6-1-01

Matt

For your eyes only, please, a work in progress. Please help me remove any errors of fact or interpretation. Many thanks for your help and time.

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Matt Meselson and Josh Lederberg, seventy and seventy-five years old respectively, had been predicting the future of germ weapons longer than most anyone else. Indeed, they had shaped history as dueling visionaries. In 2001, they still had their frictions, as separate interviews made clear. Most fundamentally, they differed on how to respond to biological threats. Lederberg saw modern trends as worrying and encouraged as many prudent defensive steps as possible. Meselson took heart from the relative scarcity of germ attacks and searched for ways to reinforce that peacefulness with global agreements. Lederberg tended to look for military solutions, Meselson for political ones.

Despite their differences, these two eminencies of biology agreed on much, including how their hopes for the abolition of germ weapons had fallen short. There was Sverdlovsk, the Rajneeshees, Iraq, South Africa, Aum, and continuing questions over what Moscow was doing at its secret military bases. And on the defensive front, the two men shared disappointments. The military's anthrax vaccinations, strongly backed by Lederberg, had become controversial. Efforts to strengthen the 1972 germ treaty, which Meselson advocated with tireless energy, had floundered.

Both scientists worried that the Clinton administration's public actions were so filled with overstatement that they might have done more damage than good, at least in the short run. Lederberg criticized Bill Cohen's performance with the bag of sugar and warned that exaggerating the power of biological weapons could backfire and inspire terrorists to acquire them. Meselson wondered if America's new obsession with germs might

raise the political stock of charismatic scientists such as Wouter Basson, the leader of South Africa's apartheid germ program. People in other countries might see the sudden U.S. interest in germ weapons, the rumors of secret projects, and the backing away from negotiations to strengthen the germ treaty as a quiet push for offensive arms. As a hedge, they might embark on germ programs of their own.

Both men said the germ threat was real. To critics who claimed it was exaggerated, Lederberg replied with a question. "Are there nuts in the world? Yes. So we could be in trouble."

Both scientists expressed doubts about the wisdom of wide vaccinations against future threats. For civilians, Lederberg said, his inclination was to put off the question of smallpox vaccinations, which had health risks and large financial costs. The focus should turn to developing antiviral drugs – no effective ones now existed – that in the future might make smallpox epidemics easier to control. His thinking gibed with the federal plan, which was to spend $343 million to stockpile new smallpox vaccine as fast as possible but use it only to help contain epidemics if they broke out.

Meselson's great hope for the future was a global accord that would make traffic in germ weapons a crime. The existing treaties against biological weapons applied to states, not individuals. A new accord based in criminal law could deter national leaders from seeking to develop germ weapons, discourage businesses from assisting them, and keep leading nations from looking the other way in the face of violations. He noted that the United States is already party to six treaties of this nature, including ones against hijacking airplanes, harming diplomats, and taking hostages. The new treaty would simply give national courts jurisdiction over germ criminals from other countries.

The most remarkable similarity between two men was how their views on the recombinant threat had evolved over the decades. For both Lederberg and Meselson, the push for the abolition of germ weapons had started with fears that the new biology would make biological warfare more dangerous. Yet decades later, both men had come to view recombinant threats with some skepticism, in contrast to the prevailing wisdom. They saw the glass as half full *and* half empty.

By no means was Lederberg retracting his warnings about the dangers of the new biology. But a quarter century of experience had taught some lessons. Making superbugs had turned out to be more difficult than first thought. Perhaps only one percent of the efforts were destined to succeed. But with enough time and investment in scientific resources, he noted, that rate of success, though low, was enough to produce new dangers.

Similarly, Lederberg was of two minds about ethnic weapons. Many experts dismissed them as science fiction, though Russia and South Africa had studied them. (14) Lederberg noted that racial mixing and inherent ambiguity over definitions of ethnicity meant that no single genetic marker would give an attacker sufficient leverage. But in a half century or so, he said, science might become powerful enough so that it could find a subtle combination of markers common to particular races. That might work as a ethnic weapon, Lederberg said, but why bother? There were much easier ways to use germ weapons against particular ethnic groups, who often tended to sort themselves geographically.

Meselson also saw reassuring and alarming signs for the future. Foreign research on designer pathogens was often inept and illogical and done simply because ambitious scientists sought to please their military bosses. But while the topic of biological weapons had suffered much

exaggeration, he said, the danger was extremely serious for the long run.

