source of gainful employment. Yet despite this prior knowledge, it is not surprising, as a sociological phenomenon, to see defensive movements of a trade-union nature originate spontaneously, as employment of geologists in the petroleum industry of the United States approaches its culmination and eventual decline. Whether such movements may be detrimental to the progress of geology as a science merits serious consideration.

Offsetting these negative considerations is the fact that during recent decades the view that geology is an integral science, and that an adequate geological education must embrace the fundamentals of the other sciences, has gained wide acceptance. Very good educational programs based on this view are already operating successfully in a number of universities.

Summary and Conclusion

Despite the large amount of superficial evidence to the contrary, the present state of science in the United States is one of considerable confusion. In large measure, we appear to have lost sight of our intellectual foundations and to have reverted to authoritarianism. Contributing to this situation is the state of the universities. Since World War II these have become so deeply engaged in the pursuit of various kinds of applied research that they have seriously neglected their primary duties as institutions of learning and of education. Possibly the greatest source of this disruption is the government contract-grant system upon which the universities are becoming increasingly dependent for continued existence.

At the same time, the problems confronting the human race today are such that a widespread knowledge of science is essential if they are to be dealt with effectively. If noncatastrophic solutions of these problems are to be found, it is urgent that our universities again become institutions of learning, and that we provide for them a more orderly form of support than that which they now receive. It is equally urgent that competent teaching in universities again be accorded the respect that its importance demands, and that the curriculum be revised to make it not only possible but mandatory for students to receive a working knowledge of the fundamental principles of science. It is also urgent that universities abandon their present preoccupation with trivial "research," and its bookkeeping based on the number of papers published per year, and attempt to achieve an atmosphere in which a Gallileo, a Kepler, a Newton, a Darwin, or a J. Willard Gibbs would find it congenial to work.

Should these things be done, a badly needed renaissance in education, in scholarship, and in science, almost certainly could be brought about.

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News and Comment

Space Program: Skepticism Grows But in Context of Cold War It Is Hard for Congress To Say No

Amid reports of growing congressional skepticism, the space agency went to Capitol Hill last week to present an "austere" $5.7 billion budget for the coming fiscal year, an increase of about $2 billion over its present budget.

Congress undoubtedly will fulminate over the grand total, and it can be expected to slice here and there, but it is a safe asssumption that between now and the day of decision the Soviets will come to the rescue with a mighty space spectacular that will drown out the voices of skeptics. Such was the case last year when the critics, who were enjoying a spate of public attention, suddenly found themselves pushed out of view by the excitement—and fear—produced by the simultaneous orbiting of cosmonauts Nikolayev and Popovich. The Russians have not told us what they now have in the works, but it is not likely to be of a petty nature, and when it is carried out, the space agency's budget will ride home free in its wake.

Nevertheless, the ranks of the space critics are growing, and for this the administration itself can take a share of the blame. For, whatever the merits of a massive national space effort may be—and it should be recognized that in the context of the Cold War a big space program is inevitable—the fact is that, in selling it to the public and Congress, the administration has been proffering some glittering but tinny arguments.

It has said that the United States must land a man on the moon and return him safely to earth before the end of the decade, but it has not said why

this should be the goal and timetable, other than to offer the homily that goals and timetables have inspirational value.

It has said that the United States will beat the Russians to the moon, but when NASA Administrator James Webb was asked last week to account for this optimism, he told the House Science and Astronautics Committee: "Well, I am a great believer in that when you turn the full power of the U.S. government and the industrial team and the very bright scientists and engineers in our universities together into an effort and meld them into a team, it is pretty hard for any other nation in the world to beat them." Webb went on to say that the United States is building a booster, the Saturn, that can handle the job, and he expressed doubt that the Russians would be able to match it. The basis for this doubt was not described, but the whole train of reasoning smacks of the long-discredited notion that the West is innately superior in things technical.

It was this notion that led some supposedly informed persons to estimate that it would take the Soviets 20 years to build an atom bomb; it led to the cozy conclusion that the Egyptians could not possibly run something as complicated as the Suez Canal, which seems to be handling traffic very nicely; and it accounts for the West's utter astonishment over the first Sputnik.

