ON THE FUTURE OF STRATEGIC FORCES

by

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Forecasting the general shape of the US-Soviet strategic competition over the next thirty years is no more hazardous than predicting other developments in the US-Soviet relationship, and in some respects is probably less so. The lengthening life cycle for strategic weaponry is such that only one wholly new generation of these systems is likely to intervene between the present and the early years of the next century. And that generation is likely to incorporate technologies that are extant or at least foreseeable with some degree of assurance. This is not to suggest that there are not substantial uncertainties in any such forecasting. But it seems fair to say that the chief uncertainties derive less from the technical than from the political sphere. This is true above all in the case of the United States, where the political future of the current Administration's commitment to strategic defense can by no means be considered assured.

Accordingly, consideration will be given here in the first instance to the political factors bearing on the future of strategic forces. The article will then review the technological developments with the greatest potential for dramatically affecting the strategic nuclear situation. Finally, the various categories of strategic offensive and strategic defensive forces will be briefly treated.

THE POLITICS OF STRATEGIC FORCES

The strategic arsenal of the United States has been decisively—in recent years, increasingly—shaped by political factors. As a major item in the defense budget, strategic forces have always attracted the attention of Congress. And public opinion has always been of importance in defining the outer bounds of acceptability of strategic forces, in terms of their social impact (e.g. civil defense, MX basing) as well as their fiscal burden. Over the last decade and a half, however, the emergence of arms control as a central political issue in the United States and the West generally has increasingly drawn strategic forces into the arena of political debate. Particularly in Western Europe, but to a significant degree also in the United States, popular anti-nuclear sentiment has become an important factor in the framing of this debate and in its outcome in specific instances.

The reemergence of the anti-nuclear movement in the 1980s appears to reflect a fundamental weakening, if not a shattering, of the political consensus which supported the growth of American strategic forces during the 1960s and 1970s. The causes of this development are not entirely clear, but no doubt include a growing awareness of the

increased Soviet military threat, a lessened understanding of the nature of the Soviet regime and its global ambitions, and a greater diffusion of the complex of assumptions associated with the idea of arms control. At all events, the idea of nuclear deterrence resting on the threat of mutual annihilation—which formed the public rationale for US strategic forces, if not the actual basis of US strategic doctrine, for twenty years—seems to have lost fundamental legitimacy and credibility in the eyes of Western publics. At the same time, structural changes in governmental processes—in the United States, the relative decline in the power and authority of the Executive Branch and the concomitant rise of Congress, the media, and various academic and other independent centers of expertise—have significantly increased the role of public opinion in national security policy formulation. As a result of all this, the modernization of US strategic forces over the next several decades will almost certainly continue to be held hostage, in more or less unpredictable fashion, by the American political process.

The Strategic Defense Initiative (SDI) announced by President Reagan on 23 March 1983 has, as now seems clear, fundamentally altered the terms of the political debate over strategic forces in the United States. By offering a plausible alternative to mutual assured destruction, it has provided a potential cure for the nuclear anxieties of the public, while at the same time arousing intense opposition from elites committed to the previous strategic consensus. In fact, public opinion polls have consistently shown levels of support for strategic defense of upwards of 70 percent, whereas only 10 to 15 percent tend to favor new offensive systems such as MX.[1] This suggests that a shift toward a defense-dominant strategic posture will be very politically sustainable in the long term. In the short term, however, elite hostility to SDI conceivably may succeed in terminating the program following a change of administration.

Assuming that SDI survives beyond 1988, it will probably survive in some form into the 21st century. But the shape of a US strategic defense program will certainly depend to a large extent on the outcome of a continuing debate on the merits of population defense and arms control, which cannot now be foreseen. Of course, Soviet behavior over the next decade will also be of considerable importance to the eventual outcome. Continuing Soviet intransigence over arms control may eventually dampen enthusiasm in the West for new agreements on strategic offense or defense. By the same token, a combination of Soviet negotiating flexibility and anti-SDI propaganda and disinformation could be effective in limiting the scope of American strategic defenses (specifically, perhaps, in choking off a population defense option) under a new comprehensive agreement.

