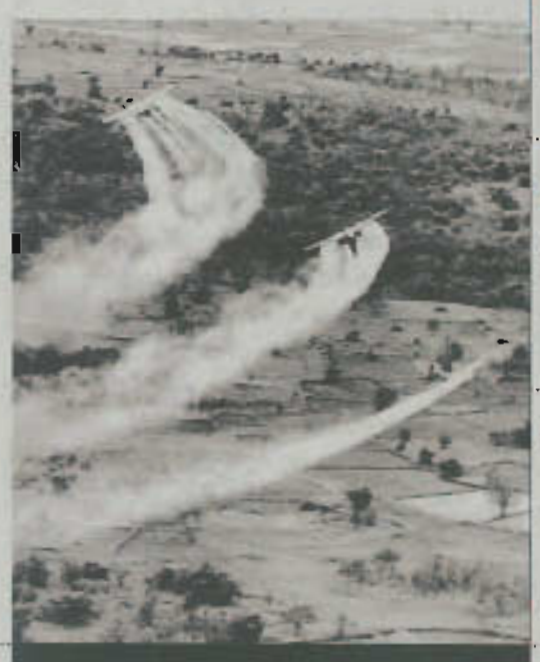
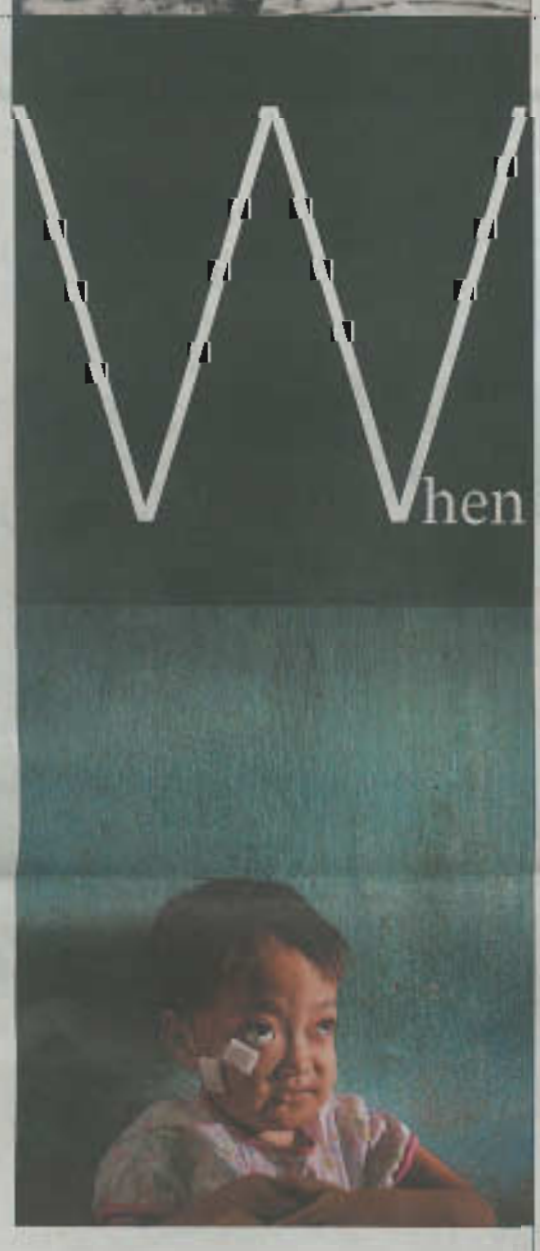
Skinnama-skinks skidoo An SOS for one of Canada's few native lizard species Page 6

Globe Focus

CHEMICAL WARFARE » 'LAST GHOST' OF THE VIETNAM WAR





» 40 years ago, the U.S. decided the best way to win a jungle war was to kill the jungle. For the job, it chose one of the more toxic substances known to man, and no less than 80 million dioxin-laced litres of it rained down on Vietnam

» Today, as many as three million Vietnamese, their children and grandchildren bear the scars of what many consider a war crime. But despite repeated attempts, they alone have failed to win compensation for what was done to them

»» Canada cares because, like the U.S., it produced Agent Orange and, like Vietnam, it must cope with contamination and with citizens who were harmed.

A special report by **Geoffrey York** in Hanoi and **Hayley Mick** in Elmira, Ont.

A CLOCKWORK ORANGE

When the white powder started falling from the sky, the soldiers were puzzled. Usually the American planes dropped bombs. Now, they were unleashing clouds of something that looked like fog, smelled like garlic and burned their eyes.

"The whole earth was covered with it," remembers Tong Van Vinh, who was a 26-year-old truck driver in the North Vietnamese military at the time. "We thought they were dropping smoke bombs on us. We didn't know it was a chemical."

A few weeks later, Mr. Vinh began to understand the terrible power of the strange clouds. "The trees died. Even the grass died. When we went to collect branches and leaves to disguise our trucks, there were none left."

This was Agent Orange doing its job. Keen to destroy the enemy's crops as well as the forest concealing its troop movements and supply lines, U.S. forces had resorted to the most powerful defoliants they could find, dropping about 80 million litres in all. But the chemical concoction killed more than plants; laced with dioxin, it was one of the more toxic substances known to humanity – so toxic, in fact, that the man who invented Agent Orange spent much of his life trying to keep it from being used.