In the future, Meselson said, germs might be designed not only to kill but to manipulate all the life processes – cognition, development, reproduction, everything. They would, in short, bestow the power to change what it means to be human. He posed a troubling question: might some group in the distant future use such powers to try to enslave others?

Hitler, he noted, wanted to enslave the Poles and keep them as a nation of workers for Germany. "Are we really so sure that we're completely enlightened after ten thousand years of recorded history, even though Hitler was not that long ago?" he asked. "Are we now cured of such things? I don't know."

(space)

In 1963, the Kennedy Administration invited a number of ~~some of~~ the ~~brightest stars of~~ academia specialists ~~to come~~ to Washington for the summer to offer their advice on arms control. Among them was Matthew S. Meselson , a Harvard biologist who had recently done ~~made his name in~~ pioneering research on how DNA copies itself. At the Arms Control and Disarmament Agency, Meselson quickly ~~became bored with~~ tired of nuclear ~~questions~~ issues and asked if he could look into ~~the issue of~~ biological ~~weapons~~ ones. ~~Yes, came the answer, help yourself.~~ The agency's senior officials ~~were~~ busy negotiating a treaty with Moscow meant to ban most nuclear tests ~~and had no time for secondary issues.~~ Armed with secret clearances, Meselson set off.

; told him to go ahead ☺

insert 2i p 115 a, b, c

Insert2i

At Detrick, he recalled, officials showed him the munitions and explained how they could cause many casualties. What was the rationale, Meselson asked, since the government already had nuclear arms? Germ weapons were cheaper, came the reply. Meselson then asked the CIA, if non-nuclear nations appeared to developing biological arms. No, came the answer. Meselson thought about this for a few days ~~"and it finally dawned on me."~~ The best thing for the wealthiest nation on earth to do, he reasoned, was to keep war "so expensive ~~that no one could afford it but us."~~ Making it cheap enough for any dictator or undeveloped nation, ~~he reflected,~~ was a bad idea. ~~Meselson had a gut feeling, too.~~ Moreover, with biology every day becoming more increasingly powerful, ~~it seemed to him that~~ germ weapons were ~~quite~~

dangerous for *Homo sapiens*, ~~that ultimately they would prove to be "really bad for the species."~~

Meselson went to see McGeorge Bundy, who a few years earlier, as Harvard's dean of faculty, had originally hired him. Now he served in Washington as the president's national security advisor. At the White House, Bundy told the biologist not to worry.

"We'll keep it out of the war plans," Meselson ~~recalls him as saying~~ he told me. "But we can't get rid of it because we have so many other things to do."

(space)

As the Vietnam War intensified, scientists at Fort Detrick redoubled their work on smallpox. This virus was no mere incapacitant. Smallpox was ancient, highly contagious, and killed about a third of its victims, mainly

The risk was real. In late 1968, a high-speed centrifuge that was spinning test tubes suddenly ~~failed~~ broke down and shattered the glass vials, exposing Patrick's men to a fog of psittacosis ~~virus~~ bacteria. The ~~crippling~~ debilitating germ causes high fever and a severe pneumonia cut by hacking coughs. Just before Christmas, the illness ~~threw~~ sent five workers into the base hospital.

The opponents of biological warfare got a huge break soon afterwards. At an airport, Meselson bumped into his old Harvard colleague, Henry Kissinger, a history professor who Richard M. Nixon, the new president, had recently named as his National Security Advisor. ~~Meselson knew Kissinger fairly well.~~ The two men had worked next door to each other at Harvard and talked on more than one occasion. Kissinger knew of the biologist's unease about germ weapons. "What should we do?" ~~was~~ Kissinger asked ~~'s main question~~, Meselson recalled. "I said, 'Let me think about it.

OK

Au: "locked up" or "broke apart"? "failed" creates an image of slowly stalling

Au: Chlamydia psittaci bacteria per Dorland's. Symptoms are like pneumonia's, so no permanently crippling – ok?

good. thanks for making this DISTINCTION

I'll write you some papers," he said he replied. "So I wrote a few papers and tried to keep close tabs on that review."

Au: ok? His "I said" on p. 152 makes this clear OK

One Meselson paper, dated September 1969, argued that the weapons were extremely potent but completely unneeded by the United States. "A light aircraft can deliver enough to kill populations over several thousand square miles," he wrote. (79) But such uncontrolled havoc, he wrote, was of no benefit in waging modern war. "Although diseases can be chosen that are normally not highly contagious, the extremely unnatural conditions inherent in military employment make it unintentionally possible to spread the disease far beyond the target area or to create a long-term epidemic hazard."

