FOOD WAR 2030

Cherl-Ho Lee
Translated by Colin A. Mouat

Bold predictions
for the decades ahead!
The trigger that will hasten the end of capitalism?

KFSRF Sikanyeon

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"..and the seven years of famine began, just as Joseph had said. There was famine in all the other lands, but in the whole land of Egypt there was food" Genesis 41 : 54

FOOD WAR 2030

FOREWORD

God granted us the air we breathe and water we drink. They are ours to use freely, and for free. They are also necessities -- without them, we could not survive for even a moment. A human being will die if he goes four minutes without air. Four days without water, and he will perish. I have heard of people going without food for upwards of forty days, but that is surely the very limit.

Yet human beings today are doing irrevocable damage to these very gifts that make life possible. Severe air pollution is leading more and more people to go into business selling canned oxygen. Our reckless and extravagant greenhouse gas emissions have summoned the specter of global warming upon us. Faced with the undrinkability of our terrestrial water sources, we have long since turned to purchasing water that is extracted from underground and packaged for us in plastic bottles. Rapid desertification of our farmland has left nearly half our continental landmass as dry, uninhabitable wastelands.

God also commanded that we work and suffer for our food. There was, so to speak, no such thing as a free lunch. And so our human history has been one of labor and striving, of wars and plundering -- for food. We citizens of the 21st century live in the fetters of this very human bondage. Ours is a polarized world where the epitome of abundance -- *Homo*

sapiens obese -- lives shoulder to shoulder with fellow members of the species whose starvation has left them little more than skin and bones. And now we stand at the brink of a life-or-death battle to secure food resources, whatever the costs.

In his book *Climate Wars*, Gwynne Dyer presents us with a world facing an apocalyptic scenario under the effects of global warming. It sees the arrival of an age (roughly midway through the 21st century) when the Earth's average temperature is about 2.3℃ higher than today, its inhabitants left starving in desolate, desertified conditions. The European Union has collapsed; the prosperous countries of its north are in a state of emergency as they try to stanch the flood of hungry refugees pouring in from the south, which has been left in a state of borderless anarchy under an influx of African refugees whose own livelihoods have been stripped from them by desertification. The United States has set up a massive barricade, stretching from California all the way to Texas, to hold off illegal immigrants fleeing food shortages in Mexico and South America. Realistic scenes show the desperate border-crossers being savagely picked off. Meanwhile, India and Pakistan's dispute over water from the tributaries of the Indus escalates into a nuclear war.

For the past half-century, the haves of the world have been working desperately to satisfy their own bottomless desires, engineering a system for this under the watchwords of "globalization," "free trade," and "economic development."

The theory of comparative advantage has become the basis for a global system dependent on a form of Western capitalism that aims to organize the countries of the world into a division of labor. Unequal distribution of wealth has reached its zenith in a world of trade liberalization under the World Trade Organization system.

In 2008, the same country that drove this capitalist tide became the epicenter for a financial crisis that rocked the world. In the ensuing years, it suffered a downgrade in its national credit rating. Cracks arose in the confidence -- nay, conceit -- of a country that had once been a trumpeter of laissez-faire capitalism founded in neoliberal economic theory. Today, banks are going belly-up, economies are slumping, and unemployment is soaring as a real estate bubble (the result of investment banking system mismanagement, negligent and irresponsible practices, and failures of monetary policy) combines with an excessive policy focus on growth to the exclusion of all else. While financial companies have collapsed, their employees have enjoyed a windfall from their speculation, and a new slavery of capitalism has emerged, one in which the remaining 99 percent of citizens face a lifetime of working to repay these debts.

The result of this has been twofold: prophecies of the end of capitalism on one hand, and last-gasp efforts to hold out (with a repackaged "Capitalism 4.0") on the other. In the latter case, the aim has been to save the sickly global village and

usher capitalism into a more exalted state -- a warmer, more "symbiotic" form -- by encouraging a more active culture of donation as a way of promoting growth and social unity. But that framework is not much of a break from the existing world order dominated by Western capitalism and technology. Most Asian, African, and South American countries are called upon simply to supply the coffee, cacao, and sugar that the developed nations crave. To meet their own food needs, they have become tributary states dependent on a small coterie of countries, most notably the U.S.

As the 21st century began, Washington was preoccupied with holding on to its superpower status. China and India were enjoying explosive growth, their massive populations (1.4 billion and 1.2 billion, respectively) becoming newly minted as major players in the world economy. Yet the U.S.'s population was failing to keeping pace. By 2012, it stood at just 314 million. A similar situation was under way in Europe, which will be lucky to escape a decline in its current population of 200 million. By 2020, China and India are expected to have a combined population of 3.8 billion -- fully half the world's people. Over the same period, the U.S. and Europe can expect to see little change in their respective populations. At this rate, the two major entities representing Western purchasing power and information production capabilities will soon find themselves unable to compete with Asia for influence.

There is one and only one way to solve this problem: globalization, or the creation of a system for global governance. If a global government is created to take responsibility for the global financial order, free trade, development, and environmental preservation, then the U.S. can continue to reign as a world leader. UN forecast reports have been trumpeting the creation of just such a government. Indeed, the launch of one was formally announced at a December 2009 climate change meeting in Copenhagen. That meeting, however, ended in failure.

We now know that the world cannot be conquered through military force alone. So what means are left? The answer is simple: food. More of it will be needed to feed Asia's burgeoning population. The planet's food production has failed to keep pace with its rising levels of consumption, and signs of a new era of shortage are everywhere apparent. Fully a billion people are going hungry in Asia alone.

China faces the worst situation of all. That country became a net importer of food in the early 21st century. As its levels of animal product consumption skyrocket, it is fast becoming the world's biggest importer of soybeans and corn. In terms of sheer quantity, China is far and away the world's largest importer of food. It produced 158 million tons of corn in 2010, but that figure is expected to fall to 140 million by 2025 as desertification progresses in its northwest. (Total worldwide production fell by 23 million tons, or 3.3 percent, between

1980 and 2010 as climate change claimed ever larger amounts of farmland.) Its annual corn imports are predicted to reach 80 million tons by 2025. Soybean imports are also expected to rise sharply, from 43 million tons in 2010 to 60 million in 2025 -- snapping up some 80 percent of world trade in the legume.

India is the world's second biggest producer of rice, after China. In the past, it produced as much as 100 million tons a year, but those levels have dropped under the effects of climate change. The country exported 25 million tons in 2010; by 2025, it is expected to be a net importer. Rising temperatures have also led to a visible drop in wheat production. Levels are predicted to decline from 78 million tons in 2010 to under 70 million by 2025. Over the same period, the country's population is expected to rise from its current 1.2 billion to 1.9 billion, putting it on par with China.

As the U.S. jockeys to maintain its dominance, it will have no option but to use food as a means of applying pressure, leveraging environmental concerns as its excuse for doing so. It is currently the world's biggest exporter of food. It utterly dominates the grain market: first in corn exports (57 percent of total world trade), soybean exports (44 percent), and wheat exports (21 percent), and fourth in rice exports (11 percent). The North American continent has so far escaped the effects of global warming relatively unscathed; indeed, Canada has seen a rise in its food production levels. Cutting carbon dioxide emissions to prevent global warming from progressing is

now something that the whole world needs to work together in doing -- there is no more crucial aim, no greater cause for the future of the planet. It is likely, then, that Washington will demand that food exports be restricted for countries that do not cooperate in reducing the rise in average global temperatures to their 2010 levels. The European countries can be expected to actively endorse this. But China and the other rising industrial powers of Asia, which are obliged to import their food, will be bitterly opposed. Their very survival hinges on their ability to purchase the food that they need from overseas.

This book offers a prognosis for the future of our world based on the insights and understanding gleaned by the author over four decades of research as a food scientist. The UN future forecast reports may be touting the "information age" and the era of global integration, but they pay scant attention to food. It is beyond any doubt, however, that food will have a seismic impact on our world in the very near future. The food wars have been a long time coming. They are now well under way. With this book, I will show that they are, in fact, the trigger that will hasten the very end of capitalism.

February 2012
Cherl-Ho Lee
Solgae Village, Gwangneung Forest

Translation may be the perfect profession for the person who can't seem to settle on any one area of interest. My bookcases at home testify to my being drawn in any and every direction educationally. As a translator, I am constantly being brought into contact with new ideas, new perspectives, new information, all of which I must process, understand, and present effectively to the reader. My reactions vary as well -- sighs and laughter, yawning and rapt interest, cries of "No kidding!" and eye-rolling. And sometimes the things I read deliver a real shock to the system. *Food War 2030* definitely falls into this category.

I had at least a passing familiarity with the discourse on food self-sufficiency before reading this book, but I was never confronted with the kind of stark, unflinching, galvanizing picture that it delivers. As a specialist in food science, Dr. Cherl-Ho Lee has been privy to all the aspects of the food system -- the very system that nourishes us day in and day out -- and what he has seen is a very troubling landscape indeed. It is an unsustainable system, a trap into which the countries of the world, in all their short-sightedness, have willingly stepped. There is nothing more fundamental to human survival than food, and yet leaders around the world have, for a variety of reasons, put that very lifeline in jeopardy. Nor has much thought been given (by the public, at least) to

the political ramifications of placing one country's food supply in the hands of another. Dr. Lee sees us moving inexorably toward catastrophe, and little that we see around us would seem to suggest otherwise.

Food security is a thorny issue, one that will require a concerted, committed, game-changing response from the people of the world and its individual countries. As I read *Food War 2030*, I kept waiting for the solution to it all, but the suggestions that Dr. Lee ventures are cautious. He offers a valuable, vital perspective on the issue as a specialist whose own country's leaders have been all too casual about their own food security. Years from now, people may look back at its predictions as uniquely prescient. We would do well now to listen closely -- and think hard.

January 2013
Colin A. Mouat

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"Keep Wheat out of Siberian Fields"

October 1995. We are in the laboratory of Dr. STEVENSON at the Georgetown Biotechnology Institute. The silence is broken by the ringing of a phone. STEVENSON pushes aside a mound of documents on his desk and picks up the receiver.

At this moment, he has just found a new lead in an elusive problem of genetic recombination. By studying a hardy green onion that survives the winter without freezing, he has successfully isolated a gene for cold resistance and transplanted it into the wheat genome.

STEVENSON (*wearily*): Stevenson.... (*with a start*) What's that? You want me to give a briefing at the President's Office on my findings? Yes, sir, I understand. Yes, I'll have everything ready.

His hand trembles as he puts down the receiver.

The airplane begins its slow descent in the capital. From the air, the landscape has little to distinguish it from any other

city: buildings sprawl like gravel over a broad, flat expanse by the sea. STEVENSON's eyes go to the parliamentary building, its dome roosting grandly atop it like the hat on a mandarin's head. Around it sit the buildings of the national museum, laid out in their characteristic "U" shape. Ringing them are the different administrative offices, their imposing façades built expressly to project a sense of high significance.

The actual name of the museum is "the Institutes." The structures clustered around the parliamentary building included museums of history, natural history, science, aerospace science, art, and world culture. One look inside is enough to explain the complex's name. Its buildings stand four to five stories - the second and third occupied by exhibition spaces, the upper one or two home to the laboratories where curators do their research. They, the curators, are the heart and soul of the country's proud tradition of historical, cultural, and scientific research. The institutes themselves are a repository for the knowledge gained by humanity over the years; the presence of the legislature and executive nearby is symbolic of the country's deep foundations in knowledge and science.

The small conference room at the presidential palace has a stately brown mahogany table at its center. Around it sit ten people, among them the CHIEF OF STAFF (CALVIN), the MINISTER OF AGRICULTURE, the PRESIDENTIAL SCIENCE AIDE,

the DEAN OF AGRICULTURAL SCIENCE at Smith University, and a CURATOR from the history museum. CALVIN speaks first.

CALVIN: I know you're all very busy, so we appreciate you coming out like this. The reason we asked you here today is to discuss ideas for a national policy response to the Biotechnology Institute's development of cold-resistant wheat seeds. Your suggestions will be relayed to the president. First, we'd like to hear from Dr. Stevenson, and then we'd like to ask the rest of you to give your thoughts.

A visibly tense STEVENSON fumbles to open up his laptop. The first slide is projected on the screen. It reads "Development of a Cold-Resistant Wheat Strain Through Genetic Modification."

STEVENSON: How is everyone today? I'd like to begin by thanking all of you for all your interest in our findings.

As you know, herbicide-resistant soybeans and insect resistant corn strains have been developed over the years through a process called genetic recombination. These strains have since gone on the market and are now used all over the world. Early on, there were some questions about their safety, but they've been used to grow food throughout the world for years now without

any problems. In fact, they've only increased in recent years.

Now, a lot of the questions that have been raised about these new strains of soybeans and corn have come from people in Asia, South America, and Africa. These are staple crops for those regions, and the main issue has been that we tend to use these varieties for feed rather than food. So our institute looked into the possibility of using genetic recombination for something that's a staple for us, namely wheat.

And what we came up with was the idea of developing a strain that can withstand freezing conditions. This would allow us to grow crops in the frozen pastures of northern Canada and Russia, which are currently going unused. We thought this would help tremendously in alleviating the global food shortage that people are predicting for the future.

He clears his throat.

So what we did was isolate a cold-resistant factor from a green onion that survives under subzero conditions, and splice it into the wheat gene. In doing so, we were able to lower the minimum cultivation temperature by three to four degrees Celsius. Over the past two years, we've been testing the new strain for safety. We've done

a battery of chemical analyses and enzyme reaction tests, and we spent a year feeding the wheat to lab rats. So far, we've found no difference at all from regular wheat. And since the gene for this new strain comes from onions, which are already edible, we've determined that there's little likelihood of the kind of major safety concerns that arise when you take genes from other species like bacteria and inedible organic matter.

Consumers' association president JUDY MASON, a large woman, breaks in almost as soon as the words are out of his mouth. As she speaks, she fiddles with a long necklace that droops down over the chest.

MASON: I think consumers are worried enough about genetically modified food. They aren't going to like hearing that we've genetically modified something that they eat every day like wheat. We all know what happened when that beer company tried using GM rice a few years back. People were up in arms, and they ended up having to cancel everything.

You're telling us that you've done scientific research and found no safety issues with GM foods. But science isn't perfect. What happens if we grow food with this technology and it ends up causing health problems? It could be catastrophic.

When you grow corn and soybeans, you're extracting the syrup and oil and then using the rest for feed. That means you can filter them one more time before using them as ingredients. But wheat is different. You mill it, and you eat it. People aren't going to accept genetic modification. The government has a duty to protect the public's health, and I don't think it should allow the growing of these crops.

By the time she finishes, her voice is at a noticeably higher pitch. Silence momentarily fills the room. Dr. HUDSON, a professor of molecular biology at elite Norwich University and head of the national biotechnology institute, has a naturally authoritative bearing, but is tentative as he begins to speak.

HUDSON: It seems like we've been having the same convertsation over and over again about the safety of bioengineered foods. Scientists all over the world have agreed that they're perfectly safe.

Now, obviously this only applies to things that have been thoroughly tested for safety. And we're especially thorough about testing things when you're splicing genes in from an organism that we don't typically eat. All the GM crops that are currently being grown have been painstakingly examined for their impact on the human body and the environment. They are only okayed for import

and distribution after first meeting the safety standards set by the countries doing the importing.

Nothing is 100 percent pure. In science, you judge what's possible based on a 95 percent probability level. One thing is clear, though -- ever since genetically recombined grains were first developed, we've been feeding GM corn and soybeans to mice in nearly all the world's laboratories, for dozens of generations, and not one of them has shown any signs of a problem. This country is the world leader in biotechnology, and the new GM strains that our companies have developed are in use all over the world. We are positive of the safety of our bioengineered foods. They're going out unlabeled, and people are eating the new corn strains and soybean strains. Most of the tacos and other corn-based foods eaten by the South Americans and Mexicans here are made with GM corn, and demand has never been so high. Most of the tofu and soybean-based foods that Asians eat are made with GM beans, and no one complains. This simply wouldn't be the case if they had even the slight sense of them being different from the old varieties.

ANDERSON, the commerce secretary, seizes the opening.

ANDERSON: Precisely. The debate over the safety of GM grains is, for all intents and purposes, over. Now, the Eu-

ropean Union did put up a big fuss about the safety of GM farm products. They made the import conditions more stringent and required labels for distribution. But if you actually meet the experts there, every one of them will tell you that this is purely about politics, not safety.

The whole "safety" debate over GM products is nothing more than a new kind of trade barrier intended to block cheap corn and soybeans from coming in from our country and the big South American grain producers. In fact, many European countries have been pushing lately to allow GM crops to be grown within their own borders. Bioengineered foods are the way of the world now, and all the experts are predicting this will only be more true in the years to come. Especially with signs of a global food shortage in the air, pretty much everyone agrees that biotechnology is our most credible option for addressing the crisis.

TERRY SCHNEIDER, a curator at the history museum, has been sitting quietly the whole time. The distinguished scholar earned his doctoral degree in history by examining the effects of the Korean War on livestock disease transmission. His focus now is on the effects that biotechnology developments would have on the country's agriculture.

SCHNEIDER (*cautiously*): Dr. Stevenson's research seems both extraordinary and timely. I have no doubt that it will

be key in solving the coming food shortage.

But I've also given some thought to what would happen to our wheat industry if these new cold-resistant strains are planted in the Siberian steppes or the Canadian tundra. As you know, we're the world's top exporter of wheat. We supply 28 million tons of it to Japan, Korea, and countries all over the world. We're also the biggest corn exporter: 52 million tons of it, more than half the global trade. *And* we're the biggest soybean exporter -- 35 million tons of them.

What I mean to say is, grain is where our wealth comes from. And that's not all -- it's also the most powerful weapon we have to control the world and the other countries in it. Suppose other countries do start growing cold-resistant crops. Imagine the Siberian steppes turning into corn and wheat fields. Where does that leave our agriculture? Have you thought about how we're going to control the rest of the world then?

When perestroika triggered the collapse of the Soviet Union, it all started with a bread shortage. Our grain trading policy was a big part of that. The reason leftists have failed to really gain a foothold in Africa and South America is because we hold the reins to the food supply.

Strictly in humanitarian terms, I agreed that cold-resistant wheat is a positive development. But now is not the time for us to be marketing it. Before we do that,

we need to have a clear strategy on how our farming industry is going to respond to bioengineering developments -- to say nothing of our approach to foreign relations.

The room is suddenly somber. His words have reframed the whole discussion. How will bioengineering transform society over the next two decades? The next five decades? Were they making preparations? Did they have a strategy? Now they have an entirely new question on their minds: what the benefits and costs would be for the country, and how to adjust the course of events in a way that benefits the national interest.

The Minister of Agriculture, ROBERT HALL, has a slightly piqued expression on his face as he speaks.

HALL: Hats off to Dr. Schneider for his insights. Truth is, GM crop development to date has gone exactly the way we've needed it to for our agricultural production.

We are the world's breadbasket. We lead the way in agribusiness, and it's been crucial for our system that we develop strains that are resistant to herbicides and insects. This has allowed us to develop large-scale farms where plants are dusted with pesticides and herbicides from planes. In the process, we've established ourselves as far and away the world's number one grain exporter.

We've developed biofuels to replace gasoline with alcohol brewed from corn - as far as applications for that grain go, the sky's the limit. We'll be able to sell our farm products at high prices for decades to come. We set the grain prices for the rest of the world.

Remember those days when we used to worry that farming surpluses might cause grain prices to drop? Yeah, that's all over now. It's turning into a producer's market -- the price is what the producer says it is. Land prices are rising in our farming communities, and farmers are getting richer. Now, suppose cold-resistant wheat strains do go out on the market and get planted in the Siberian wasteland. Do we even need to ask what would happen? We might never recover from the blow to our farming industry.

As the person in charge of this country's agricultural policy, I feel we need to give this matter some serious discussion.

BOB DORL is a parliamentary representative from the southern cornbelt state of Canowa. He has a big voice to match his big frame.

DORL: I thought we were supposed to be talking about the safety of GM wheat and the reaction from consumers. And here we are talking about national security? To say

I'm astonished would be an understatement.

Look, everyone knows that our whole approach to political diplomacy is centered around our strength as a global food supplier. The reason leftists in Africa and South America have faltered is because those countries need our food aid. In Asia, rice is the staple, so they're still a bit out of our hands. But that region is going very Western very quickly, and people are eating a lot more wheat and corn. There's also eating more animal products there -- economic growth will do that to you. So they're becoming a lot more dependent on our meat and feed grains.

This is a whole new ball game. Food rules, and as the world's superpower we've been able to take control. Helping to plant wheat in the Siberian steppes would be completely incompatible with our security interests.

Dead silence. After a moment, CALVIN rushes to wrap things up.

CALVIN: Okay, so we've heard a lot today about developing and marketing cold-resistant wheat. I'm sure you've figured this much out, but our position is that it would be premature in many ways for us to market it.

I'm going to write up everything we've talked about today and report it to the President. It's been a long day.

Thank you all for coming.

** Note: Despite continued developments in biotechnology, no cold-resistant crops have yet been developed or marketed.*

The Uruguay Round

"In the red corner, weighing in at 150 kilos, it's the all-American champion -- Tom McDonald!"

The roar from the box was deafening.

"And in the blue corner, topping out at 60 kilos, we have our Asia-Pacific champion -- Michael Li!"

Silence. Over in the blue corner, Li was looking around, his saucerlike fear-stricken eyes appearing especially large against his scrawny and frail body.

And so began a strange game -- a boxing match between two athletes from different weight classes, neither of whom seemed much interested in competing. The people in the stands were, by and large, large -- corpulent and greasy and noisily rooting for red. Over in the gate section, skeletal onlookers were pacing about, stopping periodically to peer inside the ring with nervous eyes.

"Clang!" The gong sounded. Round One.

The athletes were feeling each other out, cautiously circling the ring and looking for weaknesses. But after getting

enough of a look at his opponent's physique, McDonald let loose with an upper cut. Li fell flat. The referee ran over and hoisted him back to his feet.

And so it went for eight more rounds, Li laid low by blow after blow. Finally, the knockout came. Off he went on a stretcher.

This was the satirical treatment that one foreign correspondent offered in describing the Uruguay Round negotiations for the General Agreement on Tariffs and Trade (GATT).

The Postwar Global Economic Order

After the Second World War ended, a new global order began to take shape, with the triumphant United States at the helm. Having emerged victorious on the European front and in the Pacific War, it channeled its energies now into economic growth based on industry and international trade, putting to work its abundant store of resources and advanced levels of science and technology.

The International Monetary Fund (IMF) and International Bank for Reconstruction and Development (IBRD) were established in 1944, when the war was in its late stages, to promote economic cooperation among the developed nations of the West. In 1945, the U.S. issued the Proposals for the Expansion of World Trade and Employment, calling for the introduction of the International Trade Organization. The ITO

charter was adopted in the Cuban capital of Havana in 1948. (It subsequently became known as the "Havana Charter.") It set terms for international trade and policy guidelines for the different countries participating, advocating the organization's establishment as a way of enforcing them. But the terms were too idealistic by half, with an exclusive focus on lowering tariffs and liberalizing trade. Fifty-three nations signed on, but the charter failed to earn ratification in the Congress of the United States -- the very country that had proposed it in the first place.

Meanwhile, delegates from 23 countries met in Geneva in 1947 to discuss the U.S.'s proposed tariff reductions. After some wrangling, they managed to work out a tariff schedule that would apply equally and indiscriminately to all participating nations. They incorporated the most realistically feasible tariff and trade provisions from the ITO charter, and the result was GATT. GATT was intended as a provisional measure until the ITO's establishment, but when the ITO charter failed to win ratification, GATT ended up doing exactly what that organization was supposed to: governing the postwar economic order, not only through tariff reductions but through lower import restrictions and the abolition of discriminatory treatment. It went on to take its place alongside the IMF as one of the two pillars shoring up the U.S.-led global capitalist order in the postwar era.

But protectionism would end up making a comeback

as trade liberalization led to increasingly intense competition among exporters. The international economic order had been structured around the unrivaled supremacy of the U.S., but the rise of regional economic blocs like the European Common Market, combined with the streaking economic growth of Japan, ended up triggering its collapse and ushering in a new, multipolar era in which the U.S., Japan, and the EC each constituted its own hub of global capitalism. By the 1980s, the U.S. was facing changes to its industry structure -- an agricultural crisis, the decline of manufacturing, and the rise of the service industry - that necessitated changes to its trade framework. Brandishing the comparative advantage of its agriculture and service industries as its weapon, it used GATT as a means of reshaping the global trade structure in a way that would reestablish its dominance in the world economy. This was the Uruguay Round.

Girding for the UR

The beautiful port city of Montevideo was the host city for the GATT conference of September 1986. The events began with an agreement to hold multilateral trade talks in what would become known as the Uruguay Round (UR for short).

There had been seven previous rounds of major international trade negotiations before the UR. Four took place

before the end of the 1950s, all of them aimed at eliminating protectionism through reductions on import tariffs. The Dillon Round from 1960 to 1962 (named for U.S. undersecretary of state Douglas Dillon) centered on lowering the tariffs that different countries applied to different products. But world trade was increasing beyond the capacity of these reductions to have much effect at all. In 1962, a linear tariff reduction method was proposed by U.S. President John F. Kennedy, leading to the three-year Kennedy Round between 1964 and 1967. The end result was an agreement among the participating countries to reduce tariffs across the board by an average of 35 percent. South Korea joined GATT in 1967.

Next came the Tokyo Round. Discussions began in the Japanese capital in 1973; instead of the linear tariff reduction approach, they focused on coordination of the different countries' rates and non-tariff barriers. These talks went on for seven rounds, focusing mainly on free trade for particular items. By the time the 1980s began, there was an agreement among advanced countries on the need for market openness not only for goods but also for services like banking, and for protecting intellectual property rights through bans on the illicit reproduction of books.

UR negotiations concluded in April 1994, and the World Trade Organization (WTO) was launched on January 1 of the following year. The eight years leading up to this saw a te-

dious tug-of-war battle, with the countries of the world sharply opposed on agricultural trade openness. While the U.S. and European Union battled for the upper hand, the developing and underdeveloped countries that made up the bulk of the 140-odd member nations were left to suffer the consequences of the titans' clash. In some sense, the nations of Europe spent these eight years girding for the easing of restrictions on agricultural imports.

The system that finally took shape was one in which traditional European grain importers like Britain and Germany met their own needs with strong support from the state. Statistics show their respective self-sufficiency rates rocketing from 64 percent and 80 percent in 1975 to 114 percent and 95 percent in 1985, and again to 116 percent and 114 percent in 1990. They were now producing everything that they needed, and then some.

Meanwhile, Japan was working desperately to keep its own food self-sufficiency from sinking any further. After plummeting in the years leading up to 1980, the country's grain self-sufficiency has remained stable in the 30 percent range since the 1990s. With the 1999 enactment of the Basic Law on Food, Agriculture and Rural Areas, the country established a plan for increasing overall food self-sufficiency to 45 percent by 2015. But most of the less developed countries entered the WTO trade liberalization era completely unprepared for agricultural trade openness.

Grain Self-Sufficiency Rates for the World's Major Countries

	1970	1975	1980	1985	1990	1995
U.S.	111	174	157	173	142	129
Canada	132	171	181	202	223	172
France	141	152	178	204	210	181
U.K.	59	64	96	114	116	114
Germany	72	80	91	95	114	113
Thailand (rice)	-	-	-	146	138	218
China	-	98	92	94	100	94
Japan	46	40	33	31	30	30
Korea	81	76	54	48	40	28

Korea was a good example of this. In the years after the Korean War, the country was stricken by dire poverty. The shortage left much of the population going hungry. Without money to buy food, they had to rely on the largesse of the U.S. and its agricultural surplus. People subsisted on a diet of thin gruel made with American wheat flour and powdered skim milk. Koreans had never been consumers of dairy products before, and many lacked the enzymes to break down the lactose in milk. Their first exposure to the gruel left most of them suffering from diarrhea. But there was no other food available -- not even the supplies that had existed during wartime. People lined up for their daily servings of the watery porridge, and in the process they developed the necessary lactose enzymes. Eventually, diarrhea became more or less a thing of the past. The special wartime circumstances ended

up making dairy consumers out of a people who had never been that before.

By the early 1970s, Korea was past its food shortage (a period that subsequently became known as the "Barley Hump"). The success of the country's First Economic Development Plan meant that it was now able to import food for the first time in history. The staggering economic growth that followed would lead to a huge increase not only in imports to make up for the food shortfall, but also meat and milk consumption, which led in turn to rising imports of grain for feed. Korea's grain self-sufficiency dropped from 81 percent in 1970 to 76 percent in 1975, and again to 54 percent in 1980. In 1990, when the UR was in full swing, the rate was 40 percent. By 1995, the year the WTO was launched, it had free-fallen to 28 percent.

Why did its food self-sufficiency drop so precipitously? Primarily, this was due to a sharp upswing in animal product consumption during the 1980s. But indiscriminate agricultural import openness -- a product of the UR -- also played a large part. Policies of industrialization and exporting, based on the theory of comparative advantage, had been implemented at the expense of the agricultural sector. While the developed countries had worked during the negotiation period to beef up their production for the coming agricultural market openness, and to take national measures to increase food self-sufficiency, Korea walked into the WTO era com-

pletely unprepared. The most it did was to send representatives of the victimized farmers to the negotiations to shave their heads and hold demonstrations.

How the WTO Free Trade System Affected Developing Countries

During the UR negotiations, Korea opened its market to 1,117 of the 1,420 foodstuffs and agricultural products designated for trade liberalization. The trade volumes for these items were very small, and they were never going to have much of an impact on the agricultural market to begin with. But the import openness that followed the 1995 launch of the WTO began to have a noticeable impact on the country's agricultural infrastructure and food security. The market was opened to another 166 items in 1995, some of them major food resources in Korea: barley, corn, soybeans, potatoes, sweet potatoes, apples, grape juice, cheese, red peppers, garlic, sesame, chestnuts, pine nuts. The following year saw another 15 items included, among them grapes, apple juice, butter, condensed milk, and peanut butter. In 1997, it was pork, chicken, oysters, oranges, tangerines, and orange juice. At this point, the market was open to nearly every imaginable foodstuff but rice.

