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uBiome

*We wanted to take the results of the HMP [Human Microbe Project] and bring them directly to the public, enabling all of us to learn about our microbiomes and participate in science as soon as possible—without waiting years and years for the results to trickle down into products and services that people could use.*¹

— Jessica Richman, Cofounder and Co-CEO of uBiome

Zachary Apte and William Ludington, graduate students in biology at University of California San Francisco (UCSF), wanted to learn more about their microbiomes.² It was 2012, and with the conclusion of the Human Microbiome Project (HMP), funded by the National Institutes of Health (NIH), the scientific community was just beginning to understand the role of the microbiome in regulating health. The human microbiome, composed of trillions of microorganisms, exists in a delicate balance throughout the body. An imbalanced microbiome may increase one's susceptibility to a variety of diseases ranging from asthma to diabetes.³ Apte and Ludington discovered that "there wasn't a cheap place ... that would give meaningful, quick answers."⁴ It had been nearly a decade since the complete human genome had been sequenced, and companies like 23andMe, founded in 2006, had pioneered direct-to-consumer DNA tests, creating a market for personalized health data and democratizing information that previously had been difficult for individuals to access and understand.⁵ Would there be similar consumer appetite for on-demand microbiome analysis?

Apte and Ludington resolved to launch a startup to pursue this opportunity. They recruited another cofounder: Jessica Richman, an acquaintance of Apte's from a startup accelerator program in Chile.⁶ Richman, who'd launched and sold a company after high school, had earned her undergraduate degree at Stanford; worked at Google, McKinsey, and Lehman Brothers; and matriculated at Oxford for a Ph.D. in computational social science. The trio joined the prestigious QB3 Garage at UC Berkeley's California Institute for Quantitative Biosciences, an incubator for life sciences startups, and founded uBiome. They saw an opportunity to not only offer individual consumers access to information about their microbiome, but also contribute to a greater body of scientific research. The team posited that consumers would be interested in a microbiome analysis kit, which would provide a snapshot of their health, along with scientifically-backed dietary recommendations and lifestyle advice.

Additionally, the founders had ambitions to curate the world's largest microbiome dataset. The HMP was path breaking, but it had only sequenced genetic data from 250 microbiomes. What if sequencing tools were made available to consumers? The team imagined collecting thousands of samples and creating a public database of human microbiomes that could empower individual consumers to conduct research.⁷ Curious about the effectiveness of your diet? Conduct an experiment on yourself by taking multiple uBiome tests over time, and evaluating the resulting microbiome changes.

In 2013, the uBiome team brought the idea directly to consumers through an Indiegogo campaign that aimed to raise \$100,000.⁸ In the campaign, they described the venture as “a citizen science project that allows the public access to cutting edge sequencing technology to understand their microbiome.”⁹ For \$89, backers would receive a kit, and could use a swab (and some toilet paper) to take a fecal sample and send it back to uBiome. A \$399 pledge added samples from the nose, mouth, ear and genitals. In return, uBiome would sequence the DNA of the cells collected and create a personalized profile listing the types and relative quantities of bacteria at the sampling sites.¹⁰ Backers would also gain access to uBiome’s dataset and could compare various dimensions of their microbiomes to others. uBiome ultimately raised \$363,000 on Indiegogo, with consumers claiming that they couldn’t “wait to see [their] gut for the first time!”¹¹

The next few years were a whirlwind. Ludington returned to full-time academic research in 2013, but Richman and Apte continued as co-CEOs. In 2014, the company joined Y Combinator’s spring cohort and grew its team to 30 employees (see **Exhibit 1** for senior team member bios).¹² By 2016, a pivot had added two doctor-prescribed tests to uBiome’s product lineup: SmartGut, a stool test that identified gut microbes for patients with chronic gastro-intestinal conditions, and SmartJane, a doctor-prescribed women’s health test which could identify strains of HPV as well as four common sexually-transmitted diseases. uBiome charged up to \$2,000 to \$3,000 per test for these products, expecting that test costs would be reimbursed by consumers’ health insurers.^{13,14} uBiome continued to offer Explorer, an \$89 direct-to-consumer educational offering intended to help individuals understand the role that food and lifestyle can play in gut wellness (see **Exhibit 2** for an image of the Explorer kit).¹⁵

