THE USES OF SEAWEED AS FOOD IN HAWAII

ISABELLA A. ABBOTT[1]

Rapid and frequent air service to Hawaii has brought about a stronger westernization in food choices and food habits than was possible 30 or 40 years ago. The transport of more fresh foods from the Orient is also possible. Western fast-food establishments such as McDonald's and Kentucky Fried Chicken are patronized as heavily as similar places in California. They have nearly entirely replaced "*saimin* stands" of pre-World War II where a bowl of noodles and a bamboo stick of barbecued meat could be had quickly. Chinese restaurants are the favorite choice of students in ethnobotany at the University of Hawaii (polls taken in 1976, 1977), but there is no question that a hamburger or hot dog is everyone's favorite food, regardless of ethnic background.

Against this change in food availability and food habits, continued use of seaweeds in the diet is surprising. Those of Hawaiian, Japanese and Filipino ancestry, the principal ethnic groups historically having seaweeds in their diets, purchase enough seaweeds to keep several suppliers in business (personal observation). As used by these groups of people, seaweed food preparations appear to be unsuitable as additions to standard western meals. Their flavor is inherently "strong," i.e., very definite, unlike for example the relatively pallid string bean; they may look like tangled strings; their color (black, brown, purple, dark red) unlike most western foods. Where in a western menu would you place a dish containing seaweed dressed in soy sauce and sugar (all three items with a distinctive flavor); where cold rolls of rice wrapped in purple seaweed, and where chopped, salted fresh seaweed, intended to flavor something bland, but not used as a gravy or sauce? I suggest that two to three meals a week are probably traditional Hawaiian, Japanese or Filipino in the examples chosen above, the remainder being western, i.e., "meat and potatoes."

Hawaiian preparation of seaweed or *limu* (edible seaweed) consists of chopping or mashing the fresh raw weed, adding salt and perhaps fresh chili pepper, and eating it as a relish in a fish and *poi* (or more recently, rice) meal. *Poi* is derived from *taro, Colocasia esculenta* (L.) Schott, and is steamed then pounded with water into a sticky paste with a consistency like that of chocolate pudding. It is served cold and has a faintly acid flavor. The piquancy of a variety of seaweeds added to bland *poi* or rice has been one of the historical and current reasons for retaining seaweeds in the food choices of Hawaiians, used here to include only native Polynesian descendants.

From a list compiled by Reed (1907) of 70 "economic" seaweeds used by Hawaiians for food, Abbott and Williamson (1974) were able to identify 29 species by both Hawaiian common name and Latin binomial. The discrepancy reflects in part, multiplicity of Hawaiian names for the same species, or a lack of knowledge of the meaning of Hawaiian common names, resulting in inapplicable or inappropriate names for certain species.

It is at the native Hawaiian feast, a *luau,* that celebrates the first birthday of a child, or the 75th birthday of a parent or grandparent, or the 50th wedding anniversary that a variety of seaweeds is found on the festive board. At these times, those who know where certain species grow are charged with collection and preparation as their contribution to the feast. At least four species of algae commonly appear: *limu kohu* (*Asparagopsis taxiformis,* a red alga), *limu eleele*

[1]Hopkins Marine Station of Stanford University, and Department of Botany, University of Hawaii, Manoa, Honolulu, Hawaii.

Submitted for publication March 17, 1978; accepted for publication August 1, 1978.

Economic Botany, 32(4), 1978, pp. 409–412

(*Enteromorpha prolifera* or other species of *Enteromorpha,* green algae), *limu manauea* (*Gracilaria coronopifolia,* a red alga) and *limu maneoneo* (*Laurencia nidifica,* a red alga). These are served on a piece of *ti* (*Cordyline terminalis*) leaf, and added to fish, chicken or pork as desired. Should raw fish be served, chopped *limu kohu* will be mixed with it (a mixture called *palu* or *po-ke*). It is said that those who are wealthy serve *limu kohu* with raw fish; those not so wealthy use chopped *limu manauea* (*Gracilaria* spp.). Should raw liver be served, *limu pakeleawaa* or *limu huluhuluwaena*—two native names for *Grateloupia filicina,* a red alga—is mixed with it. So specific and traditional is this combination that the seaweed is often called *ake limu* (liver seaweed).

There is very little transfer of Hawaiian preparations of seaweed to the food habits of other racial groups except for "*aku po-ke,*" the preparation of raw fish (tuna as first choice, but other fish as well), cut into chunks and mixed with seaweeds. The success of many a cocktail party has depended on the availability and the freshness of this dish.

