Our cover this month looks into the 250-foot bowl of the Jodrell Bank radio telescope, at Cheshire, England. The stamen-like antenna protruding from the bowl's center, when properly tuned in by the operator below, is capable of communicating with remote parts of our universe millions of miles out in space. Recently, this powerful tool of the astronomer has come to the aid of scientists tracking deep space probes. For more on radio telescopes, see page 2.
Tuned in to Outer Space
Radio telescopes are on the alert for space signals

The Power Problem in Delegation
How managers can delegate more authority to their men

A Visit with Dr. Theodore von Karman
We call on the world-famous rocket expert

We Have a Time Delusion
Let’s eliminate the pressures of unreasonable deadlines

Ads with a French Accent
The whimsical world of a gifted commercial artist

What Kind of Education for Women?
The same kind, Vassar's president says, as we give men

Alcoholics Anonymous Comes of Age
AA rounds out 25 years of helping the problem drinker

Uncle Sam's Strange Supermarket
For sale: everything from swamps to hog bristles

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A MEMO TO OUR READERS:

Radio astronomy was born in the late 1920's, when Dr. Karl J. Jansky, an American engineer, first detected radio signals that he could not attribute to terrestrial sources. He deduced that they were coming from outer space and that a study of these waves might increase our knowledge of the cosmos. He was right. Subsequent investigators discovered that the signals revealed the presence of stars and star clusters far beyond ordinary telescopic range.

In an effort to receive the signals more clearly and strongly, radio astronomers developed instruments called radio telescopes. These devices gather and amplify radio waves just as optical telescopes gather and amplify light waves. Refinements in design have produced large antennae shaped like wire bowls, which can detect very weak signals from far out in space.

Enter the Space Age in 1957—when the USSR and the USA began sending earth satellites into orbit. Through one of those happy exchanges which often benefit science, just when an instrument was needed to send highly directional signals to far-ranging satellites, and to detect weak replies, an instrument was available: the radio telescope.

This month, on page 2, Sir A. C. B. Lovell describes for us the workings of radio telescopes. Professor Lovell is Director of Jodrell Bank Experimental Station in England, the home of the largest and most sensitive radio telescope operating today.

For the future, the United States is building in Sugar Grove, West Virginia, an even larger model. Its bowl will be 600 feet in diameter, and it is expected to be in operation in 1964. Not only will it further extend the useful range of our space probes. It will also reach out deeper into the universe, bringing us echoes of stellar upheavals that took place millions of years ago.

—THE EDITORS
The Jodrell Bank radio telescope, a gigantic bowl on the alert for space signals, is silhouetted against a gray English sky. Two trailers containing several tons of complicated electronic equipment have just been towed away from Jodrell Bank in Cheshire, England, on the start of their journey back to the United States. For 2½ years they have been nestling in the shadow of the giant radio telescope which, in combination with this equipment, has played a key role in the American Pioneer series of space probes. The most notable achievement of this Anglo-American tracking effort was the control of the Pioneer V space probe out to the great distance of nearly 23 million miles from earth.

Pioneer V left its launching pad at Cape Canaveral on March 11, 1960. Twelve minutes after lift off, it came over the horizon of England, and its signals were immediately located by the Jodrell telescope. Ten minutes later, the press of a button in one of the trailers operated a transmitter mounted on the telescope. A coded signal was beamed into space; within a fraction of a second it had been decoded by the space probe, which correctly interpreted its message that the payload was to be released from the final carrier rocket. Thereafter, every day for 2½ months, as the probe traveled farther into space, another coded signal was sent to it through the telescope. The signal triggered the payload transmitter, which then proceeded to transmit back to the telescope at Jodrell Bank the scientific data accumulated by Pioneer V since the previous command. Eventually, the signals from Pioneer V got weaker and weaker, and finally, at the beginning of July, the batteries had so far deteriorated that they would no longer respond to the commands sent out by telescope.

By that time, however, a mass of detailed information of the conditions in space had been gathered as the probe traversed the interplanetary system to a distance of 22,500,000 miles from earth. These adventures, involving great penetrations into space by vehicles launched from earth, would not be possible without radio telescopes. The reason for this is that communications over the enormous distances of space...
Radio telescopes, originally designed to investigate the far reaches of the universe, are now doing two jobs: They're listening for signals from distant galaxies and, at the same time, keeping track of our deep space probes. The author, director of the Jodrell Bank station in England, explains how they're built, what they do, and how they relate to rockets, satellites and space programs.

There is, in fact, not much difficulty in receiving on earth the signals emitted by a satellite which is in orbit around the earth at a distance of a few hundred miles. For example, all the Russian sputniks have carried a transmitter radiating on a frequency of just under 20 megacycles, which is well in the commercial broadcasting and communications band. These signals — the familiar bleep, bleep — have been easy to pick up with a quite ordinary commercial radio receiver working on this wave band. The difficulty arises when the satellites — and particularly the space probes — move farther away from earth. The strength of the signal reaching the earth falls off inversely as the square of the distance from the earth. For example, as the distance of a space probe from earth increases from 100 miles to 1,000 miles the signal strength from it decreases not by 10 times but by 100 times.