The same fickleness was true of incapacitating arms, Meselson argued. "The functioning of these weapons is subject to great uncertainties. A germ weapon designed as an incapacitant might actually cause a very large number of

deaths among enemy personnel and intermingled civilians, or ~~Conversely, it~~ might cause too little incapacitation to be militarily effective."

Meselson argued that the nation's strategic nuclear forces were enough to deter attack. "We have no need to rely on lethal germ weapons and would lose nothing by giving up the option," he wrote. "Our major interest is to keep other nations from acquiring them," since the living munitions constituted cheap atom bombs. "Germ weapons that could threaten a large city are much simpler and cheaper to acquire than the corresponding nuclear weapons."

on November 25, 1969, Nixon

he noted,

insert 2 P 134 A

Abruptly, ~~President Nixon~~ ended it all – the tests, the accidents, the stockpiling of germ weapons. With the stroke of a pen, he renounced not only all military germs and decades of research and development but the secret brinkmanship and war preparations of the Kennedy and

The C.I.A. called in Matthew Meselson. The Harvard biologist and proponent of the Nixon ban was eager to see the secret intelligence. ~~No hotels were nearby, so~~ he stayed at the home of a C.I.A. official for ten days. "I got hooked on this," he recalled. "And I became somewhat skeptical of their explanations." For one thing, the agency had hospital-type evidence to support the inhalation idea but nothing similar for the ingestion route – just reports of delayed illnesses and deaths. Meselson threw the baby out with the bath water, feeling the unevenness of the evidence "cast doubt on everything." He told the C.I.A. he favored the theory of tainted meat over a factory leak.

Around this time, intelligence analysts began piecing together what they viewed as an even more disturbing story of human suffering in a distant part of the world. Laotian refugees were reporting that helicopters flown by Soviet-backed government forces had sprayed them with a

mysterious substance that left horrific burns and lesions on their skin. The refugees called it "yellow rain." ~~(43)~~ American intelligence agencies obtained a sample and a laboratory found traces of what were believed to be mycotoxins, a rare, harshly toxic substance that can occur naturally or be distilled from ~~bacteria~~ fungi. The analysts wrote a ~~highly classified~~ secret report concluding that the Soviet surrogates in Southeast Asia had used germ weapons on the refugees, perhaps in some kind of field test.

Au: OK? Both we 10th & Dorland' give fungus a an origin

OK

Ronald Reagan took office in January, 1981 determined to confront what he would eventually call the "evil empire." On September 13, 1981, his new Secretary of State, Alexander P. Haig, announced at a conference in West Berlin that the United States had "physical evidence" that Soviet allies in Southeast Asia were waging chemical warfare—~~what~~ the evidence turned out to be a single leaf and stem with high levels of mycotoxins. "He got a 'We suspect,' and

turned it into a 'We know,'" recalled one official. The charges touched off a noisy public argument that would echo through the rest of the decade, pitting eminent scientists against the new, hard-line administration.

Au: high-level

Meselson, increasing upset with what he viewed as intelligence abuses, led the charge against the White House. A consultant to the U.S. Army who held high-level security clearances, Meselson was unpersuaded by Haig's evidence. Over several years, he advanced an alternate theory that many experts outside the U.S. government found plausible: The mycotoxins detected in the samples were naturally occurring, from a shower of bee feces. Meselson began to poke holes in the government's arguments on Sverdlovsk, as well. He discovered a witness overlooked by the intelligence agencies, an American professor living in the city on an exchange program, who said nothing unusual had happened in April, 1979. The debate grew harsh. Some

Democrats charged that the Reagan Administration was manipulating the intelligence to build support for its stance against Moscow and its trillion-dollar military buildup. Intelligence officials privately grumbled that Meselson was fighting to save his own reputation. After all, they noted bitterly, he had been instrumental in persuading President Nixon to ~~give up~~ renounce germ weapons and sign the international ban.

