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Beyond Nigiri and Anisakiasis, The Tale of Sushi: History and Regulation

Food and Drug Law

Third Year Paper

Cindy Hsin-I Feng

May 5, 2006

Professor Peter Barton Hutt

Abstract:

This paper is an exploration of the history of sushi consumption in the United States and how the ingredients of sushi are regulated. The paper delineates the course of sushi's culinary history in Japan, and will attempt to present an overview on the incremental process by which sushi as a cuisine evolved from a humble street food with scarce recognition to an immensely sophisticated popular cuisine in Japan and America.

After describing and analyzing the historical background of sushi, the paper will present the underpinnings of the confounding set of etiquettes that center the art of consuming sushi. This paper will also examine sushi as an exemplary form of successful, multi-directional product of globalization. It is intriguing to observe sushi as a circulating global commodity that internalizes and promotes regional dietary preferences and cultural practices. The second half of the paper will discuss both the health benefits and health hazards

associated with the sushi cuisine. While the seafood, seaweed, and seasoning involved with eating sushi have high nutritional value, sushi consumers need to be aware of the perilous nature of mercury poisoning and the biological contaminants that are embedded in improperly processed sushi fish. The FDA's current consumer advisory scheme on mercury poisoning is incomprehensive, conflicts with the guidelines that EPA delineates, and its inspection and surveillance guidelines are in practice difficult to enforce. The last section of the paper will trace the development of the Seafood Hazard Analysis and Critical Control Point Plan (HACCP) and compare its prospective policy visions and practical guidelines with the Hong Kong Food and Environmental Hygiene Department's (FEHD) Sushi Surveillance Guidelines.

Part A:

This section of the paper explores sushi's culinary roots in Japan and delineates the course of history in which it incrementally evolved into a refined, popular cuisine of choice in Japan as well as abroad. The first section explores how sushi as a culinary mode in Japan is shaped by manifold factors: the region's geographic resources, religious and cultural dietary preferences, as well as ingenious food preservation techniques invented by creative individuals. The second section examines how conveyor-belt sushi restaurants introduced an iconoclastic conceptual chapter in the culinary history of sushi and enabled sushi to become even more affordable and conveniently accessible to middle class Japan. The third section discusses how sushi metamorphosed from a humble cuisine supported by a small cluster of immigrant patrons in California to a cuisine that eventually gained wide acceptance and popularity in the United States.

I. A Brief Overview of the History of Sushi in Japan

A Japanese proverb says that if you have the pleasant experience of eating something you have not tasted before, your life will be lengthened by seventy-five days. [1]

The art of sushi and its consumption cannot be fully appreciated contextually without a close examination of its corresponding rich culinary history, aesthetic philosophy, and fascinating anthropological roots. What has become a culinary, epicurean, and cultural phenomenon in the United States is a cuisine that has evolved from surprisingly modest beginnings. Sushi as a style of food began as a way of preserving fish. In the 7^{th} century, the mountain people of Southeast Asia invented the technique of pickling[2]. The Japanese acquired this same practice that consists of pressing cleaned fish between rice and salt by a heavy stone for a few weeks and subsequently using a lighter cover for the packing process until the fish was considered ready to eat[3]. During the process of fermentation, the rice produces a lactic acid, which in turn caused the pickling of the pressed fish[4]. The finished edible product that results from this early method of sushi processing is known as *naresushi*, a sushi made with carp. It was customary at that time to only eat the fish and discard the rice. Since preparing *naresushi* entails a lengthy and arduous process that ranges from two months to more than a year, the process was perceived as too time-consuming and a waste of good rice.

The earliest reference to sushi in Japanese text appeared around 718 A.D. in two set of laws called *Yororitsuryo* and *Taiho-Ritsuryo* as an example of tax paid by actual items[5]. In the subsequent eight hundred years until the 19^{th} century, the development of sushi in Japan underwent several major transformations. In the Muromachi Period (1336- 1573), the process of producing *oshizushi* was finessed and the fermentation process was abandoned and replaced by the vinegarization process[6]. The Azuchi-Momoyama period (1573-

[1] Mia Detrick and Kathryn Kleinman, *Sushi*. 12 (1983).
[2] Jorie Nolen, *Sushi the Japanese "Snack"- 1000 Years of History*, at http://www.eatsushi.com
[3] *Supra* note 1.
[4] *Id.*
[5] *History of Sushi*, at http://en.wikipedia.org/wiki/History_of_sushi
[6] *Id.*

1603) saw the invention of *namanari* or half-made sushi, a type of sushi that was fermented for a much shorter period of time[7]. The earlier years of sushi rice fermentation was not known for yielding smells that are pleasing to the senses, the pungency of the fermentation has been described as "a cross between blue cheese, fish, and rice vinegar".[8]

In the middle of the 17^{th} century, a doctor named Matsumoto Yoshichi, inadvertently came upon the idea of adding vinegar to sushi rice[9]. The pleasing tartness produced a very attractive, refreshing taste and the necessary waiting time before eating sushi was substantially reduced. In the early 18^{th} century, *oshizushi* was perfected in Osaka and arrived in Edo by the middle of 18^{th} century[10]. Because *oshizushi* still required a substantial period of fermentation time, stores displaced notice and posters to announce to customers when to come for a freshly prepared set of sushi[11]. Still, it was a very primitive form of sushi - its texture, seasoning, and taste differ tremendously from the refined sushi consumed in restaurants today

In the 1820s, Hanaya Yohei of Edo brought to Edoites a recipe variation most closely akin to the genre of sushi that modern sushi consumers are served today[12]. Hanaya introduced raw fish to sushi rice and began the tradition of serving sushi as an efficient form of snack food when it is at its freshest in portable sushi stalls[13]. This verse of the time illustrates how eagerly and delightfully this novel way of presenting and promoting sushi was received by the Edoites, "Crowded together, weary with waiting, customers squeeze their hands as Yohei squeezes sushi.[14]" The portable sushi stalls remained popular through World War II and was commonly considered the predecessor of sushi bars and rotating sushi restaurants today. The transformation of sushi stalls to the more sophisticated form of sushi shops gradually began after the Great

[7] *Id.*
[8] Michael Ashkenazi and Jeanne Jacob, *Food Culture in Japan*. 130-132 (2003).
[9] *Supra* note 2. At http://www.eatsushi.com
[10] Edo, the imperial capital of pre-modern Japan, is officially known as Tokyo today.
[11] *Sushi Dictionary*, at http://www.ne.jp/asahi/sau/mayoicom/sushiyougo.htm
[12] Kinjiro Omae and Yuzuru Tachibana, *The Book of Sushi*. 33-46 (1988).
[13] *Id.*
[14] *History of Sushi*, at http://www.sushiman.net/sushi/history.htm

Kanto Earthquake of 1923[15]. After World War II, when Allied Occupations authorities declared their demise, sushi stalls began rapidly diminishing in numbers from the streets of Tokyo[16]. As Tokyo became a more modern and sanitized metropolis because of westernization influences and urban planning efforts from the government, eating while standing up also fell into disfavor in most types of Japanese dining establishments. Based on the Buddhist prohibition of killing and the Shinto taboo against the consumption of animal flesh, there were several notable imperial decrees against meat eating in Japanese dietary history. In A.D. 675, Emperor Temmu issued a decree prohibiting the eating of cattle, horses, dogs, monkeys, and chickens[17]. The taboo against meat eating developed further when Japanese Shintoism developed a similar philosophy to that of the Buddhists[18]. The lack of meat in the Japanese diet created an aversion to oily tastes and minimized the use of spices in cooking[19]. Fish, however, was specifically excluded from the meat taboo. A natural environment that is conducive to fishing and the exclusion of fish from the meat taboo encouraged the Japanese to exploit marine resources creatively.

Japan's geography makes the nation especially well-suited to the type of agriculture and seafood farming sushi as a cuisine requires. Japan is an island nation whose surrounding seas are warmed by Kuroshio, a plankton-rich Japanese Current, abundant with an impressive variety of seafood such as bonito, herring, salmon, and whales[20]. Stretching from cold subarctic to warm tropical seas, the Japanese coastline is full of large and small shallow bays[21]. The Inland Sea provides a calm haven for fishing in its numerous bays.

Japanese cuisine has a very practical emphasis that draws from ingredients that nature provides. The islands themselves are mountainous and the scarce arable land that exists is terraced and carefully cultivated to coax rice and a few other crops. While the philosophy of most major cuisines in the world emphasizes the creation

[15] *Supra* note 11, at 35.
[16] *Id.*
[17] *Id.*
[18] Kenneth F. Kiple and Kriemhld Conee Ornelas, The Cambridge World History of Food, at http://www.cambridge.org:80/us/books/kiple/japan.htm
[19] *Id.*
[20] Michael Ashkenazi and Jeanne Jacob, *The Essence of Japanese Cuisine*. 37-38 (2000).
[21] *Id.*

of new tastes that do not exist naturally, Japanese cooking methods strive to retain the natural tastes of food with the minimum of artificial processes and may sometimes seem antithetical to this philosophy[22].

II. The Invention of *Kaitenzushi*: Conveyor Belt Sushi Restaurants

In the past few decades, the consumption of sushi has adopted both versatility and diversity; sushi is now available in the most elegant epicurean settings as well as in convenience stores, university cafeterias, and worldwide airport kiosks. But in Japan, what ultimately transformed sushi from a luxury reserved for special occasions to a casually accessible popular cuisine was the introduction of *kaitenzushi*, or conveyor belt sushi. *Kaitenzushi* originated in the city of Higashi Osaka in 1958[23]. *Kaitenzushi* is a sushi restaurant where small plates of sushi are placed on a rotating conveyor belt that circulates through the restaurant and moves pass every table and counter seat. Customers typically observe the selection and pick their choices at leisure from a steady, well-paced stream of freshly presented plates. Conveyor belt sushi occupies a fairly significant niche in Japan, yielding 246 billion yen annually, with almost 3000 restaurants countrywide[24].

Conveyor belt sushi was invented in the Osaka Prefecture by Yoshiaki Shiraishi (1914-2001) whose idea was inspired by observing beer bottles on a conveyor belt in Asahi brewery[25]. As a sushi restaurant owner that caters mainly to the continuous inflow of working class patrons from neighborhood factories, Shiraishi consistently encountered problems of cost-effectively and efficiently staffing his operation while keeping the prices affordable. Initially, Shiraishi designed the conveyor belt restaurant such that all customers were seated facing the conveyor belt. At a later stage, however, Shiraishi realized that this type of arrangement was not

[22] *Supra* note 16.
[23] The Japan Forum, *Japanese Culture and Daily Life: Japanese Fast Food Part III- Kaitenzushi*, at http://72.14.203.104
[24] Data provided by Tokyo-based research fim, Fuji Keizai. *Id.*
[25] *Conveyor Belt Sushi*, http//en.wikipedia.com/kaiten.html

conducive to group meals and subsequently added tables at right angles to the conveyor belt, allowing up to six people to sit at one table at a time[26]. The ideal velocity of the belt is considered to be 8cm per second-slow and deliberately enough to ensure the safe transportation of the food and afford diners time to make their selection, but fast and efficient enough to transport enough volume and variety to the customers[27].