It is also clear from this simple sum that there can be no solution in terms of increasing the power of the transmitter in the probe. Even a tenfold increase in power, with its con-
sequent additional weight and drain on the power supply, would not help much; since the strength of the signal falls off inversely as the square of the distance, distance is a far more powerful influence than transmitter power.

There are two ways by which this difficulty is overcome. The amount of power collected by the receiver on earth depends on the size of the aerial to which it is connected. A television set will receive TV signals if connected to a simple single rod, but better results are obtained if an array of several rods is used. These effectively increase the area over which the signals are collected and also provide better directivity. The TV aerial is a very elementary form of a radio telescope. If many of the elements of the aerial are connected in the right manner and spread out over the ground, then an array of considerable area and directivity can be readily constructed. However, such a radio telescope would suffer from the disadvantage that it would not be easily maneuverable and would be tuned to a single frequency determined by the length of the rods.

The more familiar type of radio telescope collects the radio signals in a parabolic bowl formed of metal sheet or wire mesh. A characteristic of such bowls is that radio waves reaching them are reflected and are concentrated at a point called the focus. A simple antenna (resembling the ordinary TV aerial) placed at this focal point is connected to the receiver. This parabolic type of radio telescope has the great advantage that it can be used over a wide range of wavelengths by the simple expedient of changing the size of the single antenna at the focus, and retuning the receiver. The parabolic bowl is also somewhat easier to mount mechanically so that it can be aimed at any part of the sky.

The gain in signal strength which can be attained by picking up the signals from the probe in a parabolic radio telescope of this form is considerable. Of course, for a given physical size of the bowl the gain depends on the wavelength. As a rough indication, suppose we are receiving signals from a probe which is transmitting on a wavelength of 2 meters. Then a quite small parabolic radio telescope of 30-foot diameter would give a gain in signal strength of 300 times over a single rod antenna.

The other method by which the signal strength may be improved is by attention to the receiver itself. As a probe moves out into space the signals received on earth get weaker and weaker. Eventually, however much the gain or amplification of the receiving set on earth is increased, the signals can no longer be distinguished because they are submerged in a background hiss. This hiss, commonly called noise, is present in all TV or radio receivers and can be heard in the loudspeaker easily if the volume control is turned up when no transmissions are in progress. A great deal of research nowadays is directed toward decreasing this background noise and thereby improving the so-called "signal to noise" ratio.

The background noise in the receiving set arises from two sources. Some is caused by the reception of the radio waves from space, which arrive in random fashion and are transformed into noise-like signals by the receiver. Indeed, it is the investigation of these which is the normal astronomical function of the radio telescope. For a given wavelength of reception nothing can be done about decreasing this noise. However, in a normal receiving set a good deal of the noise is generated in the valves and components of the receiving set.
set itself. Recently, much effort has gone into improving the performance of the valves in the receiver which immediately follow the aerial.

Apart from the actual improvement which can be brought about in this way by the decrease in the noise level of the receiver, there is another feature of the receiver which can be given attention. The strength of the noise picked up from space depends on the spread of frequencies accepted by the receiver. Now in a television set the maintenance of high quality in the picture requires the use of a broad band for reception extending over a few megacycles (millions of cycles per second). The TV signals are so strong that the background noise introduced by the use of this broad bandwidth is not a worry. However, when weaker signals have to be received — from a distant broadcasting station, for example — then the circuits of the receiver are tuned more sharply, to reduce this bandwidth. The background noise decreases as the bandwidth is reduced, and weaker signals stand out more clearly. Not without sacrifice, though. Eventually, when the bandwidth is reduced to less than a kilocycle (1,000 cycles per second), the quality even of ordinary speech becomes poor.

This is a special example illustrating that the amount of information which can be conveyed in a given time over a radio link depends on the bandwidth. In some of the space probe operations the bandwidth has been only tens of cycles, but the collection of data in a short time interval then becomes a real problem. This becomes a serious matter when the power supplies in the probe have limited capacity and can only be switched on for short periods of time. For example, toward the end of operations with Pioneer V the probe's transmitter could be operated for only two or three periods of about 10 minutes per day, the intervening time being required for the probe's batteries to be recharged from energy collected by the solar cells.

These miscellaneous demands lead to the requirement for larger aerals or radio telescopes on earth. Whereas it is quite easy to build and operate a dish with the diameter of 30 feet already quoted as an example, the expense and engineering difficulties increase rapidly with size. At the moment there are in operation many radio telescopes with diameters of 60 or 80 feet, both for the tracking of probes and for radio astronomy. Beyond this size there are very few. The largest is the 250-foot dish at Jodrell Bank in Cheshire, England. As far as is known at present, the only larger one under construction is the 600-foot telescope at Sugar Grove, West Virginia, but this is unlikely to be operating until 1964. The Jodrell Bank radio telescope, although primarily an astronomical instrument, has been much in demand for the tracking of the American deep space probes such as Pioneer V, and Russian luniks.

In addition to receiving the signals transmitted by Pioneer V, the telescope, of course, had another function to perform. One of the advantages of the dish type of radio telescope is that it can be readily used either for transmitting or receiving signals. For the Pioneer V operations a transmitter was inserted on the dish and a coded signal could be beamed on to the probe. On receipt of the appropriate signal the probe would switch its transmitter either on or off. By July, when the probe was over 20 million miles from earth, the signal from the telescope was taking two minutes on its journey to the probe, and similarly for the probe-to-telescope signal.

