.

As is disclosed in Note 8, the Company has obtained funding through two offerings during the first half of 2018 and one offering during June 2019. On March 19, 2018, the Company entered into securities purchase agreements with institutional investors in connection with a private placement of common stock and warrants in the amount of $10 million, exclusive of any related transaction fees. On June 11, 2018, the Company entered into agreements with institutional investors through a registered direct offering in the amount of $14 million, exclusive of any related transaction fees. On June 12, 2019, the Company entered into agreements with institutional investors through a registered direct offering in the amount of $7.5 million exclusive of any related transaction fees.

We believe that our existing cash, cash equivalents, and short-term investments will not be sufficient to meet our anticipated cash requirements for at least the next 12 months which raises substantial doubt about the Company's ability to continue as a going concern. See Note 1 of the notes to our consolidated financial statements for more information.

We may seek to raise additional funds through debt or equity financings, if necessary. We may also consider entering into additional partner arrangements. Our sale of additional equity would result in dilution to our stockholders. Our incurrence of debt would result in debt service obligations, and the instruments governing our debt could provide for additional operating and financing covenants that would restrict our operations. If we do require additional funds and are not able to secure adequate additional funding, we may be forced to reduce our spending, extend payment terms with our suppliers, liquidate assets, or suspend or curtail planned development programs. Any of these actions could materially harm our business, results of operations and financial condition.

Cash Flows

The following table summarizes our cash flows for the periods indicated (in thousands):

	Six Months Ended June 30,	
	2019	2018
Net cash (used in) provided by:		
Operating activities	$ (8,429)	$ (6,918)
Investing activities	4,212	(15,067)
Financing activities	6,865	22,527
Net increase in cash	$ 2,648	$ 542

Cash used in operating activities

Cash used in operating activities for the six months ended June 30, 2019 was $8.4 million. Our net loss of $8.4 million, non-cash income for the change in fair value of common stock warrant liabilities and common stock adjustment feature liability of $987,000, operating lease payments of $349,000, amortization of investment premium of $82,000 and adjustments in our working capital accounts of $237,000 were partially offset by $811,000 of stock-based compensation, $348,000 of lease amortization and $77,000 of depreciation and amortization, as well as $365,000 of offering costs that are also included in financing activities.

Cash used in operating activities for the six months ended June 30, 2018 was $6.9 million. Our net loss of $17.3 million, net amortization of investment premium and discount of $27,000, and gain on the disposal of equipment of $3,000 were partially offset by non-cash charges of $4.0 million for the initial loss on and $2.4 million for the change in fair value of common stock warrant liabilities and common stock adjustment feature liability, $656,000 for stock-based compensation, and depreciation and amortization of $98,000, as well as $2.5 million for offering costs also included in financing activities and adjustments in our working capital accounts of $664,000.

Cash provided by (used in) investing activities

Cash provided by investing activities for the six months ended June 30, 2019 consisted of $8.6 million in purchases of short-term investments and $315,000 in purchases of property and equipment, which were offset by $13.2 million in proceeds from sales and maturities of investments.

Cash used in investing activities for the six months ended June 30, 2018 consisted of $18.9 million in purchases of short-term investments and $68,000 in purchases of property and equipment, which was offset by $3.9 million in proceeds from sales and maturities of investments.

Cash provided by financing activities

Cash provided by financing activities for the six months ended June 30, 2019 consisted of proceeds from the issuance of stock and warrants relating to the June 2019 Offering of $7.5 million and proceeds from the purchase of ESPP shares of $8,000, partially offset by payments of offering costs totaling $643,000.

Cash provided by financing activities for the six months ended June 30, 2018 consisted of proceeds from the issuance of stock and warrants relating to the March 2018 Private Placement of $10.0 million and the June 2018 Offering of $14.0 million, partially offset by $2.4 million of offering costs for both transactions paid during the period. Proceeds from the exercise of stock options and the purchase of ESPP shares totaled $966,000.

Off-Balance Sheet Arrangements

Since our inception, we have not engaged in any off-balance sheet arrangements, including the use of structured finance, special purpose entities, or variable interest entities other than Verdeca, which is discussed in the notes to our condensed consolidated financial statements.

Critical Accounting Policies and Estimates

Our management's discussion and analysis of our financial condition and results of operations is based on our financial statements, which have been prepared in accordance with GAAP. The preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, as well as the reported revenue generated, and expenses incurred during the reporting periods. Our estimates are based on our historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

We consider our critical accounting policies and estimates to be revenue recognition, inventories, income taxes, the liabilities relating to the March 2018 Purchase Agreement, the June 2018 Offering, the June 2019 Offering, and stock-based compensation. See Notes 4 and 8 for the estimates made in connection with the securities purchase agreements executed during the first six months of 2018 and 2019.

ITEM 3: QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Not Required.

ITEM 4: CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain "disclosure controls and procedures," as such term is defined in Rule 13a-15(e) under the Securities Exchange Act of 1934, or Exchange Act, that are designed to ensure that information required to be disclosed by us in reports that we file or submit under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in Securities and Exchange Commission rules and forms, and that such information is accumulated and communicated to our management, including our President and Chief Executive Officer and our Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure. In designing and evaluating our disclosure controls and procedures, management recognized that disclosure controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the disclosure controls and procedures are met. Our disclosure controls and procedures have been designed to meet reasonable assurance standards. Additionally, in designing disclosure controls and procedures, our management necessarily was required to apply its judgment in evaluating the cost-benefit relationship of possible disclosure controls and procedures. The design of any disclosure controls and procedures also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions.

