group that is agonized by such implications, it is the nuclear scientists. After World War II, the engineers who produced the bomber fleets that pulverized Germany did not publicly display any troubled conscience; nor did the men who directed the nation's military forces. On the other hand, the public writhing of thousands of scientists speaks for itself, and if these people have so far been unable to resolve the great moral issue of individual responsibility versus the demands of organized society, they are in company that goes back at least as far as the Greek dramatists.

Another assault on the scientist in public life came this week from David E. Lilienthal, in a New York *Times Magazine* article titled "Skeptical Look at 'Scientific Experts.'" Lilienthal, who was the first chairman of the Atomic Energy Commission, writes that "we are in the midst of a crisis in the scientific community, and of a period of bewilderment, disagreement and anxiety about the role of science and the scientific method. . . . The crisis of confidence has its roots in concern that scientists and other experts and specialists have more and more been seeking to use methods applicable to the physical world in areas of the world of men that are beyond the reach of such methods: human goals and purposes, human priorities, motivations and conflicts.

"Many of the most noted of these experts and specialists," he continues, "have departed from their own fields of competence with a cocksure confidence that they can find answers—out of their scientific or technical knowledge or intuition—to what cannot be finally and firmly answered at all: the unimaginably complex and shifting *human* problems involved in the threat of nuclear warfare."

Strategic Theorists

Lilienthal then goes on to identify these persons as "physical scientists" who have sought a "Single Solution to the threat of nuclear war in arms control or world government," and "methodologists" and "policy analysts" who "believe they have evolved a method for determining the right policies for our Government to forestall nuclear war, or, if war should come, to win it."

To the extent that these groups do exist within the scientific community, Lilienthal is correct in asserting that, for better or worse, they do exert considerable influence. But, again, we are offered a theory that assumes the scientific community to be a monolith. Lilienthal, for example, would burden the whole scientific community with responsibility for the theory "that the H-bomb would meet all of our conceivable military needs; that general disarmament 'now' must have priority over every other issue on the road to peace. . . ." The fact is, however, that dependence on the H-bomb as a comprehensive military doctrine was an Air Force concept that was worn down by arguments that, in large part, originated within the scientific community. Furthermore, while many scientists have been addicted to instant disarmament, many more have advocated the view that realism calls for the slow development of so-called confidence-building measures before major steps could be taken.

Defense Policies

As for the "methodologists"—derogatorily referred to as McNamara's "whiz kids" when the setting is the Defense Department—seemingly absurd examples of game theory can be adduced to ridicule their efforts, and Lilienthal manages to come up with a couple of very good ones. But the basic issue isn't whether a bit of foolishness creeps into the system; rather, it is whether traditional military thinking is to determine our policies for the unprecedented problems of the nuclear age, and whether the selfish and narrow orientation of the individual military services is to be dominant when national resources are allocated for defense purposes, or whether some attempt is to be made to introduce rationality into handling the problem of who gets what and how much. What case can be made for two services building duplicate missile systems at enormous expense? If the aircraft carrier, which costs a quarter of a billion dollars to build, is actually obsolete, wouldn't it be better to find this out as soon as possible? And are the aircraft carrier admirals the best judges of the issue? It's worth recalling that, if cerebration rather than tradition had dictated the matter, the fate of the cavalry wouldn't have had to be decided upon the battlefields of World War I.

Lilienthal and others are right when they point out that scientists in public affairs can be just as idiotic as the next fellow. But the significance of this observation is easily lost between Snow's demand for enthronement of the scientist and the informed layman's justifiable outrage when a scientific reputation is exploited to exert influence in a nonscientific field. This neither means that the Academy should nominate the next President nor that anyone who knows which end of a test tube is up should be run out of government. And it certainly doesn't mean that the scientist should be held to a stricter standard of morality than, let us say, the economists who advise government. What the situation does call for is the realization that scientific knowledge, properly used, can be immensely useful to the processes of government and the national well-being; that no scientist can bat 1000 in advising the government; that the extracurricular kibitzers advising government from within the scientific community should be judged on the merit of their advice, and that when they fall on their faces (which they often do) it's not a signal for everything scientific to be ousted from the councils of government. After all, if this harsh standard applied to the legal profession, three-quarters of the Congress and half of the executive agencies would be sent packing from Washington tomorrow. Instead of employing their considerable talents to decry the presence of science in government, the critics might address themselves to the real issue, which is how a democracy can incorporate into its political processes a body of knowledge that is largely beyond its comprehension.—D. S. GREENBERG