The radio telescope is also used with a transmitter in quite a different role: as a radar system. This is sometimes known as skin tracking, and is the only radio means of locating or tracking a satellite if the batteries have failed. Moreover, the launching rockets and the carrier rockets do not normally carry transmitters and they can be tracked only by radar.

Since the launching rockets of satellites and probes are essentially the same as the military intercontinental ballistic missiles, this activity of the radio telescope is closely related to problems of military defense. However, radar location of a rocket or satellite is generally a much more difficult problem than that of tracking a satellite or probe which is itself transmitting. The radar system depends on using a powerful transmitter with the radio telescope so that the energy can be concentrated in a beam toward the rocket. The rocket scatters these radio waves from the telescope in all directions, and only a small fraction of the incident energy returns to earth, where it is again collected by the radio telescope and conveyed to the receiver in the manner already described.

Earlier, we saw that the signal strength from a probe which has its own transmitter falls off inversely as the square of the distance from earth. In the radar case the signal scattered by the rocket and collected by the telescope on earth falls off inversely as the fourth power of the distance. Thus the problem of detecting a rocket at 1,000 miles compared with detecting it at 100 miles is 10,000 times greater.

**Double-Edged Uses for Big Dishes**

The same considerations regarding size of telescope apply. Fortunately, the same telescope can be used for transmission and reception, but even so there are no operational systems on earth which can locate the normal-sized military rocket at ranges of more than a few thousand miles (and, of course, in the military case the range is often limited by the curvature of the earth). The difficulties are increased when (as in the military case) there is no knowledge of the position of the rocket in the sky. The need for a large telescope means that the beam width, or the coverage, is very small; with the 250-foot telescope at Jodrell Bank the beam width on a typical operating frequency of about 400 megacycles is only 0.4 degree. Hence, for the location of rockets by radar the telescope must be moved very rapidly to cover large areas of sky where the rocket might be and then to follow it.

The so-called BMER (Ballistic Missile Early Warning System), which is now under construction as a primary radar locating device for missiles, uses dishes, or radio telescopes, of about 140-foot diameter enclosed in domes so that they can be scanned at high speed without interference by high winds. These devices, when used with the powerful transmitters, will detect missiles, or the launching rockets of earth satellites and probes out to distances of a few thousand miles.

This is a far cry from the investigation of the remote parts of the universe which stimulated the development of large radio telescopes after World War II. But such are the double-edged uses of many modern scientific instruments that the first use of the great radio telescope at Jodrell Bank was the detection of the carrier rocket of the first sputnik by radar. And in the initial days of that new era it was the only equipment in the world capable of doing so.
Are American managers delegating enough authority to their subordinates? The author says, “No,” and discusses the importance of passing power downward.

Delegation — pushing authority and responsibility as far down in the organization as possible — is widely praised by textbooks on management and by managers themselves. And a few years ago, top managers were industriously practicing what they preached by decentralizing both authority and responsibility.

Moreover, in practice, delegation through drastic decentralization has given new impetus to organizations once so large and unwieldy that keeping step with their problems and the times was impossible for them.

In the 1930's, for example, Westinghouse Electric Corporation found that it was missing markets because it took too long for information to reach the small decision-making group, and for the top decisions to be implemented by salesmen in the field. To avoid these costly delays, the company decentralized. The decentralization cost money, but in the end it more than paid for itself, and made possible sounder future growth. Westinghouse was a pioneer in this movement, and the number of companies that later followed suit, often with very good results, is large. Those in which decentralization has become a symbol to the public include Du Pont, G.M., G.E. and IBM.

Return to Centralization?

Today, however, there appears to be some withdrawal from the delegation movement. There is more emphasis on control, on “reserved responsibilities.” Sometimes there is outright centralization. For example, some of the large automobile companies, once the leaders in decentralization, have been unifying design, production and assembly of many of their models under a single manager, instead of allowing the manager of each group of models to run his operation like a “more or less independent business.”

Today, the man who rides a Ford rides essentially the same shell as the man who has a Mercury.

Why are companies retreating from practices which are not only based on sound theory but have usually proved justified in actual business situations? There are a number of reasons. In the case of the automobile companies, the cost of producing the models separately had become too high.

The current trend toward automation is another factor; so is the introduction of integrated data processing. Investments in automated machines and high-speed computers are so large that equipment must be utilized as continuously as possible; and this appears to some companies to require central control of manufacturing and centralized data processing.

These cost factors are very real, and wise management cannot afford to disregard them. But neither can it afford to disregard the costs of not decentralizing, which are just as real though not so obvious.
Problem

in

Delegation

In the first place, companies cannot continue to grow as they are growing today — by merger and otherwise — unless they do decentralize at least partially. Once a manager's full time is taken up — and most managers today already work at least a 50-hour week — he can extend himself further only if he gives his subordinates a growing part of his own responsibility and authority.