The conveyor belt sushi boom commenced in the 1970 after a conveyor belt sushi stall was installed at the Osaka World Exposition and attracted thousands of curious sushi aficionados[28]. Another boom was witnessed in the mid-1980s, when eating out became a popular middle class societal phenomenon in Japan. Ironically, the final boom of the conveyor sushi popularity was triggered by the burst of the Japanese economic bubble in the late 1990s, when inexpensive restaurants became immensely popular amidst middle class and young professional restaurant goers who were on a limited food budget.

With the invention of new *kaitenzushi* technology and advanced machines, the conveyor-belt industry in Japan is now seeking to expand its business and introduce the conveyor belt dining concept abroad. Kura Corporation, an Osaka-based kaitenzushi chain, has worked jointly with Tokyo-based video game giant, Sega Corporation, to develop a new computer-graphics touch-panel system[29]. The visually impressive system is akin to a virtual aquarium from which one can order. A customer can touch one of the fish that swims on the 16-inch liquid crystal display, the order shows up on a kitchen monitor, and the ordered sushi is then delivered to the customer's table via the conveyor belt[30]. The attractiveness of the new high-tech *kaitenzushi* machines is twin-fold: it not only serves to attract customers who are intrigued by the appealing new technology that animates and diversifies the dining experience, the new machines also reduce wastefulness at the restaurants by precisely tracking orders.

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[26] *Id.*
[27] *Id.*
[28] *Id.*
[29] Coco Kubota, Digital Journal, *Japan's Sushi Industry Seeks Opportunities Overseas*, at http://www.digitaljournal.com/news/?articleID=1997
[30] *Id.*

III. The Emergence of Sushi in the U.S

> *A Paul, Weiss partner, Kelley D. Parker, apparently received a sub par order of takeout sushi. So, according to the memo, she asked a paralegal to research local sushi restaurants. The paralegal took to the task aggressively, interviewing lawyers and staff members at the firm, reading online and Zagat Survey reviews, and producing a three-page opus with eight footnotes and two exhibits (two sets of menus). The memo concludes by expressing the hope that Ms. Parker will now be able to choose the restaurant from which your dinner will be ordered on a going-forward basis."*[31]
>
> *The number of sushi restaurants in greater Los Angeles: 276 (Based on statistics compiled in September, 2006)*[32].

Sushi as a modern cuisine saw its most dramatic and intense development and transformation in the 20^{th} century. Japanese cuisine has become one of the most popular choices for restaurant goers in America. Between 1988 and 1998, the number of sushi restaurants in the U.S quadrupled. At the release of their 2006 restaurant guides, Zagat Survey announced that sushi restaurants lead the "Top Food" and/or "Most Popular lists" in nearly all cities in the United States[33]. The popularity of sushi is hardly an inexplicable concept: it is at once healthful and nutritious without being bland or mundane, it is also a fusion of exotic flavors, refined textures, and elegant presentation.

Sushi rolls are now widely available in American suburban malls and supermarkets alongside with other once unfamiliar and "exotic" quick-meal options like Norwegian salmon bagels, chicken Masala salads, and hummus wraps. There are now over 5,000 sushi restaurants in the United States - an annual average total of $36,000,000 worth of sushi-making seaweed is being sold[34]. Reference books written for the current generation of Japanese who are seeking immigration opportunities abroad often advise young job-seeking Japanese to work as a sushi chef abroad. U.S. consular offices in Japan grant more than 1000 visas a year to sushi chefs,

[33] *Zagat Survey: 2006 New York City Restaurants*, at `http://www.zagat.com/about/about.aspx?menu=PR43`. This survey is base don roughly 5.6 million meals, since the 30,000 plus 2006 NYC survey participants dined out an average of 3.3 times per week. 54% of the participants are women, 46% men.

[34] Norma Sakamoto-Larzalere, *Bringing Home the Sushi: Food as a way of understanding each other's liverlihoods*, Kansas Asia Community Connection, Interview of Theodore Bestor on October 28, 2004.

tuna traders, and other workers in the sushi business arena[35]. The Sushi Daigaku (Sushi University) in Tokyo is essentially a trade/immigrant school in disguise, offering short courses in sushi preparation so that students can impress prospective employers with a certificate[36].

Because of its proximity to the Pacific Rim and the dietary needs of the early immigrant settlers, sushi made its American debut on the West Coast of the U.S. The onset of Japanese cuisine in America began in Little Tokyo, one of the most bustling ethnic food enclaves of downtown Los Angeles. Shigeta Hamasuke founded Little Tokyo in 1955 and opened the first Japanese restaurant of the district[37]. In 1897, the Los Angeles Japanese Association was established. 1903 further marked the debut of Rafu Shimpo, a bilingual daily newspaper. As businesses began to thrive in proportion to the arrival of more new immigrants, an opportunistic group of restaurant operators flocked to the city to start the Rafu Shokuhin Kumiai or the Food Association of Los Angeles in 1914[38]. While the Pacific War brought a devastatingly abrupt halt to all Japanese business operations, the food industry still managed to recover gradually and grew steadily once the war was over. In 1929, the Ladies' Home Journal introduced Japanese cooking to American women, but discreetly avoided the subject of raw fish: "There have been purposely omitted... any recipes using the delicate and raw tuna fish which is sliced wafer thin and served iced with attractive garnishes. These might not sound as entirely delicious as they are in reality.[39]"

Very little mention of Japanese cuisine appeared in US media until after WWII. By the 1960s, articles and recipes on sushi began to emerge in lifestyle magazines, but the recipes the magazines suggested rendered a version of "sushi" (cooked shrimp on rye bread) that were nothing like the ones we are familiar with today. A decade later, however, sushi again saw a surge in popularity in the US. In 1972, the New York Times'

[35] *Id.*

[36] Metropolis Magazine: Japan's No 1. English Magazine, http://metropolis.japantoday.com

[37] *History of Japanese Food in America: Where people gather, there is always good food.* at http://www.lamtc.com/new/Au_hojfius

[38] *Id.*

[39] Theodore C. Bestor, *How Sushi Went Global*, Foreign Policy, November/December (2000).

front page made an extensive coverage of a grandiose opening of a sushi bar in the elite Harvard Club of New York City[40]. Sushi as a cuisine of sophistication and healthfulness is gradually being synonymous with class and educational standing. Furthermore, Japan's emergence on the global economic scene in the 1970s as a sought after business and entrepreneurial destination combined with the allure of the sushi cuisine, also helped prepare the world for the debut of the sushi fad.

The pioneer of all sushi restaurants in America, Kawafuku of Little Tokyo, opened in 1966 by Mr. Nakajima, an entrepreneur with both business acumen and grand vision[41]. Kawafuku was designed to target the Japanese expatriates. But much to the surprise to the keen observers of the local food scenes, the Japanese introduced their business colleagues to the taste of sushi which in turn triggered the spread of sushi as a popular cuisine. It was Osho Restaurant under the leadership of Mr. Kubo, however, that ambitiously spearheaded the migration and multiplication of sushi bars out from the tiny epicenter of restaurants immediately surrounding Little Tokyo to the other suburbs in the area such as Century City and Monterey Park[42].

Despite the noteworthy efforts of pioneering restaurant owners that culminated in the gradual acknowledgement and acceptance of sushi's niche in the West Coast food scene, one of the critical moments in the rise of sushi as popular cuisine was marked by its appearance in West Coast supermarkets. According to *Supermarket Business*, one of the earliest accounts of a supermarket sushi sale was brought about by a company called Advanced Fresh Concepts (AFC)[43]. The company started out operating sushi bars around the West Coast but eventually decided to develop its sushi program for use in supermarkets.

The Paul Weiss sushi memo incident quoted above, albeit mostly a parody or reflection of the oft times

[40] *Id.*
[41] *Supra* note 23 at http://www.lamtc.com/new/Au_hojfius
[42] *Id.*
[43] Howard Riell, *"If You Knew Sushi",* Supermarket Business. Vol. 50, No. 6, 119 (1995).

arbitrary power hierarchy in large law firms, is in effect also an indication of the popularity and prevalence of sushi among corporate professionals in the U.S. The sushi memo has been mocked by critics as an example of the absurd assignments that paralegals are sometimes asked to tackle as a contribution of their billing diligence at law firms. But the meticulously researched memo which entailed an in depth look at Zagat reviews as well as interviews with people with refined taste in sushi also serves to show how that sushi has reached such a point of popularity in which people's demand for and knowledge in the quality of the sushi has a rather refined level.

Part B:

Sushi exists in a kaleidoscopic range of styles, forms, and varieties the consumption of which entails a set of delicate and often confounding set of etiquettes. A diner's first encounter with sushi is often daunting and mesmerizing, quite akin to sightseeing in a land unknown. Sushi restaurant goers often find their dining experiences significantly more enjoyable if they had some prior knowledge in the sushi cuisine. The first section of this part of the essay introduces the three main types of sushi as well as a few subcomponents of seasonings and garnish that enriches the eating experience. The second section discusses the intricate set of sushi etiquettes need to be understood and applied before the essence and art of sushi can be manifested. The forms and etiquettes of a cuisine are often steeped in culture and require understanding the underlying principles and philosophies of eating or preparing the food in a certain way.

I. <u>The Different Varieties of Sushi</u>

On October 12, 1997, six hundred members of the Nikopaka Festa Committee made a kappamaki (cucumber roll) that was 3,279 ft. long at Yoshii, Japan.

("Longest sushi roll", Guinness World Records, Millennium Edition)[44]

While vinegared rice is the one common ingredient that is found in all types of sushi, sushi can be served in a myriad of visually imaginative, aesthetically pleasing, and scrumptiously ingenious ways. Examining the etymology of sushi, the word Su means vinegar, and meshi, meaning rice, were combined into "sumeshi". [45] When the word is pronounced very quickly, the word merges and is shortened into the bi-syllabic sound of "su-shi". When visiting an authentic and reputable Japanese restaurant in the U.S., the waiter will typically present an a la carte menu as well as a very extensive sushi checklist which may seem complex and daunting to people who are new to the cuisine.

Sushi can be categorized into three main types: *nigiri*, *maki*, and *temaki*. Nigiri sushi has a uniquely minimalist appeal. It is often served as raw fish, salmon eggs, cooked shrimp, or sliced egg on rice and is usually ordered and in pairs[46]. Maki sushi is also known as roll sushi. The versatility in its design and presentation makes this form of sushi a very popular choice among sushi fans. Sushi novices find maki rolls particularly appealing, since the many ingredients of the roll combine into a pleasing taste that completely dispels any physical or psychological squeamishness associated with consuming raw fish. Maki sushi is rolled with rice and sheets of seaweed (nori) and sliced into six or eight bite-sized pieces. A third type of sushi is temaki or "handroll". Temaki is rolled by hand into a cone shape. Temaki usually contains larger pieces of vegetables and smoked salmon.

The basic conception of fish preparation in Japan is suggested by the following proverb: "Eat it raw first of

[44] *Supra* note 18.
[45] Lesley Downer, *At the Japanese Table*, 7-19 (1993).
[46] Matthew Stein, *The Way of Sushi*, at http://www.fallenone.net/history1.html

all, then grill it, and boil it as the last resort.[47]" The Japanese believe that the taste and texture of fish is best appreciated when it is very fresh and consumed raw. If the freshness of the fish is really undesirable, then its best taste will be produced by sprinkling it with salt and grilling it. If the fish is not fresh, then its taste is better when boiled with seasonings, such as soy sauce or soybean paste.

