

PHYSICS and SOCIETY

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PHYSICS AND SOCIETY is a quarterly newsletter of the Forum on Physics and Society, a division of the American Physical Society. The newsletter is distributed free to members of the Forum and also to physics libraries upon request. It presents news of the Forum and of the American Physical Society and provides a medium for Forum members to exchange ideas. PHYSICS AND SOCIETY also presents articles and letters on the scientific and economic health of the physics community; on the relations of physics and the physics community to government and to society, and the social responsibilities of scientists. Contributions should be sent to the Editor: John Dowling, Physics Department, Mansfield State College, Mansfield, PA 16933, 717-662-4275.

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Synopsis of the Executive Committee Meeting of the Forum on Physics and Society. Summarized by John Dowling from Secretary-Treasurer Dietrich Schroer's Minutes of the Meeting 21 April 1981.

Report of the Secretary-Treasurer: The balance in the Forum operating and awards-endowment accounts as of 1 March 1981 were \$4,623 and \$1,587, respectively. The APS is adding a one-time payment of \$1,500 to the Forum operating account to help cover some of the publication costs of the Newsletter. To avoid any possible future financial problems, Brian Schwartz moved and Paul Horwitz seconded that:

Motion No. 1: The Forum will spend during the year after this Baltimore meeting no more than \$1,000 for travel.

This motion passed. The priorities between expenses of invited speakers and Executive Committee members shall be set by the secretary and the meetings chairperson.

Report of the Newsletter Editor: John Dowling reported that he has been able to hold newsletter expenses to 2.5¢ per page, sending out for each issue about 3,000 copies to individuals and about 300 to libraries. Forum members are not submitting much to the Newsletter.

Forum-AAPT Links: Kenneth Ford reported on his conversations on possible Forum links with the AAPT. The AAPT is sympathetic; he is still waiting for a definitive response from the APS. He will continue working toward such arrangements.

Nominating Committee Membership: The nominating committee for 1981 will consist of Ralph Llewellyn (Chairperson), Ernest Hammond, Caroline Herzenberg, Arnie Strassenberg, and Mike Casper (APS Council Appointee).

Awards Committee Membership: The awards committee for 1981 will consist of Joel Lebowitz (Chairperson), Dietrich Schroer, and Mary Beth Stearns.

Nominees for APS Posts: Nominations for various APS posts, e.g., on POPA were solicited.

The Reagan Budget for Science: Kenney Kim described some of the present and anticipated consequences for science resulting from the policies of the Reagan administration. Earl Callen argued for an unified science lobby to educate politicians and the public about the value and needs of science. Paul Horwitz moved and Alvin M. Saperstein seconded that:

Motion No. 2: The Forum on Physics and Society urges the Council of the APS to request its officers to meet with the officers of other scientific societies for the purpose of organizing a fully staffed professional Washington office for public education about science.

The motion passed. Kim, Callen and Brian Schwartz will prepare a proposal along these lines for Friday's meeting of the Council. Political action in the short term is needed; e.g., could an invitation be arranged for some ex-Congressional fellows to speak before the appropriate NSF subcommittee? Should a session be organized on the subject for the next Washington meeting?

Plans for Forum Sessions: For 1982 three Forum sessions are planned for the AAPT/APS meeting in San Francisco in January, two for the Dallas meeting in March, three for the Washington meeting in April, and one for Philadelphia in November.

After-the-fact Exposure for Meeting Symposia: How can the Forum provide wider exposure for talks given at its sessions at APS meetings? In the future, session chairpersons should be asked to provide summaries of their sessions for the Forum Newsletter. Might one explore a mechanism for proceedings distribution like that of the AAPT? An ad hoc committee was formed to examine some of these questions, consisting of Robert Cahn, Nina Bvers, Marty Perl and John Dowling.

Ground Zero: Leo Sartori reported on the "Ground Zero" activities proposed for April of 1982. Together with the "Science for Peace" group of Canada, and the "Scientists Against Nuclear Arms" group of the U.K., "Ground Zero" plans a week-long countrywide educational effort about the nuclear arms race. Sartori moved and Earl Callen seconded that:

Motion No.3 The Forum Executive Committee requests that the question of APS affiliation with "Ground Zero" be placed on the agenda of the June meeting of the APS Executive Committee.

The motion was accepted unanimously. Sartori will be happy to present information about "Ground Zero" at the June meeting. A Forum ad hoc committee consisting of Sartori, Callen and John Toll is keeping in close touch with the "Ground Zero" developments.

