China as a nuclear power hovered over the session, and such strong opponents of a big civil defense program as Chamberlain and Sidel favored a modest one—presumably useful in cases of nuclear blackmail—especially if the emphasis was on general disaster planning rather than civil defense.

There was no agreement at all on what was perhaps the central question of the discussion: whether an extended civil defense program would precipitate a new round in the arms race and thereby decrease rather than increase national security.

The opponents of a bigger civil defense program seem to feel essentially that such a program might bring war nearer and probably would not help much if war came.

In oversimplified form, the case for a bigger program was made by Edward Teller, who, in a statement during the question period, said, "The absence of civil defense will guarantee that we will not survive nuclear war."

The symposium produced no consensus except for agreement that the public should make the big decision on civil defense and should be better informed in order to make the right one. And in providing some of that information, the symposium served as a rehearsal for the ABM-civil defense debate which may soon ignite.

—JOHN WALSH

Nuclear Weapons: Nonproliferation and Test-Ban Talks To Be Resumed

When the Eighteen-Nation Committee on Disarmament reconvenes at Geneva on 27 January, the problem of arresting the spread of nuclear weapons again will be the most pressing item on the agenda. The United Nations General Assembly has asked the Geneva conference to give urgent consideration to the negotiation of a nonproliferation treaty and a treaty extending the 1963 test-ban agreement to underground tests. The nonproliferation treaty would pledge nuclear powers not to assist nonnuclear countries in obtaining nuclear weapons, and would pledge the nonnuclear nations not to manufacture or acquire such weapons.

The feeling of urgency has been growing ever since Communist China exploded its first nuclear device in October 1964. The United States presented a draft treaty on nonproliferation at Geneva in August. In a statement from the White House, President Johnson said: "The time is now. The hour is late. The fate of generations yet unborn is in our hands. And 'humanity with all its fears, with all the hopes of future years is hanging breathless' on that fate."

A few weeks later the Soviet Union submitted a draft treaty similar in many respects to the U.S. draft but different in one seemingly critical particular. The American draft would permit allies to enter into such proposed nuclear-sharing arrangements as the much-debated Multilateral Force (MLF), which now seems dead, or the Atlantic Nuclear Force (ANF), an idea which may still have some life in it. MLF would be a force of missile-launching surface ships with crews of mixed nationality. ANF, though never precisely defined, might be made up of Polaris submarines contributed by the United States and the United Kingdom, with perhaps some form of participation by West Germany and other allies. Whatever the command and control arrangements for either a MLF or an ANF, the United States would retain a veto over decisions to launch an attack.

The U.S. draft treaty carries the proviso that nuclear-sharing arrangements of this kind must not increase the total number of states or other organizations having independent power to use nuclear weapons. The Soviet draft, by stipulating that nonnuclear states shall not participate—even through an alliance—in the "ownership, control, or use of nuclear weapons," would prohibit a MLF or an ANF.

Resolving such a fundamental difference in U.S. and Soviet positions would not be easy at any time. Now, with the Vietnam war exacerbating East-West relations, the problem is all the harder. For the Soviets to compromise with the West on a basic issue and enter a nonproliferation agreement would inspire a new wave of denunciations from Communist China. The Russians would be accused of cooperating with U.S. imperialists at the very time Communists were dying in order to liberate Vietnam from American forces.

However, the waves of denunciation from China seem to continue unabated in any event, and relations between the Soviets and the Chinese have reached such a low point that some high U.S. officials suspect the Russians have developed a thick skin and no longer worry very much about what the Chinese will say. Moreover, Communist parties abroad are by no means all at one with the Chinese in opposing the Russians' policy of coexistence with the West.

Many of them, in Europe and in the underdeveloped world, support coexistence, although some parties either support the Chinese position or are sharply divided. The 1963 test-ban treaty, banning nuclear tests in all environments except underground, was signed by the Russians over Chinese protests and the heavens did not fall. On the contrary, by agreeing to the test-ban treaty the Russians gained at least a small advantage over the Chinese by forcing them—when they began their weapons tests—to defy the world consensus.

