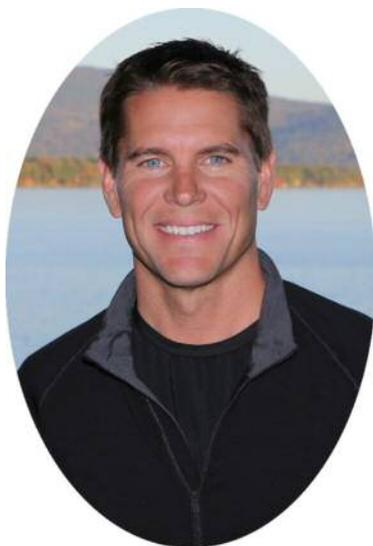


De Novo Service that Completes the Gaps in Genomic Research Using in Vitro Chromatin Assembly



Todd Dickinson
CEO
Dovetail Genomics

CEOCFO: Mr. Dickinson, what is the idea behind Dovetail Genomics?

Mr. Dickinson: The idea behind Dovetail is to address some shortcomings in today's genomics world that are caused by short read sequencing. Next generation sequencing (NGS) has changed how people do science in a dramatic and positive way. However, stitching genomes back together from small pieces is challenging, and one of the by-products of the short-read nature of today's NGS instruments is that they result in assemblies that are far from complete. Dovetail's technology solves this challenge by capturing long-range genomic information and facilitating the process of piecing the genome back together. With better assemblies in hand, Dovetail customers gain a much more comprehensive picture of their genomes of interest.

CEOCFO: Does the scientific community realize that what they are doing is not as effective as it could be? Do they know that there is a solution available?

Mr. Dickinson: The answer to the first question is yes. Everyone is keenly aware of the limitations of short read sequencing. In particular, short read sequencers have difficulty measuring a type of genetic variation that is likely to be extremely important, and that is structural variation; looking at large-scale rearrangements in the genome, insertions of DNA, deletions, inversions and translocations. These things are hard to detect when you are looking at the genome with a very fine magnifying glass. When you back away and extend your range and use a larger magnifying glass (Dovetail data), one can start seeing the context of the genome and begin to understand how the functional elements of the genome are related to each other. . Therefore, the community is well aware that they need this information and that it is hard to do that with short read sequencers. In terms of solutions, many people are trying to work on solutions to this problem, including Dovetail. We have one solution that we think is very unique and we offer it as a service, which is also a way that Dovetail differentiates itself.

CEOCFO: Is this the Chicago™ method that we are talking about?

Mr. Dickinson: It sure is the Chicago™ method!

CEOCFO: Would you explain how it works and why it works?

Mr. Dickinson: The Chicago method was based on the idea that we could emulate how DNA is structured in our cells. DNA occurs in chromosomes and are tightly packed in chromatin structures through the capability of nucleosomes. There are proteins called histones that DNA wraps around very tightly to form what are called nucleosomes, which pack DNA into a very confined space. This phenomenon occurs naturally in our cells. It turns out that you can leverage this tight packing in a very different way to glean sequence information in the genome. There was a method developed called Hi-C over the last several years that was looking at the chromosomal structure and the three dimensional structure of chromosomes for biologists to study. However, our founder, Richard Green, Assistant Professor of Biomolecular Engineering, University of California, Santa Cruz, recognized that we could leverage this packing in a different way. First we extract very long fragments of DNA from the sample of interest. This is an important difference in our approach, because most people running samples on NGS systems actually first break the DNA into small pieces and sequences those pieces. We do not do that. We take very long strands of DNA from the sample, and we carry out our own in vitro chromatin assembly process. In doing so we recreate a similar chromatin-like structure that exists naturally in cells, but we do it outside of the cell with naked DNA, freeing us from all of the biological noise in the cell. Once these long molecules wind around the histones and pack the molecule down to a small confined area, we cross-link the proteins together to form chromatin aggregates. We then employ techniques to snip the molecule in multiple places, and then reattach

together in a new and unique pattern, forming connections along that long molecule. It's those connections that we then sequence, and the data tell us about the order of DNA bases all along that original long DNA fragment. The result is a vastly improved high quality genome assembly.

CEOCFO: *You have just recently announced the launch of your service. What has been the response so far? How are you reaching out so the people that should be using Dovetail will find Dovetail?*

Mr. Dickinson: Yes, three weeks ago we announced the commercial launch of our Genome Assembly Service. The launch was a great success, we were pleased to see that it garnered attention from many of the media outlets in our industry, and we've been getting many folks inquiring about our services since then and our customer pipeline remains strong and growing.

