that PS-1 had failed." (The Uher has two power rectification systems, PS-1 and PS-2, of which the former supplies the bias oscillator which drives the erase and record heads. The panel reveals in its final report that the rectifier it had to replace was in the PS-2 power supply.) Bell had postulated that drops in the power to the bias oscillator—now known by powered by PS-1—were what had caused the record head off and erase head off marks on the tape. The total failure of some part of the power supply, known in January, was corroborative of this hypothesis but was not, as the panel now implies, a necessary consequence of it. Power drops to the oscillator could be caused, Bell wrote in January, by the momentary —and self-healing—breakdowns that commonly occur in the power system component known as a filter capacitor. If the breakdown were continuing, the January hypothesis stated, "it would result ultimately in catastrophic failure of the power supply. If it were for short durations, it would not."

Bell's conclusion is that "evaluation of the information contained [in the final report] has allowed us to take a considerably stronger position. It allows us to state with confidence that the panel's conclusion concerning keyboard manipulation cannot be valid and a reasonable hypothesis based upon power supply malfunction has become probable." "My motive in the first place," he said last week, "was to inspire them to go back and do their homework. They haven't done it. They have stretched their data as far as possible and still haven't proved their case."

The panel and Hecker, were they free to comment, might well have strong replies to Bell's criticisms. On the other hand, in compiling the final report—which the panel promised Sirica in January would follow their conclusions by only three or four weeks—there was ample opportunity to amass and marshal evidence which would both unarguably refute Bell and establish their own theory beyond reasonable doubt. It is not clear to Bell, at least, that they have yet succeeded in doing either.—NICHOLAS WADE

Chemical Warfare: Binary Plan, Geneva Talks on a Collision Course

Every Tuesday and Thursday at 10 a.m. for 5 months a year, representatives of 25 nations gather in Geneva, Switzerland, for another meeting of the Conference of the Committee on Disarmament (CCD). For the last 2 years, as the delegates have risen each in turn to deliver speeches from scribbled notes, their main subject has been how the world can ban development, production, and stockpiling of chemical weapons. However, military plans to start procuring binary weapons for its chemical arsenal could make such an agreement impossible.

The CCD talks have in fact been going on for 14 years, moving from one disarmament issue to another. Some of the discussions have dealt with far-out proposals, such as the creation of a nuclear free zone in the Balkans; its successes have included the nuclear nonproliferation treaty of 1968 and the Biological Weapons Convention of 1972. The talks are multilateral in nature; a 26th member nation, France, doesn't even participate. Despite these complications, however, CCD has been successful from time to time, largely thanks to its two superpower member states, the United States and the Soviet Union, whose seriousness of purpose is viewed as essential to any CCD scheme.

But CCD's current efforts at chemical weapons disarmament are threatened by an obscure, $5.8 million procurement item in the fiscal 1975 Department of Defense (DOD) budget now being debated by Congress. In the last month, experts have testified before three separate House of Representatives committees to the effect that if the DOD is allowed to go ahead with procurement of binary weapons—which is the first step toward the modernization of our entire chemical weapons arsenal—other countries at the CCD will assume that the United States is not seriously interested in negotiating a chemical weapons ban.

The United States has the largest stockpile of chemical weapons of any nation. Its exact size is classified, but outside experts have estimated that the nerve gas portion alone totals 40 million pounds—or enough to kill 25×10^{12} people! On the basis of its research, the DOD has been talking about replacing this vast stockpile with a new form of chemical weapon, known as the binary. A binary weapon keeps component agents in two separate compartments. Only after the munition has been fired do the two components mix to form the lethal gas. Present chemical weapons have their agent stored and transported in lethal form.

The military has pushed for the development of a binary system on the grounds that it will be safer than conventional chemical weapons to handle. However, some arms control experts argue that binaries are more likely to proliferate to other nations than conventional chemical weapons because their chemical makeup is simpler.

Typical of the fears that have been expressed in the three House hearings in the last month were those of Fred C. Iklé, the director of the Arms Control and Disarmament Agency (ACDA), who told a new subcommittee on arms control and disarmament of the House Armed Services Committee on 8 May:

"It is my personal judgment that the disadvantages of procuring chemical binary weapons at this time outweigh the advantages." And a British binary expert from the University of Sussex, Julian P. P. Robinson, told the defense subcommittee of the House Appropriations Committee on 21 May: "By defense budget standards, $5.8 million is not a lot of money. But its appropriation may well be interpreted in this country and abroad as Congressional approval for the binary program as a whole. It may thus be the thin end of a rather substantial wedge."

Representative Wayne Owens (D–Utah) estimated the size of that wedge before the same subcommittee. He claimed that the $5.8 million item was the beginning of a $200 million program of "initial procurement." The eventual cost of replacing U.S. stockpile with binary munitions, Owens has said, would be from $1 billion to $2 billion.