So considered in terms of the politics of international communism, the reaction to Soviet adherence to a nonproliferation treaty would not seem to pose for the Russians an unmanageable problem. Nevertheless, negotiating agreements with a capitalist adversary against whom one's friends are struggling in Southeast Asia would demand of the Soviets a *sang froid* and sophistication in diplomacy perhaps greater than any they have shown to date. Failure of efforts to arrange a settle-

ment in Vietnam could very well rule out a nonproliferation treaty in the near future.

But the dangers of proliferation are so apparent that the possibility that the Soviets, even without a Vietnam settlement, may be ready for serious negotiations cannot be excluded. Thus, it seems worthwhile to return to Geneva and see whether or not a treaty is obtainable. One important school of opinion in the United States holds that no objective of American foreign policy should be given a higher priority.

The adherents to this view, with its implicit call for compromise on the nuclear-sharing issue, include some prominent figures, though how much they will influence U.S. policy remains to be seen. Senator Robert F. Kennedy of New York, in a Senate speech last June, declared that the spread of nuclear weapons was the "most vital issue now facing this nation and the world." He said that the United States should search for a "form of nuclear guarantee to West Germany and other countries of Europe which meets their needs without meeting with rejection by the Soviet Union."

Much the same view was taken by the Arms Control and Disarmament Committee at the recent White House Conference on International Cooperation. The chairman of the committee was Jerome B. Wiesner, dean of M.I.T.'s School of Science and formerly the White House science adviser; other members included Roswell Gilpatric, former Deputy Secretary of Defense; Carl Kaysen, Littauer Professor of political economy at Harvard and a former White House adviser on national security affairs; and Donald G. Brennan of the Hudson Institute.

The Wiesner committee said that solutions to the problem of nuclear sharing should be sought in arrangements that do not result in the creation of new nuclear forces. It observed that forces [such as MLF or ANF], which the U.S. would regard as a safeguard against further diffusion of nuclear weapons among nations, the Soviet Union would regard as a means of diffusion.

The problem of nuclear sharing within the Atlantic alliance is, of course, of greater concern to Germany than to any other NATO country. By historical coincidence the need grows for a nonproliferation treaty just at the time when Germany has come to insist that it has earned the right to a larger voice in deciding nuclear defense policy.

Before being admitted to NATO, Germany promised never to build nuclear weapons on its soil and subjected itself to international supervision of this obligation. This commitment—which no other country in the world has matched—was noted by Chancellor Erhard in the communiqué which he and President Johnson issued at the conclusion of their talks last month in Washington. Erhard said Germany had no intention or desire to acquire national control over nuclear weapons.

The communiqué said that Erhard and Johnson had agreed that Germany and other interested NATO partners should have an "appropriate part in nuclear defense"; and that nuclear arrangements within the alliance would not constitute proliferation of nuclear weapons but rather would represent a step in preventing the spread of such weapons.

Vague Communiqué

The Germans appear to want to share in the manning, or at least in the ownership, of an allied strategic nuclear force. The language of the Johnson-Erhard communiqué was so vague, however, as to permit one to contemplate arrangements as ambitious as MLF or ANF, or as modest as those under study by the NATO defense ministers for nuclear planning, intelligence, and emergency consultation.

Secretary of State Rusk has said that the Soviets should not be permitted a veto over nuclear sharing arrangements which NATO might wish to adopt. If the United States is determined to get a nonproliferation treaty, however, it may have to persuade the Germans to be satisfied with a role in consultative and planning arrangements. In addition to trying to mollify the Russians, there could be other reasons for following such a course—a major one being to make some concession to French opposition to steps toward the integration of NATO.

Unless the Soviets have a strong desire for a treaty, they will undoubtedly insist that, under their draft proposal, Germany must have no part whatever in nuclear sharing. They could even insist that the existing "two key" arrangements for tactical weapons—whereby the United States maintains custody of the warheads for German-manned delivery systems such as the Sergeant missile—must be abandoned.

For years the Russians have overlooked no device by which they might try to weaken or break up NATO. If they have seized upon the nonproliferation proposal for this purpose, it should surprise no one. However, U.S. observers believe that the Russians' professed concern about proliferation is genuine. A guarded optimism about the Soviets' motives may be justified.

In the view of some State Department people, a nonproliferation treaty, though nice in principle, would afford no lasting safeguard against the spread of weapons. They argue that the treaty would not, for example, relieve the insecurities of India, which knows that soon it will be confronted by a hostile, nuclear-armed China. In this view, regional security arrangements are the first and essential requirement.