"Nothing that you do in science is guaranteed to result in benefits for mankind," said U.S. biologist Arthur Galston, who died last month at the age of 88. "Any discovery ... can be turned either to constructive ends or destructive ends."

As the North Vietnamese soldiers were to discover, the "destructive ends" for Agent Orange were anything but fleeting; in fact, they have yet to subside. More than three decades after the fall of Saigon, the scourge known as the "last ghost" of the Vietnam War still haunts the children, and now the grandchildren, of its initial victims – an estimated three million people.

First sprayed in 1968, Mr. Vinh was plagued by muscular and skeletal disorders. But after the war ended in 1975, his health deteriorated rapidly. By 1994, he was paralyzed and spent six months in hospital, being fed liquids through his nose. He recovered, but not enough to work on his rice farm. Today, his voice is hoarse, he can't swallow solid food, his spine is numb and often he is too weak to walk or even to turn over in bed.

Dioxin interferes with reproduction, so Mr. Vinh's nightmare swept up his children and grandchildren as well. One son is blind and mentally handicapped. Another is deaf. A third has spinal problems. One daughter is partly paralyzed, another mentally handicapped, the third chronically weak with children born blind.

Vietnam estimates 400,000 people were killed or maimed by the defoliants, 500,000 children have been born with defects from retardation to spina bifida and a further two million people have suffered cancers or other illnesses. Yet they have received no compensation from those who produced the chemicals and those who made them a weapon of war.

» SEE 'ORANGE' PAGE 4

FROM PAGE 1 ❯ ORANGE

ABOVE: From left, three surviving victims of what was initially called Operation Hades: Tong Van Vinh, Quang Van Tuoi (with the photo of his youngest daughter) and Ha Van Mang, whose only child was born with neither legs nor hands and died two months later. 'No matter how sorrowful we were,' he says, 'we were never able to have any more children.' PHOTOS BY VIET DUNG TRAN FOR THE GLOBE AND MAIL

The U.S. has offered to pay $3-million.

Mr. Vinh survives on a $60 monthly pension – far from enough to cover his medical expenses, let alone those of his children. "We hope the U.S. will provide help for us," he says quietly.

So far, that seems unlikely. In February, a U.S. court rejected the latest appeal by Vietnamese victims who were suing the manufacturers of Agent Orange for billions in compensation. As an act of charity, Washington has offered a paltry $3-million not only to help treat the victims of America's biggest experiment with chemical-warfare tactics but to clean up the contamination that keeps adding to the toll.

The Vietnamese have suffered the most and received the least help, but they aren't the only victims. Agent Orange tainted everyone it touched, and so binds Vietnam not only to the United States, whose fighters also paid a price for the misery they created, but to Canada as well.

More than two decades after ailing U.S. veterans were awarded $180-million in compensation (in addition to the billions spent on their medical care), Ottawa is offering $20,000 each to an estimated 4,500 Canadian soldiers and civilians exposed when Agent Orange was secretly tested on a New Brunswick military base.

And just as Vietnam continues to press a stubborn U.S. government to help clean up the damage Agent Orange caused, a sleepy Ontario farming town is still struggling 40 years after the fact to rid itself of the fallout from a local chemical plant that brewed up millions of litres of the stuff for the U.S war effort.

WELCOME TO THE HOME OF THE 'TOXIDOME'

Susan Bryant steers her silver Toyota down a gravel lane in a cemetery overlooking Elmira, a community of 12,000 surrounded by lush farmland about 15 kilometres north of Kitchener-Waterloo, Ont.

But the 59-year-old English instructor at the University of Waterloo isn't here to commune with the dead. "There's the toxidome," she says, pointing beyond the barbed-wire fence to a massive, windowless structure. "My favourite view is looking back through the headstones."

Being next to a cemetery is a fitting location because the building is a kind of tomb – one designed to house the putrid remains of Canada's contribution to the Vietnam War. In the 1960s, the plant now known as Chemtura was owned by Uniroyal Ltd., one of seven suppliers of Agent Orange to the American military. About 2.6 million litres of the herbicide sprayed on the jungles and people of Vietnam were made here.

And like Vietnam, Elmira remains tainted by the experience: Dioxin still pollutes the soil in parts of town, its groundwater and, some whisper, its people.

The dome housed more than 46,000 tonnes of toxic waste that was generated by the plant, excavated in 1993 – more than two decades after Agent Orange production halted – and eventually shipped to a hazardous-waste landfill site near Sarnia, Ont. And yet the province has ordered a further cleanup, and local wells remain so poisoned that drinking water has to be piped in from Waterloo.

Even the cemetery is affected: The area adjoining the plant's old dumping ground is still too contaminated for burials. "I think," Ms. Bryant says dryly, "it could be a selling point: 'You will never decay. You will be pickled.' "

This long after the fact, few Canadians are aware of their country's infamous role in Vietnam, but the past weighs heavily on some.

"You'd do it all differently now," says Fred Hager, a chemical engineer who spent his 42-year career at the plant before retiring in 1986 as head of research and development. "Everybody would."

