THE BUZZ

Barbara Dunn Talks Yeast Genetics

Barbara Dunn will be the Opening Keynote Speaker at the 2017 ASBC Annual Meeting in Fort Myers. She is a senior research scientist in the Department of Genetics at Stanford University, currently working in the laboratories of Mike Snyder and Gavin Sherlock, and will be speaking at the ASBC meeting on "What's Brewing in Yeast Genetics?"

We asked her about what was coming up in the world of yeast. Read her answers below:

1. In the context of yeast—what challenges do you see the brewing industry facing in the next five years?

One yeast-related challenge that has been around for a while—and will continue to become more of an issue with more breweries merging and/or offering more types of beer—is keeping track of many different yeast strains within a brewery. Different yeast strains usually look pretty similar when growing in liquid or even when viewed under the microscope, so having a way to almost immediately and conclusively distinguish one strain from another would be a useful thing.

Another yeast-based challenge is to monitor and preserve something that I would call (in my non-expert terminology) "strain genome stability"; in other words, since the genome of a yeast strain may change (due to adaptive evolution or random genetic drift) during continual or even short-term passaging, it would be nice to be able to check that the whole genome of the strain is kept as unchanged as possible for a consistent product.

Also, the rapid identification of many different wild yeast and bacterial contaminants (or, in open or lambic-style fermentations, the identification of such mixtures of organisms for monitoring product consistency) would be desirable.

Finally, for something that is more of an opportunity than a challenge, there now exists the possibility for rapid creation of "designer yeast strains," by either non-GMO or minimally-invasive-GMO techniques; such strains could be created for better industrial performance (robustness of growth under varying conditions, for example), or for imparting novel flavor/aroma or other organoleptic characteristics to beer.

2. What are some technology options that the brewing community can leverage from other industries?

With ever-faster and cheaper new technologies for genome sequencing and analysis, including the Nanopore MinION platform and other related real-time DNA sequencers, solving most of the challenges above, such as tracking different strains, monitoring for contaminants, and checking genome stability, will soon become possible to perform immediately in a brewery setting, and will be able to be performed by non-scientists. Other methods to deeply identify a mixture of organisms (either contaminants or in lambic-style ferments) include a method that uses cross-linking of DNA ("Hi-C seq" and related methods) to identify organisms that have not yet even been sequenced or identified. For deeply monitoring "genome stability," not just the newly available real-time sequencers, but also more classic short- and long-read DNA sequencing, as well as Hi-C seq, can be used.

Finally, for the creation of designer yeast strains, there are new rapid methods to mate yeasts (even "sterile" yeasts or mating of different species) and then select for desired traits, and also the minimally invasive GMO technique called CRISPR can be used to make targeted genome changes. This latter CRISPR method could also be used to "barcode" the individual strains in a brewery to make them each easily identified by a quick PCR test. So I feel that there are a lot of new and exciting technologies that will be of great use to the brewing community.

3. What's an appropriate way that the brewing community can interface with non-brewing research facilities?

I would suggest that members of the brewery community could make use of educational opportunities such as seminars at local colleges and universities and/or online webinars to keep abreast of new technologies, and once they have identified new methods or ideas that they are interested in, then get in touch with scientists (local or otherwise) that may be working on these technologies and talk and meet with them. Everyone is interested in beer, and most scientists I know are very interested in hearing presentations from the brewing community about issues and needs and enjoy helping to problem-solve or give ideas.

4. What's your favorite beer?

I enjoy everything from pilsners to IPAs to sour beers, but I'm going to go with an old favorite: a nice pint of Guinness stout from the tap!

Learn more by attending her Keynote all about "What's Brewing in Yeast Genetics" at the ASBC Annual Meeting. We'll see you in Fort Myers!