Owens is one of a number of House

members who are fighting an uphill battle to delay the binary program, in general, and at least the procurement item in the 1975 budget. Among them are Donald M. Fraser (D–Minn.), Floyd V. Hicks (D–Wash.), and Patricia Schroeder (D–Colo.). The procurement item appears only in the DOD appropriations bills, not in the authorizing legislation. In related action, both the House and Senate armed services committees have trimmed an unspecified "lethal chemicals" request of $6.9 million by $1.9 million.

Research on lethal chemicals, including binary weapons, is only a portion of the total budget for chemical warfare and related activities. DOD spends approximately $50 million per year on research and procurement in chemical warfare. In addition, about the same sum is spent for both defensive biological research (which is still permitted under the 1972 Biological Weapons Convention) and on related ordnance.

For its part, the DOD has justified the binaries as a needed deterrent. Amos A. Jordan, Acting Assistant Secretary of Defense, International Security Affairs, told the subcommittee on national security policy and scientific development of the House Foreign Affairs Committee on 9 May, "We believe the Soviet Union is better prepared to operate offensively and defensively in a chemical warfare environment than any other nation in the world." To support his claim, Jordan offered no substantive evidence. But he asserted that the Arab military materiel captured during the October Mideast war included Soviet-supplied "CW [chemical warfare] defensive equipment."

On the subject of the Geneva talks, Jordan's prepared statement did not address the issue of the threat posed by the binaries. It simply echoed the U.S. position at Geneva, "The Soviet draft [chemical weapons ban] does not contain adequate verification provisions."

And, despite the fact that several people are convinced that the binary procurement item shows that DOD fully intends to produce these weapons, Jordan said: "These weapons are still in development, and no Administration production decision has yet been made beyond Department of Defense advance planning for the loading, assembling, and packaging facility."

The importance of the U.S. binary program to the Geneva talks is that under the 1972 Biological Weapons Convention, in Article IX, the United States committed itself to negotiate in good faith for an early agreement to ban chemical weapons. Article IX says:

> Each State Party to this Convention affirms the recognized objective of effective prohibition of chemical weapons and, to this end, undertakes to continue negotiations in good faith with a view to reaching early agreement on effective measures for the prohibition of their development, production and stockpiling and for their destruction. . . .

Mongolia Objects

After the convention was signed, the Soviet Union put forward a draft chemical weapons ban; subsequently, the Japanese introduced a step-by-step version of a ban. To all this, the United States has said it would respond, and many CCD nations understand this to mean that the United States would submit a draft treaty of its own. But none has been submitted, and for practical purposes the talks are stalled until the United States acts.

Evidence of this came while Jordan and other witnesses were testifying in Washington on 9 May, when M. Dugersuren, the CCD representative of the Mongolian People's Republic, rose at the Geneva talks and said:

> . . . So far there have been no positive steps by the United States. . . . The United States' intention is to embark on the production of new types of chemical means of warfare such as "binary weapons". . . . My delegation is inclined to share the view that if the United States was to carry out its plan it would make solution of the problem of banning chemical weapons impossible.

HeLa (for Henrietta Lacks)

Every biologist worth his test tube knows about HeLa cells, the first established human cell line which has become a staple of hundreds of laboratories around the world. Initially grown in tissue culture in 1951, HeLa cells have turned out to be one of the hardiest and most prolific of cultured human cells.

"HeLa, with a generation time of about 24 hours, if allowed to grow uninhibited under optimal conditions, would have taken over the world by this time," a team of scientists from Johns Hopkins University has written. "As it is, the mass of HeLa cells that has been grown must be enormous, as is also the information which has been derived from their study."

Recently, the News and Comment section reported that HeLa cells may surreptitiously be taking over cultures in cancer laboratories here and abroad (*Science*, 7 June) and, in that report, repeated the lore about the origin of those cells. "In February 1951, a woman named Helen Lane was being treated for cancer of the cervix at the Johns Hopkins Hospital in Baltimore. Although she ultimately died of her cancer, Helen Lane achieved an unusual measure of immortality—cells derived from her tumor are still very much alive and with us."

This reporter spent a couple hours tracing the origins of HeLa cells. Well, sometimes you can't win. Helen Lane, it seems, never lived. But Henrietta Lacks did, long protected by the pseudonym Helen Lane. Her true identity was brought to our attention by Victor McKusick, chairman of medicine at Hopkins who, with Howard Jones, Peter Harper, and Kuang-Dong Wuu, wrote about "The HeLa cell and a reappraisal of its origins" in *Obstetrics and Gynecology* in December 1971.

Not only did they reveal that Helen Lane was really Henrietta Lacks, they also reported that the original HeLa cells were not the type everyone who knows about such things presumes them to be. "All these years, HeLa has been considered an epidermoid carcinoma of the cervix [a slow-growing tumor of surface or skin-like cells]. Its histopathology has been taken for granted." Hopkins' researchers decided to take another look at the original slides from 1951 and pronounced HeLa cells to be "without a doubt . . . a very aggressive adenocarcinoma of the cervix [a glandular tumor]." It killed Henrietta Lacks in 8 months.