A counter-argument is that a nonproliferation treaty would tend to create a new "moral climate." Nations that insisted on acquiring nuclear weapons would be stigmatized and other nations would be encouraged to join in cooperative undertakings for their security.

If any nation has the reason and the opportunity to "go nuclear," it is India. China, which has demonstrated its hostility by incursions along the Indian frontier, is expected to have a stockpile of warheads and medium-range missiles within several years. India has the technical capacity to counter the Chinese nuclear threat in kind, although the emphasis in India's nuclear energy program has been on the production of electric power.

A number of countries which do not possess nuclear weapons have a fairly advanced nuclear technology; but, with the possible exception of Israel, which for the most part has conducted its nuclear program in secrecy, India is the only country having virtually all the nuclear facilities and the sources of supply necessary in order to produce weapons, although a weapons program would violate an agreement with Canada, which has assisted India's nuclear development.

According to Alastair Buchan, director of the Institute of Strategic Studies in London, so much capital already has been invested in India's nuclear facilities that India might be able to build 50 20-kiloton bombs by spending an additional $50 million or so. On the other hand, creating a strategic force capable of threatening reprisal against the major Chinese cities with thermonuclear weapons would cost several billions. India now has no delivery system more potent than its aging fleet of Canberra bombers.

Prime Minister Shastri has said that

India does not intend to go nuclear. Shastri represents a link with the Nehru tradition that abhorred nuclear weapons. Qualified U.S. observers generally believe that Shastri and his closest political associates are resisting pressures to depart from that tradition. These pressures, which have been perhaps overrated by many foreigners, have grown since the explosion of the Chinese bombs and are reported to emanate in part from militant, highly nationalistic right-wing elements in the civil service, the military, and the younger intellectual circles.

As a member of the Eighteen-Nation Conference at Geneva, India has joined other nonaligned countries in urging the adoption of a nonproliferation treaty. But India's position—if there is one—is far from clear as to what guarantees for the security of nonaligned countries must accompany or be a part of the treaty.

Nuclear Blackmail

Immediately after the explosion of the first Chinese bomb, President Johnson declared in a television statement that "the nations that do not seek national nuclear weapons can be sure that if they need our strong support against some threat of nuclear blackmail, they will have it." But Indian sentiment, strongly influenced by India's long experience of colonialism, is against depending on a single great power for its security. Also, there is concern that, in a crisis, the pledge of protection might prove worthless.

In December 1964, when tremors from the first Chinese bomb were still being felt, Indian foreign minister Swaran Singh said that the nonnuclear powers needed an assurance of their security, and that it was the responsibility of the great nuclear powers to devise a method of providing it. Indian spokesmen later were to complain at the U.N. that the nuclear powers' nonproliferation proposals ignored the security needs of nations not shielded by an alliance. The consensus among qualified observers, however, appears to be that the Soviet Union would not join the U.S. in a pledge to protect the Indians against the Chinese, with whom the Russians must acknowledge kinship, though no relatives have ever quarreled more bitterly.

India proposed to the U.N. Disarmament Commission in May that the security of countries threatened by nuclear powers be safeguarded through the U.N. But U.S. as well as Indian diplomats have investigated the possibility of obtaining UN agreement for such a safeguard and have found little enthusiasm for the idea. Some of the Afro-Asian nations, such as the United Arab Republic, are understood to have objected to it for fear it would point a finger at China. The Russians, too, are believed to have looked coolly on the proposal. The U.S. itself was aware that, as a party to a formal, multilateral guarantee, it might have less freedom to act in a crisis than it would have in backing up its unilateral pledge.

At Geneva, the Indians seemed to back away from the idea of a U.N. guarantee, saying that it was less important than other points in their nonproliferation proposal, which, among other things, asked the nuclear powers to foreswear the use of nuclear weapons against nonnuclear states and called for such steps toward disarmament as a comprehensive test-ban treaty, a freeze on production of nuclear weapons, and a substantial reduction in weapon stocks.