NASA: Talk of Togetherness with Soviets Further Complicates Space Politics for the Agency

The National Aeronautics and Space Administration this week marked the fifth anniversary of its establishment, and in some respects it was not the happiest possible birthday for NASA. Congress, which until this year had acted the indulgent parent, has taken a much firmer grip on the purse strings and has begun demanding a stricter accounting from the agency. In recent months a somewhat belated debate on the pace and pattern of the national space effort has flared up within the scientific community, with criticism centering on plans for a manned landing on the moon in this decade. And President Kennedy's recent gambit

in his United Nations speech of proposing a joint U.S.–Soviet expedition to the moon raised questions about the future course of space exploration which are not likely to be answered for some time.

Our national space program has been explained and justified as a race to the moon against the Soviet Union, with national prestige and security at stake. The prospect of Soviet-American togetherness up there has been interpreted by some as taking the fuel out of NASA's political booster. If there is no race, they argue, then there is no hurry to get to the moon, and Congress has another reason to tighten the reins on NASA.

Exactly what sort of space cooperation is in prospect, however, is very far from clear, and any supposition that an astronaut and a cosmonaut will share a space capsule en route to the moon is certainly premature.

Speculation about U.S.–Soviet space cooperation was very much in the air before the President made his U.N. speech on 20 September, but NASA officials had been publicly cool to the idea of a joint manned landing on the moon. The director of NASA's Manned Spacecraft Center, Robert R. Gilruth, for example, was reported as feeling that such a cooperative project was impractical for both technical and security reasons. NASA, however, declared itself ready to talk it all over with the Russians if the international climate were favorable.

After the President made his proposal, which is said to have been inserted in the speech at rather a late hour and to have caught some administrators flat-footed, NASA officials publicly swung into line behind the President.

NASA Administrator James E. Webb, in a speech in Houston last Wednesday, seconded the President and couched his own rather cautious suggestions for American-Soviet collaboration on the lunar exploration project in these terms.

"In such an exploration one might find some way or means of cooperation between the U.S. and the U.S.S.R. on a plan for selecting a joint site for a lunar landing and base of exploration. If we could agree on this, the manner of cooperating to achieve this end could follow a logical pattern.

"The President's proposal seeks to move the U.S. Space Program and the U.S. space philosophy to its logical, but at the same time to its most challenging limits. It is worth emphasizing, however, that this is an extension of this basic philosophy rather than a change in policy."

Webb's remark is a reminder that, in policy terms, NASA was born with a split personality. The act creating NASA provided that the agency cooperate with all nations in the exploration of space—"all" logically including the U.S.S.R. And the record shows that the agency has talked both competition and cooperation with the Russians since its early days. But it is obvious that the "race" has been much more heavily emphasized than cooperation, and that the imposing NASA establishment is a monument to competition.

The quest for cooperation, however, has been a discernible thread running through both the Eisenhower and the Kennedy administrations. American and Soviet scientists and officials began the first casual conversations on the subject in the late 1950's at international scientific meetings. Keith Glennan, first NASA administrator, made a meaningful gesture in 1960 when he offered the services of American tracking stations before the Russians sent their first cosmonaut into orbit. The offer was politely noted but not taken up.

Times Inauspicious

In his inaugural address President Kennedy put forward his invitation to "explore the stars together," and a White House aide recently said that during the Kennedy-Khrushchev meeting in the tense summer of 1961, the President made a more pointed "let's go to the moon together" suggestion to the Russians.

This was a period, however, when the tensions between the two countries were severe and when it also appeared that the Soviet Union was considerably ahead of the United States in space technology. It was a period when the Soviet Union seemed to be following a policy of tokenism in international exchanges. It was a time when Soviet foreign policy was geared to the thesis that no progress in relations in almost any sphere was possible without "total and complete disarmament."

