KILLER FISH

HOW EATING AQUATIC LIFE ENDANGERS YOUR HEALTH

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Contents

Foreword

More than forty years ago, I invited Brian Clement to join the Foundation Soleil in Geneva, Switzerland. My intention was for him to bring back to Europe the message that food is medicine, and he did just that. Along with his wife, Anna Maria Clement, he developed a state-of-the-art complementary health program at the renowned Hippocrates Health Institute. This extraordinary and transformative program should be used as a model worldwide, so that people everywhere can find more effective relief from the grip of disease, confusion, and melancholy.

Dr. Clement and his Hippocrates Life Transformation Program nurture people by teaching them to take total responsibility for their lifestyle choices. The program's comprehensive approach covers not only physical health but also emotional, mental, and spiritual well-being. It has been a great joy for me to watch the evolutionary progress of this program over the last several

decades; the results that Dr. Clement and his team have achieved with tens of thousands of people are nothing short of remarkable. One of the greatest illusions of our time is the belief that good health comes from elements outside ourselves, as demonstrated by our extensive use of chemicals, drugs, and vaccines. We have polluted our bodies and poisoned the global environment, creating an internal and external cesspool that separates us from the natural world and our natural state of health.

The human body functions brilliantly without the use of animal-based food. Fish, meat, dairy products, and eggs have no place in our diets. Factory farming and the manufacture of animal-based products have destroyed both our environment and our health. For millennia, natural healers, spiritual teachers, and shamans have taught the message “Do not kill.” This universal tenet is receiving contemporary validation through current scientific research that proves poor health and environmental degradation are the result of breaking this fundamental code.

It’s time to allow all creatures, including fish, crustaceans, and other ocean dwellers, to live their lives fully, just as we aspire to live ours. I am elated to present this landmark book, Killer Fish, which exposes the multitude of problems that come from the consumption of aquatic life and reveals how physical disease often manifests even when we eat foods generally considered to be healthful. If you believe that fish is a more nutritious choice than meat, go one step further and discover the whole story.

Read this book and understand the delusion that food marketers have led you to believe. Not only will Dr. Clement convince you to stop consuming aquatic life, he will show you why plant-based diets are the only suitable fare for humans. Killer Fish is a cornerstone contribution to the field of human health and has the potential to save millions of lives, both human and animal. Congratulations to you, dear reader, for having the wisdom to search for truth and apply it to your life. Enjoy peace, health, and joy with all that you do.

(Christian Tal Schaller), MD, author and pioneer in the field of alternative medicine and holistic health

INTRODUCTION

What Do You Really

Know About Fish? Chances are, you or someone you know has fallen for the argument that fish offers a healthful alternative to red meat and dairy foods because of its omega-3 fatty acid content. But is aquatic life really safe to eat? If you think the answer is yes, be prepared for a rude awakening as you read this book. In these pages, you’ll find startling evidence that you probably

have not yet encountered. The messages and information in this book could not have come at a more critical time: people the world over are eating more fish than ever before. According to the US Department of Agriculture (USDA), fish consumption in North America alone has increased by at least 50 percent since 1980. Salmon, for one, has achieved newfound popularity because mainstream medicine has trumpeted praise for its omega-3 fatty acid content.

Chapter 5 reveals why this praise is undeserved and will point you to the best sources of omega-3 fatty acids. Authorities have known for some time that people who eat fish are putting their health at risk. An article in a December 2004 issue of the medical journal Annals of Internal Medicine stated: “But Americans have heard less about, and perhaps paid less attention to, various health warnings associated with fish consumption. Studies have linked overconsumption of certain fish (particularly popular ones such as swordfish, tuna steaks, Chilean sea bass, and some kinds of salmon) to neurologic deficits, cancer, autoimmune and endocrine disorders, and even some heart disease.”

Chapter 2 introduces the human health risks related to fish consumption, chapter 3 highlights the dangers of eating raw fish and sushi, and chapter 4 describes how hormone-disrupting chemicals that are found in prescription drugs and personal care products are warping the reproductive life of fish and accumulating in humans. The risks to human health are directly linked to the increasing contamination of fish and other aquatic species by industrial and consumer pollutants. This book shines the spotlight on many of these toxins, particularly mercury and polychlorinated biphenyls (PCBs).

