

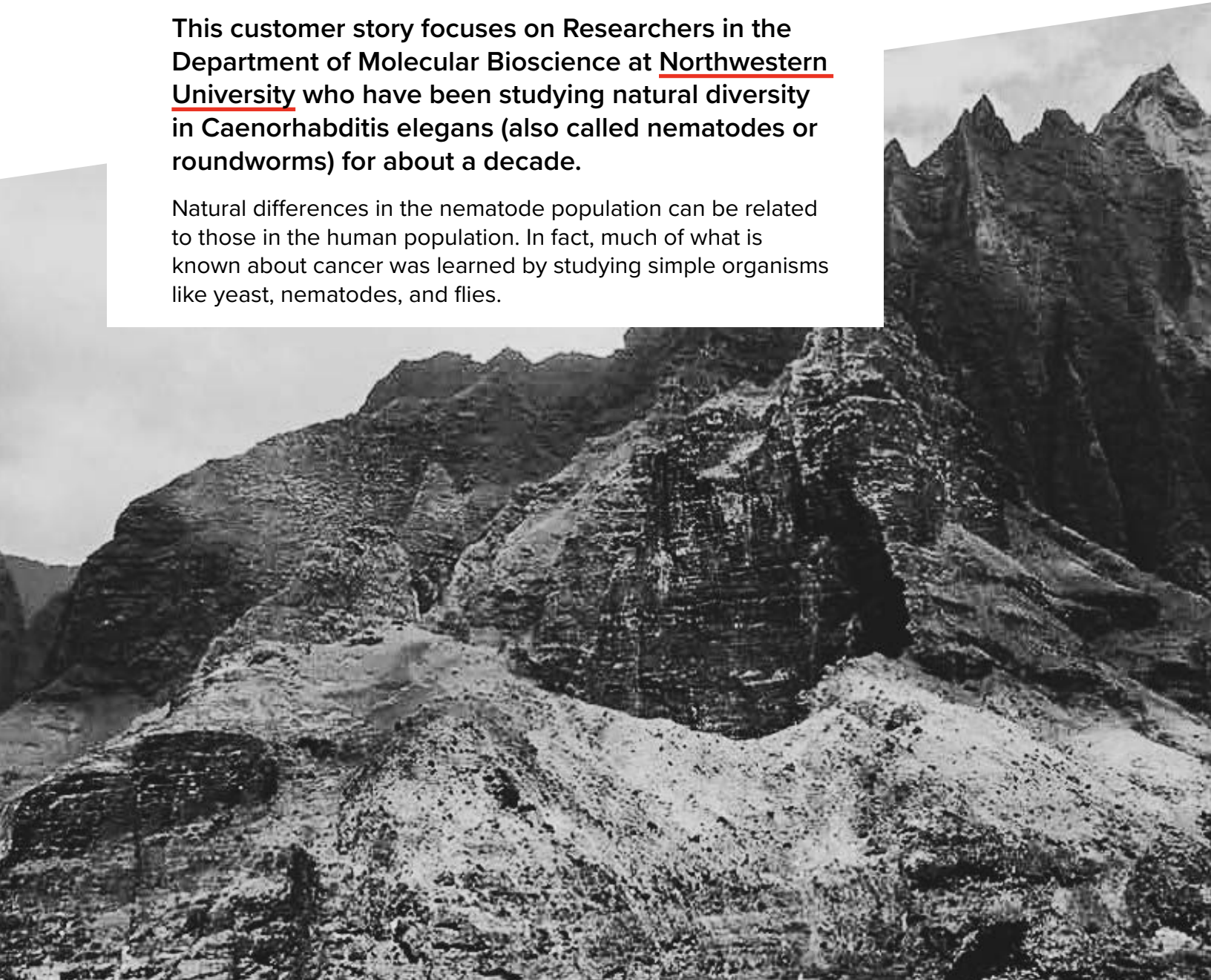


CASE STUDY

Field Research

This customer story focuses on Researchers in the Department of Molecular Bioscience at Northwestern University who have been studying natural diversity in *Caenorhabditis elegans* (also called nematodes or roundworms) for about a decade.