Now 88 and still a resident of Elmira, Mr. Hager will never forget the day in 1970 he travelled to Ottawa to test Uniroyal's herbicide with a new machine that could detect dioxin as low as one part per billion. The reading came back at more than one part per *million* – 10 times the level now generally considered safe.

"We shut the whole damn thing down," he says, "and made no more."

BEWARE THE LAKE OF THE KILLER FISH

The U.S. began experimenting with defoliants in Vietnam in 1961, giving its first lethal herbicides such names as Agent Purple, Agent Blue, Agent Green, Agent White and Agent Pink after the colour of an identifying band on the drums in which they were stored.

Agent Orange, which was based on research Mr. Galston had conducted at the University of Illinois just before the Second World War (others used his research notes after he enlisted), was the last and most potent concoction employed in the defoliation campaign initially called Operation Hades (later renamed Operation Ranch Hand).

Despite warnings that it could harm humans, an estimated 4.8 million Vietnamese were exposed. To make matters worse, the chemical was sprayed in concentrations higher than anything recommended for weed clearance even though by then the toxic effects of dioxin were well known. (Just one-millionth of a gram per kilo of body weight can cause birth defects and reproductive failure in laboratory animals.)

In total, the equivalent of at least 366 kilograms of pure dioxin were dropped. The compound takes decades to break down in the environment, and today millions of Vietnamese are still exposed to it in a series of "hot spots" where Agent Orange was stored during the war.

The cost of cleaning up just three of these sites has been estimated at $60-million, and an extreme example is Bien Hoa, a town not far from Ho Chi Minh City where 32,000 litres of Agent Orange that were spilled at an air base leaked into nearby Lake Bien Hung.

Now a placid pond shaded by willows in the middle of the town's most popular park, the lake remains heavily contaminated – sediment samples show dioxin at levels hundreds times what is safe. It teems with fish, but they are potentially deadly, so warning signs have been posted and 15 security guards work around the clock to keep people from catching them.

"Most people know it's contaminated, but they still go fishing here," one guard says. "We have to call the police to ask them to enforce the ban."

Nguyen Thi Gai, 66, lives in a one-room house on the edge of the park, and says her family often ate fish from the lake – until 1995 when tests found dioxin in the blood of her two teenage sons and in a well she had to stop using.

"I waited for years for the government to provide medical treatment for my sons," she says. "But they never gave us any treatment. So I had to treat them with traditional herbs."

This year, Vietnamese scientists asked for further blood samples from her family, but she refused, still angry at the lack of treatment.

Hatfield Consultants Ltd., based in Vancouver, has been documenting dioxin levels in Vietnam. "The lake should be sealed off and all fishing activities banned," company president Tom Boivin says. In fact, he adds, "removing the fish population is probably worth considering."

At another hot spot, the former U.S. air base at Danang, a key staging point for Agent Orange spraying missions, the company took blood samples from residents, expecting that their dioxin levels might be 10 times the international limit.

When some samples were 300 to 400 times that limit, "my eyes popped out of my head," Mr. Boivin recalls. "They were the highest levels ever recorded in Vietnam, and among the highest ever found in the world. If this was Canada or the United States, ... the government would immediately bulldoze the site."

Instead, there have been long and frustrating delays, he says. "People have been talking about it for 40 years, and only now are they finally beginning to clean up the sites. It's ridiculous that it's taken so long. There's been a lot of stonewalling and political bickering. There's no excuse for it."

The U.S. government, he notes, has repeatedly demanded proof that the presence of dioxin and the Vietnamese health problems are related to Agent Orange.

"It's pretty mind-blowing. The Vietnamese had done tons of research, but they weren't believed until our results came out. The evidence is so strong. Study after study has clearly demonstrated that these sites are a very high risk for human health.

"Under international rules, the polluter pays, so the U.S. clearly has to step up."

So far, the U.S. has been unwilling to step up, except for the offer of $3-million, which is widely ridiculed in Vietnam. "That's only a dollar for each victim," says Nguyen Trong Nhan, vice-president of the Vietnam Association for Victims of Agent Orange. "How can they survive on a dollar?"

Dr. Nhan's group launched the lawsuit against the chemical companies in 2004 and now has lost the first two rounds but is determined to keep fighting. "We are very poor, and these U.S. corporations are very rich ...," he says. "So we know it's very difficult. We must be patient. But we will continue."

They persist because the damage is far from finished. "The consequences for humans and the environment are very heavy, not just from the past 40 years but also for the next 40 years," explains Le Ke Son, editor of a toxicology magazine and director of a national committee to combat the effects of Agent Orange.

"There will be consequences for our great-grandchildren and for our great-great-grandchildren," he says.