None of this alters the validity of work done with HeLa cells but it may be worth noting—for the record.—B.J.C.

Mongolia is not exactly the most powerful nation in the world, but she is an ally of the Soviet Union. Moreover, Dugersuren's comments at CCD are often regarded as reflecting the Soviet view. Whether or not the above remarks were symptomatic of Soviet thinking, they at least represented a growing sentiment among nations at CCD.

A Symptom of General Confusion

If the binary procurement funds are approved by Congress, it will not be the first time that the United States has gone about building a weapons system while simultaneously engaging in international negotiations for its abolition. Indeed, when seeking funds for other weapons, such as the antiballistic missile or the Trident submarine, the military have claimed that the programs would strengthen our international bargaining position.

Another interpretation of the advance of the binary program, however, is that it is less a well-thought-out strategem than evidence of the current confusion of U.S. chemical warfare policy. The CCD is but one of three international fronts where other nations have taken action or indicated their intentions, but are waiting on the United States.

One of these is the 1925 Geneva Protocol which bans first use of chemical weapons in war. One hundred and two nations are parties to the treaty, and in 1969, 58 nations voted in favor, with 3 opposed, to a United Nations General Assembly resolution stating that the protocol included tear gas and herbicides.

However, in 1969 when President Nixon sent the protocol to the Senate for ratification, he added that the United States should exempt tear gas and herbicides—both of which were at the time being used in the Vietnam war. The Senate Foreign Relations Committee, after holding hearings on the matter, in October 1972 asked the White House to reconsider its interpretation of the protocol. Although the National Security Council (NSC) periodically restudied its position on the protocol, no message from the White House has been forthcoming. NSC is now making another study, which, this time, might include a possible chemical weapons ban.

Another area of confusion is the Biological Weapons Convention of 1972, which the other two principal signing nations—the Soviet Union and the United Kingdom—have said they were ready to ratify when the United States is. But the Senate has told the White House that it will not ratify the convention until after it receives a reply to its queries on the Geneva protocol. Thus not one but two landmark treaties—to which many other nations have agreed—are stalled.

It is against this background that the arms control advocates are dreading the advent of a U.S. binary weapons program. Or, as Iklé said in his testimony, "If we start on a new type of production program it becomes even harder to envisage constructive arms control agreements limiting competition in chemical weapons."

—DEBORAH SHAPLEY

Clean Air: Congress Settles for a Restrained Coal Conversion Plan

Congress was expected last week to pass a bill designed to shift some oil users to coal without doing too much violence to air quality standards.

The bill, called the Energy Supply and Environmental Coordination Act of 1974, is the result of a good deal of cutting and pasting of other energy bills that have been sitting around Congress, as well as of the Energy Emergency Act that was vetoed by President Nixon last February. The emergency act was shot down because of provisions calling for rollbacks on crude oil prices (Congress has since given up on that effort); it also generated a good deal of alarm among environmentalists and public health officials because it would have permitted selective violation of national primary ambient air quality standards (the ones designed to protect public health) instituted by the Clean Air Act of 1970.

The chief purpose of the current bill is to take the edge off demand for oil and gas and stimulate coal production by requiring that certain utilities convert to coal as their primary fuel. The original House bill, drawn up in the Interstate and Foreign Commerce Committee, chaired by Harley Staggers (D–W.Va.), would have mandated conversions even where they would have resulted in violations of primary standards for up to 4 years. The House-Senate conference, however, settled on a version closer to that masterminded by Senator Edmund Muskie (D–Maine), chairman of the air and water subcommittee of the Public Works Committee. The conditions for conversion are exceedingly complicated. In brief, the Federal Energy Administration (FEA), with the approval of the Environmental Protection Agency (EPA), could order coal conversions in air quality regions where conversion would not cause or contribute to violation of primary standards. In clean areas, individual effluent limitations would be lifted to allow the burning of dirty (high-sulfur) coal; in dirty areas, plants would have to burn clean coal or install whatever devices that would be necessary to avoid aggravation of existing conditions. FEA would have the power to order conversions for a period of a year after enactment of the bill. Enforcement powers would extend until the end of 1978. By 1 January 1979, all converted plants would have to be back in conformance with the original federal and state timetables. Estimates of the potential number of plants affected vary; one guess is between 12 and 20, considerably fewer than those on a list drawn up last winter by the FEA, which contained well over 100. At that time the American Public Health Association predicted that such a massive conversion would raise the rate of respiratory diseases and death among the "at risk" population by 20 to 40 percent.

The success of the plan depends in large part on the availability of low-sulfur coal, all of which is currently being burned up as fast as it comes out of the ground. Framers of the bill