how many processes have been industrialized from traditional processes. The first one that I have just described is the Bantu beer, which is a very large and successful operation. Another example, of course, is the fact that the Kikkoman Shoyu Company has come into the United States and built a plant which has been in operation for some time. I would judge that their sales are very good, since I visited the plant this summer and noticed that they were expanding their facilities. Another case of development has been the mahewu (magou) fermentation which, although it is small, produces a sour maize product in South Africa, at least by one plant that I visited several years ago. I have no idea of their capacity, but I recall seeing tanks of 1,000 gallons or more capacity in use. The fourth process is tempeh fermentation in the United States. This process or this fermentation was started because of the interest by many vegetarians in using a protein source of food, and the tempeh fermentation is one that satisfies their needs. We know of at least one company which is producing tempeh. The one company we know that we have supported and helped produces a package in which the soybeans are prepared and the inoculum is enclosed. This is used for people in the home who like to make homemade bread. They can make homemade tempeh. So I think that we can conclude that at least in these four cases fermentations which are traditional ones have been industrialized in the last few years, and I think that there is considerable hope for further development of other fermentations in the future.

Fermented Products in the Philippines

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The vast area occupied by Polynesia includes the Hawaiian Islands, New Zealand, and Easter Islands. Native tribes of Polynesia used the same language with similar customs and traditions. As far as fermented foods are concerned, they all resemble each other, and therefore, I would like to illustrate with Philippine fermented foods.

This country is almost divided into Malaysian line 70%, and China line 15%. With this in mind, the culture of these places and methods of preparing foods like fermented foods have something in common with Indonesia, Malaysia, Thialand, and China.

Food fermentation is traditional, and the best way of food preservation in the Philippines, just as in the Orient. This method is still popular. Some local alcoholic beverages and indigenous fermented foods are: tuba (palm wine); tapuy (rice wine); binuburan (prefermented rice wine); and basi (sugarcane wine).

Tuba is made usually in the topical and subtropical zones as a peasant wine. The responsible organism is *Saccharomyces chevalieri*. The same general procedure of tuba-making is used in Polynesia, Southeast Asian countries, and Africa. In the Philippines peasants use tangal bark (mangrove bark) in order to avoid contamination.

Tapuy (rice wine) is the only alcoholic beverage of the Ifugao Tribe in the northern part of Luzon Island. It is used for celebration or ceremony. During fermentation the early stage includes saccharification. This is followed by alcoholic fermentation, which has been shown to be done by only yeasts. These yeasts are *Endomycopsis fibrigera* and *Saccharomyces cereviseae*. The final product contains 15 or more % alcohol.

Binuburan is characterized by its sweet taste and juiciness. This is the result of prefermentation of rice for 2-3 days, i.e., the earliest state of fermentation in tapuy making.

Basi is an Ilocano term for the ancient sugarcane wine. It tastes a little sweet-sour, and it is a good flavored alcoholic beverage. There are two types of basi made according to the purpose: one type is for "babae" (for women), which is sweet and low in alcohol content; the other one is "lalaki" (for men), which is bitter, less sweet, and higher in alcohol content. Other breweries of sugarcane wine in foreign countries distill the wine after fermentation, in which case it is called "rum." But this type of wine (basi) is never distilled.

Sugarcane juice (about 15% cane sugar) is concentrated in a big pan to half of its original volume. Samac leaves, fruits and bark are added. The concentrated juice is transferred to an earthen jar, and cooled and inoculated with Chinese yeast powder as a starter. This is allowed to ferment for 7-10 days more before adding another batch of starter (rusod). After one month of fermentation, it is covered with earthen cap and sealed with clay. Maturation is done for 6-12 months.

Dominant microorganisms in Basi have been identified as *Saccharomyces cereviseae, Saccharomyces bayanus, Endomycopsis fibrigera,* and *Endomycopsis burtonii.* On the bacteria side, the organisms are identified as *Pediococcus pentosaceus* (at its early stage of fermentation) and *Lactobacillus casei* (matured stage).

Nata is the native term applied to the thick, mucilagenous film on the surface of an acidified, liquid-containing sugar, e.g., coconut water and pineapple juice. This is considered as the most indigenous and unique fermented food in the Philippines.

Nata-making may play an important role in the coconut industry in this country because of the growing interest on its production from coconut water, which is an abundant waste product of copra manufacture.

Some papers concerning nata-making or nata microorganisms are by Dimaguila, Lapuz, and others. The main organism of the nata fermentation is *Acetobacter aceti* var. *xylinum.*