With respect to offensive forces, the safest assumption is the probability that all new US offensive systems will remain politically at risk to some extent, but particularly ICBMs. The current debate over MX may repeat itself in the 1990s over the prospective small ICBM (SICBM). Yet it is not difficult to imagine controversy over other elements of the strategic modernization program, such as counterforce capability for SLBMs or strategic systems based on stealth technology. The ideological and arms control issues raised by these systems are not essentially different from those associated with MX, and the Soviets could powerfully fan such controversy should they choose to do so.

Soviet strategic forces are much more immune to internal political challenge than those of the United States, yet here too political factors must be taken into account. It is conceivable that the current Soviet commitment to what seems a virtually open-ended buildup of strategic weaponry could be curtailed or halted by the Soviet leadership during the coming decades.[2] Such a decision probably would presuppose both a worsening domestic economic situation and an international politico-military environment either highly favorable to the Soviets or sufficiently adverse to convince them of the futility of further investment in strategic forces. In particular, rapid progress in the

American SDI effort could induce the Soviets to rethink their current strategic doctrine, with its heavy emphasis on strategic offensive forces in a damage-limiting role. Such a rethinking could conceivably lead to a comprehensive strategic arms agreement involving relatively stringent limits on ballistic missiles. It might also lead to a fundamental reorientation of Soviet strategic efforts in the direction of air-breathing offensive systems and stealth technologies, coupled with massive homeland defenses as well as strengthened conventional forces. Soviet options in this regard will be explored in greater detail below.

NEW TECHNOLOGIES AND THEIR STRATEGIC IMPLICATIONS

The future of strategic forces, and the strategic and operational doctrines governing their employment, will be decisively affected by technological developments currently foreseeable or in process. Six technologies may be singled out as having potentially revolutionary implications in this regard: directed energy, computers and microelectronics, stealth, non-acoustic sensing for antisubmarine warfare, superhardening, and genetic engineering.

These technologies are not only of relevance for strategic as distinguished from general purpose forces. In one case, genetic engineering (or "biotechnology"), the relationship to strategic forces is not even immediately apparent, and the technologies in question are currently, and will probably remain, of direct interest only to the Soviets. Nevertheless, whatever the extent of their application in US strategic programs, they are likely to have a decisive effect on the overall environment in which strategic forces will exist. It is therefore essential to understand how they are likely to interact both with strategic forces as currently structured and with one another.

Directed energy. Directed energy technology, comprising various types of lasers and particle beams, is, in some of its forms, a relatively mature technology well on its way to use in weapons. It has important applications for surveillance and target acquisition, as well as for anti-satellite (ASAT) warfare and air and ballistic missile defense. It is, of course, the core technology envisioned by proponents of SDI for eventual territorial defense of the United States against ballistic missile attack, operating in a ground- or space-based mode against Soviet missiles in their boost phase. Also of considerable near-term promise, however, are lasers used against hostile satellites and used for local defense against air-breathing systems. Particularly significant is their promise for fleet defense against Soviet antiship cruise missiles.[3]

While our understanding of Soviet efforts in the directed energy area remains limited, it is clear that they have invested considerable resources in it and may be ahead of the United States, if not in the basic technologies, then in weapon applications of first-generation laser systems. It is reported that a Soviet laser ASAT system could be operational in the 1990s.[4]

The effect of directed energy technology on the relationship of strategic offense and defense is a complex question. It is not clear how lasers will be able to cope with passive defense measures used to protect satellites and ballistic missiles, nor whether laser air defense would remain effective against missiles and aircraft employing stealth technology. A better understanding of the

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operational characteristics of directed energy weapons is necessary before a useful answer can be given to such questions.