By saying that we will be first—without backing the claim with hard evidence—the administration is undoubtedly perking up spirits that might otherwise droop under the Soviets' present lead in booster capacity and manned space flight. But at the same time it is nourishing the same sort of skepticism that has made the advertising industry one of the more suspect institutions in American life. (I once asked a Soviet diplomat why his country does not claim that it will be first on the moon. He answered, "Since no one knows who will be first, it might be embarrassing to make any promises. Let us wait and see.")

Along with claims for impending superiority, the administration has also been promoting the idea that all sorts of terrestial benefits will grow out of space expenditure. Some officials are now acknowledging that space research is not easily translatable into civilian products, and they are therefore promoting the civilian technology program that was described in this space on 15 February. But others are still telling Congress and the public that the space effort is the best thing that ever happened to heart surgery and kitchen crockery. This has led to some disputation over which came first, the ceramic coffee pot or the nose cone, but whatever the case, the effort to win support for the space program on the dubious grounds of beneficial side effects smacks of flimflammery, and it is not winning friends for the race to the moon.

A further source of space skepticism is NASA's rather blatant pork-barrel approach on how to win friends and influence people in Congress. NASA's installations have to go some place, and it is naive to think that site decisions in the multi-million-dollar range can be conceived immaculately, but congressmen who have not been getting their share are concluding that the political input in these decisions is reaching grand proportions.

Houston, Texas, no doubt has many physical attributes that commend it as the site for NASA's $130 million Manned Space Center, but, coincidentally or not, the site abuts on the congressional district of Representative Albert Thomas, who chairs the House Appropriations Subcommittee that passes on NASA funds.

The case for going to Houston included the argument that the space center would stimulate a great technological revolution in the Southwest; that it would bring people and facilities flocking there who would otherwise find the area unattractive. There is no question that it will, but now NASA is proposing to build a $50 million electronics center in the Boston area, justifying the site on the grounds that Boston has a unique reservoir of trained manpower to staff this facility. At last week's space hearings no one was so impolite as to ask NASA officials whether the selection of Boston had anything to do with Senator Edward Kennedy's campaign pledge that he "can do more for Massachusetts," but the suspicion was expressed privately. And now that Senator Clinton Anderson, of New Mexico, has succeeded to the chairmanship of the Senate Aeronautical and Space Sciences Committee, it is not unlikely that NASA is going to discover some unique features in the terrain of that state. Anderson is reported to have said that he thinks New Mexico would be a fine landing point for the moon capsule.

NASA, of course, is not oblivious of those who do not share its views on how fast the space program should move along, and in a blunt fashion it is now telling Congress that budgetary cuts would have dire consequences. First of all, Webb pointed out, the $5.7 billion is needed for lots of work now under way. Cut it, he said, and the agency will have to kill or reduce some of its contracts, which means that people will be put out of work, with no one but Congress to blame.

He also argued that NASA was presenting "an austere budget set at the lowest level which would permit the maintenance of target dates that we believe are realistic." And he told Congress that if it fails to produce the money, it is, in effect, voting for second place in the moon derby. This is something that few congressmen want to be charged with, and therefore it is fairly safe to assume that NASA is going to get pretty much what it wants. Nevertheless, the skepticism exists and increases, and if the Soviets should ever be so shrewd as to convince us that they are in no hurry to get to the moon, it is probable that NASA's troubles would flourish. For, any way you slice it, an accelerated moon program can command political support only in a Cold War context, and if that were removed, the administration would find that its various enticements—lunar adventure, civilian byproducts, contracts, and judicious site selection—would not be sufficient to coax $5.7 billion out of a conservatively oriented Congress.

—D. S. GREENBERG

Fish Flour: Administration's Interest Has Not Been Matched by Funds for Needed Research

Fish flour is a promising but not altogether perfected food supplement whose potential for use in underdeveloped countries aroused considerable official interest in the early days of the Kennedy administration. The interest still exists, but so far relatively little has been done about it, and therein lies a neat illustration of the pitted path that sometimes lies between the laboratory and the fulfillment of human needs.

Fish flour, a white powder also known as fish protein concentrate, is