

# F. A. S. NEWSLETTER

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

## THE SAKHAROV ESSAY: AMERICAN RESPONSE AND POSSIBLE F.A.S. SUPPORT

*Practical difficulties (notably the time and expense of typesetting some 20,000 words—which would surely be an all-time record for the NEWSLETTER) preclude printing here the text of the highly-publicized Sakharov essay and the relatively negative response (?) of Cheprakov. Nevertheless, these papers are of obvious interest to F.A.S. members. Two members of the F.A.S. Brookhaven Chapter, O.S. Reading and Harry Palevsky, have kindly contributed briefly their own views on the situation, with the suggestion that the matter should be brought up at the next Council meeting in February and that letters or other comments from F.A.S. members could be helpful in the meantime.*

*The short Reading-Palevsky paper which follows next directs readers to complete translations of the Sakharov and Cheprakov papers. But so that F.A.S. members who have not seen the texts may be generally informed on at least the main points of the Sakharov paper, the New York Times news story (of July 22nd) by Theodore Shabad on the Sakharov paper also follows in this NEWSLETTER issue.*

—H.L.P.

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## TWO ALTERNATE RUSSIAN VIEWS OF THE FUTURE AND A (PROPOSED) FAS SUPPLEMENT

By READING & PALEVSKY.

(Brookhaven)

The attention of all scientists and politically concerned peoples of the world is recommended to the remarkable essay of Academician A. D. Sakharov of the USSR entitled "Thoughts on Progress, Peaceful Coexistence and Intellectual Freedom." Also recommended is an essay by Dr. V. A. Cheprakov, "Problems of the Last Third of the Century." Both essays were published in full in English translation in the New York Times of July 22 and August 18, 1968 and are available in photo duplication pamphlet from the New York Times Microfilm Service, 1457 Broadway, New York, N.Y. 10036. A book containing the Sakharov essay in full with notes and a laudatory afterword by Harrison D. Salisbury was published in October 1968 by W. W. Norton, N.Y. \$3.95.

Academician Sakharov presents very cogently the dangers of nuclear proliferation, an anti-missile arms race, the population explosion, environmental pollution, and the waste of natural resources. He then recommends removal of censorship, the fullest exchange and verification of information and the freedom of each nation to solve its own problems without political interference or military assistance. He outlines four stages of converging technology promoted by the adop-

(Continued on page 2)

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## F.A.S. LOS ANGELES CHAPTER PREPARES REPORT AND RECOMMENDATIONS ON AIR POLLUTION IN SOUTHERN CALIFORNIA

*On inside pages will be found the study by the Los Angeles Chapter. As usual, the NEWSLETTER is pleased to print substantive contributions—which indicate activity—from FAS chapters and branches.*

—H.L.P.

## NEWS ITEMS

*Lise Meitner, who first calculated the energy of the nuclear fission reaction, died in Cambridge, England on October 27th, at the age of 89.*

For thirty years she was the scientific collaborator of Otto Hahn, who discovered nuclear fission experimentally, and who died last July 28th (see the September NEWSLETTER). Hahn reported his discovery of fission with careful qualifications because of concern that he might have misinterpreted his apparently astounding results. It remained for Lise Meitner, working with her nephew, Otto Frisch, to calculate the energy release associated with the fission of a uranium nucleus.

In the January 16, 1939 issue of *Nature*, Meitner and Frisch included this historic passage: "It seems therefore possible that the uranium nucleus has only small stability of form, and may, after neutron capture, divide itself into two nuclei of roughly equal size. These two nuclei will repel each other (because they both carry large positive charges) and should gain a total kinetic energy of about 200 million electron volts." Within a few months thereafter Hahn's fission experiments and the Meitner-Frisch energy calculations had been confirmed in many laboratories, and the atomic age—at least in its early and experimental phase—had begun. (*New York Times*; 28 October 1968)

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*Former Defense Secretary McNamara believes a Soviet-American freeze of offensive and defensive nuclear missiles could be safely verified by unilateral national intelligence-gathering means without requiring on-site inspection. Satellite reconnaissance, in his view, would be the principal but not the only source of information. International inspection, including on-site verification, would be needed only in a later stage. The former Defense Secretary's views on the hopefully impending strategic arms limitations talks were contained in his new book, "The Essence of Security," and in interviews.*

In his viewpoint McNamara differs with the Joint Chiefs of Staff who insist that on-site inspection is essential to effective missile limitations. The Arms Control and Disarmament Agency (ACDA), and a substantial number of military and civilian experts argue that initial but nevertheless very significant strategic arms limitations agreements could be verified entirely by unilateral means. The differing points of view on how much inspection is necessary may affect the course of U.S.-Soviet discussions on limiting the strategic

(Continued on page 6)

## FAS COUNCIL MEETING

The FAS Council will meet in New York City in conjunction with the APS meetings the first week in February 1969. Exact date, time, and place will be announced in the next NEWSLETTER. All Council members and chapter representatives are urged to attend. Members who are not on the Council are welcome to attend as observers.

## Russian Views of Future and FAS Supplement

(Continued from page 1)

tion of these recommendations and culminating in a massive and effective cooperation in assistance to less developed countries at the turn of the century.

Dr. Cheprakov, an economist of the Marxist-Leninist School, forecasts that instead of the increasing improvement and convergence described by Academician Sakharov, "It can be assumed that by 1980 about 700 gigantic monopolies will control about 60 percent of the industrial output of all developed capitalistic countries and about 30 percent will be in the hands of state monopolies." Further, the greed of the leaders of these organizations will result in world wide aggressive exploitation, reaction and violence. He charges that Bourgeois ideologies "regard such developments as the outcome of incognizable blind forces that support national and group egotisms going as far as a zoological chauvinism." Thus, instead of the increasing peaceful convergence, diminishing censorship, mutually advantageous cooperation and cultural exchanges recommended by Sakharov, Cheprakov anticipates growing antagonisms and violence in and with capitalistic countries. His essay probably voices the fears of many Russians, since it was published in Izvestia.