These species of seaweed, as well as other favorites, are available for sale in local fish markets. Cleaned, washed, pounded or chopped, they sell for $1.25 to $1.75 per 4 oz, making them at $5 to $7 per lb some of the most expensive "vegetables" in the world.

On the other hand, two species of a red alga, *Gracilaria* (*manauea* in Hawaiian; *ogo* in Japanese) are offered for sale in plastic sacks not only in the fish markets but in supermarkets as well at $1.25 to 1.39 per lb. They are not prepared for Hawaiian tables but intended for Japanese or Korean kitchens. Here, the seaweed is washed, drained, and hot water is poured over it to blanch it. A *miso* (fermented soy bean) sauce, a vinegar, or sugar-soy sauce is used to flavor the seaweed before serving. This has a strong seafood-like flavor, unlike most vegetables prepared for western tables. In 1976, there were approximately 80,000 lb sold (State of Hawaii, Agricultural Commodities) in Hawaii's markets of these two species alone. I estimate this to be about three times the quantity of all other Hawaiian species offered for sale.

I estimate that an equal quantity, or about 80,000 lbs of seaweed is gathered by various families for their own use each year. Whole families from grandparents to their small grandchildren are often seen at favored "*limu* places," gathering a variety of edible seaweeds, exchanging greetings and recipes with others, and enjoying a day in the sunshine. For these families, diving for the seaweeds is not as much enjoyed as combing through drifts of algae. Diving for seaweeds is now the work of young men who collect in small groups. This is in contrast to the traditional (Abbott & Williamson, 1974) Hawaiian collections which was the work of women, forbidden before the introduction of Christianity (1820) from eating a large variety of foods including pork, coconuts, most bananas, a variety of fish and the sea turtle. Women turned to shellfish and seaweeds for food, and became experts, many (personal observations) being known beyond the boundaries of their living areas for the excellence of their seaweeds or their preparations. Many Hawaiian women 40 to 50 years ago supported their families by collecting and preparing seaweeds for market. Perhaps twice as much was sold in those days as is sold now, paralleling the decline in *poi* consumption, which, as with other things, costs four to five times more now than it did then.

In old Hawaii, one of the important food items used in exchange by coastal people with relatives in the uplands was *limu,* much appreciated for its piquancy (and furnishing a variety of vitamins and minerals scarce in upland foods). *Taro* and sweet potatoes were often offered by uplanders in exchange for sea foods (Handy & Handy, 1972). Today, prepared *limu* is a most acceptable gift to take when visiting, whether prepared in Hawaiian, Japanese, Korean or Filipino ways.

One of the most frequently seen foods containing seaweeds in Hawaii is "*norimaki*" or "*maki-sushi,*" made by Japanese for picnics and snacks, sold in Japanese stores, delicatessens, and restaurants. Flavored rice, rolled around shredded shrimp, fish, eel or egg and vegetables is wrapped in sheets of *Porphyra* (*nori* in Japanese) and served cold. *Sushi* is well liked by all racial groups. No estimates are available for the quantity of *Porphyra,* a red alga imported from Japan or Korea to Hawaii, but the amount must be large because of wide use not only in *sushi,* but also in rice balls, and it is the main constituent of Chinese seaweed soup.

Estimates for the quantity of imported *kombu* (*Laminaria* species, brown algae) are not known either. Inasmuch as the primary Japanese use is for making soup stock, its occurrence is not as conspicuous outside of a Japanese home as is *Porphyra.*

The use of *kanten* (agar, derived from certain red algae) by Japanese as a sweetened and colored dessert that resembles gelatin pudding is diminishing because of its cost, currently (January 1978) $1.35 for 0.5 oz, or $43.20 per lb, nearly matching the price of a specialty agar used in bacteriological media at $48.50 per lb (Noble Agar, sold by Difco, Co., price quoted in 1977–78 catalog). This puts agar for food in the same price range as some grades of truffles or caviar.

Of the four Japanese dishes—*ogo* with sauce, *sushi, kombu* and *kanten*—all but the last are used by other racial groups, such as the Chinese, in Hawaii.

Filipinos possibly use more seaweed per person than do Hawaiians. They are a group more commonly encountered at the seashore than Hawaiians, more curious about uses of seaweeds, more interested in a great variety. They also collect larger quantities than do others. Their chief use of seaweeds is in salads, mixed with tomatoes, spiced with fresh ginger, green onions and seasoned with soy sauce. Species of *Codium,* a green alga, are among their favorite seaweeds in Hawaii. *Codium,* well-liked also by Hawaiians, is not eaten by Japanese as widely in Hawaii as in Japan. Only one out of 20 Japanese queried knew its Japanese name (*miru*) and had eaten it. Filipino uses of the fresh algae in salads have not been transferred widely to other racial groups.

