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– – – – – – – – to provide information and to stimulate discussion. Not to be attributed as official FAS policy unless specifically so indicated.

INCREASED FAS ACTIVITY ON ABM ISSUE

On an inside page of this NEWSLETTER is another statement on the ABM question from the Chicago FAS Chapter—subsequent to the statement from the same group published in last month's NEWSLETTER—and also an item on press coverage of the growing FAS activity in the ABM area. So far, word has reached the NEWSLETTER of FAS Chapter or Branch activities on the ABM issue in: Cambridge, Chicago, Detroit, Los Angeles, and Seattle. It is likely that it will be possible to print in the next NEWSLETTER statements from one or more of these groups with, hopefully, some indications of public and press response to the new FAS activity.—H.L.P.

DuBRIDGE TO SEEK CLOSER TIES OF GOVERNMENT WITH SCIENTISTS

By WALTER SULLIVAN

The appointment on December 3 of Lee A. DuBridge, President of CalTech, as President-Elect Nixon's Science Advisor has been widely aclaimed by the American scientific community, including about a dozen FAS members informally polled by the NEWSLETTER Editor. Following is the text of an article by Walter Sullivan, entitled as above, in the New York Times of 17, 1968. Also to be found in the same issue of the Times—but not reprinted here for lack of space—are excerpts from the Times interview with DuBridge.

President-elect Richard M. Nixon's science adviser believes that a major task confronting the new Administration is to heal the breach between the scientific community and the Government—particularly the Defense Department.

Dr. Lee A. DuBridge, president of the California Institute of Technology, who was named Mr. Nixon's science adviser on Dec. 3, made the comment in an interview with a team of reporters and editors of *The New York Times.*

He said he would try to draw the country's scientific leaders, especially those outside the Government, more intimately into the President's decision-making machinery.

Furthermore, Dr. DuBridge deplored the recent cuts in spending on basic research. For the next few years, he said, the budget for such research should grow 10 per cent annually.

"Now, obviously, a 10 per cent increase can't go on for 0 years, or it would exceed the total Federal budget," he id. However, he added, "in the next few years" such growth is necessary to cover the increasing costs of research.

He expressed serious misgivings about any merging of re-

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CHAMBERLAIN AND WILSON ARE NEW MEMBERS OF FAS ADVISORY BOARD

The NEWSLETTER is pleased to be able to announce that Owen Chamberlain and Robert R. Wilson have agreed to become members of the Advisory Panel of the FAS. Both men are former FAS Chairmen. Chamberlain is a Berkeley psysicist and a Nobel laureate. Wilson is Director of the National Accelerator Laboratory in Illinois.

NEWS ITEMS

(Following excerpt is from an article by Kathleen Teltsch in the New York Times 9 December 1968. The attention of FAS members is directed to the role of FAS Council member Louis B. Sohn in constructively stimulating UN interest in a broad area where the impact of science on human life is steadily and pervasively increasing.)—H.L.P.

Four nations are asking that bugging, drugs that pry into men's minds, and computers be studied as possible threats to personal privacy. They are asking for a United Nations study of any developments in science and technology that might affect human rights.

The lead in asking the UN and its agencies to explore possible technological intrusions into individual rights was taken by Pierre Juvigny, a member of the French Supreme Court and French Delegate to the General Assembly. Japan, Mauritania, and Salvador co-sponsored the resolution with France. In a brief interview, Mr. Juvigny said that their move resulted from a number of conferences on human rights at which apprehensions were recurrently expressed that science, while producing many benefits for mankind, had registered many gains that could be injurious.

Also of concern were the ethical and moral problems posed by medical transplant operations. Juvigny said that "what we ought to do is draw up a kind of balance sheet for all the problems created by technological advances and then see where we must begin our studies."