Most scientists in the United States will heartily endorse the cogent possibilities presented by Academician Sakharov. Especially important is wide discussion and dissemination of his recommendations. Also important is the alleviation of the fears expressed by Dr. Cheprakov by calling attention to certain realities of the world situation he apparently did not take into account. The following data from American sources supplement and reinforce the recommendations of Academician Sakharov and indicate how the recommendations may avoid the aggressive struggles Dr. Cheprakov fears:

1. The governments of all the powerful nations of the world have, as their most important goal, the improvement of the lives of their people; that is, their effective cooperation in production, in sharing and in education toward continued improvement.
2. All powerful governments are partially successful in these essentials or they would not be powerful or long remain so.
3. Their differences may be regarded as different experiments in the best ways for large groups of men to live together. The experiments in the different ways are being made at the expense of those who prefer each difference.
4. With modern exchange of publications and communications each powerful nation is very carefully watching and then adopting the best component parts of each other's (experimental ?) techniques lest the others get too far ahead and attempt to dominate them to their disadvantage. To cite some examples:

A). Since Sputnik, the U.S. Government has greatly increased its support of higher education to insure that many

gifted pupils can get such education whether their parents can pay for it or not.

B). In the USSR a strong differential pay incentive system is operating notwithstanding the Communist slogan, "To each according to his need, from each according to his ability."

C). In the USA the government very carefully regulates and insures the deposits of its "free enterprise" banks.

D). In the USSR a demand-cost-effectiveness accounting system is being adopted for the control of production that is very similar to the cost-profit-production control of American businesses.

E). Even more marked convergence has occurred in weapons technologies with increasing expense, danger and destructiveness.

From the foregoing examples it is clear that the convergence of the component parts of both material and social technologies will continue. As more effective procedures are demonstrated by any nation, the others will adapt and adopt them unless civilization as we know it is ended by a nuclear debacle. The convergence will continue notwithstanding iron, bamboo or paper curtains. Present and improving communications are necessary for each nation not to fall behind in future advances as marked as transistors, lasers and Sputniks, as well as in its education and training methods.

The differences in both social and material technologies of the different nations are actually different experiments in the best ways to live. These different experiments are being made at the expense of those who differ. Other nations can adopt or avoid the procedures as the results warrant. No military force is necessary to insure such convergence toward better and better lives for all the world.

Friendly criticisms and the free exchange of information are of great value to all nations. To become aware of one's own oversights or deficiencies is always more difficult than to point out the deficiencies of others. Such criticisms can be carefully evaluated to find and correct factual deficiencies. Any unjustified efforts to maintain self-esteem and the validity of previous statements, often components of criticism, can be separated out from the valid parts by additional study and research if needed. All good leaders learn the value of independent criticism and become expert in separating out its valid parts.

The fears of exploitation by cartels and large corporations expressed in Dr. Cheprakov's essay are worthy of such analysis. Such exploitation has occurred. It is controlled in the United States by anti-monopoly laws, taxes and price regulations. All of these measures can be strengthened, and quotas can be imposed for still further control if and when the conditions feared by Dr. Cheprakov warrant. On the other hand, some large corporations are among the most efficient ways for large groups of men to work together that now exist. They pay high wages to their voluntary workers and sell their products at a profit to voluntary buyers. They stimulate, reward and utilize promptly the creativity, and initiative of their workers. Their procedures also deserve careful study and adoption where conditions warrant.

Some large corporations do tend to use their size to restrict and exploit markets and to continue inflexible, out-of-date procedures. Similar restrictions to improvements are apt to exist in all institutions not subject to pressures from alternatives outside their organizations, especially the institutions of established governments. Free exchanges of views and information such as provided by the two Russian essays and the foregoing discussion can be greatly beneficial to all parties concerned in bettering their respective ways of living.

In conclusion, the avoidance of nuclear war is an absolute must for the leading nations to continue to exist. The beneficial convergence foreseen by Academician Sakharov will eventually take place if nuclear war is avoided. No military force is needed to insure the eventual convergence. But all the dangers feared by both Sakharov and Cheprakov can be much reduced and the beneficial outcome Sakharov describes can be much expedited if his recommendations are followed.

### FAS NEWSLETTER

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Chairman \_\_\_\_\_ Cameron B. Satterthwaite

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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.

## A RUSSIAN PHYSICIST'S PLAN: U.S.-SOVIET COLLABORATION

By THEODORE SHABAD  
(*New York Times*, July 22)

A bold, wide-ranging plan for cooperation and eventual rapprochement between the United States and the Soviet Union has been offered by a prominent Russian nuclear physicist in an essay that has been circulating from hand to hand without official sanction.

Some aspects of the essay, the text of which has reached the West, were reported in a dispatch from Moscow printed in *The New York Times* on July 11.

The author, Andrei D. Sakharov, a 47-year-old member of the Academy of Sciences, looks to ultimate "convergence" of the two superpowers as the only means of averting the dangers confronting mankind.

### World Dangers Defined

He lists these as the threat of thermonuclear war, overpopulation and famine in the poorer half of the world, chemical pollution of man's environment, police dictatorships of the Hitler, Stalin and Mao varieties, and encroachment on intellectual freedom.

"The division of mankind threatens it with destruction," he warns, but he sees a "basis for hope" in what he terms "the now-inevitable rapprochement" of the socialist and capitalistic systems.

