U.S.–Soviet space cooperation that is due for completion in late October; the workshop findings were officially released on 13 September in hearings before the Senate Foreign Relations Committee.

The 13 workshop participants, chaired by radio astronomer Bernard Burke of the Massachusetts Institute of Technology, were chosen for their experience in scientific collaboration with the Soviets. They agreed that past exchanges have been quite fruitful, especially in such areas as space medicine, where the Soviets have shared data on bone loss and cardiovascular deconditioning in long-term manned spaceflight; and lunar and planetary studies, where one nation's data has helped the other to plan its subsequent spacecraft missions.

In May 1982, however, the Reagan Administration retaliated for the declaration of martial law in Poland by refusing to renew the 10-year-old agreement on U.S.–Soviet space cooperation. Since then, according to the workshop participants, the interchanges have declined steadily as previous arrangements are concluded. Although some important interchanges have continued—a prime example being the synthetic aperture radar imagery of the surface of Venus from the Soviet Venera 15/16 mission—and although Soviet scientists consistently express a desire to cooperate further, little can be done without a formal framework.

At the same time, the consensus of the workshop was that Soviet prowess in space science has been improving rapidly. Venera 15/16 was planned and launched in 18 months, far faster than the U.S. missions are mounted. The Soviets have also taken the lead in the exploration of Halley's comet in 1986 with their Vega spacecraft. The United States will not even be sending a spacecraft.

The workshop participants also noted that with the Soviets' increased capabilities in space science, there has come an increased openness and self-confidence. Numerous joint missions and hosted experiments have been flown with France and West Germany, and there is talk of international missions to both Mars and Venus.

The biggest stumbling block to renewed U.S.–Soviet cooperation appears to be the concern over technology transfer. While the workshop participants felt that the concerns were exaggerated in the case of space science, they agreed that so long as suspicions remain high, the most workable exchanges will continue to be joint discussions, data analysis, and planning of separate missions—without an exchange of hardware.

—M. MITCHELL WALDROP

Research Council Backs Competition for Shuttle

A controversial proposal by the Air Force to build a new fleet of expendable rockets received a boost from the National Research Council on 4 September. In a 28-page report drafted by a committee of outside experts, the council said that the development of such rockets—to be used primarily for launching important military satellites—would add "flexibility and security" to the nation's space program.

The idea, which would essentially resurrect 20-year-old technology as competition for the space shuttle, has been fiercely opposed by officials of the National Aeronautics and Space Administration (NASA). They had hoped that by 1988, when the rockets are to be constructed, only the shuttle would be available to ferry military satellites, and they resent the unanticipated rivalry, which threatens to sharply increase shuttle costs (*Science*, 29 June, p. 1407).

The committee, which included several former Pentagon officials or contractors and only one former NASA official, cited several arguments in favor of developing a second, rocket-based launch system, including the need for additional government secrecy. "It may be necessary to launch a sensitive and militarily important security satellite without the public exposure that has become the norm in NASA flight operations," the report stated. The committee also noted that it is unclear "from the data currently available" whether the shuttle "can ever be more economical than [expendable rockets] for launching unmanned [military] payloads."

The committee, acting on a request from the House and Senate appropriations committees, technically was not supposed to address the merits of building the new rockets. Its mandate was instead to compare three different rocket designs—two proposed by aerospace corporations and one proposed by NASA, using space shuttle components. But it largely ducked this question, claiming that the designs were roughly equivalent, and that a meaningful comparison of costs was impossible in the 5-month study period. Congressional staff aides have expressed disappointment that a more detailed assessment of the alternatives was not provided.

According to Robert Fossum, a former director of the Defense Advanced Research Projects Agency who served as the panel's chairman, the reason this was not done is that the Air Force had already begun a formal design competition by the time the committee was formed, which prevented the committee from gaining access to detailed information about the proposals.—R. JEFFREY SMITH

Antibiotics and Animal Feed: A Smoking Gun

For years, researchers have strongly suspected that subtherapeutic use of antibiotics in animals can lead to human disease but have never been able to find direct evidence. Now they have it, according to a paper published in the *New England Journal of Medicine* on 6 September.

After a painstaking study, Centers for Disease Control scientist Scott Holmberg and colleagues traced the illnesses of 18 people to hamburger made from cattle that were fed low doses of antibiotic as a growth promoter. In effect, the cattle became factories of drug-resistant *Salmonella newport*. Twelve of the patients may have been particularly vulnerable to infection because they were taking antibiotics before becoming sick. Researchers were able to pinpoint causality in part by matching the bacteria's biological fingerprint in samples taken from the cattle to those from the patients. Analyses revealed that plasmids from the various bacterial samples were all the same.

The findings are likely to rekindle the debate over the use of antibiotics as growth promoters in animals. Lawmakers have persistently rejected calls to end their use.—MARJORIE SUN