These and other dangerous substances are poisoning both wild and farmed fish, and anyone who eats fish also consumes these poisons. Chapter 1 describes the pollutants in fish and how their habitats have become tainted, and chapter 6 refutes the misconception that farmed fish are a safe choice. You won’t find much help from government agencies, or from the food and grocery industries either, in uncovering the health problems associated with fish consumption.

While urging consumers to eat more salmon for its omega-3 fatty acid content, agencies such as the USDA and the US Food and Drug Administration (FDA) fail to sufficiently warn people that salmon contains high levels of PCBs and other toxins. Nor do grocery stores place meaningful warning labels on fish that are known to harbor dangerous chemicals, leaving consumers blissfully ignorant of their health risks. When was the last time you saw a store post a prominent sign alerting consumers that tuna contains levels of mercury that are unsafe, especially for pregnant women?

You’ve probably never seen such a sign, yet, as you will learn, the

documented dangers of mercury contamination are a real and escalating threat to human health. But human health is not all that is at risk. Chapters 7 and 8 focus on how human actions and fish consumption threaten environmental health. In fact, some experts predict that sea life will perish in our lifetime. No book about the killing and eating of aquatic animals would be complete without a discussion of the ethical aspects of human conduct and cruelty toward other life forms.

There is not only the question of cruel treatment, though that is justification enough to refuse to participate in the business of animal agriculture. In addition, there exists a whole other dimension to consider, which is the extent to which an animal's intelligence should determine its use as a food source. The smarter and more socially advanced the life form is relative to human intelligence, the argument goes, the less likely it is to be served at the dinner table.

For example, unless you live in China or Southeast Asia, or unless you were starving, you probably haven't considered eating a dog, because that species is viewed as an intelligent and useful human companion in most parts of the world. However, some people who refuse to eat land creatures in recognition of their social versatility and ability to reason, or the cruelty inflicted while raising them, don't think twice about eating or mistreating fish. It's as though these creatures are too lowly to warrant compassion.

Scientific research affirms that fish are highly evolved creatures. In his thought-provoking book Eating Animals, Jonathan Safran Foer points out that since the 1990s, more than five hundred published papers have dramatically expanded our knowledge about the surprising sophistication of fish intelligence. "Fish build complex nests, form monogamous relationships, hunt cooperatively with other species, and use tools," Foer writes.

"They recognize one another as individuals (and keep track of who is to be trusted and who is not). They make decisions individually, monitor social prestige, and vie for better positions. (To quote from the peer-reviewed journal Fish and Fisheries: they use 'Machiavellian strategies of manipulation, punishment, and reconciliation.') They have significant long-term memories, are skilled in passing knowledge to one another through social networks, and can also pass on information generationally.

They even have what the scientific literature calls 'long-standing cultural traditions for particular pathways to feeding, schooling, resting, or mating sites.' "People who care about the well-being of animals, including fish, are also more inclined to care about the well-being of other human beings. History will judge our culture for how civilized and humane we have been in our treatment of all life forms. As you read this book and absorb its message,

please keep in mind that your eating habits and buying decisions help determine not only your own health but also the fate of entire species and the ecosystems on which they depend. Our awareness can constantly motivate us to change our actions and, ultimately, change the human relationship to food, nutrition, and the planet's ecological health.... one bite at a time.

HOW EATING AQUATIC LIFE ENDANGERS YOUR HEALTH

CHAPTER ONE How Aquatic Life Got Contaminated

It's about time that people who are concerned about their own health and the health of the planet become familiar with three terms coined by Chasing Molecules author Elizabeth Grossman: fliers, swimmers, and hoppers. This terminology may sound like a list of options for a frequent traveler program, and in a strange way, that's exactly what it is, except these travelers aren't human. The travelers in this case are molecules of toxic substances produced by industry and commerce.

