

SARS:

Its origins, genetics, politics and potential cures

by Bill Sardi

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SARS: did it happen by accident or by design?

Images (left to right): SARS Coronavirus;
Time Magazine cover; sanitary worker in Beijing

A World Health Organization timeline shows that the first case of SARS, Severe Acute Respiratory Syndrome, occurred in November of 2002. By the Spring of 2003 some 5000 cases had been reported and nearly 500 had died due to pneumonia with older groups experiencing the highest mortality rates, 43-55%. While the epicenter of SARS is in Guangdong province in China, people traveling to China in the months preceding the first reported case reported widespread illness with similar symptoms. Travelers to China were returning to the USA with dry coughs and prolonged illness. By no means was the first published case which occurred in November of 2002 the first bout with SARS.

In the same month the first SARS case is reported to have occurred, British Broadcasting Co. reported that

a killer flu bug was on the way and it could claim the lives of thousands. The report suggested a newly mutated flu bug might resemble the Spanish flu of 1918 that circled the globe and killed millions. Flu pandemics in 1957 and 1968 were also cited to account for 40 million deaths between them. Virologists claimed that the flu virus mutated about every 30 years and it was about ready to do that again, with a pandemic to follow. [BBC News Nov. 2, 2002] The 30-year gap between worldwide flu outbreaks which were alleged by virologists, don't follow the 1918, 1957 and 1968, 1997 pandemics. Those are gaps of 39, 9, 11 and 29 years, hardly a predictable cycle.

Who summoned these virologists to Malta? Who created the scare headlines? Did the virologists already know that a mutated virus was causing SARS?

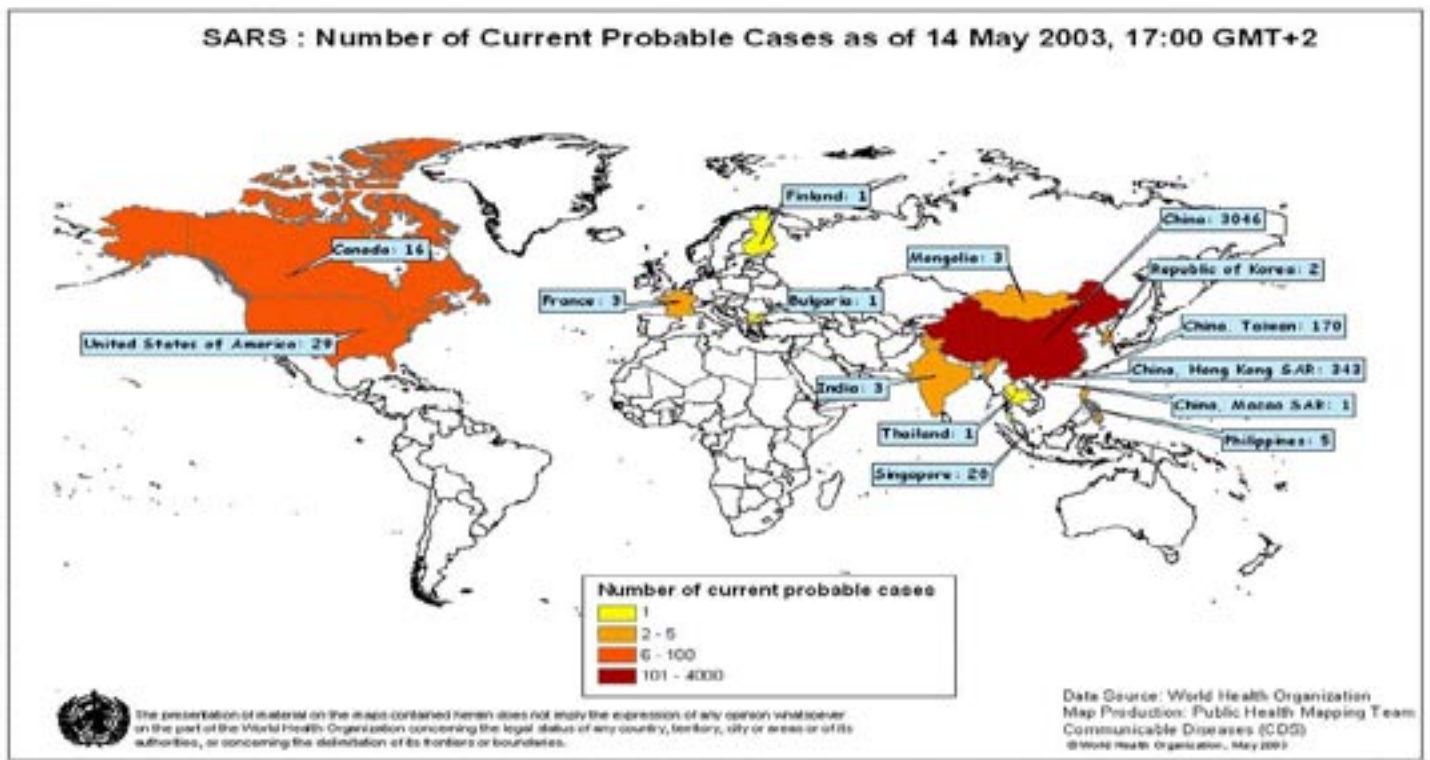
One of the reports emanating from the Malta conference said that virologists were closing in on genes responsible for flu viruses jumping from birds to humans. A report said *“it is only a matter of time before an avian virus evolves the capacity to spread from person to person, particularly if the infected individuals also harbor human influenza viruses which the avian strains could re-assort.”* [BioMedNet Oct. 23, 2002] Did SARS emanate from a natural mutation, or was it from a more sinister origin, an engineered virus?

