



Mercury Rising

A Possible Link Between Chemical Exposure And Autism May Have Been Overlooked In The Very Earliest Cases At Johns Hopkins

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by Dan Olmsted



A UNIVERSE OF ONE: Dr. Leo Kanner, the psychiatrist who first diagnosed autism at Johns Hopkins.

IN 1943, A CHILD KNOWN ONLY AS FREDERICK W. became part of the first medical report of a strange new disorder. Frederick was Case 2 of 11 children whose behavior "differed markedly and uniquely from anything reported so far," wrote Dr. Leo Kanner, the psychiatrist at Johns Hopkins University who introduced the syndrome to the world and named it "autism."

One of the children "spun with great pleasure everything he could seize upon to spin." Many of the children flapped their hands; flew into unpredictable bouts of rage and aggression; spoke in inexplicable ways if they spoke at all, sometimes referring to themselves as "you" and others as "I"; showed remarkable abilities like keen memory and perfect pitch but abject inability to perform simple tasks; obsessed over objects but ignored human beings.

Kanner didn't know why the children, all born in the 1930s, acted that way but noticed the parents were college-educated and career-oriented: lawyers, psychiatrists, scientists. He wrote, "In the whole group, there are very few really warm-hearted fathers and mothers," and later speculated, "emotionally refrigerated" parents might play a role in causing the baffling disorder.

"Most of the fathers are, in a sense, bigamists," Kanner wrote. "They are wedded to their jobs at least as much as they are married to their wives. The job, in fact, has priority."

Now, Frederick W.'s father has been identified by this reporter, who has written about autism for two years for United Press International, as a scientist named Frederick L. Wellman, and new information has been unearthed that suggests Wellman's career might indeed be a clue--though not the kind Kanner detected.

The Frederick L. Wellman Papers fill 18 boxes in the Special Collections Research Center at the North Carolina State University Libraries in Raleigh. The first item in the first folder in the first box is dated Spring 1922, when the senior Wellman was working toward his doctorate in plant pathology at the University of Wisconsin. Faded with age, the report is titled "Hot Water and Mercuric Chloride Treatments of Some Brassica Seeds and Their Effect Both on the Germination of the Seeds and the Viability of the Fungus *Phoma Lingam*."

In layman's terms, Wellman collected cabbage seeds infected with a common fungus and dunked some of them in a solution of mercury salts and hot water. "The lots treated with mercuric [chloride] were shaken vigorously at first to get thorough contact with the solution," he wrote. His faculty adviser at the time was concerned about an epidemic of cabbage fungus that was wrecking havoc on Wisconsin farms, and he enlisted his student Wellman's help in researching solutions.

By the time his son was born 14 years later, in 1936, Wellman had graduated to advanced plant pathology work at the U.S. Agriculture Department's main research center in Beltsville, in Prince George's County, just outside Washington.

In a résumé, he wrote at length about his experience there with fungicides. On cabbage seeds, he reported, "organic mercury compounds were found to be most satisfactory disinfecting agents." For tomatoes, "proprietary organic mercury dusts also gave good results." All three of the fungicide sales brochures in his archive were for organic mercury compounds--two of them containing ethyl mercury, which was introduced in commercial products just a few years earlier.

Ethyl mercury is also the active ingredient in a vaccine preservative called thimerosal. A maverick minority of scientists and a larger percentage of parents blame thimerosal--which is 49.6 percent ethyl mercury by weight--for the rising autism rate, up tenfold in 20 years to one in 150 8-year-old U.S. children, according to a report this month by the Centers for Disease Control and Prevention. Some parents say they watched their children become physically ill and regress into autism soon after they got shots that contained the chemical--a link public-health officials call coincidence, not cause and effect.

It might be just another coincidence that the father of autism's Case 2 was working with new ethyl mercury compounds seven decades ago when his son was born. Or it might not.