"It has a much heavier impact on Vietnamese veterans than on American veterans. I think the U.S. government is afraid of these consequences,

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>
> Vancouver environmental consultant Tom Boivin reacts to current dioxin levels in residents of Danang, launch pad for much of the Agent Orange spraying

LEFT: Activist Susan Bryant and the plant in Elmira, Ont., that once produced Agent Orange. TIBOR KOLLEY/THE GLOBE AND MAIL

FAR LEFT: The plant and settling pond in 1983, the year the toxic component of Agent Orange was banned from use. THOMAS SZLUKOVENYI/THE GLOBE AND MAIL

ABOVE: Thi Thuy Lieu, left, hugs daughter Ngyuyen while feeding her lunch at home in Danang. She grew up next to the U.S. base used for Agent Orange and has borne two disabled children.
RIGHT: Eleven- year-old Tran Minh Anh, left, and Nguyen Xuan Minh, 6, live at a 'Peace Village' in Ho Chi Minh City. Both suffer from debilitations that have been linked to their parents' exposure to U.S. defoliants. PHOTOS BY DAVID GUTTENFELDER/THE ASSOCIATED PRESS

'That's only a dollar for each victim'

The unlucky bunny

Long before the American military placed its order for Vietnam in the early 1960s, the Uniroyal plant in Elmira, Ont., produced the two herbicides that make up Agent Orange in equal parts.

One was called 2,4,5-trichlorophenoxyacetic acid and the other was 2,4-dichlorophenoxyacetic acid, better known as 2,4-D.

Both were widely used in agriculture and on golf courses and lawns. But 2,4,5-T contained the highly toxic dioxin, 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), now known to be a potent human carcinogen.

According to the World Health Organization, short-term exposure to high levels of dioxin may result in skin lesions and altered liver function. Long-term exposure is linked to impairment of the immune system, the nervous system, the endocrine system and reproductive functions. Chronic exposure also has resulted in several types of cancer.

The fetus is most sensitive, followed by newborns with rapidly developing organ systems, the WHO says.

To monitor the dioxin in the 1960s, chemical engineer Fred Hager and his technicians at Uniroyal relied on the most sophisticated test available to them: A diluted mixture was dabbed on the skin of a live rabbit's ear and then everyone waited to see if a rash would appear.

The theory, according to Mr. Hager, was that "if it affected a bunny, we could only assume it would affect humans."

By 1970, sophisticated testing gear had been developed, and within a year regulatory agencies in several countries had set a maximum for dioxin content. In 1983, the product was banned completely.

Today, some experts feel a dioxin level higher than one-10th of a part per million is an unacceptable cancer risk – even if it's not enough to give a bunny a skin rash, Mr. Hager says.

» Hayley Mick

so they try to find ways to reject our court cases."

Vietnamese scientists, who have been studying the effects of Agent Orange for decades, are frustrated by the U.S. judges and lawyers who demand proof of a link to the devastating illnesses among Vietnamese veterans. They say that link is as strong as the one between cigarettes and lung cancer – but the evidence relies on statistical patterns, rather than documented proof in each case.

Dr. Son cites a recent study of 47,000 Vietnamese veterans and their children. Those who were exposed to Agent Orange had a much higher rate of cancer and birth defects. "Even their grandchildren had a higher rate of cancer."

Another scientist, Nguyen Ngoc Hung of Hanoi Medical University, points to statistics showing that the rate of birth defects is far higher in provinces that were heavily sprayed, but to prove this to the satisfaction of the U.S. courts, he says, may be impossible.

THE CASE THEY THOUGHT WOULD JUST GO AWAY

Coping with chemical fallout is a familiar burden to the people of Elmira, still grappling with the aftermath of poor disposal practices for wastes from the manufacture of Agent Orange and other chemicals. Local wells have been closed since 1990, when hazardous levels of a carcinogen (this time, not one associated with Agent Orange) was discovered.

Yet the Ontario government has given the company until 2028 to clean up the site, and no serious study has looked at whether area cancer rates are higher than normal.

Why? Activists such as Susan Bryant blame the politics of denial that characterizes Agent Orange battles around the world.

For example, it was only after years of lobbying by determined veterans that Ottawa finally agreed last November to pay $95.6-million for what happened at Camp Gagetown in 1966 and 1967.

Canadian commanders at the sprawling military base east of Fredericton needed to have brush cleared to conduct training exercises, so they struck a deal with the Americans, who needed a place to test their defoliants.

Former soldier Jim Cadger remembered seeing planes spew out the powder, green grass turn brown overnight and Americans soldiers who sauntered into the bar after a day's defoliation. "They stunk to high hell."

Now, the federal government is paying $20,000 to those who can prove that they lived on or within a five-kilometre radius of the base and developed a health problem that is associated with Agent Orange, which can include several cancers, diabetes and spina bifida, a congenitally malformed spinal cord.

Despite the settlement, a group of veterans and former Gagetown residents is pressing the government for more damages in a class-action lawsuit now winding its way through the Federal Court. They claim the 1966-67 time frame is too narrow and effectively shirks responsibility for spraying they claim went on for years before and after the Americans came to Gagetown.

"The hope is to make the government accountable," says Art Connolly, a spokesman for Agent Orange Alert, a group also pushing for an inquiry into the situation. "All we want is the truth ... and to me that isn't too much to ask for."

The Vietnamese are asking for the same.

For more than 25 years, U.S. veterans of the Vietnam War have received huge sums in damages and medical benefits from the U.S government and the manufacturers that supplied it with Agent Orange. In 2006, their South Korean allies received a $63-million (U.S.) court-ordered settlement from two of the companies.