The physicist proposes a tentative four-stage timetable, to the year 2000, for political, economic and social transformations in both the United States and the Soviet Union. This, he says, would bring them together on a common ground of "democratic socialism" and enable them to deal jointly with the problems of the underdeveloped part of the world.

Dr. Sakharov points to the Czechoslovaks' current democratization effort as a significant experiment in the search for a middle ground between socialism and capitalism.

"We should support their bold initiative, which is so valuable for the future of socialism and mankind," he tells his Soviet readers. "That support should be political and, in the early stages, include increased economic aid."

Actually the Kremlin has expressed alarm at the liberal reforms of the Czechoslovak Communists under Alexander Dubcek, the party leader, on the ground that increased freedoms of expression constitute a threat to the very existence of communism in Czechoslovakia.

The Soviet scientist envisages the following fundamental changes in the Soviet Union and the United States that would, in his view, bring the two nations closer together.

In the Soviet Union, greater intellectual freedom guaranteed by law on press and information that would clearly define what can and what cannot appear in public print. Such a law was recently adopted by the National Assembly in Czechoslovakia.

In the United States, social reforms designed to eliminate racism and give the nation's 22 million Negroes the same opportunities enjoyed by the white majority. Dr. Sakharov also envisages an American shift to greater government and collective ownership of the means of production, which Soviet ideologists consider essential for any rapprochement between the two systems.

The author indicates no role for Communist China in his blueprint for the next few decades. His remarks about that country are limited to a denunciation of Maoism, which he says has assumed "monstrous, grotesquely tragicomic forms, carrying to the point of absurdity many of the traits of Stalinism and Hitlerism."

As a nuclear scientist, Dr. Sakharov displays a concern about world issues and broad philosophical problems that seems to be shared by his colleagues—in both East and West—in their awareness of the possible consequences of the use of the destructive weapons they helped to devise.

The manuscript, titled "Thoughts About Progress, Peaceful Coexistence and Intellectual Freedom," appears to have been circulating for some time in preliminary versions among the

author's friends and associates in what he describes the "milieu of the scientific and technological intelligentsia" of in circulation in the Soviet Union.

He notes that the final revision, completed last month, incorporates reader comments based on previous drafts, and thus suggests that at least some of his audience shares his outlook, if not all his specific positions. He also appears to assume among his readers close familiarity with public affairs as well as Western publications, which are normally restricted in circulation in the Soviet Union.

For example, in maintaining that there is no effective defense against a massed attack by strategic missiles armed with hydrogen-bomb warheads, he refers Soviet readers casually to the March, 1968, issue of *Scientific American*.

In that issue, two Cornell University physicists, Hans A. Bethe, who won the Nobel Prize last year, and Richard L. Garwin, contend that offensive tactics and penetration aids nullify the effectiveness of antimissile systems.

Dr. Sakharov and others who share in his views may have been instrumental in persuading the Soviet leadership to discuss limitations of offensive and defensive missile systems with the United States. Agreement to hold such talks was announced July 1 by President Johnson.

Dr. Sakharov makes a plea for a new cooperative approach to international affairs to end the present method of diplomacy, which he defines as being aimed at "maximum improvement of one's own position and maximum unpleasantness to opposing forces."

Noting that this method led to the war in Vietnam and the chis in the Middle East, he accuses the United States of "sacrificing an entire people to the proclaimed goal of stopping the 'Communist tide'" and accuses the Soviet Union of "irresponsible encouragement" of the Arabs against Israel.

On the threat of overpopulation and famine in developing countries, the author says it is futile to seek to introduce birth control under present circumstances. He proposes a 15-year tax on developed countries equal to 20 percent of national incomes to help the poor countries raise their standards of living.

Economic improvement and industrialization, he contends, would automatically tend to reduce the birth rate, judging from the experience in the advanced countries. He terms sterilization a barbaric method of birth control.

Soviet-American cooperation is essential, Dr. Sakharov says, to cope with the growing discharge of harmful chemicals into the earth's atmosphere, water and soils. Otherwise, he adds, "the Soviet Union will poison the United States with its wastes and vice versa."

The physicist praises Nikita S. Khrushchev for his exposure of Stalinist terrorism in his so-called secret speech to the Soviet Communist party's 20th congress in 1956, but adds that the exposure still has a long way to go. He calls for the publication of all relevant archival material on the Stalin era.

Without stating the source of his figures, he says that "at least 10 to 15 million people perished from torture and execution by Stalin's secret police and from harsh conditions in prison camps.

"In 1936-39 alone," he writes, "more than 1.2 million party members, half of the total membership, were arrested. Only 50,000 regained freedom; the others were tortured during interrogation or were shot (600,000) or died in camps."

Dr. Sakharov, who has signed petitions on behalf of dissident Soviet writers who were tried and imprisoned in the last two years, calls the trials a disgrace.

As the first of four overlapping stages of his blueprint for the future, he sets the period 1968-80 for a democratic evolution of the socialist system in the Soviet Union, with the qualification that the dates represent "the most optimistic unrolling of events."

In the second stage, the United States is envisaged as carrying out its social reforms and restructuring of ownership from 1972 to 1985.

The two nations would then team up in the third stage (1972-90) by imposing the 20 percent tax on national incomes

(Continued on page 4)

## AIR POLLUTION IN SOUTHERN CALIFORNIA

### Report and Recommendations by Los Angeles Chapter Federation of American Scientists (15 July 1968)

#### ABSTRACT

The present levels and dangers of smog in Southern California are summarized. Feasible emission standards are proposed that will limit hydrocarbon, carbon monoxide and nitrous oxide emission for new cars sold after 1972. The smog problem caused by cars already on the road at that time is discussed and preliminary procedures are proposed to relieve this difficult aspect of the problem. Engines which offer possible alternatives to the gasoline internal combustion engine are discussed and recommendations are made for exploring and developing alternative modes of transportation. Finally, various forms of actions by which citizens may insist on clean air are summarized.

