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DICK KELLEY/Staff photographer

Opening the copper domed brewing kettles, Morton Meilgaard observes a bubbling vat of beer.

Science hops to challenge of producing beer

By Louise Okrutsky
staff writer

If last night's beer tasted a bit like apples or cheese, Morton Meilgaard knows why a strange flavor came between you and your brew.

Meilgaard of Birmingham is the director of research and development for the Stroh's Brewing Co. After five years of research, he pinpointed 850 chemical compounds that occur during fermentation and can affect a beer's flavor.

The analysis, which earned him a doctorate from the Royal Technical University of Denmark in Copenhagen, revealed eight times more components in beer than previously were known.

In addition, he directed a research program that purified more than 250 compounds and determined their relevance to 122 flavors that have been identified in beer.

MOST BEERS contain from 30-40 flavors. Occasionally, interaction between chemical compounds results in the inclusion of flavors the brewer didn't intend to bottle.

For example, an apple flavor in beer is caused when fermenting alcohol and an acid form ethyle hexanoate, a flavor compound found in apples. A derivative of hops, isovaleric acid lends beer a cheesy taste.

Long before Meilgaard arrived at a list of chemical compounds in beer and the flavors they cause, people recognized mediocre beer. However, when they wanted to describe the unwanted taste, they were at a loss for a common reference.

One man's burnt sugar taste is another man's toffee taste. A standard list of taste descriptions Meilgaard helped compile calls both sensations a caramel flavor. The list was compiled in conjunction with the Subcommittee on Flavor Testing for the American Society of Brewing Chemists.

Other flavors, such as banana, are present in the beverage but detected by only a small portion of the drinking public. Some of the chemical compounds Meilgaard isolated in beer can't be tasted.

UNLIKE OTHER senses, taste hasn't been the subject of many classroom discussions. Teachers play records to acquaint students with guidelines for listening to music. Pictures are brought into class to teach students to look at certain details, Meilgaard said.

A child learns to describe flavors in food and beverages by observing adult reactions and comments.

"Sometimes people learn the wrong term from childhood," Meilgaard said.

In a survey of college graduates, one of seven people incorrectly called citrus flavors bitter instead of sour. One of 15 people called quinine sour instead of bitter, he said.

Brewers, who rely primarily on tasters to pinpoint trouble spots in their product, train their crews to identify certain flavors by giving them beer doctored to emphasize a certain taste.

One taster can perform about six tests a day. Using Meilgaard's research, about 100 chemical tests can be conducted in one day, he said.

"It's a faster, cheaper test and more can be done. But you have to be very careful and not believe the analysis if your tasters disagree.

"The tasters are always right."

Those gurus of the tastebud practice their art in a small room that resembles a library more than a beer hall. Wood-paneled partitions built like study carousels contain waist-high tables. On each table is a tray with six glasses and a detailed score sheet.

"That little room down there is more important than the equipment up here," said Meilgaard, gesturing to other rooms near his office filled with expensive stainless steel equipment used to analyze beer.

It was in the nearby laboratories that chemical tests were used to create the firm's new beer, Signature.

"We used every trick in the book," said Meilgaard, who was part of the team responsible for the beer.

TEST FORMULAS were brewed in the laboratory before the final version of the beer was produced in the firm's large brewing room, which is decorated with luminous blue Pewabic tile.

The brewing area is down the short street from Meilgaard's office in the firm's manufacturing complex, which has the atmosphere of a small village. Up the street from the brewing area is the ice cream plant, which kept the company alive during Prohibition.

Inside the brewing building, Meilgaard walks around the large copper kettles, opening the sliding doors in the gold-domed lids to offer a view of bubbling beer.

Meilgaard's beer career began by accident. In 1947, when he was a chemistry student at the Royal Technical University of Denmark in Copenhagen, a shortage of laboratory space compelled the school to place students in industrial laboratories. Meilgaard, was placed in a brewer's hops laboratory.

"It tickled my fancy," he said. He also was looking for a topic for a doctoral thesis.

'The taster is always right.'

— Morton Meilgaard

"I didn't think it would take until I was 54," he said.

HIS RESEARCH into the chemical properties of beer and ways in which brewer's can control the taste of their product isn't completed.

"There are lots of parts on the map that need to be filled in. We can explain maybe about half.

"The other half is vacant. But we are doing it. Research is taking place in all the big breweries and all of the institutions."

His fascination with the subject was fueled by his experience as a consultant to breweries.

"I traveled all over the world, and breweries all had flavor problems they didn't know what to do about — They don't call in a consultant unless something is wrong."

Although tasters usually were employed to determine the cause of a flavor problem, often panels of testers disagreed, indicating to Meilgaard that a chemical test was needed.

At the time, he was director and brewing consultant for Alfred Jorgensen Laboratories in his native Copenhagen. After 10 years with the firm, he spent six years as a research scientist at Carlsberg Breweies in Copenhagen.

In the late 1960s, he accepted an offer to become director of research and development for Cerveceria Cuauhtemoc, brewers of Carta Blanca in Monterrey, Mexico.

In 1973, he and his wife, Manon, moved to Birmingham when he accepted his position at Stroh's.

Lifting another door, Morton Meilgaard (above) inspects the wort, a solution of sugars obtained from malt and fermented to form beer. (Below) In the lab, Meilgaard (left) confers with Dr. Karl Siebert, manager of Stroh's research and development lab.