Georgetown, as well as the quality academic atmosphere implied by the American connection.

The agreements and contracts outlined above go beyond the traditional student exchanges, but certainly don't replace them. The Massachusetts Institute of Technology, for example, recently agreed to train 54 Iranian graduate students in nuclear engineering over the next 2 years—at an estimated cost of $1.4 million to their government. In the near future it can be expected that a great variety of mutually beneficial arrangements will be made.

What Iran is trying to do, as Brooks so simply states it, is "buy themselves into the 20th century." Or as Bradley puts it a little more sharply, "they want to purchase modernity in the same way they'd purchase a steel plant." There is little doubt that if the American sellers were setting the priorities there would be some different emphases. Iran suffers badly from a dearth of midlevel administrators, engineers, and technicians. The country has no middle class to speak of, just top and bottom. Some of the projects now under way appear to constitute an effort to develop a top-level scientific and educational establishment without the necessary logistical underpinning. Bradley says, for example, that Georgetown, renowned for its linguistics department, offered to set up a program to increase literacy. But despite the fact that the country is 70 percent illiterate, the board of Ferdowsi University was not interested. With that kind of thinking Iran may be able to supply more opportunities for its upper classes, but the peasantry is left untouched. But the Americans involved in cooperative efforts on Iranian soil know, like Ann Landers, that there's no point in giving advice unless it's asked for.

Dealings are difficult with Iranians because there is a widespread lack of coordination among seemingly related endeavors. Besides, authority keeps changing hands—the Shah likes to have several agencies responsible for the same thing so he can play them off against each other. But on a person-to-person basis the Americans fare well —the Shah knows how to talk turkey in the American way, according to Nichols and others, and has impressed foreign visitors with his factual knowledge and apparently realistic grasp of problems. Understanding with university officials is no doubt enhanced by the fact that many obtained their doctorates in the United States. Anyway, as Brooks observes, the "developmental enthusiasts" all say that the soundest way for a country to pull itself up is as a purchaser, not a donee. It looks as though Iran will be an excellent proving ground to test this theory.

—CONSTANCE HOLDEN

Beyond Vladivostok: The Feasibility and the Politics of Arms Reductions

Two earlier articles (31 January and 21 February) discussed nuclear disarmament and arms control efforts from the early postwar period up through the first two phases of the Strategic Arms Limitation Talks (SALT), culminating in the Moscow agreements of 1972 and the Vladivostok agreement in principle of November 1974. A third article (14 March) reviewed the capabilities of the "verification" technology for monitoring compliance with arms control accords.

The Vladivostok agreement, which actually would allow the United States and the Soviet Union to add thousands of deliverable weapons to their strategic forces, is perceived by its defenders as one establishing ceilings from which eventual arms reductions could be made. No other claim can be made for it except the speculative one that, without the Vladivostok ceilings, the spiral of arms deployments would know no restraint whatever. Thus, the degree of enthusiasm that can be mustered for this agreement—which will not be ready for signing until the terms of verification have been successfully negotiated in Geneva—depends less on what it would provide than on the possibilities that lie beyond it.

This question as to goals for the next round of SALT will surely be posed this spring when the Senate and House subcommittees that deal with arms control hold hearings on the Vladivostok agreement. Secretary of State Henry Kissinger has simply said that reductions will be sought, without revealing specific proposals that may have been formulated. So precisely what are some of the possibilities beyond Vladivostok? That question can be divided into two parts.

1) What numerical reductions in arms and—perhaps more important—what qualitative restraints are technically and militarily feasible in the sense of being verifiable and safe for both parties?

2) How sincere will the superpowers be in seeking agreements to stop the arms competition and actually to begin reducing the level of armaments? Central to this question is the internal political situation within each country and the weight carried by the military in the national decision-making. Also, can a show of restraint and good will on the part of one superpower influence for the better the behavior of the other?

Consider each of these basic questions in turn.