From the start, Lederberg was called into the federal clashes over Sverdlovsk and yellow rain. In 1978, he had been named president of Rockefeller University in New York City, one of the nation's premier facilities for biomedical research. But he was still eager to reach beyond academe and play a federal role, and in 1979 he had joined the Defense Science Board, a group of top scientists and industrialists who advise the military. ~~"Working with the Pentagon was not that popular with academia," he recalled. "But in my view, it~~

~~was crazy to withhold advice if they showed any signs of listening."~~

pun in

Intelligence officials were eager to hear the Nobel laureate's assessment of Sverdlovsk. "~~Every agency in town asked me for my views on what was going on there,~~" he ~~recalled.~~ but turned out to be ~~He was~~ agnostic ~~about whether the incident proved~~ that ~~the Soviets were secretly preparing germ weapons.~~ "I couldn't really make up my mind ~~about it~~," he acknowledged. "It looked very, very suspicious, and the Russians were not cooperating to provide access to the kind of information that could clear it up."

Lederberg thought there might be a benign explanation, even if Moscow's infected meat story turned out to be a lie. An accidental release of anthrax spores, he said, could have stemmed from an attempt to test defensive equipment. The treaty provides broad latitude for ~~defensive~~ such research. "There's nothing that says you can't do aerosol

experiments with anthrax on a modest scale," he said. "If you're trying to test a vaccine against aerosol-induced anthrax, you might have to do experiments" in which test animals were exposed. Soviet officials rebuffed every request for an independent investigation, an approach Lederberg regarded as suspicious. But suspicions, he felt, were not proof.

Lederberg said that his foray into the intelligence world left him unimpressed. "Intel is always totally convinced of any allegation at any point," he said. "They would pick up any rumor and try to make something of it." ~~Lederberg's doubts about Sverdlovsk grew several years later~~ when he visited the Soviet Union and met the doctor who had treated the victims. The physician repeated the standing Soviet position: The illnesses were caused by bad meat. In any event, he said, it was impossible to distinguish between ~~anthrax caused by inhalation and~~ that contracted by ingestion. Lederberg

suggested that the doctor publish his findings, which would subject them to peer review and criticism. He did not do so. That seemed odd for a scientist, Lederberg thought. "I leaned to the idea that they were holding back the most important information,'' he said years afterward. "But I still couldn't prove it was an illicit activity."

The arguments over the Soviet germ program were rooted in a clash of cultures between the biologists and the intelligence analysts. Scientists are trained to work solely from empirical evidence, preferably drawn from experiments they can observe and document first-hand. Almost everything else is suspect. "We're in the business of being skeptical," Meselson said of scientists. "There's a special way to use guys like Josh and me. If you've got to have an answer and you're willing to have a forty percent chance of being wrong, ask somebody else."

them. Putting a new agent on the threat list was a time-consuming, bureaucratic exercise. Russell did not feel he should wait. "We knew the Russians had sent people to Africa trying to collect Ebola and Marburg viruses," he recalled. "That was good enough for us."

Senator Glenn believed that the Army had veered dangerously close to offensive research. A retired Marine Corps officer, Glenn was no foe of defense spending. He just thought the United States government had no business toying with superbugs in its laboratories. It was repugnant, even if permitted under a lawyerly interpretation of the treaty. Glenn pressed to restrict funding. "It was a sad set of events," Russell said years later. "A tragedy. It set our virus programs way back."

Publicly, the critics were also making headway in attacking government claims on more conventional Soviet threats. Meselson in 1987 had ~~joined with Julian Robinson~~

co-authored

(2) ~~and Jeanne Guillemin to be published~~ an article in *Foreign Policy* further debunking the government's yellow rain theory. ~~(68)~~ They obtained documents under the Freedom of Information Act ~~which~~ that disclosed that a State Department team had scoured Southeast Asia for two years in a failed attempt to find ~~confirming~~ persuasive evidence of the charges. On another front, Meselson demanded that ~~the Soviets~~ Moscow allow an independent team to visit Sverdlovsk, the site of the anthrax deaths. ~~They~~ The Soviets refused but said they had new medical studies supporting the tainted meat explanation. Meselson invited ~~the Soviet scientists~~ them to make their case and in April, 1988, hosted them ~~as they appeared~~ in appearances at the John Hopkins School of Public Health and the National Academy of Sciences in Washington. Meselson told the audience that while he still wanted to conduct his own investigation, the Soviet story (2) was "plausible and consistent with what is known" from previous outbreaks. ~~(69)~~

Am. house style (+ book style in general) calls for using *that* for restrictive clauses *which* for nonrestrictive. OK

Sitting in the audience, Philip Brachman, a pioneering anthrax researcher involved in the initial assessment of Sverdlovsk, felt much less persuaded, ~~much~~ as did Lederberg ~~was~~. The slides of the patients' intestines showed the effects of gastro-intestinal anthrax, but they were faded, as if they had been plucked from old files. And there was a curious omission. Inhalation anthrax attacks the lymph nodes beneath the sternum. Where, Brachman wondered, were the slides of those sites? The meetings were decorous. "Everyone was feeling we should treat these people gently, we must be polite," he recalled. "We didn't come forward and say: 'This is nonsense.'"