#### TEXT

##### *The Problem:*

It is now generally understood that the greatest portion of the critical smog problem in Los Angeles is due to automobile exhaust. To illustrate, the total contribution of the motor vehicle to three of the major air pollutants is:

##### Motor vehicle contribution to smog:

Hydrocarbons .....	69%
Carbon monoxide .....	97%
Oxides of nitrogen .....	63%

The early research of Haagen-Smit showed that it is principally the chemical reaction of hydrocarbons with oxides of nitrogen in the presence of sunlight which created the eye-irritating component of smog. But it is also clear that carbon monoxide is a poisonous gas which impairs the oxygen carrying capacity of the blood and in concentrations frequently encountered near freeways can cause physical impairment, mental confusion and perhaps long-term disability. Oxides of nitrogen are an even more toxic gas and are dangerous to health in different and as yet not completely tested ways.

Of course, there are additional harmful components of smog besides the three pollutants mentioned above. For example, lead added to gasoline to improve combustion is also spewed out as a waste product. Research by C. C. Patterson has shown that urban dwellers today carry lead burdens in their bodies many times greater than before the invention of the internal combustion engine. In traffic congested areas the lead acquired by the body may approach the level of chronic lead poisoning. Recently it has been pointed out that nothing is known about the effect of deep inhalation into the lungs of very fine colloidal suspended rubber particles which are worn off vehicle tires and pass into the city air.

In brief, it is clear that the millions of dollars of damage done every year by these pollutants, the serious damage to health, and chronic impairment of living quality will continue to worsen catastrophically in the coming years if steps are not taken now to solve the problem. Even at the present level of smog pollution it is absolutely imperative that the problem be immediately alleviated.

Considerable control of industrial sources of contamination has been effected by the vigorous efforts of the Los Angeles Air Pollution Control District. The Los Angeles basin would be uninhabitable today without these efforts. Eventually even more control of industrial sources will be necessary in order to return our air to 1940 levels of purity. Before that stage, however, we face the absolute and immediate necessity of drastically reducing the pollution contribution by motor vehicles, a percentage which is roughly quoted at an over-all

#### A Russian Physicist's Plan

(Continued from page 3)

and coming to the assistance of the poorer half of the world.

Dr. Sakharov envisages the fourth stage as a period of increasing convergence between the two countries, the promotion of intellectual freedom, science and economic progress, and ultimately a world government, to be achieved by the year 2000.

90% responsibility for our present smog.

The Los Angeles Chapter of the Federation of American Scientists wishes to point out that there are two necessary kinds of solutions which must be undertaken immediately. One is the immediate, practical application of our present knowledge to significantly reduce the present smog content of our air. The second is increased research to discover and develop new technical solutions to energy production, propulsion systems and waste disposal problems. Our Federation wishes to emphasize as strongly as possible that both activities must be undertaken at once, for unless the research and long-range planning are available to solve the principles of the problem, the short-run, emergency measures cannot give us more than a few years of breathing space.

##### *Solutions:*

##### 1. Immediate Steps with Present Technology.

A. *Emission from new cars.* The average car on the road today emits the following percentages of pollutants:

##### Average car in 1967:

Hydrocarbons .....	900 parts per million
Carbon monoxide .....	3.5%
Oxides of nitrogen .....	1500 parts per million

California has required by an act of the legislature that no new car sold in the state after 1970 shall exceed the following emission standards:

##### New car standards: 1970

Hydrocarbons .....	180 ppm
Carbon monoxide .....	1.0%
Oxides of nitrogen .....	350 ppm

These standards were subsequently proposed by the Federal Government to be established as nationwide standards for new car production. In areas which have on the average a smaller density of automobiles than Southern California, these standards are appropriate since they bring the contribution from automobiles rapidly below the contribution from other sources. In Southern California with these standards, however, even after a period of the order of ten years, automobiles would still be the major smog contributors and smog would still be roughly four times the pre-war level. Therefore, California must set its own, more stringent standards.

The general opinion of the automobile industry is that modification and evolution of the internal combustion engine over a period of the order of ten years could bring the emission of hydrocarbons down to the order of 50 ppm. It is the position of the Los Angeles Chapter of the Federation of American Scientists that a substantial increase in funds and effort for this phase of research and development by the automobile industry could hasten the advent of more perfect combustion of these engines. In any case, our organization can point to the tested feasibility of manifold reactors (1) and afterburners (2) which can at this present moment reduce hydrocarbon emission well below 50 ppm. We state that, however achieved, the following standards are both necessary and feasible for all new cars after the year 1972 and should be required for all new cars registered in California subsequent to that year:

##### FAS 1972 Standards:

Hydrocarbons .....	1.0 gm/mi (50 ppm)
Carbon monoxide .....	15 gm/mi (0.8%)
Oxides of nitrogen .....	1.5 gm/mi

One comment should be made on the present method by which automobile manufacturers comply with lowered hydrocarbons and carbon monoxide emissions standards. They adjust the timing and lean out the mixture which reduces the first two pollutants—but causes a drastic increase in oxides of nitrogen emission. As a result, the oxides of nitrogen content of Los Angeles is increasing more rapidly than any other constituent and is one of the most threatening problems of the smog dilemma today. The manifold reactor and afterburner devices, however, can be easily incorporated with recycling devices which significantly reduce the emission of oxides of nitrogen.