Rice was what Korea had allowed everything else to protect. But there would be no quarter from the developed

countries. Using every means at their disposal, they set a trap -- sooner or later, Korea would have to open its rice market. This trap went by the name of minimum market access (MMA). The conditions were as follows: the country would have to import just one percent of its domestic rice consumption in 1995 (the first year of the WTO), but that level that increase by 0.25 percentage points each year thereafter, reaching four percent by 2004. The Korean government signed on during the negotiations, figuring that these conditions were nothing it could not handle.

In the long view, however, MMA also meant that the country would be required to import eight percent of its rice consumption by 2014. For all its abundance of domestically produced rice, it would still have to import a mandatory 400, 000 tons a year -- the equivalent of 40,000 ten-ton trucks. Obviously, it would no longer be able to hold out without opening its rice market.

In January 1999, an international workshop was organized in Tokyo by the Asian Productivity Organization. In front of the site, the organizer hung a banner reading "Post-Liberalization Food Security for the Nations of Asia." Over a hundred people attended, including representatives of the thirty or so Asian countries (mostly agriculture ministers), a number of academics and other experts, and representatives of the relevant international organizations. As the workshop proceeded, they began to describe the food issues that their

countries had faced since the WTO system had gone into effect.

Their reports indicated that there were three main types of countries in Asia. First, there were the developed or emerging industrial powers like Japan, Korea, and Taiwan, which had the economic wherewithal to import whatever they needed to make up for any food shortfall. These countries were worried about the devastating effects that trade liberalization would have on their agricultural infrastructure, their farming having borne the brunt of the theory of comparative advantage during the industrialization process: their food self-sufficiency levels were low, and the WTO was tearing down whatever protective barriers they had in place to keep their agriculture going. They were facing a flood of cheap products from the major farming powers, leaving their own agriculture on the brink of unsustainability. At this rate, they said, they were headed for food dependency, placing them in the unenviable position of serving at the beck and call of a handful of major food producers. The U.S. and the developed countries of Europe were guaranteeing the livelihoods of their own farmers with highly developed social security systems. They also had a strong support system in place for areas that did not have a direct impact on agricultural trade, including subsidies for environmental preservation. This meant that they had the option of circumventing the terms of the WTO and supporting their farmers at the state level. But the emerging countries could not -- their hands were tied by

the WTO. Opening their markets under these inequitable conditions, they argued, would be tantamount to abandoning their own agriculture industry. At the same time, these were also countries that had developed their economies through exporting non-agricultural products on the global market. They had no option about joining the global trade liberalization order, whatever the costs to their agricultural sector. Ultimately, they were forced to give up on agriculture for the sake of the national economy -- leaving them exposed and vulnerable on the front lines of the food wars.

ASEAN countries like Thailand, Vietnam, and Indonesia were not especially averse to the WTO. To begin with, they were relatively self-sufficient in terms of food. Some of them were double-and tripple-cropping rice for export, so they welcomed the increase in exports that came with trade liberalization. They wanted to promote world trade by eliminating protective barriers, and demanded that Japan and Korea open up their rice markets -- the sooner the better.

Finally, there were the poorest Asian nations, including Bangladesh, Pakistan, and Iran. They lacked both food and the money to purchase it, leaving them dependent on food aid from international organizations and charity groups. But because the WTO system forbade grant aid (which might distort the global trade order), they faced a steep decline in their food supply. More and more people there were suffering in the throes of starvation. It was a tragic plight: caught in the

crossfire of a rich countries' trade war, and left to go hungry.

Originally, the plan for this workshop had been to hear about the food security situation in the different Asian countries and develop some joint recommendations for the international community. But the situations turned out to be so vastly different that all they could do was to confirm that, yes, this was the situation.

"Westernize Koreans' Eating Habits"

Room No. 318 of the Korea University School of Life Sciences and Biotechnology. A graduate seminar is under way on comparative food culture. Today's topic for discussion is "The Establishment of Eating Habits and Their Socioeconomic Repercussions." Presenting first is student LEE JIN-SOOK, who lived abroad for several years while her diplomat husband was stationed overseas. The assertive mother of three began her graduate studies upon her return to Korea.

JIN-SOOK: Okay, so today I'm going to talk about my own experience with how our eating habits and tastes in food get established.

I traveled to the U.S. with my husband two months after giving birth to our first child. It was difficult raising a child there on a public servant's salary. I breast-fed her for a while before weaning her off when she was about three months old. I would prepare the food and feed it to her myself. But the lean meat at the super-

markets there was too expensive and too tough for a baby to eat. So I bought beef liver - cheap and nutritious -- and boiled it up with carrots, potatoes, and rice. I put the whole thing in the blender and fed it to the baby. Nowadays, I can whip up some fried liver, and the first one will clean the plate all by herself.

KIM YU-RIM, one of the other students, wrinkles her nose.

YU-RIM: Fried liver smells foul. You can't get rid of the stench, no matter how good your oil is. Girls usually hate that.

JIN-SOOK: Exactly. But our second was an even funnier story

We had her in the U.S., and my mother came out to look after her. Now, Boston is famous for lobster. So we would sometimes boil up a lobster for her. And my mother would sit next to her and slice up the meat and put it in her mouth -- like a mommy bird feeding her baby. These days, we can boil up a crab, and the second will scarf it down so loudly that it kills everyone else's appetite.

MALE STUDENT (*jokingly*): They say that if a pregnant woman eats crab when she's pregnant, the baby comes out walking sideways.

JIN-SOOK: Well, ours isn't old enough to get pregnant, so you don't have to worry about that.

Anyway, what really convinced me that the first foods we eat end up determining our tastes and eating patterns as adults is what happened with our third. She was conceived in the U.S., and then I had her back in Seoul. I was very busy with my mother-in-law and everything, so I didn't have a lot of time for the baby. I breast-fed all three of them, but when I was making food at home for the third, I found it was easiest to cook eggs.

I'd mix them into a rice porridge, mash it up, and that was our "Korean baby food" for our third. And she just adores eggs today. I'll cook up a rolled omelet, and she'll wolf that down without making a sound.

So it seems from my experience that the food that babies first encounter when you're weaning them off breast milk -- their first baby food -- is an important determinant of their taste in food when they reach adulthood.

Another student, CHOI BYUNG-JIN, has been listening intently the whole time from the front row. A graduate of the food engineering department, he is a diligent working student who attends graduate school while holding down a job in the research and development office of a dairy company.

He raises his hand.

BYUNG-JIN: Listening to your presentation has given me an idea. If our company made kimchi-flavored baby food -- even just a hint of the flavor -- kids would grow up loving kimchi. A lot of the younger mothers these days are worried because their kids hate kimchi. They know it's good for them, and they're frustrated that their kids won't eat it. We can market ourselves as the company whose baby food will make your kids love kimchi. I bet we'd make a fortune!

Pause.

I probably shouldn't be talking about this. Company secret.

He slumps in his seat as the other students chuckle.

PROFESSOR: I think it's a great idea. One of the reasons Koreans love kimchi so much is because of that tradition from when they were babies, and their parents or grandparents would wash it up, chop it, and put it in a baby spoon to feed it to them. The younger mothers these days don't really understand the value of that tradition. Ms. Lee's presentation seems to provide some proof of this, and I think it really resonates.

What we're mainly trying to do right now is use the scientific method, doing animal testing and analyzing and getting results in a relatively short time. But many food science studies eventually have to answer the question of how *people* respond. I think Ms. Lee's presentation provides us with a kind of long-term human physical response test, which can be very valuable. Great job.

Okay, next we have Jang Woo-jin.

JANG, a small, wiry, slightly effeminate man in his early middle age, speaks somewhat timidly as he begins.

JANG: I found out something about the origin of my own eating habits and tastes in food from talking with my mother. I was born in 1967, and she was an elementary school teacher in Seoul.

During those years, she told me, the thing the young mothers in Seoul coveted more than anything else in the world was baby food -- Gerber and Heinz. These Korean mothers who were going through the Barley Hump saw those little jars with that chubby Western baby smiling at them on the label and felt so envious. But if you wanted it, you had to go to a pharmacy or one of the high-end department stores.

Now, there was one way to get it relatively cheaply. They would buy it through the women at the PX, the

store on the U.S. army base. Back then, Korea was too poor to import that kind of baby food officially, so virtually all the baby food in the country was from the PX. My mother says I loved it. That may be why I love Western food so much now -- hamburgers, KFC, potato chips, you name it.

And what I realized from talking to her is that the taste for Western food among those of us in the younger generation has a lot to do with that Western baby food. Nowadays, you can still open up one of those Gerber's jars and smell that strong scent of butter and meat broth. For the people who grew up on that, things like hamburger and cheese taste like home.

I don't think there are any official figures on how much baby food leaked out of the PX illegally during the '60s and '70s, but I'll bet it was a lot. I mean, I grew up on the stuff, and we were by no means rich. I don't think it was something that PX employees could have funneled off and put out on the market. I sometimes wonder if it wasn't a deliberate attempt to change Koreans' eating habits

PROFESSOR (*to the class*): How many of you grew up eating Gerber and Heinz baby food?

About half the twenty students raise their hands.

That was a very interesting presentation, and I think it touches on a kind of Achilles heel for Koreans. As a people, we suffered through a great deal under Japanese colonial rule and the Korean War. We received a lot of help from the U.S. and other Western countries, and that was what laid the groundwork for our prosperity today as a capitalist democracy. The U.S. in particular helped us when we were going hungry in the war by giving us flour and powdered skim milk. Some people have said that the war was very helpful for the country disposing of its agricultural surplus, but I think that's a pretty ungrateful way to look at it.

Now, obviously the U.S. didn't just *give* us that grant aid in wheat. We signed the PL480 agreement, which committed us to only importing wheat from the U.S. after the war. That agreement finally elapsed in the mid-1990s, which allowed us to start importing wheat from Australia and Canada.

Korean eating habits did change a lot in wartime when people were going hungry. In the past, our staples had been rice and barley, but we began eating so much flour and dairy that they ended up becoming new staples for us. Then came *ramen*, and by that point Koreans were eating wheat at least once a day. Young people were taught that they had to drink milk. Some of the nutrition professors who studied in the U.S. taught that

Westernized food *was* superior nutrition. What really got us consuming more of the Western staples like milk and meat were the nutrition and diet improvement campaigns of the '60s and '70s.

But the consequences were huge. Korean eating habits changed tremendously in the 1980s. The daily amount of animal products people consumed each day nearly doubled, from 98 grams to 183 grams. It was this explosive increase in animal product consumption that led to our livestock promotion policy. We began importing large amounts of dairy cattle and feed grain, and our grain self-sufficiency dropped below 50 percent. We came to rely on imports for most of our food.

This increased consumption of animal products inevitably led to a rise in health problems among the adult population. We saw huge jumps in diabetes, hypertension, and cancer. Childhood obesity became a major issue. Ultimately, this Westernization of eating habits had the effect of putting Korea into a kind of vicious cycle: our lower food self-sufficiency meant we had to rely on other countries for our food, and people have also been careless in their livestock raising practices in a very small country, which has caused serious environmental problems and a major threat to public health.

One of the students, PARK EUN-SOO, shoots her hand up.

EUN-SOO: Are we the only country that's suffering these kinds of side effects of Westernization, or are there others? And how do we stop it?

PROFESSOR: Westernization isn't just a Korean thing. It's a global trend, and it's especially noticeable in the emerging industrial powers. Japan is ahead of us in that sense, and we're also seeing a strong move toward Westernization in the poorer countries of Southeast Asia and Africa. It's human nature to want to live better, more comfortably, and to look better. This trend -- especially the Westernization of eating habits -- is a wonderful thing from the standpoint of the Western powers. It means a bigger market for their products.

Sometime around 1970, there was an organization under the United Nations called the Protein Advisory Group -- "PAG" for short. It was made up mainly of nutrition researchers, and their goal was to find out about protein shortages around the world and increase the supply of food with protein in it to the different countries. There was a severe food shortage going on at the time in Asia and Africa, and a lot of diseases stemming from a lack of protein. So the group went around to all the different developing countries and advised them on the importance of protein, and how they needed to increase their supply.

Now, as I'm sure you now, protein means animal products. And if these poor countries were going to eat more animal products, that meant either importing them from one of the advanced countries, or importing feed and raising more livestock themselves. Was this really going to help them? Of course, the group did recommend new protein sources -- things like single-cell protein (SCP) and soy protein. But SCP production was still in the research stages, and soybeans weren't really used outside of the Northeast Asian countries where they were traditionally grown. So whose interests exactly was the group working for?

I went to Japan in the early '70s and met executives at the big food companies there, and they would always brag about how Western their diet was -- toast for breakfast, and all that. But then the '80s came around, and you started to see these big campaigns in Japan touting rice as a source of nutrition. They recommended cooking it for your children every morning. The government was actively campaigning for this. Even today, you'll see them talking about how good the quality of their rice is, and teaching people that "Japanese people like Japanese rice."

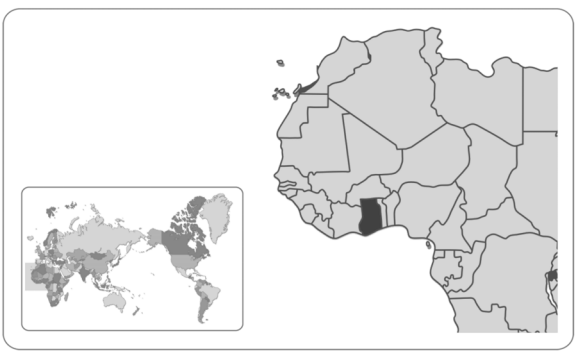
Having the right eating habits - by which I mean economical and healthful ones -- is crucial for personal health and a happy life. But in a larger sense, it's also

something the state needs to be working toward for the sake of the economy and food security. Right now, there's a no-holds-barred competition under way for economic growth among the countries of the world. They're fighting a trade war. Food is something we need to survive-we can't go a day without it. We can't just leave our food supply in the hands of others. The developed countries of the West are all self-reliant for their food. If we act foolishly and fail to protect ourselves, there isn't anyone out there that can or will help us.

Okay, that about wraps things up for today's discussion on the shaping of eating habits and their socio-economic repercussions. I hope that all of you will continue studying this field. I think today's presentations gave us some ideas about what we need to do to instill the right diet. Thanks, everyone.

Ghana's Story

Located on the West African coast, the Republic of Ghana is a beautiful country widely known to Europeans as the "Gold Coast." It borders Côte d'Ivoire to its west, Togo to its east, and the Atlantic Ocean to its south. Historically, it was one of the biggest victims of the European slave trade. It was a Dutch colony from the 16th century to the 18th, when it fell into British hands. Its people went through a history of un-



[The West African country of Ghana]

speakable suffering before achieving independence from Britain in 1957.

Ghana is a farming country. Seventy percent of its 24 million people work in agriculture. Corn and rice are major grains, but the main crop is cacao, which accounts for fully 60 percent of the country's exports. The country has also been an active contributor to the international community, as the home of onetime UN Secretary-General Kofi Annan. It has cooperated with the world's advanced nations. It has heeded their advice. And now it faces a grave food security crisis.

In the past, it had a strong, longstanding tradition of policies geared to promoting food self-sufficiency. It focused its energies on building up food production through agricultural subsidies from the government. It produced enough of staples like rice, tomatoes, and chicken that it was able to enjoy relative freedom from food worries.

But things began to go downhill in the mid-1980s. It was a time when restructuring policies played an increasing role in the world economy, with the IMF and World Bank spearheading the push. The prevailing view was that developing countries needed to adopt an approach to economic development founded in the theory of comparative advantage. The world's most preeminent economic experts were saying that underdeveloped countries could only achieve economic growth by increasing their trade volumes. That meant importing cheap food from big agricultural powers that produced

masses of it, and their own national resources and labor force on producing select export items. The parties to the UR negotiations and the WTO were steadily beating the drum for countries to abandon measures to shore up agricultural prices, reduce subsidies on fertilizer, farming equipment, and other agricultural infrastructure, and lower tariffs.

Ghana complied. It stopped subsidizing fertilizer, causing prices to soar. The government also stopped intervening in the agricultural market and propping up prices. Policies to support minimum rice and wheat prices were discontinued. The country's agricultural promotion agency and seed distribution centers were shuttered; financial support came to a halt. The fixed tariff of 99 percent on agricultural imports was lowered to 20 percent. Cut off from their supply of government aid, the farmers of Ghana were no match for the (heavily subsidized) cheap products coming in from developed countries.

In the 1970s, Ghana produced enough rice to meet its demands. In 2002, it imported fully 64 percent of its demand -- a 36 percent drop in self-sufficiency. Rice production in northern Ghana averaged 56,000 tons a year between 1978 and 1980; in 1983, the total was 27,000 tons for the *entire country*. In 2003, the U.S. exported 111,000 tons of rice to Ghana -- while its own government paid a total of $1.3 billion in subsidies to its rice farmers. A government survey estimated that 57 percent of the country's rice farmers would

have lost money had they not received subsidies. The country's production and milling expenses for 2002 and 2003 amounted to $415 per ton of polished rice, which it then exported for $274 per ton -- two-thirds of the cost.

Tomatoes have traditionally been a major contributor to Ghanaian agriculture. They are the main product of the country's eastern highlands. Canning plants were sold off as part of a privatization push, but all of them ended up shutting down eventually under the flood of imports that came with tariff reductions. The companies eating away at the market there were European Union businesses that received massive government subsidies. And as a result, workers at Ghana's tomato farms and canning plants were left without employment. Tomato paste imports rose from 3,200 tons in 1994 to 24,000 tons in 2002, while local production has remained at a low since 1995. Meanwhile, the EU provided 298 million euros in subsidies to its tomato processors in 2004 alone. It also pays millions of euros each year in export grants and operation costs for producers' associations.

Ghana's chicken industry first arose in the 1950s. It grew quickly, reaching peak levels in the late 1980s. But the next decade would see it careering downhill. This swift collapse was the result of government subsidy cuts and tariff reductions on chicken imports. In the ten years from 1993 to 2003, imports rose by 144 percent, most of them European products that were heavily subsidized by their governments.

In 2002, fifteen European countries exported nine billion tons of chicken to Africa, earning 928,000,000 euros in the process, or an average of 809 euros per ton. The governments of European countries paid an estimated 254 euros per ton in subsidies on the chicken that was exported. In the years after trade liberalization, EU chicken exports to West African countries increased eightfold. And some 500,000 poultry farmers in Ghana are suffering as a result. As recently as 1992, they had been supplying 95 percent of the domestic chicken market. Cheap imports drove that market share down to 11 percent by 2001.

In 2003, the Ghanaian parliament voted to raise the tariff on chicken from 20 percent to 40 percent, but this was still well below the previous fixed rate of 99 percent. In any case, the IMF rejected the decision, and the new rate has yet to be applied. According to the IMF's representative in Ghana, the organization told the government that raising the tariff wasn't a good idea, and the government duly agreed. Farmers' groups and NGOs in the country are now vocally protesting their government's actions.

After these complaints from developing countries, the WTO ordered the developed countries to make large cuts to their agricultural subsidies during the Doha Round of negotiations. The U.S. and EU countered that they would reduce their overall trade-distorting support (OTDS) to bound levels, but not applied levels. The former, in particular, made it clear

that it had no intention of reducing its agricultural subsidies from their current levels. Its maximum OTDS (or bound level) stands at $13 billion to $16.4 billion; actual subsidies in 2007 are known to have been somewhere between $7 billion and $8 billion.

Ghana exemplifies a situation facing most of the world's most vulnerable countries. The developed countries desire a cheap, stable supply of the cacao, coffee, and sugar that they need. They recommend that poor, underdeveloped countries earn wealth by concentrating on regional specialties like coffee and cocoa -- things that the advanced countries can't produce -- while receiving cheap supplies of basic needs like grains and meat from the major agricultural powers. The mantra of comparative advantage seems, at first blush, to make sense. And it is, after all, coming from the mouths of the world's most foremost economists.

These regional specialties that the advanced countries prefer are generally produced in tropical regions with cheap labor. They would cost two to three times as much to make in a developed country. So the production of large amounts by poor countries is essential for price stability in the advanced nations.

They are also luxuries, meaning that people are willing to go without if they get too expensive. But grains and other basic foodstuffs are essentials; any shortage would be life-threatening. It is risky in the extreme to leave such items in

the hands of others. A sharp increase in prices would leave the people of developing countries suffering great hardship, jeopardizing their very survival. As self-evident as this is, those countries have still followed along diligently with the advice of the developed countries.

So why is this happening throughout the world? Part of it, to be sure, has to do with the selfishness of the developed countries, but a bigger problem lies with the developing ones. To their political leaders and wealthy class, exporting local specialties is a road to wealth. They want to produce more, and export it at international market prices. These foods that locals don't eat have to be grown on land that would otherwise be used for food, and poor, ignorant workers -- many of them children -- have to be brought into the coffee and cacao plantations in droves to serve as a cheap labor force. Ultimately, it is the leaders of these countries who exploit their own people to satisfy the insatiable appetites of developed countries. Those citizens of developing countries gradually end up succumbing to greater poverty and starvation. Trade liberalization under the WTO has only hastened this worldwide food polarization phenomenon. Many people have awakened to this fact in recent years and are campaigning for the purchasing of "friendly products" that go some (small) way toward mitigating this exploitation.

II The Mad Cow Frenzy

Who Drove the Cows Mad?

The Human Form of Mad Cow Disease

A Stunned Public

Beef Negotiations with the U.S.

The Smart Mobs of an IT Power

New Beef Negotiations

The Wake of the Storm

Who Drove the Cows Mad?

In May 1990, British Agriculture Minister John Gummer appeared on television eating hamburgers with his four-year-old daughter. "There is no evidence anywhere in the world of BSE [bovine spongiform encephalopathy, or mad cow disease] passing from animals to humans," he confidently declared. "On the basis of all scientific evidence available, eating beef is safe." The blonde four-year-old cradled in his arms flashed a bright smile. It was enough to inspire confidence and relief in everyone watching.

Five years later, Stephen Churchill, a nineteen-year-old Briton, died from symptoms that strongly resembled BSE. It was the first confirmed case of variant Creutzfeldt-Jakob disease (vCJD) in a human being. The country went into a panic. People were enraged to have trusted their government and continued eating beef. It would take until March 20, 1996 -- after fully ten people had died -- for the Health Secretary, Stephen Dorrell, to publicly acknowledge before Parliament

that there might be a medical connection between BSE and CJD, a form of malignant dementia in humans. His announcement stunned the world -- a veritable fin-de-siècle disaster. British restaurants were on the brink of shutting down, beef exports from Britain and other European countries were halted, and most of the feed and medical products made with cow- and sheep-derived ingredients were either discarded or suffered export suspensions. Travelers in Britain had to watch what they ate, for fear of contracting BSE.

BSE (also called "mad cow disease") is a chronic, progressive disease that afflicts cattle, damaging their central nervous system and causing death in a matter of months. It mainly occurs in cattle between the ages of four and five years. Holes form in the brain, causing the animal to suddenly become ferocious. It presents signs of psychological disorder and engage sin abnormal behavior such as rampaging -- hence the name "mad cow disease." Early symptoms include sensitivity to even low levels of light and noise, unusual proneness to agitation, a strange bleating sound, unsteady movements, and drooling. The animals also show signs of nervous system impairment (difficulty walking due to pelvis and hind limb problems, hind limb paralysis, muscle tremors), and exhibit weight loss and reduced milk output. In the later stages, they are unable to stand, and may suffer total paralysis. The condition is invariably fatal.

The name "bovine spongiform encephalopathy" comes

from the spongelike condition of the brain tissue observed in postmortem examinations. The reason this disease poses such a grave threat to food safety is because it can spread from animals to humans. It can infect cattle, sheep, goats, deer, minks, and cats as well; in the case of cattle and humans, the etiologic factor is spread through the eating of an animal carcass. As a class, these diseases are referred to as transmissible spongiform encephalopathies, or TSEs. The World Organisation for Animal Health (OIE) classifies BSE as requiring Type B surveillance. In Korea, BSE and scrapie are designated Type 2 infectious livestock diseases.

The first records of TSEs date back fully 140 years to their 1873 discovery in European sheep. It was not until 1936, however, that they were recognized as infectious diseases. Based on what has been found to date, BSE is transmitted through consumption of feed containing flesh and bone fragments from scrapie-infected sheep and BSE-infected cattle. The reason the disease has been so prevalent in Great Britain, scholars believe, is because animal proteins from the intestines and bones of scrapie-infected sheep have been mixed into the concentrates given to cattle, which are natural herbivores. The country also raises a lot of sheep -- four times as many as cattle -- and a huge amount of offal (bones, heads, viscera) is generated when they are slaughtered. In the past, this offal was heated, dried, and pulverized into meat and bone meal (MBM), which was then used as feed for

livestock. From the 1970s onward, MBM entered wide use as a protein source for cattle. Specified bovine offals (SBOs) from the slaughterhouses were processed similarly and used for feed as well.

In early December 1984, cattle at a farm in Sussex were observed behaving strangely. After examining brain matter samples, the Central Veterinary Laboratory concluded that they were indeed infected with BSE. Media reports on this case became the world's first acquaintance with mad cow disease in Britain. The matter drew little attention early on; no one expected it to have any impact on humans. But the number of infections rapidly mounted, reaching 446 by 1987. The British government finally took action in 1988, banning the use of sheep-based feed for cattle and ordering the slaughter of all cows infected with the disease. (Despite these efforts, 122,324 head of cattle had died of mad cow disease in Britain by 1993.)

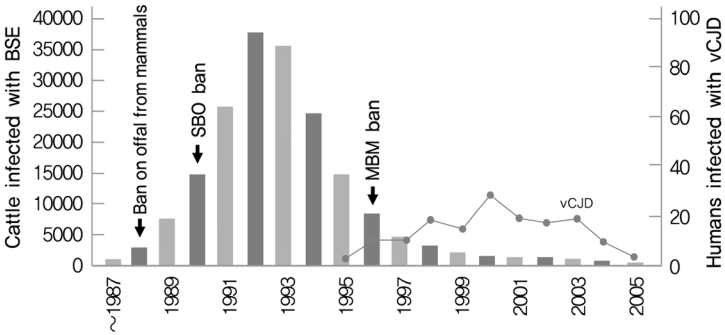
In 1989 and 1990, cases began to emerge in nearby countries. By 2001, there had been 647 infections in Ireland, 602 in Portugal, and 391 in Switzerland. France saw its first case in 1991, and another 343 in the years after. In 1996, Britain and the EU came to an agreement to slaughter all infected cattle. Eighty thousand animals were culled on March 3 of that year, having been deemed either already infected or very likely to become infected. Millions more would eventually be slaughtered throughout Europe, at a cost of billions

of dollars.

Researchers had suggested a possible connection between the disease and the use of ovine and bovine offal as feed, so the British government made the decision in July 1988 to prohibit the feeding of offal from any mammal to cattle. By 1993, the three- to five-year latency period for cattle prions was over, and cases of mad cow disease began to decline (see Illustration below). The 1990 ban on slaughterhouse offal had an even more apparent impact starting in 1996. That same year, another ban was passed down, this one prohibiting any use of flesh or bone matter in feed. By 2005, mad cow disease was believed to be completely under control in Britain. The consensus around the world seemed to be that the disease could be prevented in cattle by effective feed management. Prince Charles, an environmental advocate, described the disease as how "nature hits back" when humans violate its laws.

European livestock farming practices changed dramatically in the wake of the disease, moving away from the corporate model (maximizing meat and dairy production by keeping animals penned and feeding them concentrates) toward more eco-friendly methods. The EU also implemented a stringent permit system that determined the number of allowable animals per farm based on the land available to process their excretions.

Long ago, Korea had its own mad cow tale. Cattle, the



[Mad Cow Disease and vCJD Cases in Britain]

The first BSE infection was discovered in 1986.
Cases throughout Britain peaked in 1992.

story holds, were collapsing from old age and overwork. The folk remedy for making them get back up again was to give them eel. One taste, it was said, and the cow headed to the stream every chance it got to catch the creatures, giving it the strength that it needed to snap its bridle and flee.

Older Koreans never permit the use of meat broth when boiling up fodder for cattle. They also warn against allowing any kind of meat smell. Eating that broth, it is said, causes the cow to go crazy. As the story shows, old Korean wisdom had insight into the reasons for the craziness.

As humans entered the age of industrialized mass production, they developed scientific methods of livestock raising. Instead of being put to pasture to eat grass, cattle were penned in cages and bulked up with high-protein feed. They

were given protein concentrates filled with meat and bone meal that was taken from slaughterhouse offal, boiled at high temperatures, dried, and pulverized. From an animal nutrition standpoint, it was the most economical use of resources. But from an ethical standpoint, it was barbarism: forcing a dumb animal to cannibalize its own kind. Such behavior warranted any punishment that God saw fit to hand down.

The Human Form of Mad Cow Disease

A number of TSEs occur in humans. These include kuru, which afflicts those who engage in cannibalism; Gerstmann-Sträussler-Scheinker syndrome (GSS), which results from a genetic mutation; classic Creutzfeldt-Jakob disease; and variant Creutzfeldt-Jakob disease (vCJD), which is transmitted to humans from infected cattle. Classic CJD is a degenerative neurological disorder in which prions (a type of infectious protein) accumulate in the central nervous system and cause widespread damage to the brain, resulting a variety of neurological symptoms. Most of these cases are what is known as "sporadic CJD," which occurs at a rate of roughly 0.5 to 2.0 for every million people. Typically, it takes the form of a degenerative mutation in people aged 60 and older -- they show signs of dementia at first, and generally go on to expire within one year. The U.S. reportedly experiences around 400 cases of CJD a year, Japan about 150, and Korea somewhere on the order of twenty.

In contrast, vCJD (the so-called "human form of mad

cow disease") is spread to people through the consumption of specific parts of an infected cow. Unlike classic CJD, it is often found in younger people. When someone eats one of these infected parts, there is generally a long, asymptomatic latency period. Once the vCJD symptoms do emerge, however, the patient dies from rapidly progressing dementia -- typically within one year, invariably within two. The infected person exhibits memory loss, strange behavior, signs of retardation and dementia, and unconscious limb movements. Eventually, he is left unable to move his extremities, screaming in pain, and incapable of eating food, condemning him to a slow and excruciating death. Postmortem examination of the brain shows the telltale spongelike holes. There is still no treatment for this disease. And it has an exceptionally long latency period: anywhere from five to forty years may pass before the patient shows any symptoms. In rare instances, it may be transmitted genetically to a child.

vCJD occurs when the prions in an infected cow are spread to a human being. First discovered in 1982 by the U.S. neurologist Stanley Prusiner, prions are misfolded glycoproteins that are found in the neural membranes of humans and other animals. By themselves, they are neither pathogenic nor contagious. But as they build up in the central nervous system, they cause widespread damage to the brain. (Prusiner received the 1998 Nobel Prize in Medicine for identifying them.)