The scientific doubters as well as the government's ~~ranks of~~ intelligence analysts, many of them graduates of less prestigious ~~state~~ schools, were at a disadvantage ~~had a hard time prevailing~~ against Meselson, who ~~with~~ used his credentials and energy ~~tended~~ to dominate the debate in public, and sometimes in private government

Av: simpler grammatically this way; if too strong, restore original + add commas around "w/his creds. + energy"

counsels as well. "The burden of the evidence," he told a congressional hearing in May 1989, "is that the anthrax outbreak was the result of a failure to keep anthrax-infected animals off the civilian meat market." ~~(70)~~ He praised the State Department, which was starting to equivocate on Sverdlovsk, for showing "a commendable willingness to review previous conclusions in the light of new information and new interpretations," mainly his own.

To the best of his knowledge, Meselson stressed, the threat of germ warfare had been abolished from the face of the Earth. "No nation," he testified, "possesses a stockpile of biological or toxin weapons."

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A few months later, in October 1989, a top Soviet biologist defected to Britain and told a very different story.

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Lederberg said that biological weapons were already "widely proliferated" and that "New York City and Washington are the world's juiciest targets for such attacks." (34)

(SPACE)

As Lederberg's influence rose, Meselson's ~~went into~~ decline. The Harvard biologist had investigated the Sverdlovsk epidemic for more than a decade and defended Moscow much of that time. Now, he ~~belatedly~~ concluded that the Soviets had been lying all along about the tainted meat and that the cause of the deaths had been a leak of anthrax germs from a military plant. His reversal, ~~made~~ in the November 18, 1994, issue of *Science*, a top journal, came more than two years after Russian President Boris Yeltsin had admitted publicly that the military was responsible for the outbreak. (34a) Still, Meselson was impenitent. His lack of remorse infuriated intelligence

analysts who had warned of Soviet duplicity from the start. Coolly, he asserted that *he* alone actually *proved* the lie. "People don't understand the difference between science and anecdotes," he said of his critics.

Meselson's change of heart came after he visited Sverdlovsk (renamed Yekaterinburg) in 1992 and 1993, following the Soviet Union's collapse. He and a team of collaborators, including his wife, Jeanne Guillemin, made a detailed reconstruction of where seventy-seven victims of the leak had been at the time of the exposure. Their whereabouts, the team discovered, fell in a straight line between the military facility and the edge of the city more than two miles downwind. Along the same line, sheep had died up to thirty miles away. The pattern of illness was compelling evidence that the tragedy's origin was airborne, not foodborne. The team documented sixty-six human deaths and eleven survivors. But the precise number of victims was unknown because the Russian government

refused to disclose the number of people in the military who had died in the disease outbreak.

American analysts had long debated why the epidemic lasted seven weeks. From the start, even specialists who believed firmly in the ~~military leak idea~~ theory of a military accident said the disease came first by inhalation, then by eating stores of infected meat. Only that seemed to explain the outbreak's long duration. But Meselson uncovered forgotten American research that showed monkeys could develop the disease many weeks after being exposed. ~~So that mystery too was solved.~~ suggesting an explanation

Even though Meselson had agreed at last with the prevailing view among military analysts, ~~of the outbreak's origin~~, they felt that he was still being intellectually dishonest, and still covering for the Soviets, by downplaying how much anthrax agent had leaked from the plant into the atmosphere. His paper in *Science* estimated that anywhere from a few milligrams to a gram, or one-thirtieth of an

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D

ounce, had escaped. Most military analysts put the amount at a pound or much more. "We hooted," Bill Patrick said, recalling a Meselson lecture. But if Patrick held a grudge, he showed no sign of it. He and another Fort Detrick veteran subsequently tried to help the Harvard academician refine his calculations of how much anthrax it would have taken to contaminate the winds that day.

(space)

As Meselson ~~unraveled the~~ did his Sverdlovsk ~~episode~~ reversal, the UN team in Iraq

(pick up)

assigned to track down the biological program found itself at a dead end, blocked at every turn. Taking a page from Russia's book, Baghdad denied it ever had produced a single germ weapon, though it conceded some research. American officials encouraged