In February, the University Choir and Madrigal Singers accompanied the St. Louis Symphony to Washington, D.C. to sing with the orchestra in a concert at Constitution Hall. Before the concert, the Madrigals went to the White House to sing for President Johnson. Left: the Choir and Civic Chorus at Constitution Hall. Below: Dr. Orland Johnson rehearses the Madrigals in the Oval Room of the White House. The group sang a repeat performance of the singing birthday telegram "Take Me Out to the Ballgame" that they had delivered last fall for the President to August A. Busch, president of the St. Louis Cardinals.
Electron microscope picture shows a bacteria virus. The big picture shows the entire chromosome (DNA) released into the surrounding medium. In the small picture, the DNA is packed into the head of the virus. Chromosome of virus in big picture measures less than 1/2000th of an inch.
Dr. Kornberg shared the 1959 Nobel Prize in medicine for research he performed while on the Washington University faculty. Recently, he and a colleague won world acclaim for being the first to produce artificially the active, infectious core of a virus. In this article, based on his 1968 Founders Day Address, Dr. Kornberg discusses some of the implications of the revolutionary work currently being done in the life sciences.

THE RECENT REVOLUTION IN BIOLOGY

By ARTHUR KORNBERG

Science builds on the past but looks forward. Scientists do not dare look back. They worry about losing stride and being caught looking in the wrong direction. However, I want to try to assess where the rush of scientific activity has brought us and where it is taking us.

I clearly recall my attitudes toward science when I graduated from City College in New York in 1937. In the previous three decades, chemistry and physics had undergone revolutionary changes and it didn't seem as if my generation would witness another such revolutionary period. In this I was right. Biology by contrast had not changed profoundly in the first decades of the twentieth century. And it didn't seem as if it would in my generation either. In this I was wrong. There has been a revolutionary change in biology. The nature of heredity, clouded in abstract language even twenty years ago, can now be described clearly in chemical terms. We see how nature arranges heredity through ingenious application of well established laws of chemistry and physics. Because of these tremendous discoveries, the essence of biology has become comprehensible to the high school student and the average person.

The story of the revolution can be told in a hundred different ways. For personal reasons, I want to relate the story to the bacterial viruses.

At the turn of the century it became known that diseases such as rabies, measles, and smallpox were caused by particles smaller than bacteria. These were called viruses. Knowledge that infectious diseases were caused by microbes developed around 1850, yet a Roman by the name of Celsus stated in the first century, “Rabies is caused by a virus.” He did not, of course, understand the term as we do. Virus, in Latin, means venom or a similar poisonous fluid.

What were these particles that caused rabies, measles, and smallpox? They could not be seen in the ordinary microscope and they passed through filters that held back bacteria. The tempo of research in this field picked up sharply around 1940 for two reasons: first, the electron microscope made it possible to see and study these particles; secondly, it was discovered that bacteria could be used as guinea pigs for viruses. Bacteria, small as they are, are also beset by bugs tinier still which bite them. These are the viruses which infect bacteria. Some of the pioneering studies on bacterial viruses were carried out at Washington University by Jacques Bronfenbrenner, my predecessor in the chair of microbiology in the Medical School. Among the people in his department at the Medical School were Al Hershey and Sol Spiegelman. Their work on bacterial viruses has since become world famous.

The viruses also began to fascinate physicists. In 1945, Erwin Schrödinger wrote a little book called What Is Life? This book helped a large number of postwar physical scientists in their decision to switch to research in biology. Schrödinger's generation had seen how the laws of motion developed by Newton for large objects, like billiard balls and planets, failed to apply to the motions of tiny things, like atoms and electrons. Spurred by this discovery, quantum mechanics, an entirely new field of physics, emerged. Would a study of living things uncover still another new set of physical laws?

Among the expatriates from physics, and from Germany, was Max Delbrück. In approaching the problems of the physical basis of life, he fixed his attention on certain bacterial viruses with a well defined genetic character whose simplicity should make them easy to analyze. A typical virus invades a bacterium and within twenty minutes several hundred new viruses are produced. The bacterium bursts open and each of the new viruses is ready
to start a new infection. Delbrück reasoned that a full grown intelligent physicist should surely figure out within a few years what happens in only a few minutes in these primitive creatures. Well, these creatures are not that simple and scientists are not that smart.

Delbrück, Hershey, and Salvador Luria spent ten years learning how to breed and mate these viruses, while chemists and microscopists were analyzing the composition of the viruses and their architecture. From these investigations, there eventually emerged a picture of a rather elaborate creature. The electron microscopic photograph on page 2 shows one of these viruses. It has a head with twenty triangular sides. It has a collar piece, a long neck or tail, and a tail plate in which are inserted exactly six fibers. These structures, the head, collar, tail, and fibers, are made up of proteins. Packed into the head is another kind of substance, deoxyribonucleic acid, abbreviated DNA. The DNA is wound tightly about a very tiny spool.

The virus uses these fibers to seek out and recognize the surface of a particular bacterium. When properly anchored, a hole is made in the bacterial wall for injecting its DNA. In the main body of the photograph is a virus whose head was artificially ruptured and from which the tightly packed DNA has streamed out. The entire length of DNA shown in the picture is injected within a few seconds.

Hershey did an experiment in 1952 that has become a classic. He mixed viruses with susceptible bacteria. The viruses attached themselves to the bacteria and injected their DNA. He then stirred the mixture in a Waring blender and thereby sheared off the attached viruses. Except for the loss of their DNA the viruses did not appear to be altered. Yet the infection cycle of the bacteria proceeded just as if the virus bodies had not been removed.

With this and more refined experiments, Hershey showed conclusively that it was DNA, and DNA alone, that was responsible for producing new virus particles. The protein structures, the elaborate head, neck, and tail, serve only to protect the DNA in nature and to function as a syringe for injecting the DNA into a susceptible host. In fact, scientists learned in later experiments that if the cell wall of a bacterium is artificially removed, then free DNA will gain access to the bacterium without the syringe apparatus.

This electron microscopic picture of DNA is truly remarkable. Here we see the DNA, the chromosome of the virus, laid out from one end to the other without interruption. We measure it with an ordinary map measurer and determine its length to be 50 microns, which is .002 of an inch. This is just the length anticipated from earlier and indirect genetic studies.

From these genetic studies we know that this chromosome has more than a hundred distinct genes arranged in a precise linear sequence. Each gene is a stretch of DNA that includes about one thousand DNA components or building blocks. The gene carries a message which is spelled out in the arrangement of those components. The message in the DNA of the gene is in turn translated by the genetic code to produce a particular protein. One such gene in this virus would specify the protein for the head, another the tail protein, and so on. In a similar way one of the human chromosomes contains a particular gene for making the blood protein hemoglobin.

DNA has two functions. I have described one. It carries the message which spells out the complete chemical details for making every bit of the proteins that are the cell's form and machinery. This function determines what a cell will be. The second function involves the duplication of the DNA so that a daughter cell or daughter virus will have exactly the same DNA message to dictate its own development. In this second function, the DNA serves as a template or master tape from which a copying mechanism in the cell will make an identical copy of the DNA for the daughter cell or daughter virus.

If a single constituent in any gene in the DNA is altered either by an agent such as X-rays, by radioactive fallout, or by an error in copying, the cell or virus with the altered gene will have an altered protein with a change corresponding to that in the gene. The chances are a thousand to one that any alteration of the highly refined little protein machine will make it defective.

In the case of human hemoglobin we have recognized over a dozen distinct blood disorders which are due to a single alteration in the gene which carries the message for hemoglobin. Such changes are called mutations and the individuals that carry them are mutants. Very rarely a mutation leads to a protein which is improved. In that event, the mutant may have an advantage over his fellow men. He may be stronger or run faster. It is in just this way that hemoglobin itself evolved over millions of generations as a series of stepwise improvements over the blood pigments of our simple ancestors.

At Washington University in 1954 we became interested in how the cell copies DNA. The first DNA I ever handled was DNA I prepared from the thymus gland of a calf for our Medical School laboratory class in microbiology. In the previous years we and other scientists had learned how each of the components of DNA was itself assembled from simpler compounds, such as ammonia, carbon dioxide, and glucose. We then learned how to extract a certain enzyme, a protein catalyst from bacteria and other cells. This enzyme assembled these DNA components into huge DNA molecules. The enzyme does this only when DNA is present to direct the assembly process by serving as the template or master tape.

The DNA we synthesized in the test tube has the chemical and physical properties of natural DNA. But it is difficult to test DNA for the presence of intact genes. A little over a year ago, Dr. Mehran Goulian duplicated the DNA of a tiny virus called phages 0X174. Its chromosome is in the form of a circle and is much smaller than the one in the photograph. This DNA has 5500 components which constitute its five to six genes.

We mixed the synthetic viral DNA with bacterial cells. The cells took up the synthetic DNA and produced viruses which were indistinguishable from normal viruses. The cells responded to infection with synthetic DNA with the same efficiency as to DNA from the natural virus.
From these results we infer that in the test tube synthesis there was an error-free duplication of the original viral DNA. Each of the 5500 components in this viral chromosome was placed in exactly the right sequence. Were it not so, a defective message would have resulted and viruses would not have been produced. With these techniques in hand, it should now be equally simple to synthesize the similar DNA of the polyoma virus. The polyoma virus causes a variety of cancers in rodents. Why synthesize this particular DNA?—in order to modify it. One could do this by substituting modified constituents in the assembly process. This would result in subtle but significant changes in the message carried by the virus. In this way it should be possible to analyze which of the genes in the virus is responsible for its cancer-producing properties.

Details of this work were reported in a scientific journal last fall. Because I thought these results might be of interest to the public, I informed our press officer at Stanford. He in turn got in touch with local newspaper reporters. A reporter who interviewed me asked whether we had in fact created life in the test tube. At first this question irritated me. What's wrong with my saying "enzymatic synthesis of viral DNA"? Why use another vocabulary and call it "creation of life in the test tube"? I then realized that the reporter was simply asking a question in language that would be asked by the average citizen. Semantic problems flourish when there is lack of understanding. Understanding, in turn, diminishes when problems of language persist. So we talked for some time and spent about two hours going over the background, the details, and the implications of the work. Finally the reporter said, "As I understand it, you obtained DNA from a virus to serve as a template." "Right." "You added these components or building blocks from available supplies on the shelf." "Correct." "And then the enzyme you purified from bacteria assembled these building blocks to copy the template DNA." "Right." "So what did you do?" I paused and said, "I just watched with admiration." He paused and said, "I guess I would, too." He wrote a front story in the newspaper the next day, but the banner headline ran: "Living Virus Core Created."

In discussing our work with interested citizens, and I believe it imperative that scientists should, we must find a common language. It just won't do for me to tell the reporter that for years scientists had no interest in the question of whether viruses are living because they know exactly what viruses are. The state of living or dying understandably interests people and we should use such a question as at least one means of beginning an educational dialogue between scientists and their fellow citizens.

It is difficult to define the term "living" to the satisfaction of both the scientist and the interested citizen. We all will agree that bacteria which swim about, multiply, and are fully self-sufficient are living. But scientists, if persuaded to make a yes or no judgment about viruses, would not all agree that viruses are living. This is because viruses are not self-sufficient and must invade a bacterium or animal to multiply. Yet if you were to examine the simplest of the bacteria and the most complex of the viruses you would find no sharp line separating them. We know that the DNA of a virus is as effective as the virus itself in infecting a cell and in leading to the production of hundreds of new viruses. We know that this DNA can be assembled in the test tube from simple, well-defined chemicals. Understood in these terms, then, we can agree that the viral core is a very primitive or simple form of life, and it has been synthesized in the test tube.

The term "creation" is a problem in itself. The reporter finds it an easier word to use than "synthesis." But applied to DNA, the word creation upsets some scientists. Assembly of the DNA molecule in the test tube from its component building blocks follows the plan dictated by DNA obtained from nature. All DNA is an exact copy or a slight modification of the DNA that preceded it. We can argue that the creation of DNA is a job that has been going on for the last two billion years and will continue as long as life remains on earth.

What really startles and interests people is that genetics or heredity is simply chemistry. It is a young and difficult branch of chemistry. After twenty years of work on DNA in laboratories throughout the world we can reconstruct some of the simplest patterns of DNA duplication in the test tube. In the next twenty years this work will be more precise, varied, and extensive. Genetic engineering is clearly in prospect. This prospect fascinates people. It also frightens them and I understand why it does. Any knowledge or any invention can be used for good or evil: fire, the wheel, gun powder, nuclear power. They serve us but they can destroy us.

What will genetic engineering bring?

We can look forward to the correction of genetic defects, the cure of diseases caused by defective or missing genes. At some future date it should be possible to cure a patient with an anemia caused by defective hemoglobin. Current treatments consist only of blood transfusions and cannot cure the disease. Assume that at some unspecified future date the gene for human hemoglobin were identified, separated from other genes, and reproduced in quantity in the test tube. How could we deliver this gene into blood-forming cells of the patient? It should be possible to include this gene in one of the many viruses which infect but do not harm us. Such a harmless virus, as Dr. Stanfield Rogers has suggested, might be exploited as a vehicle for delivering genetic information into cells where it is needed.

The twentieth century revolution in physics has
brought us access to nuclear energy. How can we avoid being poisoned or suddenly exterminated by it? Advances in medicine and economics have sharply reduced infectious disease mortality. Now overpopulation with starvation is clearly the world’s number one disease. How can we control the production of babies when it is a household industry carried out entirely by unskilled labor? And especially when the workers so much enjoy their work!

Now comes the recent revolution in biology which brings genetic engineering to our doorstep.