The serious possibility of U.S.–Soviet cooperation in space dates from immediately after Colonel Glenn's orbital flight in early 1962, when the President responded to Khrushchev's congratulatory letter with a prompt reply which included a list of possible projects for cooperation in space.

Out of this exchange came the Dryden-Blagronravov space negotiations which produced the American-Soviet agreement to cooperate in three areas: (i) co-ordinated weather satellite program; (ii) joint communications satellite experiments, (iii) cooperation in a geomagnetic survey.

As has been pointed out in this space, all of these projects involve coordination, not integration. The original American suggestions were based on estimates of the limits to which the Russians would go in cooperating, and these estimates proved generally accurate.

The Russians may be willing to join in other projects which involve, essentially, the exchange of information. But the current bilateral agreement gives no real grounds for belief that the Soviets are ready to participate in undertakings which require the interchange of personnel or equipment.

On the American side, the President's position has been that genuine cooperation is desirable in part because contacts between the two countries tend to narrow the gap in the understanding which is one of the dangerous elements in American-Soviet relations. The Kennedy policy, at least until the recent speech, has been to seek agreements involving real if limited cooperation and to reject formulas with mainly propaganda value.

Speculation about U.S.–Soviet cooperation on the lunar landing, of course, was kindled by the partial test ban agreement. Fuel for the fire was provided by Sir Bernard Lovell of the Jodrell Bank Observatory, who came back early in the summer from a visit to the Soviet Union with a report which the press interpreted as meaning the Russians have given up their crash program for landing a man on the moon and are interested in cooperating with the United States in the enterprise.

What Lovell actually said—in a July letter to Hugh Dryden, deputy administrator of NASA and home secretary of the National Academy of Sciences—was rather different.

Lovell told Dryden that the president of the Soviet Academy, M. V. Keldysh, in a long conversation, had given him to understand that there has been much discussion of the Soviet space program within the Academy and that these discussions have resulted in the following decisions:

"(*a*) A determination to perfect the rendezvous technique with an immediate aim (perhaps 1965–66) of establishing a manned space platform fo

astronomical observations at a height of 150 to 200 miles. The duty period of the astronomers on this platform is envisaged as 5–7 days with immediate return to earth if lethal solar radiation seems probable.

"(*b*) Continuation of the plans to implement the existing programs on the instrumental exploration of the Moon, Venus and Mars. . . .

"(*c*) The rejection (at least for the time being) of the plans for the manned lunar landing. The President gave three reasons:

"(i) Soviet scientists could see no immediate solution to the problem of protecting the cosmonauts from the lethal effects of intense solar outbursts.

"(ii) No economically practical solution could be seen of launching sufficient material on the moon for a useful manned exercise with a reasonable guarantee of safe return to the earth.

"(iii) The Academy is convinced that the scientific problems involved in the lunar exploration can be solved more cheaply and quickly by their unmanned, instrumented lunar program."

In response to Lovell's observation that he felt the human brain necessary to the "efficient solution of the problems presented by the lunar surface," Keldysh said that the unmanned lunar landing project might be revived if progress in the next few years gave hope of a solution of the problems.

Keldysh went on to say, according to Lovell, that he felt, in respect to lunar exploration, it was now "appropriate for scientists to formulate on an international basis (*a*) the reasons why it is desirable to engage in the manned lunar enterprise and (*b*) to draw up a list of scientific tasks which a man on the moon could deal with which could not be solved by instruments alone."

The Academy president's views, of course, may not accurately reflect the intentions of the planners who ultimately control the Soviet space effort, which is a fully integrated part of the nation's military program. But even taken at face value, Keldysh's comments stop far short of taking the Soviets out of the man-to-the-moon derby or of inviting the U.S. into partnership.

More signficantly, until the end of last week there had been no Russian response to Kennedy's proposal, nor had it even been published in the Soviet press. Then, however, a commentator for *Izvestia* referred to the Kennedy proposal, terming it "somewhat premature" and suggesting that the American press was using it for propaganda purposes. And the deputy chief of the Soviet Air Force was quoted in Paris as saying that "a more favorable political evolution" was necessary before a joint expedition could be contemplated.