Computers and microelectronics. Dramatic improvements in technologies for gathering and processing information are likely to have great consequences for the future of strategic forces by revolutionizing command, control, communications, and intelligence (C^3I) and improving the accuracy, responsiveness, and flexibility of strategic systems. SDI will depend decisively on such technologies to meet the stressing requirements for surveillance, acquisition, tracking, and kill assessment of attacking missiles or reentry vehicles. But the future military environment as a whole will be reshaped by these technologies. The development of "smart" conventional munitions and the achievement of real-time targeting of the battlefield, for example, may affect importantly the future of strategic forces by raising the threshold of nuclear use in a theater conflict and reducing the counterforce requirements for US strategic forces against the Soviet homeland. It should be added that this is an area of technology in which it is virtually certain that the United States will maintain a significant advantage over the Soviets. In a defense-dominant strategic environment, it could provide the United States with a margin of advantage that would be extremely valuable in shaping Soviet perceptions of the correlation of military forces.

Stealth. Remarkably little thought seems to have been devoted, to date, to the implications of stealth technologies for the military environment of the future; yet those implications are certain to be far-reaching. In fact, the United States has made rapid strides in recent years in translating into operational systems a variety of technologies for minimizing the signatures of aircraft, and efforts are currently underway to incorporate these technologies into the next generation of cruise missiles and satellites. The penetrativity of the B-1 strategic bomber now beginning to be deployed will be enhanced substantially by the addition of stealth features; a revolutionary stealth fighter (the "F-19") appears to be essentially operational today; and the stealth Advanced Technology Bomber (ATB) designed for strategic missions will probably be available by the end of this decade.[5] These aircraft will increase enormously the offensive capabilities of US strategic and theater-strategic forces, and they will essentially neutralize the vast Soviet investment in theater and homeland air defenses of the past several decades. It seems highly unlikely that the Soviets will be able to develop effective counters to these capabilities until well into the next century, if then. In addition, stealth technology has great potential for improving the offensive capabilities of US cruise missiles of all kinds, as well as the general effectiveness of air support of both ground and naval operations. It also has important defensive applications, particularly with respect to passive defense of satellites and air defense (strategic as well as theater and tactical).

Of course, stealth systems will only be as survivable as their platforms and bases, and will be dependent on adequate strategic and tactical warning. Conceivably, an increasing reliance by the United States on stealth systems could push the Soviets further in the direction of a strategy of preemption with minimal warning, involving nuclear barrage attacks designed to disable or degrade stealth aircraft through electromagnetic pulse effects as well as direct attack on the relevant command and control networks. Maintaining adequate connectivity with stealth aircraft and ensuring their refueling and recovery could well be the most significant problem facing the United States in this area.

The possibility that the Soviets might acquire or develop comparable stealth capabilities must be kept in mind. Barring a catastrophic compromise of US programs, however, it seems likely that the Soviets will remain a decade or more behind the United States in deployed stealth systems for the foreseeable future. Indeed, the first decade of the next century may well represent the high point of US advantage, as second-generation stealth systems of every type begin to come into the inventory in large quantities. It is probable that the Soviets, by the turn of the

century, will manage to field some stealth-modified aircraft and missiles and possibly an array of first-generation systems comparable to those currently under development in the United States. However, US countermeasures probably will be able to contain this threat within reasonable bounds. The effectiveness of countermeasures will depend on technical advances in sensors and data processing, both areas in which the United States is likely to retain a commanding advantage. There is every reason to suppose that the US lead in stealth technologies will provide an enduring strategic advantage of incomparable importance.

Antisubmarine warfare. Development of a variety of non-acoustic sensors for antisubmarine warfare (ASW) is another technological area with the potential to affect dramatically the US-Soviet strategic relationship, although insufficient evidence is available to judge the maturity of the relevant technologies.[6] The combination of the promise of stealth technologies with the threat of a Soviet breakthrough in ASW could encourage a fundamental reorientation of American strategic doctrine, with the eventual superseding of SSBNs by bombers as the element of the strategic triad best combining invulnerability with offensive reliability and effectiveness. It should be noted, however, that the Soviet ASW threat to the US SSBN force will depend principally on satellite-based surveillance systems, as well as on improved real-time targeting capabilities and command and control. Defeat of that threat thus may require an aggressive US ASAT effort, including sea-based directed energy systems and electronic warfare capabilities of global scope.