Coincidence or otherwise, similar echoes emerge from cases 1 and 3 in Kanner's original study. Case 1 grew up in a town called Forest, Miss., surrounded by logging camps, lumber mills, and a national forest being planted by the Civilian Conservation Corps. Forest is 50 miles

from the Mississippi sawmills where ethyl mercury fungicides were first tested in the United States in 1929 to preserve lumber, a practice that quickly became widespread; that child was born in 1933.

Case 3 was the son of "a professor of forestry in a southern university," Kanner wrote. That university has been identified as North Carolina State--the same school where Frederick L. Wellman ended his career as a visiting professor. Case 3's father began research on Southern pines when he joined the N.C. State faculty in 1935.

In 1936, he assisted in the planting of pine seedlings in the university's newly acquired Hofmann Forest. His son was born in 1937. Organic mercury fungicides, including an ethyl mercury brand, were often used to prevent "damping off" or fungal contamination of pine seedlings during that era.

An advocate of the mercury-autism hypothesis says the pattern in those early cases strengthens his concern.

"So now we have learned that Frederick Wellman handled ethyl mercury fungicides that were first introduced to the market in 1929 and that his child was Kanner's patient No. 2," says Mark Blaxill, whose daughter Michaela has autism. Blaxill is vice president of the advocacy organization SafeMinds, which argues increased mercury exposure is behind the soaring autism rate. "And we know that cases 1 and 3 grew up around the first application of ethyl mercury products. If that's not a smoking gun, I don't know what is," Blaxill continues.

Consistent with that possibility, overlooked studies from the 1970s found a history of chemical exposures in a "quite startling" percentage of parents of autistic children; researchers could not isolate any one chemical as a common factor. More recently, studies have reported a statistically significant correlation between mercury pollution and autism rates.

A spokesman for the CDC cautions against making too much of Wellman's background.

"I've learned from being at CDC it's often difficult when you're trying to establish cause and effect," Glen Nowak, chief of media relations, says when the Wellman case is described to him. "There are other things that could have mitigated the effect, could have enhanced the effect, caused the effect. So a case study of one, you always want to be very careful."

In 1999, the CDC and other public-health authorities urged vaccine manufacturers to phase ethyl mercury out of U.S. pediatric vaccines as a precaution, given the well-known toxicity of mercury in developing brains and the increasing number of required childhood immunizations that contained it. Thimerosal remains in most flu shots, which are recommended by a CDC advisory committee for all pregnant women and for children as young as 6 months. Due in large measure to reassurance from United States and United Nations health authorities, ethyl mercury continues in wide use in pediatric vaccines in developing nations.

"Evidence is accumulating of lack of any harm resulting from exposure" to vaccines containing thimerosal as a preservative, according to a statement by the U.S. Department of Health and Human Services posted on its web site. The Department of Health points to a 2004 report by

the prestigious Institute of Medicine, which discounted a link with autism and took the unusual step of recommending research funding go to more "promising" areas.

Mercury-based fungicides were banned in the United States and many other countries as understanding of mercury's toxic effects became more sophisticated; they have not been on the market here since the 1970s. Such products were not a health threat when used properly, according to a leading manufacturer.

To be sure, there is no direct evidence of mercury exposure in any of the original cases, though Frederick W.'s mother had "kidney trouble" during her pregnancy--sometimes a sign of mercury toxicity. Frederick W.'s father worked with many dangerous substances besides mercury--a short list includes formaldehyde, arsenic, copper, sulfur, insecticides, and pesticides.

But it is also true that none of Kanner's case studies from Johns Hopkins has been examined for such exposures, even as more researchers suspect genes alone cannot explain the rising number of diagnoses. The Center for Autism and Developmental Disabilities Epidemiology, part of the Johns Hopkins Bloomberg School of Public Health, lists "Environmental Exposures" first among six areas of research on its web site. Johns Hopkins Medicine declined to comment for this story.