On November 20, 2002 the Israeli publication *Dei’ahveDibur* published a report warning of biological threats. The report asked if the threats would come from *“Saddam Hussein? Nope. Al Qaeda? Wrong again. Today Europe is terrified of a much worse threat: a deadly worldwide flu epidemic called the super flu.”* The report went on to say that *“Israeli health officials have been heard to express satisfaction over the scare headlines. They increased the public’s response to calls for vaccination.”* According to Dr. Amnon Kiro in Tel Aviv, when a superflu hits the world, we will have four months to *“prepare millions of vaccines.”* [Dei’ah veDibur Nov. 20, 2002] Israeli health officials appeared to be buoyed by their self importance now that a yet unidentified flu bug was supposed to strike soon. They were going to use the super flu to scare people into getting the flu vaccine. It’s kind of like

geologists asking the world to batten down loose items and prepare an impending storm of earthquakes based upon unreliable predictions that a massive spate of earth tremors was about to occur.

In China respiratory system disease kills 5,174 people per day. In the USA, the flu bug kills at least 36,000 people a year, 250,000 to 500,000 worldwide. What was all the fuss about a viral mutation that hadn’t occurred yet?

In another oddity at about the same time, pharmaceutical giant Hoffman-La Roche Ltd was criticized by Chinese officials in February of 2003 for claiming that its Tamiflu product, known as *“Da fei”* in Chinese, was an effective treatment for a chicken flu outbreak in Guangdong province. An Associated Press story at the time claimed the *“mystery illness”* had killed five people and sickened at least 305 with pneumonia since November, the official reported date of the first case of SARS. [CNN.com Feb. 19, 2003] This was a *“bird flu,”* that is a flu-like disease that had been given attention in the news media in Hong Kong. The H5N1 strain of bird flu virus was identified. An outbreak of the identical virus strain had been reported in Hong Kong in 1997. While the H5N1 strain was transmissible from animals to humans, it did not transfer between humans. Only those people who lived or worked closely to



animals were at risk. Chickens were slaughtered by the millions and the outbreak vanished. But there were other disturbing reports in Hong Kong of a flu bug in 1997 that was transmissible between humans. The main point here is that pharmaceutical companies were quick to launch a rumor that their product was a cure.

The Spanish flu of 1918 was caused by the H1N1 strain and killed more than 20 million people, mostly young and healthy adults. The 1968 flu outbreak was caused by the N3N2 strain and mostly affected people over age 65. [Independent- London Feb. 20, 2003]

While the first case of SARS had been retrospectively tracked back to November of 2002, it wasn't till 2003 that SARS was reported in the news. A cluster of SARS cases apparently began in Guangdong Province, South China. SARS was characterized by the onset of a fever followed by a dry cough and shortness of breath, and then life threatening pneumonia in some cases. There was no blood test for SARS. It had to be diagnosed by its symptoms.

Mortality from SARS

The fatal factor in SARS appears to be an excessive immune reaction. SARS starts with a high fever and a dry cough and then proceeds in the second week to an over-reactive immune response that destroys the alveoli in the lungs which are responsible for transferring oxygen to the blood circulation. Tumor necrosis factor, an inflammatory protein, is over-produced. Therefore, steroids which suppress the immune/inflammatory system and anti-viral drugs are combined to improve survival. [New Scientist May 3, 2003]

While the initial mortality rate from SARS was reported at about 3 percent, by May 7 when more cases had been followed, the death rate from SARS was found to be 13.2% among young and middle-aged individuals and ranged from 43 to 55 percent among those over 60 years of age. [LA Times May 7, 2003] While sporadic cases of SARS had been reported around the globe, Asia remained the epicenter. Yet Business Week magazine said: *"like something out of a Michael Crichton thriller, the disease keeps cropping up every week farther from*



A flu outbreak killed hundreds on the island of Madagascar in 2002 but no news reports did not give it the same attention as the SARS virus which has killed a similar number of people.

its source.” SARS had developed unusual attention by the news media before it had become a pandemic.