Superhardening. There are a number of technologies which may affect the future of the ICBM and its relationship to other strategic forces in important ways, but superhardening is the one with the clearest revolutionary potential.[7] It now appears that ICBM silos can be hardened far beyond what was thought possible until very recently—on the order of 25 to 50 times beyond current nominal values for US silos. This relatively inexpensive process would make ICBMs essentially invulnerable to anything but a direct hit by existing warheads. It therefore makes much more attractive a fixed basing mode for the MX ICBM, while raising questions about the necessity of mobile basing for the SICBM. At the same time, it could substantially improve the technical and cost effectiveness of a limited active defense of fixed ICBMs. Superhardening technologies also could have important applications for protecting critical command and control functions.

Genetic engineering. Emphasizing Soviet efforts in the area of biotechnology is important, if only to highlight a dimension of strategic military power that is too often completely neglected in assessments of the nuclear balance. It is now clear that the Soviets have proceeded with an extensive effort in the general area of chemical and biological warfare, in direct contravention of existing international arms control agreements (itself an important measure of the seriousness of their interest).[8] In particular, they are in the process of developing an entirely new generation of biological agents, which are more varied and flexible, easier to handle, and harder to counter than existing agents.[9] Chemical-biological warfare has been generally viewed as an adjunct to the tactical and operational battlefield. Soviet biological weaponry, however, particularly the new generation of agents, seems principally intended for strategic missions. There is reason to believe that the Soviets plan to use ICBMs for delivery of biological agents.[10] More important, however, is the potential of biological weapons in special operations applications in the periods immediately preceding and following the outbreak of general war. Specially targeted biological warfare attacks within the United States would be ideal precursors to a Soviet nuclear strike, eliminating key military and political cadres and disrupting US command and control without provoking an immediate nuclear response.[11] To the extent that SDI and improved air defense of the continental United States threaten to deny the Soviets the option of a damage-limiting nuclear strike against the United States, biological weapons

are likely to become an increasingly integral and important component of the Soviet strategic arsenal.

STRATEGIC FORCES AND DOCTRINE

Before reviewing possible developments within the various categories of strategic forces, it may be useful to raise the more general question of the nature and extent of foreseeable evolutions in US and Soviet strategic doctrine. For the Soviets, doctrine has always played an extremely important role in paving the way for changes in the Soviet strategic force posture. This has been less true for the United States, where doctrine has generally had a post hoc character and served largely bureaucratic and political functions. SDI, however, represents a doctrinal more than a technological revolution in US strategic nuclear policy, in spite of the fact that its doctrinal implications have been spelled out by the current Administration only belatedly, if at all.[12]

There is little reason to expect any fundamental changes in Soviet doctrine for nuclear war. In spite of substantial moderation of their public language on these matters, the Soviets in all likelihood continue to view their strategic forces principally as a war-fighting instrument geared to the requirements of military and political victory over the West.[13] Accordingly, they will continue to pursue superiority at the nuclear level, as well as at every other level of potential violence. And they will continue to rely heavily on the strategic approaches or principles that they have favored since World War II—in particular, surprise, deception, mass, and the maintenance of large reserve forces.

At the same time, as noted earlier, it is conceivable that significant changes could occur over the next ten to twenty years in certain aspects of Soviet nuclear strategy. As the Soviets analyze the challenges potentially facing them should the United States successfully capitalize on its prospective technological advantages, particularly in the area of strategic defense, they well might consider a reorientation of their strategic doctrine away from its current dependence on land-based ICBMs and a strategy of nuclear preemption. Such a reorientation might involve the transfer to expanded strategic defenses of the damage-limiting mission of ICBMs and relegation of the latter to the role of a secure reserve force, coupled with a greater reliance on air-breathing systems for strategic offensive missions and on strengthened conventional forces for theater attack.