In 1995, a nineteen-year-old Briton named Stephen Churchill died from vCJD, presenting the same symptoms as cattle infected with mad cow disease. By the following year, another nine people had died from what was believed to be the same disease after eating infected beef. The number of deaths in Britain passed seventy in 2000, at which point the mad cow disease panic spread throughout Europe and the rest of the world. By 2008, a total of 208 vCJD infections were found in eleven countries. Most were in Britain (167), followed by France (23) and Ireland (four). The U.S. and Spain had three each, the Netherlands and Portugal two each, and one each had died in Canada, Japan, Italy, and Saudi Arabia. Four of these infections were the result of blood transfusions.

Because mad cow disease is generally found in cattle older than two years, careful screening is required when animals aged thirty months and over are slaughtered. In particular, there is a ban on the consumption of SBOs, which are known to carry a high risk for infection. These include the bones, head, and intestines, as well as brain tissue, the spinal cord, the eyeballs, the pancreas, the lymph nodes, the spleen, the tonsils, placenta, cerebrospinal fluid, and the adrenal glands. The use of high-risk parts and meat with bone matter mixed in is prohibited. This applies not only to food, but also to medications and cosmetics prepared with cow blood and organs.

A Stunned Public

The countries of Europe were duly shocked at the early reports in 1996 about mad cow disease's transmissibility to humans, and responded with a ban on the exportation of British beef. This came at a time when an integration drive was leading to far-reaching policies for market openness among the different nations. Before 1988, British cattle were being exported to countries throughout Europe and the rest of the world; its beef was a major export to nearly every European nation.

In an effort to protect their own agriculture industries, Germany and France moved in the late '80s to limit the importation of British beef, purportedly because of the risk of mad cow disease spreading to human beings. They were also agricultural rivals, and had no clear scientific basis for their position, since there had been no real studies of mad cow disease. In the event, the mad cow disease cases in Britain gave them the excuse that they needed to block the imports. When people did contract the disease after eating infecting

beef, the EU immediately moved to ban all British beef exports. Beef consumption in Britain fell by more than half. Travelers in the country steered clear of beef; diplomats and trading company employees had it flown in from home.

But by then, infected cattle were being discovered in most of the Western countries, including Ireland, Switzerland, France, and Italy. The British beef embargo began looking especially unconvincing in 1997, when a case was discovered in Germany. Not only that, but research was suggesting that boneless beef was safe, and that there was little risk of infection for humans so long as the particularly dangerous parts -- the head, intestines, and spine -- were removed. The two-year, eight-month ban of British beef exports was lifted. At this point, mad cow disease was still seen as a freak illness that only affected the meat-eaters of Europe.

What truly touched off the worldwide mad cow disease scare was the discovery of infected cattle in non-European countries: Japan in 2001, and Canada and the U.S. in 2003. With this, the disease was now reaching beyond Europe and into Asia and North America. In Japan, three animals were diagnosed in 2001 alone.

Asia's first case came in September of that year, when a dairy cow in Japan's Chiba Prefecture was confirmed by the British Central Veterinary Laboratory to be infected with BSE. A state of emergency ensued -- not just for livestock farms,

but for all related industries. Agriculture minister Tsutomo Takebe reassured the public that the disease was only transmitted through the brain, spinal cord, and eyeballs, and that they would be safe as long as they stayed away from those parts. People were unconvinced. Japanese beef consumption dropped by 42 percent. In October 2001, the government banned the use of feed with flesh and bone matter and stepped up its BSE testing on slaughtered cattle. Some three million head were examined, with sixteen testing positive. In two of these cases, the cattle in question were relatively young: 21 and 23 months. The country passed a law requiring BSE testing for all cattle, making it the only country in the world to do so. The reason was twofold: if the disease did spread to Japan, it would be able to reassure the public that the beef was still safe to eat, since everything was being tested, and it could also secure an international trade advantage. However, examining every cow at the country's hundred or so testing facilities was also enormously costly and labor-intensive. Japanese beef became the world's most expensive.

In May 2003, an infected cow was discovered in northern Alberta. Fortunately, it had been culled as infirm in January, prior to the diagnosis -- it had been unable to walk. The remains were disposed of rather than being used for food, though they do appear to have been processed as meat and bone meal (MBM) and fed to non-ruminants. The infected animal had been born in Canada and was somewhere be-

tween six and eight years old at the time of its death. For six months before dying, it shared its space with eighty other animals, which were later found to have been come from two separate livestock supply lines. Twenty-seven hundred head of cattle were culled and disposed of, but careful testing on two thousand of them aged over twenty-four months showed no additional infections.

The Canadian Food Inspection Agency (CIA) banned the use in food of hazardous parts (the skull, brain, spine, ganglia, tonsils, and distal ileum) from cows over thirty months old. It also barred the sale of any food containing these parts, or its importation from regions where a BSE risk was present. It strengthened its tracking system for cattle, and increased the portion of the 3.25 million head slaughtered per year in the country that were screened for BSE from eight thousand to thirty thousand.

Meanwhile, the price of Canadian beef sank from $107 to $30 per 100 kilograms in the space of just eight weeks. An embargo cut off U.S. market access for what had previously amounted to 1.1 billion pounds of beef exports per year. Canada had been exporting 50 percent of its beef production, and 70 to 80 percent of that had gone to the U.S. market. To make matters worse, second and third cases were discovered in Canada in January 2005. One was a cow born in 1996, before the country's ban on feed with flesh and bone matter, while the other had been born a year after that

ban. The discovery sparked fears that the BSE risk would not be going away any time soon.

On December 23, 2003, the U.S. Department of Agriculture announced that a cow slaughtered exactly two weeks before in Moses Lake, Washington, had tested positive for BSE. The following day, its Food Safety and Inspection Service (FSIS) pulled 10,410 pounds of beef from cattle that had been raised alongside the infected animal. News of this was aired around the world on the CNN network, and the repercussions were global in scope. One country after another banned U.S. beef imports. CNN had noted that 2003 beef exports were valued at $3.5 billion; BSE-related losses, it said, could reach ten figures. A number of countries imposed embargoes, Korea and Japan among them. But the price of beef in the U.S. itself quickly recovered from its initial dip. The country's dependence on exports was relatively low.

Washington went on to announce that the infected cow had been imported from Alberta in August 2001. It was six and a half years old, meaning that it had been born before Ottawa's 1997 ban on MBM in feed and had likely become infected through contaminated feed. In July 2004, the U.S. Food and Drug Administration (FDA) and FSIS announced a ban on specified risk materials (SRMs), cattle small intestine, downer cows, unscreened cows, and mechanically boned beef.

The month after the report on BSE in the U.S., the Korean government said that it would be suspending all de-

liveries of lean meat, spine, bones, viscera, and processed meat products from U.S. cattle that were then being held in quarantine storage following export. It also announced a temporary halt to the sale of any intestines, spine, and bones from U.S. cattle that were then in distribution. The agriculture ministry said that 44,300 tons of cow by-products containing SRMs (intestines, spine, and skull) had been imported from the U.S. that year as of December 24, and that 5,500 tons of this was from Washington State, where the infected cow was found. However, it did not have information on how many SRMs were then on the market.

U.S. imports accounted for fully 44 percent of Korean beef consumption at the time, so it was predicted that an import ban would inevitably lead to a drop in the domestic beef supply. But the market situation took an unexpected turn. Not only did shocked consumers reject beef after the BSE reports, but restaurants that used imported product saw their patronage plummet. A newspaper article from the time gives some indication of the market situation post-BSE scare:

> The imported beef section at this downtown Seoul discount store has been very quiet since the BSE scare began. Retail sales of imported meat dropped off by about 60 percent after a cow infected with BSE was found in the U.S.

Things were especially bad at Chuseok [one of Korea's two major holidays] and year end, usually the best time of year for retailers. After suffering a sales slump throughout the year, they are now being hit with a worst-case scenario for December, as the BSE panic couples with avian influenza fears.

Department stores held year-end sale events throughout the month to turn their poor sales figures around, but were left disheartened when the predicted customers failed to materialize. Discount sellers had done a bit better this year, but the year-end meat crisis had them scurrying to replace their U.S. beef supplies with Australian meat.

Two to three stores close per day at Majang Beef Market after BSE Scare; some switching to pork, Red ink pools: "We used to sell 10 tons a day, now it's less than one"

Chills hits beef rib and oxbone soup restaurants

The time was noon on the 28th at the Majang Meat Market in Seoul. Forty-two hundred stores large and small line the 600-meter-long T-shaped avenue here and the network of side streets branching off it, but there's one thing missing: customers.

Instead, there are only merchants looking through piles of innocent leg bone that has gone unsold. Typically at this hour, wholesalers and retailers are dining on trotters restaurant before carting off rafts of meat, or enjoying beef sashimi over a couple of glasses of rice vodka. Today, the market is quiet as a church, the only noise a "trot" melody playing on the speakers.

This has traditionally been the preeminent meat market in the greater Seoul area, accounting for 65 percent of all meat supplies for the city and its environs. But BSE fears have left it a virtual ghost town.

Yang Sun-ja, 59, is a small wholesaler who has been selling beef and beef bone for over nine years. Now, even the regulars are gone, leaving her selling meat from pig heads in the hopes of getting even a small bite. She has only been open three days in the past month, spending half the day lamenting her plight with the other merchants.

"Should I get out, or what?" she asks.

The bigger wholesalers are in the same boat. Mr. Park, the 38-year-old president of livestock retailer "Y," stares blankly at a freezer door bearing the words "NO SALE (U.S. beef intestines)." After a moment, he

downs a shot of rice vodka and lets out a deep sigh.

"This is the worst it's been for the wholesale industry in 15 years," he says. "We used to sell ten tons a day. Now it's less than one. Can you believe it? And 30 percent of that was bone. Now it's not just intestines -- we can't sell bone. Before, we were turning over 60 million won a month. Now, with the 2.5 million we pay each of our employees, the store tax and national taxes, and the price of meat going up, we've been forty million in the hole for the month. Forty million."

Consumers had some justification in taking the BSE danger so seriously. The European cases had gotten a great deal of press, and an all-out boycott had ensued in January 2001 after the agriculture ministry announced its mid- and long-term measures to contain the disease. Its crackdown centered on the use of bone meal -- the kind responsible for BSE infection -- to feed ruminants like cattle and sheep. Things came to a head when employees of the National Veterinary Research and Quarantine Service in Incheon incinerated illegally transported meat that had been confiscated at Gimpo Airport, in an effort to check the spread of BSE. The scene was given major coverage in the media, setting off a full-fledged BSE panic among the Korean public. Day

after day brought new reports on the risks of BSE and the situation in Europe. The news told of the agricultural ministry and customs service working together to prevent cattle and sheep, as well as products and by-products from them, from coming into the country from thirty countries in the EU and elsewhere. Searches for livestock products were to be carried out for all travelers and crew members entering the country through international airports and seaports. Quarantine authorities ordered that ruminants not be given feed from the food waste recovery centers that had been built in 1998 to promote reuse and cut feed costs in the wake of the foreign exchange crisis.

Koreans had seen various reports about the BSE risk in the news over the years, but they had always seen it as something remote, disconnected from their own experience. Now, it was all too close to home.

Beef Negotiations with the U.S.

Following a summit meeting at the White House in June 2005, Korean president Roh Moo-hyun announced that the country would be resuming its U.S. beef imports. On September 11 of the following year -- thirty-four months after the ban went into effect -- imports were approved for boneless lean beef from cattle under thirty months old. And on May 25, 2007, the U.S. was given a Level 2 controlled BSE risk rating from the OIE, allowing it to export everything but SRMs from cattle that were two and a half years old or younger. It consequently asked Korea to amend its import hygiene conditions for beef.

That July 29, inspections were halted after a vertebra -- one of the SRMs -- was found in beef imported from the U.S. But after hearing the explanation from Washington during a meeting of related ministers, the Korean government decided on August 23 to resume imports. The following October 5, a second vertebra was found, and inspections were once again suspended. A technical panel of Korean and

American experts launched an examination, looking into whether to expand exports to include beef with bones from cattle thirty months old or younger and lift the age restriction once the U.S. had stepped up its feed prohibitions. But no agreement would be reached by the time the first round of bilateral negotiations on beef import hygiene conditions ended on October 12. (Japan, it should be noted, was restricting its imports to only lean beef from cattle aged twenty months and younger, while Taiwan permitted lean beef imports only from animals aged under thirty months.)

On December 19, a presidential election was held in Korea, with Lee Myung-bak of the Grand National Party emerging as the winner. Relations with the U.S. improved substantially -- Lee's inauguration ceremony the following February 25 was attended by Andy Groseta, president of the National Cattlemen's Beef Association. Nine days later, the George W. Bush administration in Washington submitted a trade report to Congress that urged Korea to open its beef market fully, indicating that it would continue to apply pressure until this happened. The following April 9 saw the Grand National Party winning a majority of seats in the Korean National Assembly. Calls to resume beef negotiations with the U.S. intensified, and the Korean government officially announced their resumption the very next day. On April 11, talks to amend the import hygiene conditions for U.S. beef began at the government complex in Gwacheon, a satellite

city of Seoul.

Five days later, Lee was on his way to the U.S. On April 18, the day before his scheduled summit with Bush at Camp David, it was suddenly announced that a deal had been struck. As recently as April 11, before the second round of negotiations, the Korean government had been maintaining that it could not import beef from cattle aged over thirty months unless restrictions on animal-based feed were strengthened. The deal, which came just eleven hours before Lee arrived at Camp David, was a major concession on Seoul's part.

[Deal reached in beef negotiations on April 18, 2008]

The Smart Mobs of an IT Power

The internet was abuzz after news broke that Lee had concluded U.S. beef import negotiations during his visit. His personal home page was flooded with messages criticizing the administration's policy, prompting its administrators to shut it down. A Blue House official later reported that more than 100,000 visitors had bombarded the site on April 29 alone, leaving tens of thousands of messages of an "insulting or critical nature" on the visitors' log. The office of the senior secretary for public affairs and planning, which administered the site, decided at around 10 o'clock that evening to shut off all message features.

But internet users continued their onslaught, attacking Lee's policies with videos, parodies, and blog messages on major national websites. A room was set up on the portal site Media Daum with a petition for his impeachment; within three weeks, it had more than 120,000 signatures. The signatories, the organizers said, could "no longer countenance a President who cast aside the pride of his people." Adding

fuel to the fire was an episode of the news show *PD Notebook* that aired on the news network MBC on the evening of April 29. Titled "U.S. Beef: Is It Really Safe from Mad Cow Disease?," it featured footage from a U.S. animal rights group that had shocked the American public with images of downer cows being culled. It also showed the funeral of Aretha Vinson, a 22-year-old woman believed to have died from the human form of BSE, and an in-depth investigation of the OIE. The answer it gave to the question posed in the segment's title was an emphatic "no."

By April 30, the number of signatures on the petition page had passed 200,000. The following afternoon, it was up to 336,000; by early morning the next day, it was past 470,000. Some news outlets described it as a "cyber revolt" against beef imports. Meanwhile, BSE horror stories were spreading like wildfire online. The claims were provocative: that the beef exported to Korea was different from what Americans ate, that vertebrae from cattle over thirty months old could be found in a T-bone steak, that a person could contract BSE from eating lean meat, that Koreans' genes made them especially susceptible to BSE, that snacks, cosmetics, and diapers made with cow parts also posed a danger, and that a number of Alzheimer's disease sufferers actually had BSE. It was around this time that someone posted a message on the popular website Daum Café announcing that a "candlelight culture festival" was going to be held on the evening

of May 2 at Sora Plaza by Cheonggye Stream in central Seoul. Organized by the National Campaign for the Impeachment of Lee Myung-bak, the event was titled, "*You* Eat the Mad Cows!!"

When the day finally arrived, the plaza was packed with over ten thousand people protesting U.S. beef imports -- shattering predictions that the only attendees would be the few hundred Café members who had applied in advance online. Within minutes, the ten thousand candles that the organizers had provided were snapped up. Many of the participants were commuters on their way home, as well as uniformed middle and high school students. Most were younger people in their twenties to thirties, but many were young students or middle-aged. This, then, was the power of the Web: the country with the world's highest internet penetration had produced its first-ever social media political protest.

Demonstrators assembled into groups chanting, "Drive the mad cows out" and "Impeach Lee Myung-bak." Holding up the candles provided to them by the organizers, they sat down on the sidewalks and roads by the stream and yelled phrases such as "I don't want to go mad from eating a mad cow" and "we are against groveling before the U.S." Reams of flyers were passed around. Bearing the title, "Korean Infection Rate 95 Percent: BSE Scarier than AIDS," they warned of a BSE risk from cosmetics and popular Korean foodstuffs like stir-fried rice cakes, fish cake soup broth, confectionaries,

[Cheonggye Plaza at 10 p.m. on May 2, 2008]

and red bean shaved ice.

The demonstration came to a peaceful close around 10 o'clock that night. There were no clashes between police and demonstrators.

Prior to the event, a group called Citizen Watchdog for U.S. Mad Cow Beef (with members from the Korean Alliance against the Korea-U.S. FTA and other civic and social groups) held a "culture festival" of its own. Staged in front of the Bosingak bell tower in downtown Seoul, the Citizens' Cultural Festival Against U.S. Beef Imports was attended by around five hundred people.

To put a stop to the beef horror stories, the government had hurriedly arranged a press conference on the afternoon of May 2, with ministers coming out from the relevant government agencies. It soon turned into a tense back-

and-forth exchange between the press and the government. The main issues were U.S. beef safety and the question of why Korea had been so much quicker than other countries to open its market. The government representatives argued that the beef issue should be approached in terms of safety management rather than as a political football. But the situation definitely was taking a turn toward the political, and soon it was spiraling out of control.

On Saturday, May 3, a demonstration in downtown Seoul blew up into an enormous rally, with police estimates putting the total attendance at ten thousand.

A new organization was put together three days later. In addition to consumer groups and internet users, the Citizens' Emergency Countermeasures Committee Against the Full Importation of U.S. Beef with a Mad Cow Disease Risk (CECC) had representatives from around one thousand groups, including People's Solidarity for Participatory Democracy, All Together, Environmental Justice, Solidarity for Peace and Reunification of Korea, and Minjung Yeondae. The evening's events were two candlelight cultural festivals, one on Cheonggye Plaza and one in Seoul's Yeouido neighborhood. Together, they were attended by roughly twelve thousand citizens.

Michincow.net, an internet group, organized another culture festival against U.S. beef on Seoul's Cheonggye Plaza. Some three thousand citizens turned out to hold up candles

and call for the decision to allow all U.S. beef imports to be overturned. Despite orders from educational authorities to bar them from attending, around one-quarter of those gathered on the plaza were elementary, middle, and high school students. As their reason for coming out, they reported seeing blog messages telling them that "even one person attending would make the demonstrations that much stronger." A number of their friends wanted to come too, they said, but were unable to because they were attending private after-school academies. The students were vocal in calling for the blocking of imports for beef that carried a risk of mad cow disease.

And so began a furor that would eventually reach nationwide scale. Over the months until August, the whole country would be every bit as agitated as one of the infected cows.

The National Assembly held a hearing on May 2 to examine the effects of full beef market openness and take steps to prepare appropriately. A number of government officials appeared to testify, including the Minister and Vice Minister of Food, Agriculture, Forest and Fisheries, as well as its chief agricultural trade policy officer and the heads of the livestock policy team, animal disease prevention team, and food industry office, the NVQRS director, and the chief of the service's quarantine inspection division. Questions centered on problems with lifting age restrictions after the U.S. announced

measures to regulate animal-based feed there, as well as the country's inability to halt imports immediately upon the discovery of mad cow disease in the U.S. Critics charged that Korea had given up its sovereign right to carry out inspections. The food minister gave his assurance that imports would be halted if mad cow disease was found in the U.S., whatever the trade frictions this might cause.

Seoul took a step back after the hearing. Instead of arguing that no beef renegotiation was possible, it now said that such talks could take place under certain conditions. Lee Myung-bak said that an immediate import halt would be effected if "anything arises that would threaten public health." But this went against the terms of the agreement signed with Washington on April 18. Articles 4 and 5 of that text stated that Seoul was not authorized to halt U.S. beef imports -- even if mad cow disease was found there -- until the OIE downgraded its status as a controlled BSE risk country. The only duty incumbent on Washington was to conduct a thorough epidemiological study and report the findings to the Korean government for discussion.

Public opposition to full beef market openness grew in the hearing's wake. Candlelight rallies were held on a near-nightly basis. The events often included "free speech platforms" set up in the backs of trucks, where thousands of citizens would flock to protest the importation of potentially BSE-ridden U.S. beef. Dozens ventured onto the platforms to

express their concerns about the beef's safety, some standing in line waiting for the opportunity to speak. Coalition for 2MB Impeachment, an organization of internet users waging a signature campaign to impeach the president ("2MB" is a pun on Lee's name in Korean), held a rally in Yeouido's Culture Park that was attended by about 3,500 people. Michincow.net organized street performances and free speech events against U.S. beef imports in Seoul's busy Myeong-dong neighborhood, and staged a march from the district's Eulji No. 1 Road to Cheonggye Plaza. An organization of young people called the Joint Preparatory Association for May 17 Youth Action held a rally in which 200 middle and high school students gathered in front of Daehan Gate by downtown Seoul's Deoksu Palace.

Conservative religious leaders began to fire back. The Christian Council of Korea, the country's largest Protestant group, organized a "prayer meeting for the nation" on Seoul Plaza in front of City Hall. The two-hour event, which began at 5 p.m. on May 18, was attended by around twenty thousand people, according to police estimates. Its sermon was delivered by David Yonggi Cho, senior pastor of the Yoido Full Gospel megachurch, who decried the fact that people were "not even eating Korean beef because of all their worries about mad cow disease." The horror stories, he said, were part of a concerted effort to drive a wedge between Korea and the U.S. "They are trying to incapacitate the admin-

istration, and the people of Korea are the ones who suffer in the end," he fulminated. Cho pitted himself against the anti-government demonstrators, declaring, "The mad cow disease panic that has struck Korea arose because their baseless rumors took on a life of their own. They have terrorized the public with their unscientific agitation."

Faced with fierce public resistance, the government began additional discussions toward a new beef deal with Washington. Lee described the new talks as "essentially a renegotiation that would allow us to allay a number of the opposition parties' and public's concerns." He also said that he did not envision any actual imports of beef happening from cattle thirty months and older. But Gretchen Hamel, a spokesperson for the U.S. Trade Representative, said that the Korean government's remarks were "inaccurate." In previous talks with Seoul, she explained, an agreement had been reached to open the Korean market to beef from cattle of all ages according to OIE standards.

The administration's image with the public took an even bigger hit after its fumbling reaction. Meanwhile, the peaceful demonstrations in Seoul's squares and plazas were starting to undergo a transformation. The events of May 24 and 25 saw the occupation of thoroughfares in the city center and violence against police.

The Korean government's May 29 announcement of final import hygiene conditions for U.S. beef was met with

days of intense nationwide demonstrations. Water cannons were used to disperse the tens of thousands of people who gathered to demonstrate. Each day brought a new scene of pandemonium, as police attempted to quash the protests and clashed violently with demonstrators in the process. Brawling and injuries became a frequent occurrence.

On the evening of June 5, the CECC launched a round-the-clock 72-hour demonstration. Meanwhile, the right-wing Special Operations Agents Forum, which had been staging a memorial for war victims on Seoul Plaza, ended up clashing with citizens who were trying to attend a candlelight vigil against U.S. beef imports. Four people suffered injuries, some of them severe. Early in the morning on June 7, demonstrators tied a rope to a police bus in an attempt to break down a combat police vehicle barricade on the two-lane road by Salvation Army Hall on downtown Seoul's Sinmun Road. Police were attempting to cut the rope with a bar cutter when a man in his twenties seized the tool and begin smashing the windows of a bus carrying police officers.

All the while, Seoul and Washington were working to resolve the issue of beef imports from cattle thirty months and older -- the focal point of the BSE worries. They decided to avoid additional negotiations (renegotiations, really) in favor of "autonomous private sector regulation." In a telephone conversation with Lee, Bush had given his assurance that concrete steps would be taken to ensure that no beef from

cattle older than thirty months would be exported to Korea. The two countries began making preparations to take follow-up action. A Korean government official said that the central issue in the steps outlined by Bush would be efforts to ensure the efficacy of independent private sector regulations to prevent beef from cattle over thirty months old from entering the Korean market, rather than renegotiations between the two governments. Bush and Lee resolved to take action because certain segments of the public would not be mollified by the private sector regulations themselves.

Discussions focused on two main types of regulation. One of them, which involved U.S. exporters labeling beef according to whether it came from cattle older or younger than thirty months, was reported to be near the consensus stage. This alone would have the effect of halting imports from the older cattle; any companies that did so could face a consumer boycott. The other type involved private businesses in both countries electing not to deal in beef from the older cattle. U.S. exporters wouldn't export it, and Korean importers wouldn't import it. There was a problem, though. Opposition from even a few businesses in either country would make it difficult to uphold.

June 10 brought another candlelight vigil to Sejong Intersection in central Seoul, this one coinciding with the 21st anniversary of the successful 1987 battle for democracy in Korea. The crowds were at record numbers: seven hundred

thousand according to the organizers, around eighty thousand by police estimates. To keep the demonstration in check, police blocked access to the nearby historic gate of Gwanghwamun, which lay between the demonstration site and the presidential office in the Blue House. Lines of container boxes were stacked up in front of the square's statue of Admiral Yi Sun-sin, a local landmark. Around one hundred thousand people (according to police; the organizers said five hundred thousand) gathered around Sejong Road and Taepyeong Road to speak publicly and chant their opposition. They filled the a long stretch of the road from the interesection along Taepyeong Road, past Deoksu Palace, and on to the main offices of Samsung. In the dark, some of the demonstrators began calling to take the protests to the Blue House, where the president lived. With that, a stream of about thirty thousand people began pouring along Jongno-1 Avenue toward the neighborhood of Anguk.

The massive demonstrations were not limited to Seoul. They were happening all over the country: in Busan and Gwangju, in South Jeolla, and at fourteen sites in Chuncheon and ten other cities and counties in Gangwon. "Million-person candlelight parades" were going on all around as well, reminiscent of a university festival in their atmosphere. Concerns about violence were shown to be baseless. Throughout their demonstrations and street protests, participants did nothing more than sing, dance, and stage freestyle debates.

The country's right continued to take action. Earlier the same day, there was a press conference at the Korea Press Center in Seoul's Central district by the Korean Council for Restoration of National Identity (CRNI). The organization, which included representatives from the Korean Veterans Association, the National New Right Union, and 103 other conservative groups, decried what it described as the "mad cow disease ruckus." Mr. Park Se-jik, president of CRNI, declared that "people supporting the June 15 Joint Declaration [with North Korea] are using opposition to today's beef imports to call for the overthrow of the Lee Myung-bak administration." Another conservative group, Citizens United for Better Society, said on June 11 that the candlelight demonstrations "have shown just about all they have to show. It's time for us to put the candles out and gather our wits."

Overseas, major press outlets were turning their attention on the demonstrations in Seoul. The *Washington Post*, the Associated Press, and Reuters dedicated major coverage to the mass gatherings. The *Post* reported that the demonstrations against U.S. beef imports had been going on all over the country for nearly a month. The *New York Times* said that what had started out as demonstrations over beef had gradually transformed into forums for left-leaning groups and labor unions to vent their disgruntlement with the conservative Lee. The Middle Eastern satellite news network Al-Jazeera was first to report, devoting long coverage to the

events in Seoul in regular hourly segments. Titled "Fury in Korea," the reports noted that crowds of one million people had gathered even after an announcement that Lee's entire Cabinet had resigned -- just four months into his administration.

In China, the press presented detailed reports on the different candlelight demonstrations staged around the country for the 21st anniversary of the June Struggle for democracy. The media showed a great deal of interest in the developments, offering in-depth analyses of the causes and background. For the top story on its international page, the *Beijing News* reported on the beef crisis leading to the en masse resignation of Lee's Cabinet. The Brazilian media also showed a keen interest in the events that coincided with the 21st anniversary of democratization. The *Folha de São Paulo*, a major daily in the country's largest city, dedicated the bulk of the front page of its international section to a photograph of marchers filling the broad Taepyeong Road thoroughfare. The title of the article read "Hundreds of thousands of demonstrators pressure S. Korean President Lee."

The overseas press said that the demonstrations that packed the streets of Seoul were unusual even by the standards of Korea, where protests were seen as relatively common. Some analysts expressed concern not just about the Lee administration's crisis, but the very future of Asia's fourth largest economy. The *New York Times* fretted about the anti-U.S.

sentiment on display in the demonstrations, saying that Lee's decision on beef imports had apparently wounded the public's pride. The rallies in downtown Seoul were characterized as an outpouring of nationalist feeling: people wanted improved relations with the U.S., but didn't feel the need to abase themselves to get them.

The massively attended 21st anniversary protests ended up transmogrifying in character, developing into a push for the administration's resignation. The NECC, which orchestrated many of the demonstrations, demanded that the government fully renegotiate the terms of U.S. beef imports by June 20. If its demands were not met, it warned, it would proceed into a campaign for the administration's resignation. And it showed that it had the weight to back its threat up: attendance at the demonstrations of June 13 exceeded all expectations. That day also happened to be the six-year anniversary of the deaths of two middle school girls, Shin Hyo-sun and Shim Mi-seon, who had been struck by a USFK armored vehicle. The NECC staged its 37th candlelight vigil that evening at Seoul Plaza, in front of City Hall. On its website, it declared that it was no longer focusing just on fighting over the beef issue -- it was now opposing many of the major policies of the Lee administration. A 39th vigil took place in the same location two days later on June 15, the eighth anniversary of a joint declaration between North and South Korea.