While invisible to the naked eye, these fliers, swimmers, and hoppers take up residence inside all life forms, including humans, and many of them are virtually immortal and practically indestructible. Being highly mobile and uncontainable, they can pop up anywhere on the planet, having traveled thousands of miles for months or even years before finally finding a "home" inside of fish and, eventually, inside of you. These hitchhiking contaminants range from pesticides, fungicides, and herbicides to heavy metals (mercury being the most common), flame retardants (especially those called PBDEs), water-and stain-repellant chemicals (known collectively as PFCs), and numerous other industrial compounds.

These molecules fly, swim, and hop about with the greatest of ease on wind and water currents. (For more information about these toxins, see sidebar, page 3.) Persistent organic pollutants (POPs) are a principal category of world travelers that take refuge inside of human and aquatic life. They include the pesticide DDT, polychlorinated biphenyls (PCBs), and dioxins. The United Nations Environment Programme has stated: "Exposure to persistent organic pollutants can lead to serious health effects, including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease, and even diminished intelligence."

Fliers travel primarily by air, attached to dust particles on the wind or in storm systems. Swimmers are mostly restricted to oceans and other bodies of water. Propelled by wind and water, contaminants that originated in North America can end up in Europe, and pollutants generated in China can travel to the United States. In fact, molecules that hitchhike on dust particles can make the journey from China to California in just a few days. Some

hitchhikers are versatile and jump from air to water and sometimes back again. These hoppers can morph into a gas, liquid, or particle.

Changes in form are influenced by various factors, such as chemical structures, temperature fluctuations, and atmospheric conditions. Rain and snow are ideal carriers, depositing hoppers in oceans, lakes, and rivers, where they are absorbed by aquatic life. Because toxins easily cross-pollute between regions of the world, and because many of them persist in the environment for decades or more after being released, any one nation's attempt to put the genie back in the bottle is an ultimately fruitless endeavor.

Limiting toxic emissions within a country's borders does not protect it from toxins created elsewhere. And the number of contaminants is always increasing. New chemical hoppers are constantly being created in laboratories and added to industrial processes and consumer products.

Meet Fliers, Swimmers, and Hoppers

Our world is home to many toxic hitchhiking molecules. Here is more information about these ubiquitous travelers:

- **Pesticides, fungicides, and herbicides**. This broad category of pollutants includes aldrin, chlordane, dichlorodiphenyldichloroethane (DDD), dichlorodiphenyltrichloroethylene (DDE), dichlorodiphenyltrichloroethane (DDT), dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), hexachlorocyclohexane (HCH), and toxaphene. Many of these substances have been banned in the United States and other parts of the world for decades, yet they persist in the environment.

- **Heavy metals**. Mercury is the most common heavy metal contaminant found in fish and other aquatic creatures. The term methylmercury refers to the various toxic compounds of mercury that accumulate in living organisms.

- **Flame retardants**. These toxic and persistent molecules are used in the manufacture of textiles, plastics, and other products. They include polybrominated diphenyl ethers (PBDEs).

- **Water- and stain-repellant chemicals**. These chemicals are known collectively as perfluorinated compounds (PFCs). They can be found in the slick paper coating used on microwave popcorn bags and pizza boxes. Two well-known brand names are Teflon and Gore-Tex.

The contaminants found in aquatic environments have a real and growing effect not only on fish and other sea creatures but also on humans. These chemicals love fat, meaning that once they are absorbed by fish and other

creatures, they bioaccumulate in fat cells. Simply put, they establish a mobile home park and invite all of their “friends” over to hang out. Bioaccumulation also happens when humans eat fish and animal flesh that is tainted with these chemicals. The toxic tourists settle into the fat cells of their human hosts for a long visit and, in the process, create a lot of mischief (see chapter 2).

How Bad Is It? Let’s Start with Mercury

You’ve probably heard a lot about high levels of mercury being found in tuna, a saltwater fish. But are you aware that this heavy metal is also found in freshwater species of fish? You wouldn’t have learned about the widespread contamination of freshwater fish by following mainstream media reports. Nor would you have learned that the primary source of mercury contamination, as well as other types of contamination in both freshwater and saltwater species, is our own industrial civilization.