The U.S. has warned India and other nonnuclear countries that insisting on disarmament measures would bring negotiations for a nonproliferation treaty to an impasse. Moreover, China has shown no interest in serious disarmament talks, and any thought of the Chinese abandoning their costly nuclear weapons program just when it is yielding results is far-fetched.

If the Russians sign a nonproliferation treaty, even one unaccompanied by security guarantees and disarmament steps, this could aid the Indians by widening a bit further the split between the Soviet Union and China. As long as the rift remains, the U.S. and the United Kingdom will have less to worry about if they are called upon to help the Indians defend themselves against China.

"The Indians would gain more security by signing a nonproliferation treaty than they would lose by refusing to sign," one high U.S. official remarked recently. "If you put it to the Indians and ask whether they are willing to take the responsibility for preventing an agreement, they'll probably sign." Other nations with a nuclear potential, such as Japan, Sweden, Switzerland, Israel, and Germany, also would find it embarrassing to refuse to sign, even if some of them wished to keep the option of going nuclear. And if there were those who did not sign, they would be under significantly greater pressure than before not to build nuclear weapons.

In the view of the U.S. negotiators who will go to Geneva, a treaty banning nuclear tests underground could serve as a useful supplement to a nonproliferation treaty or as a partial substitute for one. Nuclear weapons can be built without testing, but an untested weapon might inspire less confidence than a tested weapon in those who possess it and might be less awesome for those whom it is meant to threaten or deter. For example, the Chinese weapons tests have produced a political effect which the Indians might find hard to offset by announcing that they had an untested bomb.

On the other hand, in certain circumstances a nation might prefer not to conduct tests, even if there were no treaty. If the Israelis built a bomb, they might wish to keep it secret until faced with a threat of imminent attack. To do otherwise might cause the U.A.R. to seek nuclear weapons from the Russians.

In seeking a test-ban treaty, some problems encountered in negotiating for a nonproliferation treaty are avoided, but other problems are raised. The question of nuclear sharing within NATO poses no obstacle to a test-ban agreement. But no such agreement appears possible unless the Soviets permit some on-site inspections for verification of suspicious seismic events which U.S. detection devices cannot identify.

Unverified Ban Proposed

The Soviets announced in September that they would accept a ban on all underground tests above seismic magnitude 4.75, which is the signal produced by explosions in the 5- to 20-kiloton range, depending on the media in which they occur. The ban, which would depend on national detection systems for verifications, would have to be coupled with a moratorium on tests below the 4.75 threshold. The moratorium would amount to an unverified ban of the kind which the U.S. has been unwilling to accept. During the round of negotiations that preceded the test-ban treaty of 1963, the U.S. said it would agree to as few as seven on-site inspections, and at one point the Soviet Union said it would permit as many as three, though it later receded to its earlier position and insisted that no inspections were necessary. Considering recent improvements in detection techniques, which the U.S. has promised to take into account in future negotiations, an

earnest attempt by both sides to reach an agreement might succeed.

If for no other reason, the coming round of Geneva talks should be useful in keeping alive an awareness of the problem of nuclear proliferation and discouraging complacency in those governments whose decisions will determine whether or not the spread of weapons continues unchecked.

—LUTHER J. CARTER

Announcements

The University of Virginia has established an advisory board for its new Center for **Advanced Studies in the Sciences**. The members are to meet at least once a year to review the center's operation and to make recommendations on appointments, allocation of funds, and general policy. Members include:

John Bardeen, University of Illinois.

Jesse W. Beams, M.I.T.

Morris Cohen, M.I.T.

Frank Hereford, University of Virginia.

Thomas Hunter, University of Virginia.

Joseph H. McConnell, Reynolds Metals Company.

Edward J. McShane, University of Virginia.

John Lee Pratt, General Motors (retired).

Ernest H. Swift, Caltech.

Edward L. Tatum, Rockefeller University.

Herbert Trotter, Jr., General Telephone and Electronics.

Merle A. Tuve, Carnegie Institution of Washington.