Feasibility

Reductions. The agreement in principle reached at Vladivostok would have the merit of establishing the "equal aggregates" concept wherein all strategic delivery vehicles, whether bombers or missiles, are counted against an overall ceiling, fixed at 2400. This ceiling approximates the size of existing Soviet forces and is only a few hundred higher than existing U.S. forces.

By eliminating even the possibility of an open-ended competition in deployment of delivery vehicles, Vladivostok may reduce somewhat the suspicions on each side and make it a little easier to reach agreement on reductions. The Vladivostok ceiling of 1320 for missiles equipped with MIRV's, or multiple independently targetable reentry vehicles, is so high

that it would not much restrain competition in this dynamic new field of weapons technology. But, by continuing the 1972 agreement's freeze as to numbers of ICBM silos and numbers of "heavy" ICBM's, Vladivostok would at least fix some boundaries to the MIRV problem.

There is wide agreement among arms control specialists that nothing would promote strategic stability more than to begin phasing out most, if not all, ICBM's, or intercontinental ballistic missiles. This is so because fixed ICBM forces are potentially vulnerable to an all-out "counterforce" attack and thus constitute a kind of lightning rod. Given a deep crisis, doubts as to the survivability of ICBM's in the event of war could encourage, on both the Soviet and U.S. sides, hair-trigger responses to any sign of attack. Moreover, as many arms controllers view the matter, ICBM's are not necessary to a strong deterrent posture and they do not offer advantages sufficient to offset the nuclear instability that they create.

The Federation of American Scientists (FAS), whose position is representative of a good bit of critical thinking about such missiles, has proposed that the superpowers eliminate all their ICBM's pursuant to three successive 5-year agreements, with one-third of these forces being destroyed during each phase. The destruction of the missile sites could be readily verified by such "national technical means" as reconnaissance satellites.

The elimination of ICBM's would eliminate the part of the problem about MIRV's that most worries military strategists. MIRV's encourage counterforce doctrines because they make it possible to assign two or more warheads to each ICBM silo targeted. But if ICBM's are eliminated, or even if they become an increasingly small proportion of each side's total deterrent, MIRV's will be left without any conceivable counterforce role.

To be negotiable, any proposal for the phased elimination or drastic reduction in ICBM's would almost certainly require that the first to go include those missiles (such as the Soviet Union's SS-18) big enough to carry extremely powerful multiple warheads. Otherwise, the present fear of MIRV's as a counterforce threat would be compounded.

With the elimination or downplaying of the ICBM as a strategic weapon, the present "triad" of forces would be reduced essentially to a "diad," made up of submarine-launched ballistic missiles (SLBM's) and bombers. To many, this seems a safe thing to do because there is currently no prospect that either side will ever be able to destroy all of the other's missile submarines simultaneously. The failure to destroy even one such submarine would result in a devastating retaliatory attack; a single Polaris submarine carrying 16 MIRV'ed Poseidon missiles, with 10 warheads to the missile, would have more than enough weapons to destroy

Briefing

Scientists Win Right To Sue NIH

Scientists who have been denied training grants by the National Institutes of Health (NIH) now have the right to sue NIH if they can show they suffered specific economic and professional losses, according to a recent federal court ruling. The scientists must also have evidence that NIH denied their constitutional rights or violated laws or administrative procedures, the court said. NIH says it will not appeal the ruling.

Previously, only institutions had standing to sue NIH over training grant awards—and they rarely did. But even though the door is now open for individuals to sue, it seems unlikely that the courts will be stormed with angry scientists. Helen Hart Jones, the lawyer for the plaintiff, thinks that the criteria scientists must meet to bring such cases are difficult; besides, few scientists have the time or the money to involve themselves in litigation. "I think it is an important, minor victory," says Jones.