Miscellaneous: Should the idea of a physics-and-society journal be revived, or do journals like the *Technology Review* and the *Bulletin of the Atomic Scientists* adequately serve such a function now?

Earl Callen proposed, as he does every year, that there should be a contributed session organized at the Joint APS/AAPT meeting devoted solely to Forum-related matters. Maybe this time it will come off?

Robert Cahn circulated the Forum-related questions that are to be asked of candidates for APS offices. He asked for comments on them.

REPORT OF THE FORUM COUNCILLOR, by Mike Casper, Department of Physics, Room 20B-226, MIT, Cambridge, MA 02139

At the April 24 APS Council Meeting in Baltimore, several items of special interest to Forum members were discussed:

1. **Congressional Fellowships:** The Fellowship program that sends physicists to work as congressional staffers for a year will be continued. That was the recommendation of an *ad hoc* Council committee and the policy adopted by the Council. Two things the program needs now are more applicants and a code of ethics. A Forum committee on Congressional Fellowships could help to revive and safeguard this useful program that we began many years ago.

2. **Phys. Rev. E?** Editor-in-Chief Dave Lazurus announced that a comprehensive reevaluation of *Phys. Rev.* is taking place. The review process affords an opportunity for us to reintroduce our long-dormant proposal for a Journal of Physics and Society that got such an enthusiastic response when circulated a few years back. Many believe the proposal is superb; what we need now is a physicist willing to serve as editor. Then we could make a serious approach to the Council subcommittee headed by Stan Hanna which is conducting the *Phys. Rev.* review.

3. **Studies:** The Coal Utilization study is finished; the Breeder Safety study is about to begin; and the Alternative Energy Strategies study is on hold and likely to be dropped.

I personally am getting an uneasy feeling about the APS studies, especially the way they are funded and the way they are planned. There is a danger that the APS can become the unwitting tool of special interest groups in government and/or industry. Funding institutions can shape APS studies in subtle and not-so-subtle ways. These things happen naturally as a study proposal is written to appeal to potential funders, and the study participants are chosen so as not to dissatisfy those same benefactors.

The proposed Breeder Safety Study is a case in point. It was announced at the April Council meeting that the Electric Power Research Institute (EPRI) has promised \$150,000 with additional funding expected from the Nuclear Regulatory Commission (NRC) and the Department of Energy, (DOE). These are, of course, all reputable organizations, but they are not disinterested parties when it comes to nuclear power in general and breeder reactors in particular.

It was further announced that the chairman of the study panel will be a former chairman of the NRC's Advisory Committee on Reactor Safeguards. He would of course bring expertise to this task, but he may also

bring a history of close involvement with the very issues that the APS is supposedly subjecting to disinterested scrutiny.

In the ensuing discussion at the Council Meeting, a member of the APS Panel on Public Affairs (POPA) candidly disclosed how POPA hoped to cope with the problem of biased experts. He said that POPA was seeking a study group with the following make-up: five, pronuclear; three, anti-nuclear; and four, "good physicists." I wonder where those numbers come from, who the people will be, and how consideration of EPRI, NRC, and DOE sensitivities may influence their choice.

When I suggested at the meeting that the current study proposal might be extended to include the relative proliferation resistance of various breeder technologies, I was told in no uncertain terms that that topic had already been ruled out. I wonder if that decision could have any relation to the interests of the funders.

These are not trivial issues, but I for one would welcome a much more open process by which APS studies are planned and study group members selected. It would be a process that was clearly insulated from the possible influence of special interests. It would be useful to have a Forum committee do a formal critique of past APS studies and come up with some constructive proposals to safeguard the good name of our Society.



Committee on Opportunities in Physics: A report on the Baltimore April APS meeting, by Earl Callen, Physics Department, American University, Washington, DC 20016.

At the March 1982 Dallas APS meeting there will be a tutorial course (probably two day) in entrepreneurial physics - how to start your own business: consulting, raising venture capital, selling your invention.

When the Russians invaded Afghanistan, the US retaliated by, among other things, pinching off attendance by communist state nationals at US scientific conferences. This was done under a technology export control act administered by the Commerce Department. What the limits of this control by the US government over who can attend are, and what can be discussed by American citizens at American scientific conferences has still not been satisfactorily clarified. Now there is a suggestion that communist state nationals may not be allowed to take courses on sensitive, high technology topics at US universities. Will going to the Reagan administration on this only make things worse? Probably the best hope, in the event of a controversy, will be the courts.