Freshness is the single most important criterion for sushi aficionados. Fresh fish looks moist and close-grained, with a bright, clear color and no hints of the yellowing or browning that result from oxidation[48]. All the fish sinews should be removed and slices should be cut with the knife held at a 30-degree angle to the board[49]. The thickness of the fish slices also varies with the density of the dish. While dense fish tuna tend to be on the thicker side, a soft white-fleshed fish like fluke are presented in thinner slices.

Apart from the fish, several other important miscellaneous components are integral to the enjoyment of a sushi roll. Dried seaweed, or nori, needs to crispy and have a gold-green sheen[50]. Seaweed that is soggy is very unpleasant to chew and gives the impression of careless preparation. Sushi is also consumed with a few select condiments. Quality wasabi paste or powder is integral to an exquisite sushi dining experience. Wasabi is one of the rarest and most difficult vegetables in the world to grow. Wasabi has a heat and spicy component, but unlike chili peppers, the heat is only sustained briefly on the palatte and subsides into a gentle, pleasant vegetable aftertaste that even people who are hypersensitive to spiciness could enjoy[51]. The soy sauce that is consumed with sushi is very different from the generic supermarket soy sauce that is customarily used for stri-frys and seasoning. The soy sauce that is served with sushi has a slightly syrupy consistency and is reduced with sake. A pink vinegar-pickled ginger known as gari is shaved transparently

[47] *Supra* note 7 at 56.

[48] Alex Li Cohen, *The Environmental, and Nutritional Concerns Surrounding the Art of Sushi*, Washington University in St. Louis Journal of Japanese Civilization, (2001).

[49] *Id.*

[50] Shizuo Tsuji, *Japanese Cooking: A Simple Art.* 34-40 (1980).

[51] Real Wasabi, at `http://www.realwasabi.com`. According to popular Japanese legend, the wasabi plant was discovered hundreds of years ago in a remote mountain village by a farmer. Cultivation of wasabi in Japan dates to the tenth century, and has since spread to Taiwan, China, New Zealand, Canada, America and elsewhere. Wasabi plant has a reputation of being tricky to grow because it requires cold, pristine water with just the right balance of minerals.

thin and is nibbled between or with sushi[52].

II. The Art and Etiquette of Eating Sushi

> *In 1992, a 715-lb blue fin tuna was sold for $83,500 in Tokyo, Japan. The tuna was reduced to 2,400 servings of sushi for wealthy diners at $75 per serving. The estimated takings from this one fish were $180,000.*
>
> *("Most Expensive Fish", Guinness World Records, Millennium Edition)*[53]

Japanese cooking is a highly visual cuisine. At imperial banquets during the Edo period, court etiquette demands that guests observe a ritual of deriving a sense of appreciation and contentment from merely stare at the food. "Katachi no aji", "the flavor of the shape" - is often referred to[54]. Cooking as a profession is highly regarded in Japan and a good chef is often esteemed as a talented artist. Moreover, sushi-making is considered a both a time-honored tradition and an art of national pride in Japan. It is often noted that the red of the fish and the white of the rice symbolize the red and white of the Japanese flag[55]. The Japanese often analogizes a masterful sushi chef to a Samurai warrior, "whose skills and autonomy enables him to pick up his knives and go anywhere he chooses"[56]. Sushi chefs usually do not have hair on their arms, faces. Chefs are required to shave almost daily. Historians have also observed that men have dominated the market of professional sushi preparation, because female body temperature is higher and not suitable for handling raw fish[57].

The source of Japanese attitudes to food emerged from a combination of historical experience and religious

[52] The World Wide Sushi Reference, Glossary: Gari at `http://sushiref.com/glossary/spices:gari.html`. A good restaurant often prepares gari from its own special recipe. The freshness and tanginess of gari is often an indication of the restaurant's quality and authenticity.
[53] Guinness World Records, *Guinness World Records: Special Millennium Edition* (2000).
[54] *Supra* note 16, 167-212.
[55] James Trager, *Sushi in The Food Chronology.* 20-35 (1995).
[56] *Supra* note 16.
[57] *Supra* note 49.

ideology. Subtlety has been regarded by the Japanese as the height of civilized behavior and culture since the Heian period[58]. Colors also have important symbolic and contextual significance in Japanese life, and this is reflected in food[59]. Preserving or stabilizing the natural color of ingredients is an important consideration in Japanese cooking. Green vegetables are immersed in cold or ice water immediately after cooking to prevent discoloration from oxidation.

Eating at a Japanese restaurant entails a set of complex and intricately meaningful etiquettes. Passing food to another person via chopsticks is considered a cultural taboo, since the act parallels passing cremated bones of a deceased relative at a Japanese funeral[60]. When taking momentary pauses from eating, one should place chopsticks in front of oneself, but never directly on the sushi bar counter. Since the purpose of the soy sauce is not to flavor the rice but the fish, sushi should be dipped rice-side up in the soy sauce before ingesting[61]. Smoking in a sushi restaurant is also considered inappropriate and dismissive of the chef's efforts, since nicotine obscures the delicate flavors of the fish for the other diners. Another sushi misdemeanor is the merging of pickled ginger with specific morsels of the sushi roll[62]. Ginger is not placed in the serving tray to enhance the flavor of the sushi. It is intended to act as a palate cleanser- the power of the ginger erases taste from the tongue and prepares the taste buds for the next piece of sushi[63]. Because nibbling forces the diner to sacrifice the integrity and consistency of the roll, each piece of sushi should also be popped into the mouth and eaten immediately in its entirety.

[58] *Id.*
[59] Kenji Ekuan, *The Aesthetics of the Japanese Lunchbox*. 12-16 (2000).
[60] *The Sushi Chronicles: Sushi Etiquette*, at http://international-gourmet.net/sushi/etiquette.htm
[61] *Supra* note 49.
[62] Emi Kasuko, *Japanese Food and Cooking: A Timeless Cuisine: The Traditions, Techniques, Ingredients and Recipes.* 15-29 (2001).
[63] *Id.*

Part C:

This first section explores sushi as a multifaceted globalization phenomenon that defies the traditional west-to-east globalizing directional flow. While one can gleam fascinating insight from the intricate web of worldwide fishing trade that caters to the supplies and demands of sushi establishments, sushi as a circulating global commodity that internalizes and promotes regional dietary preferences and cultural practices is also instructive. The second section briefly examines sushi's current niche as a quality and desirable fast food of choice in America. Sushi's recent prevalence in a range of diverse and sometimes unexpected eating establishments and consumers' awareness in sushi's healthfulness serve to hint at its potential as the next sandwich of choice among fast food aficionados in America.

I. Sushi and Globalization

> *As the world rearranges itself, around silicon chips, Starbucks coffee, or sashimi-grade tuna, new channels for global flows of capital and commodities link far-flung individuals and communities in unexpected new relationships*[64].
>
> *"If ten years ago I would have suggested to launch global fast food that would be raw fish wrapped in black seaweed, people would have said that's crazy, that's impossible. But that's exactly what happened. When one thinks of globalization, one thinks of McDonald's becoming the common homogenous America food around the world. But there you have sushi, which is this improbable food that is now become a global type of fast food."*[65]

Globalization is an immensely complex and often paradoxical process that never ceases to surprise and often yields counterintuitive outcomes. Moises Naim, the Chief Editor of *Foreign Policy*, perceives the case of sushi as an example of boomerang globalization demonstrating that cultural dissemination of tastes and eating habits is often a multi-directional process which not only goes from the United States to the rest of the world[66].

The process of sushi's migration and globalization started slowly and deliberately in the large Japanese immigrant communities along the Pacific Rim: western and southern America, Brazil, and Australia. As late as the 1960s, one could still see remnants of the strong fundamental differences between oriental and occidental taste preferences, a British guidebook to Japan would still in all seriousness offer travelers to steer clear from the 'stomach-turning' Japanese habit of consuming raw fish[67].

The current sushi boom in the major metropolitan cities in the U.S. is often characterized by two main trends: modified creative rolls at popular sushi restaurants that cater more to the American taste buds, and sophisticated ambiance at restaurants that strives for an eclectic blend between East and the West. In terms of the actual sushi cuisine, several types of rolls are often preferred by the Western palate. Although American customers like rolled food, many of them would rather not see the black, paper-like seaweed used to make sushi. The invention of *uramaki*, a sushi that is rolled backwards, served to solve this problem. It is well known that the first style of *uramaki* to become popular was the California roll, a roll made of avocado and crab-flavored fish cake. Food historians generally credit Ichiro Manashita, chef at Tokyo Kaikan restaurant in Los Angeles, with engineering the very first California roll in the early 1970s[68]. The invention of the California roll is also considered by food historians as sushi's crossover from native cuisine to a popular snack well on the path to global dominance.

[66] *Id.*
[67] Alex Renton, *How Sushi Ate the World*, Observer Food Monthly, February, 2006. 2-6.
[68] John F. Mariani and Lebhar-Friedman, *Encyclopedia of American Food and Drink*. 53 (1999).

Another groundbreaking creation of the *uramaki* boom which appeals to Americans' love for spicy food is the Spicy Tuna roll, a delectable creation in which tuna is paired with Korean spices, green onion, and sesame oil. The recent years have also witnessed a creative surge in regional maki rolls that are specifically representative of the ingredients and culture of the locale from which they arise: New York roll[69], a delightful apple, avocado, and salmon creation combining the best culinary icons of the New York Jewish lox and bagels culture and the Big Apple symbol; Philadelphia roll, a scrumptious smoked salmon, cucumber, and cream cheese culinary genius consolidating the famous Philadelphia cream cheese and smoked salmon; Boston roll, a refreshingly light roll of scallion, crab, and salmon that attracts diehard seafood lovers, including the famous Boston freshwater crab specialty; and the Texas roll, a simple pairing of beef and cucumber, representing the wholesomeness of the South.

Another way in which sushi establishments contribute to the spread of sushi culture is by making use of ingredients that are familiar to the regional diners. Not only does this tactic have practical, cost effective results, it also appeals to the more risk-averse diners who tend to be more conservative eaters who stick with the tried, proven, and familiar options. Sushi Yasuda in New York City is one of the restaurants that managed to gain loyal American fans by making extensive use of local American fish such as the New York blackfish, Florida Pompano, and sturgeon from Washington State[70].

In his thought-provoking work, *Tsukiji: The Fish Market at the Center of the World*, Harvard anthropologist Theodore Bestor explores the fascinating global commodity chains that supply the Tsukiji market in Tokyo. According to Bestor, sushi has become both an icon of Japanese culture and an icon of globalization[71].

[69]New York Roll was invented by Akihiro Izumi, now head chef at the JW Marriot Hotel in Bangkok, Thailand.
[70]Sushi Net, "American-style Nigiri-sushi", at http://www.su-mile.com
[71]Theodore C. Bestor, *Tsukiji: The Fish Market At the Center of the World*. 126-176 (2004).