More important, genuine delegation attracts able young men to a business. When he took his first job, John Lee Pratt, one of America's outstanding managers and for years General Motors' chief of staff, had a choice between going to work for a railroad at $100 a month or taking a position with H. M. Barksdale, the great decentralizer of Du Pont, at $50 a month. Unhesitatingly, he chose the latter job, and quickly received the responsibility and authority that prepared him for his early and great success in the business world.

And delegation is likely to be a real attraction to the younger generation of today. Everyone knows he can earn a living somehow, but young men are asking increasingly: "What are the opportunities for development and realization of my abilities?" The Organization Man, Parkinson's Law and similar books have tarnished the reputation of big business in this respect with some of the ablest of the younger men, and the only way business can disprove the allegations they contain is by a generous return to decentralization and a genuine interest in its young men.

The "Genius Manager"

Finally, too great a degree of centralization holds the possibility of ultimate disaster for the company that practices it. If the top man is a "genius manager," he may be able to make all the major and many of the minor decisions himself, and still get by. But he will not live forever, and his demise will leave the company without a replacement for him.

If decentralization is exercised wisely — with provision for central coordination of staff functions, and for training of subordinates in the proper exercise of their new responsibilities — the actual monetary costs of decentralization will eventually be amortized by increased revenue, and there will be a net gain to the company in dollars and cents as well as a gain in stability.

Moreover, it must be remembered, the fact that operations are physically centralized does not mean that decision-making cannot be decentralized. For example, existence of a central data processing organization does not mean that the figures produced must all go to the top for decision; many of them can just as well serve as a basis for decision-making in divisions or departments.

It is quite possible, in fact, that the strongest centripetal forces in industry
are purely psychological, growing out of the desires and fears of the managers rather than dictated by circumstances.

When executives talk of the difficulties of decentralization, it is the psychological difficulties that seem to loom largest in their minds. In the seminars I have held on the subject for companies and management associations in various parts of the world, this fact appears very clearly.

**The Greatest Difficulty**

First, I ask each participant to think back over his experiences as a subordinate, recall any difficulties he has had in obtaining additional responsibility and authority from his superior and explain what he has done to overcome them. The responses and the solutions have been extremely varied, but they may be summed up as follows:

Probably the greatest single difficulty of subordinates everywhere is the power issue. The boss likes the power of making the decisions himself and he does not like to give it up. For power is something that grows on a person: the more you have, the more you want. As an English wit once put it, jokingly: "Power is wonderful and absolute power is absolutely wonderful."

For power offers at least the illusion of security. It is a resource that can compensate for other shortcomings or frustrations. The higher up you go, and the more money you make, the less important additional salary increases are (especially when you consider what remains after taxes in the higher brackets). But there seems to be no such limitation on the use of power, or at least not on its enjoyment.

And this seems to hold true increasingly with advancing age. The last hold of many on life seems to be the power to decide. And the problems arise: "how to retire the boss," and what do you do when sun and fun no longer work and hope is only where there is death?

I used to try to console my young business friends in India (where age and decision-making seem to be positively correlated in many companies) with a story worse than any of theirs.

A great American genius-founder-manager refused to retire at 65, at 70, at 75, at 80. When he was 85, his sons had neither money nor decision-making authority. They became desperate and persuaded the old man to accept their gift of a vast tract of swampland in Florida, which he could drain and develop for real estate and thus be active and enjoy a good climate at the same time. The old gentleman did finally leave, did all his sons suggested. He was highly successful, so much so that he sold all the homes he had built and had nothing more to do. So he came back at the age of 92.

Perhaps the principal answer to this problem is the appointment of a young potential successor who works on new or expanding activities which do not encroach directly on the sphere of the genius or, if worst comes to worst, to let the young man work elsewhere in preparation for the day when the dinosaur finally passes from the scene.

The second and greater difficulty of the young subordinate is the boss who says he is delegating, but is in fact not doing so. The latter still wants to be considered the Great White Father and gets extremely upset if the subordinate does not continue to check with him as before. This type of boss is more difficult to deal with than the frank one, for before a change can occur he has to be shown that his words and deeds do not mix. Apparently, then, the delegated situation has to be forced. There are two things the subordinate can do: First, he can delegate to his subordinates, and in this way set an indirect example of how well delegation works. Second, he can check as a matter of form with his — the hot potatoes and the quick pot of the boss himself must train his men individually.

**The Fear of Mistakes**

But the best way out, of course, is to become the boss oneself. So, in my seminars I ask executives to consider their experience as bosses, discuss the principal difficulties they have had in getting their subordinates to accept greater responsibilities, how they have overcome these difficulties. Most commonly mentioned is the fear of mistakes. The boss will claim that, on the one hand, if he does not delegate, he cannot multiply his influence and grow, but in order to do so he has to trust others to carry out decisions for which he is accountable. Quite frequently, the subordinate does not have the ability to carry out the delegated responsibilities as well as the chief would have done, and sometimes a subordinate makes a major mistake that comes back to haunt his chief. Then the subordinate becomes resentful because of criticism, his lack of latitude to make mistakes, lack of training or authority necessary to avoid them.

Another factor is that the chief's controls and sources of information may be inadequate, so that he learns of the mistakes only when it is too late to rectify them.

How can the boss avoid the horns of this dilemma?