The Scientific Creationists, under the guise of an appeal to "fairness" or "equal time" are seeking to place theology, and a particular sect - Christianity - into the public school biology curriculum. How does this affect physics and astronomy? Will the big bang and cosmology get equal time with Genesis? It's coming, and we better get to thinking about it. I think we need a POPA committee, or at least a session at an APS meeting, on the impact of Scientific Creationists on our disciplines.

Scientists think that when they go to Capitol Hill and ask for money they are different from every other group trodding the same path (because our motives are pure?). To the politician, scientists are just one more interest group, and a not very effective or grateful or powerful one at that. In the hard times that are ahead we had better learn how to educate the public about why we are worth supporting. This means to me that it is time for the scientific societies to get together. We need to set up a staff of full time professionals in an office of public education of science in Washington. The first group to educate is the scientists themselves, about how the US political system operates. The COPS (and the Forum Executive Committee) are urging the APS Council to start the process going.

COPS was exploring how persons in dead end jobs, and those seeking mid-career retooling, could get NSF money to help them over the hurdle (see Forum Newsletter 10, No. 2, 7 (1981)). No more. The Reagan Administration killed the program which was part of the NSF science education money. Professor Dinnan is sitting in prison in Georgia because he won't tell the judge how he voted in a tenure action (in which a woman was denied tenure). Are there any physicists in that kind of trouble? If there are, the COPS would like to know about it.

The reader will by now have recognized that the author of this report is a practitioner of advocacy journalism. What purports to be an account of the doings of the COPS meeting is that all right, but seen through my filter. I have no doubt that others who were there would write a different report.

Possible POPA Studies: a letter to Mike Casper by George M. Seidel, Professor of Physics, Brown University, Providence, RI 02912.

I just read the April issue of the Forum Newsletter and came across your request for ideas regarding possible studies by POPA. In response may I suggest that serious consideration be given to a study of maghetohydrodynamics (MHD). I recently shared a

two-day panel on the subject for OMB and NSF and came away convinced that a thorough investigation of the science and technology of MHD by a group of knowledgeable but disinterested observers is urgently needed. It is next to impossible to find competent people informed on the subject who do not have a substantial interest in the development of the technology. Decisions made under such circumstances are often not in the best interest of society or the orderly progress of the technology. The present administration's intention to terminate federal support of R&D of MHD notwithstanding, I do not have confidence in the wisdom informing policy makers in Washington. The decision may well be sensible, but in my judgement it is unlikely to have been arrived at in a thoughtful manner.

REPORT ON AN ARMS CONTROL CONFERENCE AT LAWRENCE LIVERMORE NATIONAL LABORATORY (May 26-27, 1981) by Charles Schwartz, Physics Dept., U. of California, Berkeley, CA 94720.

Arms Control is to the defense community what pollution control is to the auto-rubber-oil industry: an idea once used to organize opposition among the consuming public which has been transformed into a technical discipline under firm management by the producers. So it is not surprising that a conference entitled, "Arms Control - Where Do We Go Next?", organized by officials at the Livermore nuclear weapons lab turned out to be a not-so-grand reunion for the hawk fraternity.

The apparent intention of Michael May (former Director of LLNL, former SALT negotiator, and chief organizer of this conference) was to bring officials from the Carter administration who were most responsible for various arms control issues over the past few years together with their Reaganite replacements in order to help mold coherent policies for the next few years. The former contingent arrived and performed dutifully but nobody of any substance was there from the new administration. This is not to suggest that the Carter people escaped repeated attack from hard liners in the audience; but it must have been quite a disappointment to the professional nuclear weapons intellectuals that the newly elected pro-weapons government, which will send them lots more money, does not want to listen to their ideas.

A secondary reason for the conference was the desire by U. Cal. President David Saxon to polish the image of his university as not merely a passive cover for the arms race, by its nominal management role with the Livermore and Los Alamos laboratories, but as a concerned leader in the search for peace (through strength, of course.) There was no attempt to

include any critical perspectives in the program, although this might have added some intellectual and media grabbing sparks to a generally dull affair; but a few outsiders such as myself were allowed in (co-opted?) to watch, listen and ask a question of the masters. Here is a summary of what I found most interesting:

The five arms control topics - SALT, Theater Nuclear Forces (TNF), Nuclear Test Bans, Space Systems, Non-Proliferation - were discussed by expert "insiders" who, according to May, represented a wide variety of views. I was most impressed by the narrowness of the distinctions among them. It was repeatedly stated, and contradicted by nobody, that the first priority of the U.S. must be to enhance its presently inadequate defense capabilities; and any arms control planning would follow that. A repeated line from these arms control advocates: we never promised you that arms control could solve the problem of Minuteman vulnerability.

