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

DIVISION OF
CORPORATION FINANCE

October 23, 2018

Alison Lawton
Chief Executive Officer
Kaleido Biosciences, Inc.
65 Hayden Avenue
Lexington, MA 02421

Re: Kaleido Biosciences, Inc.
Draft Registration Statement on Form S-1
Submitted September 25, 2018
CIK No. 0001751299

Dear Ms. Lawton:

We have reviewed your draft registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by providing the requested information and either submitting an amended draft registration statement or publicly filing your registration statement on EDGAR. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing the information you provide in response to these comments and your amended draft registration statement or filed registration statement, we may have additional comments.

Draft Registration Statement on Form S-1 submitted September 25, 2018

Prospectus Summary
Overview, page 1

1. Please remove the statement that you are a "clinical-stage healthcare company" as this suggests to investors that you have an active IND and are conducting clinical trials as part of the FDA's drug approval pathway. In addition, please balance your summary disclosure to clearly state upfront that you have not conducted any therapeutic clinical trials for any of your product candidates. Please also balance your references to human clinical studies by clearly stating that you have not yet submitted INDs to conduct

therapeutic clinical trials and that you are conducting these studies assuming the product candidates are food or medical food. In addition, in each instance that you refer to human clinical trials or human dosing, please specify that these are non-therapeutic human clinical trials or non-therapeutic human dosing.

2. Please define at first use the term "targeted glycans."

3. Please tell us why you believe it is appropriate to label your platform as "human-centric," including what is meant by that term. Please also explain why you believe your MMTs have "tremendous potential" and why you have "world-class capabilities" in computational biology. In the alternative, please delete these terms.

4. We note that you have neither initiated *ex vivo* testing for nor identified an MMT candidate for your chronic kidney disease, atherosclerotic cardiovascular disease, drug or disease-induced diarrhea and organic acidemias programs. Given this, please explain why you believe these programs are sufficiently material to include in the pipeline chart. Please also revise your prospectus summary to clearly explain that you have not yet identified MMT candidates for multi-drug resistant bacteremia in high risk patients, chronic kidney disease, atherosclerotic cardiovascular disease, drug or disease-induced diarrhea and organic acidemias. Please also tell us why the table indicates that *ex vivo* testing and human clinical studies are ongoing for drug or disease-induced diarrhea.

5. Please revise your product pipeline charts on page 3 and 112 to lengthen the Planned Phase 2 and Planned Phase 3 columns to the extent you plan to develop your MMT candidates as drug products. Your current presentation suggests that you will have completed the majority of the development process for your candidates by the time you file an IND.

6. Please clearly state here and in your Business section how you will determine which product candidates you will select for drug development versus non-drug development, including the potential impact to your company if you can pursue only the non-drug development pathway. Please also clearly disclose that in both the United States and European Union, no products to date have been approved specifically demonstrating an impact on the microbiome as part of their therapeutic effect.

7. Please remove the statements throughout your prospectus that you are able to measure or assess safety in your human clinical studies or that you can assess the therapeutic viability of your MMT candidates. We note that your current business plan involves pursuing FDA approval of your product candidates, therefore these statements suggest that your product candidates are safe for use as a drug and imply that you are able to assess efficacy in non-IND clinical trials. Safety and efficacy are assessed throughout all stages of clinical trials and the determinations are within the sole authority of the FDA or comparable foreign regulatory entity. Please also clearly state in your definition of "Human clinical studies" on page 1 that your determination that your initial product candidate is safe for human clinical studies applies only in the context of food and is irrelevant for determining

whether the FDA determines that your product candidate is safe for use as a drug. Please also clearly identify the related GRAS class of compounds that you are using to determine that your product candidates are generally recognized as safe.

8. We note that you refer to your MMTs as "novel treatments" and you state throughout that your programs will be used for "treatment" of certain conditions, such as hyperammonemia. Please revise such statements throughout your prospectus to clarify that your product candidates will have to be approved pursuant to the FDA's drug approval pathway for you to make any claim that your product candidates can cure, mitigate, prevent or treat such conditions.

9. Please tell us why you believe you will be able to move directly into a Phase 2 clinical trial under an IND for each of your product candidates, including the basis for your belief that the FDA will accept the results of your non-therapeutic clinical trials in lieu of a Phase I trial conducted under an IND.