For comparison, a flu outbreak involving the H3N2 influenza A virus on the Island of Madagascar was reported to have killed 670 people by August 28, 2002, and while reported in newspapers worldwide, it was never characterized by the news media as the next killer flu bug that would threaten the world. [www.allafrica.com Aug. 28, 2002; World Health Org, Aug. 30, 2002]

The World Health Organization said five “superspreaders” had been identified who have passed the virus to 144 others while 8 percent of these infected individuals did not transfer it to anyone else. Superspreaders have also been described in other diseases like tuberculosis, rubella and Ebola virus. [NY Times, May 9, 2003] In contrast, by early May there had been 5600 SARS cases reported worldwide, with only 56 probable cases in the USA (1% of the total). No one in the US had died of SARS.

Did the CDC over-estimate the number of SARS cases to induce fear?

The Centers for Disease Control appeared to be digging up alleged cases of SARS, as if making an attempt to create public fear. How many Americans really had come down with SARS? By April 18, 2003 the CDC

admitted it had used broader definitions for SARS and 173 of the reported 208 cases never developed pneumonia, the hallmark sign of SARS. The actual number of SARS cases was 35 in the US. Julie Gerberding of the CDC said the broadest definition would continue to be used. [USA Today April 18, 2003] Why would the CDC attempt to pad the number of SARS cases?

Oddly, the American version of SARS appeared to be so much milder in the US than abroad that physicians suggested called it MARS for Mild Acute Respiratory Syndrome. This is because they may not have SARS at all. As Julie Gerberding, director of the Centers for Disease Control said, *“It is quite possible that people can meet the case definition of SARS and not be related to the outbreak at all.”* [USA Today April 11, 2003] Gerberding’s statement was a contradiction of terms.

Another oddity: on March 25, 2003, the Centers for Disease Control reported that their agency was working with the Defense Department to test existing antiviral agents. Why had the Defense Department been alerted? Was SARS caused by a bioterrorist? A week earlier, on March 17, 2003, the news media recklessly speculated that bioterrorism was behind the SARS outbreak. Yet there was no overt evidence of this. [London Times March 17, 2003]

Of note, the US Defense Department also develops biological warfare agents and in the 1990s retrieved genetic sequences of the 1918 Spanish flu from frozen corpses in the frozen tundra of Alaska. [Science 275: 1793, 1998]

The Washington Post characterized SARS as *“the first life-threatening infection that can be spread from one person to another to emerge in decades.”* [Washington Post March 25, 2003] How so? What about the flu outbreaks of 1968 and 1997? What about AIDS?

Where did SARS come from?

What was causing SARS? Researchers speculated that an animal virus mutated and developed the ability to infect humans. [Science Express May 1, 2003] Researchers began looking at a family of viruses called coronaviruses, common in poultry, cats, dogs,

pigs and cattle. It is widely known that coronaviruses are associated with serious upper respiratory illness in frail older adults. [J Infectious Diseases 185: 1338-41, 2002]

By April 16 the World Health Organization (WHO) authoritatively announced that a new pathogen, a coronavirus, is the cause of Severe Acute Respiratory Syndrome (SARS). Dr. David Heymann, executive director of WHO Communicable Disease Programs, said: *“We now know with certainty what causes SARS.”*

SARS is caused by a coronavirus, said the researchers. But viruses other than the coronavirus have been found in tissue samples of SARS patients. Possibly these are bystander viruses. Possibly an unknown virus causes SARS. [Science No. 5615, 299: 1963, March 28, 2003] Why the certainty of a coronavirus?

Frank Plummer, scientific director of the National Microbiology Laboratory in Winnipeg, says the new coronavirus has been detected in only 40% of people with *“probable”* cases of SARS. The new coronavirus was also found in 14% of the people who were not suspected of having SARS. It is possible healthy people were carrying the virus. Investigators detect the virus by obtaining samples from nasal swabs. But the coronavirus may be harbored in the digestive tract, not just the lungs. [USA Today March 30, 2003]

By April 11, 2003 the World Health Organization announced researchers had infected monkeys with the same virus obtained from SARS patients and they developed the same symptoms as humans. [Associated Press April 11, 2003]

SARS: not like other coronaviruses

The coronavirus genome is an RNA virus. It largely infects mammals and birds. An RNA virus attacks a living cell, using an enzyme called a spike protein to burrow its way through the cell wall and insert its genetic RNA material. Once inside the cell it begins to replicate wildly.

But there were nagging questions. If SARS is caused by a coronavirus, then why wasn’t it acting like

one? Life-threatening lower respiratory infections, characteristically seen in SARS are uncommonly caused by coronaviruses. They are usually confined to upper respiratory disorders, like the common cold. [The Lancet 361, No. 9368, May 3, 2003]

Furthermore, coronaviruses usually mutate rapidly. Doctors were hoping SARS would mutate to a less infectious variety. In seven weeks researchers could not detect any mutations. [NY Times, May 9, 2003] This is unlike coronaviruses.