The four-nation request for a UN study stems from meetings which had been held during previous months. Discussions at these meetings were particularly stirred by a report by Professor Louis B. Sohn of Harvard University which

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INSERTED IN THIS NEWSLETTER ISSUE

At the suggestion of FAS Treasurer, Leonard Rodberg, this issue of the NEWSLETTER contains as a separately printed insert a two-article series by Bernard Nossiter on defense firms, reprinted from the *Washington Post* of December 8th and 9th. The subject of the Nossiter articles are certainly of interest to FAS members. The insert in this NEWSLETTER is part of a substantially large press run made chiefly for the Friends Committee on National Legislation. Arrangements for these additional copies for insertion in this NEWSLETTER were made by Rodberg, to whom the NEWSLETTER is once again indebted.—H.L.P.

NEW STATEMENT OF CHICAGO FAS CHAPTER ON SITING OF SPARTAN ABM MISSILES

Following is the text of a summary statement released by the FAS Chicago Chapter on 18 December 1968, entitled "Nuclear Missile Safety and the Libertyville Spartan Site." Unfortunately, it is not possible to print in the NEWSLETTER the two maps mentioned in the statements. The map prepared by the Chicago FAS Chapter specifically for the Libertyville site can probably be obtained from the Chicago FAS Chapter if FAS members and others wish to write for it. (Editor's Note: If FAS activities in regard to ABM or other issues continue and appear to justify arrangements for the printing of maps and other figures in the NEWSLETTER in the future, then arrangements will certainly be made.) The other map not printed here but referred to as part of the testimony of Dr. John Foster may be found on pages 14 and 15 of Dr. Foster's testimony before the Joint Congressional Committee on Atomic Energy, 6 and 7 November 1967. The ABM statements emanating from the Chicago Chapter drew substantial attention in the Chicago and Waukegan, Illinois newspapers.

The Department of Defense has stated that the nuclear warheads of the Spartan missiles are safe, that there is no risk of an accidental explosion. It is difficult to accept such unqualified reassurance regarding a weapon that has to be launched and exploded within a very few minutes of the time when first notice of approaching enemy missiles is received. An accidental explosion of a Spartan warhead at the propected Libertyville site would have catastrophic consequences, not only for the population in the near vicinity, but for much of the metropolitan Chicago area. In order to reduce the number of people exposed to this danger, such a site should be 100 or more miles from any major center of population such as Chicago. Official testimony before Congress indicates that this distance would not appreciably alter the effectiveness of the "thin shield" offered to Chicago.

There are nearly half a million people living within 15 miles of the proposed Libertyville site. The explosion of a megaton warhead in a missile silo would leave a crater some 300 feet deep and nearly 1400 feet across. A sixty square mile areas surrounding the site would be destroyed by the blast wave. Heat from the fireball would start fires up to ten miles away. The worst disaster, however, may well be caused by the radioactive fallout from such an explosion. Fallout would be deposited in lethal doses over hundreds of square miles and, with the prevailing wind from the Northwest, much of this area is likely to be in the heart of metropolitan Chicago. The enclosed map shows the areas under question for the Libertyville site, making some assumptions regarding the size of the warhead.

Military secrecy prevents public appraisal of the safety of nuclear weapons. From what is known about the civilian

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FAS NEWSLETTER

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Chairman ..... Cameron B. Satterthwaite

The FAS Newsletter is prepared in Washington.

Editor: Harriette L. Phelps.

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The FAS, founded in 1946, is a national organization of scientists and engineers concerned with the impact of science on national and world affairs.

Sources of information (given in the articles in parentheses) are for further reference. Items reprinted directly from other publications are designated as such in an introductory paragraph.

SCIENTISTS' GROUP SPEARHEADS FIGHT TO RUN SENTINEL MISSILES OUT OF TOWN

Following is the text of a news item from the 23 December 1968 issue of Scientific Research, dateline Washington, and entitled "Scientists Group Spearheads Fight to Run Sentinel Missiles Out of Town":

The Federation of American Scientists may have lost some battles but it has not given up its war against the Sentinel anti-ballistic missile system. Having narrowly lost a congressional fight earlier this year to delay construction of the system, the Federation is now trying to force the government to locate the system's missile sites much further than now being planned from the 10 major U.S. cities that are to be protected. The Federation also hopes to force Congress to hold open hearings on the sites and the safety of the megaton-range Spartan missiles that are a major part of the system when the House Armed Forces Committee takes up the Army's site proposals next year.