(Continued on page 5)

## Air Pollution in Southern California

(Continued from page 4)

In any case, by setting the standards at the levels which are required for the air purity we need, private industry is offered the possibility of developing any effective, economically competitive system which will achieve this purity. Once we know those standards can be met, and we now do know this, we care only from an economic and esthetic standpoint whether they are met by modifying the internal combustion engine, fitting them with afterburners or devices, or turning to steam, electric or hybrid engines.

**B. Small cars versus big cars.** It has often been argued that some incentive should be given for the preferential use of small cars, which, consuming less gas, contribute less to smog. The counter argument is that large engines are more efficient and emit a smaller percentage of pollutants. It is also argued that consumers, in practice, would not permit the outlawing of cars with a large car weight to passenger weight ratio. By setting the exhaust emission standards in terms of grams per vehicle mile, as in the recommended FAS 1972 standards, however, this entire problem is bypassed. Each vehicle is limited in terms of its actual contribution to smog and the manufacturer has the flexibility of adjusting his efficiency and total exhaust volume as he pleases. We propose that vehicles carrying more than six passengers, including trucks and busses, have their emission standards scaled in ratio to their weight of the average passenger vehicle. In actuality, all state and federal standards are now being expressed in terms of grams per vehicle mile so that this issue is now essentially settled.

**C. Used cars.** There are over four million cars in the Los Angeles area today. The rate at which these cars would be replaced by the new, low pollution cars would be too slow to have an appreciable effect on our smog problem for many years. In fact, after more than ten years the effects of the old, heavy smog emitting cars would still be felt. At the same time there are several obstacles to equipping old cars, many of small real value, with devices which may have adaptation difficulties on cars not factory fitted. Our solution to this problem is to point out that the average car in 1967 emitted 900 ppm of hydrocarbons. Therefore, roughly half of these cars must be emitting over 900 ppm. These cars represent very sick cars. Tune-ups, timing adjustments, and engine reconditioning would return these cars to emissions less than 900 ppm. This would rapidly (in a few years) achieve a smog reduction by about a factor of two. By that time the new low emitters would begin to replace the old cars in appreciable numbers. *Therefore the FAS proposes it be legislated that no used car emitting greater than an appropriate standard, but in no case greater than 900 ppm, may be resold by dealers after 1970 and none resold at all after 1972.*

The FAS further recommends the study and adoption of safety inspection plans such as are in operation in the State of New Jersey, Connecticut and other states. In a twice-a-year inspection of lights, brakes, steering, etc., smog emission could also be tested. In this case all used cars could be made to comply with minimum pollution emission standards. The potential saving of lives of such a safety inspection system is, in itself, a strong incentive for such a plan for California.

### II. Continuing Measures to Control Air Pollution.

**A. Research into morphology of propulsion.** If the internal combustion engine is going to continue to be a feasible power source for an urban society, the completeness of its combustion must be improved or disposal of its waste products provided for. With the investment automobile manufacturers have in the internal combustion engine, and the financial resources which they have at their command, we are sure this phase of investigation will be taken care of if they are required to meet standards. This includes the development of direct flame afterburners, catalytic afterburners, manifold reactors and oxides of nitrogen recycling, if necessary to comply with the firm standards which must be enforced to achieve clean air.

Alternative forms of propulsion which involve distinctly different approaches, on the other hand, may not receive attention from large companies. There may even be the possibility of obstacles placed in the way of development of new forms of energy transformations which might, ultimately, be of great benefit to society. To mention only a few examples, hydrogen is an abundant element. When it is oxidized in order to produce energy, it produces water as a waste product. Only slightly modified cars have actually been operated on bottled hydrogen but the potentialities of this radically different fuel have scarcely been noticed. Liquefied natural gas is also a possibility. In completely different directions, electrical cars have received some small amount of attention recently. But nowhere near adequate funding is available to investigate the ultimate potential beyond lead acid batteries. Is there a future for clean, quiet transportation in sodium-sulfur batteries? In fuel cells?

There are two general areas in which funding, authorization and encouragement are needed. One is in the basic research which is probably best carried out by universities, with departments created or supported in the state colleges and contracts let to private universities. The technological developments would be best carried out under development contracts with private industry, with special emphasis on aerospace and defense analysis firms which, even under war oriented production, are usually desirous of contracts and projects. *Of course, a strong Air Resources Board must be adequately funded to carry out testing, evaluation and developmental research on all systems and solutions proposed.*

**B. Rapid transit.** Cities increase in the density of their population because they supply benefits and services to their inhabitants. As in bacterial colonies, however, they are limited by their ability to dispose of their wastes. Past a certain population density, of course, simple traffic congestion is also a feature limiting the size. Los Angeles, more from a waste disposal aspect (pollution), but also from a traffic congestion problem, long ago passed the point where it should have planned and built an adequate rapid transit system. At a certain point it becomes necessary to carry more than one or two people per private vehicle within the city. At this point the weight of people moved relative to the weight of vehicle moved ratio must be improved. We are now faced with starting late, spending a great deal of money, and obtaining inadequate public transport. The Los Angeles Chapter of the Federation of American Scientists notes that the SCRTD is the only plan proposed at this time. Unfortunately, insufficient information is available for the LACFAS to judge whether this is, in fact, a rudimentary beginning of what might become an adequate regional transit system.

At the same time as effective core rapid transit is started, however, we recommend vigorous research and planning to produce the most technologically advanced transit system possible in terms of feeder line techniques, computer programming, flexibility of unit size and integration of travel space with surrounding city. It may be possible to make up to some extent for being behind the times in development by being ahead in techniques and systems.