George Sarton, an eminent historian of science, wrote in 1930, “The most ominous conflict of our time is the difference of opinion or outlook between men of letters, historians, philosophers, the so-called humanists, on the one side and scientists on the other.” In 1963, Theodore von Laue, professor of history at Washington University, wrote in the Bulletin of the Atomic Scientists that this gap is an inescapable fact. He said: “Speaking as a non-scientist I must indeed widen this gap. I assert that in the past half century, science has changed from a philosophic and academic pursuit into a vast social and political effort to manipulate man and nature. In its new role it is a dangerous and destructive force. The earlier and relatively fruitful collaboration between science and society has come to an end. The new relationship is fatal to both science and society.”

I think I understand Professor von Laue. In some ways I too miss the slower pace and tranquility of an earlier era in science. But there is no turning back. As long as men’s minds are free to think and as long as men have the freedom to build, the tools and ways of science will be used. The question is how to make the most of science.

I AM HOPEFUL that science will be used well for three reasons: I am hopeful first because this revolution in biology has introduced a new theme, a theme of molecules to man. This theme could become a miraculous bridge across the gulf between the humanistic and scientific cultures. For the first time in recent history, physicists, chemists, and biologists are finding in the operations of heredity, problems that fascinate them all and which they can discuss in a common language. The granulation of science, which Maxwell deplored even a century ago, has visibly coalesced around the theme of molecules and genes. This area of science also happens to be of intimate concern to man and society. And I insist that basic facts of heredity and what we do with this knowledge can be understood by non-scientists and discussed in a common language with scientists. Twice before in the history of western civilization, the scientist-philosophers, the humanists, and the politicians found common grounds for broad intellectual discussions. There was the Golden Age of Pericles and there was the Renaissance. I see the prospect of a new period of enlightenment, in which we can begin to understand the molecular foundations of human nature.

I am encouraged by my recent experience in talking to newspaper reporters and reading their dispatches about our research findings, our concerns, and our aspirations. The public is beginning to listen and to understand. Shouldn’t it be possible with increasing knowledge of molecules, genes, and proteins to gain a deeper understanding of our nervous system and our behavior? In so doing we may even learn how to keep ourselves cheerful and tolerant more of the time.

The second reason I am hopeful is that scientists and non-scientists are developing a better grasp of the operations of science. They know that the secret of success in science does not rest with its heroes. No man changes the course of modern science. At best he may advance an area by a few years. The secret of science is in our capacity as men and as a society to sustain the practice and culture of science. We realize that scientists have the same weaknesses as everyone else.

THE THIRD REASON I am hopeful is that there is no rational alternative. The goal of a common understanding of science is surely beyond reach. However, it is not essential that we attain a goal but rather that we be headed in that direction. The terrible tragedy of our current political and military misadventures in the world is not so much in what has happened, although that is bad enough, but rather that we are not moving in the right direction. In previous wars and emergencies we were united to make the world a safer or saner place. This time we are divided. I know we won’t ever solve the world’s problems or even our domestic ones. What is urgent is that we be moving with a common purpose toward a solution. The movement toward the goal of a common language and common understanding of science will unite people and nations rather than divide them.

The problem is how to achieve these objectives. One way must be through political action at the national and local levels. Another must be through our educational system, particularly our universities. We must sustain and strengthen all the departments of universities. We must sustain and strengthen this university. Wherever I go in science, medicine, or society, I meet people of my generation whose lives were profoundly enlarged by Washington University. Major battles in the recent evolution in biology were fought and won in its laboratories. It is important for our country and our world society that this university have as great an impact on the next generation. The minds of young people are not receptacles to be filled by some efficient formula. Their minds are fires to be kindled. This is a trust that the faculty and friends of Washington University and we, its alumni, must fulfill.
Who is today’s college student? How does he look? What is he thinking? These questions are being asked and answered in many ways.

A generalization, which tends to ring false, pictures today’s college student as an unkempt, chronic protestor in constant rebellion against the University, Society, the Establishment and, in fact, everyone over thirty.

**NINE STUDENTS**

Without either generalizing or denying the generalizations, we present here a tiny sampling of Washington University students in their natural habitat—dressed in their regular campus attire and expressing their everyday opinions. Of course, nine students can’t begin to represent the 7100 individuals among our full-time student population. These are just nine undergraduates picked at random. Another nine might be quite different.

Photographs by Herb Weitman
WHAT MAKES YOU LAUGH?

“I laugh at extremist politicians because they are all very similar. They like to blame their problems on some outside conspiracy or force. The far right blames its troubles on a Communist-liberal-socialist conspiracy out to get them, the Constitution, and free enterprise. The far left is looking for a reactionary-fascist-conservative conspiracy. Both of them feel they are out to save humanity and institute the noblest, best form of society. This makes me laugh.”

Alan Howes
Freshman
Shoreham, New York
DO COLLEGE STUDENTS TRUST ANYONE OVER THIRTY?
"I think this is a myth. Trust has nothing to do with age alone. Trust is something you feel in someone. If you prove yourself to someone, you've hopefully earned his trust. Personally, I trust almost nobody."

Paula Rubovits
Sophomore
Chicago, Illinois
WHO ARE YOUR HEROES?

"My father, and this may sound corny, has taken a lot of time to work with me. He has not pushed me into the law but he made sure that I knew what the law is and what is available. He told me when I got on the plane to come out here to school, 'Whatever you do, don't let your schoolwork interfere with your education.' This makes him one of my real heroes."

Dan Freeman
Senior
Chevy Chase, Maryland

IF YOU HAD IT TO DO OVER AGAIN, HOW WOULD YOUR EDUCATIONAL CAREER BE DIFFERENT?

"I probably would have studied a little harder in high school, and then been better prepared for college and the requirements it puts upon the individual. I'd like to see undergraduate education extended to about five or six years rather than four because I haven't been able to take all I've wanted to in four years. It might get boring after a while but it would develop a better-rounded individual."

Fritz Edelstein
Senior
Woodmere, New York
WHAT MAKES YOU LAUGH?

"Anybody who's pompous. I think my generation does that. We laugh at Everett Dirksen because he's SO pompous. And Johnson because he is also. Kennedy could make speeches about the country, patriotism and things, and they would ring true. Johnson does it but he just doesn't quite come across. We laugh at anyone who can poke fun at pomposity. Bill Cosby's great at that."

Beth Thomas
Sophomore
Dallas, Texas

WILL YOU BE ABLE TO FIT INTO SOCIETY TEN YEARS FROM NOW?

"I don't think I'll be able to fit in any better in ten years than I do now. I think society now, ten years from now, can only be improved if our basic assumptions are reanalyzed radically in terms of more human values. I don't think I fit in today. I adapt. I survive."

David Glanz
Senior
Cleveland, Ohio
WHAT ARE YOUR HOPES FOR THE FUTURE?

"I hope to get my master's degree in Paris and work for a few years there translating. Then I want to come back to the states and settle down to be a teacher. What I'm doing now is learning about people and I hope that this will help me in the future."

Linda Fassero
Senior
Benld, Illinois
IS IDEALISM STILL ALIVE?

“A lot of my teachers say my work is too idealistic and I’m living in a dream world. Idealism may be dead for a lot of people but I want it to be alive so it’s alive for me. It’s in my work and it’s quite noticeable. I want it to be there. I don’t want it to be dead.”

Chris Bartholome
Sophomore
Terre Haute, Indiana
WILL YOU BE ABLE TO FIT INTO SOCIETY TEN YEARS FROM NOW?

"I would like to live in a slower society, perhaps one like America was quite a few years ago. One that isn't dirty and crowded. One where I would feel like any talents and gifts I may have would be more appreciated than they are here."

Fred Krughoff
Senior
St. Louis
As a political scientist who has concentrated on Latin American politics, Dean Kling examines the relevance of revolution to America and the nature of the protest movement.

REVOLUTION AND AMATEUR PROTEST

By MERLE KLING
Dean of the Faculty of Arts and Sciences

To discuss revolution in the context of our society immediately raises the question of relevance. Few Americans would share the feelings of the Mexican in Carlos Fuentes' novel who exclaims: "At times it seems to me that the absence of bloodshed and death drives us desperate, as if we feel ourselves alive only when surrounded by firing squads and destruction."

The United States, unlike many countries in Latin America, does not habitually resolve problems of succession in governmental offices by revolutionary violence. Between 1950 and 1965, at least forty successful revolutions took place in sixteen of the twenty Latin American republics. Clearly, despite our painful memories of the assassination of American Presidents, our political history does not resemble Latin America's.

When we turn from the chronic political violence of Latin America to the so-called great revolutions, we encounter other obstacles to meeting the criterion of relevance. A great revolution, such as the Bolshevik Revolution in Russia does not lend itself to easy repetition.

An entire generation of radical intellectuals in Western Europe and the United States, it is true, were assured by Soviet leaders that the Bolshevik Revolution was the model for future revolutions. They quoted Stalin's dictum that the USSR was destined to be the prototype of a future world Union of Soviet Socialist Republics. But they did not achieve power in Western Europe or in the United States. When groups professing adherence to Marxist-Leninist symbols and values did gain governmental control in China, they rather promptly concluded that the Russian dispensers of such symbols and values had betrayed them. The Castro regime thus far has not served as a model for emulation, even in Latin America.

There can be an additional reason to challenge the relevance of revolution in our setting. Many share a popular belief that participation in revolution is a response to conditions of economic poverty. Since they can cite spectacular figures of per capita income, gross national product, and expenditures for sports, cosmetics, tobacco, and liquor in the United States, they dismiss revolution as a matter of remote significance.

There are many considerations that limit the salience of revolution for us—the evident lack of emotional need for firing squads; the absence of a tradition of political revolution, as in Latin America; the unique qualities of great revolutions that frustrate efforts at imitation; the impressive comparative wealth of the country. The list is not exhaustive. Political scientists might speak of the viable civic culture in the United States as mitigating against revolution. Psychologists might cite our capacity to internalize aggressions. Constitutional lawyers might refer to the legitimacy with which large numbers of Americans endow their governmental institutions. Viewed from these angles of vision, revolution does not appear to warrant a prominent place on the agenda of our problems.

Yet, there are paradoxes. The President, in his State of the Union message, is not content to point with pride to the accomplishments of his administration; rather, he reluctantly acknowledges that there is a restlessness in the land. Governmental officials do not announce their vacation plans for the summer but their strategies of riot prevention and control. After decades of preaching the values of international understanding and the benefits of firsthand knowledge of alien peoples, officials advocate restrictions on foreign travel. Harassed university administrators solemnly ponder the new dilemmas spawned by student militancy and the politics of confrontation.

How shall we account for the chilling winds of discontent that blow through a country that is supposed to be basking in the warm sun of prosperity? Shall we dismiss those who blow cold rather than hot simply as victims of unhappy childhoods—as adolescents who failed to solve problems of authority within their families and now
indiscriminately attack elusive establishments, obscure power elites, and a system whose component pieces are so poorly synchronized that its gears may be stripped when it is forced to change speeds in the process of trying to catch up with its shortcomings? Shall we explain the discontents of our winter as merely a reaction to the Vietnam war? Shall we regard the sporadic violence and threats of violence of our summer as emanating solely from the deprivations of the poor and the desperation of unhappy childhoods, and the efforts of some social scientists to demonstrate a relationship between personality and political preferences still leave a good deal to be desired. Secondly, despite the high visibility of the Vietnam war, I believe that the end of that war would not cause the behavior we seek to describe as alienation, disaffection, dissent, and political radicalism to disappear.

Third, we again should lay to rest the proposition that revolutions are the product of oppressive poverty. Historians of the French and Russian Revolutions have demonstrated that significant economic development preceded these revolutions. De Tocqueville's view of the formation of revolutionary attitudes is well known: "A grievance patiently endured so long as it seemed beyond redress becomes intolerable once the possibility of remedy crosses men's minds." The possibility of remedy evidently crossed the minds of the French in the eighteenth century and the Russians in the twentieth.

The data on Cuba are at least equally discouraging for the assumption that economic backwardness stimulates revolution. By certain standard indicators, Cuba was far from the poorest country in Latin America before the Castro revolution. In 1958, Cuba's per capita national income was $335—relatively high in comparison with other Latin American states. The number of passenger vehicles, 159,200, again was high by Latin American standards. The indices of a high level of social mobilization also were present: the literacy rate was over 75 per cent, the daily newspaper circulation was 129 per 1000 population (in contrast with 3 per 1000 in Haiti), there were 170,092 telephones (26 per 1000), 176 radio receivers per 1000 population (a figure exceeded only by Uruguay, often labeled the most progressive state in Latin America), and there were 315,000 television receivers, a number exceeded only by Mexico and Brazil. But Castro's revolution took place.

If childhood experiences and poverty provide questionable explanations for the appeals of revolution, are we forced to conclude that intellectuals are an inherently cantankerous and contrary group, readily available for protest and demonstration? In the past, at least, political radicalism or alienation was supposed to be concentrated among writers and free-floating intellectuals who did not work in an institutional setting. Professors and students with academic, institutional affiliations conformed more to the norms of the prevailing society. According to this thesis, protesters of revolutionary aspiration should be found especially among those who have turned on, tuned in, and dropped out. But they are not.

One of the distinctive symptoms of our time is the prevalence of militant protest on the campus. Institutions of higher education today may harbor more writers and poets than Greenwich Village and more demonstrators than Union Square in the 1930's. I should like to speculate about the form, the content, and the sources of the protest that intersects with an academic setting.

At the outset, let's confess the obvious: we are talking about a minority; not the ghetto poor and the potentiality for violence in their condition, but the relatively small number in the academic community. It is a minority, however, that is predominantly white and middle class in origin, often including very talented and bright students, if at least one sociologist is to be believed, who were brought up by permissive parents. It is a minority that imparts a certain tone and texture to the campus, plays a large role in defining issues and structuring responses, and exercises an influence disproportionate to its numbers.