Ellen K. Silbergeld, a professor of environmental health sciences at Hopkins, is currently using a \$204,000 grant from the National Institute of Environmental Health Sciences to test whether humans respond in different ways to mercury exposure. The goal, according to her report's abstract, is to understand "preventable risk factors for autism based upon the hypothesis that mercury compounds by themselves do not cause autism but may contribute to the risks . . . in combination with genetic susceptibility and co-exposures to other risks, such as infections." Silbergeld declined to comment for this story.

A recent issue of the *Autism Advocate*, published by the Autism Society of America, the nation's oldest and largest such organization, focused on "the possible link between autism and the environment." "We already have enough evidence to make the judgments that environmental factors are critical issues for autism," wrote Dr. Martha Herbert, an assistant professor of neurology at Harvard Medical School. "This newer model of autism implies that we have great opportunities to do constructive things about this challenge."

In April the Institute of Medicine convenes a two-day conference titled, "Autism and the Environment: Challenges and Opportunities for Research."

Johns Hopkins' Medical Privacy Board denied a request for information from the medical records of the original 11 cases reported by Leo Kanner, citing both privacy and practicality. The first three cases were identified independently.

THE HENRY A. WALLACE BELTSVILLE Agricultural Research Center is located just outside Washington's traffic-clogged I-495 beltway. The Georgian-style main building is set back majestically from Route 1.

Off the highway, two-lane roads thread through 6,600 acres as the bustle of Washington yields to rolling countryside, big barns, and grazing cattle. The log visitors' center with its massive stone fireplaces was built by the Civilian Conservation Corps in the mid-1930s. Yet even some longtime Washingtonians are unaware that the world's largest agricultural research center lies in their midst.

When Frederick L. Wellman began working there in 1935, Henry Wallace was secretary of agriculture under Franklin D. Roosevelt, and the New Deal was launching initiatives to spur crop production and overcome the Dust Bowl days of the Depression. That year Congress passed a law mandating more basic agricultural research.

By then, Wellman had earned his Ph.D., wed a Wisconsin woman named Dora U'Ren, spent a year in Honduras with the United Fruit Co., and, in 1930, was hired at the U.S. Bureau of Plant Industry's headquarters in Washington. He was preceded there by a colleague from Wisconsin, John Monteith, who was one of the most active experimenters in the world with mercury fungicides. Monteith wrote numerous papers about his tests on mercury fungicides at the bureau's Arlington Turf Garden, now the site of the Pentagon. Monteith and Wellman had written a scientific paper on cabbage fungus in 1927.

During most of 1936, Wellman was hunting exotic plant diseases in Turkey, Egypt, and Iran. He was, as Leo Kanner wrote, a plant pathologist who "has traveled a great deal in connection with his work."

Their child was born on May 23, 1936. Exactly six years later, in May 1942, the boy's worried parents brought him to see Kanner at Johns Hopkins Hospital, about 30 miles up Route 1 from Beltsville. Kanner called him "Case 2: Frederick W."

"The child has always been self-sufficient," Kanner quoted his mother as saying. "Usually people are an interference. He'll push people away from him. To a certain extent, he likes to stick to the same thing."

"On one of the bookshelves we had three pieces in a certain arrangement. Whenever this was changed, he always rearranged it in the old pattern."

"He had said at least two words ('Daddy' and 'Dora,' the mother's name) before he was 2 years old. From then on, between 2 and 3 years, he would say words that seemed to come as a surprise to himself. He'd say them once and never repeat them."

Kanner was an international leader in diagnosing and treating childhood mental disorders--he wrote the book *Child Psychiatry* in 1935 and is widely credited with establishing the discipline in the United States. But he asserted in "Autistic Disturbances of Affective Contact"--published in 1943 in the now-defunct psychiatric journal *The Nervous Child*--that this was something completely different.

"These characteristics form a unique `syndrome' not heretofore reported, which seems to be rare enough, yet is probably more frequent than is indicated by the paucity of observed cases," Kanner wrote.

The children just did not appear retarded. "Even though most of these children at one time or another were looked upon as feeble-minded, they are all unquestionably endowed with good cognitive potential," he wrote. "They all have strikingly intelligent physiognomies."