With regard to the United States, it is unclear to what degree SDI will assume the character of a general doctrinal revolution in American national security policy in the direction of a defense-dominant strategic posture. To date, the Administration has been reticent concerning the implications of SDI for aspects of strategic defense other than ballistic missile defense (BMD), and Administration spokesmen have generally been reluctant to make far-reaching doctrinal claims even for BMD. As a result, and in the absence of technologies capable of providing full protection of the continental United States, the extent to which SDI represents a commitment to the pursuit of defense remains rather ambiguous. Given the foreseeable political pressures (international as well as domestic) against a maximalist version of SDI, it is difficult to predict the shape of American strategic thought and doctrine in the early years of the next century. Nevertheless, it seems fairly safe to say that at least the terms of the political debate will have moved a considerable way in the direction of a defense-dominant strategic outlook.

In order to examine more closely the relationship between doctrine and force structure, it will be convenient to discuss separately strategic offensive and defensive forces.

Strategic offensive forces. As indicated earlier, there is a strong likelihood that political factors will continue to constrain the modernization of the US ICBM force. It can be confidently predicted that the political troubles of MX will be revisited on SICBM in the 1990s. A variety of options will be available to solve the problem of the

vulnerability of the current ICBM force—hard mobile basing, deep underground basing, superhard silo basing, and various forms of active defense. Many questions remain concerning the operational merits of the first two modes, and political objections to both of them can be imagined; superhardening seems promising, but costs remain uncertain; the relationship of ICBM modernization to the SDI is at present wholly opaque. Yet other questions will remain concerning the positive rationale for the SICBM and its cost-effectiveness, particularly in an environment of expanding Soviet defenses and an increasingly hard Soviet target base. It will be plausibly argued that the prompt counterforce requirement can be assumed by the D-5 SLBM, while other counterforce missions can be taken over by stealth bombers and by air- and sea-launched cruise missiles. Depending on the anticipated performance of air-breathing stealth systems and on the solution of current problems involving target acquisition and C^3 for sea-based systems, such an argument may prove to be not only plausible but compelling. On the other hand, it is perhaps not altogether fanciful to wonder whether decreasing concerns about ICBM vulnerability and increasing concerns about ICBM cost-effectiveness, penetrativity, and lethality might not lead to a revival of interest in MX in the 1990s.

With regard to sea-based strategic forces, it is likely that the political consensus supporting the sea-based leg of the triad and its modernization with the Trident SSBN, the D-5 SLBM, and a Trident successor will continue for the foreseeable future (although the possibility should perhaps not be excluded that the D-5 will come under political attack because of its counterforce capability). It also seems likely that over the next decade nuclear-armed SLCMs for land attack will become widely dispersed throughout the US fleet, thus substantially expanding the role of the Navy (both surface and subsurface) in supporting strategic missions. By the turn of the century, the Navy may also have developed carrier-based stealth strike aircraft, which would further increase its capabilities for power projection against the Soviet homeland in a nuclear conflict.

As for the bomber leg of the triad, it seems well within the realm of possibility that a strategic stealth bomber force could become the premier US strategic service in the 1990s and beyond. This will be particularly likely if an arms control regime of deep cuts in offensive forces is achieved, or if the future of the ICBM is clouded by lengthy debate over the merits of the SICBM and Soviet advances in ASW raise questions about the survivability of the SSBN force. On the other hand, the possibility should not be excluded that the stealth Advanced Technology Bomber will come under political fire for providing the United States with a dangerously destabilizing first-strike advantage (particularly when coupled with strategic defenses for damage limitation). The formidable difficulties of handling stealth technology and cruise missiles in the context of an arms control agreement may, however, render such political attacks ineffective. From a military point of view, the dual-use potential of stealth bombers is likely to be particularly attractive, since improved conventional munitions will make increasingly possible not only non-nuclear theater combat but even limited non-nuclear strategic engagements. Dual-use ALCMs would of course also support such employment concepts. Conceivably, US nuclear targeting of the Soviet Union could eventually be restricted to the relatively limited number of superhard command and control facilities.