A study of Negro college students published last year emphasizes the fact that high status students are more likely to take part in protest movements than students from families in lower economic and social brackets. Reporting the results of his research in The American Political Science Review, James Orbell wrote: "... the data leave no doubt that the higher quality colleges recruit from the higher status part of the Negro population, but they also show that such high status is strongly associated with protest participation. Only 35 per cent of students from households where the head was semiskilled or unskilled were participants, while 53 per cent of the skilled or professional group could be similarly classed."

Consequently, I do not apologize for focusing attention on a minority.

My central argument is that the protest movement manifest in American academic life is amateur in its form and content. I am not employing the word "amateur" perjoratively. I am simply trying to identify a certain organizational feature and a latent element in the program of protest that stand in contrast with professionalism.

In form, the organizational behavior of the amateur protestor can be contrasted with the model of the professional revolutionary described by Lenin. Early in the twentieth century Lenin was preoccupied with questions regarding the organizational form necessary to consummate the revolution he sought in Russia. In 1902 in his book *What Is To Be Done?*, which in some respects served as a manual for Bolsheviks and Communists, he wrote: "... by 'wise men,' in connection with organization, I mean professional revolutionaries, irrespective of whether they are trained from among students or workingmen; ... no movement can be durable without a stable organi-
zation of leaders to maintain continuity; . . . the organization must consist chiefly of persons engaged in revolutionary activities as a profession; . . . in a country with an autocratic government, the more we restrict the membership of this organization to persons engaged in revolutionary activities as a profession and who have been professionally trained in the art of combating the political police, the more difficult will it be to catch the organization. . . .

The emphasis in Lenin's What Is To Be Done? clearly is on organization, leadership, professionalism, skill in coping with hostile police, and repeatedly on the need for stable, continuous leadership. About a half century later when Gabriel A. Almond, the American political scientist, and his associates made an analysis of several authoritative Communist texts they concluded that certain qualities were stressed for the model professional revolutionary. These qualities were: militance, rationality, organization and discipline, leadership, activism, dedication, uniqueness, and confidence. The heavy weight attached to discipline and leadership in this body of revolutionary literature especially is notable.

Measured by Lenin's standards for a professional revolutionary, protesters in the United States today, I suspect, choose amateurism. Their biases resist professionalism. They prefer spontaneity to discipline; the frequent rotation of personnel in office to stability of leadership; and the uninhibited expression of feelings to calculated and possibly excessively rational restraint. They respond to the symbol of "participatory democracy" rather than democratic centralism. As students who occasionally have encounters with the police they, nevertheless, may meet a few of Lenin's criteria. But their essential organizational style can be counterposed to that of the professional revolutionary. The form is amateur.

Not only the form, but an important ingredient of the content of the contemporary protest is amateur. One current in today's stream of protest is a rejection of a model of professionalism and success. The contemporary model of professionalism and success incorporated big organization, big research, big science, and big technology. The social concomitants of the professional model were bureaucracy, impersonality, and the search for a universal code to regulate behavior. For those who subscribed to these models, the difficult problems of allowing for individualism of style and idiosyncrasy of taste were to be fudged between the high trumps of economic productivity and personal careerism.

The IBM card has become the trite symbol of the enemy as the protesters register their objections to the emphasis on technical competence, specialization, quantification, technology, and the myopic pursuit of a dull version of success. Overtly the protest relates to the Vietnam war, racial segregation, poverty, military conscription, and even environmental contamination. The war gives the protest focus, immediacy, and identity; but it does not exhaust the protest. For latently the protest incorporates another important element. This element is poorly articulated and often inchoate. But I believe that a more subtle reading of the message of the protesters is that they are repelled and threatened by the demands for technical competence and the suppression of emotion imposed by our present forms of social organization. They are brothers, beneath the skin, of the Luddites, the group of English working-men who destroyed labor-saving machinery as a protest in the early nineteenth century. Their preference for simplicity and directness over complexity and circumspection is obvious. Their protest, in the sense in which I have employed the term, is amateur. It is a protest against the pervasive professionalism of modern society.

What are the sources of this protest that I have described as being amateur both in form and content? There can be different explanations depending on how we approach the problem or talk about it. In thinking about this problem, I find it useful to adapt Karl Deutsch's concept of social mobilization. Let me try to indicate the relevance of Deutsch's concept of social mobilization for possibly understanding Castro's revolution in Cuba and then suggest an adaptation of the concept to what I have called amateur protest.

To Deutsch, high literacy rates, a high rate of newspaper circulation, a wide distribution of radio receivers and television sets, are indices of social mobilization. By these indicators, Cuba, before the Castro revolution ranked high in social mobilization (compared to other Latin American countries). Yet Cuba, rather than other Latin American countries, was the site of a major revolution.

Although social mobilization was relatively high in Cuba, the outputs of the Cuban system were not at the same level as social mobilization. Thus we might assume that a high level of social mobilization would generate demands for efficient government and economic well-being. But Batista's Cuba was notoriously graft-ridden and unemployment was common. Boris Goldberg has described this facet of pre-Castro Cuba:

"... in Cuba ... there was a huge number of persons who had no real 'work,' an investigation during the economically favorable period of May, 1956, to April, 1957, showed that out of a labor force of 2,200,000, some 361,000 (16.3 per cent) were totally unemployed and 134,000 'underemployed' . . .

"The majority of these persons had had no real roots in the economy of their nation. . . . As a conglomeration of rootless individuals, unaccustomed to work, they have resisted strict discipline. . . . Since they have not worked, they more than others have been able to participate in terroristic and guerrilla activities. . . . They were recruited from the young unemployed and underemployed of the cities and the countryside, as well as from university and high-school students and from frustrated intellectuals of all descriptions who, with a lot of time on their hands, had only their rootlessness to lose and a world to conquer."

Building on Deutsch's concept, we might account for the Cuban revolution by pointing to the gap between the level of social mobilization and the economic opportuni-
ties of the Cuban system. This gap helped to create a relatively large group of rootless, alienated people who could be mobilized for guerrilla warfare and revolutionary politics.

What does this have to do with participants in what I have called amateur protest in the United States? Just this: We have mobilized the consciences and sensitivities of a significant number of youth in the United States while the dominant behavior of the society often violates the level of conscience and sensitivity that we have mobilized.

Our agencies of education have imparted one set of values and society at large practices another. College-trained parents have provided their children with experiences designed to develop sensitive consciences. They have sent them to schools that presumably reinforce such values. So receptive young people were supposed to care about their fellow men, to cherish peace more than war, to seek to know themselves, to accept the equality of man, to admire intellectual accomplishment more than the acquisition of wealth, to subordinate competitive drives to cooperative progress, to love rather than to hate, and courageously to pursue the truth rather than pusillanimously to dissemble. But when they take these values seriously, we denounce them as rebels and troublemakers! There is a gap between the level of conscience and sensitivity and expectation that has been mobilized among a sector of American youth and the behavior that they observe—and it is a gap filled by amateur protest.

To quote Lenin, let us ask, "What is to be done?"

I propose that we try to convert at least a portion of amateur protest into professional social science.

There is a possibility, indeed a probability, that amateur protest will dissipate into futility. The bases for professionally inspired revolution are not present in the United States. The repugnance of amateur protesters for the model of the professional revolutionary further diminishes the relevance of the revolutionary option. Under prevailing conditions, therefore, the consciences and the sensitivity of protest may be drained off by absorption in petty issues of dormitory rules, isolated confrontations, and depressing efforts to shock a shadowy establishment.

But the proclaimed targets of the protest represent real and not fictitious problems: war, discrimination, poverty, ghastly urban environments, and a scale of social priorities that defies a rational defense. The effective route of attack on these problems lies through merging a passion for their solution with the evolving technical capabilities of modern social science. For the insistent demand for expertise in coping with social issues today itself is revolutionary and transforms the nature of revolution.

I can anticipate some of the reservations that will be voiced to this proposal. Some will fear that the large amounts of money required for mounting a meaningful effort in the social sciences will attract entrepreneurial bees who flit promiscuously from one federal funding flower to another. Some of my colleagues in the social sciences, still unsure of their scientific footings, will forecast the pollution of their scientifically pure environments by the smog of application. And, we can predict that those who enjoy the dubious pleasures of undisciplined amateur protest more than the gratification of solving difficult social problems will shy away from the sacrifices that accompany a commitment to training, research, and relevant application in modern social science.

But these reservations, I believe, are specious. Opportunistic entrepreneurs are not confined to social science or pseudo social science, and methods can be devised to contain them. A concern with practical problems can facilitate rather than inhibit the development of so-called pure science. The motivation to change nature or society probably has contributed more to the discovery of basic knowledge than the motivation simply to understand phenomena. Let me stress, furthermore, that social scientists need not shrink from the exploration of certain problems on the grounds that they are alleged to be the subjects of value controversies. With respect to certain of our most conspicuous problems, such an argument is disingenuous. For if there is a serious value controversy, there must be groups on both sides of a question. But who in our society values war more than peace? Who values racial oppression more than freedom and equality? Who nearly advocates ugly cities in preference to decent ones? Who values economic poverty over economic well-being? It is symbolically revealing that both conservative and liberal academic economists have supported the negative income tax. There is more of a consensus than some social scientists are willing to acknowledge.

As for those temperamentally attracted to amateur protest, they constitute a more formidable obstacle. But the decision belongs to them. Perhaps some will desert the world of protest for the world of the creative arts. Perhaps some will wander off into questionable trips of introspection and self-indulgence. Perhaps some will lose interest in their causes. But for those with a sustained interest in a more humane society the entry into the world of professional social science may offer an alternative to amateur protest. As a minimum, professional social science may provide a moral equivalent for amateur protest.

To sum up: I have maintained that in form the current protest is amateur rather than in the mold of the professional revolutionary; a latent element in the content of the protest also is amateur. An alternative direction involves engagement with the rigors and challenges of modern social science. According to this view, if the energies of talented students who seek a more humane society can be mobilized on behalf of modern social science, then social change need not be revolutionary and violent, professionalism need not be exploited for inhumane ends, and protest need not be amateur. If war is too serious a matter to be left to generals, the gap between our potentialities and achievements today is too great to be left to the vagaries of professional revolutionaries or the protest of amateurs.
The Plain Fact Is...

...our colleges and universities "are facing what might easily become a crisis"

Our colleges and universities, over the last 20 years, have experienced an expansion that is without precedent—in buildings and in budgets, in students and in professors, in reputation and in rewards—in power and pride and in deserved prestige. As we try to tell our countrymen that we are faced with imminent bankruptcy, we confront the painful fact that in the eyes of the American people—and I think also in the eyes of disinterested observers abroad—we are a triumphant success. The observers seem to believe—and I believe myself—that the American campus ranks with the American corporation among the handful of first-class contributions which our civilization has made to the annals of human institutions. We come before the country to plead financial emergency at a time when our public standing has never been higher. It is at the least an unhappy accident of timing.

—McGeorge Bundy
President, The Ford Foundation
A STATE-SUPPORTED UNIVERSITY in the Midwest makes a sad announcement: With more well-qualified applicants for its freshman class than ever before, the university must tighten its entrance requirements. Qualified though the kids are, the university must turn many of them away.

- A private college in New England raises its tuition fee for the seventh time since World War II. In doing so, it admits ruefully: "Many of the best high-school graduates can't afford to come here, any more."

- A state college network in the West, long regarded as one of the nation's finest, cannot offer its students the usual range of instruction this year. Despite intensive recruiting, more than 1,000 openings on the faculty were unfilled at the start of the academic year.

- A church-related college in the South, whose denomination's leaders believe in strict separation of church and state, severs its church ties in order to seek money from the government. The college must have such money, say its administrators—or it will die.

Outwardly, America's colleges and universities appear more affluent than at any time in the past. In the aggregate they have more money, more students, more buildings, better-paid faculties, than ever before in their history.

Yet many are on the edge of deep trouble.

"The plain fact," in the words of the president of Columbia University, "is that we are facing what might easily become a crisis in the financing of American higher education, and the sooner we know about it, the better off we will be."

T HE TROUBLE is not limited to a few institutions. Nor does it affect only one or two types of institution. Large universities, small colleges; state-supported and privately supported: the problem faces them all.

Before preparing this report, the editors asked more than 500 college and university presidents to tell us—off the record, if they preferred—just how they viewed the future of their institutions. With rare exceptions, the presidents agreed on this assessment: That the money is not now in sight to meet the rising costs of higher education... to serve the growing numbers of bright, qualified students... and to pay for the myriad activities that Americans now demand of their colleges and universities.

Important programs and necessary new buildings are
being deferred for lack of money, the presidents said. Many admitted to budget-tightening measures reminiscent of those taken in days of the Great Depression.

Is this new? Haven't the colleges and universities always needed money? Is there something different about the situation today?

The answer is "Yes"—to all three questions.

The president of a large state university gave us this view of the over-all situation, at both the publicly and the privately supported institutions of higher education:

"A good many institutions of higher learning are operating at a deficit," he said. "First, the private colleges and universities: they are eating into their endowments in order to meet their expenses. Second, the public institutions. It is not legal to spend beyond our means, but here we have another kind of deficit: a deficit in quality, which will be extremely difficult to remedy even when adequate funding becomes available."

Other presidents' comments were equally revealing:

- From a university in the Ivy League: "Independent national universities face an uncertain future which threatens to blunt their thrust, curb their leadership, and jeopardize their independence. Every one that I know about is facing a deficit in its operating budget, this year or next. And all of us are hard-put to see where we are going to get the funds to meet the educational demands of the coming decade."

- From a municipal college in the Midwest: "The best word to describe our situation is 'desperate.' We are operating at a deficit of about 20 per cent of our total expenditure."