The latest FAS skirmish took place last month when its Chicago chapter publicized tests the Army was making of foundations at five potential Spartan missile sites, all within 15 miles of the Loop. Before that, the Seattle FAS chapter had protested vociferously against an Army proposal to place a missile at the site of a projected city park. FAS members in the other urban areas scheduled for missile sites are being urged to make similar protests. This month, the Detroit chapter took up the fight.

Charging that the Spartan missiles might accidentally bring disaster to the area, the Chicago Federation chapter stirred up enough public alarm to bring John Foster, the Defense Department's director of research and engineering, hurrying out to Chicago to hold a private meeting with anxious local Congressmen.

According to an Army spokesman, the Sentinel system has a "series of safety devices" that make the possibility of any nuclear yield in case of accident "so remote as to be nil." For "obvious reasons," the safety devices are classified. "I would think that if the scientists could be made privy to this information, as thinking men they would accept the safety of the system," the Army spokesman said. And he added that "in 20 years there has never been a nuclear yield from a weapon involved in an accident."

But this reassurance does not satisfy FAS National Chairman Cameron Satterthwaite of the University of Illinois. There's always a chance for human error and these missiles will always be in a state of almost ready alert," he said. "So I don't think there could be too many safeguards."

Federation scientists estimate that a full underground nuclear explosion at a missile site would create a 2-to-3-mile mile radius of complete destruction. The Army agrees that such an accident would "do a lot of damage" to the surrounding area. However, if the missile sites were moved several hundred miles out from the city, radiation damage to the metropolitan area would be substantially reduced.

"The fallout decays pretty rapidly. So, depending on how the wind's blowing, you can gain a good deal in an hour or so if the explosion is several hundred miles away," said Stanley Ruby, an Argonne National Lab physicist and Illinois FAS chairman.

The Army's answer is that the sites must be close to the city to protect it from missiles coming in from all directions. Ruby admits this argument makes some sense to him and that he sees only a slim possibility of accident in the Sentinel system. But, he said, the military should not have absolute authority in setting up the system. "With the kind of interlocks and safeguards that are needed, we feel someone should be looking over the Army's shoulder."

DuBridge on Scientists and Government — Continued

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search work, now done by many government agencies, into a single department of science and technology.

He likened this to the establishment of a "Department of Typewriters" simply because many government agencies make use of such machines.

Rather he hopes that the various government departments will expand their research in areas related to their missions.

Dr. DuBridge was interviewed on Friday in Washington, where he has been meeting with members of Mr. Nixon's entourage. He said he also hopes to consult with his predecessor, Dr. Donald F. Hornig.

Dr. DuBridge indicated that the entire machinery whereby the Government and the President make basic policy decisions in science and technology was under review by the incoming Administration.

Not only will Dr. DuBridge assess the situation critically, but also a committee headed by Dr. H. Guyford Stever, president of the Carnegie Mellon University in Pittsburgh, is doing so.

The new science adviser believes the gulf that has developed between the scientific community and the Defense Department can be attributed in large measure to opposition to the Vietnam war.

However, he conceded that some of it was rooted in earlier concern, particularly among university researchers, over the arme race and the danger of a nuclear holocaust.

Universities Role Stressed

"A university being a teaching institution," he said, "cannot easily have closed laboratories with "Secret" signs on them." Nevertheless, he added, it is important to the defense of the nation that the universities work with the Defense Department "in ways that are consonant with the university atmosphere."

Asked for his views on the debate concerning an antiballistic missile system, Dr. DuBridge said he was not as yet privy to sufficient information for a judgment. However, he spoke out strongly on the need for measures to curb the "rat race of nuclear build-ups."