Strategic defensive forces. As stated earlier, it is unclear to what extent SDI will effect a revolution in the direction of a defense-dominant posture for American strategic doctrine. To the extent that SDI begins to provide an effective defense against ballistic missiles from the 1990s on, however, it will greatly increase Soviet incentives to improve their offensive capabilities in other areas. Even moderate Soviet success in developing stealth-modified air-breathing systems by the turn of the century could have serious consequences for the strategic balance, if the United States continues to

neglect its continental air defenses. The same is true of Soviet development of new biological warfare agents for strategic missions. However, a US commitment to deployment of the full range of strategic defenses—BMD, air defense, ASW, ASAT, civil defense, and "land defense" (i.e. defense of key civilian and military facilities against sabotage and special operations)—is likely to encounter formidable political difficulties because of the societal impact in the United States of many of these forces and capabilities. A serious revival of civil defense, to name just the most obvious case, could become a particularly hard political bone of contention. Nonetheless, the logic of SDI is likely to exert a strong pull in this direction.

With regard to BMD, it is premature to predict precisely how political and technical factors will interact in the development of SDI. Political factors (and a misplaced technological utopianism) may operate to delay deployment of any BMD system until well into the next century, causing rejection of piecemeal deployments of first generation systems (whether conventional or directed energy) as they mature in favor of a comprehensive defense anchored by a highly effective boost-phase directed energy component. On the other hand, concern over the vulnerability of the US ICBM force and other military targets in the continental United States—notably, the C^3I network—could conceivably give SDI a shorter-term, lower-tech focus on point and area defense. In the latter case, it is possible that a limited defense of critical targets (especially the National Command Authority, SAC and NORAD headquarters, and at least some Minutemen or MX fields) could be available by the mid-1990s. A minimal system, designed to remain within current ABM Treaty constraints, might be deployed for protection of the National Command Authority. (Such an option may become increasingly attractive in the not-altogether-unlikely event that command and control vulnerability replaces ICBM vulnerability as a source of concern and focus of political debate over strategic forces in coming years.)[14] With regard to options for comprehensive defense, the most promising systems at present appear to involve kinetic kill mechanisms and ground-based lasers. A multilayered system using these technologies might be deployable well before the end of the century. At the same time, a laser system with at least limited capabilities (for example, a laser ASAT system) will almost certainly be available by the early 1990s.

As for air defense, the United States is now engaged in a fundamental overhaul of its posture in this long-neglected area, and seems likely to exploit the potential of stealth technology to develop new generations of air defense interceptor aircraft and associated missiles that could mount a credible defense of US airspace against the Soviet air-breathing threat. At the same time, the United States will be able to minimize the need for a costly and vulnerable air defense infrastructure comparable to that in the Soviet Union, with warning and battle management functions being performed principally by air- and space-based sensors and command elements. Such air defense systems, it may be added, would also have important applications in support of naval and theater operations.

Passive measures for civil and land defense are likely to attract increasing attention to the degree that active air and ballistic missile defenses are seen to be effective in limiting damage to the continental United States. But it remains unclear whether or to what extent political support will be forthcoming for civil defense measures to protect key industrial facilities, important communications nodes and other infrastructural elements (such as electric power installations and oil refineries), and the general population.