By 2016, the company had raised nearly \$22 million over two rounds. Series A was led by Andreessen Horowitz; Series B by the biotech-focused VC firm 8VC. The team developed patented testing processes and accumulated the largest human microbiome database, with more than 250,000 samples.¹⁶ Researchers at the Centers for Disease Control and NIH, as well as at Harvard and Stanford partnered with uBiome to conduct microbiome research; Harvard professor George Church joined other leading geneticists on uBiome’s scientific advisory board.¹⁷ In September 2018, the venture raised another \$83 million at a \$600 million dollar valuation in a Series C financing led by biotech VC firm OS Fund. The venture arm of Dentsu, Japan’s largest ad agency, joined the round as a strategic investor. At the same time, uBiome announced plans to use its microbiome data to conduct drug discovery research and added two board directors: former Novartis CEO Joe Jimenez and UCSF professor Joe DeRisi, a leading biochemist. They joined Kimmy Scotti of 8VC, which was uBiome’s largest investor shareholder with 22% of its equity (Andreessen Horowitz was second largest with 11%).

However, reviews by current and former employees on Glassdoor and press reports painted a less rosy picture of uBiome. Employees complained about micromanagement and asserted that senior management lacked the ability to successfully scale the company.¹⁸ Some described a culture of intimidation, where employees were instructed to blindly follow instructions rather than to ask questions.¹⁹ *Business Insider* also reported that cofounders Apte and Richman failed to publicly disclose their romantic relationship and that Richman, when contacted about being included in the site’s “30 most important women in tech under 30” list, did not reveal that she was in fact forty years old.²⁰

Meanwhile, in product reviews, consumers expressed concerns about their ability to interpret test results, with one claiming that uBiome's data was "virtually impossible to understand." Additionally, some doctors had doubts about the utility of the prescribed tests, SmartJane and SmartGut, with a practitioner claiming that results were "essentially meaningless at our current state of knowledge. Just because we can test something doesn't mean we should."²¹ Experts noted that the gut's bacterial composition was constantly changing, and argued that a single test could not accurately predict health.²²

Echoing that view, one former employee remarked that uBiome's tests "remind me of astrology... You get one SmartGut report and you might say, 'Oh, well that totally explains why I've been having such-and-such problem.' Then you do it the next day, and you get completely different results."²³ The authors of a meta-review of in the journal *Nature* summarized the state of human microbiome research: "Overall, our current understanding of the precise relationships between the human gut microbiome and disease remains limited,"²⁴ Nevertheless, uBiome continued to advance research supporting the efficacy of its products, aiming to persuade health insurance companies to reimburse the cost of doctor-prescribed tests.²⁵ Some consumers unexpectedly received bills totaling thousands of dollars when their insurers declined reimbursement.²⁶

In April 2019, uBiome was the subject of an FBI raid. Former employees said that the company had repeatedly billed individuals without their consent in order to meet aggressive targets for the number of billable tests it served and boost reported revenue.²⁷ Between 2017 and 2019, the Federal Trade Commission had received 28 complaints about uBiome, largely related to billing and unexpected costs.²⁸ In some cases, several tests were run on the same sample in order to increase billings – sometimes in violation of state regulations, when the sample had been collected and stored before uBiome had secured approval for medical-grade testing.²⁹ According to *Business Insider*, "When not enough new customers were signing up for uBiome's services... the company tried to bill insurers for conducting updated tests of stored samples that were in some cases years-old. When the insurance companies required assurances from doctors that the tests were medically necessary... uBiome hired doctors to remotely sign off on tests using tactics that appear to violate the regulations of some states' governing of telemedicine."³⁰

Cofounders Richman and Apte resigned as co-CEOs and left uBiome's board of directors in July 2019. The remaining board members hired a consulting firm to conduct an independent review of business operations, in particular, the allegations that had surfaced as a result of the FBI raid. Meanwhile, the company's staff, which had peaked at about 300, was reduced to roughly 100. In September 2019, uBiome lost the federal lab certification that allowed it to offer doctor-prescribed tests, and the drugstore chain CVS halted sales of uBiome's Explorer kits for consumers. That month, the company filed for Chapter 11 bankruptcy, aiming to reorganize operations, then later switched to Chapter 7, in order to cease operations and auction off its 246 patents, equipment, anonymized data, and its collection of 300,000 samples – which sold for \$7 million.³¹

In uBiome's bankruptcy filing, its interim CEO acknowledged that the founders "implemented certain business strategies" that had "operational (but not scientific) flaws and,

in some instances, were of questionable legality. These issues included improper insurance provider billing practices, improper use of a telemedicine physician network, overly aggressive and potentially misleading marketing tactics, manipulation of customer upgrade testing, and improper use of customer inducements,” according to the filing.” The filing added that “certain information” in uBiome’s fundraising pitches “may have been incorrect and/or misleading.”³²