### III. Citizen Action.

**A. Legislation.** The LACFAS urges that citizens insist their legislators promptly enact adequate standards of automobile exhaust emissions. At the moment of this writing, for example, Assembly Bill 357 has passed the California Assembly and is stalled in the Senate. The smog standards proposed by the bill are much less stringent than the ones proposed here by the FAS and urgently require passage as a beginning of a solution to the problem. We urge that legislators be required to continuously revise and review standards (with Air Resource Board advisement) and continually strengthen controls and reduce pollution emission by all forms of energy users, including industrial as well as transportation activities. In order to achieve both legislative and administrative remedy we propose two broad areas of citizen action:

(Continued on page 6)

## Air Pollution in Southern California

(Continued from page 5)

**B. Initiative.** If the state assembly does not act, or acts in an inadequate manner, we recommend that the legislation needed be passed directly by the voters in the form of an initiative enactment of state law. There is at this time enough general knowledge of the standards needed so that they can be set forth in a comprehensible way. About 500,000 signatures are needed to qualify such a measure for the next general election. It is probable that enough voters feel the necessity for pollution control so that a reasonable set of standards could be passed if the legislature is reticent on this subject.

**C. Pressure groups.** In order to obtain the necessary laws from the legislature and in order to enlist sufficient pressure from the citizens at large, the LACFAS recommends the increased membership in and increased activity of such groups as the Clean Air Council, Stamp Out Smog (S.O.S.), GASP, and many other citizen organizations. These organizations can perform crucial services in keeping the public informed, keeping pressure on the legislature, and prodding the news media into coverage of all pollution matters. Student mobilization and action could be crucially effective. Probably a great deal more can be done from within university faculties, particularly if college presidents and senior faculty members back necessary and imaginative solutions on the state government level.

The efficiency which man demands in his future in order to liberate him for the constructive, satisfying activities cannot be achieved without planning. The planning cannot be achieved without funding, and funding and authority to plan cannot be achieved without the insistence of enlightened citizens.

### REFERENCES

- (1) The Automobile and Air Pollution: A Program for Progress. Printed by U.S. Chamber of Commerce, October, 1967.
- (2) George W. Cornelius Research Laboratory  
279 West Seventh Street  
San Pedro, California 90731
- (3) Patterson, Clair C. "Contamination and Natural Lead Environments for Man," Arch. Environ. Health 11, 344, 1955.
- (4) Air Pollution Data for Los Angeles County, January, 1968. Louis J. Fuller, Air Pollution Control Officer.
- (5) A Breath of Death, KLAC Documentary, October, 1967.
- (6) Scientist and Citizen, Vol. 10, No. 3 (April) 1968. Publication of Scientists' Institute for Public Information. Published by Committee for Environmental Information, 5144 Delmar Blvd., St. Louis, Missouri 63108. (Lead Contamination)

(Comments and suggestions on the above may be addressed to: Halton Arp, Chairman, Los Angeles Chapter, 1206 South Gramercy Place, Los Angeles, Calif 90019)

## NEWS ITEMS — Continued

Continued from page 1)

arms race which are expected to begin sometime in the next few months. (*New York Times*; 8 September 1968)

Many questions remain to be answered about the effects of nuclear power on the environment. This general conclusion emerged from a two-day conference held in Vermont in September. The conference was called by the Conservation Society of Southern Vermont, and its immediate stimulus was a projected nuclear power plant at Vernon, a small community in Southeast Vermont. The sponsors of the conference were disturbed by the refusal of the AEC to have anything to do with what was believed to be the first attempt at a public forum on the proliferation of nuclear power. Delegates ranged from a nucleus of acknowledged experts recruited by the Scientists' Institute for Public Information, to a class from nearby Franconia College. (*New York Times*; 15 September 1968)

Man's developing ability to control the sex of his offspring could have wide-spread social, moral and political effects.

Professor Amitai Etzioni of Columbia predicted that highly accurate sex control in man could come about within five years. In *Science* Etzioni speculates on some possible consequences of this feat of genetic manipulation.

Among his speculations: There may be a bumper crop of boys. This could conceivably lead to an end to the two-party political system (because men vote systematically and significantly more Democratic than women). Also, because women are greater consumers of culture, attend church more regularly, and normally oversee the moral education of children, a large male surplus could lead to a society with some of the rougher features of frontier town. Further consequences could arise from the differing sex choices of different social classes. There could be an increased average age of marriage, a rise in prostitution and homosexuality, and an increase in the number of bachelors. Etzioni noted that "The dangers are not apocalyptic, but are they worth the gains to be made?" (*New York Times*; 15 September 1968)

Automation can reduce unemployment rather than add to it. This is one of the conclusions contained in a report issued by the Joint Economic Committee of Congress. But the report, concerned generally with unemployment problems, noted that automation would have to be faced effectively and that this would require planning and special training programs. (*New York Times*; 16 September 1968)

The potential resources of the ocean may be very great, but from the standpoint of cold economics they are not yet particularly attractive to investors. Technical problems are expected to rule out profits from the oceans' minerals and foods at least for some years ahead. Stocks of some companies have multiplied rapidly in the past year, stimulated by reports from brokers describing the "enormously rich resources" that supposedly are almost within reach. But most professionals in undersea work believe it is unrealistic to expect exploratory efforts now underway to lead to any sizeable profits in the next ten or fifteen years, for either equipment suppliers or those who might use the equipment to get at the seas' resources. There has apparently been a widespread tendency to underestimate human and equipment limitations involved in deep sea exploration. (*Wall Street Journal*; 16 September 1968)

James E. Webb resigned as head of the National Aeronautics and Space Administration (NASA) with a warning that the Soviets would retain a commanding lead in space because of budget cuts in the American space program. Webb, who has headed NASA for nearly eight years, also said that financial restrictions might prevent the U.S. from attaining its announced goal of placing a man on the moon by 1970. President Johnson named Dr. Thomas Paine, now NASA's deputy administrator, to replace Webb as acting director.