There was speculation that the SARS virus mutates so fast that a vaccine would not be able to be developed for it. Because of rapid mutation, vaccines against animal forms of coronaviruses have had only limited success. Dr. Anne Brigden, University of Ulster virus expert, said a SARS vaccine would take years to develop. [Hospital Management, April 29, 2003]

But samples of SARS virus taken from patients in different countries reveals they are genetically identical, something that is remarkable for an RNA virus. Usually RNA viruses mutate very quickly, changing a letter or so in their genetic code every time they replicate. A non-mutating virus is much easier to target with a vaccine. [Agence France-Presse, May 9, 2003]

Furthermore, same-strain coronavirus infections are not known to recur. By May 1, 2003 health officials were reporting that a dozen patients who had seemed to recover from SARS became ill again after leaving the hospital in Hong Kong. It is not known if they contacted the disease a second time or it was reactivated. [New York Times May 1, 2003]

What is the genetic makeup of the SARS virus?

One end of the SARS virus is similar to a virus that causes severe bronchitis in poultry and the other end looks like that of viruses which cause hepatitis in mice and diarrhea and pneumonia in cows. This virus invades the epithelial linings in the lungs. Dutch scientists report that an animal vaccine used in chickens against infectious bronchitis frequently recombines with other coronaviruses. The animal vaccines that work

against coronaviruses are made of viral proteins with an adjuvant which provokes a much stronger immune response than the viral proteins alone. But adjuvants can trigger an autoimmune response and scientists have yet to find a safe one for eliciting epithelial immunity in humans. [New Scientist April 26, 2003] Did SARS emanate from an adjuvant-laced vaccine experiment that induced a recombined version of a coronavirus?

There is speculation that SARS is a product of recombination, that is, it was produced when two strains of viruses infected a cell at the same time. Currently the two progenitor or original strains are unknown. Parts of the SARS virus appear to be similar to the bovine coronavirus and the avian infectious bronchitis virus. Since the genome for SARS has been published, it could be used to track whether genetic engineering contributed to its appearance. In the laboratory, coronaviruses have undergone genetic manipulation since the late 1990s.

The coronaviruses have large RNA genomes, perfect to attach other strands of genetic material to. Various experiments using recombination have been demonstrated with coronaviruses. [Journal Virology 77: 4528-38, 2003]

How to engineer a coronavirus

According to researchers at the National Biotechnology Center in Madrid, Spain, the coronavirus infects mucosal surfaces of the respiratory and digestive tract. The tropism (invasive orientation) of coronaviruses can be modified by the manipulation of the spike protein used to invade a living cell. In general, in humans and fowl, coronaviruses infect the upper respiratory tract while porcine (pigs) and bovine (cattle) coronaviruses establish themselves in the digestive tract. Human coronaviruses are responsible for 10-20% of all colds.

Professor Joe Cummins of the Department of Biology, University of Western Ontario, warns that “*none of the early reports have acknowledged the large body of reports on the genetic manipulation of corona viruses in the laboratory nor have they considered the possibility that the unique virus arose as a laboratory accident or purposeful experiment.*”

A coronavirus from a disease in pigs that produces symptoms similar to SARS has been manipulated to create a viral vector (carrier) to intentionally implant foreign genes (gene therapy).

ProdiGene: Edible coronavirus vaccine

Prodigene, a Texas-based company specializing in production of crop biopharmaceuticals also produced an edible vaccine for swinecorona virus. Inquiries as to where ProdiGene was conducting field crop experiments with the swinecorona virus have been deemed confidential information by the US Department of Agriculture. [Professor Joe Cummins April 21, 2003]



ProdiGene was developing and testing a coronavirus vaccine genetically implanted in corn to prevent viral infection in pigs. China is the largest market for this plant-based vaccine for pigs.

The biggest market for an animal coronavirus vaccine would be China which is the home of 3.6 billion chickens, 612 million ducks, 437.6 million pigs, 203 million geese, 148.4 million goats, 131.1 million sheep, 104.6 million cattle, 22.5 million buffaloes, and over 22 million horses/donkeys/mules/camels. [China Briefing Book – Issue 1, American Farm Bureau Federation, September 25, 2001] It is unknown if Prodigene, or one of the companies associated with Prodigene, was conducting biotech crop experiments in China.



Prodigene, a Texas-based company conducted open-field experiments with transgenic corn and coronaviruses. Did the experiment get out of hand?