- From a private liberal arts college in Missouri: "Only by increasing our tuition charges are we keeping our heads above water. Expenditures are galloping to such a degree that I don't know how we will make out in the future."

- From a church-related university on the West Coast: "We face very serious problems. Even though our tuition is below-average, we have already priced ourselves out of part of our market. We have gone deeply into debt for dormitories. Our church support is declining. At times, the outlook is grim."

- From a state university in the Big Ten: "The budget for our operations must be considered tight. It is less than we need to meet the demands upon the university for teaching, research, and public service."

- From a small liberal arts college in Ohio: "We are on a hand-to-mouth, 'kitchen' economy. Our ten-year projections indicate that we can maintain our quality only by doubling in size."

- From a small college in the Northeast: "For the first time in its 150-year history, our college has a planned deficit. We are holding our heads above water at the moment—but, in terms of quality education, this cannot long continue without additional means of support."

- From a state college in California: "We are not permitted to operate at a deficit. The funding of our budget at a level considerably below that proposed by the trustees has made it difficult for us to recruit staff members and has forced us to defer very-much-needed improvements in our existing activities."

- From a women's college in the South: "For the coming year, our budget is the tightest we have had in my fifteen years as president."

What's Gone Wrong?

Talk of the sort quoted above may seem strange, as one looks at the unparalleled growth of America's colleges and universities during the past decade:

- Hardly a campus in the land does not have a brand-new building or one under construction. Colleges and universities are spending more than $2 billion a year for capital expansion.

- Faculty salaries have nearly doubled in the past decade. (But in some regions they are still woefully low.)

- Private, voluntary support to colleges and universities has more than tripled since 1958. Higher education's share of the philanthropic dollar has risen from 11 per cent to 17 per cent.

- State tax funds appropriated for higher education have increased 44 per cent in just two years, to a 1967-68 total of nearly $4.4 billion. This is 214 per cent more than the sum appropriated eight years ago.

- Endowment funds have more than doubled over the past decade. They're now estimated to be about $12 billion, at market value.

- Federal funds going to institutions of higher education have more than doubled in four years.

- More than 300 new colleges and universities have been founded since 1945.

- All in all, the total expenditure this year for U.S. higher education is some $18 billion—more than three times as much as in 1955.
Moreover, America's colleges and universities have absorbed the tidal wave of students that was supposed to have swamped them by now. They have managed to fulfill their teaching and research functions and to undertake a variety of new public-service programs—despite the ominous predictions of faculty shortages heard ten or fifteen years ago. Says one foundation official:

"The system is bigger, stronger, and more productive than it has ever been, than any system of higher education in the world."

Why, then, the growing concern?

Re-examine the progress of the past ten years, and this fact becomes apparent: The progress was great—but it did not deal with the basic flaws in higher education's financial situation. Rather, it made the whole enterprise bigger, more sophisticated, and more expensive.

Voluntary contributions grew—but the complexity and costliness of the nation's colleges and universities grew faster.

Endowment funds grew—but the need for the income from them grew faster.

State appropriations grew—but the need grew faster.

Faculty salaries were rising. New courses were needed, due to the unprecedented "knowledge explosion." More costly apparatus was required, as scientific progress grew more complex. Enrollments burgeoned—and students stayed on for more advanced (and more expensive) training at higher levels.

And, for most of the nation's 2,300 colleges and universities, an old problem remained—and was intensified, as the costs of education rose: gifts, endowment, and government funds continued to go, disproportionately, to a relative handful of institutions. Some 36 per cent of all voluntary contributions, for example, went to just 55 major universities. Some 90 per cent of all endowment funds were owned by fewer than 5 per cent of the institutions. In 1966, the most recent year reported, some 70 per cent of the federal government's funds for higher education went to 100 institutions.

McGeorge Bundy, the president of the Ford Foundation, puts it this way:

"Great gains have been made; the academic profession has reached a wholly new level of economic strength, and the instruments of excellence—the libraries and

Drawings by Peter Hooven
EACH NEW ATTEMPT at a massive solution has left the trustees and presidents just where they started.

—A foundation president

laboratories—are stronger than ever. But the university that pauses to look back will quickly fall behind in the endless race to the future."

Mr. Bundy says further:

"The greatest general problem of higher education is money . . . . The multiplying needs of the nation's colleges and universities force a recognition that each new attempt at a massive solution has left the trustees and presidents just where they started: in very great need."

THE FINANCIAL PROBLEMS of higher education are unlike those, say, of industry. Colleges and universities do not operate like General Motors. On the contrary, they sell their two primary services—teaching and research—at a loss.

It is safe to say (although details may differ from institution to institution) that the American college or university student pays only a fraction of the cost of his education.

This cost varies with the level of education and with the educational practices of the institution he attends. Undergraduate education, for instance, costs less than graduate education—which in turn may cost less than medical education. And the cost of educating a student in the sciences is greater than in the humanities. Whatever the variations, however, the student's tuition and fees pay only a portion of the bill.

"As private enterprises," says one president, "we don't seem to be doing so well. We lose money every time we take in another student."

Of course, neither he nor his colleagues on other campuses would have it otherwise. Nor, it seems clear, would most of the American people.

But just as student instruction is provided at a substantial reduction from the actual cost, so is the research that the nation's universities perform on a vast scale for the federal government. On this particular below-cost service, as contrasted with that involving the provision of education to their students, many colleges and universities are considerably less than enthusiastic.

In brief: The federal government rarely pays the full cost of the research it sponsors. Most of the money goes for direct costs (compensation for faculty time, equipment, computer use, etc.) Some of it goes for indirect costs (such "overhead" costs of the institution as payroll departments, libraries, etc.). Government policy stipulates that the institutions receiving federal research grants
must share in the cost of the research by contributing, in some fashion, a percentage of the total amount of the grant.

University presidents have insisted for many years that the government should pay the full cost of the research it sponsors. Under the present system of cost-sharing, they point out, it actually costs their institutions money to conduct federally sponsored research. This has been one of the most controversial issues in the partnership between higher education and the federal government, and it continues to be so.

In commercial terms, then, colleges and universities sell their products at a loss. If they are to avoid going bankrupt, they must make up—from other sources—the difference between the income they receive for their services and the money they spend to provide them.

With costs spiraling upward, that task becomes ever more formidable.

Here are some of the harsh facts: Operating expenditures for higher education more than tripled during the past decade—from about $4 billion in 1956 to $12.7 billion last year. By 1970, if government projections are correct, colleges and universities will be spending over $18 billion for their current operations, plus another $2 billion or $3 billion for capital expansion.

Why such steep increases in expenditures? There are several reasons:

- Student enrollment is now close to 7 million—twice what it was in 1960.
- The rapid accumulation of new knowledge and a resulting trend toward specialization have led to a broadening of the curricula, a sharp increase in graduate study, a need for sophisticated new equipment, and increased library acquisitions. All are very costly.
- An unprecedented growth in faculty salaries—long overdue—has raised instructional costs at most institutions. (Faculty salaries account for roughly half of the educational expenses of the average institution of higher learning.)
- About 20 per cent of the financial “growth” during the past decade is accounted for by inflation.

Not only has the over-all cost of higher education increased markedly, but the cost per student has risen steadily, despite increases in enrollment which might, in any other “industry,” be expected to lower the unit cost.

Colleges and universities apparently have not improved their productivity at the same pace as the economy generally. A recent study of the financial trends in three private universities illustrates this. Between 1905 and 1966, the educational cost per student at the three universities, viewed compositely, increased 20-fold, against an economy-wide increase of three- to four-fold. In each of the three periods of peace, direct costs per student increased about 8 per cent, against a 2 per cent annual increase in the economy-wide index.

Some observers conclude from this that higher education must be made more efficient—that ways must be found to educate more students with fewer faculty and staff members. Some institutions have moved in this direction by adopting a year-round calendar of operations, permitting them to make maximum use of the faculty and physical plant. Instructional devices, programmed learning, closed-circuit television, and other technological systems are being employed to increase productivity and to gain economies through larger classes.

The problem, however, is to increase efficiency without jeopardizing the special character of higher education. Scholars are quick to point out that management techniques and business practices cannot be applied easily to colleges and universities. They observe, for example, that on strict cost-accounting principles, a college could not justify its library. A physics professor, complaining about large classes, remarks: “When you get a hundred kids in a classroom, that’s not education; that’s show business.”

The college and university presidents whom we surveyed in the preparation of this report generally believe their institutions are making every dollar work. There is room for improvement, they acknowledge. But few feel the financial problems of higher education can be significantly reduced through more efficient management.

One thing seems fairly certain: The costs of higher education will continue to rise. To meet their projected expenses, colleges and universities will need to increase their annual operating income by more than $4 billion during the four-year period between 1966 and 1970. They must find another $8 billion or $10 billion for capital outlays.

Consider what this might mean for a typical private
A recent report presented this hypothetical case, based on actual projections of university expenditures and income:

The institution's budget is now in balance. Its educational and general expenditures total $24.5 million a year.

Assume that the university's expenditures per student will continue to grow at the rate of the past ten years—7.5 per cent annually. Assume, too, that the university's enrollment will continue to grow at its rate of the past ten years—3.4 per cent annually. Ten years hence, the institution's educational and general expenses would total $70.7 million.

At best, continues the analysis, tuition payments in the next ten years will grow at a rate of 6 per cent a year; at worst, at a rate of 4 per cent—compared with 9 per cent over the past ten years. Endowment income will grow at a rate of 3.5 to 5 per cent, compared with 7.7 per cent over the past decade. Gifts and grants will grow at a rate of 4.5 to 6 per cent, compared with 6.5 per cent over the past decade.

"If the income from private sources grew at the higher rates projected," says the analysis, "it would increase from $24.5 million to $50.9 million—leaving a deficit of $19.8 million, ten years hence. If its income from private sources grew at the lower rates projected, it would have increased to only $43 million—leaving a shortage of $27.8 million, ten years hence."

In publicly supported colleges and universities, the outlook is no brighter, although the gloom is of a different variety. Says the report of a study by two professors at the University of Wisconsin:

"Public institutions of higher education in the United States are now operating at a quality deficit of more than a billion dollars a year. In addition, despite heavy construction schedules, they have accumulated a major capital lag."

The deficit cited by the Wisconsin professors is a computation of the cost of bringing the public institutions' expenditures per student to a level comparable with that at the private institutions. With the enrollment growth expected by 1975, the professors calculate, the "quality deficit" in public higher education will reach $2.5 billion.

The problem is caused, in large part, by the tremendous enrollment increases in public colleges and universities. The institutions' resources, says the Wisconsin study, "may not prove equal to the task."

Moreover, there are indications that public institutions may be nearing the limit of expansion, unless they receive a massive infusion of new funds. One of every seven public universities rejected qualified applicants from their own states last fall; two of every seven rejected qualified applicants from other states. One of every ten raised admissions standards for in-state students; one in six raised standards for out-of-state students.

WILL THE FUNDS be found to meet the projected cost increases of higher education? Colleges and universities have traditionally received their operating income from three sources: from the students, in the form of tuition and fees; from the state, in the form of legislative appropriations; and from individuals, foundations, and corporations, in the form of gifts. (Money from the federal government for operating expenses is still more of a hope than a reality.)

Can these traditional sources of funds continue to meet the need? The question is much on the minds of the nation's college and university presidents.

Tuition and fees: They have been rising—and are likely to rise more. A number of private "prestige" institutions have passed the $2,000 mark. Public institutions are under mounting pressure to raise tuition and fees, and their student charges have been rising at a faster rate than those in private institutions.

The problem of student charges is one of the most controversial issues in higher education today. Some feel that the student, as the direct beneficiary of an education, should pay most or all of its real costs. Others disagree emphatically: since society as a whole is the ultimate beneficiary, they argue, every student should have the right to an education, whether he can afford it or not.

The leaders of publicly supported colleges and universities are almost unanimous on this point: that higher tuitions and fees will erode the premise of equal oppor-
Tuition: We are reaching a point of diminishing returns.

It's like buying a second home.

-A college president

-A parent

tunity on which public higher education is based. They would like to see the present trend reversed—toward free, or at least lower-cost, higher education.

Leaders of private institutions find the rising tuitions equally disturbing. Heavily dependent upon the income they receive from students, many such institutions find that raising their tuition is inescapable, as costs rise. Scores of presidents surveyed for this report, however, said that mounting tuition costs are "pricing us out of the market." Said one: "As our tuition rises beyond the reach of a larger and larger segment of the college-age population, we find it more and more difficult to attract our quota of students. We are reaching a point of diminishing returns."

Parents and students also are worried. Said one father who has been financing a college education for three daughters: "It's like buying a second home."

Stanford Professor Roger A. Freeman says it isn't really that bad. In his book, Crisis in College Finance?, he points out that when tuition increases have been adjusted to the shrinking value of the dollar or are related to rising levels of income, the cost to the student actually declined between 1941 and 1961. But this is small consolation to a man with an annual salary of $15,000 and three daughters in college.

Colleges and universities will be under increasing pressure to raise their rates still higher, but if they do, they will run the risk of pricing themselves beyond the means of more and more students. Indeed, the evidence is strong that resistance to high tuition is growing, even in relatively well-to-do families. The College Scholarship Service, an arm of the College Entrance Examination Board, reported recently that some middle- and upper-income parents have been "substituting relatively low-cost institutions" because of the rising prices at some of the nation's colleges and universities.

The presidents of such institutions have nightmares over such trends. One of them, the head of a private college in Minnesota, told us:

"We are so dependent upon tuition for approximately 50 per cent of our operating expenses that if 40 fewer students come in September than we expect, we could have a budgetary deficit this year of $50,000 or more."