The problem of counterforce strategies and the instabilities generated by the growth of first strike capabilities in new weapons systems did not arise in the program; and when I asked a pointed question about this, it was brushed aside with platitudes about the goodness of U.S. intentions. It appears to me that, among all these "insiders", it is a settled matter that deterrence means warfighting capability. MAD is dead, long live the new madness.

I had been told several times before that, among people in the know of the enlightened defense experts in Washington, it is understood that nuclear weapons will, of course, never be used in a war; it is all just part of the essential posturing of modern geopolitics. In this light one could stomach the open cynicism expressed by some of the former Carter officials: regarding the European objections to the deployment of new long range US TNF - the US will have to enter into talks with the Soviets on this issue, as the Europeans are insisting we do, and we will have to give a credible appearance, if not substance, of serious negotiations in order to proceed with this modernization of our forces; regarding US nuclear weapons being stationed in Japan - one Carter official asked another to state, for the record and publicly, what US policy was and he got the formal answer that the US does not have any nuclear weapons in Japan, with the added fillip, "If you say so, Walt."; regarding non-proliferation policy - the objective, which has been largely achieved, is not to prevent others from getting nuclear weapons but to keep the rate of proliferation small enough so that we can manage the lesser instabilities implied.

Long stretches of the proceedings were dull and uninteresting, with frequent replay of cliches about "linkage", "zero sum game", "SALT 2.8 vs SALT 3". More than one speaker referred to the familiarity of the company and of the arguments from previous gatherings of the clan. Some of the more interesting comments came from a couple of Europeans who, while sharing the basic philosophy and objectives of the in-group, has some fresh, non-American perspectives. A German participant said, "We are going to watch very carefully what you decide on the MX basing, whether parochial considerations will override others." (Translation: If Reagan listens to his friend Laxalt and decides not to put the MX in Nevada, then it may be much harder to get the TNF deployment accepted by the Europeans. Why should Europeans have to accept the unpleasantness of nuclear missiles stationed in their back yards when Americans are spared a similar burden?)

A few "technical" observations made by some of the more moderate experts, which left me feeling quite uneasy: if part of the MX basing mode solution is to use existing silos (this seems rather likely), then there will be strong pressures for an ABM system; but since the Soviets show no interest in changing the SALT I Treaty, that leaves the option of US abrogation. Whenever we resume arms control talks with the Soviets, anti-submarine warfare will be high on their agenda. The Comprehensive Test Ban is not only dead for now, but it would be only marginally beneficial if adopted. The most urgent need is to improve the survivability of the US satellite system in case of an attack.

The role played by Paul Nitze at this conference was particularly interesting. As leader of the **Committee on the Present Danger** he was the spearhead of the last five years' effort by right wing forces in this country which succeeded in returning us to the Cold War with rampant militarism leading all national policy. His statements at the conference were quite moderate (in this company), his general tone and demeanor were that of the grand old man. Former officials of the Carter administration, whose arms control efforts had been savaged by Nitze and his allies, showered him with deference and seemed quite reluctant to disagree with him. I read this as a sign of how far the center of the Democratic Party has moved to the right on defense issues.

I went to this conference biased by the belief that the best way to work against the dangers of the nuclear arms race was to shun the temptations of working within the system and be instead an active outsider. These two days in Livermore certainly reinforced that opinion.

FILM REVIEW:

The Defense of the United States, a CBS Television Report in five parts: **Ground Zero**, **The Nuclear Battlefield**, **Call to Arms**, **The War Machine**, and **The Russians**. Each is in color, 52 min., 1981. Distribution data not currently available, inquire to Delores Sura, CBS News, 524 W. 57th St., New York, NY 10019. Reviewed by John Dowling, Physics Department, Mansfield State College, Mansfield, PA 16933.