In February of 2003 ProdiGene announced it has demonstrated for the first time that an oral vaccine expressed from plants gives protection against a virulent pathogen in livestock. The trials were conducted on swine using an edible form of a vaccine against transmissible gastroenteritis virus (TGEV). [Tech Mall Feb. 15, 2003] A small group of people with lymphoma have successfully received a plant-based drug, so human trials are beginning. [Reuters Dec. 13, 2002]

China has issued safety certificates to more than 20 foreign companies to test genetically modified organisms. [Bio Exchange April 29, 2002] China, in conjunction with companies such as Monsanto, has been conducting field tests on transgenic products. [Bangkok Post March 11, 2003] Monsanto is the company that brought products like saccharin, dioxin and Agent Orange to the world, and is headed by Robert Shapiro, who once was CEO at the Nutrasweet operation of Searle Drug, since purchased by Monsanto.

According to the Grain Quality Task Force, ProdiGene is developing oral vaccine products from its transgenic corn with partners such as Eli Lilly and Avant Immunotherapeutics. [Grain Quality Task Force fact sheet #47, July 2, 2002]

Anthony Laos, Prodigene's president, claims the company lives primarily off of venture capital provided primarily by an unnamed angel (individual investor). Mr. Laos was formerly director of market development

and sales for Elanco Products Company, a division of Eli Lilly and Company. [Seed Quest July 30, 2002] Is Eli Lilly the secret investor behind Prodigene? Large pharmaceutical companies are known to provide private capital to grow startup companies and then purchase them at a later date.

Researchers indicate, for the first time, that construction of infectious coronavirus clones is possible. A fully function infectious TGEV coronavirus DNA clone, leading to a virulent virus able to infect both the enteric and respiratory tract has been engineered. In piglets an immune response is generated which can induce immunity in newborn piglets. Coronavirus DNA has also been copied and cloned in vaccinia virus (cowpox, used to inoculate for smallpox).

Since coronaviruses can be engineered by targeted recombination or by modification, and since coronaviruses with a long genome size and a tendency to grow in the digestive tract, they are ideal vectors (carriers) for vaccine development or future gene therapy. The coronavirus can be manipulated in the laboratory to infect specified target organs or species, animal or human. [Journal Biotechnology 88: 183-204, 2001]

Researchers in Madrid, Spain, have been able to recombine the gene for transmissible gastroenteritis coronavirus (TGEV) that have entry (spike proteins) into the gastric tract and lungs. The experiments show that alteration of the spike gene can change the target tissue, species and virulence of the transmissible gastroenteritis coronavirus. [Journal Virology 73: 7607-18, 1999]

Mistake or intentional mutation?

Dr. Mae-Wan Ho, author of *Genetic Engineering Dream or Nightmare?*, reports that a paper published in 1994 explains a technique for rapidly shuffling and recombining DNA in the laboratory to generate recombined proteins in a more efficient manner than ever before. A California-based company, Maxygen Inc, was set up to exploit this technology. The idea is to create a strain of virus, resistant to antibiotics or antivirals, that could be used as a vector or carrier for

gene therapy. However, some of the new strains created could obviously be lethal. In Europe, releases of genetically engineered micro-organisms are permitted, that is, as transgenic waste consisting of dead bacteria and cells with plenty of transgenic DNA. (Transgenic means at least one foreign gene has been inserted.) [Institute of Science in Society, London]

Transgenic material has, in fact, been leaked into the human food chain. Not only did this occur when experiments by ProdiGene with transgenic corn contaminated a succeeding soybean crop raised on the same Iowa field, but the FDA admitted that genetically engineered pigs were sold illegally for use as food. [NY Times Feb. 6, 2003] The pigs contained a gene to produce insulin-like growth factor, a promoter of cancer. [British Medical Journal 321: 847-48, 2000]

The world of biotech crops, vaccine and drugs

What the public is unaware of are the consequences of genetic experiments now underway throughout the world. The goal is to vaccinate the entire world with edible or nasal vaccines. Farming is turning into pharming.

Bio-pharming is a potentially burgeoning new industry. The market for biopharmaceuticals is projected to reach \$140 billion by 2020.



Animal viruses mutate and infect humans where both live in close proximity, as in China.

Rather than inserting genes into plants to improve the sweetness of a peach or protect the plant from pests, genes are inserted that instruct the plant to manufacture pharmaceutical compounds. In the future, flu shots may be replaced by bananas. Prozac corn puffs may be next.



Flu shots may become obsolete if edible vaccines are approved.

Says a report by BioExchange: *“Quietly and stealthily, our fields are being turned into industrial factories yielding potentially the most dangerous technology since nuclear power reactors were developed.”* [BioExchange Oct. 4, 2002]

Biotechnology companies are approaching farmers around the world to grow their genetically modified crops which will make plants protein factories for edible drugs. Plant-based pharmaceuticals are promoted for their low cost, widespread availability, and ease of administration. [Trends Plant Science 6: 219-26, 2001] Genetically-altered crops aren't just being engineered to resist herbicides or be more productive, they are having DNA grafted into their genome to produce drugs or vaccines. This approach can produce drugs at \$1-2 per gram compared with around \$150 a gram from a bioreactor factory. A traditional drug factory costs \$200-400 million and takes years to build. A new drug may cost \$100 million to develop. [Economist March 27, 2003]

For example, GTC Biotherapeutics of Massachusetts is using the milk from livestock to make drugs. Epicyte of San Diego uses maize to make drugs.