On the conservative front, four groups, including the Free Citizens' Alliance of Korea, staged a rally on the afternoon of June 13 in front of Seoul Station. Around ten thousand people showed up to call for an end to the beef renegotiation demands and urge the government to reestablish order. The escalating scale of the demonstrations, they argued, represented nothing less than an attempt to topple the administration. "If this keeps up," they had warned, "the whole country will descend into irreversible pandemonium." Conservative group members also tried to storm the offices of the national news network MBC on June 13, charging it with bias in its reporting on the demonstrations.

The NECC saw its rallies more and more sparsely attended as it tried to push a generally anti-administration agenda. The Seoul National University student council had previously held a class boycott to urge renegotiations with Washington; now it said it would no longer be attending any candlelight vigils that focused on political issues.

A professor of Japanese studies at Cornell University, in Korea for a talk at the 2008 Lecture Series of World Distinguished Scholars, commented that the demonstrations seemed to be "very Korean", as well as entertaining and unusual, during the interview with Yonhap News. He said it was amazing to see such massive rallies in a country where mad cow disease had never actually been found.

New Beef Negotiations

The candlelight vigils were the public's show of resistance against the government's too-hasty-by-half negotiations on U.S. beef imports. And, in the end, they led to new negotiations that would restore the nation's sovereign right to quarantine inspection and ensure equivalent treatment of SRMs for domestically consumed and exported beef in the U.S.

In a statement on June 12, the U.S. Trade Representative announced plans to work with Korean Minister for Trade Kim Jong-hoon on finding an approach that both sides could agree to. Alexander Arvizu, deputy assistant secretary of state in the Bureau of East Asian and Pacific Affairs, said the Korea situation was serious enough to warrant Washington approaching it with an open mind in order to break through the problem. Meeting with reporters after attending a House hearing that day on Washington-Tokyo relations, he said that it was in the interest of both the U.S. and Korea to make headway and reach a resolution on the beef issue. He also responded in the affirmative when asked at the hearing wheth-

er it would not seem unfair to Koreans that Japan only imported U.S. beef from cattle aged under twenty months.

The new ministerial-level negotiations took place in Washington on June 13. Korea was asking for an export verification (EV) program from the U.S. government to prevent meat from cattle over thirty months old from being exported to its market. During the period through 2007 when only lean beef from cattle under thirty months old was being permitted, Washington had specified this on the export quarantine certificate through just such an EV program. This time, however, it refused. An EV system, it explained, would constitute excessive U.S. government interference in autonomous regulations and violate the import conditions that it had signed with Korea the previous April.

On the first day of negotiations, Kim Jong-hoon laid three photographs down on the negotiations table. They had been taken at Gwanghwamun on June 10, the date of the largest candlelight demonstration turnout. "Look at this," he told U.S. Trade Representative Susan Schwab. "Can you explain *this* through science?" he asked, referring to the scientifically assured safety of U.S. beef. After a pause, sources said, his face hardened, and he told Schwab, "If no deal is reached, you will go down in history as the one who ruined Korea-U.S. relations."

Washington had been against new negotiations in the early going, but the intensifying demonstrations in Korea led

it to change its collective mind. The Blue House started things off by rushing senior secretary for foreign affairs and national security Kim Byung-kook over to Washington to initiate action the White House National Security Council. An official there later said that Kim was instrumental in successfully turning the beef issue into a matter of the Korea-U.S. alliance.

Bush was on a visit to Europe when he received a report that the negotiations were under way again. His orders were to respect Seoul's position as much as possible. But Schwab came out swinging. On the second day, she flatly rejected a plan for strengthening the quarantine authority of the Korean government, even as she proposed a compromise in the form of a quality system assessment (QSA). Common ground proved elusive, so on June 15 Kim played the strongest card he had, declaring his willingness to pull out of the talks. He told the U.S. negotiators that he was going home, and boarded a train bound for New York, en route to a Korean Air flight back to Seoul. The White House sounded the alarm. A senior official called Korean ambassador Lee Tae-sik and asked him to stall Kim while they worked to adjust the terms in line with Seoul's demands. Now, at last, Kim had seized the advantage.

The newly negotiated beef terms were signed in Washington on June 19. Diplomatic observers whispered that Kim, who had maintained a rigid stance throughout the pro-

ceedings, and Schwab, who had lost the high ground in negotiations when the White House instructed her to accommodate Seoul where possible, both wept when things were over.

The agreement that day involved the U.S. only issuing export certificates of quarantine for beef that had been through process verification (PV) or QSA, so as to prevent any beef from cattle aged over thirty months from entering the Korean market. Not only that, but the two governments also agreed to rule out four parts (skull, brain, eyes, and spine) for import even from younger cattle. These were not considered SRMs for cattle under thirty months, but Washington and Seoul, hoping to allay public concerns, agreed not to allow their import.

Another bone of contention had been the length of the export ban on meat from the older cattle. No time period was specified in the new negotiations; the agreement text simply indicated that it should last "until consumer confidence improves," or until Korean importers requested it. There had also been questions about the U.S. government's ability to unilaterally designate exporting businesses for inspection within 90 days of the beef import conditions taking effect, which critics said violated Korea's "quarantine sovereignty." The two sides discussed ideas for adding a supplementary provision giving the Korean government the authority to participate in the selection. According to the agree-

ment reached on April 18, Seoul had no right to designate specific sites for inspection, or to demand that the U.S. government take action against them. With the new negotiations, there was now a basis for the Korean government to examine particular sites within the U.S. If one of these examinations turned up examples of particularly flagrant violations, Seoul could now demand discussions with the Washington, and if no appropriate action could be agreed to within four weeks it could step up its inspection measures for exports from those sites.

On June 19, Lee Myung-bak gave a special talk on the ban on U.S. beef imports from cattle thirty months and older. Following discussions at a meeting of relevant ministers and senior-level talks between the administration and the Grand National Party, the government officially announced the outcome on June 21.

One critic of the renewed negotiations was the so-called "Mr. Beef," Senator Max Baucus, who hailed from the U.S. livestock hub of Montana and chaired the Senate Committee on Finance. In a statement to the AP on June 21, Baucus argued that the officials had substantively altered the agreement signed on April 18. "The implications of this agreement," he wrote, "set an unfortunate precedent for U.S.

beef trade with Korea and other countries." AgWeb, an online agricultural news site, wrote on June 23 that despite the two countries' claims to the contrary, the beef discussions were, in fact, a renegotiation. The process, the site claimed, had been "mismanaged." Doug Bandow, vice president of policy for the non-partisan civic group Citizen Outreach, questioned why the U.S. was stationing troops in Korea when it had a vertiable army of demonstrators opposing beef imports. The Fox News network brought a number of hardliners onto its current affairs talk programs, where they proceeded to fulminate over the new negotiations and candlelight rallies. According to some, this demonstrated that there was no need to station U.S. forces in the country. Meanwhile, Republican Sen. Saxby Chambliss issued a June 21 statement expressing his displeasure over the failure to achieve full liberalization of U.S. beef imports. "I am disappointed we are continuing a regime of managed trade," he wrote. He also said that he could not accept "a deal that serves short term political benefit at the expense of long term economic gains."

The foreign press, including AP, AFP, and Reuters, gave major coverage to the outcome of the negotiations, with their indefinite ban on beef imports from cattle over thirty months old. In particular, they noted how attention was focusing on whether some measure of calm would be restored after the large-scale demonstrations, now that there had

been additional negotiations with Washington over the beef imports that had plunged the administration into crisis. Major newspapers in the U.S. and the U.K. -- the *Wall Street Journal* and *Financial Times* among them -- turned their attention to how things would unfold in the wake of the new deal. Would Seoul regain popular trust? What position would Congress take on the negotiations? In particular, the *New York Times* noted in its online edition that despite Lee's apology and the replacement of his advisers and Cabinet, the protests were moving beyond the beef issue and turning into opposition to his government in general.

Indeed, the candlelight rallies continued even after the announcement of new negotiations, this time organized by 48-Hour Citizen Action to express opposition to U.S. beef imports. But turnout from the general public was sparse. The dwindling attendance of families and young students was especially conspicuous. There was no change in the banners raised by interest groups. However, the directors of Parksamo, an association of supporters of politician Park Geun-hye (daughter of the late president Park Chung-hee and a leading conservative politician) chaired by Jeong Gwang-yong, declared an end to their participation in the candlelight rallies. On the group's homepage, they wrote, "The matter of beef renegotiations in now in the hands of politicians, who will answer more than 90 percent of popular demands." An opinion poll conducted just after the new negotiations showed

58.5 percent of people saying that the candlelight rallies against the resumption of U.S. beef imports "need to stop" -- far more than the 35.5 percent who said that they should continue.

On June 26, an announcement went up on the government's official gazette stating the new import hygiene conditions for U.S. beef. The Korean Confederation of Trade Unions (KCTU) joined civic groups in occupying a storage yard in Busan Harbor, where cooling containers were holding U.S. beef, and staging protests at freezers throughout the province of Gyeonggi in an effort to stop the shipments. In the area of Sejong Intersection in central Seoul, the actions of demonstrators lurched toward the illegal and violent. Some brandished lead pipes. Conflicts with police grew especially heated, prompting them to forcibly disperse demonstrators with sprinkler trucks. Demonstrators also damaged property at hotels and other private businesses. Early in the morning on June 27, a woman asked protestors why they were breaking the windows of the Koreana Hotel in downtown Seoul, a popular destination for foreign guests. She was promptly mobbed. Go Jin-gwang, the 53-year-old co-president of the students parents' association Haksamo, went to her aid and ended up being assaulted himself. The Journalists' Association of Korea, the Korea Press Photographers Association, and the labor unions of the Chosun Ilbo and Dong-A Ilbo daily newspapers issued a statement denouncing the

assault of journalists from the two news outlets by demonstrators occupying the Gwanghwamun area.

The same candlelight rallies that had originally been about non-violent protest had morphed into attacks on journalists and assaults on police officers and civilians. No longer were the demonstrators members of the general public peacefully holding up candles. The people attending now were wearing masks and holding bricks, slingshots, and water bottles. It was a minority, one clearly distinct from the ordinary citizens who had led previous rallies. And as the demonstrations became more general anti-government protests, they also became increasingly violent, with protestors sporting pickaxes and hammers.

As June gave way to July, religious groups began taking part in the candlelight rallies. The Catholic Priests' Association for Justice (CPAJ) organized "emergency masses" and street marches to call for renegotiations on U.S. beef. Representatives from the Korean Christian Action Organization, the National Clergy Conference for Justice and Peace, and around thirty other Christian groups came together in a group called Ministers Denouncing the Abuse of Public Authority. At a press conference in front of the Sejong Center for the Performing Arts (near Gwanghwamun), the organization issued a statement urging Lee Myung-bak to "immediately stop his abusive actions against the public." It subsequently took over for CAPJ in organizing additional candlelight rallies. From the

Buddhist community, there was an emergency dharma meeting on July 4 to "urge repentance from the guardians of citizen sovereignty," organized in front of Seoul City Hall by the Buddhist Emergency Dharma Meeting action committee. Among the more than ten thousand demonstrators were Buddhist monks and followers, KCTU members, and ordinary citizens.

Assessments from overseas were mixed. The U.S. current events weekly *Newsweek* broke down the increasingly violent demonstrations in its July 7 edition, stating that the habits of the authoritarian era were dying hard in the still-immature democracy. Don Oberdorfer of the Johns Hopkins University U.S.-Korea Institute said that the ongoing mass demonstrations in Korea were less an expression of opposition to beef imports due to food safety concerns, and more an act of political resistance against the country's conservative administration by progressive groups. But Norma Kang Muico of Amnesty International, who visited Korea on July 4 to investigate possible human rights abuses in connection with the demonstrations, praised the "great people power" after attending one on the day of her arrival. The event, she said, was peaceful and well organized, and something that she had never before seen as an East Asia officer. So it was, then, that perceptions of the rallies differed very much in the eye of the beholder.

The Public Grows Weary

"Help! Street protests are starving restaurants!"

"Enough of the demonstrations! Save the dying restaurants!"

Fifty or so middle-aged men and women stood in front of the Yi Sun-sin statue on Sejong Road holding picket signs. Around their shoulders was a banner reading, "Stop demonstrations that hurt restaurant business."

[Street protesters urging a stop to the demonstrations]

As the candlelight rallies wore on, differences of opinion on them began deepening into society-wide fissures. Once religious groups joined the fray with their emergency masses, prayer meetings, and dharma meetings, it was the turn of university presidents and lawyers to respond with their own appeals and emergency statements calling for an end to the demonstrations and the restoration of law and order. The Korean Council for University Education (an organization of university presidents) and the Korean Bar Association issued appeals to this effect. Members of conservative groups, including Right Korea and an association of surviving family members from victims of the North Korean invasion that started the Korean War, staged a press conference of their own in front of Myeongdong Cathedral. They called for the im-

mediate dissolution of CPAJ, which they said was fomenting social chaos by calling for the administration's resignation. The religious groups, they contended, had overstepped their bounds in attending what they, the conservatives, described as an anti-government campaign. They called for an immediate halt to the street protests. Some religious groups decided by themselves to take down tents that they had set up on Seoul Plaza to protest U.S. beef imports, but other progressive-leaning parties and groups had theirs forcibly removed by the city of Seoul.

By then, the rallies had been going on for more than two months. Polls showed close to 66 percent of people saying that they should be stopped -- though the progressive *Hankyoreh* newspaper published another poll showing 67.6 percent of respondents to still harbor apprehensions over U.S. beef.

The religious groups eventually began distancing themselves from the rallies. First, CPAJ said that its members would be halting their fasts and returning to their pastoral duties. Then the indigenous Won-Buddhist faith's Kyomus for the Opening of Society canceled a scheduled emergency dharma meeting. The National Buddhist Council for Security of Korea and eleven other Buddhist groups issued a statement asking seven demonstration leaders (then engaged in a tent protest and wanted by police) to leave the Jogye Order. The statement denounced what it described as "sinners" who saw

only baseless visions of BSE-infected U.S. beef and were committing a crime against the public, which was grappling with high oil prices, and the country's businesses, which were being hurt by the rallies. "The time has come," they said, "to expel the ringleaders of the mad cow beef protests from the Jogye Order, the headquarters of the national Buddhist community." It was wrong, they added, for the order to harbor these individuals after they had painted the police as brutes in their attempted to establish order, and actually inflicted violence on hundreds of riot police themselves.

While this opposition was taking shape, massively attended rallies were still taking place every weekend. In a report on the social costs of the demonstrations, the Korea Economic Research Institute estimated losses to the state at 1.92 trillion won (about $1.7 billion), including macroeconomic costs of 1.35 trillion won (such as reduced investment due to social instability) and 570.8 billion won in costs from the postponement of needed public sector reforms. On July 24, around 120 merchants from the neighborhoods of Hyoja and Samcheong (located nearby Gwanghwamun) filed suit to claim damages from the demonstrators. Through the offices of the Special Committee for a Proper Demonstration Culture and the Victims of Candlelight Protests, they demanded compensation from the CECC.

Amid all of this, George W. Bush paid a visit to Korea. Demonstrations against his trip were under way before the

plane even touched down. On August 5, the date of his visit, two rallies were going on simultaneously just 300 meters apart from each other in downtown Seoul: one opposing the visit, the other welcoming Bush. Less than two weeks later came the Independence Day holiday. August 15 that year was both the 63rd anniversary of Korean independence and the 60th anniversary of the founding of the republic. Over ten thousand demonstrators took over downtown Seoul that day for an illegal candlelight demonstration. When they refused to disperse, police used water cannons and plain clothes squads to get the situation under control. Some of the demonstrators turned violent, wearing masks and brandishing lead pipes against the vehicle where the police's speakers had been set up.

These events came just a few days after *PD Notebook* issued an August 12 apology to its viewers for its previous reporting on BSE. The president of the MBC network, Ohm Ki-young, relieved two producers of their posts over the episode. The apology stated, "In presenting footage of animal abuse from the U.S. Humane Society and reporting on a death that was believed of being the result of BSE, *PD Notebook* made six translation errors, and the presenter used the term 'mad cow' to describe a downer cow. The episode also stated that Koreans were more susceptible to the human form of mad cow disease than Westerners and had a '94 percent chance of contracting the disease.' Furthermore, in covering socially

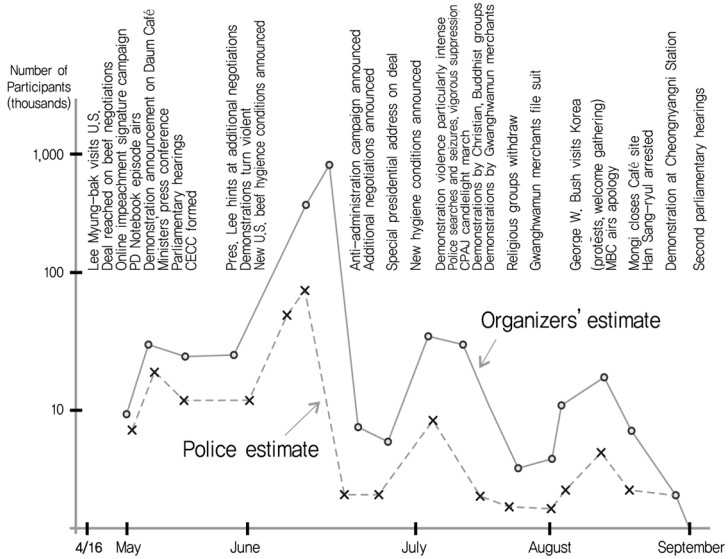
sensitive issues and areas where opinions are sharply divided, it presented only one slant on the U.S. livestock slaughter system, slaughterhouse conditions, the importation of Canadian cattle, and feed control policy."

Another organization bowed out of the demonstrations less than a week later. "Mong-i," the administrator of the Ten Alliances for Driving Out Mad Cows, officially announced the group's disbanding with an August 17 post to its home page announcing the closure of the café. The group had participated in the first one hundred candlelight demonstrations since May 2; the reason given for the decision was "profound questions" about the outcome of the demonstrations.

Around the same time, the police started making arrests over the protests. On August 17, Seoul's Jongno Police Station arrested Jinbo Corea president Han Sang-ryul for violating the country's Assembly and Demonstration Act. Han was charged with conspiring with the CECC's executive to organize 58 illegal demonstrations during candlelight rallies over the two months from May 6 to July 5, including occupations of Taepyeong Road and Sejong Road in central Seoul. Another individual, a 48-year-old named Na, was arrested after being accused of leading demonstrations on Agora, a section of the popular Korean website Daum. News reports stated that Na had encouraged people to demonstrate and announced the locations of upcoming protests.

Once the protests reached the triple digits, they began

petering out. Turnout was poor. The CECC had previously announced plans for the public to "hold our candles high in our everyday lives," but now it found itself having to rely on smaller-scale events. The aftershocks of the BSE uproar did continue for a little while past the end of August: around three hundred officials from civic groups (the CECC and Korea Society Forum among them) -- organized more festivals against U.S. beef imports in front of Seoul's Cheongnyangni train station and staged a debate on the topic of "How Should the



[2008 Candlelight Demonstrations Against Korea-U.S. Beef Negotiations]

Candlelight Rallies Evolve?" With this, the uproar that had held the country in its grip for four months in 2008 disappeared into history.

Whatever Happened to American Beef?

Inspections of U.S. beef resumed, and the country's product rose to account for 11 percent of all beef imports to Korea. Sales began to pick up, especially at Japanese restaurants. According to an announcement by the Korea Customs Service on July 9, 2008, a total of 465 tons of U.S. beef had passed customs inspections between June 26 (the date of their resumption) and July 8, representing 11.7 percent of the 3,954 tons of beef imported over that period. However, Australian beef kept up the dominance that it had established in the market after the U.S. ban, importing 2,745 tons (69.4 percent) over the same period.

By August, U.S. product had risen to second place in market share for imported beef. Real-time inspection statistics released by the National Veterinary Research and Quarantine Service on August 18 put the amount of U.S. beef passed by customs since July 1 at 4,439 tons. A total of four countries had imported beef to Korea over that period. Australia accounted for most of it (12,753 tons, or 60.2 percent of the 21,184 tons total). The U.S. exported 4,439 tons (20.9 percent), nudging past both New Zealand (17.7 percent) and

Mexico (1.1 percent) to take second place. Within less than two months of the import resumption on June 26, U.S. meat now had a share of more than 20 percent of the imported beef market.

Back in 2003, when all U.S. beef was being imported regardless of animal age or the part of the body, Korean beef had made up 141,000 tons of the country's yearly beef supply of 435,000 tons, or 32.5 percent. Another 293,000 tons (67.5 percent) was imported, with 199,000 tons of that coming from the U.S., for a 67.9 percent share of all imports. But no U.S. beef was imported at all in the three years after the December 2003 embargo. Canadian beef was also subject to an import ban over the same period, which opened the way for Australia and New Zealand to dominate the market. Meanwhile, overall beef consumption was dropping noticeably: the country's total beef supply plummeted to 277,000 tons in 2004 before slowly recovering to 295,000 tons in 2005 and 337,000 tons in 2006.

Fifty-three thousand tons of U.S. meat -- 23.8 percent of all imported beef - came into Korea in 2008, the year of the mad cow disease furor. The country regained the Korean beef market with relatively celerity. By 2010, it was exporting 90,000 tons, or 36.9 percent of all imported beef.

The Wake of the Storm

A coffee shop looking down over the grassy plaza in front of Seoul City Hall. Mr. KIM is staring vacantly down at the grass. Listless late autumn leaves swirl limply in the November breeze, resembling nothing so much as paper cup candle-holders kicked aside in late summer and trampled underfoot. What had gotten everyone so wound up? Who had it all been for, all the screaming and raging and the flames?

Suddenly, a voice cuts into his reverie.

HWANG (*entering*): Ah, Mr. Kim. I see you've beaten me here.

KIM (*stammering*): Oh, oh yes. Mr. Hwang. Won't you have a seat? It's been a while. Is everything finished?

HWANG: Oh, yes. Things are a lot better now. None of those damned demonstration reprimands. What about you?

KIM: Don't ask. You know how the political desk is. Dirty pool. And they want to hold someone accountable. Predictable, right? They all want to get down in the mud and win points for themselves. There's going to be a Cabinet reshuffle, and the opposition's all giving each other awards for the Citizen Emergency Countermeasures Council. No one remembers what the candlelight rallies were supposed to be about in the first place. They're like a bunch of sharks swimming around looking for a bite.

I don't think anyone ever imagined the demonstrations would whip things up like this. No politician could have gotten people this worked up if they'd tried. In a way, there was something pure about it. People were saying that they weren't going to get stepped on like some underdeveloped country in their deals with the big countries. That's why you saw all the middle school students and the strollers. It was the politicians jumping in and muddying the waters that screwed everything up.

I was more worried about the way all these disgruntled groups in society just blew up. It was like they'd been waiting for it, for the opportunity to pounce. Seeing all those homeless people on Sejong Road and Cheonggye Plaza every night -- it was bone chilling. It was like they'd taken over the demonstrations and turned them into riots, turned them into catharsis for all their resentments.

Of course, we should be more worried about the subversives who put them to work -- the ones we don't see. (*looks up*) Oh, there's Mr. Park!

PARK walks over, extending his hand to shake.

PARK: Mr. Kim, how are you? It's been so long. Five years, is it? Before I went out to the hinterlands, anyway. I suppose everything's been quiet back at the center of it all?

KIM: You! Why, you were a veritable world champion mad cow fighter. How is it now?

PARK: Truthfully? Kind of empty. It feels like everything's just been sucked right out of me.

I'm sure you know, but we've been reporting on the BSE risk for five years now, being the country's only online current affairs journal and all that. Never once did we get the attention of the mainstream media. The production team for *PD Notebook* looked us up after seeing a foreign press report by one of our trainee reporters -- and even then we slipped through the cracks. Yet again.

But I'm amazed at how things blew up. You had all those mad cow horror stories floating around on the online bulletin boards. Fact started getting mixed with fiction. I was sure that would be the end of it.

And then I saw all those kids out in the streets with their candles, all those mothers with their strollers. I was stunned. It was electrifying, exhilarating -- seeing that level of interest from the public in the mad cow disease danger that the newspapers had been warning about. They called them "culture festivals," but what I saw underneath that was a tremendous act of resistance against the way the country was getting marginalized in its foreign relations.

I think that what set the whole thing off was a very human desire. To keep the public healthy. To keep our food safe. So the motives started out pure. It was completely justifiable.

But you just knew the politicians wouldn't be able to pass up such a beautiful opportunity. Or the subversives, for that matter. So it ended up turning into a battleground: a free-for-all of violence and anti-government sloganeering that provoked an over-the-top response from the authorities. It was just terrible. Everybody got hurt, and nobody got anything out of it. And isn't that just what all us writers were going for?

KIM: That's about the size of it. At root, it was about our administration not being able to get beyond its historical tendency to sponge off of bigger countries. The same old imperial tributes and audiences with the king -- we saw

it with Park Chung-hee, we saw it with Chun Doo-hwan, we saw it with Kim Young-sam and Roh Moo-hyun. It's more than you can bear to watch.

We're the same country that hosted the Olympics and the World Cup. We were looking at a top five finish at the Olympics. We got to the Round of 16 at the World Cup. People were sending a powerful message that they weren't going to take their leaders groveling in front of Washington anymore. And the government did everything it could not to get the message. That's why things weren't resolved. It wasn't about anti-Americanism or pro-Pyongyangism -- it was a simple matter of pride. The politicians wounded that pride with their old practices, and nothing's been done to fix that.

PARK: Exactly. We saw that over and over again covering the events. Early on, we kept hearing the demonstrators asking the leftists to back off. And the turnout plummeted once the opposition really started broadcasting that it was campaigning against the administration.

I think our newspaper's perspective is a bit different. The U.S. beef issue is something that both the progressive and conservative administrations share. As different as Roh and Lee have been, they've had one thing in common: pushing for an FTA with the U.S. when

they were in power, and opposing it when they were out of power.

It would be hilarious if it weren't so tragic. The same people who were desperately trying to get an FTA passed and allow beef imports yesterday turn around and started opposing the FTA and beef imports once they're out of office. And the one side starts out against the FTA, only to go overboard pushing for beef imports once it's in power, just to get the FTA passed. How does this look to the public? Shameless. Comical. They must really think the people are completely senile.

And why is it anyway that they want the FTA passed once they're in power? I think it's because you've got different groups backing the agreement. There are the big car and steel exporters on one side, and then there are the elites and big financiers on the other, the ones who are used to the Anglo-American order. Put them together with the power groups and you've got the "mad cow alliance."

At the end of the day, I think the candlelight demonstrations were the product of a conflict between conglomerates and workers, between the elite and the common people.

KIM: I think that difference in perspectives has a big impact on how you look at the demonstrations. Kim Dae-

jung said they showed how powerful the public could be, but Choi Chang-jip over at Korea University said that we shouldn't view them as any kind of a turning point toward a new form of democracy -- that the results, as they stand now, are just too hollow. I'm curious to see how history judges the demonstrations and the whole beef import flap.

It is dark now. Bright lights from the surrounding skyscrapers cast a glare over the autumn leaves on the plaza.

KIM: There is one thing, though. I think we learned some important things from this. To begin with, we've been terrible at foreign relations and trade. We're one of the world's top ten trading countries. So tell me why our international bargaining skills are stuck at the level of a poor developing country. It's like we're stuck in the 1960s and '70s. Of *course* the public is disappointed. Of *course* they're angry. Here, we've got people declaring how we've gone from being a country that takes aid to one that gives aid, but we don't actually have anyone capable of doing that in our administration.

None of our public servants really knows how the international community goes about things, how it approaches things. So we end up getting humiliated time and time again, and the country suffers incalculably. It's time we woke up.

HWANG (*passionately*): Absolutely. Sometimes I go international conferences for a story and I feel like I'm about to explode.

There are times when the people representing our government don't even have a clue what the conference is about. The other countries' delegates have spent months preparing, poring through all the documents that change hands, all the responses to questions, gauging where things stand. They come there with a clear strategy.

And then there's the Korean delegates. They get a stack of hundreds of pages of conference materials, and that's the first time they've laid eyes on them. They don't have time to actually *read* them, so they scan, and that's it. And then they come home with the report on the conference's decisions and say, "This is what we need to do." They don't give a damn about what this does to the national interest. While the other countries' delegates are all butting heads trying to guard their own interests, we sit there watching on the sidelines. This happens time and time again, and it's a huge problem. It seems there are still a lot of people here who think it's a privilege just to be able to go to a conference.

About ten years ago or so, I was invited to an Australian grain corporation reception in Tokyo. There were a lot of Japanese grain agents there. I was greeting the

people from Mitsui and the Mitsubishi Corporation, and when I told them I was from Korea, they greeted me like a customer. I said to them, "In Korea, we've got the Samsung Corporation, we've got a lot of big companies. So how is it that your companies are supplying us with grain?" And they said we didn't have any futures trading experts here to do that.

I thought about it, and they were absolutely right. Whenever I've had colleagues sent to the Chicago futures exchange from the government or from a corporation, all the people around would say, "Have a good two or three years out there."

Now look at Japan: they send people out there, and they work there until the day they retire. They're staying up all night learning how to read the market. And that's the difference. That's what puts us in the position of having to depend on Japan for the food we need. Our politicians should be looking at this as a major problem. They should be trying to fix it yesterday. But no one cares.

PARK: There aren't a lot of people who really get how important foreign relations and trade negotiations are in the globalization era.

He seems to hesitate for a moment, as though he has a lot to say and doesn't know where to begin.

No one at those international conferences ever used to care where the Korean delegate was. He was just the representative of a poor, weak country. And now that he's representing one of the world's top ten economies, you'll often see them asking for Korea's opinion on things. But he's just sitting there, without a clue what they're really talking about. It's humiliating.

And it's shocking for the rest of the world. It's a big enough problem to have someone there who doesn't understand anything about the situation, but there are even bigger structural problems with our government. We've got our public servants on a rotation cycle where they're transferring into a new position every year. They don't even develop an understanding of their own duties. The Uruguay Round agriculture talks started in 1986 and went on for more than eight years, and in that time we saw eight different bureau chiefs in the agriculture ministry. They tell me no one's served for more than two years as secretary or deputy director.

Now, in the U.S., or in Japan, you have professional bureaucrats with more than two decades of experience, getting sent out on a permanent basis to fight for their country's interests. Korea's approach has been just ridiculous. All the advanced countries spent that time reading the trends at the conference, preparing for the coming agricultural trade liberalization, working overtime

to increase their food production and build their self-sufficiency, setting detailed strategies for what to do after the negotiations were finished. Whereas we walked into the WTO system completely unprepared.