A bluefin tuna can get caught off the coast of Massachusetts, flown to buyers in Japan, then resold to a chef in Brookline, Boston. Bestor believes that the tuna trade is a very apt example of the globalization of a regional industry that is facing multifaceted challenges such as international competition, challenging environmental regulations, shifting markets, and the diffusion and redefinition of culinary culture as tastes for sushi proliferate worldwide[72]. Moreover, Bestor observes that "sushi's global popularity as an emblem of a sophisticated, cosmopolitan consumer class more or less coincided with a profound transformation in the international role of the Japanese fishing industry"[73].

Tsukiji is the largest seafood market in the world. It deals with $6 billion worth of business each year buying and selling Tokyo's supply of seafood[74]. While some of the best tuna from New England may eventually make it to Nobu in New York or Los Angeles, it will always gets there via Tokyo. Once the crew of Japanese fish importers and experts inspects the finest fish caught at various shorelines in the world and decides that it is fit enough for Tsujiki, the fish immediately gets shipped by air to Japan[75]. At the Tsukiji market in Tokyo, the very same batch of fine fish will likely be purchased by Tsukiji sushi exporters who will in turn supply seafood to premier expatriate sushi chefs at the world's leading gourmet cosmopolitan cities[76].

Despite its delicately sophisticated appearance and taste, sushi and its embodiment of rawness, dampness, and softness in texture is imaginably not an easy concept to sell to the uninitiated. Bestor notes that while North Americans tend to think of the direction of cultural influence as one that flows from West to East, Japanese cultural motifs and products such as Nintendo, Playstation, Pokemon, and sushi have been surprisingly enthusiastically received by American customers[77]. An interesting occurrence of maki exportation in the sushi establishment scene validates many of Bestor's arguments. The various sushi rolls

[72] *Id.*
[73] *Id.*
[74] Tokyo Metropolitan Government's Official Site, *A Guide to the Tsujiki Market*, at http://www.tsukiji-market.or.jp/youkoso/welcom_e.htm
[75] *Id.*
[76] *Supra* note 51.
[77] *Id.*

that were originally created to cater to American tastes are now finding its way back to Japan. For example, "Bond Street", a type of nigiri made with fatty tuna covered in caviar and gold leaf, and topped with grated daikon radish and chives is now rapidly becoming popular in top sushi restaurants in Japan.

Bestor points out what makes one fish desirable over another is steeped in culture[78]. The Japanese places tremendous emphasis on the outward appearance of the fish. The slightest blemish in a piece of fish might be construed as being indicative of more imperfection within. Food culture is not a pre-ordained or immutable phenomenon. Like nations, food culture develops along imagined national cuisines around often equally imagined national traits, "Just as rugged individualism and meat on the grill is seen as a trait essential to American identity, Japanese imagine a national cuisine along the lines of certain traits: rice and seafood.[79]"

Sushi's widespread popularity and accessibility does not necessarily mean that it has lost its exclusive place as invaluable Japanese cultural property. Globalization does not always homogenize cultural differences nor erase the salience of cultural labels. In the grander scheme of global economy of consumption, the brand equity of sushi as Japanese cultural treasure adds to the cachet of both the country and the cuisine[80]. In many ways, Japanese cultural control of sushi remains unshakeable. This could especially be seen in the interactions among tuna laborers on the docks. Japanese buyers and tuna specialists sent from Tsukiji to work seasonally on the docks of New England work intimately with foreign fishers, instructing them on the proper techniques for catching, handling, and packing tuna for export[81].

II. Sushi as Fast Food: The Next Sandwich?

[78] *Id.*
[79] *Supra* note 20.
[80] *Id.*
[81] *Id.*

> *From an exotic, almost unpalatable ethnic specialty, then to haute cuisine of the most rarefied sort, sushi has become not just cool, but popular. The painted window of a Cambridge, Massachusetts, coffee shop advertises "espresso, cappuccino, carrot juice, lasagna, and sushi.*[82] *"*

While elitists have always looked down at fast food, criticizing its baser tastes and deeming it as another crude manifestation of American popular culture, the alluring appeal of fast food in the U.S. can well be seen in the mesmerizing array of fast food choices that are overwhelmingly available in the country. In his meticulously researched nationwide bestseller, *Fast Food Nation*, esteemed journalist Eric Schlosser astutely observed that one of the main reasons people buy fast food is not only because of its inexpensiveness and convenience, but also because of its carefully designed pleasing good taste[83]. The McDonald's Corporation is the quintessential epitome of America's service economy and is responsible for 90 percent of the country's new jobs, boasting approximately thirty thousand restaurants worldwide and opens almost two thousand new ones each year[84]. In 1970, Americans spent about $6 billion on fast food; in 2001, they spent more than $110 billion[85].

Since sushi had to be marketed in an attractive way to compete with America's expansive and ever growing fast food industry, it had to not only emulate the most desired traits of fast of such as portability and facility, it also had to emphasize characteristics as a healthy and exotic type of fast food. When sushi is prepared in stores, it lends an air of freshness, theatrical flair, and international ambiance that could not be achieved by standard fast food. While sushi's exoticness and aesthetic appeal attracts the attention of gourmets and fine diners, it was the health aspect that retained consumer interest in the fast food market.

Pret A Manger, one of the most popular gourmet fast food chains in the United Kingdom which is now part-owned by McDonald's, started selling sushi from its shops in 2000. It now sells approximately 25,000

[83] Eric Schlosser, *Fast Food Nation: The Dark Side of the All-American Meal.* 1-10, 272-286 (2002).
[84] *Id.*
[85] *Id.*

to 30,000 of its 4.95 pound sterling "sushi deluxe" packs weekly, nearly as many as the tuna mayonnaise sandwiches. According to Simon Hargraves, "Sushi is the new sandwich. In the fast food world where customers are ever more neophiliac, it's still seen as healthy and innovative.[86]"

Part D:

The first section examines sushi's intrinsic nutritional value and health benefits. In addition to the nutritious advantages one can derive from a fish diet, the various peripheral components of a sushi meal such as seaweed and wasabi can also yield surprisingly salubrious health effects. The second and third sections of Part D explore some of the serious health hazards associated with eating sushi such as mercury poisoning and biological contaminants. Contrary to popular conception, mercury poisoning is a health danger to not only youths and pregnant women, but also to the exposed population at large. Because FDA's current consumer advisory scheme is far from comprehensive and is often at odds with the guidelines that EPA delineates, the mercury regulation status quo has triggered a series of ardent responses from various concerned public health policy advocate groups. Sushi consumers also need to be mindful of the biological contaminants that are often embedded in fish. Despite the FDA's Food Code's seemingly solid set of freezing guidelines, the actual application of these guidelines requires frequent inspections and strict surveillance of seafood establishments and sushi restaurants that are in practice tough to enforce.

I. Sushi's Health Benefits

According to a recent National Oceanic and Atmospheric Administration (NOAA) announcement, Americans consumed a record amount of seafood in 2003, a sharp increase from 14.8 pounds per person in 2001 to

[86] *Supra* note 82.

16.6 pounds per person in 2003[87]. The increase in consumer demand has been attributed to the seafood's scientifically proven health benefits to the heart, the popularity of high-protein diets, and the abundant supply and attractive pricing of many farmed specifies. The National Fisheries Institute (NFI) is recommending that Americans double their intake of fish to two servings per week as part of a heart-healthy diet regimen[88]. Research has also shown that wasabi, the unique flavorant used to spice up and disinfect raw fish in sushi, has significant health benefits and helps strengthen the immune system. Wasabi is rich in beta-carotenes, glucosinolates, and a range of isothiocynates which has anti-bacterial properties and help mitigate microbial elements or latent pathogens[89]. Wasabi is also a powerful agent that kills some forms of E-Coli and Staphylococcus viruses[90]. Medical studies on asthma and congestive disorders have also indicated that wasabi helps reduce excess mucous in the chest and nasal cavities that sometimes aggravate asthma conditions[91].

Specialized seaweed or "nori" used in the creation of *maki* and *temaki* are also beneficial to health in the sense that it is low in calories and rich in nutrients. Seaweed contains high amounts of minerals such as calcium, magnesium, phosphorous, iron, iodine, and sodium[92]. Nori is also a rich source of Ligans which helps fight cancer[93]. They also contain important vitamins such as A, B1, C, and E. One of seaweed's predominant health benefits is its ability to remove radioactive strontium and other heavy metals from the human body[94]. Nevertheless, sushi consumers who are on a sodium-restricted diet should be careful with their seaweed intake. Since nori comes from the sea, it contains a very high level of sodium.

In September, 2004, the FDA also announced a qualified health claim for reduced risk of coronary heart disease on conventional foods that contain eicosapentaenoic acid (EPA) and docosahexanoic acid (DHA)

[87] National Oceanic and Atmospheric Administration (NOAA), at http://www.noaanews.noaa.gov/stories2005/s2531.htm
[88] National Fisheries Institute, at http://www.aboutseafood.com
[89] *Supra* note 37.
[90] *Id.*
[91] *Id.*
[92] Sundance Natural Foods Online, Neptune's Garden: Vegetables of the Sea, at http://www.efn.org/∼sundance/Seaweed.html
[93] *Id.*
[94] The World's Healthiest Foods Organization, Sea Vegetables, at http://www.whfoods.com

omega-3 fatty acids, typically contained in oily fish such as herring, tuna, lake trout, and salmon[95].

When the research has reached a more ripened stage, the FDA intends to exercise its enforcement of new packaging of such fish products to read as:

> "Supportive but not conclusive research show that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease. One serving of [name food] provides [x] grams of EPA and DHA omega-3 fatty acids."

In spite of the beneficial nutritional value of sushi fish, wasabi, and nori, sushi consumers are at risk of incurring a series of health detriments by incorporating sushi as part of their diet regimen. In the grander scheme of the public health spectrum, consumer awareness is a crucial factor in contributing to food safety. Sushi and sashimi contain raw ingredients and exhibit distinct features in the production process that are associated with increased microbiological hazards, they are definitely unsuitable for people with impaired immunity, including pregnant women, the elderly, and those with chronic illness such as cancer. For the people with generally good health who wish to consume sushi, they should still remain alert when identifying reliable and reputable operators and choose the sushi and sashimi that are in good conditions.

II. Sushi and Health Hazards: Mercury Poisoning

[95] At http://www.cfsan.fda.gov

Fish, an excellent "brain food", high in protein and omega-3 fatty acids, also comes with some perilously alarming health costs. Tuna is one of the most frequently ordered sushi item at Japanese restaurants. A typical tuna sushi order of a pair of nigiri sushi or a maki roll contains approximately two ounces of tuna. An order of sashimi can be as much as 6 to 8 ounces of tuna. Thus, a child or woman consuming even one 2-ounce sushi order could exceed what the EPA considers safe.

Eating sushi and sashimi has become mercury Russian roulette. [96]

Methyl mercury is a potent form of mercury created by microbial action on mercury in polluted waters that becomes more concentrated as it rises through the food chain, big fish that eat smaller ones have the most methyl mercury[97]. The mercury that is typically found in the environment primarily comes from anthropogenic sources, such as coal-fired power plants and industrial processes[98]. While mercury exists in nature, the amount that is to be transformed into methyl mercury is dismal by comparison[99]. Bacteria transform mercury into methyl mercury, an organic form that is a neurotoxin, and bring mercury into the food chain. According to the National Academy of Science (NAS) report, the consumption of mercury-contaminated fish is the primary source of exposure for humans[100].