Based on their evaluation as of the end of the period covered by this Quarterly Report on Form 10-Q, our President and Chief Executive Officer and our Chief Financial Officer have concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting (as such term is defined in Rule 13a-15(f) under the Exchange Act) identified in connection with the evaluation identified above that occurred during the quarter ended June 30, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II. OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

Except as set forth below, we currently are not a party to any material litigation or other material legal proceedings. From time to time, we may be subject to legal proceedings and claims in the ordinary course of business.

On April 1, 2019, Arista Cereal Technologies Pty Limited and Bay State Milling Company filed a Complaint against us in the United States District Court for the District of Delaware, asserting claims for alleged patent infringement. On June 26, 2019 the Court issued a Joint Stipulation and Order to Extend Time to Serve Summons and Complaint until October 15, 2019 indicating that “the parties have agreed on this stipulation seeking additional time…in light of the ongoing settlement discussions between the parties and the desire to preserve the litigation status quo for a short period of time in order to enable continuing settlement discussions.”

On April 24, 2019, Arista Cereal Technologies Pty Limited initiated an interference proceeding with the United States Patent and Trademark Office (“USPTO”) concerning the same patent relating to our Resistant Starch Wheat products (US 10,246,716) to determine the priority of invention. If the USPTO determines Arista was the first to invent, the subject matter of the interference would be granted in a patent to Arista. On the other hand, if the USPTO determines we were the first to invent, we would maintain our patent. A decision by the USPTO is not expected until mid-2021.

On August 9, 2019, the United States Court of Appeals for the Federal Circuit upheld a prior USPTO decision on an interference proceeding, that we appealed in 2018, involving a patent application relating to our Resistant Starch Wheat products. Based on this decision, our patent interference proceeding is now terminated, and Arista maintains its patent.

ITEM 1A. RISK FACTORS

In addition to the other information set forth in this Quarterly Report, you should carefully consider the factors discussed in Part I, “Item 1A. Risk Factors” in our Annual Report on Form 10-K for the year ended December 31, 2018, which could materially affect our business, financial condition, liquidity or future results. The risks described in our Annual Report on Form 10-K are not the only risks facing our company. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial also may materially adversely affect our business, financial condition, liquidity or future results.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

None.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES

None.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

ITEM 5. OTHER INFORMATION

None.

ITEM 6. EXHIBITS

The following exhibits are attached hereto or are incorporated herein by reference.

Exhibit Number	Exhibit Description
4.1(1)	Form of Warrant.
4.2(2)	Form of Placement Agent Warrant.
10.1(3)	Form of Securities Purchase Agreement dated as of June 12, 2019.
31.1	Principal Executive Officer's Certifications Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Principal Financial Officer's Certifications Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1(4)	Certification Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2(4)	Certification Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

(1) Incorporated by reference to Exhibit 4.1 filed with the Report on Form 8-K filed on June 14, 2019
(2) Incorporated by reference to Exhibit 4.2 filed with the Report on Form 8-K filed on June 14, 2019
(3) Incorporated by reference to Exhibit 10.1 filed with the Report on Form 8-K filed on June 14, 2019
(4) This certification is deemed not filed for purpose of Section 18 of the Exchange Act or otherwise subject to the liability of that section, nor shall it be deemed incorporated by reference into any filing under the Securities Act or the Exchange Act.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

	Arcadia Biosciences, Inc.
August 14, 2019	By: /s/ RAJENDRA KETKAR Rajendra Ketkar President and Chief Executive Officer
August 14, 2019	By: /s/ MATTHEW T. PLAVAN Matthew T. Plavan Chief Financial Officer

Exhibit 31.1

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO EXCHANGE ACT RULE 13a-14(a)/15d-14(a)
AS ADOPTED PURSUANT TO SECTION 302
OF THE SARBANES-OXLEY ACT OF 2002**

I, Rajendra Ketkar, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Arcadia Biosciences, Inc. for the period ended June 30, 2019;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles; and

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Dated: August 14, 2019

/s/ RAJENDRA KETKAR
Rajendra Ketkar
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

**CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO EXCHANGE ACT RULE 13a-14(a)/15d-14(a)
AS ADOPTED PURSUANT TO SECTION 302
OF THE SARBANES-OXLEY ACT OF 2002**

I, Matthew T. Plavan, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Arcadia Biosciences, Inc. for the period ended June 30, 2019;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles; and

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Dated: August 14, 2019

/s/ MATTHEW T. PLAVAN
Matthew T. Plavan
Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION
PURSUANT TO 18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the accompanying Quarterly Report of Arcadia Biosciences, Inc. (the "Company"), on Form 10-Q for the quarter ended June 30, 2019 (the "Report"), I, Rajendra Ketkar, President and Chief Executive Officer of the Company, hereby certify pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002 that:

(1) the Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: August 14, 2019

/s/ RAJENDRA KETKAR
Rajendra Ketkar
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 32.2

CERTIFICATION
PURSUANT TO 18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the accompanying Quarterly Report of Arcadia Biosciences, Inc. (the “Company”), on Form 10-Q for the quarter ended June 30, 2019 (the “Report”), I, Matthew T. Plavan, Chief Financial Officer of the Company, hereby certify pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002 that:

(1) the Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: August 14, 2019

/s/ MATTHEW T. PLAVAN
Matthew T. Plavan,
Chief Financial Officer
(Principal Financial Officer)