Last week Kennedy also took steps to reassure key congressmen that his offer of cooperation to the Russians did not signal any abatement in American efforts to get to the moon first.

In a letter to Representative Albert Thomas (D–Tex.), chairman of the Independent Offices subcommittee which handles the NASA appropriation, Kennedy indicated he believes the moon landing program should proceed full blast, and he noted that, in respect to cooperation with the Russians, "there are a good many barriers of suspicion and fear to be broken down before we can have major progress in this field."

How Much of a Cut?

Even before Kennedy sent up his U.N. trial balloon there were reports that the Thomas subcommittee was preparing to cut the NASA appropriation below the $5.350 billion voted by the conference of the House and Senate space committees. This figure itself was a compromise which reduced the original $5.7 billion in the NASA request by some $360 million. Whether Thomas, who represents the Houston district in which the Manned Spacecraft Center is located, can exert a restraining influence on economy-minded members of the House Appropriations Committee, who are reported disposed to cut the space budget under the $5 billion mark, remains to be seen.

Although Kennedy's proposal has hardly helped NASA's fiscal prospects, a lessening in the legislators' enchantment with spending for space has been apparent for some months. And this was probably inevitable. The novelty of countdowns, blast-offs and red-hot reentries has worn off somewhat, and the space agency's very success and smoothness have to some extent robbed its operation of drama. Since the end of the Mercury program, no space spectaculars have occurred, and none are in early prospect. Nor have the Russians recently staged any extravaganzas such as those which, several times in the past, jolted Congress into scary acquiescence at space appropriations time.

Legislators characteristically react suspiciously to fast agency growth, and they have been sobered by the headlong progress of NASA from an agency which in 1959 spent $339 million and employed 9235 persons to one which for 1964 proposed a budget of over $5 billion and a payroll of 32,500 people.

Some disgruntlement has been expressed within Congress about the rather meager nourishment provided civilian industry by the fruits of space research. And increasing notice is being taken inside Congress of the criticism coming from within the scientific community that NASA is abrogating scarce scientific resources to carry out a manned lunar program when the job could be done more economically and safely if it were done more slowly, in a program that first emphasized unmanned investigations. While Congress is aware of the controversy, the legislators at this point seem to regard it as a falling out among experts, and, as one member of the House space committee put it, the criticism so far comes from a minority.

In the area of congressional relations, NASA seems not to have adjusted to altering conditions. The agency's friends in Congress complain that they are taken for granted, and NASA has antagonized committees and individual legislators by treating requests for information in a manner regarded on Capitol Hill as cavalier.

At any rate, NASA lacks both the expertise and the assets for lobbying which its major rival for funds for space research—the Air Force—commands. The Air Force has many means of endearing itself to legislators, from air transportation to football tickets, and it also has installations, contractors, and subcontractors distributed over many constituents.

The Air Force's yen for a greater role in space is a factor which may well affect the long-term fortunes of NASA. Both agencies are active in space research; NASA is basically a research agency, while the Air Force is a mission-oriented defense agency with R&D responsibilities. The two agencies share information, and the Air Force plays a direct role in some NASA undertakings, but the arrangement has not worked to the Air Force's full satisfaction.

The Air Force has pressed for closer collaboration, more "stick-time" experience in space for its people, and more leeway to work toward the development of military systems in space.

Air Force planners have been es-

pecially interested in an orbiting space station and in the development of space vehicles capable of intercepting and capturing or neutralizing satellites, which they suspect might one day be bombs in orbit.

So far they have been given limited encouragement, but it is incorrect to say that NASA has stood in the way. Rather, top Defense Department officials have kept a fairly tight rein on Air Force development of novel and astronomically expensive space weapons systems and have required that concrete proposals be made to show specifically how space can be exploited militarily. Senior Air Force officers have argued angrily that you can't know what can be done if you don't have the money to try.

In recent weeks, reports that top-level policy changes will expand the military space program have appeared in the aerospace trade press, but so far there are no signs of changes in the budget for military space research, which for 2 years had been maintained at about $1.5 billion.