Data on the mercury level in fish can be found through two federal agencies: the FDA tests fish for mercury content, the Environmental Protection Agency (EPA) determines mercury levels that it considers safe for women of childbearing age. Fish that is deemed to have the highest mercury-level has more than 0.66 parts

[97] A chart on the Food & Drug Administration Web site (`www.cfsan.fda.gov/frf/sea-mehg.html`) shows that swordfish has 14 times the concentration of mercury as catfish. Levels are low in scallops and crabs and are usually undetectable in salmon, oysters, and shrimp.

[98] Committee on the Toxicological Effects of Methylmercury, Board on Environmental Studies and Toxicology, National Research Council, *Toxicological Effects of Methylmercury* (2000).

[99] *Id.*

[100] *Id.*

per million (ppm), while fish with the lowest mercury-level has less than 0.12 ppm[101]. While swordfish, mackerel, trout, and yellow fin tuna are among fish with the highest mercury-level, other popular restaurant options such as salmon, freshwater eel, and sea bass are considered quite safe[102].

While the federal government has issued a health advisory about methyl mercury in seafood, warning women and children to limit their consumption of tuna and to reduce the consumption of four other species of fish in their diets, the government does not yet mandate supermarkets and restaurants to mandate these important warnings. The Fish and Fishery Products Hazards and Controls Guide of 1994 listed methyl mercury as a potential safety hazard for the following selection of seafood: bonito, halibut, Spanish mackerel, king mackerel, marlin, shark, swordfish, and bluefin tuna[103]. This selection is based both on historical data on methyl mercury found in the fish consumed in the U.S. and the FDA action level of 1.0 ppm in the edible portion of fish. The FDA currently warns women and children that they should not eat king mackerel (0.730 ppm), swordfish (0.97 ppm), shark (0.988 ppm), and tilefish (1.45 ppm)[104]. Despite the fact that the average mercury level of 0.721 ppm for sushi tuna tested was near the level of king mackerel, currently no warning exists to warn women and children to curb the intake of high mercury tuna in sushi.

Extensive medical research and scientific data have shown that even low levels of mercury exposure in women can cause neurological problems in their children, affecting language, hearing and movement[105]. According to an EPA estimation, approximately 28% percent of American women of childbearing age have blood mercury level that could be perilous to their babies. As a result, over 60,000 children are born each year at risk of

[101] http://cfsan.fda.gov/~dms/admehg3.html

[102] National Resources Defense Council, *Mercury Contamination in fish: A Guide to Staying Healthy and Fighting Back*, at http://www.nrdc.org/health/effects/mercury/sushi.asp

[103] Chapter 10, Fish and Fisheries Products Hazards and Controls Guidance, Third Edition, June 2001. The FDA is currently re-evaluating the 1.0 ppm action level in light of new scientific data on the health detriments of methyl mercury from the consumption of fish. FDA anticipates updating the Guide accounting for the new data and will also consider including advice on how to assess the significance of a potential methyl mercury hazard in fish.

[104] *Supra* note 70

[105] *Supra* note 67. Affected children show traits that "include poor performance on neurobehavioral tests, particularly on tests of attention, fine motor function, language, visual-spatial abilities (e.g., drawing), and verbal memory.

lifelong problems[106]. Mercury can have deleterious effects on the developing fetal brain when it crosses the placenta, causing shortened attention spans in children and reducing their IQ[107].

Sushi consumption presents significant inherent health risks to pregnant women. Because many of the fish chosen for sushi are the apex predators of the fish food chain, they can bear high concentrations of mercury. Fish that is highest in the food chain build up the highest levels of mercury through bioaccumulation[108]. FDA and the EPA, acknowledging the danger of mercury poisoning, issued a joint advisory to women and children about methyl mercury in seafood in March 2004, which advised against eating seafood species containing the highest level of mercury (shark, swordfish, king mackerel, or tilefish)[109]. A scientific sampling research demonstrates that the tuna that is commonly served to patrons at famous Japanese restaurants in Los Angeles contains an alarmingly high mercury level[110]. The study shows that consumers usually have no way of being cognizant of how much mercury they are ingesting whenever they order a specific type of sashimi, nigiri, or maki. Additionally, there is a noticeable discrepancy between the observed mercury levels from the sampling experiment and the ones published by FDA reports.

Despite FDA's efforts toward issuing warnings to the segment of the population that are at risk of mercury poisoning from sushi or seafood consumption, the agency has yet to show considerable diligence and vigilance towards protecting consumers who are assumed to be in the risk-neutral or low-risk segments of the population. Rigorous scientific studies are now challenging the FDA and the medical community's long-held assumption that commercial fish consumed in the U.S. do not contain enough mercury to pose a grave prob-

[106] E. Oken et al., *Maternal Fish Consumption, Hair Mercury, and Infant Cognition in a U.S. Cohort, Environmental Health Perspectives*, 2005, 113: 10. At http://ehp.niehs.gov/members/2005/8041

[107] *Id.*

[108] Nancy Shute, The Collaborative on Health and the Environment, *Heavy Metal Fish: New Warnings about Mercury tell Seafood Buyers Beware*, at http://www.protectingourhealth.org/press/2003/2003-0317-USNWR-mercuryinfish.htm

[109] The FDA and EPA also advised several seafood substitutes that have lower mercury content: shrimp, canned light tuna, salmon, pollock, and catfish.

[110] Yellowfin tuna had an average mercury concentration of 0.765 ppm and a median of 0.818 ppm. Bluefin tuna contained an average mercury concentration of 0.609 ppm and a median of 0.650 ppm.

lem for adult men or women not expecting to become pregnant. The Centers for Disease Control reported last year that almost 8% of the 1,709 women of child-bearing age tested had blood mercury levels above 5.8 micrograms per liter (or 0.58 ppm), the amount considered safe in umbilical cord blood by the Environmental Protection Agency[111]. Other findings demonstrate that blood mercury levels rose in proportion to frequent fish consumption. Furthermore, an interesting study shows the correlation between blood mercury level and education among fish consumers - the blood mercury levels were greater among fish consumers with higher education who presumably are more well-versed in the health benefits of eating fish can afford to eat sushi and high grade fish more frequently[112]. Researchers are also beginning to explore how methyl mercury exposure may affect people through the life span. In a study conducted by the New England Journal of Medicine in November, 2002, data has suggested that men with elevated mercury levels may have more heart attacks[113]. Low-level mercury exposure may also increase people's susceptibility to autoimmune diseases.

The FDA's current consumer advisory scheme is far from comprehensive. It only addresses the risk groups of pregnant women, women of child-bearing age, and their children. In an effort to reduce the risks posed by mercury, the State Attorney General in California has began mandating the following supermarket warnings: "Warning! Pregnant and nursing women, women who may become pregnant, and young children should not eat the following fish: swordfish, shark, king mackerel, tilefish. They should also limit their consumption of other fish, including fresh or frozen tuna."[114]

The inherent dilemma with food safety regulation is that you are continuously balancing precariously the cost and benefit analysis between toxicity and nutritional benefit. While fish has significant nutritional value,

[111] *Supra* note 65.
[112] J.K. Virtanen et al., *Mercury, Fish Oils, and Risks of Acute Coronary Events and Cardiovascular Disease, Coronary Heart Disease, and All-Cause Mortality in men in Eastern Finland*, at http://atvb.ahajournals.org/cgi/content/abstract/25/1/228
[113] Devin Smith, Columbia News Service, *Sushi Fans Sometimes Get More than They Ordered*, March 7, 2003. At http://www.jrn.columbia.edu/studentwork/cns/2003-03-07
[114] *Supra* note 65.

mercury is perilously toxic. The process of determining what mercury level is safe is a very complex as it has to factor in a person's body weight, sex, and age, and also the varying amount of mercury in different types of fish. Government agencies have also been sending mixed signals. While FDA allows five times as much mercury in fish as does the EPA; a 2000 report by the National Research Council was more in line with the EPA's more conservative approach[115]. According to David Acheson, Chief Medical Officer for the FDA's Center for Food Safety and Applied Nutrition, the agency plans to rely on public health education, rather than regulation to reduce the risk of mercury poisoning[116].

One of the most fundamental flaws in the FDA's fish monitoring program comes from the fact that the agency's fish testing efforts are very limited in scope, while the agency places a disproportionate effort into informing the public about the hazards of high-mercury fish species. Acheson, the FDA's chief medical officer, said the agency had not advocated large-scale testing of fish because of the tremendous time and expense such an endeavor would entail[117]. Current regulations do not give the FDA much leverage in trying to prevent the sale of fish containing 1 ppm or more of mercury[118]. To take action, the agency has to prove that the particular fish had too much mercury and the consumption of that fish would be harmful. Acheson believed that there was little chance the FDA would be able to prove in a courtroom that an individual fish was harmful.

According to Eli Saddler, a public health analyst and the director of a mercury monitoring advocacy group, now that companies such as Micro Analytical are starting to develop rapid and inexpensive testing systems, the FDA should push for increased monitoring[119]. Saddler's organization also urges restaurants and grocery

[115] Jerry Hirsch, *Groups Warns of Toxic Tuna: Tests on Sushi from L.A. eateries raise questions about FDA mercury monitoring*, at http://www.latimes.com/news/local/la-fi-fish6mar06
[116] *Id.*
[117] *Id.*
[118] *Id.*
[119] *Supra* note 65.

stores to stop selling the fish species known to contain the highest mercury that frequently exceed the FDA maximum threshold unless seafood suppliers provide proof that fish being sold do not exceed the FDA's limits.

Public health analysts at Gotmercury.org have also articulated a set of pertinent policy recommendations that encourage an increased awareness in the dangers of mercury poisoning on the part of the consumers and a concerted effort towards mercury testing on the part of the FDA[120]:

- The FDA should revise and clarify warnings regarding tuna consumption by women and children.
- Restaurants and supermarkets that sell sushi should be required to post the FDA mercury advisory.
- The FDA should improve food safety by requiring mercury testing of more fish and shellfish with inexpensive rapid testing technology now available.
- Restaurants and grocery stores should stop selling the fish high in mercury content unless seafood suppliers provide proof that the fish being sold do not exceed the FDA's 1-ppm limit.

Furthermore, states should take the initiative to enact legislation similar to California's Proposition 65 law that requires mercury-in-seafood warnings at the point of sale. Proposition 65 requires any business with more than 10 employees to post mercury-in-seafood signs. After lawsuits by California Attorney General Bill Lockyer, restaurants named in the suit settled in February 2005 and bean posting warnings for diners[121].

Despite the rising trend of voluntary posting point-of-sale warnings amongst conscientious retailers, costal states where sushi and seafood consumption are the highest, should still strive to emulate the California model by passing their own laws to protect consumers and requiring businesses to post the FDA warnings

[120] *Id.*

[121] *Id.* Turtle Island Restoration Network and As You Sow Foundation filed the original intent to sue notice against restaurants and supermarkets in California for failing to post Proposition 65 warnings. Attorney General Lockyer's office took up the suits and additionally filed against canned tuna companies. California supermarkets are posting warnings under an interim settlement and the canned tuna trial is currently in its final stages.

and any state warnings regarding mercury levels in fish and shellfish at the point of sale.