Perhaps even more than in the case of offensive forces, the future of SDI and of strategic defense generally is likely to be decisively influenced by political and cultural intangibles such as national leadership and the fortunes of doctrinal and propaganda battles. That arms control offers an alternate route to national security which would permit blocking off the technology and policy avenues explored above is a possibility that

will continue to fascinate Western elites in spite of its fundamental implausibility. At the same time, it would be wrong to discount unduly the imperatives of technology. It is well to remember that it was not an American president, but a Soviet general, who uttered these sentiments:

> There are no limits to creative human thinking, and the possibilities offered by modern science and technology are tremendous. And I think that it is theoretically and technically quite possible to counterbalance the absolute weapons of attack with equally absolute weapons of defense, thereby objectively eliminating war regardless of the desires of resisting governments.[15]

NOTES

1. Recent polling results are assembled in Keith B. Payne, *Why SDI?* (Fairfax, Va.: National Institute for Public Policy, 1985), pp. 33-44.

2. Current intelligence community projections credit the Soviets with some 16,000 warheads for intercontinental attack by the mid-1990s if recent trends in deployment rates continue; this would represent almost a doubling of the current inventory. See Robert M. Gates and Lawrence K. Gershwin, "Soviet Strategic Force Developments," testimony before a Joint Session of the Subcommittee on Strategic and Theater Nuclear Forces of the Senate Armed Services Committee and the Defense Subcommittee of the Senate Committee on Appropriations, 26 June 1985, p. 4. To what extent this estimate reflects a thorough assessment of Soviet economic limitations and political priorities (to say nothing of operational military requirements) is far from clear.

3. See for example, Alfred Skolnick, "Too Light on Lasers?" *Proceedings*, 110 (December 1984), 30-36.

4. Department of Defense and Department of State, *Soviet Strategic Defense Programs*, October 1985, pp. 12-15.

5. See Bill Sweetman, "The Vanishing Air Force—Stealth Technology Goes Operational," *International Defense Review*, 17 (August 1985), 1257-59.

6. See, for example, Edgar Ulsamer, "Penetrating the Sea Sanctuary," *Air Force*, 67 (September 1984), 29, "Disquiet for the Silent Service," *Air Force*, 67 (October 1984), 25-28.

7. See Edgar Ulsamer, "The Prospect for Superhard Silos," *Air Force*, 67 (January 1984), 74-77.

8. An excellent overview is provided by Manfred R. Hamm, "Deterrence, Chemical Warfare, and Arms Control," *Orbis*, 29 (Spring 1985), 119-63.

9. William Kusewicz, "Beyond 'Yellow Rain,' " *The Wall Street Journal*, 25 April to 18 May 1984; Jonathan B. Tucker, "Gene Wars," *Foreign Policy*, 57 (Winter 1984-85), 58-79.

10. Bill Geertz, "Soviets Fill Craters, Dig New Ones to Fool U.S. In Missile Accuracy," *Washington Times*, 7 August 1985.

11. See particularly Joseph D. Douglass, Jr., and H. Richard Lukens, "The Expanding Arena of Chemical-Biological Warfare," *Strategic Review*, 12 (Fall 1984), 71-80. Also worth noting is the emphasis given by the Soviets to protection of their own population from the effects of strategic CBW attack by the United States. See Leon Goure, *War Survival in Soviet Strategy: USSR Civil Defense* (Miami: Center for Advanced International Studies, 1976), pp. 62-63, 78-79.

12. The most thorough and satisfying account of Administration policy on SDI to date is "The President's Strategic Defense Initiative," a pamphlet issued by the White House in January 1985. See also Department of State, "The Strategic Defense Initiative," Special Report, No. 129, June 1985.

13. For a nuanced treatment of recent changes in Soviet declaratory policy relative to nuclear weapons, see Dan L. Strode and Rebecca V. Strode, "Diplomacy and Defense in Soviet National Security Policy," *International Security*, 8 (Fall 1983), 91-116.

14. See Bruce G. Blair, *Strategic Command and Control: Redefining the Nuclear Threat* (Washington: Brookings Institution, 1985), together with my review in *Strategic Review*, 13 (Fall 1985), 79-84.

15. General Major Nikolay A. Talenskiy, "Antimissile Systems and the Problem of Disarmament," *International Affairs* (October 1964), as reprinted in *Bulletin of the Atomic Scientists*, 21 (February 1965), 27.