Dr. DuBridge emphasized at the outset of the interview, held at The New York Times bureau in the national capital, that he could only express his "general philosophy" on such matters. Once he has stepped into his new role, he said, his views on some policy matters may change.

Dr. DuBridge is familiar with the Washington scene. He was a member of the first science advisory committee, formed by President Truman on April 20, 1951. He served as its chairman from 1952 to 1957 when the committee reported to the President through the Office of Defense Mobilization.

In the wake of the lofting of the first Soviet sputnik in 1957, the committee and its chairman were moved directly into the White House establishment with Dr. James R. Killian Jr. as its first leader. It is to this post, at the President's elbow, so to speak, that Dr. DuBridge will succeed.

Queried on Space Program

Dr. DuBridge was asked about the space program, which was greatly intensified by the sputnik launching, but which more recently has been criticized as too costly and has suffered many budget cuts.

He extolled the many discoveries made with unmanned spacecraft, but said that for the more elaborate missions of the future astronauts would probably be more economical than the elaborate systems needed to duplicate their performance.

"There are many people," he said, "that visualize that in the next 20 or 30 years we might have quite a few people on the moon—a quasi-permanent base, with an exchange of people back and forth."

Dr. DuBridge was asked about commitments to industrial projects, many of them military, of such magnitude that their momentum carries them far beyond desirable limits.

He replied that there were "vested interests" throughout the national establishment—in agriculture, in atomic energy, in space research, in the military, and so forth.

"One must avoid building a program," he said, "which cannot be changed or stopped because the personnel build-up, the interest build-up, has become an impediment to change."

He was asked whether he was of the somewhat despairing view that widespread famine was almost inevitable because population growth is outstripping food production.

The use of modern agricultural techniques in the developing countries could multiply food production manyfold, he said, but there are serious limitations to the speed with which this can be done.

"There is a serious danger," he said, "that in 25 to 30 years the population will double and the food supply will double and we will be right where we are today as far as the percentage of the population that is undernourished is concerned."

The answer, he observed, is to press forward with research on greater food output at "all possible speed." At the same time, he said, it will be necessary "to exert all possible pressures and techniques for limiting the population growth."

With regard to recurrent proposals that the Cabinet include an officer concerned with science and technology, Dr. DuBridge said that, if such an officer were responsible for directing research activity, it might still be necessary to have a Presidential science adviser.

The Cabinet man would have to "fight" for his agency, Dr. DuBridge said, and could no longer be a "neutral adviser."

FAS and Sentinel Anti-Ballistic Missiles — Continued

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nuclear power program, and from experience with complex electrical and mechanical devices, many civilian scientists and engineers are worried about the risk of nuclear warheads exploding near the city. One of the most compelling statements on weapon safety is given in the Department of Defense handbook, **The Effects of Nuclear Weapons: ". . . there** is always a possibility that, as a result of accidental circumstances, an explosion will take place inadvertently."

The record of the military in handling nuclear materials does not inspire a great deal of confidence. There has not yet been a nuclear yield from the accidental explosion of a nuclear weapon, but a number of incidents involving nuclear materials have occurred. The worst accident with a nuclear reactor in history occurred with an Army reactor which was being operated by military personnel. This accident is generally acknowledged to have been the result of gross carelessness. Nuclear weapons have been involved in a number of accidents with airplanes. In one instance, a 24 megaton hydrogen bomb was accidentally dropped in North Carolina. It was reported that for this weapon, with enough destructive to wipe out half of the State, five of the six safeties were released in the accidental drop.

The need for placing the Spartan site close to a major population center has not been made clear by the Defense Department. The testimony before Congress implies that the Spartan provides a "thin shield" over an area some 400-700 miles across. If there is no overwhelming need to place Spartan sites so close to Chicago, then every attempt should be made to have this site moved at least 100 miles away to an area where the population density is very much lower than here. A copy of the testimony of Dr. John Foster at a Congressional hearing is included which shows that a site in Iowa could cover Chicago.