And you know what was even worse? The new fisheries agreement with Japan, the one we started in May 1996. It took two years and three months to reach that agreement. Japan's team was packed with veteran officials from their Fisheries Agency. And then there was our team: all senior officials from the Ministry of Foreign Affairs and Trade. Well, they sure showed how capable they were of handling specialized issues like that. Meanwhile, our representative at the talks got shuffled out twice, and the department director once. What kind of negotiation are you going to get with that? They ended up completely failing to address the pair trawler issue, leaving our fisheries to be depleted by Japanese boats, and they totally gave up on the issue of dominion over Dokdo. It was outrageous. And no one took responsibility for it.

And then you had the talks for the fisheries agreement with China. They started in December 1997 and lasted for two years and ten months. And during that time, we had three different representatives and three different department chiefs. And the result? Oh, just losing all fishing rights for the Yangtze zone, that's all. Once

again, no one takes responsibility. Oh, there was a lot of after-the-fact denunciations in the National Assembly, but no fundamental resolution to the issue.

It's happened time and time again. With things going this way, it'd be strange *not* to see something like the mad cow disease flap. This is the globalization era. National interests hang in the balance on these negotiations. And here we are, still acting like one of the world's poorest countries.

At this point, PARK is quite agitated. KIM speaks quietly, as though trying to calm him.

KIM: It has been very disappointing. These things keep happening, over and over, yet our politicians are just infighting, and the government mucks the whole thing up with its amateurishness. I think what we need, more than anything else, is specialized institutions to train foreign relations and trade experts. The time has come for us to stake our future on younger people who aren't just informed in their area, but have an intelligible national perspective and a sense of calling. It's late in the game, but it's our only hope.

There's one other thing this situation has taught me: you can't play games with the food people eat. People need to understand that food is sacred -- it doesn't matter if you're talking about political strategy, group

interests, or personal ambition.

What is human history but a long battle for food? People have invaded their neighbors and started wars to get it. Take the French Revolution: everything started because people were demanding their daily bread. Or the Russian Revolution, where politicians took advantage of a starving public.

Now, our economic growth gave us the greatest wealth we've ever known, virtually overnight. We have more rice than we know what to do with. Our refrigerators are filled with food. Go to the grocery store and you'll see shelf after shelf of it. And the result? We just don't think about food at all.

A half-century ago, we had nothing to eat. We were starving. It's just astonishing to see what we've become -- so thoughtless, so profligate with our food, so wasteful. It's something fundamental, ensuring the safety of our food, but one thing I really came to understand with this whole thing was how creating too much of a feeling of anxiety can really hurt a society too.

HWANG: I was really shocked to hear some of the horror stories that were going around. Things that were completely unsupported were all over the internet in the blink of an eye. It was like an atomic bomb going off. Once a false rumor gets spread, there's nothing you can

do. All the scientists, all the researchers at the state think tanks, they can come out and state the facts, and it won't do a bit of good. They did more damage than I could possibly say.

HWANG seems to flash back for a moment to some unpleasant memories.

PARK: Look, controversies over food safety are nothing new. You could actually say that we here in Korea have a long history of worrying about our food. This is a country where you've got consumer groups scaring people to death with horror stories about MSG -- something they use all around the world. Or they're talking about lye in soy sauce.

And then there was the whole ramen beef tallow thing -- a real episode for the Korean modern food history books. It all happened because the prosecutors didn't know what they were doing, and what ended up happening? The supermarkets all threw out their ramen. The country's biggest food company was bankrupted, just like that. And even when they were found not guilty after nine years in the courts, no one took any responsibility for it.

That's the country we're living in. How many innocent canners went bust over the silkworm pod formaline episode? We have food industry people killing them-

selves over bad dumplings, and no one takes responsibility. It's time for us to give some serious thought to how we can improve the way this country is run, because right now it's all messed up: you've got one victimless food hygiene episode after another, needlessly worrying the public. I think the mad cow disease situation was just another example of that. No BSE was ever found in a cow here, to say nothing of human BSE. Who wouldn't expect the rest of the world to be shocked to see something like that happen here?

His expression is straightforward - every bit the internet journalist.

The traffic jam in front of City Hall has eased up, and the vehicles are now moving along smoothly. The lawn beneath the window summons an early winter chill under the grayish blue light of a neon sign. The leaves peacefully fluttering across the darkened plaza seem somehow plaintive.

III The Seed Wars

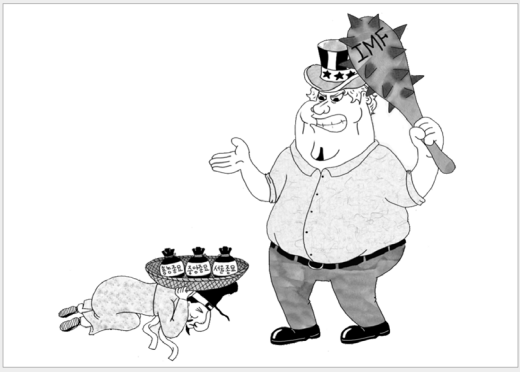
The UPOV Conspiracy

Dinosaur Agribusiness

What Monsanto's BT Cotton Did in India

A Canadian Farmer Battles a Dinosaur

The Korean Seed Market



The UPOV Conspiracy

There is an old Korean saying: "Even a starving farmer will breathe his last on a pillow of seeds." It is emblematic of what the seed represents to the farmer -- his hope for tomorrow. It also represents a characteristically Korean refusal to let go of the strands of hope until the very moment that one's life ends. But those same seeds, the ones that represent life to farmers, are now slipping out of their hands.

On October 20, 2010, a protest was staged in front of the World Intellectual Property Organization's offices in Geneva, home to the International Union for the Protection of New Varieties of Plants (UPOV). The participants came from La Via Campesina and various farmers' groups from all over Europe. It was UPOV's 50th anniversary, and Korea was organizing the proceedings as chair nation. The demonstrators claimed that UPOV was allowing seed breeders to make off with strains that farmers had been selectively stockpiling for millennia. The breeders, they said, had patented and sold new strains developed through minor modifications to vari-

eties that farmers had been using for centuries. In the process, they were denying those farmers their own right to stockpile seeds from their own harvest to use the next year or share with neighbors.

Intellectual property protections for seed breeders first appeared in 1930, with the U.S.'s enactment of the Plant Patent Act of 1930. Germany and France followed suit with their own special laws to protect new plant strains in 1953 and 1957, respectively. A system took shape in which the government recognized and safeguarded ownership of new plant strains. The International Convention for the Protection of New Varieties of Plants was adopted in Paris in 1961, with most of its signatories coming from the nations of Europe. When it went into effect in 1968, it gave the binding force of international law to the plant strain protection system. In its wake came vigorous efforts to develop new breeds of plants -- after all, the breeders were now entitled to protections for their long-term efforts and investment. The result was the development of many new strains that increased productivity and yielded outstanding crops.

The convention barred double protections on new plant varieties through patent laws and special laws. But it was subsequently amended in 1991, with the U.S. and other countries carrying the day in calling to eliminate these prohibitions and strengthen legal enforcement, increasing the rights of breeders and expanding the scope of protections

to basically any and every kind of plant. During the Uruguay Round, the developing countries received a five-year grace period on implementing the WTO's Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). But the deadline arrived on January 1, 2000, and they were forced to enact patent laws or special laws to protect new strains.

On January 7, 2002, Korea became UPOV's fiftieth member nation. (As of July 2011, there were seventy, most recently Peru; Japan, China, Israel, Singapore, Jordan, and Vietnam were present from among Asian countries.) Countries had to recognize intellectual property rights for all new plant varieties within ten years of joining. Farmers were required to pay royalties for their use. It is currently estimated that Korean farmers will have to pay roughly $700 million in seed royalties overseas over the next decade. These expenses add up to roughly 10 percent of the cultivation cost, leaving farmers facing a much heavier burden than they had in the past.

On the face of it, UPOV's proposition would seem reasonable enough: protect the rights of breeders, and compensate them fairly for their efforts and outlays to develop new strains. It looks like just another form of intellectual property right, the kind that contemporary society generally finds eminently reasonable. And, indeed, when UPOV was first emerging in the 1960s, its motives were pure enough: to rec-

ognize at least minimum rights for breeders, encouraging them to pursue research and development and make a greater contribution to society.

But during the Uruguay Round negotiations, greater intellectual property right protections were increasingly part of a strategy to maximize the gains for advanced countries, and it was these motives among a small minority that carried the day at the 1991 UPOV conference. Any country that wanted to become an "advanced seed nation" had to join UPOV, and that meant recognizing intellectual property rights for all new seed strains within ten years, paying all the attendant royalties. The bait held out to the developing countries was a ten-year grace period. Most bit. After all, their own regimes were generally unstable, and none of *them* would have to answer for the international agreement in ten years' time.

In terms of intellectual property rights, the royalty payment demands would seem fair enough. People today generally takes these to be universal rights that require protection. But things become more complicated when farmers are prevented from using the seeds that they harvest for their next year's crops. Typically, seeds and nuts suffer from deteriorating genetic character -- in other words, their quality becomes degraded over repeated sowing. This has led to the use of F1 hybrids, which are created through cross-breeding of two different varieties. Farmers often purchase these hybrid seeds and use them for their crops.

There is a strong argument to be made, however, that taking away a farmer's right to reuse his own seeds, or to choose whether or not to buy new ones, is tantamount to robbing human beings of a God-given gift. And the use of so-called "terminator technology" (where traits show up in just one generation of new seeds, and are absent from any new ones that are harvested) is seen by many as something inhuman, abominable. The reason that people so respect technology, and so revere scientists, is because of the service that they have done to the public by contributing to the general prosperity. People will simply not accept the dirty pool of modifying a small subsection of the genes that God gave us to create a new, patented strain, which people are then preventing from using unless they first pay for the privilege. It is, in a word, a conspiracy to use technology to deprive people of *nature itself* in the name of intellectual property rights.

A 1985 ruling in the U.S. on hybrid utility patents tells the tale. It determined the entire plant to be subject to the terms of the patent, and all its components -- seeds, tissues, cultures, cells, even its DNA sequence. Furthermore, it banned the resowing of seeds harvested from the patented strain. Now, anyone with the technology to modify even a very small portion of the genome had the right to legally own the food that God granted to humankind.

Dinosaur Agribusiness

The leading science powers cottoned on early to the value of seeds. One of the first things that Japan did after colonizing Korea was to conduct a large-scale survey and collection of the peninsula's local rice strains. They gathered a total of 1,452 varieties between 1911 and 1912, including 876 of nonglutinous paddy rice, 384 of glutinous rice, and 192 of dry-field rice. Few people alive today are aware of this plundering of genetic resources that took place during the colonial era. It is not particularly surprising, however, if one considers that one of the reason Japan so coveted the peninsula over the centuries was because of the fine quality of its rice.

The soybeans that grew naturally in southern Manchuria and on the Korean Peninsula first came to Western awareness in 1739, by way of China, where a French missionary took a sack of seeds with him to plant in a Paris botanical garden. When China opened its doors to the West in the wake of the Opium Wars (1840-1842), those strains were

picked up by American agricultural scientists. Commodore Matthew Perry is also said to have gathered soybeans from Japan after opening that country up in 1854. Indeed, the U.S. was quick to recognize the importance of seeds in the early days of its territorial expansion, and went about snapping up different varieties from all over the world. In a 1770 letter, Benjamin Franklin recounted sending soybean seeds to his home from England. The country's third president, Thomas Jefferson (1743-1826), was famous for collecting different seeds from around the world. In 1929, the U.S. sent the Dorsett-Morse Oriental Agricultural Exploration Expedition to Asia to gather seeds. These included 4,451 varieties of soybeans -- some from Japan and China, but the bulk of them (3,500) from Korea. Today, the U.S. is the world's largest repository of seeds, possessing around 650,000 varieties.

The National Soybean Research Laboratory at the University of Illinois reportedly houses around 20,000 soybean seeds, approximately 4,000 of which are indigenous to Korea. The seeds that Koreans unwittingly handed over with a "Hello," "Okay," and "Thank you" were the ancestors of the U.S.'s soybeans today. American breeders have altered the forms of their plants to allow for mechanical harvesting and made huge improvements in the yield per acre. Together, these helped it to become the world's single largest producer of the plant. And now it is taking things a step farther, using genetic recombination to develop soybeans that are modi-

fied to withstand herbicide, with an eye toward taking complete control of the world soybean seed market.

Monsanto, that market's Leviathan, started out in 1901 as a food additive company. In the 1950s, it made a fortune synthesizing the artificial sweetener saccharin. It also produced nerve gas during the Second World War; later, it developed defoliant dioxins that were used in the Vietnam War. When the demand for chemical weapons dried up after the war, it turned its focus to agricultural chemicals, producing herbicides and insecticides. And when the biotechnology revolution started in the 1960s, it was right there in the fray. Its Roundup Ready soybeans were a particularly clever "have your cake and eat it too" strategy: they were resistant to the herbicide Roundup, itself a Monsanto product. The company became a pioneer in the world genetically recombinant seed industry, coming to account for fully 87 percent of world GM crop acreage with its patented soybeans, cotton, corn, and other plants.

As of 2007, the size of the worldwide patented seed industry was $22 billion, or 82 percent of the world's seed market. Monsanto's market share of 23 percent put it in a solid first place, followed by Dupont and Syngenta at second and third with 15 percent and 9 percent, respectively. Together, they account for nearly half (47 percent) of the total market, with 65 percent of patented corn seeds and half of soybean seeds. The top ten companies represent a com-

The World's Top Ten Patented Seed Companies			
Rank	Name (Nationality)	Sales (millions of dollars)	Market Share (percentage)
1	Monsanto (US)	4,964	23
2	Dupont (US)	3,300	15
3	Syngenta (Switzerland)	2,018	9
4	Groupe Limagrain (France)	1,226	6
5	Land O'Lakes (US)	917	4
6	KWS AG (Germany)	702	3
7	Bayer CropScience (Germany)	524	2
8	Sakata (Japan)	396	<2
9	DLF-Trifolium (Denmark)	391	<2
10	Takii Seed (Japan)	347	<2
Total	14,785	14,785	67

(http://www.gmwatch.org/gm-firms/10558-the-worlds-top-ten-seed-com)

bined two-thirds of the world patented seed market.

What happened to allow the global seed market to fall into this small clutch of corporate hands? The answer lies in the frenzy of mergers and acquisitions that took place in the late 20th century. Four of Korea's five major seed companies were sold off to overseas buyers during the foreign exchange crisis of the late 1990s. Novartis spent $38,090,000 in 1997 to acquire Seoul Seeds, before itself being acquired by Syngenta. Hungnong Seed and Jung Ang Seeds were sold off in 1998 to the Mexican seed company Seminis for $166,890,000. That same year, Japan's Sakata bought Chongwon Seeds for $10,470,000. The same seeds that Korean farmers clung to

even as they starved were now being handed over during a period of crisis. Can we really say that the crisis was successfully resolved when it came at such a cost? Indeed, it may have been a carefully crafted plan to seize these very companies that plunged it into crisis in the first place.

At the time, Hungnong, Jung Ang, and Seoul Seeds held a combined share of 70 percent of the Korean market. Hungnong, in particular, was a blue chip company that was exporting $10 million worth of seeds each year, mainly to other Asian countries. Its primary export items were vegetable seeds -- radishes, cabbage, peppers -- which it sold to Japan, China, India, and elsewhere. Seventeen years of breeding to hybridize Russian wild melons with Japanese Euncheon melons had produced a superior form of Oriental melon, an achievement that drew worldwide recognition. Jung Ang, for its part, cross-bred Jeju's native crisply flavored peppers with spicy and highly disease-resistant Vietnamese varieties to develop the Cheongyang pepper. Developed in 1983, it became virtually synonymous with Korean peppers. Now, the very same seed companies, with their world-class levels of technology, were being sold off en masse in the crisis years of the late '90s.

What caught the attention of the world's big agribusinesses was less the scale of the seed market, and more the technology and potential that Korea's seed companies possessed. Japanese companies had long used Korea as a place to gather

seeds, and the country had developed considerable skills in using Japanese technology and seeds to breed radishes, cabbages, cucumbers, and other vegetables. In the 1970s, it actually began exporting to Japan with its superior flavors of radish and cabbage. These new crops were also welcomed in China, which had lost its own traditional vegetable varieties amid an influx of cheap Western seeds. Korean pepper seeds took over the Indian market, too, lowering production costs and increasing yields. It appears, then, that foreign giants like Monsanto and Syngenta were willing to pay top dollar to purchase these seed companies and the technology that came with them, seeing them as a foothold to make inroads into the Asian market.

From its beginnings as a pesticide company, Monsanto had developed into a veritable behemoth, acquiring American grain seed companies like Dekalb and Asgrow in the 1980s. In 2005, it acquired the world's number one vegetable grain company, Mexico's Seminis, for a price tag of $1.4 billion. With this, Seminis's Korean holdings -- Hungnong and Jung Ang -- ended up becoming Monsanto property. As the new century dawned, a new order took shape, one where massive mergers and acquisitions had left the world's seed companies in the hands of a small coterie of multinational pesticide giants. Germany's Bayer, the world's top agricultural chemical producer, owns the world's seventh largest seed company in Bayer CropScience. The world's second ranked pesti-

cide company, Switzerland's Syngenta, is also its third largest seed company. Top-ranked seed company Monsanto is the fifth largest pesticide company; second ranked Dupont is the sixth largest agricultural chemical company. And as pesticides and seeds alike fell into the hands of a select few corporations, world agriculture became their prey, leaving its natural origins behind and, some contend, subjecting billions of farmers around the globe to a new form of slavery.

These agribusiness dinosaurs have routinely violated anti-trust regulations designed to prevent unfair transaction practices, yet no one seems able to stop them. A technology cartel is rapidly taking shape, and no one is stopping that, either. Things have progressed beyond the point where any one country or international agreement can keep the situation in hand. In March 2007, Monsanto (the world's third largest seed company) and BASF (its largest chemical company) signed an agreement to jointly invest $1.5 billion in research to breed high-yield corn, cotton, canola, and soybeans that are capable of withstanding drought conditions. According to them, this research represents a great leap forward in providing farmers with high-yield varieties. Monsanto is also developing new, genetically modified corn with Dow AgroScience and signing cross-licensing agreements with Syngenta. In every case, these actions are purported to be in the interests of farmers. In truth, it is an attempt by a small handful of agribusiness behemoths to establish a uni-

fied front in their quest to dominate world agriculture.

More worrisome still are the seed companies' recent efforts to strengthen their ties to distributors and processors. Strategic partnerships have been formed between Monsanto and Cargill (the world's foremost grain majors), Syngenta and ADM, and Dupont and ConAgra. The majors are demanding that farmers grow particular strains that are developed by their seed company partners. The farmers are compelled to buy expensive seeds from specific companies, and to use the pesticides and herbicides that they manufacture. World agriculture today is converging around a small subset of strains developed by a select few seed companies, while traditional varieties vanish into history. Seed diversity is now in dire peril.

Humans have had abundant experience with the disasters that result from a lack of seed diversity. Perhaps the best-known example is the Irish famine of 1847. High-yield potatoes from South America became all the rage; every farmer planted them. But after a few years, the country was hit by an outbreak of blight, which the Irish potatoes were highly susceptible to. The entire crop was wiped out, and more than one million people who had subsisted off them perished that year. Another three million emigrated en masse to the United States.

The seed dinosaurs' attempt to expand their market through the globalization of patented seeds poses a grave

threat to human survival. It must be stopped. Farmers stand to become little more than slaves once stripped of their right to choose freely by the unholy alliance between pesticide and distribution companies. In this new form of indentured servitude, they will have no choice but to farm the strains dictated by the dinosaurs, and sell them at the prices that those companies set.

What Monsanto's BT Cotton Did in India

The cotton fields of India's Vidarbha region have long been a lifeline and source of income for its residents. But during the past decade, the region has seen more than 200,000 farmer suicides. Indian NGOs say the reason for this is the mounting losses and debt that farmers have incurred growing BT cotton developed by Monsanto. Many farmers have been ruined, and are now suffering from the direst of poverty.

When the cotton strain first came out in the late 1990s, it was touted as a pesticide-free product with a high yield and strong resistance to insects. Farmers who planted it would make a killing, the company insisted. Most went along, switching to the new strain. But after a few years, they began to sense that they had been tricked. Not only did the yields fall well short of Monsanto's lofty predictions, but they found themselves having to spend more and more on pesticides. This, it turned out, was what you get when you pur-

chased seeds developed by a pesticide company. They also suffered huge losses from the eating habits of the mealybug, an insect that had been unwittingly introduced alongside the cotton. Relatively impervious to pesticides, the insects had to be caught and killed by hand, and spread easily to other crops. The results were devastating to the region's agriculture. Meanwhile, seed prices soared with each passing year, rising from an initial five rupees per kilo to 3,200 rupees -- 2,400 of which reportedly went to Monsanto as royalties.

It was a trap that Indian farmers could not easily escape. For the past decade, they had been using BT cotton seeds exclusively, and now they could not find the traditional varieties on the market. No one was planting them anymore. They had no choice but to continue planting the BT cotton, despite the tremendous costs of the seeds and the cultivation. They fell deeper and deeper into debt; many finally opted to commit suicide by drinking pesticide.

Fortunately, the BT cotton farmers did not remain in Monsanto's yoke for long, once it became clear just how devastating the effects of the seed giant's grasping had been. The Navdanya campaign arose as a way of preserving India's indigenous seed strains. Its participants collected and bred local varieties for distribution to farmers. Spearheaded by environmental and farmers' rights advocate Vandana Shiva, the campaign established the Navdanya Seed Bank, where

some two thousand rice seeds are stored and provided to farmers free of charge. It also collects cotton seeds to give to farmers in distress. Thanks to this supply of indigenous cotton seeds, farmers are once again enjoying a bountiful, pesticide-free harvest.

A Canadian Farmer Battles a Dinosaur

American and Canadian farmers have not been happy lately. On the seed bags that they buy, they are finding a message warning them that the seeds cannot be resown -- doing so would be a violation of patent law. Farmers no longer feel that they can call their crops their own. They see no blessings from these children. For a profession that loves natures and respects its laws, the blow to their pride is nothing short of devastating.

This was the backdrop when Percy Schmeiser captured the world's attention with his legal battle against Monsanto. For more than half a century, he and his wife had farmed in the town of Bruno, Saskatchewan. An adventurous sort, Schmeiser was an active presence in local politics. Since the 1950s, his crop had been canola.

Monsanto accused Schmeiser of illegally cultivating genetic elements, cells, and seeds from its own Roundup Ready canola (developed to resist the company's own glyphosate herbicide Roundup) and selling the yield. The seeds in ques-

tion were registered under Canadian patent number 1313830 and could not, by law, be used without the permission of the patent holder. Schmeiser had harvested the seed from his own field in 1997 and sown it in 1998, reaping the resulting crops later that year.

Monsanto's Canadian office is headquartered in the city of Missisauga, Ontario. (The company's American headquarters are in St. Louis, Missouri.) The company patented the seed in question in February 1993, receiving all rights to its development, manufacturing, use, and sale until February 23, 2010.

Schmeiser's first trial began in August 1998. Monsanto was asking for of $145,450: $15,450 for seed costs ($15 for each of the 1,030 acres planted), plus $105,000 in damages and $25,000 in fines. Schmeiser countered that he had never sown the seeds in his fields. Indeed, he reported experiencing major problems due to the weeds that his herbicide had failed to kill. The GM canola prevented him from planting any other crops in the field, since it was impervious to other pesticides. Monsanto, he said, had done nothing to prevent the seeds from spreading into his field, and was violating the law by patenting a foodstuff, allowing it to spread freely onto farmland, and then claiming a patent violation when it was discovered there. The court disagreed and sided with Monsanto, citing the need to protect new strains according to the Plant Breeder's Right Act.

Glyphosate herbicides work by inhibiting an enzyme called EPSPS, which produces amino acids necessary for the growth and development of many plants. A plant will die when sprayed with it. Monsanto scientists developed a glyphosate-resistant form of canola by splicing the plasmid RT73 into the plant's DNA using a transfer vector. Inserting a plasmid into plant cell DNA creates plants that are resistant to herbicides -- stem, leaves, seeds, and all. Any seeds produced from them will inherit the same property and be glyphosate-resistant themselves when they sprout the following year.

Canola had long been a small-scale crop in Canada, but yields ballooned with the planting of Monsanto's Roundup Ready strain. As recently as 1996, there had been 50,000 acres planted with the variety, cultivated by around six hundred farmers. By 2000, it was 4.5 million to 5 million acres, grown by around 20,000 farmers -- representing fully 40 percent of the country's total canola production. Used for oil and animal feed, the GM canola has become one of the country's most profitable crops.

Records from the first *Monsanto v. Schmeiser* trial show that the farmer set aside seeds from his canola harvest for planting the following year, as was the practice in Bruno. Between 1993 and 1999, he consistently used seeds from his own farm, without purchasing any new ones. By following the traditional method, he believed, he could produce hardy,

high-quality seeds that would be resistant to various diseases. He sowed traditional Argentine canola, rotating a portion of it with wheat and peas, and sometimes leaving the field fallow. But he had spent the four preceding years continuously sowing canola, which he said had led to an increase in his yields. There had also been fewer diseases and a larger harvest, since the pathogens remained buried in the ground when the fields were not plowed. This, he said, was what enabled him to produce and plant higher-quality canola seeds than other farms.

He also testified that he had made every effort to minimize his use of chemical herbicides, doing so only when absolutely necessary. He didn't use Roundup, but another herbicide that he sprayed on the ground in the early spring, which he said was effective in killing off growing weeds and keeping the ground moist. The herbicide in question lasted for around three years. He did use Roundup, he added -- around telephone poles and in ditches by the highway. But not in the canola fields, where he said it would kill off useful germs, reduce the yield of future harvests, and promote root rot.

Schmeiser's field was split into nine sections. In 1996, he had planted 370 acres of canola in the first, fourth, sixth, and seventh sections (either the entire section or a portion of it). The following year, he planted seeds from the first section over 780 acres in every field except the fourth, seventh,

and ninth. The year after that, he sowed 1,030 acres with seeds from the second field. Five of the farms nearby had purchased and planted Monsanto's Roundup Ready canola in 1996, but they were five miles away from Schmeiser's second field, where he had gathered seeds in 1997. A nearby resident named Huber testified that his own field, where he had planted the Roundup Ready variety, was located just southwest of Schmeiser's sixth field -- close enough to hear a horse neigh, he said. Many of his own crops had blown over into Schmeiser's field in late 1996, he claimed. There was no evidence, however, to indicate that seeds had been collected from the sixth field that year for use the next. Monsanto testified that all Roundup Ready crops produced in the region after 1996 were transported in sealed trucks to a plant for pulverizing.

In the summer of 1997, the private inspection service Robinson Investigations launched an investigation to determine whether Monsanto seeds had been used illegally anywhere in Saskatchewan. According to its findings, Schmeiser's farm had been unlawfully cultivating Roundup Ready canola. Schmeiser himself testified that he had first discovered the Roundup-resistant canola in 1997 when he was applying the pesticide around telephone poles and in ditches in his first, second, third, and fourth fields. All of them were located east of a paved road; according to Schmeiser, he had gone out a few days after spraying the herbicide and discovered

that many of the plants were still alive. He applied herbicide to the second field a few more times, but when he checked a few days later he found that around 60 percent of the plants had survived. Most of them were concentrated toward the road, with fewer and fewer of them farther away from it. When Schmeiser harvested canola seeds that year, he collected everything, including the survivors from the second field, and stored them in Bruno. After processing by Humboldt Flour Mills, the seeds were mixed with fertilizer and planted in his field in the spring of 1998.

Meanwhile, seeds collected by Robinson from Schmeiser's second and fifth fields in 1997 were grown at the University of Saskatchewan Department of Plant Sciences. The plants were Roundup Ready. Based on subsequent testing, Dr. Keith Downey concluded in 2000 that the canola collected from Schmeiser's field had been obtained from Monsanto seeds, and could not have been the result of drifting pollen or natural hybridization with a native variety.

Mike Robinson testified in court about meeting with Schmeiser in March 1998. Apparently, when Robinson introduced himself as a representative of Monsanto, he told the farmer that the seeds he had sown the year before were the company's. Schmeiser first denied ever hearing such a thing. He then asked to be recorded speaking to Robinson, but his was turned down. Finally, he testified that he had not been paying attention.

In late March 1998, a representative of Monsanto learned about Schmeiser processing the seeds at Humboldt and demanded that the company provide samples of the seeds that were stored there. Schmeiser was unaware that Humboldt was still keeping a portion of the sample for which he had requested processing. Without his consent, the company went ahead and gave Monsanto the sample. Half of it was submitted for genetic testing, while the other half was grown experimentally at the University of Manitoba.

Monsanto paid a visit to Schmeiser's farm that August and asked to be allowed to take a sample. Schmeiser turned them down. The company then received a court order to allow sampling, and Schmeiser agreed, on the condition he be permitted to observe. However, he was not present when the Monsanto people actually went to take the sample. This sample, too, was split in half, with one portion subjected to genetic testing at Monsanto's head office and the other experimentally grown. The results showed a 95 to 98 percent probability that patented genes were present.

In its final decision, the court acknowledged the possibility that Monsanto seeds could have fallen onto the highway while being transported or been brought in by birds, insects, or the wind, but said that this did not explain the density of patented plants observed in Schmeiser's field. It ruled that the farmer's cultivation of herbicide-resistant canola from Monsanto, deliberate or not, was illegal and a viola-

tion of patent law. He was ordered to pay damages to the company.

Schmeiser appealed, but all seventeen of his grounds were rejected in 2002. A Canadian federal court of appeal consisting of three judges unanimously dismissed the case. He took the case to the Supreme Court next, but lost that appeal in 2004. And so the David versus Goliath battle ended, with a resounding loss for David.

The court battle may be over, but Schmeiser's anger lives on. In an interview, his wife said their one lawyer was no match for Monsanto's nine-person legal team. Today, the farmer is seen as something of a hero by farmers' rights and environmental groups, and is frequently asked to give lectures. Thus continue the attempts -- however feeble -- to resist the abuses of increasingly massive and cartelized multinational agribusiness dinosaurs in their attempt to take over global agriculture.