And now the Canadians at Gagetown have a package that so far has seen 1,483 cheques worth almost $3-million issued. Even a British soldier who was there at the time has received a special pension from his government.

In all, the various payouts surpass $25-billion, but the chances of the Vietnamese receiving something similar are increasingly slim.

The latest dismissal by their damage suit – which claims the U.S. chemical companies committed war crimes by supplying Agent Orange – frustrates supporters, who call it misguided and unfair.

"The government has already paid 20 to 25 billion dollars to the people who did the spraying," says Johnathan Moore, a New York lawyer who represented the Vietnamese plaintiffs. "How can you then deny compensation to those who were sprayed?"

The answer to that is a complicated mix of intricate legal manoeuvres, fuzzy science and the tricky issue of who bears responsibility for the aftermath of war.

In 1984, after years of arguing over health risks linked to Agent Orange, the seven chemical companies settled a massive class-action suit by U.S. veterans for $180-million after a judge persuaded them to buy themselves out of protracted litigation.

By 1997, after the last of the money had been paid out, 291,000 people had received benefits.

For the chemical companies, the settlement was the final chapter. "The assumption was that this would go away," says Peter Schuck, a Yale University law professor whose 1987 book *Agent Orange on Trial: Mass Toxic Disasters in the Courts* detailed the landmark case.

But they were wrong. For two decades, they faced a succession of new lawsuits, all of which were dismissed because, in the eyes of a U.S. Federal Court, the 1984 case had settled the matter.

Then, in 2003, the U.S. Supreme Court affirmed an appeals-court decision that allowed Vietnam veterans who had opted out of the original settlement, or were diagnosed afterward, to sue the manufacturers.

The door was opened to a new wave of lawsuits, and American veterans weren't the only ones paying attention.

Around the world, people injured by Agent Orange were inspired to take action.

In May, 2005, Mr. Cadger, who had worked at Gagetown as a communications technician, saw a CBC television report revealing that the U.S. military had tested Agent Orange at the base.

"I remember thinking, 'This is going to be another government cover-up.' And I got involved."

He joined other veterans and former Gagetown residents seeking redress, a group that included Mr. Connolly, who had spent part of his childhood at the base when his father worked in the army.

A year later, Mr. Connolly flew to Hanoi for a conference on illness and pollution related to Agent Orange that was also attended by delegates from South Korea and the United States.

It was a depressing trip – he toured an orphanage for children with ghastly deformities – but inspiring too, he says. A few months earlier, veterans from South Korea – the United States' biggest ally during the Vietnam War – had won their $63-million settlement from Dow Chemical and Monsanto. And then, on Sept. 12, the government of Prime Minister Stephen Harper announced that it would compensate the Gagetown residents.

Mr. Cadger, who had developed diabetes, received his $20,000 in December, paid a few bills and banked the rest. "I took it because I had it coming," he said of the money, "but it angered me more than anything."

Despite his anger, he conceded that he was better off than his Vietnamese counterparts. But last month, at the age of 64, he suffered a heart attack and died.

'WE KEPT HOPING WE WOULD HAVE A HEALTHY CHILD'

With his health problems and those of his children and grandchildren, Tong Van Vinh, the former truck driver, tells a sad tale. But it is no less heartbreaking than those of his roommates at Friendship Village, a huddle of buildings on the outskirts of Hanoi where Agent Orange survivors receive temporary respite and health assistance from their government and foreign charities.

Quang Van Tuoi, a 65-year-old veteran of the Viet Cong, shows a small photo of his youngest daughter, born with deformed limbs and mental handicaps. Her eyes are glassy and unfocused, and her body is partly paralyzed.

All five of his children, born from 1975 to 1994, have similar mental problems. "We kept hoping we would have a healthy child," he says. "But they all suffered the same illness."

Although the Vietnamese government tries to discourage Agent Orange victims from trying again if their first child is born disabled, most are impoverished farmers who rely on children for help. Persuading them to give up their dreams of having a large family isn't easy.

Some can't have children at all. Ha Van Mang, 64, was digging a bunker when the Agent Orange fell on him in 1968. Ever since, he has endured numbness and migraine headaches, and after the war, his wife gave birth to a son with no legs or hands.

The baby died two months later, he says, and "no matter how sorrowful we were, we were never able to have any more children."

Mr. Mang's body twitches uncontrollably, day and night, and he is tormented by rashes that feel like ants crawling on his skin. He feels guilty that he has been unable to work on his rice farm since 1978.

"I get headaches so strong that it brings tears to my eyes, and sometimes I just cry and can't do anything else."

Like Jim Cadger, he gets angry when he thinks of how the U.S. courts have rejected appeals from the only victims of Agent Orange yet to receive assistance.

"It's an injustice," he says. "An unfairness."

» Geoffrey York is The Globe and Mail's correspondent in Beijing. Hayley Mick is a Toronto-based reporter with Globe Life.