The Defense of the United States is an excellent example of what television reporting should be - a factual, thorough, comprehensive treatment that examines the pertinent issues and asks the hard and the correct questions. It is an outstanding presentation that makes a real contribution to the public understanding of not only what the arms race is and its likely consequences, but what role the U.S. plays and why it does so. Here are brief summaries of each of the five programs.

Ground Zero takes a close look at the terrifying prospects of nuclear war and all the preparations that must be made to wage it. This program discusses ICBMs and why the MX may replace them, B-52s, submarines, the concept of launch under attack, limited nuclear war, MIRV, nuclear war scenarios, SIOP, etc. The capstone of the program is a simulation of what would happen when one 15 megaton bomb is dropped on SAC Headquarters near Omaha - complete with gory details and estimates of casualties. **Ground Zero** gives some small indication of what nuclear war might entail. The program also leaves one with the impression that the combination of Reagan's campaign cold-war rhetoric, the announced increases in military spending, and the overwhelming inertia of the arms race all tend to enhance the prospects that such a catastrophe will occur.

The Nuclear Battlefield examines the efforts of the superpowers to develop tactics for fighting nuclear war and what would happen to Europe if it became a nuclear battlefield. It provides an historical perspective on how and why nuclear weapons are used to counter the threat of the Soviet-Warsaw Pact forces. There is background material on the special role the French played; the training of non-U.S. military personnel to handle the missiles that will carry tactical nukes; battlefield problems such as radiation damage, heat degradation, nuclear "friendly fire", etc. It also treats the important issues which are raised by deploying 7000 U.S. nuclear weapons in Europe: the counter deployment of the Soviet's accurate, MIRVed SS-20s, the political turmoil and resistance to the Pershing missile (which can reach the Soviet Union in five minutes), and the destruction of Europe if the nuclear war ever occurs - as best summarized in this new way of measuring distance, "German towns are only two kilotons apart."

Call to Arms assesses the strength of U.S. conventional forces. It examines the recruit situation: how today's compares to previous (favorably in general); women recruits; and the problems with getting, training, and keeping recruits. The program covers some of the peculiar demands of technological warfare: need for permanent and well-trained personnel, adequate parts and supplies, maintaining reasonable living standards - particularly on crowded Navy carriers, overworking the people who do stay, etc. NATO forces also come in for discussion: how joint training exercises are conducted, the reliance on technology, how they compare to Warsaw Pact forces, and how U.S. allies do their fair share for NATO. **Call to Arms** asks such important questions as, why do we pour money into NATO to fight a conventional war when most strategists consider this to be an unlikely possibility, and is the Rapid Deployment Force: a) robbing other areas, b) workable, c) cost efficient, and d) necessary? A good summary of **Call to Arms** comes in the discussion on the problems the Iranian raid exposed: "There was no lack of money here, no shortage of available equipment or manpower...there was a failure to think a problem through...and a failure to use effectively what we already have."

The War Machine asks whether our new weapons will work when the time comes that we really need them. To find answers CBS follows the F-18 fighter plane for nine months. The F-18 was conceived ten years ago as a low-cost alternative to the Navy's expensive F-14. The Navy reluctantly settled on the F-18 as a prototype of a small, relatively cheap and simple fighter. Then the Navy started the transformation of the F-18 into a warplane that would do almost everything, but at a price of about 30 million dollars a copy. The F-18 typifies the problems of technological warfare. It is a big airplane that requires a big carrier that requires a multitude of escort ships that requires highly trained personnel that requires... **The War Machine** looks at a simulated combat test which pitted sophisticated F-14s and F-15s against relatively crude F-5s. In one-on-one situations the F-14s were almost invincible, but in nearly all other cases they lost, numbers triumphed over technology. The program also examines various aspects of combat readiness: will planes be kept maintained and ready, is training sufficient when weapons can't be fired because they are too expensive, are spare parts available, etc. Finally, the program addresses the military-industrial complex (complete with Eisenhower's famous address). Parts for the F-18 come from 20,000 companies and 44 states - which makes for a built-in lobby for the plane and a reluctance for Congress to attack it. In short the Iron Triangle (the Pentagon, Congress, and the defense contractors) form "not only a closed world...incestuous to a degree," but a world where "...buyer and seller merge, perspectives narrow, alternatives disappear, and debate stops."