The Korean Seed Market

A party atmosphere prevailed in the early 2000s. Presidents and government officials alike crowed that Korea had successfully beaten back the foreign exchange crisis. By a decade later, though, it was apparent just how much of the nation's wealth they had sacrificed. The leaders who sold Korea Exchange Bank to the U.S. company Lone Star -- knowingly facilitating the fleecing of fully four trillion won -- will go down in history as traitors to their country. But there was an even greater loss, one incurred during the overseas selloff of the country's seed industry. Few give much thought to it today.

There certainly is much to deplore in the short-sightedness and selfishness of the owners of Korea's leading seed companies (Hungnong, Seoul Seeds, Jung Ang, and Chongwon) when they sold their businesses off for a sizable sum. Greater blame, however, lies at the feet of the ignorant and irresponsible leaders in charge of the country's agricultural policies at the time of the foreign exchange crisis. The gov-

ernment should have done whatever it took to prevent the sale of the indigenous seed industry, the very lifeline and pride of its people. It did not.

Following their acquisition by foreign corporations, the country came to depend on overseas supplies for more than 70 percent of its vegetable seeds. It had sacrificed its seed sovereignty. The problem was not the supply per se -- it was the fact that all those companies' indigenous seeds and genetic resources were now in the hands of foreign corporations. Seeds are a key material in agriculture, accounting for about 10 percent of costs. Having them in overseas hands leaves the public vulnerable to price manipulations, and makes it more difficult to obtain the varieties that we want. In effect, we handed over a weapon that we could have used in the coming seed war. Now, we are in the unenviable position of having to import the bulk of our very own native varieties.

The mandarin oranges of Jeju Island, the laver seaweed of Wando, the blueberries of Iksan -- all of these had been cultivated on Korean territory by Korean farmers. As of 2012, however, those farmers will have to pay royalties overseas every time they produce and sell these crops. Ninety-nine percent of the Jeju mandarin orange crop comes from Japanese seeds, and the farmers who raise these fruits must pay Japan for every seedling planted. This is the result of the UPOV convention, which extends to all crops as of that year.

Six items that had previously been exempted from royalty payments -- strawberries, mandarin oranges, raspberries, blueberries, cherries, and seaweeds (including laver, sea mustard, and kelp) -- are now subject to them. The problem, in this case, is Korea's high level of dependence on foreign seed supplies. For the six aforementioned varieties in particular, Korea depends on Japan for as much as 99 percent of its seeds.

The past few years have seen some efforts in Korea to promote the use of domestic seeds. One success story has been strawberries: as recently as 2005, domestic varieties accounted for less than 10 percent of the domestic crop, but that number has recently risen as high as 61 percent. But for a small handful of examples, however, domestic seed percentages have been pitiful indeed. Hybridization improvements are relatively easy for vegetables and flowers, given the short breeding periods involved, but it is a very different story for seedlings and fruits. Once these are planted, it takes at least three years for them to bear fruit, which translates into long periods of new strain development. Indeed, Korea depends on foreign product for many of its most popular crops, among them grapes (98 percent), shiitake mushrooms (60 percent), roses (82 percent), and carnations (99.8 percent). Reports indicate that Japanese seed company officials have recently been hard at work surveying Jeju Island ahead of the impending calculation of royalty payments on manda-

rin oranges.

Foreign royalty payments from Korean farmers have been ballooning over the past decade, from 550 million won in 2001 to 18.4 billion won in 2005 and 21.9 billion won in 2010. After UPOV goes into full effect in 2012, that amount is expected to reach 79.7 billion won over the following decade. Korea's Agriculture Ministry is currently working on the so-called "Golden Seed Project," which involves investing 814.9 billion won over ten years to improve the country's seed capabilities by 2020 and meet an export target of $200 million. This effort faces an uphill battle, though. That amount is pocket change next to the yearly research expenditures of a company like Monsanto, a multinational that ranks as the world's top seed company. Together, the top ten corporations hold 70 percent of the global seed market. Guarding what is left of Korea's seed sovereignty will require a Herculean effort to develop marketable seeds.

The Korean government develops and supplies seeds for five crops: rice, barley, soybeans, potatoes, and corn. These are strictly monitored by the state, with mandatory reporting on all exports and imports. In contrast, most of its major vegetables -- cabbages, radishes, peppers -- are supplied by the foreign corporations that acquired Korea's seed companies. Over 80 percent of seeds or bulbs for spinach, carrots, onions, tomatoes, and strawberries come from Japan. But the seed war to come will know no borders, and it will be no

easy matter telling domestic products apart from imports.

Whenever seeds are sold in Korea, they have to be registered with the Korean Seed Association. The criterion for determining whether they are imported or indigenous is whether the breeder is located in Korea or overseas. Strains produced by foreign breeders can only be sold after first being tested for import adaptability -- a two-year process that examines whether they are suited to Korea's climate and soil. Once one has passed, it is considered imported. This means that even seeds owned by foreign companies are considered indigenous if they were produced by a Korean breeder. By this standard, the country's Rural Development Agency has stated that 100 percent of cabbage, peppers, garlic, and watermelon crops are domestic varieties, as are 95 percent of radishes and over 80 percent of onions and tomatoes, although most of them are imported. The approach shows just how casually they viewed the whole thing.

As of 2010, the global seed market was valued at an estimated $30 billion. The share of the top ten multinationals has risen from 14 percent in 1996 to fully 67 percent in 2007. These companies are putting the most cutting-edge technology to work in developing seeds that can adapt to the conditions brought by climate change. Dupont is working on corn that can withstand heavy winds and yields twice as much output per unit of area. The companies that lose out in the seed war will end up having to pay through the nose

for seeds from these multinationals, or else be subject to royalties.

Fortunately, there are some companies that fought off the acquisition push and survived intact. One was Dongbu Seeds, and another was Nongwoo Bio, which turned down an offer of 100 billion won at the time of foreign exchange crisis in Korea. Nongwoo's chairman, Koh Hee-sun, held a press conference at the Korea Press Center in Seoul to declare that seeds were a legacy to be bequeathed to the future. If he could not take the pressure, Koh said, he would sooner sell his company to the state.

Meanwhile, a handful of researchers from the seed companies that were sold off decided to tender their resignations. Convinced of the need to restore Korea's seed sovereignty, they set up their own institute and went to work developing new strains. In so doing, they hoped to replace the seeds developed by the companies that had been sold off.

Korea is a peculiar country. In a history of multiple foreign invasions, it was always the commoners who took action to rescue it, while the forces on the royal payroll went scurrying at the first sign of alarm. This happened with the Japanese invasions of the 1590s, and again when Japan colonized Korea. Yet it has not only been true of national defense. No one can deny that it is private companies that have been keeping the Korea of today fed and happy.

After the foreign exchange crisis, many Koreans took to saying that their dinner tables had been swamped by foreign seeds. They were not wrong. More than half of the country's vegetable seeds are supplied by the corporations -- Syngenta and Monsanto among them -- that acquired its indigenous seed companies. But there are a few survivors, as well as committed private breeders working to study seeds, and their work is slowly starting to come to fruition. It was through the work of Korean researchers that the country went from a near-total dependence on Japan for strawberries to a domestic production rate of over 60 percent by 2010. Rates of 40 percent and 30 percent have been reached for shiitake mushrooms and carrots, respectively.

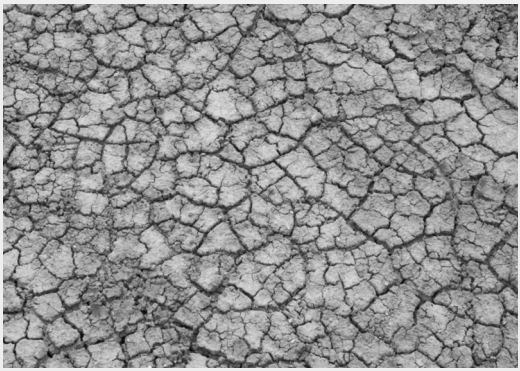
Korea's vegetable seed market is valued at about $130 million. Nongwoo Bio, one of the surviving seed companies, reclaimed first place honors in its market in 2010 with 31.8 billion won in domestic sales, for a market share of 23 percent. Meanwhile, Lee Wang-young, who left Hungnong to form Seedtech Korea when the former was sold off, went to work with six employees on a research greenhouse measuring about 10,000 square meters. The group has been producing a variety of seeds: millennium king watermelon, honeymoon watermelon, Baekdu summer radish, South Han River zucchini, midsummer kimchi peppers, and Cheongpungmyongwol kimchi peppers. With 840 million won in 2010 sales, they are fighting to reclaim a 5 percent share of the domestic market.

IV The Opening Act

The 2008 Grain Price Hike

The Weather Disasters of 2010 and 2011

Climate Change Continues



The 2008 Grain Price Hike

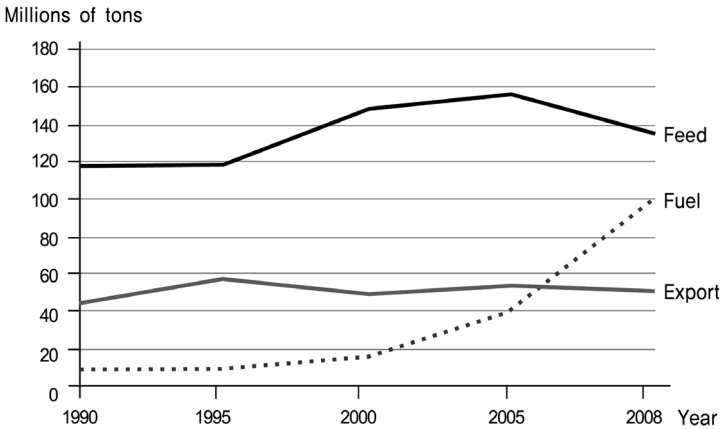
While Korea's administration was being turned upside down over mad cow disease, what was going on in the world grain market? Satiated Koreans may have been grumbling about beef imports, but in the rest of the world, starving multitudes were taking to the streets clamoring for bread. Demonstrations and riots over food shortages took place in some thirty countries, resulting in many injuries and deaths. Skyrocketing food prices in Haiti led to a weeklong protest in which six people lost their lives and Prime Minister Jacques-Édouard Alexis tendered his resignation. In Karachi, the largest city in Pakistan, wheat prices tripled in the space of just three months, putting it out of reach for even the wealthy. Each day saw a new fight break out among people lined up to buy bread in front of one of the government's general stores. A food exporter, Pakistan had a rationing system in place after the WTO took effect, with fully half the population suffering from a shortage. Meanwhile, the so-called "tortilla riots" broke out in Mexico over the scarcity of corn.

A soybean shortage in Indonesia triggered worker protests after food companies idled their factories.

International corn prices per ton rose from $100 in 2005 to $ 170 in 2006 and 2007, and $280 in 2008. The cost per ton of wheat more than doubled from $200 in 2007 to $440 in 2008. Soybeans doubled from $280 to $560 per ton over the same period. Rising corn prices produce a chain reaction: farmers plant more corn and fewer soybeans, which in turns triggers a rise in the price of the latter. And the principal cause of the rising corn prices is widely believed to have been American bioethanol production.

Generally, it is thought to be more economical to use ethanol from fermented corn as an fuel for cars rather than ordinary gasoline once oil prices rise over $100 a barrel. Amid growing instability in global petroleum prices, American bioethanol production began to soar in 2006. Eighteen million tons of corn were used for the fuel in 2000; by 2005, the total was up to 40 million tons. In 2008, it stood at 100 million won, or one-third of the country's corn production. Most of this was attributable to the rising oil prices, but another factor was government policy channeling huge amounts of money into the bioethanol industry, purportedly to reduce global carbon emissions and prevent global warming from escalating.

Ethanol has a long history of use as an automobile fuel. Henry Ford's first cars ran on it. The reason gasoline ended



[Corn Use in the United States, 1990-2008]

up being used for all cars had to do with how very cheap petroleum was. Meanwhile, sugarcane-rich Brazil began mixing bioethanol and gasoline to make fuel in the 1930s; in 1975, the production and use of bioethanol became a national effort. By 2006, a mixture of gasoline and 20 percent bioethanol was being sold throughout the country.

It was also in the 1970s that the U.S. began mixing bioethanol from corn into fuel for its cars. Today, gasoline with a 10 percent ethanol content can be purchased anywhere, and engines are built to accommodate the mixture. In the 1990s, flexible fuel vehicles (FFVs) were developed that could run on fuel with a bioenergy rate of up to 85 percent. One ton of corn produces 336.9 liters of ethanol, or 2,132

liters for every hectare planted.

Increased use of biofuels was recommended by both the 1997 Kyoto Protocol and the fourth Intergovernmental Panel on Climate Change report in 2007 as a way of cutting carbon dioxide emissions. The plants that go into them absorb CO_2 and produce sugars through photosynthesis; those sugars, in turn, are used to make ethanol, which is burned as fuel. The fuel is said to be carbon neutral. Even it is released into the atmosphere, it is simply the same CO_2 that was absorbed in the plant's growth process.

The Kyoto Protocol (full title: the Kyoto Protocol to the United Nations Framework Convention on Climate Change) was adopted in December 1997 at a third general meeting of UNFCCC countries in Japan to combat global warming. The protocol went into effect on February 16, 2005. In it, legally binding carbon emission reduction targets were designated for six types of greenhouse gas, CO_2 among them. The aim was to reduce emissions of them for all advanced countries by at least 5.2 percent from their 1990 levels. Fifteen European Union countries ratified it, but the George W. Bush administration in the United States refused to. (Korea ratified the agreement in November 2002, but was classified as a developing country and so had no obligation to cut its emissions.) For the advanced countries of Europe and North America, this meant that the use of biofuels was now essential. To produce biodiesel, they ramped up their production

of oil-bearing plants such as canola and oil palms, giving less and less space over to food crops. (By 2020, an estimated 13 percent of the world's grains, 15 percent of its plant oils, and 30 percent of its sugarcane will be used for biofuel.)

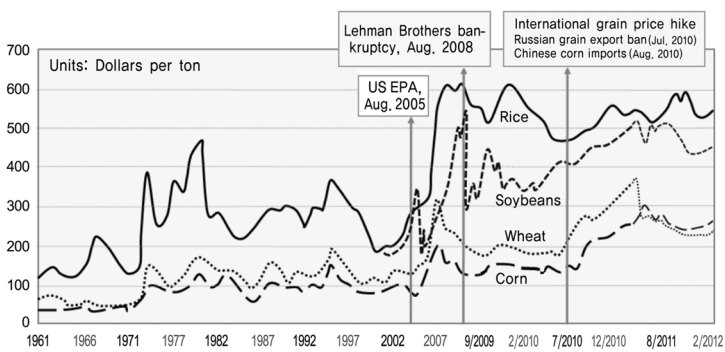
As international corn and wheat prices spiked, countries moved to limit their food exports as a way of keeping their own food prices in check. Big grain exporters in particular -- Brazil, Russia, China, India, and Ukraine among them -- either limited their food exports or halted them altogether. The result was an explosion in the price of virtually every item. By 2008, rice prices were going through the roof: Thai long-grain rice rocketed from $330 to $1,000 a ton, while California's medium-grain variety went from $600 to $1,100.

But the biggest hit was suffered by the Philippines. A rice exporter, it had opened itself up to tariffied rice imports with the WTO's launch in 1995. The cheap rice that poured in triggered a collapse in its own production base. In the decade after the market was opened, it purchased two to three million tons of inexpensive rice each year. This went a long way in alleviating the food shortage for the working class.

Things took a nose dive after international prices jumped. Fifteen thousand workers gathered in front of Malacañan Palace in Manila to call for the resignation of Presi-

dent Gloria Macapagal-Arroyo. Stunned at the vehemence of the response, the government set up sites where it sold fixed rations to the poor at one-third of the regular price, using rice imported from Thailand and Vietnam at a cost of one dollar per kilogram. Workers lined up by the thousands, fighting to purchase the rations. Armed soldiers were sent in to make sure that no riots erupted. All the while, the government was facing its own crisis, teetering on the brink of national bankruptcy. Rice subsidies were amounting to over one billion dollars, a fifteen-fold increase from the year before.

In total, over thirty countries around the world erupted into chaos in the wake of the 2008 grain price hikes. Food riots broke out in Egypt, Yemen, the United Arab Emirates, Mauritania, Sudan, Burkina Faso, and Senegal in the Middle



[International Grain Prices, 1961-2012]

East and Africa; the Philippines, China, India, Indonesia, and Bangladesh in Asia; and Argentina, Mexico, and Peru in Latin America. They were also seen in Morocco, Guinea, and Uzbekistan. Russian milk, bread, egg, and food oil prices were frozen for six months. Thailand froze its food prices, and India banned some of its rice exports. In Morocco, thirty-four people were imprisoned for rioting. A riot in Cameroon resulted in twenty-four dead and 1,500 injured. One in Yemen left twelve dead. More than ten thousand took to the streets in Indonesia to demonstrate.

In 2007, India became the first country to respond to the increasingly unstable global food supply conditions with an export ban on wheat and wheat products. Russia, China, Argentina, Ukraine, Kazakhstan, Serbia, Pakistan, the European Union, and Australia followed suit, declaring restrictions or outright bans on wheat and barley exports. Australia, which was just coming out of an intense two-year drought, took emergency measures to restrict the export of feed grains. The EU eliminated import tariffs on grains. Pakistan applied a grain export tax, Serbia banned wheat and corn exports, and Brazil levied an export tax on wheat. In addition to its wheat ban, India also raised its minimum producer price, while abolishing import tariffs. China canceled export duty reimbursements for 84 types of grain and applied export restrictions and duties for 57.

There was one country that did not take action to res-

trict grain exports: the United States. It was, without a doubt, the major beneficiary of the 2008 grain shock. It has succeeded in raising income for its farmers and fattening its grain majors by using corn to make biofuel, triggering a more than twofold increase in international grain prices in the process. Two birds, one stone.

The Weather Disasters of 2010 and 2011

The 2008 grain shock was tempered somewhat by the world financial crisis that broke out the following year. But another food crisis threat was moving in fast on the horizon: climate change, the result of global warming. September 2009 saw the beginning of a more than six-month-long period in which regions of five southwest Chinese provinces -- including Yunnan, Guizhou, and Sichuan -- saw not so much as a drop of rain. It was a catastrophe, the worst drought in a century. Five hundred rivers and 310 reservoirs dried up. The afflicted area was twice the size of the entire Korean Peninsula, home to twenty million people.

The following summer brought drought conditions and raging wildfires to Russia. International wheat prices soared from $200 to $300 a ton, prompting the country to ban exports of it. The disasters affected 13.3 million hectares of farmland, or 30 percent of the country's total grain planting area. Damages were estimated at $ 1.38 billion.

That same year, the other side of the world was hit by massive flooding. In July, the worst floods in eighty years left 20 percent of Pakistan underwater and more than 20 million people homeless. Visiting the scene, United Nations Secretary-General Ban Ki-moon said it was the first time that he had ever seen a natural disaster at that scale. In traditionally bone-dry Australia, heavy flooding struck the northeast in December 2010 and January 2011. Seventy villages and cities were hit in Queensland alone, with over 20,000 injured and 35 killed. Torrential rains fell over a huge swath of the country, including the eastern provinces of Queensland, New South Wales, Victoria and the northern part of Tasmania. Experts attributed this to the combined effects of rising sea temperatures due to global warming and the La Niña ocean-atmosphere phenomenon. The enormous scale of the damages prompted the government to assess a "flood tax" to aid residents of the afflicted areas. Meanwhile, the country's wheat crops were heavily damaged, leaving them unavailable for export.

In the Middle East, it was Tunisia and Egypt that bore the brunt of the damages. Russia and Australia had been their primary sources for wheat, their staple food. Now, those avenues were closed.

Tunisia was rocked by dramatic events in January 2011. After 23 years of iron-fisted rule, President Zine El Abidine Ben Ali was forced into exile by bloody protests from a pub-

lic enraged at the widespread starvation and tyranny. The events began with the self-immolation of a young street vendor who had been suffering under poverty, starvation, and abuse from authorities. The population went into revolt and took to the streets demanding bread. Police opened fire on the demonstrators, leaving many dead or injured. The events -- which became known as the "Jasmine Revolution," after the country's national flower -- were broadcast to the rest of the world in real time online and through social media. In the process, they lit a fuse among young people in the country's Arab neighbors.

Given its long history and tradition, it is fitting that Egypt should consume more bread per capita than any other country in the world -- an average of 400 grams a day, far more than the 130 grams consumed in France, the home of the baguette. Known as *aysh*, Egyptian bread is kneaded from whole wheat flour and baked in an oven. Flat and round, with a pocket for filling, it is spread with cheese in the morning, stuffed with vegetables for midday sandwiches, and wrapped around lamb at dinnertime.

When bakers of *aysh* went on strike in 2008, the government took emergency action, enlisting soldiers to make it in their stead. In Arabic, the word *aysh* (عيش) means "life," and it was the government's job to keep this lifeline in place. It set up state-supplied bakeries in every neighborhood, and poor people -- who represented nearly half the

country's population of 80 million -- lined up every morning to purchase bread at much cheaper rates than they could at private bakeries. The *Los Angeles Times* characterized it as a kind of "contract" between the ruler and the people: the ruler got power, the people a stable supply of bread.

And the public reacted with rage when this contract was broken. In 1977, President Anwar Sadat had tried to eliminate flour subsidies at the request of the International Monetary Fund, in the hopes of attracting foreign investment. The resulting rise in bread prices set off riots in nearly every major city. Eight hundred people were killed. The subsidies stayed.

Sadat was assassinated four years later, and succeeded in office by Hosni Mubarak. Egyptians put up with Mubarak's administration for the next three decades. The boiling point finally came when the wheat supply dried up in the wake of the 2008 grain price hikes. Now the wait to buy *aysh* at government bakeries stretched to four, five hours. There was also a limit: twenty pieces per customer. Citizens took the streets, and were only allayed when the administration took money from the military budget and used it to import more flour.

January 2011 brought three straight weeks of anti-government demonstrations in Cairo, with chants of "*Aysh, huriyah, karamah insaniyah*" -- "bread, freedom, and human rights." Once again, bread was the culprit. Food prices had

nearly doubled over the preceding four to five years. The Russian drought had led President Vladimir Putin to ban all wheat exports in July 2010. Egypt had an annual wheat consumption of 13 million tons, but a self-sufficiency rate of just 46 percent: it relied on Russian imports for 7 millions tons of it. With this channel closed, the country was facing an emergency. By August, nearly every front-page news story was about bread prices. In a story titled "No change in *aysh* prices," the state-run *Al-Ahram* newspaper reported that the government had signed a contract with France to import 240,000 tons of wheat. The private (and consequently less tightly controlled) *Al-Shorouk* newspaper said that replacing Russian wheat with French wheat would cost up to $1.2 billion. Cairo rushed to sign additional trade agreements with Argentina (where wheat was harvested in the winter) and Mercosur. But Argentina also suffered the effects of La Niña, leading to a very poor harvest. Australia, obviously, was not an option, with its once-in-a-century flooding.

There was only one place to turn: the U.S. It was the world's biggest wheat exporter, and a longtime provider of food aid to Egypt. But Federal Reserve chairman Ben Bernanke was announcing a second round of quantitative easing to stimulate the economy. It was the worst possible timing: the value of the dollar dropped, and investors switched preferences from that currency to investment in kind. While Egypt was frantically trying to get its hands on wheat,

speculators were storming the grain market, sending wheat prices skyrocketing.

Food prices in Egypt rose by an average of more than 20 percent that year. At private bakeries, *aysh* prices were up fully 25 percent. Facing mounting financial pressures from its purchasing of expensive flour, the government tried to raise prices at the state-run bakeries, too -- to offer higher-quality bread, it explained. The response was vehement, and the plan was withdrawn.

With each new day, the anti-government protests intensified. On January 17 and 18, three people committed suicide by self-immolation -- presumably inspired by the Jasmine Revolution in Tunisia. Large-scale protests on January 25 resulted in four deaths. That same day, the government shut down the internet. Three days later, tanks rolled into Cairo's Tahrir Square.

A million-person anti-government protest took place on February 1, followed by a bloodbath the next day as pro-government forces clashed with demonstrators. A two-day meeting of the Supreme Council of the Armed Forces was held on February 10 and 11. Mubarak gave a television address in which he stated that he would not be giving up his seat before his term expired in September. According to the terms of the Constitution, he would be handing over some authority to the vice president, Omar Suleiman.

The speech only added more fuel to the fire. Demon-

strators in their hundreds of thousands assembled in Tahrir Square (a name that translates into Arabic as "liberation") to call for Mubarak's resignation. The protests in Cairo continued on February 11. Demonstrators also took to the streets in droves in Alexandra and Suez. The entire country was roiling.

That same day, Suleiman appeared on television to say that Mubarak would be resigning his seat. Arab television reported that the president had fled with his family that day to Sharm el-Sheikh, a city on the Sinai Peninsula. After eighteen days of protests by almost a million people, their demand had been met: the Mubarak regime was gone.

The international community responded swifty to his resignation. United Nations Secretary-General Ban Ki-moon said that he respected the difficult decision that had been made in the broader interests of the Egyptian public. U.S. President Barack Obama said that Mubarak's resignation had answered the public's calls for democracy.

Anti-government protests were soon under way in other Arab nations. On February 12 -- the day after Mubarak's resignation -- thousands of people staged anti-government protests in Algeria and Yemen. In Algiers, calls from the opposition brought two thousand citizens into the central square to demonstrate for democracy against President Abdelaziz Bouteflika, who had been in office for more than a decade. In the Yemeni capital of Sana'a, students led thousands of

[Tahrir Square in Cairo, February 11, 2011]

citizens in protests demanding the immediate resignation of President Ali Abdullah Saleh, himself in power for more than 20 years. Later that month, events in Libya escalated into full-fledged civil war, while additional demonstrations erupted in Syria. And so it was that a citizen uprising against a food shortage and corrupt dictatorship spread like wildfire throughout North Africa and the Arab world.

Climate Change Continues

The fall of 2011 brought drought conditions to major livestock regions in Texas and other parts of the southwestern Untied States, forcing farmers to sell off their cattle. Pasture land was devastated; hay prices jumped from $80 to $200 a ton. Cattle owners had waited all winter long for rain that never came. Now facing higher feed prices, they were left with no option but to put their cattle under three years old up for auction.

Climate change also had severe effects on the country's top export grains -- corn, wheat, and peanuts. Spring 2011 flooding in the Mississippi River breadbasket washed away 3.6 million acres (14,569 km^2) of farmland. The following summer brought a double blow of intense heat and drought conditions; September came with an early frost. A November 8 report by Bloomberg called the corn harvest the worst in three years. Early that month, the government had lowered its forecast for the harvest by 27 million tons from the initial 337 million announced in July. Peanut yields were ex-

pected to fall 13 percent short of the previous year; prices rose from $450 to $1,200 a ton. This, in turn, triggered hikes of 30 percent to 40 percent in the prices of Kraft and Smucker's peanut butter. Meanwhile, rice production was expected to drop by 19 percent.

The U.S. was far from the only country to suffer such conditions in its granaries. Thailand, for example, saw 12.5 percent of its total farmland damaged in large-scale flooding beginning in July. But the result of all this was ongoing food price inflation throughout the world. At root, it had to do with an imbalance in food supplies: production was remaining stagnant -- and even dropping-under the unusual weather conditions, but demand kept rising. Beef and pork consumption in China had doubled over the preceding twenty years; poultry consumption had quadrupled. And this, in turn, had a knock-on effect on the corn used to feed cows: demand rose no fewer than 47 times from ten years prior.

So demand was soaring, but production was dropping under the combined influence of global warming and weather disasters. The Intergovernmental Panel on Climate Change (IPCC) predicted that by 2030, the average global temperature would be up 0.4℃ to 1.5℃ from its 1980-1999 levels. By the end of the 21st century, the rise would be 1.1℃ to 6.4℃. The oceans were predicted to rise by 18 cm to 59 cm from thermal expansion and glacier melt. If every

country in the world were to take active steps to cut carbon dioxide emissions, the concentration in the atmosphere would "only" rise from its current 380 ppm to 550 ppm by the end of this century, for a 1.1℃ increase in temperatures. At the current rate, however, that concentration could reach as high as 970 ppm, bringing an increase of 6.4℃. In comparison, the average temperature rose by 0.74℃ over the course of last century -- and that is what brought on the strange weather conditions that have appeared in recent years. The rise has triggered phenomena like El Niño and La Niña, which have resulted in a succession of massive typhoons, tsunamis, heavy rains, and intense droughts.

A 2007 report by the IPCC indicated that atmospheric CO_2 levels of 450 to 550 ppm would result in a 2℃ increase in average global temperatures -- and the current concentration was already over 385 ppm. Unless something was done about the increase in greenhouse gas emissions, it warned, global temperatures would rise by 3.5℃ by the end of this century. This, in turn, would cause the extinction of 40 to 70 percent of all life forms on the planet, force tens of millions of people to migrate as sea levels rose, and leave 250 million Africans without sufficient water.

Glaciers at the North and South Poles have been melting away at a rapid rate due to global warming -- an estimated million square miles by 2007, or about half of what existed a half-century ago. The influx of water has caused sea

levels to rise; indeed, some South Pacific islands have already disappeared underwater. Global warming's most devastating effect on food production, though, has been the loss of farmland to the oceans and salinity. Experts are predicting a battle for the polar regions by 2030, as melting glaciers open up new sea routes. Much of the Earth's land will be underwater, resulting in the loss of fertile farmland around coasts and along the lower courses of rivers.

Global warming is expected to lead to increased food production in Siberia and northern Canada, but it will also reduce yields, given the shorter growth period for rice. Indeed, it is being predicted that it will cause a drop of about 11 percent in rice production. There will also be a northward shift in the land suited to the growing of barley, various fruits, and cool-season crops. France's vineyards will vanish; Korea's alpine cabbage crops will be hit hard. Rising ocean temperatures will cause disruptions to the aquatic ecosystem, leading to the relocation or outright disappearance of current fisheries. Already, Koreans have seen walleye pollack fishing disappear from the country's East Sea coast.