He needs to start off by drawing up, preferably in writing, a clear description of what he is delegating, and ensure that both the subordinate who will assume the responsibility and others who may be affected by the decisions understand the description. Next, there must be training in exercising the delegated responsibilities, and formal training in groups is not sufficient here. The boss himself must train his men individually.

**Over-Anxious Subordinates**

The boss may also have a problem of a different sort: the subordinate who, instead of being reluctant, is overly anxious to grab as much responsibility and authority as possible. This the boss can prevent by defining quite clearly his own areas of competence — the hot potatoes and the quick political footwork upstairs that he still needs to engage in. And he needs to reward his subordinate for the successful exercise of his delegated responsibility or punish by clear application of the creed:

"By their fruits [rather than their talks] ye shall know them."

In sum, then, the solution to delegation is one of proper balance: give increased responsibility and authority, but know how they are being exercised and coordinated.
A Visit with Dr. Theodore von Karman

by Lee Edson

What lies ahead for men and missiles in space? For expert views on the future, we visit the Nostradamus of modern aviation, who initiated U.S. Air Force rocket research and now heads NATO's Advisory Group for Aeronautical Research.

MARCH 1961

"There is difficulty in agreement even on where space begins. . . . What is the free part of the ocean? It is really the same question."

In 1945, Dr. Theodore von Karman, one of the world's leading aeronautical scientists, and former head of the Scientific Advisory Board of the U.S. Air Force, made some remarkable predictions about the future of aerial warfare. In a 30-volume report called Toward New Horizons, Dr. von Karman and his associates forecast the coming of such things as ICBM's, supersonic aircraft, global missile bases, nuclear warheads and spaceships. He urged the U.S. Air Force to build special centers to carry out further research, in order to keep American air might supreme. This remarkable document, created at the request of General "Hap" Arnold, became the secret blueprint of U.S. air development and, now declassified, is still a guide to Air Force long-range thinking.

This year, with the new Administration's interest focusing sharply on defense, we sought out this amazing scientific Nostradamus of aviation — who is hardly known to the general public — to ask what he foresees in the next 15 years, as America and Russia intensify their competition for outer space.

We were fortunate to catch von Karman at his spacious Spanish-style home in Pasadena, where he has lived since 1936. Although we are old friends, it is hard to keep up with him, since he spends most of his time either
The major problem . . . is this: Can there be an agreement with nations, whereby satellites will be restricted only to peaceful missions?

As to the future, it depends on whether we have disarmament or not. I think there will be . . . a balance between manned and automatic weapons.

in Paris, where he heads NATO's Advisory Group for Aeronautical Research, or flitting about other world capitals. He met me at the door, a hand outstretched in affectionate greeting. As usual, his short, stocky frame was wrapped in his favorite blue Oriental robe, a gift from a Japanese scientist. At 79, bachelor von Karman has a shock of white hair, calm perceptive gray eyes and a gentle half-smile, which blend to give him the look of a wise western Confucius. Accompanied by his constant companion, a large coal-black poodle named Koko Mephistopheles, von Karman stopped to excuse himself from the inevitable knot of visiting professors and military experts who were conversing animatedly in several tongues in the living room. He speaks six languages, including a smattering of Chinese, and I recalled that once he absentmindedly began a Cal Tech lecture in German. He ushered me into his den.

As we sat facing one another across his desk, I reminded him of his post World War II predictions. "Yes, everything our (USAF) Scientific Advisory Board said in 1945 was carried out," von Karman mused, "except making big aircraft for the transport of entire armies. We made the recommendation, but the Air Force would not consider
the possibility of limited warfare — only massive retaliation. So their plans did not include the Army and Navy."

Von Karman's thick but delightful accent betrays his early years spent in his native Budapest, Hungary, and in Göttingen, Germany, where his theories, more than half a century ago, cast new light on the understanding of the motion of fluids and contributed to the basic design of the airplane. For eight years he directed the Aeronautical Institute at Aachen, Germany, and served as a consultant to Junkers, the Luftschifbau Zeppelin and Handley Page of England. Later, he inspired the beginning of the aircraft industry in Japan. He came to the U.S. in 1926 to lecture under the auspices of the Guggenheim Fund, and became the first director of Cal Tech's Guggenheim Laboratories, where he initiated rocket research for the U.S. Air Force.

He consulted on pumps for the Los Angeles Water District, and on turbines for the Grand Coulee Dam and for generating electricity from windpower in Vermont. He was associated with Northrop in the development of the Flying Wing. He is a founder of the Aerojet General Corporation, the world's largest missile and propellant manufacturer, and he is also the theoretical father of the Bell X-1, the first plane to pierce the sound barrier.

Over the years von Karman has authored four books on engineering and aerodynamics and almost 150 scientific papers; and he has been awarded some 30 honorary degrees and medals. "His lastling contribution," a scientist has said, "is his bridging of pure science and engineering to solve the big crises that affected aviation in the last half century."

"As to the future," he was saying now, "it depends on whether we have disarmament or not. I think there will be armament, and there will be a balance between manned and automatic weapons.