Natural differences in the nematode population can be related to those in the human population. In fact, much of what is known about cancer was learned by studying simple organisms like yeast, nematodes, and flies.



Problem

A team of seven graduate students, researchers, and technicians were embarking on a three-week nematode study on the Hawaiian Islands. They needed a way to track each sample from the point of collection, take photos, and mark the GPS location of each collection site. Since they would be gathering thousands of samples, they knew they needed a simple, electronic tool to take out into the field.

“The previous solution was essentially you take a piece of paper in the field, you take a picture, you write down the information, you take a marker and you write on the bag where you pick up the rotting thing,” said principal investigator Erik Andersen. “That was clearly not going to work anywhere close to what we needed to do.”

Searching for a Solution

“We wanted to be able to have an app that we can go out into the field where we don’t necessarily have cellphone service or GPS,” Erik said. “But we wanted to keep track of a bunch of different things as quickly and easily as possible, because we were going to collect hundreds of these samples a day.” Their ideal solution would be easy to use, not be reliant on data or cell service and incorporate lots of features, like the ability to take photos or scan barcodes to speed up the process even more.

After doing some online research, graduate student Dan Cook selected a few apps to test out. One was “really complicated, unwieldy, and unstable,” he said. Another was too pricey. Another app, which was designed more for clinical studies, wasn’t quite stable enough and didn’t have enough features. Then he came across Fulcrum.

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So it certainly saved time in the field — and outside of the field, because the data was already in a manageable format that we were able to download, integrate, process very easily.



We were looking for barcode scanning because we wanted to be able to track samples from the point of collection, and take photos so that later on we can review,” Dan said. “In addition to collecting the sample, we would also label what we thought it was, so having the photo helps us go back and make sure if we collected a rotting flower that it actually looks like a rotting flower in the picture.”

Results & Benefits

After testing the app thoroughly, the team was ready to take Fulcrum out into the field. “It was fairly straightforward in terms of implementing,” Dan said. “We tested it thoroughly, and that helped us hammer things out.” “We essentially tried a bunch of things, but whenever we had an easy change, Dan had it implemented in 10-15 minutes,” Erik added.

Besides being easy to use, Fulcrum also increased the speed at which the researchers were able to collect specimens. Collections that used to take three to five minutes or more now take a minute and a half or less. “So it certainly saved time in the field — and outside of the field, because the data was already in a manageable format that we were able to download, integrate, process very easily,” Erik said.

Using Fulcrum also eliminated their concerns about data loss. “[Fulcrum] seems rock solid in terms of stability,” Dan said. “If we collect a bunch of data and the program crashes, that fear is that we would lose a day’s worth of data or a week’s worth of data. So we could sync whenever we had cellphone service, which was nice because we didn’t have to worry about data loss.”

They also found their accuracy had improved. “Sample management is a major issue across all scientific studies,” Dan said. “Sample mix-ups happen all the time. Being able to immediately tag the sample that we isolated — in the field, at the location of the isolation — to a specific identifier really went a long way toward improving our ability to keep track of samples and reducing the error rates there as well.”

Another benefit to using Fulcrum was reproducibility. “One of the big themes in science is reproducibility and being able to rigorously analyze your data and for other people to be able to repeat your analyses. Fulcrum facilitated that for us in a major way,” Erik said. “NIH (the National Institutes of Health, which is funding Erik and Dan’s study in part) is paying a fair bit of money every year to be able to make studies more reproducible. And this is the kind of thing where you can collect high-quality data over the course of a long period of time and come back to it easily enough to write code around a nice data frame.”

“This will be the single largest collection of this organism and a variety of species of nematodes ever done,” he continued, “and that was really facilitated in large because of Fulcrum. So we’re going to be able to get not only the largest number of collections but also understand what’s the humidity and temperature and moisture level and all these different parameters that we kept track of in a way that no one else has been able to keep track of and record about these types of samples.”

You can find the apps they used in the field in our extensive App Gallery, just search for “**Nematode**.”