NEWS ITEMS — Continued

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suggested that new problems in the human rights field were being evoked by eugenics, or biological selection practices, the use of sedatives and truth serums, as well as by electronic inventions that permit eavesdropping or other invasions of private activities.

Professor Sohn, during a year's sabbatical from Harvard, has been cataloging decisions made by UN bodies. But he paused to discuss the report he has written. "I frankly was thinking what new aspects are facing us in the human rights field," he said. "I talked to friends who are chemists and scientists. And the more I looked into the matter the more concerned I became that we are not stopping to think."

"This is not science fiction—it is here and now." Professor Sohn, in a recent study, said he saw particular dangers in inventions that would give a few men great power to influence or destroy their fellows. "A conspiracy of technicians might be more dangerous in a nuclear age than a conspiracy of generals," Professor Sohn said.

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The sale of the Cornell Aeronautical Laboratory to EDP Technology, Inc. (see the October NEWSLETTER) has been temporarily blocked by legal action.

The injunction, blocking the sale, was sought by New York State Attorney General Louis J. Leskowitz, who said that the proposed sale would violate the restrictive terms of gifts made [to Cornell] and irreparably damage the intended beneficiaries of the gifts. Cornell acquired the laboratory as a gift from Curtis-Wright Corporation for the nominal price of $1 in 1945. Aircraft manufacturers made cash gifts toward the operation of the facility. In arguing for the injunction, the Assistant New York State Attorney General contended that the University had received various gifts for charitable and educational purposes in the nature of a public trust, and had dedicated them to the laboratory.

Denying the motion by Cornell, the Laboratory, and EDP Technology to dismiss the action, State Supreme Court Justice Frederick M. Marshall said that there were triable issues of fact. "The disposition of a unique laboratory facility for a consideration of $25 million should not be flung off on a motion for summary judgement," he said. Justice Marshall said that he would direct that the case be given preference on the trial calendar.

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An interesting tabulation and discussion of what the military probably wants from the incoming administration is contained in an article in the 23 December 1968 issue of *The National Observer*. The list, with some estimated price tags, includes the following:

A "thick" anti-missile defense system, instead of Mr. Johnson's "thin" system. Estimated cost of the "thin" ABM system is $8 billion; estimated cost of the "thick" system is $40 billion to $50 billion.

New Fighter aircraft for the Air Force and the Navy, about $12 billion.

More funds for advanced research and development, perhaps in the range of $3 to $5 billion.

The new strategic bomber, about $15 billion.

Deployment of the multiheaded Poseidon and Minuteman III ballistic missiles, $12 billion.

More nuclear submarines ($80 million each), nuclear aircraft carriers ($544 million each), and nuclear escort ships ($125 million each).

Mr. Nixon also proposed during the campaign to switch over to all-volunteer armed forces, once the war in Vietnam has ended. Estimates of the additional cost of such an army in the first year run in the $5 to $7 billion range. But Defense Department studies have indicated the cost might, in fact, run as high as an additional $17 billion.

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An attempt by a group of countries without nuclear weapons to create a new, permanent disarmament forum was blocked by the U.S. and the Soviet Union. The sponsors of the attempt, including several nations dissatisfied with the treaty to halt the spread of nuclear weapons, agreed to put off their effort to reactivate the General Assembly's dorminant Disarmament Commission until the Assembly session next year.

The U.S. and Soviet Union, Co-Chairmen of the Geneva Disarmament Conference, have fought the attempt to reactivate the Commission, which would give non-nuclear weapons States a sounding board for criticism of the understandings of the super powers on nuclear issues. The attempt was led by Italy, Brazil, Yugoslavia, Argentina, and Pakistan. (*New York Times;* 13 December 1968)

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Twenty-two scientists, including six Nobel laureates, have declared that an intensifying crisis in American science and education exists as a result of drastic cuts in federal financial support. Acting as an investigative committee of the New York Academy of Science, the scientists went so far as to say that the future of the country and of mankind is threatened.