The ruling was made by Judge Donald P. Lay of the Seventh Circuit Court of Appeals in a case involving Julia T. Apter, Professor of Surgery at Rush-Presbyterian–St. Luke's Medical Center in Chicago. Apter appealed a lower court ruling that only her institution had standing to sue NIH. Apter first brought NIH to court alleging that in 1971 she was denied a $580,000 5-year training grant because of sex discrimination and demanding that NIH reconsider the application.

Standing in court is one thing; winning a case is another. Apter's case against NIH will now proceed in a lower court. Although Judge Lay avoided passing on the merits of her case, he did outline the criteria Apter met which gave her—and by inference any other chief investigator—standing to sue. She successfully argued that she had suffered economic injury, as well as professional injury such as "loss of professional prestige and the chance to associate with and train students." She had sufficient personal stake in the outcome of the grant application, by showing she had invested 800 hours of time in its preparation. Finally, Judge Lay noted that the allegations made against NIH in the suit, such as violations of constitutional rights and administrative procedures, fell within a "zone of interests" with which that agency should legally be concerned.

The ruling is one of a number of recent court decisions opening up the government's award of research monies to public scrutiny. Last year, another federal appeals court declared that most of the contents of research grant applications sent to the National Institute of Mental Health (which is not now part of NIH), are public documents under the Freedom of Information Act (*Science*, 15 November 1974). The Association of Women in Science has, in still another lawsuit, obtained court backing for the release of previously secret information about appointments to NIH review committees.

According to one lawyer familiar with these cases, these decisions are part of a trend for courts to broaden the definition of who is eligible to bring a case to court. At the same time, when government agencies have been brought to court the trend has been for judges to order them to open up as many of their deliberations to scrutiny as possible and make them more publicly accountable in other ways. If both trends continue, scientists in the future will be finding out a lot more about how the government doles out its billions of research dollars each year—and asking more questions about that process.—D.S.

every city in the Soviet Union with a population of 100,000 or more.

Qualitative restraints. A constant spur to the arms race is the fear of each superpower that the other may gain major technological advantage. There is, for instance, the worry of the U.S. military that the Russians might eventually achieve such accuracies that their modern ICBM's would all be potential silo killers whether equipped with single or multiple warheads. Indeed, in the absence of restraints on technological innovation in weaponry, numerical ceilings on deployed forces will simply change the criterion of nuclear "superiority" from an edge in numbers to an edge in quality. Accordingly, if post-Vladivostok accords are to hold out any hope of stopping the arms race, they must address the problem of qualitative improvements.

As arms controllers view the problem, the most promising way to restrain such advance is through limitations on weapons testing. For instance, George B. Kistiakowsky and Herbert F. York have suggested (*Science*, 2 August 1974) that the number of flight tests of long-range ballistic missiles be reduced by 20 percent a year for 5 years. This would be followed by a period in which the number of tests allowed each year would be barely enough for the superpowers to maintain confidence in the reliability of their existing weapons, much less to check out the performance of entirely new weapons. Again, verification would be possible; for some years now the Pentagon has been monitoring Soviet missile tests in surprising detail, and the Soviets are believed to have a comparable monitoring capability.

A similar regime to restrict underground nuclear testing could be imposed without fear that either side could gain a significant military advantage from any cheating done at yields so low as to be undetectable. At the end of 5 years, each side could be limited to a single test, this one perhaps being held essential to maintain confidence in certain existing weapons. Ultimately, all testing might be banned.

Paul Doty, director of a program on science and international affairs at Harvard, has underscored the advantage of combining reductions in weapons deployed with restrictions on testing. In his view, "a modest schedule of reductions of central [strategic] systems and a diminishing quota of permitted test firings of ballistic missiles are mutually supportive and form the basis of a potential agreement that appears much more attractive than one based on either limitation alone."

Internal U.S. and Soviet Politics

Whatever the opportunities for arms reductions and qualitative restraints, they are not likely to be realized unless Washington and Moscow unequivocally take the view that their security lies more in arms control than in arms competition. In this context, it is useful to look at the situation in the two national capitals.

