

TECHONOMY NYC

Remaking the World One Molecule at a Time

Speaker:

John Melo, CEO, Amyris

Introduction:

David Kirkpatrick, Techonomy

(Transcription by [RA Fisher Ink](#))

Kirkpatrick: I just really love the fact that we're going to continue with yet another biotech company that is taking a completely different approach to sustainable production. Amyris—John Melo is the CEO—company has an amazing history. I hope he'll tell you a little bit of the history, but basically they are using yeast to produce that otherwise we'd have to kill animals for and knock down trees, etcetera. So, come tell us about it!

[APPLAUSE]

Melo: I was actually thinking, if I had had the benefit of this morning, I would have remade the title. And the title would be Making Hope a Reality One Molecule at a Time, because that's actually what we do. And the technology is really, really, really cool—especially from an immigrant from a small whaling village in the middle of the Atlantic Ocean, the technology blows me away all the time. But what blows me away even more is the impact that technology has. It's the ability to really make available, to make accessible, to everybody in the world—not just the rich kids—the really rare and amazing molecules that come from nature. And that's what I'd like to share with you this morning.

We're going to be talking about three things. A little bit about the technology, a lot about the impact, and a little bit about the future and what I think it holds for us.

So how did we get started? To David's point about our history, we actually started with a grant from the Bill & Melinda Gates Foundation. And it was really a simple idea, simple concept that we had, that we could really change the makeup of yeast, re-engineer yeast so it could take something that's available, accessible, and make it available to what's rare and not easy to access. And the idea was around programming yeast to make a molecule called artemisinic acid that was part of the biggest or best cure in the world for Malaria, and make it available to kids in sub-saharan Africa by reducing the cost. That was the big idea. Could we actually do that?

The Gates Foundation funded us \$42.5 million to do that. And we ended up successfully re-engineering yeast to make this product called artemisinic acid that delivers a treatment called

artemisinin. And the first year it was introduced, we went to market in 2013 in partnership with Sanofi-Aventis—and the first year we introduced it, we reduced the number of children dying from 1.6 million a year to 600,000. So one million children saved a year not having die of malaria, not because there wasn't a treatment, but because they couldn't access it. And they couldn't access it because it comes from a tree—the tree is rare. Some years it grows well, some years it doesn't. But even worse, farmers discovered cell phones, which meant that they could trade the product in the global market and depending on how much money they could sell it for, make it inaccessible to kids that were dying. So that's the history—that's how we got started.

So a little bit about the technology and what it is. Starting on the right, the way to think about this is we take very accessible carbon from sunlight from sugar cane. And we do it in Brazil because Brazil has the most sustainable system to grow sugar cane. It doesn't use any irrigation, it just grows, and it grows, and grows, and grows and it's harvested for a very low cost. So we take sugar cane syrup and then we feed that sugar cane syrup into big tanks, we put yeast in those tanks, and that yeast then converts that sugar cane syrup into exactly the molecule we want. And we do that for many different markets—and I'll explain that.

So the magic is actually where the arrow is on the screen. What we do—we're the world's lowest cost, fastest, and most effective programmers—genetic programmers—of yeast. We can program yeast to make hundreds and hundreds of different chemicals. And we actually do that to make available the chemistry that really makes a difference, and I'll describe some of that chemistry to you.

And you might wonder like, how do we do it and how has it changed? I started this in late 2006 and at that time, it took us about a week to genetically change yeast. And it wasn't perfect—about half the time we were wrong. And we never really knew exactly the perfect chemistry that we would make. That was about a week per bug. Today, we can engineer a yeast strain—a new yeast strain—about every two and half minutes. As a matter of fact, we've made the process so simple that you can change the genetics of yeast as easy as you could actually change what your web browser looks like. We've created a language, we've created the tools, we've created the infrastructure, we have the data—and we do it and hire people to do that automatically all the time. It's really a fascinating simple technology.

So what do we do with that technology? Well, today we have many different products. One of our products is called Squalane. Squalane is an amazing molecule—it's actually the best emollient you can get for your skin. It's really, really, really good. So you'd wonder why don't all cosmetic companies put it in their skin care products? And they don't because it's one of the most expensive emollients you could get. And actually, even worse, it used to be sourced from sharks. And shark liver oil—now, can you imagine killing sharks to get the oil out of their liver so you can put it on your skin? We thought about that and said that's just not right. So we have a yeast that actually takes the sugar cane syrup and makes the purest, best Squalane you can buy in the world. And to date, we save about two to three million sharks a year with the

amount of Squalane we make available to the industry. And about a 1,200 of the world's leading cosmetic brands are now purchasing our Squalane to put it in skin care products. That's just giving you an example of how we can have positive impacts quickly.