What made them different, he concluded, was "an extreme autistic aloneness that, whenever possible, disregards, ignores, shuts out anything that comes to the child from the outside." He called the disorder autism, from the Greek word "autos," or self, borrowing the term from a Swiss psychiatrist who used it to describe childhood schizophrenia. The children appeared to inhabit a universe of one.

In September 1942, Frederick W. was placed in a school for the developmentally disabled near Baltimore. His father transferred to the agriculture department's international division. In early 1943, Frederick L. and Dora Wellman left the U.S. mainland for the next two decades. But they would return for their only child.

ELEMENTAL OR METALLIC MERCURY, the slippery quicksilver that used to spill out of broken thermometers, is made up of single atoms, No. 80 on the Periodic Table of Elements. Mercury can combine with other elements to form compounds; these compounds are called organic mercury if they include a carbon atom, inorganic mercury if they do not.

All forms of mercury are toxic, but organic mercury--which can cross the body's blood-brain barrier and the placenta--is especially dangerous.

One kind of organic mercury, methyl, "bioaccumulates" or builds up in some large fish. Pregnant women are advised not to eat too much of certain fish for fear of causing neurological damage to their offspring.

Ethyl is a sister compound from the same alkyl subgroup of organic mercury; it has one more carbon and two more hydrogen atoms than methyl. But ethyl mercury is man-made--it was not present in the environment, and humans were not exposed to it, until a Ukrainian immigrant named Morris S. Kharasch created the first commercial formulations just before Kanner's earliest autism cases were born.

In the 1920s, in part based on expertise he developed in chemical warfare research for the United States during World War I, Kharasch filed 11 patents that paved the way for several ethyl mercury products by the end of that decade. His dual focus was evident in his *Who's Who* entry: He had been "awarded patents along pharmaceutical lines, and treatment of fungus diseases of small grains."

Those patents led directly to thimerosal--trademarked as Merthiolate by Eli Lilly and first used in vaccines by 1931. They also led to three ethyl mercury fungicides, the DuPont and Bayer

brands Ceresan and New Improved Ceresan, marketed in a partnership called Bayer-Semesan; and Lignasan, used to treat timber.

Wellman's North Carolina State archive, in a folder titled "Memorabilia," contains sales brochures for both kinds of Ceresan. "New Improved Ceresan usually destroys seed-borne diseases either by direct contact with the spores or by forming a vapor which penetrates every crack and cranny of the seed," the brochure reads. It also helped protect seeds "against certain soil-borne organisms."

The pamphlets also warn the compounds are "poisonous and precautions with all packages must be observed. Use a dry filter dust mask or clean dry cloth over the nose and mouth, as New Improved Ceresan is poisonous to inhale." (The third of three fungicide pamphlets in Wellman's archive was for Semesan, another organic mercury compound from Bayer-Semesan.)

Used properly, mercury fungicides were never a health hazard, according to Germany-based Bayer CropScience.

"Investigating the health and environmental aspects of our products has always been an important activity for Bayer," the division's web site says. "Although the correct use of mercury-containing seed treatments would be safe to the environment even by today's standards, these pioneer seed-treatments were replaced, at the end of the 1970s, by a new generation of mercury-free products."

A DuPont spokeswoman, Gabriel King, says she cannot comment in detail because "going back that far, it's the institutional memory--there's just nothing there."

DuPont and Bayer both referred this reporter to CropLife America, a trade group. A CropLife spokeswoman says it, too, lacks familiarity with mercury fungicides.

Wellman was aware that, with mercury fungicides, he was handling "a very strong poison."

In 1940, while at Beltsville, he wrote he had become familiar with "toxic values of chemicals [and] injurious effects of disinfectants on human beings or animals that might be involved." He wrote that mercury--including the inorganic kind he first tested on cabbage seeds as a Wisconsin student in 1922--can have devastating effects: "It must be remembered that the mercury chloride is a very strong poison, and special care must be taken in using it and disposing of the poison solution."