Naysayers within the scientific and industrial communities have long contended that most of the mercury being detected in fish and aquatic sediments comes from natural geologic leaching. However, numerous studies conducted over the past decade have shown that this argument no longer carries any weight. Much of the mercury we are seeing in fish comes from industrial pollution. When mercury by-products enter water, whether freshwater or salt water, they are converted into methylmercury, which is easily absorbed by fish. The methylmercury bioaccumulates up the food chain through predator fish until it’s absorbed by humans.

The only way to avoid contamination by these forms of methylmercury is to avoid eating fish. The following series of studies document that mercury contamination is the result of the atmospheric spread of mercury from human sources. In a 2007 article in Environmental Science & Technology, researchers reached this conclusion: “Our findings suggest that atmospheric transport is a key factor relative to Hg [mercury] in fish across the western United States.”

The researchers collected and analyzed 2,707 large fish from 626 streams and rivers across twelve western US states and discovered that mercury concentrations were high in all of the fish they sampled. The previous year, two scientists from the Woods Hole Oceanographic Institution published a study in the same journal that evaluated concentrations of methylmercury in freshwater fish from every state. They reported, “The accumulation of MeHg [methylmercury] in wild fish populations is linked to atmospheric Hg [mercury] loadings, two-thirds of which are estimated to be from anthropogenic sources.”

Anthropogenic is a term that refers to the influence of human beings on nature. Even earlier than this, four marine scientists from various universities reported similar findings: “There is a broad and geo-chemically consistent database indicating that, over large regions of the globe, human-related Hg [mercury] emissions have increased relative to natural sources since the onset of the industrial period.”

This should end the previously contentious debate about whether naturally occurring sources of mercury in the environment or human-generated sources are the principal culprits in contaminating aquatic life and, consequently, endangering human health. In the United States, the Great Lakes and California waterways are particularly plagued by mercury contamination. The Great Lakes, the largest surface body of freshwater on the planet, are a major receptacle for industrial pollutants.

From the 1970s to 2007, long-term monitoring data documented an escalation in mercury levels in several fish species in the Great Lakes. Lake Erie walleye, for example, continue to show increasing levels of mercury contamination. Mercury levels in this species have remained steady in Lake Ontario for two decades, while levels have increased over the past ten years in Lake Erie.7 A 2004 report by the California Department of Health Services warned about mercury contamination and the health risks associated with consuming fish from the entire Sacramento-San Joaquin River Delta and all of its tributaries in the northern part of the state.

According to the report, “Mercury concentrations in several species of fish exceed the health-based screening values set by the US Environmental Protection Agency.” In the San Francisco Bay, all of the fish species carry unsafe levels of mercury. This is a result of gold mining, which started with the California gold rush of 1849. Mercury was used to amalgamate the gold at slurry mines in the Sierra Nevada Mountains. Nearby streams carried the mercury waste into delta waterways, and it eventually washed into the San Francisco Bay.

The contamination is so thorough that there is no hope of ever completely cleaning it up. Mercury levels in striped bass, sturgeon, and shark, in particular, are so high in the San Francisco Bay and related waterways that the California Office of Environmental Health Hazard Assessment has issued health warnings that women of childbearing age or pregnant women and children should eat no more than one meal that includes these fish each month.

Women beyond childbearing age and men should consume no more than two of these fish meals each month. My advice, as you can imagine, is not to eat any of these fish. I don’t believe consuming any level of mercury is safe for

long-term health. The government does not agree. In 1969 the US Food and Drug Administration (FDA) established 0.5 parts per million (ppm) as the maximum safe level of mercury contamination in fish. In 1979 that level was arbitrarily raised to 1 ppm, despite the well-documented neurological problems in humans caused by mercury exposure. (Parts per million is a measure of the number of chemical molecules; one part per million is roughly equivalent to about one milligram per liter of water.)