III. Sushi and Health Hazards: Biological Contaminants

> *Shunya Kamegai, a 40-year-old director of the Meguro Parasitological Museum in Tokyo, a diehard sushi eater for decades, recently had a 24-foot-long tapeworm evicted from his intestines. Kamegai's physician estimated that the tapeworm grew approximately 20 centimeters a day in his belly*[122].
>
> *"Tapeworms are relatively benign, more like low maintenance pets than a dreaded pathogen. Symptoms such as feelings of fullness and nausea are rare. They just hang in there and undulate. I have never had a tapeworm but wouldn't mind! Hey, you get to refer yourself in the plural.*[123] *" (Adams, sushi aficionado)*

Since sushi and sashimi exhibit distinct features that are associated with microbiological hazards, proper sanitation when preparing fish is one of the most crucial tasks at sushi restaurants and when making sushi at home. In order to preserve the texture, integrity, and taste of sushi rolls and fish, the high heat cooking process we normally depend on to eliminate most of the pathogens that contaminate our food is not used in the preparation of sushi and sashimi. While adequate freezing eliminates infection by the parasites, the preparation process of sushi involves tremendous direct hand contact from sushi chefs in turn increases the risk of improper food handling techniques.

An individual with a normal immune system usually has no problem fighting off these pathogens, but immuno-compromised individuals such as HIV patients, tend to take longer to recover from parasite induced

pathogens, are often very difficult to treat, and the infection may relapse[124]. This recurrence may in turn further weaken the immune system and catalyze the progression of HIV infection.

One of the biggest human hazards of consuming uncooked, undercooked, or frozen seafood are the parasites[125]. Parasites in the larval stage can preset a grave health hazard to seafood consumers. A parasite is a living organism dependent on a host for nourishment[126]. Parasites grow naturally in many animals and can be transmitted to humans and cause illness. These organisms can vary in size and pose hazards to both food and water. Within one to six hours after the ingestion of infected larvae, violent abdominal pain, nausea, and vomiting may occur[127]. A process called candling is quick and inexpensive and can serve to reduce the risk of infection by parasites[128]. Each fish fillet is held in front of a light to as to render any parasites visible. Parasites are usually tightly coiled, clear worms, $\frac{1}{2}$ to $\frac{3}{4}$ inch in length, and it imbeds itself in the flesh of the fish fillet[129].

While the incidence of parasitic infection is higher in regions such as Japan, the Netherlands, and Pacific Coast of South America where raw fish is frequently consumed and is a core staple in their local culinary tradition, it is steadily increasing in the U.S. due to increased consumption of raw fish in sushi.

There has been a dearth of extensive, rigorous scientific studies on parasites in sushi in the U.S. A Seattle based study in 1994 conducted microbiological analyses on the rice associated with sushi, as well as an evaluation of the microbiological safety of raw fish served at Japanese restaurants and the cleanliness of food contact surfaces: the study found 10% of salmon sushi and 5% of mackerel sushi were infected with

[124] *Food Safety and HIV Infection*, Nutrition and the MD, Vol. 24, 1998: n6, 5-6.
[125] U.S. Food & Drug Administration: Center for Food Safety and Applied Nutrition, *Fish and Fisheries Products Hazards and Controls Guide*, 2^{nd} edition, January 1998, at http://www.cfsan.fda.gov/∼dms/haccp-2e.html
[126] A.M Adams, K.D. Murrell, and J.H. Ross, *Parasites of Fish and Risks to Public Health*, Review of Science and Technology. 1997, 16: 652-660.
[127] *Id.*
[128] *Id.*
[129] Valerie Saxion, *Everyone Has Parasites*. 5-15 (2003).

parasites[130].

In the US, parasitic etiologies that trigger reported cases of fish-borne diseases are still currently a rarity. The majority (80%) of fish-borne disease outbreaks are attributed to biotoxins (toxic marine algae) or scombrotoxins (histamine intoxication from improperly stored fish), 12% by bacteria, and 8% unknown[131]. Sushi consumers need to be particularly vigilant of three major groups of parasites in raw fish: flukes (trematodes), nematodes (roundworms), and tapeworms (cestodes)[132]. Flukes by its nature are too large to remain undetected and they are also an extremely rare breed of parasite[133]. Roundworms or *Anisakis*, on the other hand, look like thick strands of short human hair that are on average 25-150 mm in length, and 2mm in diameter. In North America, *Anisakiasis* is most frequently diagnosed when the affected individual feels a tingling or tickling sensation in the throat and coughs up or manually extracts a nematode[134]. In more acutely severe cases, there is stabbing abdominal pain akin to appendicitis accompanied by a nauseous feeling[135]. Severe cases of *Anisakiasis* cause tremendous discomfort and pain and require surgical intervention. Symptoms typically occur from as little as an hour to about two weeks after the consumption of raw or undercooked seafood[136]. Seafoods are the primary sources of human infections with these larval worms. Although fewer than 10 cases are diagnosed in the U.S. annually, it is suspected that many other cases go undetected, the disease is transmitted by raw, undercooked or insufficiently frozen fish and shellfish, and its incidence is expected to increase with the rising popularity of sushi and sashimi bars[137]. Tapeworm

[130] *Supra* note 94.
[131] H.H Hess, A. Reily, and Ben Embarek, *Prevention and control of hazards in seafood. Food Control.* 2000: 11: 149-156.
[132] *About Consuming Raw Fish*, at http://www.13.waisays.com/fish.htm
[133] *Id.*
[134] Foodborne Pathogenic Micoorganisms and Natural Toxins Handbook, *Anisakis simplex and related worms*, at http://www.cfsan.fda.gov/∼mow/chap25.html
[135] *Id.*
[136] James N. Parker and Philip M. Parker, *The Official Patient's Sourcebook on Anisakiasis.* 10-20 (2002)
[137] *Id.*

is the only type of parasite that can have a semi-permanent lifespan inside a human body. Tapeworms are usually in the intestines and body cavities of the fish[138]. One can avoid ingesting tapeworms by avoiding an intake of fish organs.

Micro-organisms include bacteria, viruses, yeasts, and moulds. Not all of them are harmful. Those capable of rendering foodborne illnesses are commonly known as foodborne pathogens. Some of these pathogens are carried in raw food and persist throughout the food preparation process. For example, while Vibrio parahaemolyticus is usually found in seafood, Staphylococcus aureus and Salmonella species may be introduced into food by cross-contamination or improper handling during food processing. Microbiological assessment of sushi and sashimi provides information regarding the hygienic quality. One of the most commonly adopted initial assessments is the determining the number of indicator organisms in food[139]. The number of aerobic bacteria colonies grown in the laboratory conditions, technically termed as Aerobic Plate Count (APC), has been used to assess product quality[140]. In terms of food safety, the most common indicator organism employed is the Escherichia coli (E. coli) which reflects the extent of faecal contamination and the possible presence of enteric pathogens in foods[141].

Bacteria are living single-celled organisms that can be transmitted by food, water, insects, rodents, or humans[142]. Bacteria reproduce very rapidly under favorable conditions. Some bacteria have the ability to form spores that protect them during unfavorable temperature conditions such as cooking and freezing.

[138] H. Deelstra et al., *Strange Substances in Our Food*, 132, 136-137 (1996).
[139] Fletcher M. Arritt, Joseph D. Eifert, and Michael L. Jahncke, *Microbiological Shelf Life of Raw Flounder Fillets*, Virginia Polytechnic Institute and State University, at http://sss.ifas.ufl.edu/26thAnn/file21.pdf
[140] *Id.*
[141] *Supra* note 99.
[142] Marion Nestle, *Safe Food: Bacteria, Biotechnology, and Bioterrorism.* 25-43 (2003).

Unlike parasitic infections, bacteria are not killed in the process of freezing. Bacteria that cause food poisoning are difficult to detect by the food's appearance, taste or even smell. Cooking and irradiation are the only means of preventing this form of infection.

Bacteria that cause disease do not normally occur in the intact fish muscle that is ingested. Fish fillets, however, can become contaminated by improper handling, storage, or preparation. One bacterium, *bacillus cereus* in particular, is associated with the rice used to make sushi. *Bacillus cereus* is a spore forming bacterium commonly found in soil, dust, and raw foods which when ingested can cause profuse watery diarrhea, abdominal pain, vomiting, and nausea[143]. The best way to prevent contracting illness from bacillus is to exert control on cooking time and temperature, avoid preparing food too far in advance, and avoid holding cooked foods at room temperature[144].

A virus is an organism that relies on other living cells to reproduce. It is smaller than bacteria and is responsible for causing several foodborne illnesses such as hepatitis A, Norwalk, and rotavirus[145]. In the case of food preparation, viruses are transmitted from person-to-person, from people-to-food, as well as from people to food-contact surfaces. Food that is tainted by improper personal hygiene by a food handler can easily catalyze a bout of virus infection. Most seafood associated diseases are caused by a virus, specifically the Norwalk virus[146]. The Norwalk virus can also be passed during handling or preparation of seafood by workers who did not wash their hands properly after using the bathroom. Hepatitis A is another virus commonly found in seafood and is the most common type of hepatitis, characterized by the sudden onset of fever, nausea, vomiting, fatigue, and abdominal pain followed by several days of ensuing jaundice[147]. The

[143] M. Sugano, H.C. Lee, and E.S. Tjong, *Microbiological safety of raw fish served at Japanese sushi restaurants and antibacterial effects of vinegar and wasabi.* 15-39 (2000).

[144] *Id.*

[145] National Restaurant Association, *About Foodborne Illness: Common Pathogens*, at http://www.restaurant.org/foodsafety/how_to_pathogens.cfm

[146] *Id.*

[147] Hepatitis A virus is a communicable disease that may be foodborne, but is also transmitted through person-to- person contact in settings such as daycare centers and hospitals by persons who do not adequately wash their hands after rest room use, and by consumption of raw or undercooked shellfish harvested from contaminated waters. In the foodservice industry, the primary controls for Hepatitis A are proper training and effective supervision of employees to ensure good hygienic practices,

source of Hepatitis A is fecal material and sewage.

The effectiveness of deep freezing to kill microorganisms depends on the interrelationship between several factors: the temperature of the freezing process, the length of time needed to freeze tissue, the length of time the fish is held frozen, the fat content of the fish, and the type of parasite present[148]. Additionally, the process of deep freezing sushi may potentially ruin the texture, taste, and aesthetics of the fish. As standard practice in North America, many fish such as tuna are deep frozen immediately after being caught, and get passed off as fresh fish when thawed in the marketplace. In the U.S, it is estimated that up to 60% of sushi is frozen at some point before they are served to diners. The FDA considers serving raw fish that has not been previously frozen to kill parasites to be illegal[149]. The FDA's Food Code recommends the following freezing guidelines to seafood establishments who provide fish intended for raw firs consumption:

> Freezing and storing at -4 degree F (20 degree C) or below for 7 days (total time), or at -31 degree F (-35 degree C), or below until solid and storing at -31 degree F (-35 degree C) or below for 15 hours, or freezing at -31 degree F (-35 degree C) or below until solid and storing at -4 degree F (-20 degree C) or below for 24 hours[150].