- State appropriations: The 50 states have appropriated nearly $4.4 billion for their colleges and universities this year—a figure that includes neither the $1-$2 billion spent by public institutions for capital expansion, nor the appropriations of local governments, which account for about 10 per cent of all public appropriations for the operating expenses of higher education.

The record set by the states is remarkable—one that many observers would have declared impossible, as recently as eight years ago. In those eight years, the states have increased their appropriations for higher education by an incredible 214 per cent.

Can the states sustain this growth in their support of higher education? Will they be willing to do so?

The more pessimistic observers believe that the states can't and won't, without a drastic overhaul in the tax structures on which state financing is based. The most productive tax sources, such observers say, have been pre-empted by the federal government. They also believe that more and more state funds will be used, in the future, to meet increasing demands for other services.

Optimists, on the other hand, are convinced the states are far from reaching the upper limits of their ability to raise revenue. Tax reforms, they say, will enable states to increase their annual budgets sufficiently to meet higher education's needs.

The debate is theoretical. As a staff report to the Advisory Commission on Intergovernmental Relations concluded: "The appraisal of a state's fiscal capacity is a political decision [that] it alone can make. It is not a reseachable problem."

Ultimately, in short, the decision rests with the taxpayer.

- Voluntary private gifts: Gifts are vital to higher education.

In private colleges and universities, they are part of the lifeblood. Such institutions commonly budget a deficit, and then pray that it will be met by private gifts.

In public institutions, private gifts supplement state appropriations. They provide what is often called "a margin for excellence." Many public institutions use such funds to raise faculty salaries above the levels paid for by the state, and are thus able to compete for top scholars. A number of institutions depend upon private gifts for student facilities that the state does not provide.

Will private giving grow fast enough to meet the growing need? As with state appropriations, opinions vary.

John J. Schwartz, executive director of the American Association of Fund-Raising Counsel, feels there is a great untapped reservoir. At present, for example, only one out of every four alumni and alumnae contributes to higher education. And, while American business corporations gave an estimated $300 million to education...
in 1965-66, this was only about 0.37 per cent of their net income before taxes. On the average, companies contribute only about 1.10 per cent of net income before taxes to all causes—well below the 5 per cent allowed by the Federal government. Certainly there is room for expansion.

(Colleges and universities are working overtime to tap this reservoir. Mr. Schwartz's association alone lists 117 colleges and universities that are now campaigning to raise a combined total of $4 billion.)

But others are not so certain that expansion in private giving will indeed take place. The 46th annual survey by the John Price Jones Company, a firm of fund-raising counselors, sampled 50 colleges and universities and found a decline in voluntary giving of 8.7 per cent in 12 months. The Council for Financial Aid to Education and the American Alumni Council calculate that voluntary support for higher education in 1965-66 declined by some 1.2 per cent in the same period.

Refining these figures gives them more meaning. The major private universities, for example, received about 36 per cent of the $1.2 billion given to higher education—a decrease from the previous year. Private liberal arts colleges also fell behind: coeducational colleges dropped 10 per cent, men's colleges dropped 16.2 per cent, and women's colleges dropped 12.6 per cent. State institutions, on the other hand, increased their private support by 23.8 per cent.

The record of some cohesive groups of colleges and universities is also revealing. Voluntary support of eight Ivy League institutions declined 27.8 per cent, for a total loss of $61 million. The Seven College Conference, a group of women's colleges, reported a drop of 41 per cent. The Associated Colleges of the Midwest dropped about
ON THE QUESTION OF FEDERAL AID, everybody seems to be running to the same side of the boat.

—A college president

5.5 per cent. The Council of Southern Universities declined 6.2 per cent. Fifty-five major private universities received 7.7 per cent less from gifts.

Four groups gained. The state universities and colleges received 20.5 per cent more in private gifts in 1965-66 than in the previous year. Fourteen technological institutions gained 10.8 per cent. Members of the Great Lakes College Association gained 5.6 per cent. And Western Conference universities, plus the University of Chicago, gained 34.5 per cent. (Within each such group, of course, individual colleges may have gained or lost differently from the group as a whole.)

The biggest drop in voluntary contributions came in foundation grants. Although this may have been due, in part, to the fact that there had been some unusually large grants the previous year, it may also have been a foretaste of things to come. Many of those who observe foundations closely think such grants will be harder and harder for colleges and universities to come by, in years to come.

FEARING that the traditional sources of revenue may not yield the necessary funds, college and university presidents are looking more and more to Washington for the solution to their financial problems.

The president of a large state university in the South, whose views are typical of many, told us: "Increased federal support is essential to the fiscal stability of the colleges and universities of the land. And such aid is a proper federal expenditure."

Most of his colleagues agreed—some reluctantly. Said the president of a college in Iowa: "I don't like it...but it may be inevitable." Another remarked: "On the question of federal aid, everybody seems to be running to the same side of the boat."

More federal aid is almost certain to come. The question is, When? And in what form?

Realism compels this answer: In the near future, the federal government is unlikely to provide substantial support for the operating expenses of the country's colleges and universities.

The war in Vietnam is one reason. Painful effects of war-prompted economies have already been felt on the campuses. The effective federal funding of research per faculty member is declining. Construction grants are becoming scarcer. Fellowship programs either have been reduced or have merely held the line.

Indeed, the changes in the flow of federal money to the campuses may be the major event that has brought higher education's financial problems to their present head.

Would things be different in a peacetime economy? Many college and university administrators think so. They already are planning for the day when the Vietnam war ends and when, the thinking goes, huge sums of federal money will be available for higher education. It is no secret that some government officials are operating on the same assumption and are designing new programs of support for higher education, to be put into effect when the war ends.

Others are not so certain the postwar money flow is that inevitable. One of the doubters is Clark Kerr, former president of the University of California and a man with considerable first-hand knowledge of the relationship between higher education and the federal government. Mr. Kerr is inclined to believe that the colleges and universities will have to fight for their place on a national priority list that will be crammed with a number of other pressing
Colleges and universities are tough. They have survived countless cataclysms and crises, and one way or another they will endure.

—A college president

problems: air and water pollution, civil rights, and the plight of the nation’s cities, to name but a few.

One thing seems clear: The pattern of federal aid must change dramatically, if it is to help solve the financial problems of U.S. higher education. Directly or indirectly, more federal dollars must be applied to meeting the increasing costs of operating the colleges and universities, even as the government continues its support of students, of building programs, and of research.

In searching for a way out of their financial difficulties, colleges and universities face the hazard that their individual interests may conflict. Some form of competition (since the institutions are many and the sources of dollars few) is inevitable and healthy. But one form of competition is potentially dangerous and destructive and, in the view of impartial supporters of all institutions of higher education, must be avoided at all costs.

This is a conflict between private and public colleges and universities.

In simpler times, there was little cause for friction. Public institutions received their funds from the states. Private institutions received their funds from private sources.

No longer. All along the line, and with increasing frequency, both types of institution are seeking both public and private support—often from the same sources:

- The state treasuries: More and more private institutions are suggesting that some form of state aid is not only necessary but appropriate. A number of states have already enacted programs of aid to students attending private institutions. Some 40 percent of the state appropriation for higher education in Pennsylvania now goes to private institutions.
- The private philanthropists: More and more public institutions are seeking gifts from individuals, foundations, and corporations, to supplement the funds they receive from the state. As noted earlier in this report, their efforts are meeting with growing success.
- The federal government: Both public and private colleges and universities receive funds from Washington. But the different types of institution sometimes disagree on the fundamentals of distributing it.

Should the government help pay the operating costs of colleges and universities by making grants directly to the institutions—perhaps through a formula based on enrollment?

ments? The heads of many public institutions are inclined to think so. The heads of many low-enrollment, high-tuition private institutions, by contrast, tend to favor programs that operate indirectly—perhaps by giving enough money to the students themselves, to enable them to pay for an education at whatever institutions they might choose.

Similarly, the strongest opposition to long-term, federally underwritten student-loan plans—some envisioning a payback period extending over most of one’s lifetime—comes from public institutions, while some private-college and university leaders find, in such plans, a hope that their institutions might be able to charge “full-cost” tuition rates without barring students whose families can’t afford to pay.

In such frictional situations, involving not only billions of dollars but also some very deep-seated convictions about the country’s educational philosophy, the chances that destructive conflicts might develop are obviously great. If such conflicts were to grow, they could only sap the energies of all who engage in them.

If there is indeed a crisis building in American higher education, it is not solely a problem of meeting the minimum needs of our colleges and universities in the years ahead. Nor, for most, is it a question of survive or perish; “colleges and universities are tough,” as one president put it; “they have survived countless cataclysms and crises, and one way or another they will endure.”

The real crisis will be finding the means of providing the quality, the innovation, the pioneering that the nation needs, if its system of higher education is to meet the demands of the morrow.

Not only must America’s colleges and universities serve millions more students in the years ahead; they must also equip these young people to live in a world that is changing with incredible swiftness and complexity. At the same time, they must carry on the basic research on which the nation’s scientific and technological advancement rests. And they must be ever-ready to help meet the immediate and long-range needs of society; ever-responsive to society’s demands.

At present, the questions outnumber the answers.

- How can the United States make sure that its colleges and universities not only will accomplish the minimum task but will, in the words of one corporate leader,
NOTHING IS MORE IMPORTANT than the critical and knowledgeable interest of our alumni. It cannot possibly be measured in merely financial terms.

—A university president

provide "an educational system adequate to enable us to live in the complex environment of this century?"

Do we really want to preserve the diversity of an educational system that has brought the country a strength unknown in any other time or any other place? And, if so, can we?

How can we provide every youth with as much education as he is qualified for?

Can a balance be achieved in the sources of higher education's support, so that public and private institutions can flourish side by side?

How can federal money best be channeled into our colleges and universities without jeopardizing their independence and without discouraging support either from the state legislatures or from private philanthropy?

The answers will come painfully; there is no panacea. Quick solutions, fashioned in an atmosphere of crisis, are likely to compound the problem. The right answers will emerge only from greater understanding on the part of the country's citizens, from honest and candid discussion of the problems, and from the cooperation and support of all elements of society.

The president of a state university in the Southwest told us: "Among state universities, nothing is more important than the growing critical and knowledgeable interest of our alumni. That interest leads to general support. It cannot possibly be measured in merely financial terms."

A private college president said: "The greatest single source of improvement can come from a realization on the part of a broad segment of our population that higher education must have support. Not only will people have to give more, but more will have to give."

But do people understand? A special study by the Council for Financial Aid to Education found that:

82 per cent of persons in managerial positions or the professions do not consider American business to be an important source of gift support for colleges and universities.

59 per cent of persons with incomes of $10,000 or over do not think higher education has financial problems.

52 per cent of college graduates apparently are not aware that their alma mater has financial problems.

To America's colleges and universities, these are the most discouraging revelations of all. Unless the American people—especially the college and university alumni—can come alive to the reality of higher education's impending crisis, then the problems of today will be the disasters of tomorrow.

The report on this and the preceding 15 pages is the product of a cooperative endeavor in which scores of schools, colleges, and universities are taking part. It was prepared under the direction of the group listed below, who form EDITORIAL PROJECTS FOR EDUCATION, a non-profit organization associated with the American Alumni Council.

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The Plain Fact Is . . .

. . . Washington University can continue to be a fine institution of high quality if it can raise at least $6,000,000 annually in unrestricted private gifts

By CHANCELLOR THOMAS H. ELIOT
The Plain Fact Is . . .

I am fed to the teeth with some journalists and other academic critics who today are pointing accusatory fingers at university presidents and asking: "Why haven't you let the people know, long since, that private institutions of higher learning are facing a grim future? Why haven't you told the world that you're about to go broke?"

I can give four answers.

First, not all of us think that we are going broke, and we have no intention of doing so.

Second, the circumstances that are the primary cause of the general sense of financial crisis are of very recent origin. They are the sudden and tremendous growth of low-tuition (or free) public institutions that pay high faculty salaries; and the war in Vietnam, which has stimulated inflation, has caused cutbacks in research support, and will probably cause a heavy loss of tuition income in the graduate and professional schools.

Third, many university presidents, myself included, have sought in speeches, reports, and articles to give the public the financial facts of academic life.

Fourth, most private institutions survive only by raising large amounts of money every year from private donors. How many donors—individuals, corporations, or foundations—are going to give their money to a university whose president wails that it is going down the drain?

Certainly the situation is tough . . . very tough. Just how tough it might become is shown by the example given in the accompanying article entitled "The Plain Fact Is . . . ," describing a mythical university with an annual operating deficit after gifts of from $19,500,000 to $27,800,000 in 1967. But
obviously such a private university is not going to exist in 1977. It would be either public or defunct.

I have been aware, for a year, of this analysis of the future of the mythical university. Many months earlier I had instituted a rather similar analysis of Washington University—which is continuing today. It suggests that this University can continue to be a fine institution of high quality, through the next decade, if it can raise annually at least $6,000,000 in unrestricted private gifts.

**This figure is a large one, but it cannot be less if we are to pay competitive salaries, sufficient to keep our fine professors here and to attract able new faculty members.**

This figure would have to be higher if we were to insist on continuing to do everything that we are doing now or would like to do. We can’t. Faculty committees, administrators, and trustees are today engaged in making the terribly hard decisions—what must we curtail or even drop, and what are the most important things that we can and must do extremely well?

Certainly if we were to make no changes whatsoever, the future would be black. Either we would go broke in a big way, or we would freeze or reduce all costs and by so doing drive our professors away. We could probably survive for a few years with a low-paid faculty, but who wants a high-tuition university that gives its students an education that is mediocre or worse?