CHEMICAL WARFARE: 'LAST GHOST' OF THE VIETNAM WAR

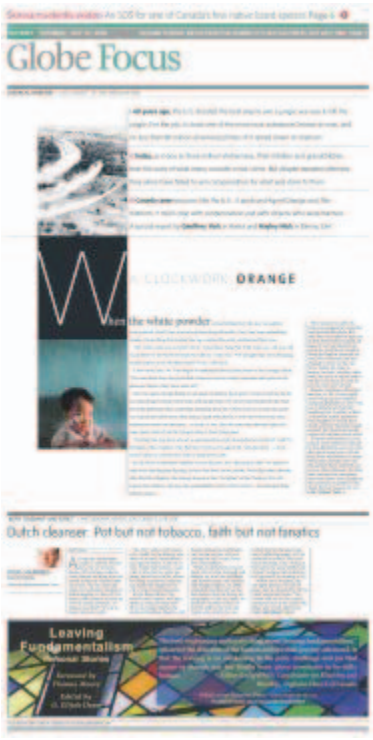
A CLOCKWORK **ORANGE**

GEOFFREY YORK and HAYLEY MICK

July 12, 2008

40 years ago, the U.S. decided the best way to win a jungle war was to kill the jungle. For the job, it chose one of the more toxic substances known to man, and no less than 80 million dioxin-laced litres of it rained down on Vietnam Today, as many as three million Vietnamese, their children and grandchildren bear the scars of what many consider a war crime. But despite repeated attempts, they alone have failed to win compensation for what was done to them Canada cares because, like the U.S., it produced Agent Orange and, like Vietnam, it must cope with contamination and with citizens who were harmed. A special report by Geoffrey York in Hanoi and Hayley Mick in Elmira, Ont.

HANOI, ELMIRA, ONT. -- When the white powder started falling from the sky, the soldiers were puzzled. Usually the American planes dropped bombs. Now, they were unleashing clouds of something that looked like fog, smelled like garlic and burned their eyes.


Globe Focus

ORANGE

Dutch cleanser: Pot but not tobacco, faith but not fanatics

Leaving Fundamentalism

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WELCOME TO THE HOME

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OF THE KILLER FISH

The U.S. began experimenting with defoliants in Vietnam in 1961, giving its first lethal herbicides such names as Agent Purple, Agent Blue, Agent Green, Agent White and Agent Pink after the colour of an identifying band on the drums in which they were stored.

Agent Orange, which was based on research Mr. Galston had conducted at the University of Illinois just before the Second World War (others used his research notes after he enlisted), was the last and most potent concoction employed in the defoliation campaign initially called Operation Hades (later renamed Operation Ranch Hand).

Despite warnings that it could harm humans, an estimated 4.8 million Vietnamese were exposed. To make matters worse, the chemical was sprayed in concentrations higher than anything recommended for weed clearance even though by then the toxic effects of dioxin were well known. (Just one-millionth of a gram per kilo of body weight can cause birth defects and reproductive failure in laboratory animals.)

In total, the equivalent of at least 366 kilograms of pure dioxin were dropped. The compound takes decades to break down in the environment, and today millions of Vietnamese are still exposed to it in a series of "hot spots" where Agent Orange was stored during the war.

The cost of cleaning up just three of these sites has been estimated at $60-million, and an extreme example is Bien Hoa, a town not far from Ho Chi Minh City where 32,000 litres of Agent Orange that were spilled at an air base leaked into nearby Lake Bien Hung.

Now a placid pond shaded by willows in the middle of the town's most popular park, the lake remains heavily contaminated - sediment samples show dioxin at levels hundreds times what is safe. It teems with fish, but they are potentially deadly, so warning signs have been posted and 15 security guards work around the clock to keep people from catching them.

"Most people know it's contaminated, but they still go fishing here," one guard says. "We have to call the police to ask them to enforce the ban."

Nguyen Thi Gai, 66, lives in a one-room house on the edge of the park, and says her family often ate fish from the lake - until 1995 when tests found dioxin in the blood of her two teenage sons and in a well she had to stop using.

"I waited for years for the government to provide medical treatment for my sons," she says. "But they never gave us any treatment. So I had to treat them with traditional herbs."

This year, Vietnamese scientists asked for further blood samples from her family, but she refused, still angry at the lack of treatment.

Hatfield Consultants Ltd., based in Vancouver, has been documenting dioxin levels in Vietnam. "The lake should be sealed off and all fishing activities banned," company president Tom Boivin says. In fact, he adds, "removing the fish population is probably worth considering."

At another hot spot, the former U.S. air base at Danang, a key staging point for Agent Orange spraying missions, the company took blood samples from residents, expecting that their dioxin levels might be 10 times the international limit.

When some samples were 300 to 400 times that limit, "my eyes popped out of my head," Mr. Boivin recalls. "They were the highest levels ever recorded in Vietnam, and among the highest ever found in the world. If this was Canada or the United States, ... the government would immediately bulldoze the site."

Instead, there have been long and frustrating delays, he says. "People have been talking about it for 40 years, and only now are they finally beginning to clean up the sites. It's ridiculous that it's taken so long. There's been a lot of stonewalling and political bickering. There's no excuse for it."

The U.S. government, he notes, has repeatedly demanded proof that the presence of dioxin and the Vietnamese health problems are related to Agent Orange.

"It's pretty mind-blowing. The Vietnamese had done tons of research, but they weren't believed until our results came out. The evidence is so strong. Study after study has clearly demonstrated that these sites are a very high risk for human health.