Another one of our products, Clearwood, which is really patchouli. We found another interesting application was patchouli is the base of a lot of the most amazing fragrances in the world. A lot of Tom Ford's new fragrances use patchouli as a base. Here's the challenge—when you extract patchouli from the plant, it's no longer as good as patchouli. Because when you extract it, you have to burn the plant. So what you get in patchouli is a burnt tone. Now the burnt tone makes it a little bit brown and everybody's learned to work with it and it's all wonderful, but here's one little factoid. When you don't put that burnt tone in the patchouli, when you actually use the perfect natural patchouli from the plant, which is what we make using the yeast to take it from sugar cane, the fragrance lasts two to three times as long. Isn't that amazing?

So it's amazing when you can take the best from nature and make it available to all and sustainable. You actually make it better. Because the extraction processes and what we do to try and make things available actually do damage. Do damage to the planet, the damage to the product, the damage to the people that actually consume it.

The third product we have is vitamin E. Kind of by accident, we become the third largest manufacturer in the world of vitamin E. Why? We have this amazing molecule called farnacene. It's our first billion-dollar molecule. We have a molecule that we started designing in 2007 that's now created over a billion dollars worth of value and it's an amazing molecule that's usually found in very small volumes on the peel of an apple. Because it's in such small volumes and it's in the peel of an apple, it costs a lot of money. So no one would ever use that molecule to actually go into any really big market. What do we do? We completely destroy the whole approach by actually making it really, really cheap so it's accessible to go into very high value great products, like vitamin E.

And why is vitamin E important? Do you realize 90 percent of all the vitamin E in the world goes into animal feed? And why does it go into animal feed? Because the world is tearing up protein like never before. It's really amazing. And protein, without antibiotics is a bit of a problem. So to take out antibiotics, what do you do? You overdose the hell out of feed with vitamin E to keep the animal healthy so the animal gets fat fast so they can be killed and you can consume it. So those little factoids about actually what's happening in the world through the seven to nine billion people how we can make a difference by making these supplies sustainable.

The next product is a natural sweetener. It's another great example. I actually found this morning in my room when I ordered breakfast, they sent me a little cup that had sweeteners. You guys ever seen this? There's one, two, three, four, five different sweeteners that came to my room this morning. Does that sound familiar? All right, now here's where it's interesting. Has anybody ever read the ingredients in these?

And by the way, how about the instructions? So here's one called Café Delight. It's a sugar substitute. It says, you know—there's a couple of things in here. The chemistry sounds kind of complicated. I'm not sure I'd want to consume it, but it says don't cook with it, and then it says, by the way, only use a couple of pinches because it's really, really, really powerful. Now, why can't all sweeteners be zero calories, as good or better than sugar, and you use it just like sugar? Would that be simple?

We think that's the answer and we think we have that answer and we think we're doing that by engineering a yeast that could actually make that product. We're taking it to market this year. We've already produced a lot of commercial quantities. We've sampled at the customers and we think it's the right answer. We think the answer is give consumers a no compromise solution. Give them something as good or better than they get today—make it the same cost or cheaper, and actually make it for much lower cost so you can make the growth of the biggest brands in the world sustainable.

That's really what we do in a nutshell. And the last one is artemisinin. We do all this with partners—some of the biggest brands in the world partner with us to make real their sustainability agenda.

How would I summarize this? We have the lowest cost, most disruptive way to produce pure ingredients from sustainable sources with no compromise.

The last thing I'll talk about is our Clean Beauty brand. We introduced a brand for the keep clean beauty industry called Bio Sods. And the brand has been amazing. We decided to actually set a standard above everybody's standard for what we do in beauty. And it started from a simple idea—has anybody read the ingredients that are on your beauty products?

It is incredible—they're predominantly petroleum or alcohol. So why do you put petroleum or alcohol on your skin? And you do it because it typically looks good very quickly. The most products we put on our skin actually close our pores, kill the microbes in our skin, and actually kill our skin over time. So we decided to make a difference there and we're doing it with this brand called Bio Sods. And one thing we discovered is consumers really want a better answer.

So in January of 2017, we were selling to about 198 consumers a day. As of April, we were selling to 1,242 consumers a day, and by the end of this year, we expect to be selling to about 4,000 consumers a day. Again, really simple, we believe the world needs "make good" with no compromise. Make better products, do it without compromise, and it is really turning into an interesting business in addition to being a good business. We're now one of the 40th fastest-growing companies in the NASDAQ. We've already generated over a billion from our leading molecule. And actually, the products we sell are profitable on a gross margin basis and growing.

So we hope you participate in making the world better and there is really hope. And we are turning that hope into a reality by using technology to make available to everybody some of the best products that are in nature today. Thank you.