We must make whatever changes are necessary to enable us to provide a fine education for our students. The arts and sciences are the heart of a university: we are excellent today in the humanities, social sciences, and natural sciences, and we must remain so. We have a world-famous medical school. Academic distinction has been attained in several other areas. All of them are areas suitable for a good university.

Any change that includes curtailing or eliminating a worthy academic endeavor is painful. It evokes sadness, and wrath from those who think that their endeavor is more important than any other. It’s no fun to eliminate or reduce anything. But if we don’t, then indeed we could go broke. We have no intention of going broke.

Rather than close or curtail a particular school or program, could we get state support for it, or even operate it for the state? Possibly. But the state authorities’ reaction when St. Louis University announced the closing of its dental school does not give rise to any optimism.

**However, I see no devastating prospect. Our teaching and research will be better than ever—if:**

We do have the hardiness to make a few selective cutbacks;

We are not “thrown” by a worsening impact of the war, on costs and on research and on enrollment; and

We organize successfully to raise the $6,000,000 or more that will be needed annually.

I think we have the courage to make the hard choices and that the great majority of our alumni and friends will recognize the necessity for making them.

I cannot predict confidently the dual impact of war and inflation on our financial future.

I do believe that we must raise at least $6,000,000 a year. This is because I have faith in Washington University; faith in its alumni; faith in the awareness of St. Louisans, individual and corporate, that theirs is a better city because this institution is here; faith in the determination of private enterprise, generally, to maintain the independence and quality of private higher education.
The symptoms of anxiety neurosis, a psychiatric disease which affects an estimated ten million persons in this country, have been chemically induced for the first time in medical history by a Washington University researcher. He is Dr. Ferris N. Pitts, associate professor of psychiatry, whose findings on anxiety neurosis have opened a new research field. He received his undergraduate and medical degrees from Washington University. A member of the faculty of the School of Medicine since 1955, he holds a Research Career Award from the National Institutes of Health.

ANXIETY NEUROSIS

By ROGER SIGNOR

This has been called the age of anxiety—and with good reason. Tranquilizers have become almost as commonplace as aspirin in the typical medicine cabinet, and each day doctors hear a multitude of physical complaints which were probably triggered by anxieties.

This undercurrent of everyday anxiousness tends to obscure a widespread psychiatric problem. It affects millions of people and has been known by many names, including anxiety neurosis, neurocirculatory asthenia, and effort syndrome.

Dr. Paul Dudley White and associates at the Massachusetts General Hospital and other investigators have done outstanding research during the past twenty-five years in clarifying the condition. Last December, Dr. Ferris N. Pitts and Dr. James N. McClure of Washington University's psychiatry department reported in the New England Journal of Medicine that they had carried out a research project which is the first to show that the symptoms of the condition can be induced by a chemical. They prefer to call it anxiety neurosis. This was the initial research step that points to a possible physiological basis for the affliction.

The symptoms of anxiety neurosis are many, but the work of physicians such as Dr. White and Dr. Pitts has revealed a definite syndrome. There also is strong evidence that the condition is hereditary. Before giving detailed information necessary for diagnosis of anxiety neurosis, Dr. Pitts reads to his medical school classes an essay from the Saturday Review by Goodman Ace, who is an expert on the subject.

"My symptoms were simple, really, and will no doubt find identification in many hypochondriacal minds," Mr. Ace wrote in 1964. "At any given moment and all through any day or night I could develop a rapid heartbeat and pulse that triggered a shortness of breath accompanied by a fear of dying. It was not so much the actual fear of dying as it was doing it unattractively; lying prone on a strange, busy street somewhere or slumped in a theater seat, or in a restaurant or a crowded elevator. . . . It is with the purpose of demonstrating that there is an art to handling hypochondria with grace and dignity that this piece is being written. Fainting in nightclubs, regurgitating in taxis, leaning against tall buildings, are not accepted savoir-faire. I know. I was there, Charlie. I was a mess."

Ace went on to say that he was most fortunate in finding three doctors who independently diagnosed his problem as neurocirculatory asthenia, or anxiety neurosis, and that he would be forever grateful for their considerate attendance, although they could not cure him.

Having the problem properly diagnosed, however, is a big step. It is a nightmarish experience for an anxiety patient to go from doctor to doctor only to be told perfunctorily, "There's nothing physically wrong with you."

One of Dr. Pitts' patients, Gerald Mulkey of South St. Louis, last February described for a gathering of medical
students just how frightening this experience could be.

His symptoms began twenty-two years ago when he was living with his wife and two small children in San Francisco. Through all of the following, it should be noted, he managed to work steadily and raise a family.

"I started to get ready for bed one evening," Mr. Mulkey told Dr. Pitts' students, "and the first thing I was aware of was a pain in the center part of my chest. It was vague at first, but then it spread around my chest and got worse. Next, I felt palpitation and then I had difficulty in breathing. I got up and started walking around, trying to get my breath. I became frightened and thought I was having a heart attack. Then I got panicky. I didn't know what to do. I just kept pacing back and forth. Finally, I had some coffee, and after an hour or so, my symptoms abated—I found it easier to breathe and my chest pains were not quite so severe. But I didn't go back to bed again. I sat up all night."

"The symptoms kept recurring every week," Mr. Mulkey continued. "It was getting so I was having these attacks about once a day, sometimes twice a day; at the most, I'd go a day or so without an attack. I just couldn't figure out what brought them on and I started to make the rounds of San Francisco doctors. I went from one to another and it was always the same. They listened to my heart, took my blood pressure—the usual routine—and they all gave me the same answer: There was nothing wrong with me. I came to the conclusion that I had an incurable heart disease and the doctors just didn't want to upset me by telling me."

"ONE NIGHT I CAME home from work and told my wife that if I had to die, I wanted to die among friends and relatives in my home town. So in three days I had sold everything and we moved back to St. Louis. The attacks continued, of course, and I started the round of doctors here in St. Louis. And I still got the same answer. My heart was sound and they could find no reason for the attacks.

"I had reached a point where I would become panic-stricken when I had an attack. I literally would jump off a bus, terrified that I was going to drop dead. It embarrassed me to think I might die in front of a lot of strangers. One night at home, I jumped up and ran six blocks to a hospital. I didn't think about it, of course, but that was a dandy thing to do if you were having a heart attack. But I had to get to the hospital. I ran up to the front desk and asked where the nearest doctor was. The nurse pointed to a room, so I went right in and told the doctor, 'I'm having a heart attack!' I can laugh now, but I wasn't laughing then. The doctor checked me over. He was very nice about it and eased me into the idea that I had an emotional problem and should see a psychiatrist. He was the first doctor I'd seen who suggested this. I took his advice and made an appointment with a psychiatrist. I'm not going to drop dead, I told myself, I'm just losing my mind."

"The psychiatrist talked to me about an hour, mainly getting background. Then he told me that he'd see me again in two weeks. Right after that visit, I had some severe attacks and I called him to tell him I couldn't wait two weeks. He suggested that I enter a hospital 'for a rest,' and I was all for that."

"Well, I didn't get the rest. When I entered the hospital, the attendants locked a big door behind me and it didn't take me but a few seconds to realize where I was. I made up my mind that if I wasn't crazy to begin with, I'd lose my mind if I stayed in that place. I had had enough of the psychiatric world for the time being. But, later on, I began to look around again on my own for a psychiatrist and I was referred to Dr. Pitts."

That was eight years ago. Now fifty years old, Mulkey says: "If I knew then what I know now, I'm sure my attacks would have been milder because of the very knowledge of what they really were." He emphasized that it took several conversations with Dr. Pitts before he accepted and understood his condition and became convinced that his symptoms did not mean that he was going to die of a heart attack.

D R. P ITTS, AN ASSOCIATE PROFESSOR of psychiatry, who conceived the recent chemical tests in the Department of Psychiatry, pointed out that making a diagnosis of anxiety neurosis is a complex matter. Some of the symptoms exist to a degree in normal people who are under stress; for example, in soldiers under siege or in medical students under the strain of final exams. Using the guidelines established in studies by Dr. White, other clinicians, and his own experience, Professor Pitts used the following criteria for diagnosis in his very rigorous testing last year of anxiety neurotics. To qualify as an anxiety neurotic, the patient must have had:

1. Frequent "anxiety attacks," that is, acute episodes of extreme fearfulness such as a feeling of impending doom, fear of insanity, fear of having a heart attack or other serious affliction; in addition, the attacks include at least two of the following symptoms: difficulty in breathing or getting a full breath; smothering or choking or struggling to breathe; sighing; chest discomfort or chest pain and a lump in the throat; plus at least three of the following: dizziness or giddiness; faintness; weakness; fatigue; inward shakiness; tremor; tingling sensation in the skin; vascular throbbing, and palpitation.

2. Severe feelings of tenseness nearly daily for at least two years immediately before the interview for the tests.

3. On occasion, at least ten of the following symptoms: headache, dizziness, blurred vision, chest pain, palpitations, difficulty in breathing—breathlessness, sighing, tiredness-fatigue, easy fatigability, tingling sensation in the skin, depressed mood, trembling, shakiness, weakness, fears, and insomnia.

4. No other psychiatric disease or serious medical disorder affecting heart, lungs, liver, kidneys, or neuromuscular function.

It is extremely rare to find a patient in whom the onset of the symptoms of anxiety neurosis occur after the age of thirty-five, so the age-ceiling in the Pitts' experiment was set at thirty years.

The results of four independent studies in four nations prompted Dr. Pitts to conduct his chemical test. They all showed that anxiety neurotics, when placed under standard exercises, produced excessive amounts of a key body
Gerald Mulkey, left, a patient, and Professor Pitts discuss anxiety neurosis before a medical school class.
metabolic chemical. Also, their anxiety symptoms often developed with an increase of the substance. This substance is lactic acid, produced in sugar metabolism in body tissues. People with serious organic disease develop high blood lactate levels after exercise. In each of the four investigations mentioned above, the anxiety neurotics produced the same blood levels of lactic acid.

During exercise the muscle tissue produces lactic acid, which then flows into the bloodstream where it is carried to the liver. The liver in turn removes the lactic acid and rebuilds sugar molecules which are returned to the bloodstream. (This function was first elucidated by Carl and Gerty Cori of Washington University.) In patients with liver disease this unique clearing process of the liver is defective and excessive lactic acid is produced. Liver function was found to be normal in anxiety neurotics, however, and Dr. Pitts reasoned that their increased levels of lactic acid might be due to some specific mechanism.

Dr. Pitts decided to find whether lactate injected directly into a patient would produce symptoms of anxiety neurosis. First he did a pilot study, then selected fourteen patients and ten normal “control” individuals for his test. “Each of the patients and control subjects was told only that we were studying the effects of elevating the blood level by infusion of certain sugars normally present in the body; that neither they nor the physician administering the solution would know if any solution was expected to produce any particular effect, that they were to report anything they noticed to the physician in the room and to answer his questions,” Dr. Pitts explained in his report.

The attending psychiatrist knew nothing of the purpose of the test and was not told anything about the subject. Separate bottles of sodium lactate, sodium lactate with added calcium, and ordinary glucose in saline were infused into the subjects’ veins in a variety of orders. In this “double-blind” study the response on the part of the anxiety neurotics to the pure lactate acid was dramatic. They all witnessed the symptoms of an anxiety attack.

“Very nervous and chest tight,” said one patient. “Breathing uncomfortable, vision not well focused, very unpleasant, had this kind of attack once at work and they had to take me to the doctor—just like this only I’m not as scared this time because you’re here and you wouldn’t let that fluid in my vein harm me.”
All but two of the normal controls experienced only a few symptoms, but felt somewhat uncomfortable from the pure lactate. The two exceptions however, described extreme anxiety reactions, feelings which they had never experienced before.

All the subjects were able to differentiate the effects of the three solutions given them. The reaction to the sodium lactate with added calcium was significantly less in both patients and normal subjects. None of the subjects developed symptoms from the glucose solution; this fact made it clear that simply receiving a bottle of fluid in the arm does not cause anxiety symptoms in either normal adults or anxiety neurotics.

Most important, for the first time the symptoms of anxiety neurosis had been reliably and predictably induced. A new area of research had been opened in biochemical psychiatry.

"We're just beginning," Dr. Pitts pointed out. The fact that the two normal subjects had marked anxiety attacks, for instance, may indicate that the mechanism producing the symptoms is a general one, and that anxiety neurotics may simply be more susceptible to its effects. Symptoms of anxiety neurosis also occur in patients with the depressive illnesses, and Dr. Pitts would like to see whether the tests produce different responses in these individuals. At the same time, the studies in metabolic processes that lie ahead are complex. The biochemical mechanism which apparently produces the anxiety attack is far from being known, and until it is, biochemical control of the condition cannot be attempted.

It is known that a highly significant number of people have anxiety neurosis as their primary medical complaint. Estimates are that they represent about 5 per cent of the population, or as many as 10,000,000 individuals in this country alone. That would make this hereditary disorder the most common single medical ailment. "These people, although they are constantly nervous and have anxiety attacks, seem to be conscientious and manage to carry on their work," Dr. Pitts said. Despite the anxiety neurotic's terrifying and depressing symptoms, he does not commit, or even attempt, suicide. "He is just not that kind of person," Dr. Pitts added.

A follow-up study by Dr. White and his associates showed that the mortality rate in anxiety neurotics was the same as in the general population. This finding tended to belie the notion that anxiety is a causative factor in serious illness.

But there is no question that the anxiety neurotic suffers. Generally, the attacks strike him frequently and irrespective of circumstance, although stressful situations sometimes tend to trigger them. While the patient somehow manages to get by, the condition certainly doesn't help him. Life is difficult enough without the constant fear of keeling over from a heart attack. Tranquilizers only alleviate the secondary symptoms of anxiety neurosis but do nothing for the basic symptoms.