"Under international rules, the polluter pays, so the U.S. clearly has to step up."

So far, the U.S. has been unwilling to step up, except for the offer of $3-million, which is widely ridiculed in Vietnam. "That's only a dollar for each victim," says Nguyen Trong Nhan, vice-president of the Vietnam Association for Victims of Agent Orange. "How can they survive on a dollar?"

Dr. Nhan's group launched the lawsuit against the chemical companies in 2004 and now has lost the first two rounds but is determined to keep fighting. "We are very poor, and

these U.S. corporations are very rich ...," he says. "So we know it's very difficult. We must be patient. But we will continue."

They persist because the damage is far from finished. "The consequences for humans and the environment are very heavy, not just from the past 40 years but also for the next 40 years," explains Le Ke Son, editor of a toxicology magazine and director of a national committee to combat the effects of Agent Orange.

"There will be consequences for our great-grandchildren and for our great-great-grandchildren," he says.

"It has a much heavier impact on Vietnamese veterans than on American veterans. I think the U.S. government is afraid of these consequences, so they try to find ways to reject our court cases."

Vietnamese scientists, who have been studying the effects of Agent Orange for decades, are frustrated by the U.S. judges and lawyers who demand proof of a link to the devastating illnesses among Vietnamese veterans. They say that link is as strong as the one between cigarettes and lung cancer - but the evidence relies on statistical patterns, rather than documented proof in each case.

Dr. Son cites a recent study of 47,000 Vietnamese veterans and their children. Those who were exposed to Agent Orange had a much higher rate of cancer and birth defects. "Even their grandchildren had a higher rate of cancer."

Another scientist, Nguyen Ngoc Hung of Hanoi Medical University, points to statistics showing that the rate of birth defects is far higher in provinces that were heavily sprayed, but to prove this to the satisfaction of the U.S. courts, he says, may be impossible.

THE CASE THEY THOUGHT

WOULD JUST GO AWAY

Coping with chemical fallout is a familiar burden to the people of Elmira, still grappling with the aftermath of poor disposal practices for wastes from the manufacture of Agent Orange and other chemicals. Local wells have been closed since 1990, when hazardous levels of a carcinogen (this time, not one associated with Agent Orange) was discovered.

Yet the Ontario government has given the company until 2028 to clean up the site, and no serious study has looked at whether area cancer rates are higher than normal.

Why? Activists such as Susan Bryant blame the politics of denial that characterizes Agent Orange battles around the world.

For example, it was only after years of lobbying by determined veterans that Ottawa finally agreed last November to pay $95.6-million for what happened at Camp Gagetown in 1966 and 1967.

Canadian commanders at the sprawling military base east of Fredericton needed to have brush cleared to conduct training exercises, so they struck a deal with the Americans, who needed a place to test their defoliants.

Former soldier Jim Cadger remembered seeing planes spew out the powder, green grass turn brown overnight and Americans soldiers who sauntered into the bar after a day's defoliation. "They stunk to high hell."

Now, the federal government is paying $20,000 to those who can prove that they lived on or within a five-kilometre radius of the base and developed a health problem that is associated with Agent Orange, which can include several cancers, diabetes and spina bifida, a congenitally malformed spinal cord.

Despite the settlement, a group of veterans and former Gagetown residents is pressing the government for more damages in a class-action lawsuit now winding its way through the Federal Court. They claim the 1966-67 time frame is too narrow and effectively shirks responsibility for spraying they claim went on for years before and after the Americans came to Gagetown.

"The hope is to make the government accountable," says Art Connolly, a spokesman for Agent Orange Alert, a group also pushing for an inquiry into the situation. "All we want is the truth ... and to me that isn't too much to ask for."

The Vietnamese are asking for the same.

For more than 25 years, U.S. veterans of the Vietnam War have received huge sums in damages and medical benefits from the U.S government and the manufacturers that supplied it with Agent Orange. In 2006, their South Korean allies received a $63-million (U.S.) court-ordered settlement from two of the companies.

And now the Canadians at Gagetown have a package that so far has seen 1,483 cheques worth almost $3-million issued. Even a British soldier who was there at the time has received a special pension from his government.

In all, the various payouts surpass $25-billion, but the chances of the Vietnamese receiving something similar are increasingly slim.

The latest dismissal by their damage suit - which claims the U.S. chemical companies committed war crimes by supplying Agent Orange - frustrates supporters, who call it misguided and unfair.

"The government has already paid 20 to 25 billion dollars to the people who did the spraying," says Johnathan Moore, a New York lawyer who represented the Vietnamese plaintiffs. "How can you then deny compensation to those who were sprayed?"

The answer to that is a complicated mix of intricate legal manoeuvres, fuzzy science and the tricky issue of who bears responsibility for the aftermath of war.

In 1984, after years of arguing over health risks linked to Agent Orange, the seven chemical companies settled a massive class-action suit by U.S. veterans for $180-million after a judge persuaded them to buy themselves out of protracted litigation.

By 1997, after the last of the money had been paid out, 291,000 people had received benefits.