In addition to its primary responsibilities in regulating seafood, the FDA, with input from the Conference for Food Protection, is responsible for writing recommendations for restaurants and regulations for foodservice operations. These recommendations are presented as the model Food Code, and are written to assist health departments at the state level in developing regulations for a foodservice inspection program. Under the

proper handwashing and safe handling of food and tableware. Hepatitis A symptoms usually occur within 15-50 days following exposure. Symptoms of this infection include abrupt fever, fatigue, loss of appetite, nausea, abdominal discomfort, jaundice, dark urine and joint aches.

[148] *Fish and Fisheries Products Hazards and Controls Guidance*, 3^{rd} edition, June 2001, at http://www.cfsan.fda.gov/∼comm/haccp4e.html

[149] J. Moshkin, *Sushi Fresh From the Deep Water, the Deep Freeze*, The NY Times. Late Edition. 2004 April 8; Sec. A:1 (col. 3).

authority of the FD&C Act, FDA conducts both mandatory surveillance and enforcement inspections of domestic seafood harvestors, growers, wholesalers, warehouses, carriers, and processors[151]. Depending on the nature and complexity of the operation, inspections can take less than a few hours or up to a few days. The inspection covers product safety, food hygiene, and economic fraud issues. The FDA also samples and tests seafood product and enforces specific labeling requirements[152]. The agency has discretionary power in determining the frequency of the inspections and the requirement of the operation to submit to these inspections. Failure to comply with the FDA regulations could bring about both civil and criminal penalties[153]. The FDA also supervises and works in conjunction with the individual states to implement regulatory programs.

Part E:

> *People in the at-risk groups should not eat raw or undercooked fish or shellfish. People with liver disorders or weakened immune systems are especially at risk for getting sick. Foods made with raw fish are more likely to contain parasites or Vibrio species than foods made from cooked fish. Always cook finfish until its muscle is opaque and flaky*[154].

The FDA recommends that anyone with reduced autoimmunity illnesses and certain conditions to follow safe seafood practices and stay away from eating sashimi. Theses diseases and physical conditions include: cancer, diabetes, HIV infection, people with liver disease (either from excessive alcohol abuse, viral hepatitis, or other causes), people with iron disorders, people who have been involved in long-term steroid use, and

[151] Paula Kurtzweil, *FDA Consumer Report: Critical Steps Towards Safer Seafood*, at http://www.cfsan.fda.gov/~dms/fdsafe3.html
[152] *Id.*
[153] *Id.*

those that have gone through gastrointestinal surgery[155]. Based on the statistics on cases reported to the Centers for Disease Control and Prevention, between 1973 and 1987, shellfish and finfish (including some sushi favorites, such as tuna, salmon, and yellowtail) accounted for roughly 5 percent of food-borne illness, which is essentially 3.8 million cases of food poisoning in the United States as a result of fish, including 250 deaths and 16, 250 hospitalizations[156]. The first section of Part E analyzes the development of the Hazard Analysis and Critical Control Point Plan (HACCP), its rationale and prospective policy visions, as well as the inherent deficiencies. The second section presents the Hong Kong Food and Environmental Hygiene Department's (FEHD) innovative set of Sushi Surveillance Guidelines. Juxtaposition between the FDA's HACCP and Hong Kong FEHD's guidelines shows area in which the HACCP has room for improvement and expansion.

I. HACCP

> *To ensure safety, it is of utmost importance that those who handle and process seafood commercially understand the hazards associated with (specific types of seafood with which they are involved), and keep these hazards from occurring through a routine system of preventive controls*[157].
>
> *"James Bond, the first tough guy in Western fiction who was also a foodie, enjoyed Japanese women and sake (when it's served at exactly 98.4 degrees Fahrenheit, but didn't fancy the rawness that defined sushi.)*[158] *"*

The Hazard Analysis and Critical Control Point Plan (HACCP) is considered by many to be a conceptually revolutionary way of thinking about food safety. While not a novel concept by any means, the progeny of its implementation in the seafood industry only dates to the early 1990s. Ever since David Kessler's offi-

[155] *Supra* note 150.
[156] *Id.*

cial testimony before the Senate in 1992, in which he advocated for developing an inspection system based on the HACCP, its principles have played a pivotal role in influencing the status of seafood regulation[159]. Contrary to popular misconception, HACCP is not so much a rigid program as it is a conceptual rationale for regulating safety. HACCP principles were first developed by the Pillsbury Company in the early 1960s with the aim of regulating the safety of astronaut food products[160]. HACCP is risk assessment process in which the efforts are made to control the ascertained risks and prevent the occurrence of unsafe incidents. Its safety regulation process focuses on identifying and preventing hazards that could cause foodborne illnesses rather than relying on spot-checks of manufacturing processes of finished seafood products[161]. Since HACCP is mostly designed and implemented by industry actors, its success requires and mandates cohesive cooperation from the participants[162]. Additionally, each HACCP-based program entails the embodiment of seven fundamental principles as delineated by the FDA:

1. Analyze hazards - potential hazards and measures to control them are identified;

2. Identify critical control points - find points in the food production process at which hazards can be controlled or eliminated;

3. Establish preventive measures with critical limits for each control point - create standards by which one can determine a risk has been effectively controlled or eliminated;

[159] *FDA Backgrounder- HACCP: A State of the Art Approach to Food Safety*, October 2001, at http://www.cfsan.fda.gov/∼lrd/bghaccp.html

[160] William A. Wurts, World Aquaculture, *FDA Requires HACCP Plan and Training for U.S. Fish Processors and Importers*, 28(3): 62-65: 1997.

[161] *FDA's Seafood HACCP Program: Mid-Course Correction*, at http://www.cfsan.fda.gov/∼comm/shaccp1.html

[162] *Supra* note 122. The regulation applies to processors: businesses in the United States or foreign countries engaged in custom, commercial, or institutional processing, importers: U.S. owner or consignee at the time of entry into the United States, or the U.S. agent or representative at the time of entry.

4. Establish procedures to monitor the critical control points - create oversight to guarantee hazard control;

5. Establish corrective actions to be taken when monitoring shows that a critical limit has not been met (such as disposal or reprocessing)[163].

On January 28, 1994, the FDA proposed a system of rules under the title, "Proposal to Establish Procedures for the Safe Processing and Importing of Fish and Fishery Products" and through this proposal, affirmed its reasons for supporting the regulation of the entire seafood industry[164]. The five fundamental goals for safe seafood control included:

1. To create a more effective and efficient system for ensuring the safety of seafood than currently exists;

2. To enhance consumer confidence;

3. To take advantage of developmental work on the application of HACCP-type preventive controls for seafood;

4. To respond to requests by seafood industry representatives that the Federal government institute a mandatory, HACCP-type inspection system for their products; and

5. To provide U.S. seafood with continued access to world markets, where HACCP-type controls are increasingly becoming the norm[165].

As sushi falls under the classification of a fish or fishery product, in order to adequately protect customers

[163] *Supra* note 121.
[164] *Id.*
[165] 60 Fed Reg 65096, at 65097.

and maintain a high caliber business reputation, sushi fish establishments must engage in "hazard analysis" and must design a cogent, comprehensive "HACCP plan" which includes but are not limited to a list of food safety hazards that are likely to occur and a list of procedures and provisions to be taken in the event of such a hazard[166]. Critics, however, have argued that the regulations set forth by the 1994 guidelines are not exhaustive and comprehensive. It was only in 1997 the requirement that every seafood processor includes a HACCP program became effective[167]. Furthermore, critics have also noted that the FDA regulations about building a HACCP plan err in its assumption that certain preconditions such as the Sanitation Standard Operating Procedures (SSOP) have already been met[168]. In recognition of how tough it is for seafood operations to have the foresight, thoroughness, and rigor in identifying, evaluating, and combating safety hazards, the FDA further published the Fish and *Fishery Products Hazards and Controls Guide* as a supplement to the regulations[169].

In February, 2001, the General Accounting Office (GAO) issued a report evaluating FDA's seafood HACCP program, concluding that while FDA has made substantial progress in ensuring the safety of seafood through HACCP implementation, the program still has significant room for improvement and strengthening in order to realize its full objective[170]. An internal evaluation by FDA's own Office of Seafood demonstrates that

[166] Food Drug and Cosmetic Act, 21 C.F.R. 123.6 (2002)

[167] *Supra* note 118.

[168] At `http://hccpalliance.org/alliance/fsisSept28.pdf`
Sanitation Standard Operating Procedures (SSOP) include:
1. Safety or water (including ice) and comes into contact with food or food contact surfaces;
2. Condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garments;
3. Prevention of cross-contamination from unsanitary objects to food, food-packaging material, and other food-contact surfaces—including utensils, gloves and outer garments, and from raw product to cooked product;
4. Maintenance of hand washing, hand sanitizing, and toilet facilities;
5. Protection of food, food processing-packaging materials, and food contact surfaces from adulterants (e.g. lubricants, fuel, pesticides, other unsafe compounds, and use of toxic compounds;
6. Proper labeling, storage, and use of toxic compounds;
7. Control of employee health conditions that could contaminate food, food-packaging materials, and food-contact surfaces;
8. Exclusion of pests from the food plant.

[169] U.S. FDA: *Fish and Fishery Products Hazards and Controls Guide*, 3^{rd} edition (2001), at http://www.cfsan.fda.gov/∼comm/haccp4.html

[170] *Supra* note 123.

the implementation of the 1997 HACCP program helped increase the frequency of seafood processor inspections[171]. Moreover, surveys of the seafood industry conducted subsequent to the HACCP implementations have also shown that the seafood industry is engaging in significant upgrades in facilities, equipment, and daily plan operations to ensure safety[172]. Accordingly, FDA has initiated a Mid-Course Correction to revise and bolster the Seafood HACCP program. FDA's correction program aims to intensify its focus on seafood processors whose products present the highest risk to consumers, including but not limited to: firms that need to control for pathogens, firms that need to control for allergy-inducing histamines, and firms that do not currently have HACCP plans[173].

Sushi restaurant owners or distributors should thoroughly educate employees on the proper way to prepare and handle sushi. All products should come from an identifiable source and all seafood should come from a source that is in compliance with a HACCP plan. A HACCP-based guidance for processing sushi in retail operations typically includes the following general points on its checklist:

[171] *Id.* Before the seafood HACCP program was launched, FDA averaged seafood processor inspections only once every four years. After the implementation of the 1997 program, the frequency has risen to annual inspection.

[172] *Id.* Implementations of these state-of-the-art preventive control measures contributes to a significant increase in the margin of safety for seafood consumers.

[173] The Agency is redoubling its efforts towards these high risk processors, this will entail frequent inspections, more extensive laboratory testing for pathogens and histamines, and enforcement action where appropriate.

1. All food is obtained from an identifiable, approved source. No seafood from a recreational fisherman or other non-approved sources is used in the sushi operations.

2. All seafood, including fish, shellfish, crustaceans, eggs (roe) and surimi comes from a source that operates under a HACCP plan.

3. Certain fish will require freezing either by the suppliers or retail operations prior to serving as a raw ready-to-eat item due to potential parasite problems.