Let's consider an example that was calculated using the average level of mercury contamination for chunk white canned tuna. A normal child weighing forty-five pounds who eats six ounces (about one can) of chunk white tuna has ingested four times the recommended level of mercury. Table 1 lists the maximum mercury concentration levels in the most contaminated types of fish. This information is based on data compiled by the FDA from various scientific studies conducted over three decades.

Table 1. Mercury levels in fish

Type of fish	**Maximum measured mercury level (in parts per million)**
Shark	4.5
Tilefish (from Gulf of Mexico)	3.7
Swordfish	3.2
Chilean sea bass	2.1
Tuna (fresh or frozen)	1.8
King mackerel	1.6
Halibut	1.5
Tuna (yellowfin)	1.4
Bluefish	1.4
Snapper	1.3
Grouper	1.2
Orange roughy	1.1

Source: US Food and Drug Administration

Pesticides, PCBs, and Dioxins

There has never been any debate about the source of certain categories of contaminants in fish, such as the whole family of dioxins, PCBs, and pesticides. All are clearly and widely seen as by-products of industrial processes. Just as many scientific studies have demonstrated the dangerous levels of mercury in fish, additional research from all over the world has documented the presence of other contaminants, either alone or in conjunction with mercury.

For example, a study was done to determine the concentrations of environmental toxins in fish eaten by the Ojibwa tribe in the Upper Great Lakes region. Researchers found PCBs and seventeen other organochlorine compounds in lake trout, whitefish, and walleye. Lake trout and whitefish from Lakes Michigan and Huron had the highest concentrations of organochlorines, whereas mercury, at 0.58 parts per million, was highest in walleye. PCBs were found in all lake fish sampled.

To illustrate how persistent and virtually indestructible some of these contaminants continue to be, we need only look at the continuing presence of the insecticide toxaphene in the sediments of the Great Lakes. Banned for all uses in the United States in 1986 because it is highly carcinogenic, toxaphene had been used widely on cotton and soybean crops in the midwestern United States. Toxaphene was also frequently used in lakes to kill unwanted fish species.

Certain fish, such as salmon, store the chemical in their fat much more readily than other animal species, possibly because toxaphene was manufactured to be used in water. When sediment cores from Lakes Superior, Michigan, and Ontario were analyzed, toxaphene was detected in alarming levels, demonstrating how slowly it degrades. Once absorbed by fish, it can biomagnify up the food chain. Researchers determined that the continuing buildup of toxaphene in sediment and aquatic life was caused by atmospheric sources. The chemical originated far away but traveled on air currents, probably attached to dust particles, before ending up in the lakes.

Fish in the lakes and streams of California are also affected by pollutants. You may have heard of the Donner Party, the nineteenth-century wagon-train pioneers who were trapped in California’s Sierra Nevada mountain range in a winter snowstorm and resorted to cannibalism to survive. Donner Lake was named for them to mark the area of their encampment. It is located alongside Interstate 80 between Sacramento, California, and Reno, Nevada. The fish in Donner Lake have mostly become unfit for human consumption as a result of PCB and mercury contamination.

California's Office of Environmental Health Hazard Assessment issued a permanent fish advisory for the lake on January 27, 2011. The warning stated that fish samples caught in the lake contained detectable levels of mercury, PCBs, and a few other chemicals and that people should drastically cut back their consumption of brown trout and lake trout. A series of studies done between 1999 and 2002 found that the waters of Canada's Arctic and subarctic regions were so highly polluted with mercury that fish species such as lake trout, pike, and walleye carried mercury levels exceeding government safety standards.

"New research on PDBEs and perfluorinated compounds determined that these contaminants are widespread in freshwater fish and concentrations may be increasing," concluded a Canadian team of scientists in 2005. "Global warming is a major issue of concern for Arctic and subarctic waters and may have adverse impacts on contaminant levels in fish." In 2010 scientists analyzed nine fish species that were caught in waters off the Aleutian Islands of Alaska.