The panel directed a preliminary report to President Johnson, President-Elect Nixon, their science advisors, and the new Congress. It called for both short-range and long-range money measures to ease the asserted crisis and to put federal support of research and education on an assured footing. The investigation covered 84 academic institutions and the work of 193 research scientists chosen at random. It exposed widespread harms of the $6 billion cut in federal spending ordered by the last Congress to combat inflation.

The panel said that one result of the cuts is that "potential solutions of such problems as poverty, racial discrimination, population control, air and water pollution, cancer and cardivascular disease, mental illness, mass transportation, housing and education, are not being pursued because of a lack of continuing support." The panel asserted that the damage includes "new colleges, graduate centers, and research centers [which] are finding it difficult to attract first-rate scientists." Furthermore, it said, young scientists and new research projects are having difficulty finding support. The report declared that, whereas our nation will need more scientists in the future, it will actually have less because training programs are being drastically curtailed. The report also noted that previous federal investments in the advancement of science are being lost, and because "new schools, hospitals and research centers are not being fully utilized, research that is now reaching a fruitful stage will have to be discontinued, and experienced research teams are being disbanded with consequent permanent losses of important capabilities."

As a short-term measure, the panel recommended the diversion of federal science funds—funds now earmarked for buildings and other capital equipment—to faltering research programs and to the training of scientific manpower. As a longer-range solution, it recommended the adoption of "guidelines for the annual growth rate of federal spending on scientific research," and suggested that the growth of the economy could support an annual growth rate of 15 to 20% in such spending.

Among the panel members was Jerome B. Weisner, M.I.T. Provost and former Science Advisor to President Kennedy. (*New York Times;* 23 December 1968)

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The Army has adopted stiffer safety measures for testing lethal nerve gases and other chemical agents at its Utah

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Proving Ground. The tighter safeguards were recommended by a committee of experts after some 6300 sheep died last March following tests of a chemical nerve agent at Dugway Proving Ground. The Army has said investigations have failed to turn up any conclusive evidence that the sheep died because of the gas. But it has nevertheless paid a claim of more than $376,000 for the loss of the sheep.

The Army made public a 39-page report in which the special committee recommended restrictions on release height and particle size of chemical agents. It calls for more reliable weather forecasting in consideration of wind speed in planning tests.

The new restrictions do not apply to relatively low toxicity chemicals, such as riot control agents, incapacitating and non-persistent lethal agents. The Army had said earlier this year that large-scale testing of lethal chemical agents had been suspended. The committee making the recommendations to the Army was headed by Dr. William H. Stewart, Surgeon General of the U.S. Public Health Service. Members included representatives of the Agriculture, Commerce, and Interior Departments, the State of Utah, and the Surgeon General of the Army. (*New York Times;* 21 December 1968)

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A new $50 million science complex is planned for Columbia University. The complex will be located on Columbia's North Campus, near the corner of Broadway and 120th Street.

Columbia's acting president, Dr. Andrew W. Cordier, said that the area chosen for the new buildings was within Columbia's "traditional campus boundaries" and that the construction will "cause no community dislocation." Some of the University's real estate operations have met considerable opposition in the Morningside Heights area of New York City.

The first building to go up, according to Cordier, will be a $12 million Life Sciences facility. This will provide a permanent home for Columbia's expanding program of instruction and research in the biological sciences, and should be completed by 1972. The new complex will also include expansion of the Departments of Biological Sciences, Astronomy, Chemistry, Physics, and permit the growth of Columbia's Computer Center, for which a $3 million expansion program has already been proposed. These new science facilities will be among the first supported by the University's current $2 million capital campaign, Cordier said, a drive that recently passed the $1 million mark. (*New York Times;* 15 December 1968)