"Manned aircraft will be of two types — low flying, which cannot be detected by radar, and very high flying, at the limit of space. Supersonic planes will continue to be developed for large payloads. Nuclear bombs will get smaller, so it will be possible to use such aircraft for the delivery of bombs and also to use smaller missiles like Minutemen from mobile bases. Satellites will be used first for reconnaissance and eventually for the delivery of bombs, directed from the ground.

"Mention of satellites led me to ask the inevitable question — why are the Russians ahead of us?"

Von Karman pointed a finger at me. "Look here," he said, "the Russians are not so far ahead. Sometimes a group is developed which is ahead in one thing, soon another group in another country is ahead in something else. France and Germany had boom periods in physics. So did Italy. America, too, in nuclear discovery. The major problem, I think, is this: Can there be an agreement with nations, whereby satellites will be restricted only to peaceful missions? If we can get this, maybe we won't worry so much about the Russians."

"What about space itself?" I asked. "Do you think there will be a real battle over space control?"

"Yes, I'm afraid so," von Karman replied. "I can remember a few months ago when we set up the International Academy of Astronautics under the International Astronautics Federation. The Russian scientist, Sedov, who is president of the Federation, agreed to all the departments of the Academy that we proposed, except one. That was the department on space law. He said that American lawyers and Soviet lawyers would never agree on points of law. So we dropped that one.

"There is difficulty in agreement even on where space begins," von Karman went on. "My friend, Andy Haley, the space lawyer, suggests 64 miles up," von Karman smiled. "Haley calls it the Karman Jurisdictional Line. It is the line where a satellite first begins to be dominated only by centrifugal force. Others say 64 miles is too low. What is the free part of the ocean? It is really the same question."

The ring of the telephone interrupted further comment. Excusing himself, von Karman adjusted an ornate hearing aid, picked up the phone, and then slipped into fluent French. He was through in a moment.

"Science," he continued, getting back to our conversation, "feeds on a real interchange of ideas across national boundaries. But right now internationalism in science is weakened by exaggerated national security rules and by proprietary rights. I once told the AGARD (Advisory Group for Aeronautical Research and Development of NATO) staff that the effect of strict security is that we don't tell our friends what our eventual opponents already know. It is difficult to tell the point at which true security begins."

"I think that the proprietary rights exercised by some companies are more dangerous at the present time to scientific development than exaggerated security. Many results can be applied to developments that have great monetary value for some firms, but scientific results cannot be patented, so there is a tendency in some companies to keep silent on some ideas important to the advancement of science. It is to our interest to limit this."

Von Karman also expressed concern over the lack of support of basic research. "Nowadays," he pointed out, "scientists — especially those in particle physics — need a good deal of money, so to get support they say there will be a great application to weapons. A great nation should make an honest appropriation for basic research."

On the crisis in modern education, von Karman shrugged and said: "Education, especially in the high school, is made too easy these days. I learned from my father not to teach only what is interesting to the students. Better to teach students also what they do not like. It makes them think."

At the door, von Karman twinkled, "People ask me why so many of today's outstanding scientists are Hungarians — Teller, Szilard, Wigner, the late John von Neumann. I have a non-Hungarian friend, a Cornell professor, who has a theory about Hungarians. He says they're really Martians. How else could so many Hungarians be from outer space — Bartok (his music is not terrestrial) and Zsa Zsa Gabor (surely she is not of this world) and von Karman, he too works with unearthly things, and so on?"

"But this is only one point of view," von Karman smiled. "The real reason I think is that all the famous Hungarian scientists I have mentioned graduated from the same kind of gymnasium in Budapest. They all won the same medal — the Otvoes Prize — in a national competition for excellence in science. The more the U. S. rewards intellect, the more it will develop good scientists. Non-Hungarians."
WE HAVE A TIME DELUSION

by Greer Williams

"Time is money," says the American executive, and with an eye to profits he sets up deadlines to save it. But a fact worth knowing is that sometimes the only way to save time is to spend it.

Not everyone has the opportunity to appraise his boss to his face—or a boss who will tolerate such conduct. Having both, I felt impelled not along ago to tell my boss: “You suffer from a collapsed sense of time.” I should now like to level the same charge at a lot of other bosses, too, in various fields of endeavor. In fact, I submit that as a people we have a time crisis—the illusion, or perhaps delusion, that we haven’t time. We don’t have time for a second cup of coffee or breakfast table conversation. We don’t have time to spend with our children when we come home. We don’t have time to get a well-rounded education. We don’t have time for adventure—we make retirement plans instead. We don’t have time to read books for pleasure. Some of us don’t even find time for vacations.

Most of all, we don’t have time to think. Perhaps this is due to our national habit of busyness, or because we would rather not contemplate ourselves or accept the responsibility of our insignificance. If business lags, or even levels off, an advertising agency or a public relations counsel can tell us what to say or do to step up our pace and make a better showing. We have management consultants, including psychologists, to solve our employee relations. If we get into conflict with our parents, wives, children or our secret selves, a psychoanalyst can give us a theory for behavior and resolve our conflicts.

**A Managerial Oversight?**

What I mean by a collapsed sense of time is the tendency to belittle the time it takes to make an original contribution, to do work that will withstand the critical tests of use and abuse. Put another way, a collapsed sense of time is managerial oversight, rising out of “No. 1 Man egotism” and the “magic” of mass production, with its omnipresent production schedules and delivery dates.