Required 6-months' public notice is given on the possible use of plenary powers by the International Commission on **Zoological Nomenclature** in connection with the following names, listed by case number [see *Bull. zool. Nomencl.* **22**, pt. 4 (2 Nov. 1965)]:

1625. Suppression of *Drassus atropos* Walckenaer, 1830 (Araneae).

482. Validation of *Pan* and *Panthera* from Oken, 1816 (Mammalia).

1618. Neotype for *Ceratophyllus soricis* Dale, 1878 (Insecta, Siphonaptera).

1705. Suppression of *Eucidaris* Pomel, 1883, *Papula* Bayle, 1878, *Cidaris papillataconoidea* Parkinson, 1811, and *Cidarites savignyi* Audouin, 1826 (Echinoidea).

1706. Type-species for *Phasia* Latreille, 1804 (Insecta, Diptera).

1708. Suppression of *Papilio lintingensis* Osbeck, 1765 (Insecta, Lepidoptera).

1709. Type-species for *Monopsyllus* Kolenati, 1875; Suppression of *Ceratopsyllus sciuri* Kolenati, 1856, *Monopsyllus sciuri* Kolenati, 1857, and *Ceratopsyllus monoctenus* Kolenati, 1856 (Insects, Siphonaptera).

1710. Type-species for *Stizus* Latreille, [1802-1803] (Insecta, Hymenoptera).

1711. Type-species for *Diodontus* Curtis, 1834 (Insecta, Hymenoptera).

1712. Type-species for *Trychosis* Foerster, 1868 (Insecta, Hymenoptera).

1713. Type-species for *Prospaltella* Ashmead, 1904 (Insecta, Hymenoptera).

1714. Suppression of *Mullus auriflamma* Forskal, 1775 (Pisces).

1716. Type-species for *Chamaemyia* Meigen, 1803 (Insecta, Diptera).

1720. Suppression of *Xyleborus* Bowdich, 1825 (Insecta, Coleoptera).

Comments should be sent in duplicate, citing case number, to the Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, London S.W.7, England. Those received early enough will be published in the *Bulletin of Zoological Nomenclature*.

Grants, Fellowships, and Awards

The Guggenheim Foundation offers fellowships for graduate work in **rocket propulsion**, flight structures, and space flight at Princeton, Columbia, and Caltech. Each fellowship carries a stipend of up to $2400, plus tuition. Candidates should be under 30 years old and should have a bachelor's degree in a pertinent field. Application deadlines: Columbia, *1 February*; Princeton and Caltech, *15 February*. Applications should be sent directly to the schools; at Columbia address the Dean, School of Engineering, at the other schools, Dean of Graduate Studies.

The University of Colorado will select 15 college and junior college teachers to participate in an NSF-sponsored academic year institute in **anthropology**, to begin with the 1966 fall semester. The program is designed for people without advanced degrees in anthropology but who are teaching one or more courses in the subject. The two semesters of work lead to the masters or Ph.D. degree. Stipends are $3000, plus travel allowance and $450 for each of up to four dependents. Application deadline: *20 January*. (Robert H. Lister, Department of Anthropology, University of Colorado, Boulder 80304)

The **Courant Institute of Mathematical Sciences** at New York University awards visiting memberships to mathematicians, scientists, and engineers. Applicants must have a doctoral degree. Visiting members' only duties are to be in residence at the institute and to participate in research activities; they will also be invited to participate in advanced seminars. Stipends are determined by the visitors' professional status. Deadline for receipt of applications for the 1966–67 academic year: *1 February*. (Visiting Membership Committee, Courant Institute of Mathematical Sciences, New York University, 251 Mercer Street, New York 10012)

Meeting Notes

An international school of **nonlinear mathematics and physics** will be held 27 June to 5 August, as part of NATO's advanced study institute program. The course will take place at Max Planck Institute for Physics and Astrophysics, Munich. The physics session will cover classical field theories, gravitation, statistical mechanics, optics, and turbulence. The mathematics session will include ordinary and partial differential equations, shock waves, asymptotic and numerical methods. Application deadline: *1 March*. (N. J. Zabusky, Nonlinear School, Bell Telephone Laboratories, Whippany, New Jersey)

A limited number of papers will be accepted for an international conference on **internal medicine**, 7–10 September, in Amsterdam. The principal theme for the meeting is "integration in internal medicine." Papers may be submitted on recent developments, autoimmune transplantation, corticosteroids, and radioisotopes. Abstracts: up to 300 words; deadline: *1 February*. (Secretariat, Holland Organizing Centre, 16, Lange Voorhout, The Hague, Netherlands)