The Russians feature Walter Chronkite seeking to find out "who are these Russians...what are their intentions...what is there to fear." Interviews with Soviet officials and with several western correspondents assigned to the Soviet Union examine various points of the debate between the two super powers: the mutual threats perceived by both the U.S. and the Soviets, the Soviet race to achieve parity, the technological superiority of the U.S., the failure of the U.S. to ratify SALT II, Soviet support of national liberation movements, and Soviet perceptions of America. The program also looks at the question of matching Soviet military expenditures, the Soviet gerontocracy, and problems with Poland. As to who are the Russians and what are their intentions Chronkite concludes with, "No one can say with certainty. But if their perception of America is as flawed as we believe it is, then our perceptions of the Soviet Union just could be flawed too. In the absence of any real dialogue, the same old fears and doubts continue to dominate our relationship.

In conclusion, clips of Reagan's campaign quotes featured in **The Defense of the United States** are good examples of the cold-war rhetoric that "take us back to those thrilling days of yesteryear" and fuel the arms race. What CBS has done is to question "the conventional wisdom about very unconventional weapons of war..." and why "...we're leading toward the largest military buildup in this nation's history." Dan Rather asks in closing: "But will we make ourselves stronger by unquestioning faith in new weapons technology? Will our European alliance be strengthened by a strategy that might force us to destroy Europe in order to save it? Will we increase our national security by insisting there is a way to fight a limited nuclear war without mutual destruction?" These programs should help stimulate the debate. They are a real contribution to a public understanding of the issues.



ARMS CONTROL KIT: A Resource List for Physicists Interested In Arms Control by John Dowling, Physics Dept., Mansfield State College, Mansfield, PA 16933

It is nearly as traumatic an experience for a physicist to switch from physics into arms control as it is to jump into solid state from molecular physics. One has to establish credentials in a different area, learn new buzz words and terminology, and master new techniques and diverse subtleties. What follows is a list of resources that I have found helpful. Since it is a personal list readers should be forewarned of the following points. It is 1) not intended to be complete, 2) biased in favor of arms control, and 3) concerned with political and social issues as opposed to the real physics involved in the arms race. (Dietrich Schroeer is preparing a Resource Letter for the **American Journal of Physics** which will deal largely with the actual physics involved in arms control.)

The resources listed here consist of organizations that are concerned with arms control issues (many of which publish newsletters), journals, a very select list of books, and audio visual materials. I apologize in advance for slighting anyone's favorite that I missed.

ORGANIZATIONS: There are many groups working for (and against) arms control. Here is a representative sampling of a few of the political, church-related, science-oriented, and general groups who are active in examining arms control issues. I give a short description of the thrust of each and note whether they publish a newsletter. The address given is for the headquarters, many have offices throughout the country.

American Friends Service Committee, 1501 Cherry St., Philadelphia, PA 19102. Long established church-related group, very active.

Armament and Disarmament Information Unit, Science Policy Research Unit, Matell Bldg., U. of Sussex, Falmer, Brighton BN1 9RF England. Newsletter: **ADIU Report**. Resource group working for arms control, particular emphasis on Britain, but their excellent defense analyses are of general interest.

Arms Control Association, 11 Dupont Circle NW, Washington, DC 20036. Active group working to promote public understanding of policies and programs in arms control. Newsletter: **Arms Control Today**.

Center for Defense Information, 122 Maryland Ave. NE, Washington, DC 20002. Supports strong defense but opposes excessive expenditures on forces. Newsletter: **The Defense Monitor**.

Federation of American Scientists, 307 Mass Ave. NE, Washington, DC 20002. Long active science-oriented group with large interest in arms control. Newsletter: **F.A.S. Public Interest Report**.

Ground-Zero, P.O. Box 40797, Washington, DC 20016. Grass roots organization working towards an "Earth-Day" event on the theme of nuclear war. See **Forum Newsletter** 10 (1), 6 (1981).

Institute for World Order, 777 UN Plaza, New York, NY 10017. Interested in arms control and its impact on world order.

Riverside Church, Disarmament Program, Riverside Dr. and 122nd St., New York, NY 10027. Church-related group working on disarmament. Newsletter: **Disarming Notes**.

SANE, 514 C. Street NE, Washington, DC 20002. Activist organization interested in promoting "sane" policies in favor of arms control.

Union of Concerned Scientists, 1208 Mass. Ave., Cambridge, MA 02138. Science-oriented group in-

terested in many issues, emphasis on arms control and nuclear power.

World Without War Council, 175 Fifth Ave., New York, NY 10010. Promotes public understanding of issues to end war.

JOURNALS: Here are representative journals from a variety of perspectives: arms control, science and public affairs, political science, and the military industrial complex.