Koreans, forming a relatively small portion of Hawaii's population as compared with Japanese, Filipinos or Hawaiians, have contributed a pickled seaweed relish that has been modified from one traditionally prepared with cabbage. Reactions are strongly divided to "*Ogo Kim Chee*" (made with *Gracilaria* spp.—*ogo* in Japanese—or *Halymenia* spp.), not to the seaweed (Abbott & Williamson, 1974) which constitutes the bulk of the relish but to the abundant seasonings of fresh garlic, fresh chili pepper and fresh onions. The lively pickle is made from numerous recipe modifications and is either proudly or diffidently offered to guests. Eating it leaves a lasting odor. In Hawaii some years ago, a bumper sticker admonished: Ban *Kim Chee*! Nonetheless, of all the seaweed dishes prepared in Hawaii, probably more people with different cultural origins eat seaweed *kim chee.*

In summary, about 18 species of Hawaiian seaweeds (Abbott & Williamson, 1974) are offered for sale or are collected for food by Hawaiians, Japanese, Koreans, Filipinos and a scattering of other racial groups. It is suggested that although most people living in Hawaii have become strongly westernized in their food choices (as documented by the contents of their grocery baskets and their patronage of fast-food restaurants), a large number remains that appear to treasure traditional seaweed foods, and hence provides a small but steady market for the essential ingredients. The five to six dried seaweeds available from Japan also maintain a good market. It appears that instead of losing the traditional methods of preparing these foods that are odd to the eyes of westerners, westerners as

well as all racial groups in Hawaii have come to enjoy and appreciate the dishes containing seaweeds that are prepared by others.

LITERATURE CITED

Abbott, I. A. & E. Williamson. 1974. Limu, an ethnobotanical study of some edible Hawaiian seaweeds. Pac. Trop. Bot. Gard.

Handy, E. S. C. & E. G. Handy. 1972. Native planters in old Hawaii: their life, lore, and environment. B. P. Bishop Museum Bull. No. 233. Bishop Museum Press, Honolulu.

Reed, M. 1907. The economic seaweeds of Hawaii and their food value. Ann. Rep. Hawaii Agric. Exper. Sta. 1906: 61–88.

ANNOUNCEMENT

Erythroxylon—New Historical and Scientific Aspects

Symposium sponsored by Botanical Museum of Harvard University and Casa de la Cultura del Ecuador

Quito, Ecuador December 3–5, 1979

R. Buchard, University of Manitoba, Winnipeg: *Coca, Nutrition and Health: Recent Research in Bolivia*

W. C. Evans, University of Nottingham, Nottingham: *Comparative Phytochemistry of the genus* Erythroxylon

L. Grinspoon, Harvard Medical School, Boston: *Coca and Cocaine as Medicines: an Historical Review*

B. Holmstedt, Karolinska Institutet, Stockholm: *Coca and Cocaine: Development in Europe since 1860*

J.-E. Lindgren, Astra Co., Stockholm: *Methods of Analysis of Cocaine and Metabolites: a Review of Present Possibilities*

J. L. McLaughlin, Purdue University, West Lafayette, Indiana: *MIKE Spectroscopy and Direct Analysis of Coca*

P. Naranjo, Quito: *Social Function of Coca in Pre-Columbian America*

T. C. Plowman, Field Museum of Natural History, Chicago: *1) The Botany of Coca: an Overview. 2) Admixtures to Coca*

L. River, Université de Lausanne, Lausanne: *Alkaloid Biology and Metabolism in* Erythroxylon

R. E. Schultes, Harvard Botanical Museum, Cambridge: *Coca in the Northwest Amazon*

A. T. Weil, Harvard Botanical Museum, Cambridge: *Therapeutic Potential of Coca Leaves in Modern Medicine*

T. G. Vitty, University of Manitoba, Winnipeg: *Effects of* Erythroxylon *Alkaloids on the Relative Utilization of Carbohydrates and Fats in Intact Animals*

Chairman of the Symposium, Plutarco Naranjo, M.D.

Open to all interested persons. There will be no registration fee.

For further information, write to Prof. R. E. Schultes, Harvard Botanical Museum, Cambridge, Mass. Telephone: (617) 495-2326.