More than 300 open-field test plots for transgenic plants have been approved by the USDA. [National Assoc Seed & Venture Funds, Omaha World Herald, Jan 20, 2003] Transgenic means a plant has been given at least one new gene.

Impossible to contain GMO

Pharmaceutical companies produce drugs in the conventional manner, in cultures of microbes or mammalian cells. The problem is that mutant plant DNA may spread to nearby fields. DNA drift is a problem. [Wired.com Oct. 10, 2002] It is impossible to contain every seed kernel, plant pollen and grain kernel generated from crops grown in agricultural fields. The problem has been generated by biotech companies approaching farmers to grow GMO pharm crops on or near fields where food or feed crops are grown. Dr. Mae-Wan Ho says warnings against the use of open air food crops to produce gene drugs have gone unheeded. Pollen carrying the genetically altered drugs or vaccines could be inhaled by field workers or the crops themselves consumed by wild or domestic animals.

The USDA says it is tightening regulations on pharma crops by increasing the isolation distance up to one-half mile and requiring the crops to be planted three weeks before or after conventional corn. For reference, ragweed pollen has been found 400 miles out at sea. Genetically modified pollen has been measured to travel more than three miles from trial fields by bees and up to 500 meters (about 1500 feet) by air. [The Independent Sept. 29, 1999] Jane Rissler, deputy director and senior staff scientist at Union of Concerned Scientists, says the government is unprepared to regulate pharma crops. [The Non-GMO Source, Volume 2, Issue 9, Sept. 2002]

Unexpected DNA has been found next to genetically inserted DNA in soybeans, which casts doubts over the claims that the biotech industry has achieved precise control over its technology. [New York Times August 16, 2001]

DuPont and Dow Chemical have already paid fines for mishandling of genetically-modified corn they grew in Hawaii. The companies violated rules to prevent the spread of GM pollen from crossbreeding with regular corn. GM corn was planted less than 1260 feet from other seed production corn. [Pacific Business News Dec. 13, 2002]

The biotech industry first said it would move research out of the Midwest farm belt starting in 2003, but then back off and said they would leave such decisions to federal regulators. [Reuters Dec. 13, 2002]

Alliance between politicians and biotech firms

The biotech firms need the politicians to do their bidding and open up markets for their genetically altered products. Politicians, via newly invoked anti-terrorism authority, have the power to coerce, scare or force human populations to take vaccines.

The Bush administration is pushing biotech crops as evidenced by its announcement to file suit in the World Trade Organization seeking to overturn a moratorium on genetically altered food crops in most European countries. [Washington Post May 13, 2003] The US government sponsors research in biotechnology hoping US technology will dominate this emerging field. For example, in August of 2002 ProdiGene announced it had received a \$300,000 grant from the National Institutes of Health to study the safety and effectiveness of an oral vaccine against traveler's diarrhea. [ProdiGene Press release August 12, 2002]



Genetically engineered crops are being promoted by the US Department of Agriculture. Transgenic plants, where a new gene has been inserted, have increased potential to generate new viruses that are extremely pathogenic.

There is a cozy relationship between politicians and biotech company CEOs. In the very month that ProdiGene had been cited for GMO contamination of a

soybean field in Iowa, ProdiGene's president, Anthony Laos, was appointed by George W. Bush to America's "Board on International Food and Agriculture Development (BIFAD)," which advises the United States Agency for International Development (USAID), the US agency that oversees GMO food aid. BIFAD advises the US government on international food issues such as agriculture and food security, including safety of US crops from bioterrorism. Among top donors to the Bush campaign in 2000 were agricultural companies like Archer Daniels Midland and a host of pharmaceutical companies.

State governments are also close to biotech companies, hoping to lure companies for a potentially burgeoning new industry. The state of Iowa has invested \$3.5 million in Prodigene. [Des Moines Register March 6, 2003] So Iowa officials are not about to enforce stiff regulations on Prodigene.