For the chemical companies, the settlement was the final chapter. "The assumption was that this would go away," says Peter Schuck, a Yale University law professor whose 1987 book *Agent Orange on Trial: Mass Toxic Disasters in the Courts* detailed the landmark case.

But they were wrong. For two decades, they faced a succession of new lawsuits, all of which were dismissed because, in the eyes of a U.S. Federal Court, the 1984 case had settled the matter.

Then, in 2003, the U.S. Supreme Court affirmed an appeals-court decision that allowed Vietnam veterans who had opted out of the original settlement, or were diagnosed afterward, to sue the manufacturers.

The door was opened to a new wave of lawsuits, and American veterans weren't the only ones paying attention. Around the world, people injured by Agent Orange were inspired to take action.

In May, 2005, Mr. Cadger, who had worked at Gagetown as a communications technician, saw a CBC television report revealing that the U.S. military had tested Agent Orange at the base.

"I remember thinking, 'This is going to be another government cover-up.' And I got involved."

He joined other veterans and former Gagetown residents seeking redress, a group that included Mr. Connolly, who had spent part of his childhood at the base when his father worked in the army.

A year later, Mr. Connolly flew to Hanoi for a conference on illness and pollution related to Agent Orange that was also attended by delegates from South Korea and the United States.

It was a depressing trip - he toured an orphanage for children with ghastly deformities - but inspiring too, he says. A few months earlier, veterans from South Korea - the United States' biggest ally during the Vietnam War - had won their $63-million settlement from Dow Chemical and Monsanto. And then, on Sept. 12, the government of Prime Minister Stephen Harper announced that it would compensate the Gagetown residents.

Mr. Cadger, who had developed diabetes, received his $20,000 in December, paid a few bills and banked the rest. "I took it because I had it coming," he said of the money, "but it angered me more than anything."

Despite his anger, he conceded that he was better off than his Vietnamese counterparts. But last month, at the age of 64, he suffered a heart attack and died.

'WE KEPT HOPING WE WOULD

HAVE A HEALTHY CHILD'

With his health problems and those of his children and grandchildren, Tong Van Vinh, the former truck driver, tells a sad tale. But it is no less heartbreaking than those of his roommates at Friendship Village, a huddle of buildings on the outskirts of Hanoi where Agent Orange survivors receive temporary respite and health assistance from their government and foreign charities.

Quang Van Tuoi, a 65-year-old veteran of the Viet Cong, shows a small photo of his youngest daughter, born with deformed limbs and mental handicaps. Her eyes are glassy and unfocused, and her body is partly paralyzed.

All five of his children, born from 1975 to 1994, have similar mental problems. "We kept hoping we would have a healthy child," he says. "But they all suffered the same illness."

Although the Vietnamese government tries to discourage Agent Orange victims from trying again if their first child is born disabled, most are impoverished farmers who rely on children for help. Persuading them to give up their dreams of having a large family isn't easy.

Some can't have children at all. Ha Van Mang, 64, was digging a bunker when the Agent Orange fell on him in 1968. Ever since, he has endured numbness and migraine headaches, and after the war, his wife gave birth to a son with no legs or hands.

The baby died two months later, he says, and "no matter how sorrowful we were, we were never able to have any more children."

Mr. Mang's body twitches uncontrollably, day and night, and he is tormented by rashes that feel like ants crawling on his skin. He feels guilty that he has been unable to work on his rice farm since 1978.

"I get headaches so strong that it brings tears to my eyes, and sometimes I just cry and can't do anything else."

Like Jim Cadger, he gets angry when he thinks of how the U.S. courts have rejected appeals from the only victims of Agent Orange yet to receive assistance.

"It's an injustice," he says. "An unfairness."

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The unlucky bunny

Long before the American military placed its order for Vietnam in the early 1960s, the Uniroyal plant in Elmira, Ont., produced the two herbicides that make up Agent Orange in equal parts.

One was called 2,4,5-trichlorophenoxyacetic acid and the other was 2,4-dichlorophenoxyacetic acid, better known as 2,4-D.

Both were widely used in agriculture and on golf courses and lawns. But 2,4,5-T contained the highly toxic dioxin, 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), now known to be a potent human carcinogen.

According to the World Health Organization, short-term exposure to high levels of dioxin may result in skin lesions and altered liver function. Long-term exposure is linked to impairment of the immune system, the nervous system, the endocrine system and reproductive functions. Chronic exposure also has resulted in several types of cancer.

The fetus is most sensitive, followed by newborns with rapidly developing organ systems, the WHO says.

To monitor the dioxin in the 1960s, chemical engineer Fred Hager and his technicians at Uniroyal relied on the most sophisticated test available to them: A diluted mixture was dabbed on the skin of a live rabbit's ear and then everyone waited to see if a rash would appear.

The theory, according to Mr. Hager, was that "if it affected a bunny, we could only assume it would affect humans."

By 1970, sophisticated testing gear had been developed, and within a year regulatory agencies in several countries had set a maximum for dioxin content. In 1983, the product was banned completely.

Today, some experts feel a dioxin level higher than one-10th of a part per million is an unacceptable cancer risk - even if it's not enough to give a bunny a skin rash, Mr. Hager says.

Hayley Mick