10. You state that you have conducted seven human clinical studies with your MMT candidates. However, we note that you discuss only two human clinical studies in your Business section. Please advise.

Our Strategy, page 5

11. We note your disclosure that you are conducting human clinical studies based on discussions with regulatory authorities. Please describe, where appropriate, each of the discussions you have had with the FDA and foreign regulatory equivalents regarding your product candidates and/or the pursuit of this regulatory pathway.

12. Please put into context your statement regarding your "rapid and cost-effective development approach" to advance your pipeline, "including conducting human clinical studies and planned clinical trials as appropriate based on data and discussions with regulatory authorities." In this regard, we note your risk factor disclosure on pages 18-20 which indicates that the drug development process is uncertain, lengthy, and expensive. Please also reconcile your belief that you may rapidly advance your pipeline with your statement on page 18 that the regulatory approval process for microbiome product candidates may be more expensive and take longer than the approval process for product candidates based on better known or more extensively studied technologies.

Risks associated with our business, page 6

13. Please disclose with prominence equal to the discussion of your strengths the risks that the FDA may require additional preclinical trials before allowing you to proceed to clinical trials, the FDA may determine that your product candidates cannot be marketed as conventional foods or medical foods, and that the FDA may disagree with your determination that your products involve GRAS ingredients.

Implications of Being an Emerging Growth Company, page 7

14. Please supplementally provide us with copies of all written communications, as defined in Rule 405 under the Securities Act, that you, or anyone authorized to do so on your behalf, present to potential investors in reliance on Section 5(d) of the Securities Act, whether or not they retain copies of the communications.

Use of Proceeds, page 84

15. We note that you intend to use the net proceeds, together with existing cash and cash equivalents, to advance your programs in hyperammonemia through Phase 2 clinical trials and to advance your pipeline outside of hyperammonemia. Please revise your disclosure to specify whether you will be able to complete the Phase 2 clinical trials for your hyperammonemia programs and to disclose how far in the development of your other pipeline product candidates you expect to reach using proceeds from the offering. If any material amounts of other funds are necessary to accomplish the specified purposes for which the proceeds are to be obtained, state the amounts and sources of such other funds needed for each such specified purpose and the sources thereof. Refer to Instruction 3 to Item 504 of Regulation S-K.

Management's Discussion and Analysis of Financial Condition and Results of Operations
Critical Accounting Policies and Significant Judgments and Estimates
Stock-Based Compensation
Determination of the Fair Value of Common Stock, page 106

16. Once you have an estimated offering price or range, please explain to us how you determined the fair value of the common stock underlying your equity issuances and the reasons for any differences between the recent valuations of your common stock leading up to the IPO and the estimated offering price. This information will help facilitate our review of your accounting for equity issuances including stock compensation and beneficial conversion features.

Business, page 111

17. We note your disclosure on page F-29 regarding the Midori License Agreement. Please tell us whether you licensed the technology underlying your product platform or lead product candidates through this agreement. If so, please disclose the material terms of the agreement, including the intellectual property and technology licensed, rights and obligations of the parties and termination provision. In addition, please file the agreement as an exhibit to the registration statement, or tell us why you do not believe this is required. See Item 601(b)(10) of Regulation S-K.

Our Microbiome Metabolic Therapies (MMTs), page 117

18. Please supplementally tell us the specific observations supporting your statement that your MMT candidates have been observed to have limited systemic exposure.

Ex Vivo Screening in Healthy Voluneer Microbiome Samples, page 119

19. We note that you collaborate with a third party to generate certain metabolic data. Please tell us if you have any agreement, whether written or oral, with such party. If so, please identify the party, disclose the material terms of the agreement and file the agreement as an exhibit to the registration statement. In the alternative, tell us why you believe you are not required to file this agreement.

Rapid Advancement into Human Clinical Studies, page 120

20. We note your disclosure that for the use of a substance to be GRAS, the scientific data and information about its use must be widely known, and there must be a consensus among qualified experts that this data and information establish that the substance is safe under the conditions of its intended use. We also note your disclosure that you rely on qualified experts from scientific consulting organizations that are highly experienced in conducting GRAS evaluations to conduct initial safety assessments of your MMT candidates. Please expand your disclosure to identify the substance that is considered to be GRAS, the relation of your product candidate to this substance, and to describe the scientific data indicating that the substance used in your product candidates are GRAS and the initial safety assessments that were conducted of your MMT candidates.