ProdiGene was only given a slap on the wrist, a \$250,000 fine, for its violation of GMO crop rules by the US Department of Agriculture. Anthony Laos, in a press release issued by ProdiGene, said: "We are pleased to put recent allegations behind us and are optimistic about the future of biopharmaceuticals." Hardly sounds like an apology for a goof-up that damaged the reputation of the entire bio-pharm industry. [ProdiGene press release, Dec. 6, 2002]

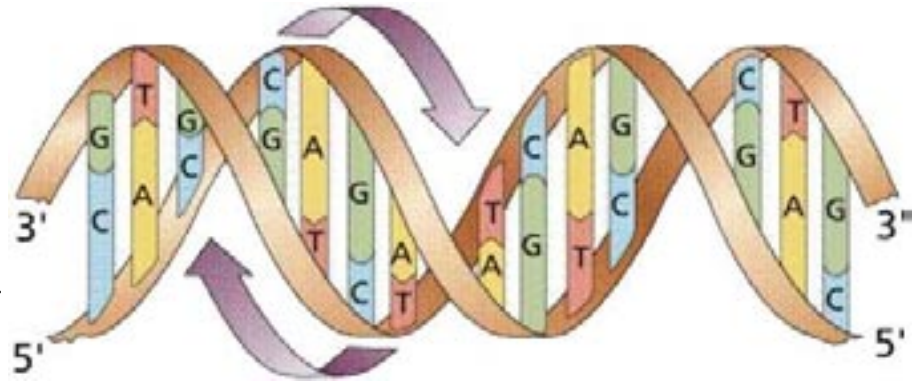
By March 5, 2003 ProdiGene had announced that Anthony Laos had stepped down from his position as president of the company and was replaced by Russell K. Burbank. [ProdiGene press release March 5, 2003] Burbank has been obtained from The Scotland Group of Newport Beach, California, that specializes in placing management in distressed companies. [Des Moines Register March 5, 2003]

Prospective SARS cures

The lack of any medicine that specifically treats SARS calls for urgency. Worldwide efforts to produce a vaccine or drug that specifically treats SARS are underway.

Nucleotide Drawing

Can man control nature? The rearrangement or insertion of the letters A, C, G, T in our genes, called nucleotides (adenine, cytosine, guanine and thymine) can produce new characteristics in life forms, such as a fish that glows in the dark. Plants can be grown where new genetic information is inserted to produce an edible drug or vaccine as the plant grows.



But can these transgenic plants be controlled? What happens when an insect or a rodent ingests a transgenic plant that produces a vaccine or a drug?

Currently, SARS is diagnosed by symptomology. There is no blood test for the disease. Roche Diagnostic has announced it will have a reliable diagnostic test for SARS by the end of July 2003. The test kit will be priced around \$10-15. [UPI May 12, 2003]

Until drugs or vaccines are available, health officials are focusing on quarantine and barrier methods of restricting the spread of SARS. SARS is known to spread rapidly among hospital workers. Apparently airborne droplets from coughing or sneezing transmit the SARS virus. In a hospital in China where the staff diligently following use of surgical masks (but not paper masks), gloves, gowns and hand-washing, none of 69 staff were infected with SARS whereas some staff who did not follow these precautions developed SARS. [The Lancet 361: May 3, 2003]

The treatment of viruses primarily relies upon the human immune system. For example, despite treatment for symptoms, there are no specific antiviral agents for the family of picornaviruses which cause about 65% of the cases of the common cold. [Pharmacotherapy 23: 339-48, 2003]

False cures?

In China a myriad of SARS remedies have emerged. Consumer binge buying of antiseptics like vinegar and bleach has been reported. Chinese herbal remedies, bull thymus extract, and a host of other traditional remedies are reported to be selling well in China. [New York Times May 10, 2003] Animals at the Beijing zoo are being fed vitamins and Chinese herbal medicines as

zookeepers explore all methods to protect them from SARS. [News24.com May 1, 2003]

In the US, even though recovery from SARS solely depends upon the human immune systems, and vitamins like vitamins C and E, and minerals like selenium and zinc, help to boost immunity, a coalition of dietary supplement manufacturers, which includes the Council for Responsible Nutrition and the National Nutritional Foods Association, issued its own misdirected bulletin to discourage companies from making false claims regarding SARS cures. [Washington Post April 29, 2003]

In the US, the Federal Trade Commission has sent letters to more than 40 website operators and companies, warning them to stop making false claims regarding SARS cures ranging from beta glucans to colloidal silver. [NY Times, May 10, 2003]

The serum cure

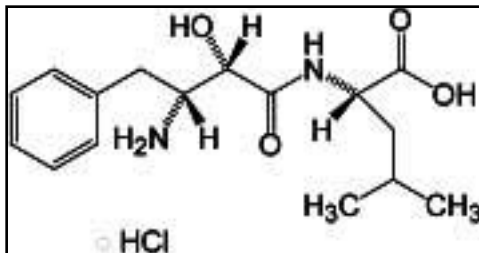
A Hong Kong doctor, Gregory Chen, claims a 60 percent success rate in treating SARS with transfusion of blood serum from recovering SARS patients who have built up antibodies to the virus. [Telegraph-London May 11, 2003] Serum taken from the blood of SARS patients who have recovered from their infection has been effective in treating some patients who had not responded to anti-viral treatment. [News24.com May 7, 2003]

Serum antibodies would represent a valid treatment for SARS, but would not be used as a preventive measure

due to limited supply of antibodies and the need for injection.