4. Vegetables, both whole and pre-cuts, and other edible products, i.e., seaweed (nori), vinegar, and spices are obtained from approved and identifiable sources.

5. If commercially prepared, pre-acidified sushi rice is used, it should be obtained from an approved and identifiable source operating under a HACCP plan which includes records for the rice production.

6. All potentially hazardous foods are delivered at or blow 41 degree F or solidly frozen.

7. Retail establishment actively manages a program for routine inspection of incoming products for approved sources, product condition and temperature as necessary, integrity of packaging and proper label information, and documents product acceptance or rejection with dates, times, and the person making the decision, plus any necessary comments[174].

In addition, the FDA has also published consumer guidelines delineating critical steps toward safer seafood purchase and consumption in its Food Code. Some of the food handling techniques suggested by the FDA Food Code are highly applicable to sushi operations and sushi consumers alike:

- Employees should be in clean clothing with no outerwear and should always wear hear coverings.

- Employees should never be smoking, eating, or playing with their hair.

- Employees should also not be sick or have any open wounds.

    - Employees should be wearing disposable gloves when handling food and change gloves after doing nonfood tasks and after handling any raw seafood.

    - There should be no darkening around the edges of the fish or brown or yellowish discoloration[175].

In order to prevent potential bacterial growth, the preparation of sushi rice also entails meticulous care. The bamboo or plastic mats used in rolling sushi should also be cleaned and sanitized daily. Sushi chefs should line them with plastic film and rewrap them within 4 hours of continuous use and in between contact with other sushi products. Heat during the cooking process can activate certain bacterial spores that can grow and unleash toxins unless the rice is preserved and refrigerated. Because refrigerated rice is often more difficult to form for sushi and hot rice is too hot to handle, most sushi operations choose to acidify the rice to protect it during handling without refrigeration. Employees at sushi restaurant should also pay special attention in monitoring the pH of the acidified rice. It is best to acidify rice when it is warm to facilitate better mixing and penetration of the acid solution. Acidified rice should have an initial pH of 4.1 and the pH of the rice should not exceed equilibrium of 4.6[176].

Since a single outbreak of food-borne illness could depress a restaurant's profit or even drive it out of business entirely, it is in the restauranteurs' best interest to adhere to FDA guidelines and ensure that employees are adequately trained in food safety and consistently use safe food-handling methods. Since sushi chefs are often first generation immigrants from Japan, they sometimes do not have an extremely high command of English. Because language can be a very effective barrier when it comes to communicating the proper food hygiene techniques, it is crucial for restaurants owners to provide accurate translations of the food handling

[176] *Supra* note 134.

guidelines to the chefs' strongest language.

II. Surveillance on Sushi and Sashimi in Hong Kong: A Comparative Study

In Hong Kong, sushi and sashimi are classified as restricted food in the Food Business Regulation of the Public Health and Municipal Services Ordinance (Chapter 132)[177].$The Hong Kong Food and Environmental Hygiene Department (FEHD) d$ Under the current program's arrangement, Food inspectors are responsible for taking food samples and send them to the Public Health Laboratories, Pathology Service of the Department of Health for microbiological analysis. Between January 1997 and December 1999, a total of 1926 samples of sushi and sashimi from different outlets were collected for microbiological examination[179]. The lab examination consists of two parts: the first part assesses the level of indicator organisms (APC & E. coli) and the other on specific pathogens including Salmonella species, Shigella species, Staphylococcus aureus, and Vibrio parahaemolyticus. The level APC or E. coli can reflect the general hygienic status of sushi and sashimi. High levels of APC and E.

[177] Food and Environmental Hygiene Department (FEHD), Risk Assessment Studies Report No. 2, *Microbiological Hazards Evaluation: Sushi and Sashimi in Hong Kong* (2000), at http://www.fehd.gov.hk
Legal Provision for Sushi and Sashimi Regulation in Hong Kong: Under Schedule 2 of the Food Business Regulation (subsidiary legislation of Cap. 132), sashimi and sushi are classified as restricted foods (items 18 and 19 respectively of the Schedule). The sale of restricted foods including sashimi and sushi is governed by section 30(1)(a) of the same Regulation as follows:
"30. Restriction of the sale, etc. of articles specified in Schedule 2
(1) Save with the permission in writing of the Director, no person shall-
(a) sell or offer or expose for sale, or possess for sale or for use in the preparation of any article of food for sale, any of the foods specified in items 1 to 5 inclusive, items 9 to 14 inclusive and items 16 to 20 inclusive of Schedule.
Thus any person who wishes to sell or prepare for sale sashimi and sushi must apply for appropriate license or permit from the Director of Food and Environmental Hygiene.
With effect from 1 March 1997, all premises engaged in the preparation and sale of "sushi" and "sashimi" are subject to one of the following means of licensing control:
(a) a general restaurant license with specific endorsement is required when these food items are prepared, handled and sold for consumption on the premises.
(b) a food factory license with specific endorsement is required when these food items are prepared, handled and sold for consumption off the premises; and
(c) a restricted food permit is required for only selling these food items for consumption off the premises, such as from a licensed fresh provision shop. The food has to be supplied from a source approved by the Director.

[178] *Id* at 9-11.
[179] *Id* at 13.

coli are indicative of unsatisfactory hygienic practice during processing of food from source to table. High counts of APC in foods often indicate contaminated raw materials or unsatisfactory processing and indicate inappropriate time/temperature conditions during storage. Although there is no scientific data that suggests that these organisms are direct causes of human illness, the levels of unsatisfactory samples suggest room for improvement in the production process.

Sushi operations in Hong Kong are commended to pay special attention to the following key steps:

1. Buy the seafood and other raw materials from reliable and reputable sources:

(a) The health certificate or other documents issued by the exporting countries should be checked.

(b) The documents must be kept to maintain traceability.

2. Ensure optimal storage conditions:

(a)

The freezing temperature for foods should be at -18 degree C or blow, and the chilling temperature should be at 4 degree C or below; the temperature of the freezer or chiller should be monitored regularly and proper record should be kept;

(b) The raw ingredients and prepared foods should be stored separately to prevent cross-contamination;

(c) After preparation and during transportation and display, all sushi and sashimi should be covered and kept at 4 degree C or below to reduce the risk of cross-contamination and multiplication of bacteria and

(d) The leftovers should be discarded after business hours.

3.

Ensure the seafood is used at its fresh state:

(a)

No excessive amount of seafood should be stored; and

(b) Apply "First-in-first-out" principle in stock keeping.

4.

Observe hygienic practice during food preparation and any other handling process:

(a)

Hands should be properly washed and direct touching of foods should be reduced to a minimum- use machines or wear disposable gloves;

(b) All food handlers should observe personal hygiene strictly;

(c) Hygiene of the preparation area and the equipment should be maintained in food condition;

(d) Utensils should be cleaned and disinfected before and after use, separate utensils should be used for the preparation of sushi and sashimi; and

(e) Sushi and sashimi should be prepared in separate areas with good ventilation[180].

The Hong Kong FEHD widely distributes the "Know more about Japanese Sashimi" guide to educate consumers on general steps of avoiding food poisoning in sushi/sashimi consumption or preparation. The well-researched and concise illustrated brochure offers consumers a few seemingly commonsensical but often neglected tips on how to select legitimate sushi restaurants and how to pick out seafood that is optimal for human consumption:

1.

Observe the general hygiene of food premises and visually inspect the cleanliness of common areas such as the floor, wall, and ceiling.

[180]Hong Kong FEHD, *Hygienic Handling of Food Eaten Raw*, at http://www.fehd.gov.hk/safefood/library/raw/3.html

2. Choose sushi and sashimi that at least visually appear to be in good conditions, the following characteristics could be an indicator of freshness: the coldness of sushi and sashimi, the softness and whiteness of rice, the brightness and transparency of fish, and the fat layers of fish fillets should be clearly visible[181].

Additionally, the Hong Kong FEHD also published a highly comprehensive brochure on "How to Wash Your Hands" that concisely delineates the seemingly obvious but oft ignored before-and-after golden rules of washing hands, "before food preparation, after a trip to the toilet, after touching ears, hair, mouth, or other bare body parts, after handling waste, and after engaging in any activities that may contaminate hands"[182]. A comparison between the HACCP-based guidance for processing sushi in retail operations and the FEHD guidelines shed light on the areas of deficiency that the HACCP guidelines need to ameliorate. While the HACCP guidelines for sushi operations includes detailed and instructive tips emphasizing the importance of procuring seafood and rice from a reliable source, it lacks prescriptive reminders on the storage conditions of sashimi and sushi, and the hygiene conditions during the actual food preparation process. Despite the FDA's efforts in publishing supplementary consumer guidelines on safer seafood purchase and consumption in its Food Code, the food handling techniques suggested by the Food Code lacks the cohesiveness and conciseness of the FEHD recommendations in its supplementary brochures. The "Know more about Japanese Sashimi" and "How to Wash your Hands" illustrated, step-by-step brochures, albeit simplistic at first glance, serves to give sushi preparation staff and sushi restaurant operators a more intuitive and easily accessible set of instructions that they can directly apply to their the preparation of sushi. The HACCP guidelines could be strengthened in enforcement value if it could strive to substantively incorporate some of the FEHD guideline's practical suggestions as well as stylistically emulate the FEHD guideline's conciseness and comprehensiveness.

Part F: Conclusion

[181] Hong Kong FEHD, *Know more about Japanese Sashimi*, at http://www.fehd.gov.hk/safefood/library/Japanese_sashimi/2.html
[182] Hong Kong FEHD, *A Guide to Washing Your Hands,* at http://www.fehd.gov.hk/safefood/library/handwash/3.html

Tyler Cowen, scholar of culinary anthropology, once expressed his three-prong theory for what makes for good food: competition, experimentation, and pride.[183] A cuisine that is represented by the most number of restaurants in a given locale is usually one of reliable caliber, at least among popular consensus. Good cooking also entails bold experimentation with novel ideas, cooking techniques, and presentation methods. Pride, the more tangible third element, also contributes to the making of good food, since the refined confidence that a cuisine exudes add to its appeal. Sushi as a cuisine is in many ways the fine embodiment of the three culinary virtues. The essay's extensive exploration of the intriguingly rich history of sushi and the various cultural specific dietary taboos and etiquettes associated with eating sushi serve to attest to both the well-merited pride. The kaleidoscopic varieties of sushi that are still increasingly evolving and the surging popularity of sushi as a form of healthful fast food alternative also evident the competitive edge of the cuisine as well as the cuisine's scope for more experimentation. Sushi as a successful food of widespread eminence on the globalizing front, also shows how competition, experimentation, and pride inherent a culinary practice can help the product attain the status of a global commodity. For sushi to continue its path of success on the local and global culinary arenas, there should be concerted efforts on the part of regulatory authorities to heighten consumer awareness in the inherent risks of consuming sushi, correct the oversights in the current surveillance and control programs, as well as to actively seek opportunities to emulate foreign regulatory regimes that may potentially have solid preexisting hygiene inspection and hazard control programs for sushi and seafood operations.

[183] "Is Globalization changing the way the world eats?", Tyler Cowen, International Association of Culinary Professionals, 26^{th} Annual Conference, April 21-24, 2004.