Whether or not mercury affected Wellman's child is speculation, of course. Yet there are possible clues. Frederick W., for example, was born three weeks early by cesarean section because his mother had "kidney trouble," Kanner wrote.

According to the CDC's toxicological profile for mercury, "The kidney is one of the major target organs of mercury-induced toxicity." Elsewhere it states: "You can be exposed to mercury vapors from the use of fungicides that contain mercury. Excess use of these products may result in higher-than-average exposures. . . ."

"Family members of workers who have been exposed to mercury may also be exposed to mercury if the worker's clothes are contaminated with mercury particles or liquid," it says.

Decades ago chemists were much less sophisticated about the dangers of some of the substances they worked with. "There were chemists, there were chemical assistants who would suck chemicals through pipettes in those days," says Thomas Felicetti, executive director of Beechwood Rehabilitation Services in Langhorne, Pa. Felicetti published a study in 1981 that found children with autism were far more likely to have parents whose jobs brought them in contact with chemicals.

Felicetti's study was a follow-up to one in 1974 by Dr. Mary Coleman, a leading autism expert at Georgetown University who has since retired. Her study of 78 autistic children found "an unusual amount of exposure [of parents] to chemicals in the preconception period." Twenty of the 78 children were from families with chemical exposure; in four of those families, both parents had chemical exposures. Seven out of eight of those parents were chemists.

"Of the control parents" whose children did not have autism, she wrote, "there was only one family (again both the father and the mother) who were working as chemists in a laboratory."

In a 1976 book she edited, *The Autistic Syndromes*, Coleman wrote that "since the incidence of individuals exposed to chemicals in all related occupations in the United States is 1,059,000 in 91,000,000 or 1.1 percent of the population . . . to find that 25 percent of any sample has had chemical exposure is quite startling.

"This is an area where more prospective research is needed," Coleman wrote. That has never been done.

According to Coleman's book, the idea of parental exposure leading to autism in a child "can not be dismissed, because of the theoretical possibility that chemical toxins could effect genetic material prior to conception."

Dozens of studies have implicated mercury in genetic damage, including chromosomes breaks, point mutations, and partial and complete deletions. One study on hamsters (it is unethical to test toxic substances on humans) found mercury produced more point mutations than lead, a widely recognized threat to children's mental development.

The scientific literature is also full of evidence that fetuses and young children can suffer long-term harm, including brain damage, from mercury exposure even if their parents do not.

The case that galvanized world attention occurred in Minamata, Japan, in 1956, when wastewater from a Chisso Corp. chemical plant spilled toxic levels of methyl mercury into Minamata Bay, and pregnant women ate contaminated fish. Children born to mothers who ingested methyl mercury from contaminated fish while pregnant had profound physical and neurological problems even though their mothers did not show any impairment.

In 1972 thousands of people in Iraq ate bread made from grain treated with methyl mercury fungicide that was intended for planting, not human consumption. Hundreds died. A follow-up

study on children whose mothers ate contaminated bread after giving birth and who were exposed only through their mothers' breast milk showed problems including language delay that led one parent to describe the children as "needles blunted by the poison." Language delay is one of the hallmarks of autism as well.

Eating ethyl mercury-treated grain led to similar poisonings in Ghana in 1967. Twenty people died. Of those who survived, "toxic effects appeared earlier and were more severe in children than in adults," according to a report of the incident published in 1974 in the journal *Archives of Environmental Health*. "Four children developed disturbances of speech which led to stammering and scanning. . . . Mental abnormality was observed in one boy who showed outbursts of anger unrelated to circumstances. A girl developed encephalitis [brain swelling] and became completely paralyzed . . . [with] complete loss of speech."

The report added: "Of all the fungicides in modern use, the alkyl-mercury compounds [which include ethyl and methyl mercury] offer the most serious health hazards. This is the conclusion reached by many workers . . . who have undertaken many investigations of persons at risk of occupational absorption of alkyl mercury compounds. Serious concern has therefore been expressed about the necessary contamination of the environment with mercury, particularly from its use as fungicides in agriculture and in industry."