A few months before the FBI raid on uBiome, another prominent genetic testing startup had announced its shutdown. Arivale, which had raised \$54 million in venture capital, offered a subscription wellness program for \$99 per month that combined insights from genetic, blood, and microbiome tests with lifestyle questionnaire data to provide health recommendations to consumers.³³ As of late 2019, however, not all microbiome-focused ventures were struggling (see **Exhibit 3** for background on microbiome startups). In November 2019, Viome, which offered a \$149 microbiome test for consumers similar to uBiome’s Explorer, raised \$57.5 million at a \$482.5 million valuation from Khosla Ventures and other VCs, adding to the \$46 million from earlier rounds. Meanwhile, three VC-backed startups that focused on microbiome-based drug discovery – Finch (\$194 million in total capital raised), Maat Pharm (\$38 million raised), and Second Genome (\$64 million raised) – were making progress with research, business development agreements with established pharmaceutical companies, and fundraising.

Exhibit 1: uBiome Senior Team Bios as of 2019

- **Jessica Richman**, CEO and Co-founder, earned joint undergraduate degrees in Economics and Science, Technology & Society at Stanford University. She then attended Oxford University as a Clarendon Scholar, completing an MSc at the Oxford Internet Institute and a PhD in Innovation through the Saïd Business School. She had previously worked at Google, McKinsey, and Lehman Brothers.
- **Zachary Apte**, Chief Technical Officer and Co-founder, and later co-CEO, was a scientist by training, having studied Physics during his undergraduate degree at Hampshire College before beginning a PhD in biophysics at UC San Francisco. He joined startup accelerators in Berkeley and in Chile during his PhD before founding uBiome.
- **Nathaniel Walton**, Chief Operating Officer, joined uBiome in 2017 as VP of Product. He had previously served in this role at a digital consumer intelligence company called Brandwatch. A graduate of Oberlin College, he had studied Economics.
- **Sara Bird**, Vice President of Product Technology, was a student of microbiology. She completed an undergraduate degree at UC Davis before beginning her PhD at the Stanford University School of Medicine. Upon graduation, she joined Sandia National Laboratories as a Research Scientist. In 2017, she joined uBiome as an R&D Scientist, and was promoted to Director of R&D within the year before being promoted to VP of Product Technology a few months later.
- **Yogesh Bhootadai**, Lead Clinical Laboratory Scientist, joined uBiome after completing his PhD in Vision Science at the University of Alabama at Birmingham. Upon graduation, he joined Proteus Molecular and Clinical Labs for two years before becoming a part of the uBiome team.

Source: Casewriter summary of LinkedIn profiles.

Exhibit 2: UBiome's Explorer Kit



Source: "UBiome Gut Explorer Kit." *Sweatcoin*, Sweatcoin, sweatco.in/offers/1560.

Exhibit 3: Microbiome-Focused Ventures

Company Name	Year Founded	Company Description	Product Lines	Status as of Late 2020	Total Capital Raised (\$ Million)
Enterome	2008	Developer of pharmaceuticals, based on the gut microbiome, designed to treat metabolic and bowel diseases	Drugs currently in clinical trials	Active	\$230
Second Genome	2009	Creator of novel medicines designed to treat chronic disease and illness by leveraging microbiome science	Drugs in preclinical trials, microbiome data platform	Active	\$64
UBiome	2012	Provider of microbiome tests designed to collect, analyze, and communicate information about consumers.	Variety of testing kits	Out of business	\$105
Finch	2014	Machine-learning powered developer of microbiome-based therapies to treat chronic hepatitis B, inflammatory bowel disease, and more	Drugs currently in clinical trials	Active	\$194
MaaT Pharma	2014	Developer of microbiome bio therapeutics designed to improve the survival outcome of blood cancers. Owner of an analysis platform which supports the evaluation of drug candidates	Drugs currently in clinical trials	Active	\$38
Arrivale	2015	Combined genetic and microbiome testing with personal coaching to help consumers engage in "scientific wellness"	Personalized health coaching and test kits	Out of Business	\$54
Viome	2016	Subscription based service analyses consumer microbiomes and curates dietary supplements to prevent and reverse chronic disease.	Test kits and personalized supplements/pro biotics.	Active	\$103

Source: PitchBook profiles.

Endnotes

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