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The U.S. has lifted its suspension of U.S.-Soviet official cultural exchanges imposed after the Soviet invasion of Czechoslovakia in August. Officials said discussions would begin soon between these two countries on implementing other parts of the 1968-69 cultural agreement, which virtually came to a halt after the invasion. Under the agreement, each side is to send three major performing arts groups to the other's country and each side is allowed one touring exhibition. (*New York Times;* 20 December 1968) (*This news items relates, of course, to cultural rather than scientific exchanges; but it is included here because both scientific and cultural exchanges between the U.S. and the U.S.S.R. are subject in somewhat similar ways to changes in the political climates between the two countries.*)

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In a relative break with their previous custom, the Soviet press published prompt and relatively complete factual accounts of the progress of the six-day flight of Apollo 8 which orbitted the moon. On completion of the trip, Tass, the Soviet Press Agency, paid tribute to the "courage and mastery" of the three astronauts and noted that the Apollo 8 flight "ushers in a new stage in the history of space exploration." President Podgorny of the Soviet Union addressed a congratulatory cablegram to President Johnson. And in a message released by the Soviet Embassy in Washington, ten Soviet cosmonauts extended congratulations to the Apollo 8 astronauts. Previous Soviet press coverage of manned American space flights has been essentially accurate but relatively sparse. (*New York Times;* 29 December 1968)

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A new federal report warns that the nation could lose billions of dollars and thousands of lives in the next thirty years, for lack of a major program to predict and guard against earthquakes. The report, prepared by an interagency working group of the Federal Council for Science and Technology, and released by Donald I. Hornig, the President's Science Advisor, on December 30th, declared that such a massive toll might result frm a single earthquake disaster. So far, the nation's worse disaster was the 1906 earthquake at San Francisco, which claimed 700 lives and cost the equivalent of $2.6 billion in today's dollars. The chance of another, greater, earthquake near San Francisco within the next 30 years is called substantial. Only one such major disturbance occurred there in the 20th century, but there were four during the 19th century before the Bay area became densely populated.

The panel said that the earthquake hazard was a national problem, not limited to the West Coast, and that many regions are almost totally unprepared. As an illustration of the national scope of the problem, the report said that a series of shocks in Missouri occurred more than 150 years ago that may have been part of the largest known earthquake in the United States outside of Alaska. This disturbance of 16 December 1811 was felt over an area of at least a million square miles, from Canada to New Orleans, and from the Missouri River to Boston.

The report said that only 18% of the country had sufficiently detailed geological mapping to give more than the rudimentary idea of local earthquake hazards. Lacking guidelines, many cities, government agencies, and individuals are continuing to build with no consideration to earthquake hazards. The panel report recommended a ten-year research program that would cost $220 million. The report noted that studies near Denver (see previous NEWSLETTERS) had indicated that injection of water into certain areas of natural strain might trigger earthquakes. A series of earth tremors occurred there early this year after an Army arsenal dumped waste water into a 12,000-foot deep well near Denver. (*New York Times;* 30 December 1968)

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The supply of medical school graduates has been falling behind the rapid expansion of enrollments in other sectors of the university and professional school system ever since the 1920's. This is the conclusion of the Carnegie Commission on Higher Education in a report released in early December.

At present, the report said, 20% of all new physicians starting practice in the United States each year have received their training abroad. And health care is not properly available in many rural areas and urban ghettos. The Commission called for new and expanded facilities to provide for 75% more medical students by 1976. It urged federal grants to cover the entire cost for the creation of new places, as well as start-up grants for about 20 new medical schools at a rate of 4 a year for 5 years. Grants for students, depending on need, of as much as $3,500 a year are urged as well as sizeable grants per student for the institutions. (*New York Times;* 15 December 1968)

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The Soviet Union has begun operations at its first experimental tidal power station on the Arctic Ocean. The station, fifty miles northwest of Murmansk, has been under construction for several years. The first power is being produced by a French-manufactured 400-kilowatt turbine. The second turbine, to be installed later, will raise the capacity to 800

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kilowatts. The Soviet Union has lagged behind other countries, notably France, in the development of tidal power. The small initial station is designed to serve as a pilot project for far more ambitious power plants. (*New York Times;* 30 December 1968)