In this fiscal year, the space program and foreign aid were the two most serious victims of the government's economy drive. NASA's budget falls slightly short of \$4 billion, the lowest figure in six years. In Webb's opinion, by mid-1969 the Soviets "will be operating a program about twice ours." He noted that for the last three years he had been warning Congress that the Soviets were building a booster bigger than the American Saturn V, which attains 7.5 million pounds of thrust, "and they will be flying it soon." (*New York Times*; 17 September 1968)

Chemical defoliation has brought ecological change in South Vietnam, but is probably not causing permanent damage. This is the view of Fred H. Tschirley of the U.S. Department of Agriculture. The long-range effects of defoliation in Vietnam have been extensively considered and have been of concern to many American scientists (see previous NEWSLETTERS). Tschirley was among members of a committee set up earlier this year to review the defoliation program comprehensively. His report is only a

(Continued on page 7)

**NEWS ITEMS — Continued**

(Continued from page 6)

small part of an overall study, most of which is still classified. A U.S. spokesman in Saigon said that "There is sufficient ground sampling to give full meaning to his (Tschirley's) report." But the report was studded with qualifying phrases and was not claimed to be a complete and authoritative assessment of defoliation effects. (*New York Times*; 21 September 1968)

A model law on the donation of human organs for transplantation is being brought to the attention of state legislatures throughout the nation. Three states have already passed modified versions of the law and many others are expected to follow suit during the next few years.

The Uniform Anatomical Gift Act was developed by the National Conference of Commissioners on Uniform State Laws, and approved in August by the American Bar Association. Only six states now completely lack laws bearing on organ donations for science and transplantation. But the current laws are a mixture of old common law, dating as far back as the seventeenth century, and some modern statutes. They vary from state to state in important particulars and leave uncertainties and gaps. The need for uniform laws has been given new impetus by the dozens of heart transplants performed in recent months, at least some 2,000 kidney transplants to date, and many different types of lesser tissue transplants. The gist of the model law is that a person should be able to control disposition of his body, but that if he dies with no expressed wishes in this regard, decisions may be made by his next of kin. (*New York Times*; 22 September 1968)

Senator Henry M. Jackson (D-Wash.) has again expressed his concern that U.S. military communications, radar, and missile systems, could be blacked out by electromagnetic pulses (EMP) from nuclear explosions. In a Senate speech, Jackson suggested that the EMP problem might be more serious now than it was at the time of the Senate ratification of the 1963 partial nuclear test ban treaty. Jackson, chairman of the Military Appropriations Subcommittee of the Joint Congressional Committee on Atomic Energy (JCAE) is usually considered the Committee's atomic weapons expert. In reply to Jackson a Pentagon spokesman said that the EMP effect was a recognized problem but that it was not insoluble and that much of the underground testing in the last five years has been aimed at meeting it. (*New York Times*; 25 September 1968)

The U.S. should have a volcano watch, according to the Director of the Geological Survey. Surveys of a long-dormant Costa Rican volcano that erupted and killed more than 100 persons in July led Dr. William T. Pecora to suggest that a similar disaster could occur in the United States. He urged the setting up of a volcano watch in the Cascade range that could pick up tell-tale signs preceding eruption so that nearby residents could have advance warning. Among volcanos in the U.S. with "eruption potential," Pecora listed Mt. Rainier and Mt. St. Helens in Washington and Mt. Lassen and Mt. Shasta in California. He noted that studies of volcanos in Hawaii have led to means of catching the "signature" of a volcanic hazard before it occurs, but that time and study were necessary for reliable warning. (Richard D. Lyons in the *New York Times*; 25 September 1968)

When a doctor prescribes a drug, he probably has learned what he knows about it from the manufacturer's sales pitch rather than from any objective source. So testified the head of a government study group, Dr. Philip R. Lee, assistant secretary of HEW, before a Senate Committee. Lee noted that, "Most of the drug information received by practicing physicians comes from the advertising and promotional activities of drug companies, from printed and graphic advertisements, and from drug salesmen." According to Lee the drug industry is spending an estimated total of \$600

million a year on advertising and promotion, compared with \$500 million for research. (*New York Times*; 26 September 1968)

Concern, expressed by various scientists, over military research at the Cornell Aeronautical Laboratory (see Previous NEWSLETTERS) should be diminished by the sale of the Laboratory. EDP Technology, Inc., with headquarters in Washington, is buying the laboratory, which has been a wholly owned subsidiary of Cornell University since 1956, for \$25 million. Transfer of ownership of the applied research center should be completed by the end of the year. (*New York Times*; 26 September 1968)

In two separate statements the Senate Preparedness Subcommittee suggests the U.S. may be falling behind the Soviets in some essential defense aspects. On September 28th the Subcommittee reported its conclusion that U.S. strategic nuclear forces were adequate to deter a Soviet attack under "reasonably foreseeable circumstances," but, looking ahead, the Subcommittee found "little ground for complacency" about the U.S.-Soviet nuclear power balance.

On October 5th the Subcommittee criticized the Defense Department's aircraft development policy and said that the U.S. might lose its tactical air superiority to the Soviets. The Subcommittee report noted that the only new fighter aircraft the U.S. has developed and produced since 1955 is the F-4 Phantom. It asserted that in this same period the Soviets have turned out "an impressive array" of eighteen new fighter planes. (*New York Times*; 29 September 1968, 6 October 1968)

Despite British withdrawal from the project (see previous NEWSLETTERS), several European nations are still planning to go ahead with construction of the world's most powerful accelerator. But the project is expected to take nine or ten years and by then the machine may be, in terms of design, obsolete—which may also be true for the 200 GEV U.S. machine to be built at Weston, Illinois. Plans for the European machine, to be built at Geneva by the European Center for Nuclear Research (CERN), are still in a formative stage. The CERN accelerator may reach 300 GEV and also utilize collisions between protons accelerated in opposite directions in adjacent "storage rings". Because CERN is on the French border a large tract of land has been obtained from France to accommodate the storage rings.