Two recent U.S. studies have found a possible association between environmental mercury and a risk of autism in American children.

Raymond Palmer and colleagues at the University of Texas found the autism rate was higher in Texas counties with more mercury exposure from toxic industrial releases. In the other study, researchers found children living in areas with the highest level of mercury pollution in the San Francisco Bay area were roughly twice as likely to have autism.

The Environmental Protection Agency now says 6 percent of American children are born to mothers with a mercury level high enough to put them at risk for health problems.

IT IS SAFE TO SAY THAT LEO KANNER was not looking for environmental exposures as a cause of the strange new cases he was seeing.

By the time the Wellmans arrived at Johns Hopkins in 1942 with Frederick W., Kanner had observed a number of such children who would form the basis for his landmark description of autism as a "markedly and uniquely different" disorder.

He believed they had something else in common.

"In the whole group," he wrote in his original study, "there are very few really warmhearted fathers and mothers." In subsequent studies he became more emphatic, describing "the almost total absence of emotional warmth in child rearing."

"As a rule, the parents of our autistic children are cold, humorless perfectionists," he wrote in 1954. "[T]he emotional refrigeration which the children experience from such parents cannot but be a highly pathogenic element in the patients' early personality development, superimposed powerfully on whatever predisposition has come from inheritance."

Kanner's speculation about the parents' role was tempered by his beliefs that most of the children he saw had been that way since birth, and that their autism was "inborn." By the end of his long and distinguished career at Hopkins, he had completely dropped the idea of parental responsibility, and noted: "At no time have I pointed to the parents as the primary, postnatal sources of pathogenicity." Kanner was also harshly critical of the claims of Bruno Bettelheim, who blamed autism on the homicidal feelings of mothers for their child. Another autism pioneer, Bernard Rimland (who died in 2006), demolished the psychological-damage idea for good in his 1964 book *Infantile Autism: The Syndrome and Its Implications for a Neural Theory of Behavior*.

Kanner made another key observation in that original 1943 study.

"There is one other very interesting common denominator in the backgrounds of these children," he wrote. "They all come of highly intelligent families."

The Wellmans certainly fit that mold--Frederick L. Wellman had a Ph.D. in plant pathology, his wife was a college graduate, and he had four talented siblings: an opera singer; a newspaperman and best-seller author; a writer for adventure magazines; and a painter, writer, and radio commentator. Yet only the Wellman sibling with a clear chemical connection, Frederick L. Wellman, had a child with autism.

In Thomas Felicetti's 1981 study, there was no "intellect effect," he said; chemical exposure was the difference. One parent applied roof tar, which contained a number of toxic chemicals.

Rimland, the researcher who disproved the idea that "refrigerator" parents made their children autistic, pointed out in a 2002 written statement in his role as head of the Autism Research Institute that Kanner earned his M.D. in 1919 in Berlin, came to Hopkins in 1928, "and has been reported to have seen well over 20,000 children in the course of his psychiatric career. . . . It is remarkable, in retrospect, that none of the children were seen in Kanner's first 12 years of practice [at Hopkins], and all 11 were born after 1930, when, as it happens, mercury-containing vaccines were first used in this country. A coincidence? Very unlikely."

Others, including the author of a new book, argue autism has been around for ages and only awareness of it has increased. In this view, increasing exposure to mercury--or any other environmental agent--could not be causing an autism epidemic for one simple reason: There is no autism epidemic.

"The most important piece of evidence provided by those who believe that thimerosal is related to autism is that rates for all the various autism spectrum disorders have risen dramatically over the past few decades," writes Roy Richard Grinker, a George Washington University anthropologist, in *Unstrange Minds: Remapping the World of Autism*.

Grinker, who has a teenage daughter, Isabel, with autism, argues in his book that the "evidence" just doesn't hold up. "[T]he increase in the rate of autism is more likely due to the result of new and improved science--more reliable definitions of autism and more awareness of autism among health-care professionals and educators. Maybe we are finally diagnosing and counting autism correctly."