We are a time-conscious people. Look around. Our environment is loaded with electric clocks and self-winding watches, time signals, datesl and calendars, to give us the latest word on the day and the minute. Being on time would seem to be the busy man’s greatest virtue—and his salvation.

Time is money, said Benjamin Franklin. Strange it is, however, that we have to spend it to save it. Some cultures worship the past. As offspring of the Industrial Revolution and disciples of progress, we live for the future. Yet none of our greatest thinkers have been able to think of a substitute for the indefinite time needed to mature one’s knowledge to the point where it can be translated into effective, error-free action.

It should be fairly obvious that it takes much longer to write a book than to read it, to invent the electric light than to turn it on, to compose a symphony than to play it—or that it takes longer to design, test, modify and tool up for a new model of automobile than it takes to mass produce 100,000 copies of it. Even then, as we well know, the first model in a new line may contain some “bugs” that we only hope the manufacturer and dealer will make good.

Still, we keep on making the common mistake of hoping the human intellect will get busy and solve the unknown on the same time schedule and with the same profit it maintains in doing over and over what it has learned to do well. The mistake is usually a costly one.

Our obsession with making haste is nowhere more apparent than in medical research. Here, the public, awakened by health crusaders, has become a gigantic pressure group for rapid advancement in scientific knowledge. Not that we have any deep love of knowledge, but that we want results measurable in lives saved and sickness eradicated. At the end of World War II, I remember that some cancer fighters, impressed by what money and a team of scientists had accomplished in the atomic energy crash program, said: “Give us the money and we’ll set up a Manhattan District and have the answer to cancer in five years.” At the end of five years they said 10. Now 15 years have passed, with cancer deaths rising from 200,000 to 268,000 a year meanwhile.

I have lived among medical scientists for 22 years. I do not believe that health crusaders who talk about backing “hot leads” and thus reducing the time lag between basic discoveries and their mass application fully understand the problem. You can finance this kind of research, of course, but you cannot predict that it will bring us nonstop to the desired result.

Human creativity, however, doesn’t work that way. The problem is, popular notions to the contrary, that you cannot hire a human mind, put it on a time schedule, and bid it think its way to a specified end. It may, someday, but hot leads can become blind alleys; bypaths may become expressways. The recent boon to mental patient care—tranquilizing drugs—came out of research not in mental health but in motion sickness, anesthetics and antihistaminics.

Normally, logically, and it would seem necessarily, the process of mass production and use of a product cannot be superimposed on its research development without inviting trouble. The crucial questions for the decision-maker, then, are two: Have all the important questions of trial and error been resolved? In moving from experimental to general use (and abuse) how much trouble is our man of action willing to invite?

**The Impossible Took Longer**

During World War II, the Army Air Forces had the delightfully brash slogan: “The Difficult we do today; the Impossible takes a little longer.” The impossible was undertaken in getting the B-29 Superfortress, the biggest bomber of that war, into action against Japan. That was the B-29’s primary mission—to drop bombs on the Japanese homeland. To do so, and return to its home base, the B-29 had to fly higher, farther and faster, and carry more, than any other bomber. It was designed to operate at a ceiling of 45,000 feet, to stay out of harm’s way. This meant the engines and the cabin air had to be pressurized, an innovation in combat planes.

The B-29 prototype had its first flight test in December 1942. To put modified copies of this airplane in combat would require not only tooling up for production but flight-
testing of each bomber, training of air and ground crews (85 men per plane), building of training bases and airfields in India and China, and the ferrying of the B-29's across the Pacific. In June 1944, a wing of B-29's flew their first bombing mission, and by the end of 1944 the Superfortress was in mass production. It was heavily engaged in the relentless process of reducing Japan to ruins when, on August 6, 1945, a B-29 delivered the atom bomb to Hiroshima. Nagasaki was next, and then the war was over.

To do all this, with a new airplane, the Army Air Forces generals consciously seized time by the forelock and commanded it to kneel. They figured that they could shorten the whole process of moving an airplane from factory to combat by six months by taking the planes from the assembly line, flight-testing them, and working out the "bugs" at the same time the crews were being trained to fly them. In effect, some trainees became test pilots and some flight-testing took place in combat.

This feat of technological warfare has been duly and deservedly publicized—but not so the price exacted.

Thousands of Bugs

"Bugs" there were—over 2,000 changes were required in the B-29's four 2,200-horsepower engines. In the beginning these supercharged engines occasionally blew up in flight, at the cost of some lives and great anxiety. For other crews, there was the hazard of "explosive decompression." This is an unsettling experience, although normally not injurious, provided it occurs at an altitude low enough so the airman's oxygen mask enables him to breathe without the added air pressure. Until modified, the plexiglass blisters (cabin windows) sometimes blew out under the internal air pressure.

What the B-29 added up to, therefore, was a beautiful airplane surrounding some excellent flyers undergoing a form of experimental neurosis. Furthermore, it did not fly bombing missions at altitudes up to 45,000 feet, but more commonly at about 30,000 feet or less, which did away with the depressurization problem in combat and thus, of course, the theoretical advantage of pressurization.