Moscow. A commonly held American view of the Soviet approach to SALT is that it is heavily influenced by the concept of the "correlation of forces," or the aggregate of political, economic, and military factors bearing upon the relative strength or weakness of the two superpowers. As this concept is usually understood, the Soviets are trying in the SALT negotiations, as well as in other aspects of U.S.-Soviet relations, to gain the upper hand and to play on the correlation of forces to bring about such a result.

Or, to put the matter another way, the Soviet's primary aim in SALT is to gain a competitive advantage rather than to enhance strategic stability and reduce the risk of nuclear war. Often coupled with this dark assessment of Soviet motives is another perception that is more pessimistic still. It holds that, from their Marxist-Leninist convictions, the Soviets feel a compelling need to gain strategic superiority against the day when the United States, out of fear that the collapse of capitalism is near, strikes out in desperation.

The above may well attribute to the Soviets more doctrinal consistency and less common sense than is in fact warranted. Nikita Khrushchev himself once wisely observed that nuclear weapons make no class distinction. And the Soviets have shown more than once that they know some of the nuclear facts of life. For instance, by the beginning of SALT, they were as eager as anyone to avoid the folly of wide deployment of antiballistic missiles.

On the other hand, there is indeed reason to believe that the Soviets may hang back on the matter of arms reduction. In the past, they have generally referred to the aims of SALT as obtaining arms limitations and *subsequent* reductions, thus tending to put reductions off into a vague beyond. The Soviets may be even less amenable to proposals for qualitative restraints than to proposals for reductions. Their desire to catch up with the United States in fields such as MIRV technology has long been manifest.

Another circumstance bearing on the future of SALT is the fact that the Soviet military is not simply given a voice in the preparation of Moscow's negotiating positions. Those preparations are actually made for the most part right in the Soviet Ministry of Defense. Thus, the notion that SALT consists chiefly of negotiations between the civilian and military leaderships *inside* the two governments seems much less true in Moscow than in Washington.

Washington. Herbert Scoville, Jr., who was the Arms Control and Disarmament Agency's assistant administrator for science and technology during the Johnson Administration, recalls how extremely cautious the ACDA was during those years in formulating arms control proposals. The agency was afraid it would provoke the hawks in Congress and be accused of selling out to the Russians. But Scoville, like a number of other arms control specialists, believes that the situation today is quite different. He believes that the Congress now would respond positively to bold arms control initiatives by the Executive Branch, if only such initiatives were forthcoming.

In the first two rounds of SALT, the Pentagon clearly has had a decisive influence in the shaping of certain key U.S. negotiating positions. The reluctant-dragon stance of the United States on the MIRV ban question gave early evidence of this. But there is the possibility now that the Pentagon's approach to SALT, which has included the heavy-handed use of "bargaining chips," may be falling into disfavor.

Guns versus Butter

The immense cost of such proposed new weapons systems as the B-1 bomber ($84 million per plane), together with urgent competing claims on the tax dollar, has led to a more questioning attitude in Congress. As one Senate aide puts it, "The Armed Services Committee has gone from a time when guns and butter was quite feasible to a time of terrible economic problems." The new congressional budget committee, which is supposed to look at the big picture, may itself impose new restraints on the Pentagon. The signs on Capitol Hill are not con-

clusive, but they do suggest that, on questions of new weapons and arms control, the White House will now have to deal as much with Congress as with the Joint Chiefs of Staff.

One potent congressional critic of Vladivostok is Senator Henry M. Jackson (D–Wash.), an announced candidate for the presidency in 1976. Although more hawk than dove in past years, Jackson has denounced the Vladivostok ceilings as too high and proposed that the parties agree that 700 of the 2400 delivery vehicles allowed on each side not be modernized—and hence left ripe for eventual elimination. Without such a promise of future reductions, the Senate might not ratify a treaty based on the Vladivostok agreement, Jackson seemed to imply.