There is, however, pressure in Congress for greater emphasis on space weaponry, and this has, if anything, been increased by the partial test ban agreement. The latest example, and a fairly typical one, was a statement released last week by the House Republican Policy Committee's subcommittee on the military role in space. The report was keyed to the view that "the evidence is persuasive that the military is not playing the role it should in space and that corrective action should be initiated immediately."

The conclusions put forward by the three-man subcommittee, headed by Representative Louis C. Wyman of New York, urged these steps: "i) Conduct of our national space program as a true partnership between NASA and the Department of Defense; ii) A shift of emphasis from research to operations in the various projects approved by the Department of Defense; iii) A determination on the part of the Administration that no 'military gap' should be allowed to develop—regardless of the current 'peace offensive' of the Soviet Union."

Partisan purposes cannot be discounted in the task force report, but the paper probably reflects not only the views of a number of younger House Republicans active in the policy committee but also sentiments held by a fair number of legislators of both parties in both houses.

It is clear, therefore, that NASA has recently suffered some unaccustomed difficulties and reverses. But it would be overstating things greatly to say that the tide has turned and is running against the agency. It would be more accurate to observe that NASA has entered a new phase.

The agency's way in the early days was smoothed by such potent interference runners as Lyndon Johnson and the late Senator Robert Kerr (D–Okla.). Now it is, to a much greater extent, on its own. NASA must defend itself against the onslaughts of the economizers, accept the consequences of cold war ups and downs, give solid answers to its critics, and pay the price of its own bumptiousness.

If some of the excitement has gone out of the space endeavor, NASA, in a brief 5 years, has established itself firmly with many solid accomplishments. If the legislators have grown more sophisticated and their questions about NASA activities sharper, the agency and its program still command strong support in Congress.

In other words, NASA, after 5 years, has come down to earth.—JOHN WALSH

Announcements

Academy Centenary

The National Academy of Sciences will observe its 100th anniversary with a series of scientific meetings and social and ceremonial events on 21–24 October.

Founded during the Civil War, the Academy provided technical expertise for the government in that conflict and then went on to play a key role as a source of advice on a broad range of issues involving science and government. Although the Academy has had a long association with governmental affairs, it is an independent organization that is close to government but formally outside of it. Its charter, which was granted by an Act of Congress on 3 March 1863, assigns it the task of furthering science in the national interest and advising the federal government on scientific and technological matters upon request.

Under this mandate it has been intimately involved in the growth of American scientific and technical activities. Its early services included the appointment of committees on weights and measures, the protection of coal mines against explosions, and the surveying and mapping of U.S. territories. Its recommendations led to the establishment of the U.S. Geological Survey, the Weather Bureau, the National Bureau of Standards, and the U.S. Forest Service. During World War I the Academy established the National Research Council to help organize the nation's scientific resources for national defense. In World War II it was responsible for many activities under the federal Office of Scientific Research and Development.

In recent years the 670-member organization has been responsible for U.S. participation in many major international scientific efforts, including the International Geophysical Year; it serves as an adviser on the scientific content of the space program, and among numerous other activities, it is conducting a study on the nation's use of its scientific and engineering manpower.

Attendance at the centennial observance is by invitation only.

Grants, Fellowships, and Awards

Applications are being accepted for the Glorney-Raisbeck fellowship in the **medical sciences,** for the academic year beginning next July. The fellowship carries a $6000 stipend. Applicants must hold the M.D. degree and be residents of New York or adjacent areas. They must also have an institutional appointment which will supplement the stipend and enable them to carry out their research or study program. The fellowship may be renewed for two additional years. Deadline for receipt of applications: *1 November.* (A. C. McGuinness, Committee on Medical Education, New York Academy of Medicine, 2 E. 103 St., New York 29)

Four postdoctoral fellowships in research and clinical **allergy** are available from the Allergy Foundation of America. Stipends are $5400 the first year and $6300 the second, plus a total of $800 for laboratory and travel expenses. Candidates must be graduates of approved medical schools and have completed at least 2 years of hospital internship. Recipients of the fellowships will engage in research and in clinical training as arranged with their preceptor. (Secretary, Scientific and Educational Council, Allergy Foundation of America, 801 Second Ave., New York 17)