Another expert who argues autism is not new is Dr. Darold Treffert, a Wisconsin psychiatrist who has worked with autistic patients for decades.

"Autistic disorder did not begin with Kanner's description of it in 1943 any more than Down's syndrome began with [Dr. Landon Down's] description of it in 1887," Treffert says in an e-mail. In fact, he says, Down identified several children who today would be described as autistic.

But the incidence could have increased due to new factors, Treffert continues. His belief that autism has long existed "does not negate any present investigations of the etiology [cause] of autistic disorder, including the role of environmental or heavy metal factors."

Despite those assertions, there is a distinct lack of observed cases before 1930--less than a handful in the United States, each of which might have had autistic symptoms but differ in many ways from Kanner's original 11.

A chemical connection might also help explain why Kanner, in Baltimore, first described the disorder: He happened to be located near government researchers working with cutting-edge chemicals. Frederick L. Wellman did advanced work for the federal government in suburban Maryland, literally on the road to Baltimore, while the father of Case 8 was "a chemist and law school graduate at the government Patent Office," another Washington agency. Other cases appear to have been local, based on the way they were first noticed or on their parents' occupations--one mother, a pediatrician, became a Maryland public-health officer. Case 4 was the son of a mining engineer, which also suggests the possibility of some environmental link. (It is unclear why Kanner, who died in 1981, arranged the first 11 cases in the order he did, which is not chronological.)

Ricci King, a Washington state autism advocate, says she has long noticed a connection between farm backgrounds and autism, especially in children who never had been vaccinated. That fits with a link to fungicides, she says.

"For some reason in the back of my brain I was filing the fact that some of these parents were farmers, or lived near farm communities," says King, who has a 14-year-old son, Robert Hedequist, with autism and moderates an international autism biomedical discussion group for parents and professionals, ABMD@yahoogroups.com.

"A light bulb went off for me at a conference in Portland [Ore.] in 2001 where I met a mother of five children, all on the spectrum, all unvaccinated," King recalls in an interview. "She was from eastern Washington, she came from a family of farmers, and her husband was a farmer as well. All five of her children had regressive autism. Meeting her changed the way I look at autism, and prompted me to explore the connection."

King says her "jaw literally dropped" when presented with the idea that mercury in fungicides could link Kanner's early cases. "It would be hard to convince me that there isn't a connection," she says.

Again, that's speculation. But Mercury, like many toxins, can linger in the environment and could theoretically be a risk for decades via earth, air, and water. At the Beltsville center where Frederick L. Wellman experimented with mercury fungicides in the 1930s--and where research on their agricultural uses presumably ended decades ago--mercury concentrations remained up to 2,000 times the U.S. average, according to a 1995 Coastal Hazardous Waste Site Review by the National Oceanic and Atmospheric Administration.

AFTER LEAVING BELTSVILLE IN 1943, Wellman became head of the Department of Plant Pathology and Botany at the U.S. Agricultural Experiment Station at the University of Puerto Rico, Rio Piedras, making frequent forays around the world. The bespectacled scientist published several books as well as dozens of scientific papers. He founded the Caribbean Division of the American Phytopathological Society.

His career was his calling. The first chapter in his 1974 book *Plant Diseases--An Introduction for the Layman* begins with a stark depiction of what can happen without the contributions of plant pathologists.

"There are many plant diseases that have destroyed important food crops causing poverty, misery, hunger, and, finally, the ugliest thing in all human experience: famine," he wrote. "I have seen and smelled villages in the last stages of famine. . . . To me, privileged, fed, and protected, the sight seemed an impossibility."

Wellman became the world's leading authority on a fungus called *Hemileia vastatrix*, the cause of coffee rust disease. Again, mercury was part of the picture. He wrote:

Coffee seed is covered with a tough parchment-like shell and this may be washed and disinfected with strong chemicals. Solutions of formaldehyde, strong chlorides, salts of mercury and salts of copper can all be used and after half an hour of soaking, the treated seed rinsed in water.