Reports also indicate that climate change will result in a 0.6 to 0.9 percent reduction in world grain yields by 2080. There will be some variation between regions: Northern Hemisphere countries are expect to enjoy a 2.7 to 9.0 percent rise in grain production, while developing countries will face a decline of 3.3 to 7.2 percent. The drop is expected to be as

high as 5.2 to 12.5 percent for South America, 2.5 to 7.8 percent for Southeast Asia, and 3.9 to 7.5 percent for sub-Saharan Africa. South Asia will reportedly see a particularly steep decline: fully 18.2 to 22.1 percent. The world's population is predicted to roughly 1.5 times from its current level over the same period, with the majority of the population growth occurring in Asia. This means that the continent's food shortage is poised to grow ever more severe.

Worldwide efforts to stop global warming have been afoot for some time, with widespread participation. The book *An Inconvenient Truth* by Al Gore (vice president of the United States during the Bill Clinton administration) did much to awaken people to the impending disaster of global warming as a result of CO_2 emissions, and led to his being awarded the 2007 Nobel Peace Prize alongside the IPCC.

The December 1997 general meeting of UNFCCC nations in Kyoto saw the adoption of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (see page. 159). Parties were restricted in their emissions of six types of greenhouse gases: carbon dioxide, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons, and sulfur hexafluoride. Article 3 set the goal of reducing emissions for all 38 developed countries by 5.2 percent from 1990 levels between 2008 and 2012. Reduction targets were set at 8 percent for fifteen European Union countries, 7 percent for the United States, and 6 percent for Canada, Hungary, Japan, and

Poland. Countries with relatively low carbon emissions (New Zealand, Russia, and Ukraine) were exempt from reduction obligations; Norway, Australia, and Iceland, which had very low emissions to begin with, received additional emissions rights of 1 percent, 8 percent, and 10 percent, respectively.

But a strong industry outcry led the U.S. to pull out in 2001, and Russia, Japan, and Canada soon followed suit. They argued that the system would be meaningless without binding reduction requirements for the world's biggest CO_2 generators -- the U.S., China, and India. The nonparticipation of these countries would mean a reduction of just 15 percent in global greenhouse gas emissions.

For all that, the protocol did represent a starting point in putting global warming prevention into practice. It enabled the buying and selling of CO_2 emission rights: companies that could not reduce their emissions within a certain time frame would have to buy them at cost from businesses that had leftover rights or had planted trees. Roughly a dozen carbon emissions exchanges were established, including the European Climate Exchange (ECX). The market grew quickly, reaching $126.3 billion by 2008. Finland introduced the world's first carbon tax in 1990, and was soon followed by other Northern

European countries: the Netherlands, Norway, Sweden, and Denmark. In November 2011, the Australian parliament passed a Clean Energy Act with a carbon tax; as of July 2012,

2010 Greenhouse Gas Emissions by Country		
Rank	Country	Percentage of Emissions
1	China	27.1
2	USA	15.9
3	India	5.6
4	Russia	5.3
5	Japan	3.5
6	Germany	2.5
7	Korea	1.8
8	Canada	1.6
9	United Kingdom	1.5
10	Indonesia	1.4

companies subject to the tax would have to pay AU$23 per ton of CO_2 emitted. Meanwhile, the U.S. -- which accounted for 16 percent of the world's CO_2 emissions -- attempted to institute its own carbon tax, but without success.

With the Kyoto Protocol set to expire in 2012, another meeting of UNFCCC member nations was organized in Copenhagen in December 2009 to develop a new agreement to take its place. Lasting fourteen days, the conference was attended by 20,000 people, including official representatives from 192 countries and leaders of 105 countries. But no consensus was reached on the Copenhagen Accord; the different leaders simply agreed to "take note" of it. The agreement set the goal of restricting the rise in average global temperatures to within 2℃ from pre-industrialization levels. Devel-

oped countries would set 2020 reduction goals by the end of January 2010, while developing countries would submit detailed reduction plans by the same date. The different countries would also agree to submit reports every two years based on independent monitoring, reporting, and variation (MRV). In addition, goals were set for developed countries to supply $30 billion in emergency aid to developing countries between 2010 and 2012, and $10 billion a year through 2020, with plans to establish a legally binding agreement by the end of 2010. But the conference failed to set any greenhouse gas reduction target for 2050, and even the matter of a binding reduction plan was put off until the next conference. The Copenhagen meeting, in short, was seen as a bust.

In November 2011, the South African city of Durban hosted the 17th United Nations Climate Change Conference, with delegates from 194 countries in attendance. An agreement was reached there to extend the Kyoto Protocol and inaugurate a new climate deal by 2020, with participation from developed and developing countries alike. By agreeing to keep the protocol in effect, the participants prevented the UN-led climate change regime from collapsing in a legal vacuum, and a road map was sketched out for a future deal on climate change. But there remained a yawning gulf in views between developed and developing countries as to just *who* had to reduce emissions, and by how much. China and India argued that it was wrong for the same advanced countries

that had been emitting CO_2 for the past two centuries to now pass responsibility off on the developing countries and hinder their economic development. The developed countries, for their part, said that emerging countries like China, India, and South Africa, and developing OECD members like Korea and Mexico, already accounted for more than half the world's total greenhouse gas emissions. Any climate change deal that left them out would be meaningless.

It was just after this conference that Canada announced that it was bowing out of the Kyoto Protocol. Environmental minister Peter Kent explained the decision by noting that his country would have to pay $1,600 per family to abide by its terms -- a total of $13.6 billion. And even after this astronomical outlay, he argued, the rise in greenhouse gases still could not be checked without action being taken by U.S. and China. Indeed, the U.S. was refusing to participate, pointing to the need to protect its industry, the lack of clear evidence that greenhouse gas controls helped to prevent global warming, and China's exemption from mandatory reductions as a developing country.

One thing was clear: the map of the world was changing. Worldwide greenhouse gas emissions had increased by fully 50 percent over the preceding 20 years, and a good deal of land had been inundated amid rising sea levels. Flooding and droughts had left hundreds of millions of poor Africans and Asians facing starvation. The time had come for the big

carbon countries to take responsibility for addressing their plight.

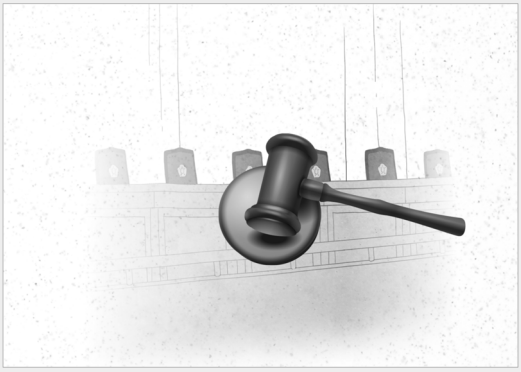
[Representatives of the Korea Green Foundation calling for Green Climate Fund payments at the Durban conference]

V The Fat Tax Hearings of 2015

The First Round (Act I)

The Second Round (Act II)

The Obesity Tax



The First Round (Act I)

The door opened with a nervous rattle. She squeezed her body through the narrow space, panting all the while. Anger blazed on her face as the amber necklace shook in the deep folds of her squat neck. The March winds were chilly, but she was dressed in a short-sleeved blouse and a widely flared skirt that barely covered her knees. The same thick layer of subcutaneous fat that caused her unbearable discomfort in the summer did, at least, leave her impervious to the winter cold.

"Fat tax?" she sputtered. "Those sons of bitches. Can parliament do that? I was pissed off already, but this just does it."

She kept the grumbling up in a steady groan as she waddled over to the Cadillac parked in front of her house. Her upper torso was wider than a kettledrum, watermelon bosoms buried in her belly fat like the folds of cloth hanging from a stone Buddha.

She wedged herself into the front seat of the car, which

had been pushed back as far as physics would accommodate. Hoisting one elephantine leg up was enough to leave her once again panting desperately.

"Crazy sons of bitches," she hissed. "It's bad enough the way they treat fat people. Now they want me to pay a tax? Communists, that's what they are. Just wait until I give them a little piece of my mind."

Mrs. O'Brien was, after all, a very important lady, head of one of the country's major consumer groups. Her sharp tongue, frequently deployed on behalf of women's groups and NGOs, had earned her a worldwide reputation. Today was a special occasion, though. She was on her way to deliver an opinion at the parliament's hearing on a proposed obesity tax.

Heaving herself up the parliament building staircase, she could already feel the burning of the ulcerated flesh around her crotch. No matter. She couldn't be bothered by that, not today.

The mood in the hall is somber as Mrs. O'BRIEN walks in. Well aware of her reputation for profanity, the onlookers are quiet as church mice, waiting to see what she has to say to the parliamentarians and government officials.

CHAIRMAN *(soothingly)*: Ms. O'Brien, welcome. Please have a seat.

It takes a few moments for her to squeeze into the armchair. She glares back at the CHAIRMAN fiercely.

(*with authority, but also a slight tremor*) We'd like to hear your thoughts on the obesity tax. Everything you say will be recorded and transcribed.

O'BRIEN: Mr. Chairman, I'm not sure exactly why I even have to be here today to talk about this nonsense. What does a person's weight have to do with any tax? As long as people have food, they have a right to eat whatever they want. We call that the pursuit of happiness. We eat what we want to, and so what if we put on weight? It's not hurting anyone. We aren't selling anything here. What exactly is this tax about?

Not only is this a violation of basic human rights, but it is discrimination -- it is an insult -- against people who are overweight. This is supposed to be the most democratic country in the world. Human rights and personal freedoms are supposed to be protected. And you think you can make a law like this?

As it happens, I myself fall into that particular category. What have I ever done to inconvenience people? Have I used my body to earn money? It makes absolutely no sense to tell me I have to pay a tax simply because I'm fat.

She picks up the bottle in front of her, pours the water into a glass, and takes a swig, as though trying to catch her breath.

My parents loved me. I never wanted for anything. And I inherited their eating habits: I liked hamburgers, sausages, fried chicken, ice cream, cheesecake, you name it. They both worked, so they were busy all the time, but there was always something delicious in the fridge.

I drank milk, I drank cola, I drank fruit juice. And women *do* put on a bit of weight when they have children. So one day I looked, and I weighed more than 100 kilos. I was at home most of the time looking after the kids, and I had the car and the washing machine and everything else to make life easy for me.

So then I passed 150 kilos. I wasn't eating anything in particular -- the same things everyone else does in this country: milk, meat, things like that. I have a strong stomach, and at the restaurant I ate what they gave me. It is a bit uncomfortable now that I weigh over 200 kilos, but I haven't hurt anyone, and I have no trouble doing the things I need to do.

I ask you, how does it make any sense at all to tell me I have to pay a tax? Well, I plan to take this up with the Constitutional Court.

The CHAIRMAN looks over at Mr. SAMUEL, the health

minister, who is on the other side busily taking notes.

CHAIRMAN: Mr. Samuel, do you have anything to say on the matter?

SAMUEL: Mr. Chairman, I don't think this is a matter of inequality or prejudicial treatment. Obesity today is a national issue. The very fate of our society hinges on our response to it.

For the past fifty years, we have recognized the seriousness of the problem and worked in various ways to prevent things from getting worse. We've spent millions of dollars on scientific research into the causes and prevention of obesity, and we have worked to educate the public with dietary guidelines.

And now we have to admit that it's all been a failure. Thirty years ago, 50 percent of the population was obese. Now it's more than 70 percent. Fully 30 percent of people are morbidly obese, weighing more than 200 kilograms. It is a problem that affects us all, rich and poor alike. And it is having serious health costs. Heart disease, hypertension, cancer, diabetes -- all of these are directly linked to obesity. Health care costs for these diseases have risen from 6 percent of GNP twenty years ago to 10 percent today. It is the public's disease now, and a threat to our very survival. Things like war and terrorism may pose localized threats to us, but obesity

threatens all of us. If we do not take drastic action now, we will regret it.

O'BRIEN (*red-faced and thundering*): Mr. Chairman, may I say something?

The CHAIRMAN hesitates, then nods.

Thank you. What *exactly* has the government done up until now? Sure, we've had tons of studies on what causes obesity, but what do we learn? "Make sure you get all the nutrients you need." "Everything in supermarkets and restaurants is safe and clean and good for you. It gives you what you need to survive." We hear it time and time again, on TV and in the newspapers. "Eat food that's good for you," they tell us.

It doesn't say anything anywhere about how eating too much of it can cause obesity. If anyone should be taxed, it's the businesses that promote obesity. But the people who gain weight from eating it? What you're doing is adding another tax to people who are already victims of contemporary commercialism. It just doesn't make any sense.

The CHAIRMAN looks over at the GOLDRICH, the commerce minister, who is sitting next to O'BRIEN. Though no match for her in his presence, he is a weighty figure himself,

his round, flat face and balding dome framed by gold-rimmed glasses. He has a belly twice as big around as his buttocks, with a rather forlorn-looking belt in the process of slowly prying itself apart far down below his navel.

GOLDRICH is looking around somewhat peevishly.

GOLDRICH (*in a measured tone*): Mr. Chairman, I have listened to what Ms. O'Brien said about holding food companies responsible, and I cannot agree.

This is a free market economy, and the first responsibility for purchasing anything lies with the consumer who makes that decision. That's the way business law works here. And that's why you have all that information printed on the package. With processed foods, we have mandatory labeling, where you have you show the total amount of calories and necessary nutrients per serving. This allows consumers to consume the amounts they need of the foods they need.

I'm sure everyone here recalls that lawsuit a few years ago, where a consumer sued a hamburger chain over his own obesity. He said the makers hadn't put up any warning that you could become obese if you kept eating that food. And we all know what happened: he lost the case and became a laughing stock.

It's common sense that you gain weight if you eat more than you need, and it's ridiculous to try to hold the

manufacturers accountable for your own failure to control your own appetite when you keep eating hamburgers all the time. The law doesn't protect irresponsible consumers who try to blame others for their own lack of self-control.

GOLDRICH wipes his oily forehead and chin with a handkerchief. His face is flushed.

But I do agree with Ms. O'Brien that charging a fat tax is a bad idea. If we do that, it will have a severely negative impact on our industry and economy. It could very well trigger social unrest.

Right now, the food industry here accounts for 12 percent of our GNP. It's a huge part of our manufacturing sector. A fat tax would lead to a major drop in food consumption and massive unemployment for workers in food production and sales. The ripple effect would be enormous, extending to every area connected with food production: mechanical processing, packaging, distribution, you name it. It would also be very bad for our balance of trade -- all those countries that mimic our eating habits and purchase our food won't want to buy it anymore. As the person in charge of promoting industry in this country and steering its economic development, I have to oppose this tax.

The CHAIRMAN looks around, a slightly vexed expression on his face. His eyes land on MILLER, the agriculture minister, who is busily talking with his aides.

CHAIRMAN: Mr. Miller, what is the opinion of the agriculture ministry? You guys are the ones in charge of the food supply.

A short-haired, square-jawed, fleshy man with bright eyes, MILLER pounces on the opportunity to speak.

MILLER: Mr. Chairman, first of all, let me thank you for this opportunity to speak. The agriculture ministry has traditionally seen it as its duty to make sure the public has a sufficient, stable supply of food. And we pride ourselves on being very good at that, as the evidence before you shows.

A century ago, we didn't have the food we needed. So we made it a matter of national priority to ensure a stable supply. We worked overtime and invested lots of money in ramping up production. We mechanized farming and developed new production technology, and our productivity took off. We have all we need to eat, and what we don't eat, we sell to other countries. And that helps our economy.

We've also made huge advances in storage and processing, which has led to the mass-production of qu-

ality food. Consumers have gotten used to buying premade food on the market, taking it home, and thawing it or heating it up. Women these days don't have to work in the kitchen like they once did. People have never had so much to eat, or had it so easy eating, as they do today. This is what people dreamed of for thousands of years, and we are now living that dream. We have a terrific food supply system in place, and people today are enjoying more abundance and contentment than ever before.

So what if they weigh more today than they did a century ago? It's nothing more or less than the natural consequence of the same kind of well-fed, comfortable life people have always wanted. People are fat because they understand those things to be paramount. The government has no business sticking its nose into matters of personal pursuit of happiness.

He looks around for a second and takes a sip of water from his glass.

Big livestock farming has always been a mainstay in this country. We have dairy farming and meat processing industries that export the highest-quality food to countries all over the world. More than half the major grains traded on the global market -- its wheat, its corn, its soybeans -- are our products, our exports. Everywhere

around the world, people envy us for our abundance. They see our way of eating as the most advanced, and they follow our lead. We're actually doing a lot to improve nutrition around the world, and we plan to keep doing that. For us to charge a fat tax now would be absurd. It would be against our national interest.

Miller just manages to keep his tone measured as he finishes.

CHAIRMAN: Okay. Well, I'd like to thank all of you for your thoughts. It looks like we have a lot of differences on the issue in terms of public health and the food industry. Consumer groups and NGOs have also had a lot to say, and not all of it agrees. It doesn't look like it will be easy to reach any conclusion on this.

For the second hearing next week, we'll hear more from scientists and civil society. This is where we'll stop for today. Thank you all for coming.

He bangs his gavel authoritatively three times and rises.

The Second Round (Act II)

By 10 o'clock in the morning on March 12, parliament was buzzing. The coverage of the first hearings in the newspapers had gotten major attention -- a fact that went some way in explaining all the cameraman who were hustling around getting their equipment set up. O'Brien had once again dragged her bulk to the hall well in advance.

The CHAIRMAN hushes the crowd.

CHAIRMAN (*somberly*): "Ladies and gentleman, last Tuesday we had the first of our hearings on the obesity tax. Today, we're going to hear from some experts. First up, we have Dr. Truman, a physiologist from the Alpha University Medical School who will be speaking on the causes and prevention of obesity. Dr. Truman?

Dr. TRUMAN is a slender-faced woman who pushes her black, horn-rimmed glasses up her nose as she speaks.

TRUMAN: Mr. Chairman, let me first of all say that it is honor to be asked to such an important occasion.

We've been working for half a century now studying the causes of obesity, and it looks like we've begun to figure out the mechanism at the molecular level. The early theory had to do with fat cells. The idea was that when you take in too many nutrients as a child, you end up with a greater number of fat cells in your body. They grow as you grow, and that's what causes obesity. Unlike other cells, these cells can basically keep growing forever, and the result is what we see today: the bodies of the obese extend farther and farther outward, in ways we could never have imagined before.

So the view among scholars was that you should make sure children get the right levels of nutrients without too many fat cells forming. If you did that, the argument went, they could go their whole lives without ever becoming pathologically overweight.

But we found that there are some people who eat a lot more than others do and still don't gain weight. So we tried to explain that, and the explanation had to do with hormones. If you look at people with hyperthyroidism -- who secrete excess hormones from their thyroid gland -- they don't seem to gain weight proportionally to what they eat. In severe cases, they may even be emaciated.

In the late 20th century, we finished up the Human Genome Project, which gave us the complete sequence of genes in the human body. That let us see the genetic sequence for determining obesity. But that doesn't mean the problem is fixed, just like that. At the present time, we can't manipulate the genetic code to produce people whose obesity switch has been shut off, so to speak. We don't have any methods of curing people who are already obesity through gene therapy.

In my mind, then, the clearest, most effective approach to preventing and treating obesity is to teach people to control their appetite, and to not eat more than the necessary amount of calories. You hear people saying, "All I do is look at food and I gain weight," but that's just not true. You gain weight because you've eaten more calories than you need. And by trying to lose weight with drugs and diet foods without cutting back their portion sizes, people are endangering their health and causing serious side effects.

The room is subdued after she finishes speaking. Perhaps hoping the liven things up a bit, the CHAIRMAN turns to Dr. WOODBECK, an attractive, short-haired woman with thin-framed glasses on her face.

CHAIRMAN: Dr. Woodbeck, you're a professor in the

food science and nutrition department at Beta University. So you're something of an authority on nutrition. Would you tell us what your thoughts are?

WOODBECK: Mr. Chairman, this obesity tax is a very troubling issue, and it's a bit awkward for me to state my position on the matter.

Human nutritional science as we know it today originated with animal nutrition studies of the late 19th century. Essentially, people's basis for judging the nutritional value of food came from looking at animals. Food that was nutritious was the kind that made livestock grow a lot when you fed it to them. By analytical deduction, they found a lot of necessary nutrients through animal testing. They discovered things like vitamins, essential amino acids, minerals, things like that, and all of it contributed greatly to improving nutrition and promoting health. Vitamin production was industrialized, which helped some of our companies develop into global powerhouses.

A lot of people around the world have really benefited from this. A century ago, the big diseases were things like scurvy, beriberi, night blindness, and skin conditions associated with lack of essential nutrients. Those conditions are almost virtually unknown today. We are in perhaps the best nutritional shape anyone has ever

been in human history.

But there are still a lot of people who aren't getting adequate amounts of trace minerals or nutrients. In other words, we're living in an age when we have both a nutritional surplus and deficiency at the same time. In some segments of the population, we find obesity stemming from a nutritional surplus, but cutting nutrient intake abruptly could need to a nutrient deficiency.

So my view is that it's less of a priority for us to charge something like an obesity tax. Rather, we need to be increasing the supply of diet foods and working to address this trace mineral deficiency issue.

Radiating confidence, WOODBECK looks over at the COMMERCE MINISTER and AGRICULTURE MINISTER before turning her eyes to the audience. Only she and they know just how much of her research budget comes from those ministries.

Meanwhile, a somewhat anxious-looking Dr. TRUMAN motions to be allowed to speak.

TRUMAN: Mr. Chairman, I would like to draw attention to something very important Dr. Woodbeck said -- (*looks down at her notes*) -- she said that modern nutritional science has its origins in livestock nutrition. I would ar-

gue that that's precisely what has turned us into a nation of fat people.

When you're raising livestock, your goal is to make the animal as big and fat as possible, as fast as possible, with the minimum amount of food. By basing our nutritional science on this, we've essentially been fattening our public like cattle. We judged how good food was by feeding it to animals and seeing how big and how quickly they grew. And what food did we end up recommending to people? Stuff that was easily digested and absorbed.

By that standard, things like wheat flour, refined sugar, cream, butter, and food oil are terrific -- they're packed with nutrients. And since fiber isn't easily digested, thing like grains, vegetables, and beans are considered bad. Meanwhile, you've got the food processing industry taking out all the bad stuff, fiber and whatever else, and making refined, enriched foods with high concentrations of nutrients. This is what accounts for most of the processed foods we eat today.

So we end up with more calories than we need just from eating small amounts. But we don't feel *full*, so we eat more. And since most of it gets absorbed and never reaches the colon, we end up with constipation -- or, worse, colon cancer. There is one and only one reason so many people in this country are suffering from con-

stipation and developing cancer, and that's because of our processing practices. I cannot for the life of me understand how you can go on about nutritional *deficiencies* without recognizing the serious flaws that underlie our modern nutritional research.

WOODBECK's eyes are steely. She is not about to let this one pass.

WOODBECK: Mr. Chairman, I feel that Dr. Truman's comments are much too simplistic. Yes, nutritional science does trace its origins back to animal nutrition, but we've done countless experiments with animals and people over the years, and that science has developed into a nutritional theory that is appropriate to the characteristics of the human body.

Obviously, it is true that we've had an elevated risk of constipation or colon cancer due to our overlooking the importance of fiber over the years. But the field had recognized that problem, and we put a great deal of emphasize on fiber intake today. That's where all the diet products you see today come from -- foods with added vegetable fiber, drinks with water-soluble fiber in them. We've also revised the concept of the daily recommended amounts, teaching people not to eat above a certain amount, which is lower now than it was ten years ago.

The obesity problem does not stem from problems in nutritional science. Rather, it is something directly linked to our eating patterns. If you look at the dietary guidelines used in public health education since the 1980s, they teach you to keep the amount of calories you get from fat below 30 percent of your intake. But that's not an easy thing to do when your food is all meat and creams and fried things. Lower the fat content and people won't eat it. It won't sell.

The CHAIRMAN watches intently. To keep the debate going, he turns now to Dr. MITCHELL, a well-known anthropologist at Omega University.

CHAIRMAN: Dr. Mitchell, what are your thoughts on this?

The elderly veteran scholar, with graying hair and the deportment of an English gentlemen, speaks in quiet tones.

MITCHELL: The obesity problem that we face today is, I believe, the result of a complex combination of factors that have been present throughout the history of Western civilization. One of them has to do with the historical errors present in modern nutritional science. But, I would argue, a greater one has to do with Western standards of beauty.

Take a look at one of those beautiful murals from

the Middle Ages. You'll see the baby angels with their chubby faces and limbs. You'll see the voluptuous female, symbolizing abundance. These are the aesthetic ideals to which our society has traditionally aspired. This is why women had to have large chests and fleshy buttocks and thighs. These were the women that men particularly prized, and so they were the ones who had many descendants. In other words, human beings have, in essence, been selectively bred to meet the aesthetic standards of Western society.

Now let's compare that to Eastern societies. In places like China, Korea, and Japan, women were supposed to have small chests and petite figures. They wore clothing that kept their bosom tightly bound. The contrast with the revealing clothing of the West could not be more apparent. So you could say that people in the East were "bred" to meet that standard.

He sits for a moment with his eyes closed, as though gathering his aesthetic thoughts.

And there is one more important factor, which is the difference in the way East and West view nature. You'll see the Western view in the Bible's chapter on Genesis. The world is something for people to conquer, to use and administer as they see fit. But people in the East view it as something that you need to coexist with,

harmonize with. So when Westerners built their countries in the New World, they did so after first virtually exterminating the indigenous populations of the Americas and Australia, whereas the Chinese embraced the indigenous people of Indonesia and Malaysia and lived side by side with them as trading partners.

You'll see the same thing in food choices: in the West, we actively kill livestock and process the meat until it's unrecognizable. But the people of the East have generally sought to harvest plant-based foods and to eat them naturally, without changing them too drastically.

This cultural difference has developed into a major difference today in human populations. In Western societies, you have one small minority that monopolizes everything and eats more than its share of nutrients. In Eastern ones, you'll see many different peoples living together in dense environments, sharing their food, even if there isn't enough for everyone. Now that the world is becoming a global village, I think it's time we tried to establish a kind of harmony. A new paradigm, if you will.

The room is once again somber. The chairman appears to be impatient for some kind of definitive resolution. He turns toward ROBIN HOOD, one of the parliamentarians.

CHAIRMAN: Let's hear from Rep. Hood now. You are a well-known advocate for environmental protections, and,

of course, you were the one who proposed this legislation.

HOOD, a exuberant, and slim young man with bright eyes, takes his seat.

HOOD: Mr. Chairman, ladies and gentlemen, I hope that today marks a turning point toward a new paradigm for our values and ethics.

Human societies made many terrible mistakes in the past in trying to satisfy their selfish desires and instinctual urges. And now we find ourselves in the place of the dinosaurs. We cannot live the way we're living. We slaughter ten times as many cows and pigs and chickens as there are people. We've eaten their milk and flesh and blood, and now we're fatter that we can stand. To raise all those animals, we've had to pen them up in tiny little cages and fatten them up. But we're exactly the same way: we're also penned up in our apartments and cars, getting fatter by the moment.

Human culture today is at the point where things can't keep going anymore without changing. We've recognized the problem for the last fifty years, and we've done a lot to try to fix it. We've drawn attention to the inhumane, brutalizing practices of today's livestock industry. We've publicized all the health problems that result from

having a diet skewed too heavily toward animal products. And we've taught people that by only preparing food that tastes good, you cause nutritional imbalance, and that by eating too much you create a national epidemic of obesity.

And it's all been a disaster.

Why? It's because our economy, our values, our virtues as a society, are all pointed in that direction. If we believe our lives are dignified and worthy of protection, then we have to recognize at least some freedom and dignity in the lives of other creatures, too. What God will provide for a society where people are eating too much and then taking drugs and exercising to lose weight, while other people in the world are starving? We have to see obesity for what it is: a sin against God. We have to see overweight and protruding guts as ugly and unhuman. We have to take action, now.

We've tried to fix things with education and publicity, but that's gotten us nowhere. In fact, it's gotten worse. Now is the time for us to stake our future as a country on a proactive solution to this problem. The most effective way of doing that in a liberal democracy is to propose a fat tax. If we want to make public understand how serious the situation is, and return to this country's founding principles of liberty, equality, and reciprocity, then we have no choice. We need this tax.

The resolute tone of his words has the entire room buzzing. The CHAIRMAN looks around for something, anything, to calm things down. As it happens, the LABOR MINISTER - a bald, good-natured-looking fellow, raises his hand to speak.

CHAIRMAN (*gratefully*): Mr. Labor Minister.

LABOR MINISTER: Mr. Chairman. Rep. Hood described the need for an obesity tax in humanitarian terms. My perspective on the matter is a bit different. Simply put, the fact that 70 percent of people in this country are obese has been disastrous for our labor market.

Less than 10 percent of elementary school students today can run a hundred meters in under 20 seconds. More than 30 percent collapse before they ever reach the finish line. Our workers already rank at the very bottom of the world's nations in physical strength, and our productivity is dropping. Yes, modern industry is all machines and automation, but it still demands a basic level of physical fitness from workers. Thirty percent of people today are morbidly obese. They're out of the labor market. If the current trend of obesity in this country keeps up, our industry won't be able to take it anymore.

That's why I agree with Rep. Hood on his fat tax. If we look back through history, we can find any num-

ber of cases where people used taxes to solve problems of diet and public health. In 15th century Korea, they banned beef because the public was killing too many cattle. Violators were fined heavily. In Denmark, the parliament voted to double the price of cigarettes because of the effects on people's health. We need to give serious thought not just to a fat tax, but a heavy tax on the kinds of foods that cause obesity, too.

The CHAIRMAN glances over the room, sensing that some kind of decision has been reached.

CHAIRMAN: Ladies and gentlemen, we've heard a lot of opinions and ideas these past two days on the obesity tax legislation. These hearings will be a vital resource for next week's decision in the society and welfare subcommittee. I hope we'll be able to find a judicious solution to this serious problem that confronts our society.

Thank you all for coming.

Another authoritative bang of the gavel.

The Obesity Tax

On March 19, 2015, the parliamentary subcommittee on society and welfare passed the obesity tax. It read as follows:

(1) The government, in order to prevent the spread of obesity and the loss of national competitiveness due to declining public health, may assess a tax on overweight individuals.

(2) Public transportation operators (taxis, buses, railroad services, airlines, sea vessels, etc.) may assign differential fares according to the degree of a person's overweight.

(3) The government may assess particularly large taxes on high-calorie processed foods that cause obesity.