Aviation Week and Space Technology, McGraw-Hill Building, 1221 Ave. of the Americas, New York, NY 10020. Covers all defense issues related to aviation and space. 32 issues yearly, \$37.

Bulletin of the Atomic Scientists, 1020-24 East 58th St., Chicago, IL 60637. Covers science and public affairs with major emphasis on arms control. 10 issues yearly, \$20.

Disarmament Times, Room 7B, 777 UN Plaza, New York, NY 10017. Newspaper format covers arms control issues from a UN perspective. Number of issues varies with UN activity, inquire for specific prices.

Foreign Policy, P.O. Box 984, Farmingdale, NY 11737. Deals with many political issues, one of which is arms control. 4 issues yearly, \$15.

International Security, The MIT Press, 28 Carleton St., Cambridge, MA 02142. Covers international security issues. 4 issues yearly, \$15.

Scientific American, Scientific American, Inc., 415 Madison Ave., New York, NY 10017. Well known monthly which has occasional articles on arms control issues. 12 issues yearly, \$37 for two years.

Technology Review, Room 10-140, M.I.T., Cambridge, Mass. 02139. Includes articles dealing with technology's impact on arms control issues. 8 issues yearly, \$18.

BOOKS: As mentioned before, this is a very select list of either classic works on arms control issues or important resource books in themselves.

Arms Control: Readings from Scientific American, edited by Herbert York. (Freeman, San Francisco, 1973). Supplementary edition also available.

Effects of Nuclear Weapons by Samuel Glasstone and Philip J. Dolan (U.S. Govt. Printing Office, Washington, 1977).

Fiscal Year 1982 Arms Control Impact Statements (U.S. Govt. Printing Office, Washington, 1981).

The Game of Disarmament by Alva Myrdal (Pantheon, New York, 1979).

On Thernonuclear War by Herman Kahn (Princeton Univ. Press, 1960).

The Price of Defense by The Boston Study Group (NY Times Books, 1979).

AUDIO-VISUAL MATERIALS: There are many a-v materials available that deal with arms control. Here are some of the better ones.

Effects and Dangers of Nuclear War. A set of 16 posters (black ink on 97 x 64 cm paper) which show the "effects and dangers of nuclear war." \$30 per set postpaid, available in booklet form, 10 copies for \$5. Distributor: John B. Massen, Director, Northern California Div. UNA-USA, 152 St. Francis Blvd., Daly City, CA 94015.

The Effects of Nuclear War. 26 page report compiled by the U.S. Arms Control and Disarmament Agency, Washington, DC 20441. Provides an excellent summary of "the effects of nuclear war." Free, 1979.

Hiroshima-Nagasaki August 1945. 16 mm, black & white, 17 min., 1970. Best film available on what happens in a nuclear blast on a city. Distributor: Museum of Modern Art, Cir. Film Program, 11 W. 53rd St., New York, NY 10019. \$275 purchase, \$25 rental.

Nuclear War Prevention Kit. A 20 page booklet which lists things you can do to help prevent nuclear war. Distributor: Center for Defense Information, 122 Maryland Ave., NE, Washington, DC 20002. \$1.

Shadows of the Nuclear Age. Set of 13, half-hour audio-cassette tapes which provide an excellent background on the nuclear age from WWII to date. Distributor: SANE Education Fund, 1411 Walnut St., Philadelphia, PA 19102. \$37.75 for tapes and discussion guide.

The War Game. 16 mm or 3/4" videocassette, black and white, 49 min., 1968. Best film available on what will probably happen to a society which experiences nuclear attack. Distributor: Films Incorporated, 1144 Wilmette Ave., Wilmette, IL 60091. \$575 (16 mm) or \$435 (video) purchase, \$150 rental. Free loan from FAS (but long waiting list).

War.Peace.Film Guide by John Dowling. Guide to 287 films on war and peace in general, about 40 of which deal with nuclear war and the arms race. Distributor: World Without War Council, 67 E. Madison, Suite 1417, Chicago, IL 60603. \$5.75.

World Military and Social Expenditures. 1980 by Ruth Sivard. Excellent summary of the economics of the arms race, contains comprehensive summaries in graphical form. Available from Arms Control Association, 11 Dupont Circle NW, Washington, DC 20036 or World Without War Council, 67 E. Madison, Suite 1417, Chicago, IL 60603. \$3.50.