"Dovetail is making short read data better in a way that is critical for scientific discovery." - Todd Dickinson

CEOCFO: *Do you need to convince people? Are they skeptical that it can be done? Where does it fit in the continuum of what researchers are considering?*

Mr. Dickinson: That is a fair question. We think everyone should run a Dovetail Library before every sequencing run, because you get so much more information out of that run. I think that in time products and services like what we do will be incorporated much more into the mainstream workflow of sequencing. Everyone acknowledges that the long-range information is critical for many types of studies. However, for people that are interested in only SNPs (single nucleotide polymorphisms), they can study those quite well with microarrays or short read sequencing. For many other areas of studies, again such as the structural variation that we talked about or for evolutionary studies or comparative genomics, where you want to compare one genome to another and understand how they differ or how they have evolved, you really need to have a complete picture of the genome. Therefore, we think that it will be paramount to incorporate long-range information. What prevents people from running Dovetail now? I think it's primarily an awareness issue: many people have not yet heard of us, as we are a new company. We need to get the word out about our technology, and we are now hard at work doing so. Dovetail data acquisition does mean another step that you have to take outside of today's standard NextGen sequencing workflow. Therefore, our aim at Dovetail is to make this as simple as possible for customers. The way we have designed it to start is by just offering a full service where they can send us their sample and we will include not only the standard shot-gun NGS sequencing, but also the Dovetail library, and combine them together to give them the best possible outcome.

CEOCFO: *Is interest primarily from the US? Have you been reaching out worldwide? What is happening so far and what do you anticipate?*

Mr. Dickinson: We are getting interest from all over the world, and this is great to see. We have customers in Europe and in Asia. However, many of our customers certainly do come from the US. We plan to grow our business organically and build a sales and marketing team to drive the commercial activities. The great thing about a service is that it is very easy for anyone to jump on a website, learn how the process works, and call us up and send us a sample. That is the nice thing about it. I do not necessarily need to have a sales team on the ground in Korea, for example, for a Korean researcher to be able to go to our website and get a service project started with us.

CEOCFO: *On your site it indicates that the DNA sample could be from anything: blood, liver, muscle, plant, animal or bacteria. Down the road, what might a researcher come up with because they are able to see the full spectrum here?*

Mr. Dickinson: There are lots of things that you get when you have a more comprehensive view of the genome. You can start making sense of many things that go missing when you have lots of gaps. Sometimes the gaps in today's assemblies span very important regions of the genome. They could include genes that have very important functions that you cannot pin point without a full, comprehensive assembly. Therefore, for disease research, having this concept of a medical grade genome, where you have a complete view of every human sample of interest, is likely to become increasingly important. Creating genomes that have gaps in them is ultimately going to become a liability. Therefore, this is a big driver for our technology. In disease research you need to understand every bit of that genome as we learn more and more that structural variants are linked to disease. For example, we know that cancer is a disease of structural variation. Translocations and inversions and deletions; there are all kinds of large rearrangements occurring that you must have a good assembly of the sample, of the genome, to really detect accurately. Once you draw these associations, you can develop an understanding of the mechanism behind the disease for subsequent treatment development.

CEOCFO: *Personally, you have a history in the industry with a number of previous ventures, not only on the scientific side but in the sales, marketing and commercialization arena. What have you learned that will hold you in good stead here for Dovetail?*

Mr. Dickinson: I have learned a lot. Illumina was a fantastic training ground for me and I learned a lot from my mentors there. The thing that sticks with me most is that what really makes great products are the people and strong teamwork. Therefore, the thing that we focus on most at Dovetail is building a great team and a team environment and focus. That is the first thing. The second thing is process; we aim to establish sound product development processes that stand the test of time. Those are two of the big ones. Through it all, it's important to create an environment that is fun and positive. Therefore, we tend to recruit people that are not only at the top of their fields, but also fun to work with and that we want to have on the team.

CEOCFO: *Are you funded?*

Mr. Dickinson: We are!

CEOCFO: *What is the plan for the next six months to a year?*

Mr. Dickinson: The plan is to drive our commercial activities now. Now that we have launched our service it is time to build out the commercial function. Therefore, we are actively recruiting sales folks, marketing folks and support to flesh out that organization. We want to establish a base of customers and get people to realize the importance of Dovetail data and that they cannot go without it, and to establish our brand in the field as a high quality company that delivers only high quality data. Once we have done that and built that base and reputation, our plan is to deploy lots of follow-on products and services. We are certainly not going to stop at this first genome assembly service. We have a clear five year road map that has many different product extensions, obviously allowing for continued innovation as well. We are excited about our future!

CEOCFO: *Is there competition? Have there been or are there any viable companies now that are taking the next step the way you are?*

Mr. Dickinson: There are other companies that are trying to get after this long range information in the genome. However, none of them are adopting a similar service-focused business model like Dovetail. Other companies sell equipment to do this, so customers have to come up with capital and equipment budgets to acquire these technologies and then hire people to run them in their labs. There are many people that do not want to do that or do not have the funding to do that. Therefore, our business model is a little bit different in this regard.

CEOCFO: *Why is Dovetail Genomics a company on the move?*

Mr. Dickinson: I think people should pay attention to Dovetail Genomics because Dovetail is making short read data better in a way that is critical for scientific discovery. I believe our technology will have profound implications and broad application, not only in research, but also ultimately into how we diagnose and treat disease and how we feed the world.

Interview conducted by: Lynn Fosse, Senior Editor, CEOCFO Magazine



**For more information visit:
www.dovetail-genomics.com**