The present CERN accelerator operates at 28 GEV. It is surpassed by the Brookhaven (31 GEV) and Serbukhov, U.S.S.R. (73 GEV) machines. (Walter Sullivan in the *New York Times*; 6 October 1968)

An international institute of science and technology may open its doors in Europe next September. The institute's sponsors are leading industrialists, economists, and scientists from both sides of the Atlantic. France, Italy and the Netherlands have offered homes for the institute and it is understood that West Germany has allocated funds for it in its 1969 budget. With financial support from both government and industry, the institute would seek to provide Europe with the talent needed to compete with American industrial technology. It would aim to expedite the technological application of new discoveries in science—a process in which the American lead has helped to create the so-called technology gap.

The plan is one of several for international cooperation in technological education and research. Some of them are far broader in scope—but much further from realization. Previous plans for international research institutes have envisioned work on such problems as transport, environmental pollution, and information processing. Soviet leaders have expressed interest in such institutions but with the usual proviso that they could not go ahead until the Vietnam War ended.

At the Pugwash conference in Nice, France, in September,

(Continued on page 8)

## NEWS ITEMS — Continued

(Continued from page 7)

Victor F. Weisskopf, MIT physics professor (and FAS member), suggested a European institute that would locate in Geneva both the nuclear research organization (CERN) and the European Molecular Biology Organization. (Walter Sullivan in the *New York Times*; 6 October 1968)

*Population growth may be an incentive for progress and a stimulus to economic development, according to some students of population questions who challenge the prevailing concern with overpopulation.* According to an article in *Chemical and Engineering News*, "It is difficult to find a point of view about the so-called population crisis that has not been expressed by one expert only to be refuted by another." The article discusses population growth in relation to food supply, fertility control, technical innovation, economic development, and other factors. (News release, *American Chemical Society*; 7 October 1968)

*The world's population reached 3.4 billion during mid-1967.* This statistic is contained in the *Demographic Year-Book*, an annual compilation of vital statistics by the United Nations. The Year Book estimated that the present world population will double by the year 2006. (*New York Times*; 18 October 1969)

*President Johnson is preparing for the next administration a comprehensive study of alternative world strategies, including the cost of foreign bases and other political-military arrangements.* Reportedly conceived more than a year ago and carried on in an off-limits section of the Pentagon, the study will delineate a range of courses including, for instance, the gold-flow implications of each choice. The 35-man study group includes military officers and civilians from the Departments of State and Defense and the CIA. Among the questions reportedly included in the study are the tradeoffs between large transport aircraft for troop deployment versus the maintenance of overseas bases. (*New York Times*; 24 October 1968)

*The nuclear-powered airplane—a \$1 billion failure in the 1950's—may possible fly yet.* The new optimism about nuclear aircraft stems chiefly from the success of Lockheed Aircraft's huge C-5A, the first airplane large enough to carry the weight of a nuclear reactor. But even though the weight problem *per se* may be manageable, there is no doubt that an actual nuclear-powered plane is at least a decade and several billion dollars in the future. It is not yet clear whether the single advantage of a nuclear plane—unlimited range—would be worth the cost. With respect to cost and other advantages of operation, the situation is much less

clear than in the case of nuclear-powered submarines and surface ships. (*The National Observer*; 28 October 1968)

*Because of violence in Chicago at the time of the Democratic National Convention, the American Psychological Association has moved its 1969 convention from Chicago to Washington, D.C.* George A. Miller, President of the Association, said, "Plans for the Chicago convention were cancelled only after a large majority of the Association's membership, influenced by the accounts of violence in Chicago during the recent Democratic National Convention, clearly indicated that they would not attend a 1969 convention held in Chicago." The APA statement added that, "... holding the meeting in Chicago would have been repugnant to a substantial segment of the membership and the meeting itself would have been impaired with respect to its scientific and professional purposes . . ." The 1969 meeting should bring about 12,000 APA members to Washington. (News Release, American Psychological Association; October, 1968)

*A five-year study of desert animals on the Nevada nuclear test site shows constant exposure to low-level radiation cuts their life-span by half and fertility by a third.* Norman French, a UCLA ecologist heading the animal studies for the AEC said these conclusions were based on careful studies of two species of mice. The study results are among the first for radiation of a type that survivors of nuclear war would experience. Most previous radiation studies have been concerned with the effect on individual animals of high-level but short-duration doses. The current experiments with whole populations subjected to low-level, long-duration doses involved an average daily dose level of about one roentgen. (*Washington Post*; 2 November 1968)

*The natural gas dislodged by the December 1967 underground nuclear explosion in New Mexico—Project Gasbuggy (see previous NEWSLETTERS)—is contaminated with so much radioactive tritium that it is not commercially saleable.* Although Gasbuggy was "highly encouraging" in producing recoverable gas "in quantity", the presence of the long-lasting tritium prevents the use of the gas without expensive treatment. The gas currently reaching the well head contains about 12 microcuries per cubic foot. One AEC spokesman suggested that gas with less contamination might be released if specially made, cleaner—but more expensive—nuclear explosives were used.

The need for unusually clean explosives, apparently demonstrated by Gasbuggy, could increase the cost of some other contemplated uses of nuclear explosives for peaceful applications. These possible uses include shaking oil loose from "tight" underground deposits, digging caverns for underground gas storage, and excavations for mining, harbors, and canals. (*Washington Post*; 15 November 1968)

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