They discovered that the fish were carrying significant concentrations of POPs, including PCBs and three pesticides (DDE, mirex, and HCB). The highest level of DDE, a breakdown component of the insecticide DDT, was found in sockeye salmon, while the highest PCB level was found in rock sole. The researchers stated: "All species [of fish studied] would trigger strict advisories of [no more than] between two and six meals per year." Furthermore, the scientists noted that their results raise questions about whether these fish are safe to eat at all.

In Japan, researchers conducted blood tests on 131 men and 122 women (ages twenty to seventy-six) who lived along the coast. They measured levels of PCBs and dioxins, such as PCDDs. Study participants completed a dietary questionnaire that the researchers used to determine both the amount and types of fish commonly consumed. Plasma concentrations of a biomarker of fish intake were positively associated with blood levels of dioxins.

The researchers stated: "The frequency of intake of coastal fish, such as horse mackerel, mackerel, and sardine, was associated with concentrations of PCDFs and PCBs. The intake of raw fish was positively related to total dioxins and PCBs." As part of a 2005 study in Singapore, scientists measured the levels of several heavy metals and POPs in the edible portions of twenty types of commonly consumed seafoods, such as gray prawns, eel, and salmon. They found that the insecticides chlordane and DDT, in addition to PCBs, were the primary contaminants, with the highest concentrations found in salmon fillets and green mussels.

The authors discussed these contaminants and related cancer risks in their

conclusion: “Daily intake of DDTs, heptachlor, and PCBs in seafood exceeded the conservative cancer benchmark concentrations set by the US Environmental Protection Agency, suggesting that a significant number of people are potentially at risk in Singapore over a lifetime from seafood consumption.” In 2001 a team of toxicologists collected samples of 11 fish species caught in Europe’s largest wetland, the Danube Delta in Romania.

They measured concentrations of PCBs, PBDEs, and organochlorine pesticides (such as DDT, HCH, and HCB) in the fish and water sediments. DDT was the predominant pollutant in all samples and was found in both fish muscle and liver. The next highest concentrations were of PCBs. Between March and June of 2006, a group of toxicologists acquired food samples from twelve cities in the Catalonia region of northeastern Spain. They measured concentrations of PBDEs in this wide variety of foodstuffs. By far the highest concentration of total PBDEs turned up in fish and shellfish, at levels nearly twice that of the next most contaminated category of foodstuffs, oils and fats.

Table 2. Common contaminants in fish

Toxin	Type	Effects	Fish with high levels
Dichlorodiphenyltrichloroethane (DDT)	insecticide	endocrine disruption, diabetes, and possibly cancer	sockeye salmon
Hexachlorobenzene (HCB)	fungicide	neurological problems, enlarged thyroid and liver	wild salmon, mackerel
Polychlorinated biphenyls (PCBs)	industrial chemical used as coolant fluid	endocrine disruption, neurological problems	black bass, carp, channel catfish, largemouth bass, and smallmouth bass
Polycyclic aromatic hydrocarbons (PAHs)	by-products of burning fuels	DNA damage, cancer, and lower IQ	Atlantic mackerel, Atlantic salmon, blue whiting, clams, herring (smoked), mussels, rainbow trout (farmed), and shrimp

Check Your State’s Fish Advisories

Most states periodically post advisories, usually on a website, that warn consumers about fish species that pose a risk to human health if eaten. A state agency such as the Department of Health is typically in charge of issuing advisories about the fish caught in its home state. Have you ever checked the warnings posted by your state? Probably not. Few consumers even know about these advisories, much less use them to guide their buying and eating decisions. Yet paying attention could protect your health, if not

your life. In my own state of Florida, the Department of Health issues fish consumption advisories in cooperation with the state Department of Environmental Protection and the Fish and Wildlife Conservation Commission. Let's take a look at what was posted on the Florida Department of Health website in 2011.

After first proclaiming that eating fish is an important part of a healthful diet, the state agency posts twenty-eight pages of single-spaced warnings about species of fish that inhabit dozens of rivers, creeks, canals, lakes, and coastal waters. In total, Do Not Eat warnings (in bold capital letters) are issued for various species in ninety-seven bodies of water. Several hundred additional listings warn consumers not to eat some types of fish more than once a month if they want to avoid health consequences.