21. We note your disclosure on page 122 that the human clinical studies will allow you to decide whether to continue to develop a specific MMT candidate for non-drug applications or instead to file an IND and investigate it for drug applications. Please revise your disclosure throughout the prospectus to clarify whether you intend to develop MMT candidates for non-drug applications if the human clinical studies do not result in desired outcomes, and if so, the process by which you will bring the product to market and the competition you will face. Please also explain the reasons you plan to pursue drug approval for these MMT candidates if you have the ability to market it as a food or medical food product.

Clinical Development , page 128

22. We note on page 147 your explanation that an IND is not required for human testing of GRAS substances unless the study is intended to evaluate the product's ability to diagnose, cure, mitigate, treat or prevent a disease or condition. Given that you have selected KB195 the treatment of hyperammonemia, and the objectives of your completed clinical trial and planned human clinical trial in UCD patients is to evaluate the effects of KB195 on microbiome nitrogen metabolism, please explain why you believe an IND is not required for these studies.

Drug or Disease-Induced Diarrhea, page 139

23. We note that your pipeline tables on pages 3 and 112 indicate that you have completed *ex vivo* screening for drug or disease-induced diarrhea. Please provide disclosure regarding the results of your *ex vivo* screening for this indication or revise your table so that it is consistent with your disclosure.

Future Pipeline Opportunities, page 139

24. We note your disclosure on page 140 that you are currently conducting a human clinical study in Type 2 diabetes, initially with a proprietary formulation of commercially-available ingredients and that you intend to introduce your own MMT candidate in the final stage of the study in the second half of 2019. Please expand your disclosure to provide additional information about this study, including a description of the proprietary formulation of commercially-available ingredients that you are testing in patients, its mechanism of action, and how the introduction of your MMT candidate fits into the study. Please also disclose whether you have identified the MMT candidate to be introduced into the study, and if so, discuss the results of *ex vivo* screening and testing of the MMT candidate, and tell us why you do not include this MMT candidate in your pipeline table In addition, we note that pursuant to FDA guidance diabetes is not a condition for which medical food can be labeled or marketed. Please tell us whether you are conducting these studies pursuant to regulations supporting research with food or medical food, and how you intend to develop and market your potential MMT candidate given the FDA's position.

Manufacturing, page 140

25. We note your disclosure on page 66 that in 2018, you entered into a services agreement with a third party to handle the manufacturing supply chain from drug substance synthesis through labeling and packaging for your planned clinical trials and that you may not be able to locate alternative suppliers. Please disclose the material terms of this agreement and file it as an exhibit to the registration statement, or tell us why you do not believe this is required. See Item 601(b)(10) of Regulation S-K.

Expedited Development and Review Programs for Drugs , page 150

26. We note your disclosure on page 131 that you may be able to seek designation of KB195 for the treatment of a Rare Pediatric Disease. Please revise your disclosure in this section to explain the conditions for and the impact of receiving a Rare Pediatric Disease Priority Review Voucher.

Description of Capital Stock, page 190

27. We note that your forum selection provision identifies the Court of Chancery of the State of Delaware as the exclusive forum for certain litigation, including any “derivative

action." Please disclose whether this provision applies to actions arising under the federal securities laws. Also ensure that the exclusive forum provision in your proposed organizational documents states this clearly. In this regard, we note that Section 27 of the Exchange Act creates exclusive federal jurisdiction over all suits brought to enforce any duty or liability created by the Exchange Act or the rules and regulations thereunder.

Exhibits

28. Please file as an exhibit to the registration statement the services agreement with Flagship Management, or tell us why you do not believe it is required to be filed. See Item 601(b)(10) of Regulation S-K.

General

29. Please provide us proofs of all graphics, visual, or photographic information you will provide in the printed prospectus prior to its use, for example in a preliminary prospectus.

You may contact Keira Nakada at 202-551-3659 or Jim Rosenberg at 202-551-3679 if you have questions regarding comments on the financial statements and related matters. Please contact Irene Paik at 202-551-6553 or Erin Jaskot at 202-551-3442 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Healthcare & Insurance

cc: Kingsley L. Taft - Goodwin Procter LLP