Once a patient is properly diagnosed as an anxiety neurotic, the most effective medicine at present is simply reassurance and moral support, Dr. Pitts stated. This therapy has worked with Mulkey and numerous other patients, who reiterate ... if I only knew then what I know now.

Supportive therapy certainly is better than a terse "There's nothing wrong with you." In his humorous, but telling, style, Goodman Ace described how it felt to be left without the support of a sympathetic physician. He wrote:

"To these three learned men of medicine I will forever be grateful: Dr. Jack Weiner, Dr. Joseph Diamond, and Dr. Foster Kennedy, who, at their untimely passing, I felt were somehow in violation of their Hippocratic oath... One day I was in the office of one of the new doctors who had X-rayed me and turned my stomach inside out. For fear he might dismiss me as having nothing wrong with me, I confided that what I had was neurocirculatory asthenia. To my delight he nodded his head. The symptoms, he told me, were a rapid heartbeat and pulse."

"Needless to say, I was shaken. I asked if he could give me something for that. He wrote a prescription. I stuck it in my pocket and walked out. At the first drugstore I approached the pharmacist, took the prescription out and was about to hand it to him when I read what the doctor had written: You have no organic abnormality of the heart, no feeling of breathlessness is dangerous, nothing bad will happen to you. And he had the nerve to sign it. I ordered a tube of toothpaste, small size. I knew now I wasn't going to last long."
Professor Horowitz, author of numerous works on social policy and theory, begins this examination of the United Nations after twenty-two years with the observation that the UN is a "dull organization." He concludes this penetrating study, however, with "a renewed appreciation of how a dull organization may yet preserve us from an exotic death."
THE DIVIDED POLITICS OF THE UNITED NATIONS

The unvarnished fact is that the United Nations is a dull organization. It is not so much the center of international politics as it is a theater in which certain inter-nation scenarios are sometimes played; a stage on which historical events can be recorded, rather than an organization making history. To say this is not to criticize the United Nations so much as to cast doubt on those whose expectations for the organization continue to remain exaggerated. Yet, a nagging sentiment tells us that the United Nations is not working too well. The fact that it elicits neither the satisfactions of the old nor the passions of the young might be symptomatic of a general malaise. My purpose is to tease out a set of serious contradictions that characterize the United Nations.

I shall consider the United Nations as an organization with an ideological dimension rather than simply as a conglomeration of conflicting nation-states. To do this we have to take for granted one major article of faith: that the United Nations is an entity which is greater than the sum total of its parts.

Here we immediately come to the master contradiction. Even though the United Nations is more than the mere sum total of the national units of which it is comprised, it is considerably less powerful than the nations which give it formal allegiance. When one takes into account the uncluttered fact that the New York City Sanitation Department has a larger annual budget than the United Nations, a considerable amount of the pomp, ceremony, and rhetorical starch can be removed from discussions about the United Nations. To think that one garbage collection agency in one metropolitan area has a larger amount of money at its disposal than the total United Nations network certainly provides a sobering effect in facing the actual potential of the United Nations as it is presently constituted.

Certainly we need to be spared a lengthy analysis of the formal organizational components of the United Nations. For in the first place, studies of the Charter are easily available in standard texts on the United Nations, and beyond that is the sociological reason that the most interesting aspects of organizational life are what go on at the operational and informal performance levels. In this sense the United Nations illustrates two principles of organizational theory well known to the social sciences. First, the formal rule structure by no means defines and determines the operational codebook of an organization. Rather, it is more likely to define only the outer limits beyond which the informal system cannot transgress. Second, the United Nations demonstrates, beyond a doubt, that the size of an organization in no way uniquely determines its power. Thus, the simple fact of United Nations membership, or even the relative status accruing to member nations, is not in itself a measure of power. Indeed, there may be a sense in which membership is a reflection of powerlessness, as is the case with some of the new nations, whose membership in the United Nations gives them a way to attract foreign loans and foreign capital that might otherwise be unavailable to "non-legitimate" states.

The proportions of United Nations power leads us to consider six dilemmas which seem to characterize its twenty-two years of life.

First and foremost is the contradiction between the peace-keeping functions and the developmental goals of the United Nations. It is obvious that the peace-keeping role had been largely responsible for maintaining a relative state of tranquility between Israel and Egypt from 1956 to 1966. It is equally clear that the peace-keeping activities of the United Nations have been instrumental in preventing regional wars in relation to the Cyprus question and to the Congo in Africa. But these peace-keeping functions, which we are repeatedly being urged to strengthen, bring up a problematic point about the United Nations' corresponding role of stimulating social and economic development. Where United Nations activities lead to the spread of capital to new areas of the world, it stimulates the destabilization of traditional societies. Where this process is not underway, urging in the direction of pressuring advanced nations into reducing...
Dr. Irving L. Horowitz, professor of sociology
the gaps between poverty and wealth on a world scale also stands in an uncongenial relation to peace-keeping.

This is no mere dilemma between peace-keeping and developmental functions. It may conflict with the perception of development on the part of many nations as a thing involving violence, not only because internal revolutionary upheaval is considered by them as necessary but sometimes even as an instrument of their policy. They will then undermine United Nations’ legitimacy. One can immediately see that this is the case with respect to current Cuban foreign policy, where the very definition of the Cuban Revolution becomes wrapped up in a veritable “Fifth International”—the concept of a Latin American revolution as a whole.

The concept of development may not necessarily be consonant with the peace-keeping function of the United Nations. The fact that the United Nations continues to underwrite and advocate both development and peace-keeping has not led it to weigh these goals from the viewpoint of nations which perceive a high stake in violence. Instead, it reflects the aspirations of the already developed sectors rather than the newly emerging nations.

In this connection, one cannot say with complete warrant that the United Nations’ peace-keeping role is restricted to peace among nations, or that it in no way impinges upon questions of civil war, since the era of insurgency and counter-insurgency represents a period of incredible ambiguity where the definitions of national interests involved are constantly shifting.

The Congo crisis of 1956 represented a clear intervention by United Nations Forces within an essentially civil war situation. The strained definition of the Congo problem as linked to “mercenary” intrigue, in this case the Belgians, simply does not overcome the obvious fact that intervention in this case involved a restriction on the tolerance level of internal conflict rather than restricting conflict between nations. We observe then that a major contradiction, one which cannot be resolved by administrative fiat, is between the goals of peace-keeping and those of economic development.

Second, a major contradiction exists for an organization such as the United Nations when it is based on limited contract between nations in contrast to an organization such as the nation, which is based on unlimited interests.

Put in its traditional mode, there is a difference between two philosophic starting points: (1) There is a Kantian definition in which nations surrender limited portions of their sovereignty for the purpose of maintaining peace in the same way that individuals surrender portions of their own sovereignty in order to maintain their lives. (2) This view comes hard upon the Hegelian approach, which, in the tradition of Realpolitik, assumes that the truly macroscopic organization of modern times—which expresses the economic, psychological, and sociological unity of a people—is the nation. For Hegel, it is so because the nation is the fulcrum of collective interests held together both at the material and the symbolic levels by the sovereign ruler. The idea that a sovereign nation can surrender a portion of its power, of its rights, to an international organization was declared absurd by Hegel. Only individuals can surrender portions of their rights. When they do so, they commit themselves irrevocably only to a national guardian. They in no sense empower the national guardian in turn to subcontract, as it were, a further portion of individual rights to yet a more removed and abstracted set of authorities.

The United Nations is in some sense organizationally arranged as a savior from strictly national interests; yet it is limited precisely to being a forum for the expression of such national interests. This point is well known. It is written into the Charter itself, into the formal organizational division between the Security Council and the General Assembly. What is rarely appreciated is that the United Nations, insofar as it expresses the national interests, serves to legitimize those interests. It therefore serves to reinforce the very kind of national identities which it is ostensibly supposed to overcome, or at least curb. The cosmopolitanism of the United Nations contradicts the localism and parochialism of each nation, while it legitimizes national claims. The symbols of national power are in no sense either overcome or minimized in the United Nations. These symbols get set forth in righteous dress to a world public, appealing for legitimacy on a scale otherwise unavailable to a given nation.

Nations such as Israel or Cuba, for example, which are denied a considerable number of normal diplomatic channels of expression, require the United Nations first as a form of expression of their national sentiments, and second as a basic acknowledgement on the part of the world community that there is in fact a nation such as Israel, whatever the Arab Bloc might declare, or there is in fact a nation such as Cuba, irrespective of its treatment by the Organization of American States. The cosmopolitan intent of the United Nations is subverted by the very legitimizing effect it has upon nationalistic claims.

We turn now to the third contradiction, that between decision-making nations and those nations which are affected by such decisions. Superordinate versus subordinate relationships have become enlarged and in fact enshrined in the Security Council mechanism. And yet, were there to be no Security Council mechanism, there could be no United Nations; since there is presently no other way to pacify big powers, except to give them a means of expression outside the General Assembly.

But this is not the core of the contradiction—only its manifestation. The problem is that world politics has bypassed the organizational machine of the Security
Council as well. Certain member nations which sit in the Security Council, such as Taiwan, have legitimacy but no actual power. This constant reminder of diplomatic absurdity is an indication that the genuine exercise of political power is not in the United Nations but rather in the hands of the major powers, since it is they who, in effect, decide even what absurdities should and should not be allowed.

While the organization of the United Nations is very much in keeping with the spirit of Montesquieu, that is, the faith in bicameral legislative devices and the idea of checks and balances of power, the Security Council and General Assembly relation is more nearly a stimulus-response situation. What was overlooked by the founders of the United Nations, and has long since been forgotten by present-day jurists, is that bicameralism and the theory of checks and balances against the undue exercise of power must rest on an independent constituency with strong electoral power. The source of authority has to be differentiated for multiple agencies of power to be effective. In the case of the United Nations this very assumption breaks down, since the source of power in the Security Council is, in the main, also the source of power in the General Assembly, namely, the large nations and their respective demands and goals. Separation of functions, and checks and balances, formally operates in the United Nations, but the substance is lacking. And without distinctive and different constituencies the democratic options desired by all nations remain unattainable.

This brings up our fourth contradiction. The nation-state is, after all, an operational modus vivendi understood to be by all contracting parties. But in the aftermath of World War II, there has arisen not simply a polarization between the United Nations and the nation-state but the steady emergence of regional blocs which have significant power unto themselves. These regional alliances often operate at cross purposes with the United Nations. Covering Latin America, for example, there is the United States-supported Organization of American States; but there is also a newly formed, Cuban-sponsored Organization of Latin American Solidarity. At another intermediary level, there are regional economic associations, such as the Latin American Free Trade Association and the Central American Common Market. Just what legal arrangements exist between larger-than-nation organizations, yet organizations which are obviously less all-inclusive than the United Nations, remains unclear and for the most part unexamined.

Interest politics goes on at the international level largely uncurbed by what is ostensibly an organization providing sufficient security to cancel the need for such purely protective self-interest mechanisms. Both major world powers in effect conduct their bloc affairs through such trans-national pact agencies. The likelihood of a clarification of the UN's jurisdictional role in these intra-bloc (rather than intra-nation) conflicts seems most unlikely, given the continuation of the Cold War by other means.

We have covered contradictions between large nations and small nations within the United Nations and between the United Nations and regional bloc associations. We turn now to perhaps the most agonizing contradiction of all: that between member nations and non-member nations. Whereas one might dismiss the previous contradictions as simply different levels of operationalizing diplomatic and political relationships, this contradiction drives right to the core of the United Nations problem.

This dilemma might best be posed by reformulating the question of the admission of China to the United Nations in terms of the desirability to China of seeking such admission. From the Chinese literature available to us, the main problem is China's relative contempt for the United Nations Charter. It is noted that there is an absence of militance in the United Nations, a tendency to place development under the charge of established national bureaucracies. There are mouthings of faith in democracy on a world scale, and at the same time considerable repression within some of these nations. Under such circumstances, it raises severe questions whether China would consider participation in the United Nations unless its basic objections were met. These conditions mean not only depriving Taiwan of China's seat, but depriving Taiwan of any independent status as a nation. The two-China policy is no more likely to be accepted by mainland China than would England accept the idea of separate nationhood being granted to Wales. One could easily envision Chinese demands for the expulsion of those nations, whether they be South Africa, Greece, or Spain, which in its estimate violate the basic political liberties and the basic revolutionary impulses of its own people.

Thus the price of China's participation in the United Nations is high and she may not even consider it realistic to service to her interests to pay the price it may cost her. That it may not pay for one of the world's largest and most powerful countries to belong to the United Nations undermines United Nations legitimacy as little else can.

The final contradiction is that between expectations and performances in the United Nations. Although its twenty-two-year-old record is superior to that of the old League of Nations, part of the superiority stems from the less presumptuous goal it set for itself: more stringent limits set on the violation of national sovereignty. Above
all, the United Nations' peace-keeping operations benefit from the general technological escalation in the price of widespread conflagration. Perhaps extrinsic technical factors, rather than any intrinsic organizational uniqueness, serve to establish firm limits for the United Nations.

Here, recognition should be taken of the genuine failures of the United Nations at the peace-keeping level and of its development decade. At the former, the role of the United Nations in the Middle East dispute has been inglorious, to put it mildly. It did not succeed either in preventing conflict or in compelling the belligerent parties to negotiate their differences. It too readily assumes the stability of de facto solutions. Similarly, with respect to the war in Vietnam, the United Nations role has been ineffective, restricted to informal attempts to limit the scale and scope of the conflict.