What all this adds up to is that the United States may bear a special responsibility to take the lead in SALT and press hard for substantial arms reductions and qualitative restraints. Because of the relative openness of its society and the counterbalancing elements in its government, the United States should find it easier than the Soviet Union to put military programs in perspective and weigh their risks as well as their advantages to national security.

An early test of the seriousness of the SALT negotiations will turn on whether each side insists on deploying all the weapons Vladivostok would allow. As many arms controllers view the matter, if the United States shows restraint by not building up to the ceilings, the Soviet Union might behave similarly. Kistiakowsky believes, too, that perhaps the only way to get an agreement restricting missile flight testing would be for the United States first to cut back its testing unilaterally, perhaps by a modest 10 percent a year.

Such proposals for unilateral initiatives or restraint in arms control always run into the objection that the United States cannot afford to do other than insist on reciprocity and equality. The argument is made that equality is necessary to avoid any "perception" of nuclear inferiority, even if in actuality U.S. strategic forces are the very essence of redundancy and overkill.

A very real problem of perception, and perhaps the only serious one, is that nuclear weapons and the threat of nuclear war are viewed with a comforting abstractness. If there should ultimately be a breakthrough in the SALT negotiations, it will be because the U.S. and Soviet leaderships have decided to act on the reality that nuclear weapons are a terrible and continuing threat to mankind.

—LUTHER J. CARTER

Intensive Care for Newborns: Are There Times to Pull the Plug?

Would it ever be right not to resuscitate an infant at birth? Would it ever be right to withdraw life support from a newborn whose chances of surviving on its own and living to lead anything even close to a normal life are virtually nil?

To each of these questions a group of physicians, lawyers, social workers, ethicists, economists, and laymen unanimously answered, "Yes," when they considered the "Ethical issues in newborn intensive care" at a conference in the Valley of the Moon in northern California. Their thoughts on this complicated subject and a "moral policy for neonatal intensive care" they are proposing will be spelled out in the June issue of *Pediatrics*.

The need for a coherent policy on questions of life or death for critically ill newborns is urgent. Neonatal intensive care units, in which newborns are treated with increasingly sophisticated medical care, used to be few and far between. Now, there are dozens spread across the United States, each prepared to receive desperately sick newborns from miles around. And more and more babies who, only a few years ago, would have died within weeks or months of birth are being saved. Thus, infants with Down's syndrome, hydrocephalus, and a number of other genetic and congenital disorders are living. Remarkable progress in resuscitating infants with respiratory problems is saving significant numbers of lives, including those of premature babies who are just too tiny to make it on their own.

This was brought out clearly last month, when Richard E. Behrman and Tove S. Rosen of the College of Physicians and Surgeons, Columbia University, delivered what is probably as comprehensive a report as exists on the subject of fetal survival to the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. Although the researchers are careful to point out that their data and conclusions are severely limited by the fact that there is very little comprehensive statistical information on the subject, it is nonetheless apparent from the information they gathered for the commission that, from one point of view, things are improving. For example, data from New York City for the years 1962–1971 show a 68 percent improvement in survival rates for infants born weighing less than 1000 grams.

The question, to which there is no simple answer, is whether these saved infants are normal or whether there are occasions when medical technology does for the very young what it now frequently does for the very old—keep the body alive but not the mind.

California Conference

The Valley of the Moon conference was convened by 3 men from the University of California at San Francisco. Two of them are doctors: Roderick Phibbs and William Tooley. One is a Jesuit philosopher: Albert R. Jonsen.* Discussion was directed toward problems raised by five case summaries and, in the end, the convenors drew upon the contributions of the 17 conference participants in formulating the moral policy they offer to "health professionals involved in neonatal care for their critical consideration."

Their feeling is that a policy, or some

* Jonsen is a member of the national commission, a post to which he was named subsequent to the Valley of the Moon conference.