While Wellman made a name for himself in plant pathology, Leo Kanner did the same in the field he named. Johns Hopkins became a "clearinghouse" for autism cases from as far away as South Africa. By 1958, he had files on 150 autistic children.

In 1971 Kanner wrote a follow-up paper on the first 11 children. "Twenty-eight years have elapsed since then. . . . The patients were between 2 and 8 years old when first seen at the Children's Psychiatric Clinic of the Johns Hopkins Hospital.

"What has become of them?" he asked. "What is their present status?"

Frederick W. was one of just two children whose outcome he considered favorable, Kanner said (Case 1 from Forest, Miss., was the other). In 1962 officials at the Maryland institution where Frederick W. lived wrote:

He is, at 26 years, a passive, likeable boy whose chief interest is music. He is able to follow the routine and, though he lives chiefly within his own world, he enjoys those group activities which are of particular interest to him. He was a member of the chorus in the Parents' Day program and was in charge of the loud speaker at the annual carnival. He went on weekend trips to town unaccompanied and made necessary purchases independently.

Two years later the Wellmans took their son out of that institution and brought him to live with them in Puerto Rico. Their son "picked up a lot of Spanish and worked out a schedule of studying language lessons on records at 4 o'clock every afternoon," they told Kanner.

Frederick L. Wellman soon retired from his Puerto Rican post, and the family moved to Raleigh, where he became a visiting professor at North Carolina State.

"We settled into a new home and [Frederick] did his part in it," the Wellmans wrote Kanner. "He has become acquainted with the neighbors and sometimes makes calls on them. We tried him out in the County Sheltered Workshop and Vocational Training Center. He took right to it, made friends with the teachers, and helped with some of the trainees. Through his relationship there, he took up bowling and he does pretty well."

Frederick L. Wellman retired from N.C. State in 1970. He, his wife, and their son lived in an apartment building until the elder Wellmans died in the 1990s; Frederick W. turned 70 last May.

A man who twice answered the intercom at his current residence said it was a wrong number. A letter sent to his address received no response.

So the last word must come from Kanner's follow-up more than a quarter-century ago.

In 1969, Frederick W. began working at the National Air Pollution Administration, now part of the Environmental Protection Agency, doing routine tasks like running a copy machine. His boss wrote in 1970 that he "is an outstanding employee by any standard."

Mark Blaxill of SafeMinds says the new information about Frederick W. and the other early cases is a call to action.

"It's important not to make overly large claims from this evidence, but we need to take seriously the early environmental clues like this," he says. "Johns Hopkins has detailed data on the first couple of hundred Kanner patients. Perhaps there are more clues in that sample, like an undiscovered environmental cluster, that no one has considered before."

"I would hope that Hopkins might consider opening up those case files and, instead of focusing on the parents, start thinking about where these families lived and what the parents' occupational exposures might have been."

Dan Olmsted is a journalist with United Press International in Washington, where he writes the Age of Autism column, available at www.upi.com. Copyright 2007 © United Press International Inc. All rights reserved. Researcher Beverly Crawford contributed to this story.

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CHEMICAL SPILL: The papers of the late Frederick L. Wellman (above) include a study of organic mercury on plant fungi and brochures for commercial fungicides containing organic mercury (below).

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COURTESY U.S. DEPARTMENT OF AGRICULTURE'S AGRICULTURAL RESEARCH SERVICE

Wellman worked with organic mercury at the Henry A. Wallace Beltsville Agricultural Research Center (the main building in a photograph from 1848).



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DOSED: The U.S. Department of Health and Human Services insists that organic mercury preservatives in vaccines given to young children are safe, but the centers for disease control asked drug manufacturers to start phasing them out in 1999.



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TABLE OF THE ELEMENTS: A photograph from Frederick L. Wellman's papers shows a chemical-lined lab in Costa Rica, where wellman once worked.