On the developmental side, various Third World attempts to redress the imbalances between the wealthy industrial nations and impoverished agrarian nations have come to naught. This was symbolized most effectively in the Geneva International Trade Conference of 1960 which pointed up how drastically at odds certain powerful nations, especially the United States, were with respect to the aims and ambitions of the "Bloc of 77." In fact, United States policy at these trade association meetings is often in violation of the best advice rendered by its own economists and social scientists. Such is the delicate balance in the United Nations that without a consensual bridge between the United States and the Soviet Union, even when votes taken are in overwhelming support of a developmental position, it fails to become operationally meaningful. It becomes a rhetorical device available to the United States and the Soviet Union to support desirable rather than realistic goals of the underdeveloped nations.

At the level of measurable successes, there is the informational yield of organizations such as UNESCO, the technological cooperation developed between nations in terms of health and welfare benefits which are funneled through the World Health Organization. In effect, the special operations of the United Nations, having little policy spillover, best illustrate the success of the United Nations. In this sense, while the United Nations has not done a great deal to close the gap between the poor and wealthy nations at the large-scale diplomatic level, it has been distinguished by a series of small-scale successes at the scientific level. From arms control and atomic information sharing to serious research on world population and world health, the United Nations has served a vital data-processing role.

But it would be a dismal climax to reduce the worth of the United Nations to the work of its specialized agencies. There is a value in recognizing the United Nations' worth even at its macroscopic organizational tasks. These might be put into four distinct categories.

First, the worth of the United Nations is attested to by the fact that it does represent a forum for expressing disagreements. Men talking, after all, tend to be men not shooting, and the longer they talk the less likelihood there is to be a shooting or an open military hostility. During the conflicts or disputes in belligerent territory, the United Nations, representing as it does a neutral forum, "a third force," enables a quicker resolution of actual conflicts than might be the case were there to be no United Nations. It is often easier for belligerents to deal with a "Mediator Rex" than with one another.

Second, the United Nations is a diplomatic equivalent of the old-fashioned international Swiss (now West German) spy center. There is an informational tradeoff between nations concerning new policies at the United Nations. Trial balloon proposals can be sent up indicating sentiments and currents at work that cannot for one reason or another be part of the public dialogue and are better left to quiet diplomacy.

Third, the United Nations might be viewed as an informal early warning system. It is that organization in which the limits of national sovereignty can be defined. The definition of these limits serves to indicate to all nations concerned the threshold of any particular conflict, or the threshold of the potential for greater violence.

Fourth and finally, there is the worth of the United Nations as an ideal typification of One World. In this sense it may serve as an informal limitation upon the worst infections of nationalism, self-righteous chauvinism, and unbridled military responses to every menace and every threat to a given nation. The Secretary-General seems particularly suited to perform this special role. From Dag Hammarskjold to U Thant, the goal of international tranquillity between nations has been expressed by the giant men of the small nations.

In sum, although real power is not exercised within the juridical framework of the United Nations, real sentiments are expressed there. Insofar as there is a desperate need for exact information on the nature and sentiments of those who have power, the United Nations serves as a major forum and at the same time a realistic measuring device of both where the world community of nations is, and where it seeks to go.

And so we return to the starting point; hopefully with a renewed appreciation of how a dull organization may yet preserve us from an exotic death.
The St. Louis area is one of the major focal points for an insidious and widespread fungus infection associated with starlings, bats, and other small animals.

THE ST. LOUIS DISEASE

By JAMES MANIOTIS
Associate Professor of Botany

A group of youngsters exploring a bat-infested Missouri cave come down with a chronic cough; boys playing ball in a schoolyard develop coughs and fever; a gardener spreading chicken manure on his flower beds develops chest pains and a cough and soon dies. Bronchitis? Pleurisy? Atypical pneumonia? It could be any of these. But medical scientists are becoming more and more aware that the same symptoms can also indicate an insidious and widespread fungal infection known as "histoplasmosis," or more popularly as "the St. Louis Disease."

Fungi, a family of plant-like organisms, come in all shapes and sizes. Some are large, like the mushrooms and puffballs; a far greater number are microscopic, like the molds and yeasts. Although the fungus causing histoplasmosis and the disease itself have been reported from many countries around the world, histoplasmosis is generally associated with the regions bordering the Mississippi River and its larger tributaries, the Missouri, Ohio, and Tennessee. The St. Louis area seems to be its focal point in the central states.

It is estimated that about thirty million persons have had histoplasmosis in the United States. In the Missouri area, surveys have shown that from 80 to 90 per cent of all persons tested for histoplasmosis show positive skin reactions to histoplasmin, a preparation made from the fungus causing histoplasmosis, *Histoplasma capsulatum*.

Mycologists, botanists who specialize in the study of fungi, have found that the fungus causing histoplasmosis occurs normally in the soil and is almost always associated...
with small animals. It is known that some infected animals such as birds and bats may excrete the fungus in their sputum or droppings, although some authorities insist that soil burdened with large amounts of excreta has a changed acidity which permits the abundant growth of the histoplasmosis fungus which is normally present in the soil.

The first soil isolation of *Histoplasma capsulatum* was made from material taken from a rat burrow near a chicken house. Since that time, the fungus has been isolated near other chicken houses and from bat caves, barn yards, heavily manured soil, hollow trees, and even river water. It has been found also in such unlikely places as the feather stuffing of baby pillows and in unused attics which have harbored wild birds, squirrels, or bats. Tracing the origin of a case of histoplasmosis can become quite a detective story, involving the talents of botanists, zoologists, ecologists, veterinarians, and medical scientists.

The truly insidious feature of the fungus is that it is often associated with places where children congregate, such as school playgrounds. Mycologists have found the fungus in the soil, where starlings, pigeons, grackles, and bats drop their excreta from building ledges onto the usually dry and powdery soil of the playground below. It happens that children are particularly susceptible to the disease, showing the greatest infection and mortality rate of any age group. Their play activities create dust clouds, insuring the possibility of infection through inhalation of spores. It is interesting to note that small children also show a high frequency of oral infections, which may be related to the placing of dirty fingers in the mouth.

One mycologist has found an effective way to combat this occurrence in such situations—simply lay down new soil, plant grass, and keep a good lawn by watering regularly. Other authorities routinely insist on blacktopping play areas where infection has been traced.

When faced with these facts, one can understand the recent concern of state and federal health officials in the Dexter, Missouri, region, where numerous cases of histoplasmosis were reported. For the past seventeen years, millions of blackbirds have wintered in a twenty-acre tract in the center of town. It was estimated that fifteen million birds were in roost there during the early part of 1965. Since it would have posed an enormous health problem to dispose of fifteen million poisoned birds, the birds were driven from the town to an area a mile
The starling (Sturnus vulgaris) was first introduced to this country from Europe in the 1890's. It has become perhaps the most numerous bird in America.

away by the use of flashing red lights and sirens.

Similar histoplasmosis outbreaks, traced to the presence of flocks of birds, have been reported in other places in Missouri and nearby states. In Milan, Michigan a recent outbreak of the disease among junior high school children was traced to starlings in the trees around the school playground. To eliminate the source of infection, the trees were removed to destroy the birds' roosting places. The starling, introduced from England about 1890, is now one of the most numerous birds in America.

Significantly, domestic dogs and cats show a 50 per cent rate of infection in areas where human positive histoplasmin reactions are high. No one has shown, however, that these pets play significant roles in distributing the fungus in the environment or transmitting it to man or other animals, although the possibility exists. Nor has anyone ever shown that an infected human can transmit the disease to other persons.

Other mammals that can be infected by the fungus include rats, mice, skunks, opossums, cattle, and horses. Chickens have not been shown to carry the fungus; the high frequency of isolation of the fungus in association with chickens is probably due to the acid nature of the heavily manured soil where chickens are kept.

The causative agent of histoplasmosis is a microscopic fungus which differs in appearance depending on where it grows. In the soil, or when grown on corn meal agar medium at room temperature in the laboratory, Histoplasma capsulatum looks like any other mold. It produces fine filaments or threads which turn a brownish color as they produce spores. Light and easily airborne, the spores constitute the highly infective phase of the fungus when breathed into the lungs. When grown on agar containing human blood at body temperature, when incubated within an experimentally inoculated animal, or when found in an infected human, the fungus grows much like common baker's yeast, producing oval, yeast-like cells which may be carried by the lymph system or bloodstream throughout the body of the animal or human.

All evidence to date indicates that the usual route of histoplasmosis infection is through the lungs. If, for example, a farmer working his field inhales dust clouds containing spores of the soil form of the fungus, chances are good that he will come down with a mild nonfatal form of the disease, which from most symptoms may be diagnosed as an unknown respiratory ailment.

Common symptoms of histoplasmosis infection include dry cough, shortness of breath, chest pains, and hoarseness. Often there is "fever of unknown origin," night sweats, weight loss, aches in the muscles and joints, and a general feeling of malaise. Chest X-rays taken some time after initial inhalation of spore clouds may show nodules or other findings resembling tuberculosis. It is known that in areas where the disease is widespread, each year as many as 2000 patients suffering from histoplasmosis are hospitalized in tuberculosis sanitoria. Histoplasmosis is a great imitator not only of tuberculosis, but also of such other diseases as influenza, pneumonia, leukemia, and carcinoma. Primary or initial lung infections of histoplasmosis generally are not severe and most patients show a rapid recovery.

In a very small minority of individuals who have been exposed to the fungus, the disease may advance to a severe and even fatal form as it progresses through the body. In these severe cases the lung manifestations usually are less prominent, but severe changes of the internal organs, such as enlargement of the liver and spleen, are found. Other manifestations include endocarditis and ulcers of the mouth, pharynx, larynx, stomach, and bowels. If not treated medically, about 80 per cent of these severe cases result in death. There are more than fifty known deaths each year from the disease.

Until recently, no single antibiotic or chemotherapeutic agent of any value in treatment of the severe form of this disease was known. There are two new antibiotics, however, which appear to be effective in the early treatment of human histoplasmosis and offer hope to the unfortunate few who develop the severe form of the St. Louis Disease.

As our technology advances and our soil, water, and air become more polluted, the delicate biological balances which nature evolved over millions of years are overthrown. We are faced with hazards of enormous magnitude. Any biologist reading the story of histoplasmosis would wonder if there was any awareness of the chains of circumstances which permitted huge flocks of undesirable starlings to congregate in cities. Who destroyed the forests, who killed the songbirds, who introduced the starling and the sparrow to America? Shall we now kill the starlings and blacktop everything?

With increasing frequency, many of the basic problems facing us today are there because we have ignored the capabilities of our own environment. Histoplasmosis, or the St. Louis Disease, is just one of them.
THE ARTICLE "Nine Students" in this issue of the Magazine is an attempt to sample student opinion and to get some idea of what students today are thinking. If we had really tried to learn what students are thinking, we would have had to call the story "Seven Thousand Students," as we would have had to interview every full-time student at this university.

None of us likes to be classified, labeled, or pigeonholed, but the college student has really suffered from this kind of approach. Up until World War II, there was a widespread and unfortunate stereotype of the university student as a "Joe College," interested only in fraternity dances, football, and swallowing goldfish. One friend of ours who went to college in the twenties did seem to conform to that image. He once remarked that the most important thing he learned in college was how to carry a quart bottle of bathtub gin in a raccoon coat so that it wouldn't spill when he was doing the Charleston. There were probably many college kids in those days who shared our friend's outlook, but we would be willing to bet that the great majority never owned a raccoon coat, carried a bottle of bathtub gin, or even did the Charleston.

The image changes rapidly. After the war, the catchword was "apathy." The average college student was pictured as the complete conformist, intent only on staying out of trouble, getting a safe job after graduation, and settling down in a ranch house in the suburbs. If the college boy of the twenties was interested only in fun, according to the stereotype, the college student of the fifties was concerned only about security.

At times this concern may strike some of us as a bit too enthusiastic or somewhat misdirected, but it's a small price to pay.

As many observers are pointing out, student concern in this country is beginning to take a new direction in this election year. On campuses everywhere, students are starting to take a much more active interest in practical party politics and to substitute political action within the framework of party politics for protests and demonstrations.

In his article "Revolution and Amateur Protest" in this issue, Dean Kling proposes that the student truly concerned about society and the world about him should turn to professional social science. Involvement in practical party politics is the other constructive, and potentially productive, path this concern can take.

INTERVIEWING STUDENTS FOR the "Nine Students" story turned up some interesting sidelights. Perhaps the most common feeling unearthed among those we interviewed was a deep anxiety about the possibility of nuclear war. The Bomb still seems to be very, very much on the student mind and colors a great deal of his thinking.

One of the questions in the survey used the term "student responsibility" in the hope that the students themselves might define this vague but vital concept. To most of the students we talked to, "responsibility" meant looking out for one's own rights without losing sight of the fact that other people have rights as well.

The question "Who are your heroes?" brought a widely varied response. The winners were Gandhi, Churchill, and John F. Kennedy. What that proves, we're not quite sure.

One of the questions, "Do you trust anyone over thirty?", was answered indirectly when Herb Weitman and Jim Patterson of the Magazine staff, both obviously over thirty, were prowling the campus seeking students to interview. Several students asked them, "Are you two guys cops?"

—FO'B
Fannie Hurst, who died this past winter at the age of 78, was our most celebrated alumna. Her novels and short stories were read by millions throughout the world, and the motion pictures based on her works were seen by countless more.

Miss Hurst's associations with this university go back more than sixty years to the time when the present Hilltop campus was first opened. She was a freshman the year that the University took over the new buildings it had leased to the St. Louis World’s Fair.

Fannie Hurst made a lasting impression on this campus in its earliest years. Perhaps her most significant contribution was the libretto she wrote for the first senior class musical—an event that was to evolve in two years into the annual Quad Show.

In 1909, Miss Hurst left Washington University with an A.B. degree and went on to graduate work at Columbia University and then to her long and distinguished career.

The name Fannie Hurst will live on at Washington University in the Fannie Hurst Chair of Creative Literature established by her will.