Anti-SARS drugs

Another approach to conquering SARS is to create protease inhibitors, similar to those used against HIV, that block viral invasion. A protease inhibitor known as AG7088 (Agouron Pharmaceuticals, owned by Warner-Lambert), which has been undergoing clinical testing against common-cold rhinoviruses for a few years now,



Molecular structure of bestatin (ubenimex), now being considered as anti-SARS drug. Bestatin was developed in 1976 and is no longer under patent protection.

could be utilized. AG7088 could be administered by nasal spray. [Associated Press May 13, 2003; Science May 13, 2003] SARS could be used to accelerate approval for this drug.

By May 12 a Hong Kong doctor claimed he was collaborating with scientists to design another drug that they hope will control SARS. The scientists are testing a synthetic protein inhibitor, or peptide blocker, aimed at blocking SARS from penetrating human cells. [NY Times May 12, 2003] The drug being referred to already exists. It is an aminopeptidase blocker known as bestatin (ubenimex). Bestatin has been used in the treatment of cancer patients and appears to reduce virus-induced lung injury. [The Lancet 361: May 3, 2003]

Bestatin not only works by inhibiting the enzyme that permits cellular invasion of the RNA virus, but also works via inhibition of the enzymatic degradation of connective tissue (collagen) by invading tumor cells or viruses. Specifically, bestatin (ubenimex) inhibits aminopeptidases, the enzymes responsible for breakdown of collagen. [Clin Exp Metastasis 10: 49-59, 1992]



Quercetin, found naturally in red onions and the peel of red apples, blocks enzymes that permit the SARS coronavirus to enter living cells.

Specifically, bestatin works by binding to aminopeptidase N on white blood cells (macrophage/monocytes), boosting the immune activity of these cells. [Cancer Immunology, Immunotherapy 43: 206-12, 1996] Coronaviruses enter the cells of pigs via an enzyme called aminopeptidase N. In experiments published in 1992, recombinant aminopeptidase N genes transmitted infection by transmissible gastroenteritis virus (TGEV) to cells which otherwise would not receive them. [Nature 357: 417-20, 1992]

The Q-Cure

Of special interest is the fact bioflavonoid molecules found naturally in fruits and onions, and widely available in health food stores as dietary supplements, are documented aminopeptidase N inhibitors. A report published in the German journal *Pharmazie* in February of 1990 describes the "inhibitory potential of 20 flavonoids from medicinal plants" in neutralizing aminopeptidase and found that quercetin and myricetin, found naturally in red onion, red apple peel, berries, fruits, vegetables, herbs, tea and wine, to be effective aminopeptidase inhibitors. [Pharmazie 55: 129-32, 2000] It may be wise for people in SARS-infected geographical areas, or air travelers, to supplement with myricetin and/or quercetin plus vitamin C. Both quercetin and vitamin C are known



Quercetin plus vitamin C is widely available in health food stores. Quercetin has also been shown to be effective against herpes virus, polio virus, HIV and many cold viruses.

to inhibit coronaviruses, herpes viruses, adenoviruses and rotaviruses and paramyxoviruses. [Microbiologica 13: 207-13, 1990] Other reports cite quercetin as an unusually powerful natural molecule against herpes simplex, polio virus, parainfluenza virus and respiratory syncytial virus. It reduces the infectivity of viruses as well as its ability to replicate. Quercetin is active against RNA and DNA viruses. [Journal Medical Virology 15: 71-79, 1985] Doses of around 2000 mg per day are suggested with accompanying vitamin C, and more if actively infected with a virus.

There is additional evidence that natural remedies may be potent against bio-engineered disease. For example, in a study of mice infected with recombined leukemia viruses, powdered oral doses of Echinacea purpurea leaves administered three times weekly (7.5 mg per mouse per week) resulted in prolonged survival of these animals. [Nihon Rinsho Meneki Gakkai Kaishi 24: 10-20, 2001]

Final thoughts

One wonders if the elective smallpox vaccination program, which has been unpopular with US healthcare workers, is a way to soften the public's view for a bio-engineered oral vaccine? The civilian smallpox vaccination program, with only 33,444 having elected to under vaccination as of April 18, 2003, has produced

483 reports of adverse reactions (1.4%), 75 percent of these occurring among women. Of these, 45 cases required hospital admission and 103 women were pregnant who were vaccinated with two resulting miscarriages which may or may not be linked to the vaccine. [The Lancet Volume 361, May 10, 2003]

When virologists met in Malta in November of 2002 to discuss the anticipated superflu epidemic, Olbert Osterhau, a professor of virology at Erasmus University in Rotterdam, said: "Whatever knowledge, technology and skills we develop, eventually it's the policy makers and the politicians that decide what is going to happen." [BBC News Nov. 2, 2002] SARS isn't as much a medical phenomenon as it is a barometer of world geo-political manipulation. #####

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