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Ameica's astronomers are getting their first look at some interesting aspects of the stars from the Orbiting Astronomical Observatory which went into orbit on December 7th. The satellite is in a 480-mile high circular orbit, placing it above the earth's atmosphere. This lets it "see" ultraviolet and other wave lengths which are blocked by the earth's atmosphere. Particularly by studying ultraviolet emissions, astronomers believe they can learn much about the heat and intensity of stars, and thus obtain clues to their age. They hope to put stars of different ages into a sort of rough order and thus deduce evolution of the stars and, possibly, of the universe. The seven telescropes in the Orbiting Observatory are in a package developed at the University of Wisconsin. In operation, they inspect individual stars for hours at a time, observing chemical composition, pressure, and density of each stellar structure. (*New York Times;* 12 December 1968)

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Official Soviet policy on heart transplants appears to be changing. The first Soviet heart transplant, performed last November 4th—with the heart recipient dying some 33 hours later—was described in detail in the Soviet newspaper Literaturnaya Gazeta on January 1st. The newspaper also reported that in December five other patients were awaiting heart transplant operations at the Military Medical Academy in Leningrad. The organization of the full-fledged heart transplant team at the Academy suggested that the Soviet military disagreed with the cautious approach to heart transplants urged a year ago by the Ministry of Public Health, the government's civilian medical authority.

After the news of the first Western heart transplant in December 1967 had reached Russia, the Soviet Health Minister indicated that Soviet physicians would not be permitted to perform such operations pending more research on the problem of rejection of the donor's heart by the recipient's body. Later the prohibition was modified, allowing for transplants in extreme urgencies. Now, with detailed reports on the first Soviet transplant attempt and acknowledgment that other patients are awaiting new hearts, it appears that Soviet policy has changed, and more heart transplants will probably be attempted in Russia in the coming year. (*New York Times;* 2 January 1968)

A fifteen-year-old New Jersey high school junior presented a paper at the prestigious International Geographical Congress in New Delhi on December 2nd. The young man, Arthur Bryan Cooper of New Shrewsbury, N.J., read his paper on "The Influence of Religion on Early European Exploration and Mapping of Asia."

Senior scholars in the audience listened with apparent interest as the New Jersey boy expounded on the contribution that early religious travelers made to western knowledge about Asia. Afterwards, Mr. Cooper submitted to routinely scholarly questions on his paper. He commented in an interview after the session: "I think it was pretty sneaky to submit the paper without giving my age." But actually, under the Congress rules papers are accepted strictly on merit and the authors are not required to list their ages. (*New York Times;* 3 December 1968)

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Several factors probably contribute to America's leadership in winning recent Nobel prizes in the sciences. This is one of the conclusions of a study made for the Organization of Economic Cooperation and Development (OECD) in Paris. The study notes that "ossification" in European research organizations and the ancient hierarchical structures of European universities have contributed to a European decline relative to America since perhaps early in this century. Although Europeans continued to lead in Nobel prizes through the twenties, by that period the leadership in basic research probably had already begun to shift to the United States. Also, as has often been noted, the flight of prominent scientists from Europe in the thirties, and the post-war American affluence (including the "brain-drain") have greatly benefitted American science.

The OECD study noted also interesting statistics: 29 of some 70 foreign members of Britain's Royal Society are American; a recent UNESCO survey of review articles—which articles are generally written by leaders in their fields—shows that about half the articles on a worldwide basis are written by Americans; scientific paper contributions by Soviet and Japanese authors have been climbing in recent years, the percentages being 16 and eight respectively; and British contributions have held approximately steady over the last couple of decades, while those from France and Germany have declined. (Walter Sullivan in the *New York Times;* 3 November 1968)

In response to reader suggestions and a personal conviction that the format of The FAS NEWSLETTER could be improved, the November NEWSLETTER was set in larger type. Reader response to this change would be welcome and any other suggestions on format.

H. L. P.

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