** Note: None of the fifteen members of the subcommittee had a body weight of over 100 kilograms. They took great care to keep in shape, having determined that being overweight would hurt their election chances. Moreover, their busy election and parliament schedules left them with little time to gain weight.*

VI The Food Wars in 2030

The US and Europe

China

The End of Food as a Weapon

The U.S. and Europe

It is New Year's Day, 2030, and the streets of New York City are desolate and dark. Gone are the excitement and splendor of the millennial festivities that heralded the arrival of 2000 and a new century. Instead, a cold, bleak wind bears through empty thoroughfares, leaving in its wake a swirling vortex of winter leaves and leftover garbage from the demonstrations that wracked Wall Street over the preceding days. On every street corner, homeless people lie curled up and sleeping, calling to mind the hippies who filled the streets of Amsterdam in the 1970s. The crumbs that fluttered down from the big donors and their hundreds of millions in slush funds were of no use to them. Things are similarly grim in Europe in 2030. With the European Union gone, Brussels is now a city of darkened buildings.

When Lehman Brothers went bankrupt in 2008, it heralded the end of capitalism and its unchecked, insatiable greed and selfishness. Laissez-faire principles, based in Friedrich Hayek's neoliberal economic theory, had served as the

U.S.'s guide, but its actions had encouraged the granting of subprime loans, driving housing prices farther and farther upward. The banks collapsed, and the working class found itself saddled with mountains of debt. The financial companies went bankrupt, but their officials made off with enormous amounts of money through speculative investments that left the world turned upside down. In particular, they won big in the grain market, causing prices there to skyrocket.

Some began demanding greater social responsibility and contributions from companies -- "Capitalism 4.0," they called it. But things were too far gone with the big money that ruled the world. The tide could not be turned. After all, rich people had always donated money, and their philanthropy drew more press the more over-the-top their abuses of the system grew, all of it in an attempt to pacify the poor. It made eminent sense, then, when this sense of victimization and suffering led to changes in the social system. The 2020 presidential elections brought a visibly socialist-leaning Democratic Party into power, and the country pulled out most of the troops that it had stationed overseas in Afghanistan, Iraq, Iran, and elsewhere.

The year 2011 was a watershed, bringing a spate of protests against government policies devised to benefit the so-called "one percent" -- the richest members of the population. In the beginning, they were confined to the financial center of Wall Street, but they quickly turned into an or-

ganized national campaign. The country's poor and oppressed began to band together, united by social media like the internet and Twitter. The first "smart mob" political revolutions arose in Middle Eastern countries -- Tunisia, Egypt, Libya, Yemen, and Syria. Soon, they were happening in southern Europe: Greece in 2015, followed by Italy, Portugal, and Spain. The regime changes was veritable revolutions. In Greece, the three big political families -- the Papandreous, Karamlises, and the Mitsotakises -- had brought enormous financial pressures on their country. Each new administration hired thousands of its leader's associates and relatives to serve in government posts, and all without making any cuts to the old staff. The government went deeper and deeper into hock trying to appease a disgruntled public, offering an extravagant smorgasbord of social services such as universal free education. Its end was foreordained.

When catastrophe did finally strike the Greek economy in 2011, politicians responded by attempting to form a transitional coalition government. But the problem was too great for the old parties and politicians to handle. In the later elections, the neoliberal party scored a massive win, claiming more than half of all seats in the parliament and using them to carry out an economic revolution, creating new -- and high -- progressive property and income taxes. A special law was enacted to confiscate the property and real estate of rich people who did not pay their taxes and deliver them to so-

cial enterprises.

The effects of the global financial crisis were also severe in Italy, where a privileged minority enjoyed a monopoly on wealth, keeping it in the family through inheritance practices and leaving a vast majority mired in inescapable poverty. Its transition was similar to Greece's: with the resignation of Silvio Berlusconi (a media magnate and the country's richest man) as prime minister, the reins of power went from the moderate right to the moderate-green Daisy Party.

In the wake of their changes, the southern European countries bowed out of the European Union in 2015. Their debt was simply too much for the northern European countries to take. These first chips at the EU framework eventually led to a full-blown collapse in 2020. Radical reformers took over throughout the continent, slashing national debt, while a political debate ensued over how to combine saving the economy with sustainable environmental practices. It was like 1929 Germany all over again.

China

New Year's looks very different in Hong Kong and Shanghai. From the vantage point of Kowloon Peninsula, Hong Kong Island is positively festooned with neon signs announcing the arrival of 2030 from the top floors of its skyscrapers. The beaches by Tsim Sha Tsui's Haiphong Road and Avenue of Stars are thronged with revelers. In Shanghai, the skyscraper forest of Pudong has long since eclipsed New York. The banks of the Yangtze are lit brightly, tourists covering seeming every available patch of ground. Setting off firecrackers and swigging back cola and beer, they bid farewell to the passing year and look forward to good fortune in the next.

China's prosperity defied the pessimistic predictions of many futurologists. To be sure, there was no shortage of crises in the country's transition from communism to a capitalist economy. The move toward reforms and openness had begun under the leadership of Deng Xiaoping following the 1976 death of Mao Zedong, but was soon attacked by hard-liners. Deng persevered, however, and after the Tiananmen Square

incident of 1989 China became a booming socialist market economy under the direction of Jiang Zemin. It set its focus on leaving behind the sclerotic thinking of the communist planned economy and charting a new course of openness. In 2000, Jiang declared the so-called "Three Represents": advanced social productive forces, advanced culture, and the interests of the overwhelming majority. The last of these was the most pivotal: it meant that the classes that the party had to represent were no longer just the workers and peasantry, but also entrepreneurs, capitalists, and intellectuals. Beijing was formally declaring that the Communist Party of China was not just the party of laborers and peasants anymore.

Prosperity rose at a fierce clip. Between 1980 and 2005, the country's annual rate of economic growth averaged 9.6 percent. Its gross domestic product increased by no less than 586 times between 1952 and 2010, from 67.9 billion yuan to 39,798.3 billion yuan -- almost $5.9 trillion. Per capita GDP went from 119 yuan to 29,748 yuan, or around $4,000. The amount of trade rose from $20.8 billion in 1978 ($9.7 billion in exports and $10.9 billion imports) to $2,972.7 billion in 2010 ($1,577.9 billion in exports, $1,394.8 billion in imports). In the second quarter of 2010, China leapfrogged past Japan to become the world's second-ranking GDP, after the United States. Its share of the global economy likewise soared, jumping from 5 percent in 2005 to 9.5 percent in 2010.

There was a dark side to all this expansion -- widening

gaps between rich and poor, city and country, one region and another, as well as growing problems of pollution, crime, and corruption. At a Party Congress in 2007, President Hu Jintao proclaimed the so-called Scientific Development Concept. Policies were to prioritize qualitative, human-centered development over quantitative metrics. Efforts would be made to minimize destruction of the environment and relieve the social conflicts that resulted from unequal distribution of wealth by increasing the availability of health care, pensions, and other social services. Intellectuals did continue to protest the country's one-party rule, but most of the public was against any social upheavals that might get in the way of economic growth, and the resulting improvements to their standard of living. The country had two major forces shoring up its massive society of over a billion people: the efficiency of the socialist market economy, and the probity of senior officials, a feature present from the very earliest stages of the Communist government, along with ongoing efforts to eradicate corruption. In 2020, the country achieved a per capita GDP of $ 10,000. And with that, it moved past the U.S. to become the world's top economy.

China's growth was powered by industry development that depended heavily on fossil fuel energy. It took until 2020 for either it or India to join the UN Framework Convention on Climate Change based on the Kyoto Protocol. Growth also had a major impact on Chinese eating habits. Per capita con-

sumption of meat doubled to 60 kilograms from its 2006 levels. Milk consumption likewise doubled. Now facing a severe shortage of feed grains, the country began importing 70 million tons of corn in 2020. Most of this came from the U.S., which supplied half the world's 100 million tons in trade of the grain. This was not enough, however. China also had to rely on Argentina and Brazil for imports. Its corn self-sufficiency dropped below 60 percent. It also experienced a significant rise in its imports of soybeans, a source of protein for animals. Soon, it was importing more than 55 million tons of them a year -- fully 80 percent of the global trade of 80 million tons. Its soybean self-sufficiency plummeted below 20 percent. A rice exporter as recently as 2010, it began importing rice and wheat in 2015. These large grain imports sent international grain prices rocketing to an average of 30 percent over their 2010 levels. Still, it had the means to buy as much as it needed. Pure grain importers like Korea and Japan were forced to suffer through the shocks to grain prices that accompanied its crop reports.

The End of Food as a Weapon

At the Durban Climate Change Conference, it was decided that a new climate system was needed, one in which both developing and developed countries took part. In November 2020, a conference of UNFCCC member countries was held in Boston with the goal of launching just such a system. Eight years before, Barack Obama had been reelected to a second term as president, and he had gone on to win over Congress with his confidence. His country's 2015 ratification of the Kyoto Protocol was a major turning point for the UNFCCC. And the reason for his action was clear: global warming could no longer be ignored.

The average global temperature rose by 1℃ in the early part of the 21st century, as atmospheric CO_2 concentrations leapt from 385 ppm to 450 ppm. Following the adoption of the Kyoto Protocol, the developed countries of Europe attempted to cut their CO_2 emissions, but levels actually rose for the major greenhouse gas emitters, the U.S. and China among them. People were deeply concerned: at

this rate, the world was on a collision course with irreversible catastrophe. Washington could hold out no longer. As the hitherto apathetic public increasingly began to panic over climate change, Congress finally caved and moved quickly to join the Kyoto Protocol.

The effects on industry were bigger than anticipated. Most of the thermal power plants that relied on coal and other fossil fuels were forced to shut down; nuclear, solar, and wind power plants rose in their place. Taxes on automobiles and gasoline were raised substantially. In order to cut down on emissions of methane -- a far more devastating greenhouse gas than CO_2 -- legislation was introduced to halve the number of animals raised for livestock in the country by 2030. Such was the situation when the countries met in Boston.

At the meeting, the U.S. asked the other countries of the world to cooperate in meeting the goal of stemming the rise in average global temperatures and keeping them at their 2000 levels. The developed countries dutifully went to work meeting the protocol's reduction targets, while demanding that the developing countries agree to lower their own emissions to 1990 levels. Those that failed to cut their carbon emissions by 2030 would face economic sanctions, including restrictions on food exports. This prompted a fierce outcry from countries like China, Japan, and Korea that depended on the U.S. for food. The latter two had worked dili-

gently to cut their greenhouse gas levels since the protocol went into effect in 2005, but China faced a more serious situation. It already had double the carbon emissions of the United States; lowering them to 1990 levels would be tantamount to abandoning its industry. If the world's largest exporter of corn and soybeans were to restrict its food exports over environmental concerns, China would face a major crisis -- and holding on to the reins of power would be a much more difficult proposition.

The 2020 conference in Boston failed to establish any common ground between the developed and developing countries in their standoff on emissions standards. Hoping to preserve its status as the world's lone superpower, the U.S. put its energies to work in heading off further global warming. Its aim was to formalize the vision that it had articulated at the conference, with the strong support of other Western powers. It presented this conception -- aimed at lowering average global temperatures to their 2000 levels -- to the United Nations Security Council, but it was voted down by Russia and China. The U.S.'s next step was to join forces with Canada, Australia, and the countries of Europe in putting pressure on China, India, and the other developing countries of Asia. If they did not restrict their CO_2 emissions to 1990 levels, it declared, their food exports would be cut off. Heavily dependent on foreign imports for much of their food, emerging industrial powers like China, India, and Korea

now began focusing their energies on stepping up their own food production. During their industrialization process, they had abandoned their own agriculture to willingly join in a global division of labor founded in the theory of comparative advantage. It took a catastrophe for them to realize the error of their ways, the need for their own food sovereignty.

But the heavens did not look kindly on their belated awareness. In the years around 2025, Asia was rocked by unprecedented weather disasters. In China, desertification marched from Central Asia out past the western region of Xinjiang and into Gansu Province and Inner Mongolia, ravaging a huge section of the country. Xinjiang and Inner Mongolia were hit especially hard -- residents depended on aid from the government for their very survival. The shortage had the effect of quieting the loud calls for independence that had been emanating from those regions. Meanwhile, an alternating pattern of droughts and flooding erupted throughout the southwest, in provinces like Yunnan and Sichuan, and the northeast, in Hebei and Shandong. The late 2020s brought seven straight years of dismal crops. Much of what China had earned in its industrialization process had to be spent buying food from around the world. International prices went through the roof, an all-time bonanza for the grain majors of the West.

As 2030 rolled around, the United States found itself having to make a difficult decision. The time had come for it

to keep the promise that it had made in Boston, limiting food exports to the countries that refused to cooperate in preventing global warming. China could not slow its industrial growth -- it needed that to earn money to buy food. Its CO_2 emissions were at double their 1990 levels, fully 30 percent of worldwide output. The world could no longer afford to wait. In February 2030, Washington delivered its ultimatum, banning grain exports to China. That same year saw dramatically higher levels of desertification in China's northwest and severe drought conditions in its north, including the Shandong Peninsula. Famine-related deaths began to mount. South of the Yangtze, millions of hectares of farmland were inundated by flooding. The U.S. decision to block food imports at such a time touched off a major reaction from the Chinese. Day after day, demonstrators crowded into the streets of Beijing and other major cities to protest.

The end of the world began with a trivial mistake. Riled up by the demonstrations, a small group of Chinese soldiers fired a nuclear warhead toward the United States. The nuclear defense shield picked it up on its radar and intercepted it over the Pacific Ocean. But the U.S. computers had been pre-programmed to respond by sending nuclear missiles toward China's major cities. China's own automatic launch system went into effect, and a barrage of missiles came back in the opposite direction. Nuclear war had begun.

VII Tagore's Prophecy

Exodus 2030

Korea's World Vision

Exodus 2030

The lights are on again tonight in the office of Dr. Kim Tae-kyun at the Korea Bioseed Company. The two-story prefabricated structure on the outskirts of Suwon, with a floor area of around 1,650 square meters, is the company's central institute. Over at the left end of the second floor, Kim is putting the finishing touches on a paper presenting the results of his last seven years of research. A biology graduate of Kim Il-sung University in North Korea, he was working in the plant genetics laboratory of the North Korean Academy of Sciences when the two Koreas were reunited in 2020. He worked at a couple of different places over the next three years or so before taking on his current position.

As he works, he finds himself thinking of his father. A professor in the Kim Il-sung University biology department, the older Kim had often said, "When I look into the genetic chain, it feels like I am traveling in space on board a tiny spacecraft called the mitochondrion. In the cockpit, there's just ever more complex genetic chains. I press the buttons

marked A (adenine), T (thymine), G (guanine), and C (cytosine) on the DNA double helix and the craft goes up and down, spins and expands and contracts. It's like doing somersaults in space."

In addition to being a scientist, his father was also keenly interested in history. He deplored the way the Korean people had been divided, and firmly believed that they would one day be united again -- and that once they were, they would make great contributions to the world. He was particularly fond of the *Hwandan Gogi*, a set of texts on ancient Korean history. He spoke frequently of the global vision that lay within the grasp of the Korean people, with their history dating back to 7000 B.C. and the Dongyi people, the great archers of Northeast Asia. In 2015, he was purged over his friendship with Kim Jong-un's uncle, Workers' Party of Korea vice chairman Jang Song-taek. He was sent to the Yongdung coal mines of North Pyongan Province, where he passed away. His life's goal had been to discover the independent control and expansion mechanism located within the genetic package.

Kim Tae-gyun's work at the seed company has involved looking at how environmental factors influence the plant DNA replication process. If he can figure out the mechanism by which things like temperature, humidity, and salinity affect the replication of particular forms of DNA, he believes, then perhaps he can develop a new type of seed that can

withstand conditions of intense cold or drought, or survive the ravages of seawater. Previous recombination methods had been controversial, since they involved extracting useful genes from other species or microbes and splicing them into the plant genome. Kim's decision has been to sidestep the debate by investigating ways of maximally expressing the potential for cold or drought resistance present within the plant genome itself. Off to one side of his laboratory stands a special, environmentally controlled greenhouse where small shoots of wheat, rice, corn, and soybeans grow voraciously in their pots.

It is August 2030, and executives at the Korea Bioseed Company are sitting in the conference room awaiting the findings from Dr. Kim's research. Among them is the chairman of the company, one Ko Young-sun. While the four major seed companies in Korea were being sold off during the foreign exchange crisis of 1997, Ko stood his ground and kept the company under his ownership. He is an old man now, almost ninety, but still boasts a hale and hearty physique; his bearing calls to mind a kind of guru. He has rescued his country's seed industry from the brink of collapse, and his company is recognized throughout the world for its outstanding capabilities, but he maintains a parsimonious focus on research, working to keeping the rumor mill from churning too much.

The words "Self-Expressing Cold-Resistant Plant Seed

Development" appear on the screen.

"I'd like to thank the chairman and everyone else for coming here today to hear my findings," says Kim. "For the past seven years, I've been looking at how genetic elements are amplified by environmental factors in the plant DNA replication process. What I've found is that distinctive types of enzymes operate depending on the environmental factor. This is the technique that applies with the cold-resistant strain I'm talking about today. It's a new strain that can grow in temperatures some four to five degrees lower than the normal growth temperatures for this plant."

He clears his throat.

"Now, the reason plants suffer under cold conditions is because of necrosis -- tissue death -- that occurs when the growing point encounters conditions that are colder than the critical temperature. However, we also see a lot of variation between plants in the temperature at which this necrosis occurs. For instance, wheat and barley can grow under frost conditions. Pine trees keep their greenery at temperatures of 20 degrees below zero.

Take the green onion. Its growing points don't experience necrosis even at temperatures as low as -10℃. And the reason for that is the distinctive amplification pattern at its DNA360 point. This is actually present in all plants; when a plant is easily damaged by cold conditions, that means that this part's amplification is too low. How much amplification

occurs is determined by an enzyme called TX6, which is produced by DNA856.

So for the new cold-resistant wheat and corn seeds, we've increased DNA856 activity to allow for growth and harvesting under conditions that are four to five degrees colder than the critical temperature for growth. At this level of cold-resistance, it would be possible to grow these plants in the grasslands of Siberia and northern Canada. By the same logic, we can also develop drought-resistant crops, or saline-resistant crops that can withstand seawater exposure."

The room is silent for a moment.

"This seems big," says Lee Young-ok, the director of development. "Very big. But does the TX6 enzyme produced by DNA856 have any other functions besides preventing necrosis in growing points at low temperatures?"

Kim nods. "We've actually done a number of experiments to analyze the functions of TX6, DNA360, and even DNA856. We are certain that their only function in the plant is to contribute to its ability to withstand the cold. All organisms have a genome with at least a billion base pairs. There isn't much difference in size between a microorganism genome and a human one. Now, consider the fact that every one of these base pairs contributes to some function or property of the body. This means that all organisms have the same kind of potential in their genome, be they microbes, insects, plants, or animals. Which one of those we become is

the result of the transformation and expression of a very, very tiny part of the genome shared by all organisms. All we're doing now is trying to find and control a very small subset from billions of basic functions."

"This seems like a historic discovery, Dr. Kim, and, as far as I'm aware, a completely new theory," says Park Young-joon, vice president for technology, his face somewhat flushed. "Have there been similar findings published by other researchers? Have you written these results up yourself? As you know, we can't patent it if it's already been published."

"I haven't published anything yet," Kim said. "Actually, this theory was my father's life's work when he was at Kim Il-sung University, and all I've done is carry out application experiments here. So I should really thank you for everything you've provided me with here."

"Outstanding. Simply outstanding." Shin Ki-chun, the company's president, is beaming. "I think it's just wonderful that such a historic finding has been made here at our company. This is going to turn not just this company but all of Korea into a food superpower. What we need to do now is patent these findings -- not just here but everywhere. That way, the world will recognize this new technology as superior to today's genetic recombination techniques. And since it doesn't involve gene transformation, it's completely safe -- just a matter of controlling genes. With this new technology, we can stop the abuses of Monsanto and all the other seed giants

that have been controlling global agriculture. And we're the ones who made it! We'll be bigger than them yet."

"Personally, I am against patenting this technology for our company alone."

chairman Ko's voice is quiet.

"What I'm hearing is that this technology is about treading in God's domain -- controlling and adjusting the basic functions of the gene. Such things should not be used for personal gain, either for a person or a group. We must not be like the companies that develop new seeds through genetic recombination and then exploit the world's farmers with their patents. We need to share it. And we need to let as many people as possible use it -- at no cost.

"That way, we can free the farmers of the world from the yoke of intellectual property rights. I feel happy and fulfilled just knowing that we did this. My thanks, and my congratulations, to Dr. Kim, and to all of you."

Korea's World Vision

On November 15, 2030, Sweden's Karolinska Institute of Medicine announces the awarding of the Nobel Prize in Medicine to Dr. Kim Tae-kyun of Korea. The Nobel committee in Oslo also selects Korea Bioseed Company chairman Ko Young-sun as the winner of its Peace Prize -- for shedding a lone ray of hope in a world devastated by the nuclear war between the United States and China.

And so it was that the world's eyes turned once again to Korea. No longer was it the small country of a half-century ago, home of the "Miracle of the Han River," the nation whose record economic growth left it second only to Japan in its region for its wealth. No longer were the news stories about its student demonstrations and parliamentary brawling. The Korea that the world saw now was the first Far East country to establish a Western-style democracy, a truly advanced nation that gave the world new values to rally behind amid the debris from capitalism's collapse.

The year 2012 brought great changes to Korean democracy. The public delivered a stern verdict against the older generation of politicians, the ones who had focused solely on narrow factional interests and keeping their own side in power, without taking the population that they served into account. The elections swept into office a new crop of independents who pledged to do away with the yearly allowance for parliamentarians, and over 200 special prerogatives that they enjoyed. Instead of developing a new party, they established an alliance in which they worked together on an issue-by-issue basis. Their political experiment was a success, and the elections of 2016 saw them take a majority of seats. Newly empowered, they passed legislation to eliminate the aforementioned allowances and perquisites. No longer was the National Assemby a place where a prevaricating privileged class and inveterate violators of the law lorded it over the public and make a mockery of the people with their immunity from prosecution. The new leaders were held to a higher standard of ethics and integrity, and they rose to it, earning the respect of the public. They were good men and women, sincere servants of the people who rode their bicycles and tended to the smallest of neighborhood affairs.

The local government councils underwent a similar change. Gone were the corrupt local leaders who sold off national land as if it were their own private property. It was a grand success of democracy, and one that proved decisive

when North Korea had its 2020 military coup d'état. This new South Korea was ready to embrace the North Korean people. The two populations learned to live side by side, and the South Korean parliament devised a special law to support North Korean local governments for the sake of its northern brethren. These governments were offered assistance and investment inducements for their own independent operation; South Korean financiers were barred from buying land and real estate there. The combination of the South's technology and management prowess with the North's philosophy of self-sufficiency and community consciousness produced a new model for a world-leading nation.

Preparations for unification had been under way for some time. In particular, the peninsula's food supply was the subject of close scrutiny. The world grain price hikes of 2008 had sounded the alarm about food security. The country was too weak by far, dependent on imports for over half of its foods and no less than 70 percent of its grain supply. Citizens campaigned to promote self-sufficiency in preparation for the coming global shortage. They educated the public in minimizing food waste and consuming healthy, environmentally friendly local products. Farmland reforms were implemented to establish a "land-to-the-tiller" system, and agricultural income guarantees were introduced. A permit system was created for the livestock industry, requiring farmers to produce a portion of their own basic feed, with support

from the government. The result was a historic increase in food self-sufficiency, meeting a goal to raise the rate by 1 percent each year, reaching 70 percent self-sufficiency for food and 50 percent self-sufficiency for grain by 2030. Meanwhile, heavy investment in seed industry research and development had contributed to one singular, world-changing research finding.

On December 1, 2030, Britain's *The Times* newspaper printed the following editorial:

> A tiny "hermit nation" in the East. A peripheral country devastated and divided in a proxy battle between Cold War superpowers. The world was astonished to see Korea rise, in the space of just a half-century, from the world's poorest nation to one of its nine largest economies. It was, simply put, incredible. No other country in the world could have done it.
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> But the world underestimated Korea. In the late 19th century, when the East was first becoming known to the West, the country lost its sovereignty to Japan through the foolishness of its politicians, who devoted themselves all too readily to political intrigues. Everything that was Korea's was seen by the world as belonging to Japan or China. A thousand years of glorious culture forgotten; now, all the world saw was a displaced

people, a nonexistent people. Few knew that the same Koreans had once between the Dongyi, the Eastern tribe of accomplished archers who had laid the cornerstone of East Asian civilization with a moral state that was the elite of Northeast Asia back in 3000 BC. Once rulers of the region, they saw most of their history incorporated into that of China with the fall of Goguryeo, leaving behind only its roots -- and a growing sense of resentment -- on the Korean Peninsula. Old Chinese texts paint the Dongyi as an advanced people who venerated etiquette and spread advanced culture onto the Japanese archipelago and throughout Northeast Asia. This potential transformed into the dynamic energy that powered the years after the Korean War.

Rhee Syngman, South Korea's first president, was a superior diplomat who managed to stake out a solid place for his country in the competition between Cold War powers. He also left a lasting legacy for the country's sovereignty with his declaration of a "peace line" in the Korea Strait and seizure of Japanese fishing boats plying Korean waters. After taking over in a 1961 coup, Park Chung-hee went to work implementing a plan for economic growth, setting up a framework for industrial development and launching the Saemaul Movement as a way of instilling a can-do attitude in a defeatist public. Through focused investments in heavy chemicals, he help-

ed steer the country to within striking distance of the world's top performers in steel, petrochemicals, semiconductors, shipbuilding, and cars. It was a period that saw the emergence of companies that would soon rank among the global elite: POSCO, Samsung, Hyundai, LG. The national income passed US$ 20,000, and the country was able to purchase more than enough to make up for any food shortfall. It was the greatest abundance the country had ever seen.

But the democracy wave of the 1980s brought with it some measure of growing pains; the country went through a time when freedom was all too readily confused with allegiance to the opposing regime in Pyongyang. Militant left-wing teachers taught a biased version of history that hurt the country's legitimacy and identity. Among young people, patriotism gave way to individualism and a distorted sense of nationalism. Society became polarized between the haves and have-nots, conservatives and progressives -- dichotomies that reproduced themselves in the country's political structure. It became commonplace for politicians to make no secret of their grasping for power. By the 2000s, they were routinely flip-flopping in a way that made a mockery of the public they were ostensibly serving. Korea Exchange Bank was illegally sold off to international speculators, costing the country a massive sum, yet no one stepped

forward to take responsibility. Those tasked with financial oversight colluded to shelter insolvent savings banks, leaving the working class helpless to do anything about the squandering of their hard-earned savings. Both the executive and legislative branches were implicated. Members of parliament had next to no voice in boss-driven politics. Politicians focused solely on meeting quorums and grabbing personal concessions. And the public could no longer bear to stand idly by and watch.

The 2011 by-election for Mayor of Seoul heralded an end to party politics, as a little-known independent crushed his ruling party opponent to win the seat. Politicians were floored to see where the popular winds were now blowing. The ruling party reinaugurated itself under a new name; the opposition made a big fuss about rallying together its variously splintered factions. But the milk was already spilt. The parliamentary elections brought a great wind of change, a complete restructuring of the Korean political environment. Political newcomers came in droves to run as independents, and the very first pledge they issued was to do away with 200 special privileges enjoyed by National Assembly members, including immunity from arrest or liability for their speech. The public was delighted to see reform plans that cut back ballooning parliamentarian salaries and gave them posts without remuneration. In the 2016 election, the inde-

pendents who presented these plans swept into office, and the National Assembly made great strides. Parties disappeared; a new "social media parliament" took shape, where people rallied together online whenever a major national issue reared its head. The national integrity index rose from the bottom rungs to among the highest in the OECD. Upon this sturdy foundation, it incorporated what was once North Korea, successfully building an advanced, unified country that was the envy of the rest of the world.

This vision for the world was already present five thousand years ago in Korea's founding mythology. "Serving the welfare of humankind to build a harmonious world" -- this founding principle provides the world of today with a value to rally behind as it faces the end of capitalism. The Korea Bioseed Company's gift to the world of self-expressing cold-resistant seeds could never have happened without the Baedal people of Korea, and their longstanding dream of serving the welfare of humankind.

The Bengali poet Rabindranath Tagore was true prophet. In 1929, he wrote the following word in his poem "Lamp of the East":

In the golden age of Asia,
Korea was one of its lamp-bearers
And that lamp is waiting to be lighted once again
For the illumination of the east
Where the mind is without fear
And the head is held high
Where knowledge is free
Where the world has not been broken up into fragments by narrow domestic walls
Where words come out from the depth of truth
Where tireless striving stretches its arms toward perfection
Where the clear stream of reason has not lost its way into the dreary desert sand of dead habit
Where the mind is led forward by thee into ever-widening thought action
Into that heaven of freedom
My Father, let my country awake

| About the **Author**

Cherl-Ho Lee was born in Hamheung on August 18, 1945, just after Korea's liberation from Japanese rule. A graduate of Seoul's Jangchung High School, he studied agricultural chemistry at Korea University and served as an ROTC artillery officer. In 1970, he was selected to study in Denmark with the support of the Danish government (the DANIDA program). After six years studying in the country, he received a Ph.D. in food science from the Royal Veterinary and Agricultural University. He worked as a researcher for four years at the Massachusetts Institute of Technology before being invited back to Korea University as a professor in its Department of Food Technology. In 2010, he retired after thirty years in teaching to found the Korea Food Security Research Foundation, where has been working to alert the public to the coming world food crisis and educate people in preparation for it. His honors include the Pomegranate (Seokryu) Medal for Civil Merit and the Red Stripes Medal given by the Republic of Korea, as well as membership as a Fellow of the Institute of Food Technologists in the United States. He has written over twenty books, including *Food Orchestra, White Paper on Food Hygiene Cases, and Introduction to Korean Food Science*, as well as over 270 research papers.

| About the **Translator**

Colin Mouat was born in Florida in 1976. A lifelong language enthusiast, he studied linguistics at the University of Florida, with a concentration on how social evaluations influence the language learning process. He has lived in Korea since 2004. His translations include more than ten books in the Korean Film Council's *Korean Film Directors* series and three collections of lectures by Won-Buddhist Prime Dharma Master Kyongsan. He currently resides in Daejeon, Korea, where he is a professor in the Department of English Language and Literature at Hannam University.