So the airmen accomplished their mission, but not quite according to plan and not without penalties for short-cutting time. Since we claim to be rational animals, the only fair way of measuring our achievements is in terms of what we rationalized that we could do. If we simply "muddle through" to success, then we should, as in this instance, be congratulated for good luck and tenacity, but not for genius or foresight.

The folly of peacetime attempts to experiment and produce simultaneously has been brought home to me in various projects in which I became involved. One example will suffice. It shows that social and behavioral scientists are apparently no better time-shrinkers than the other types of executives I have mentioned.

A group headed by an anthropologist obtained a Government contract to produce 40 handbooks of 100,000 words each to inform Americans working overseas on the customs and attitudes of the particular foreign people they had to deal with. The idea, a brilliant one, was to avoid becoming "ugly Americans" and provoking the hostile advice, "Yankee, go home."

Unhappily, the contract called for delivery of all 40 books at the end of one year. Unfortunately, too, the handbooks were not assigned to 40 professional writers with the instruction to find whatever expert help they needed and get the job done. The material was to be assembled instead by a committee of area specialists for each country, through a process of group dynamics.

The theory was that the committee, chaired by an anthropologist, would sit as a discussion group, and "share," "interact" and "interrelate," a writer member finally "integrating" the information in one well-organized, presentable, readable document.

Supposedly, the psychologist's special knowledge would add something to the economist's and vice versa, and so on around the table, so that the whole would prove greater than the sum of its parts.

It was a noble experiment, but the clock was running. There was a production schedule (frequently extended), but the first requirement, a model of the product, was lacking. There had been no pilot project, and the process had not even advanced to the "bug"-eliminating stage.

When I arrived on the scene as a senior writer, panic was in the air. When I left three months later—to save my sanity from experimental psychosis—the committees were still sitting, with themselves, with each other, and with the executive staff, in daily and sometimes twice-daily conferences. The director said that he measured each employee's effectiveness by the extent he helped make the project "a battleground of ideas."

I told him that by his standard I was ineffective, and I resigned.

By the year's end, the group produced not 40 but six handbooks, a remarkable feat in itself. Meanwhile, the behavioral scientists resorted to business management consultation, reorganization and new direction, having made, once again, the mistake of trying to "break the legs of time."

Men Who Have Mastered Time

The injunctions, "Don't waste time" and "Haste makes waste," place us in a time box. The only way out is to stop and think. The human mind can be an awful bust when it doesn't take that time. I do not say that punctuality is an impossible virtue. The way to be on time is not simply to go through the physical, thoughtless motions, but either to start soon enough or resist the tyranny of unrealistic deadlines.

Oddly enough, the airline pilots, whom one might think of as leaders in the general speedup of modern life, are really outstanding examples of the need for taking time in translating the unknown into the known.

Haven't you noticed? Airlines purport to fly schedules, but they treat "on time" as a variable rather than a constant. They don't necessarily leave on time or arrive on time, and the tardy pilot doesn't try to make up time by flying faster. A flight that gets behind usually gets farther and farther behind as it continues. The pilot knows that rushing increases tension and stress—and the chance of error. He takes it easy and plays it safe. As his passenger, I am all for him. He has mastered time.
Savignac works out a design in his Paris studio. From his drawing board comes a steady flow of eye-catching posters, like the ad below for an Italian newspaper, and like those shown on following pages.

Ads with a French Accent

by Charles E. Rotkin

Raymond Savignac, of France, is one of the world's most gifted designers of billboard posters. These recent designs, speaking in mute eloquence for their creator, show his mastery in combining the worlds of advertising and art.
This French-made frying pan "never sticks."

Ducotone paint is designed for easy roll-on.

The "little cheese" (Mio brand) is for Italian children.
Ads with a French Accent

The French Call it an Affiche.

We’d call it a billboard poster. 

But in France, possibly more so than here, it has evolved into a distinct art form. And a man who has played a major role in this evolution is Raymond Savignac, one of the most imaginative, most successful affichistes in the world. For the commercial art of Savignac is several notches above the ordinary commercial level. It is an art which combines people and products with a sure, bold line, with whimsy and humor. He has proved his theory, described in a written analysis of his work, that “the loud and provocative attitude of a poster and its violent nature are so exaggerated that they transcend the limits of bad taste, and actually give it a certain style.”

Today, Savignac’s work pervades the everyday lives of several million Frenchmen, has even extended beyond Gallic frontiers to Italy and across the Channel to England. His brilliantly conceived designs persuade these millions to buy specific brands of soap, shoe polish, electrical appliances, neckties, perfume, mattresses, fountain pens. . . . Savignac’s line of products is extensive. His success comes, perhaps, from another theory he has written about: “A poster is optimism carried to the extreme, like life with no digestive difficulties, no neuroses, no kidney disorders. . . .”

Savignac is a short, bouncy man whose most prominent features are a heavy black mustache and deep-set twinkling eyes. He was born 53 years ago in southern France, and attended the Ecole Lavoisier, a secondary school in Paris. At 17, he began working as a copyist-designer, later did animated cartoon drawings. His first break came when he met Cassandre, well-known as a stage scenery painter and also as one of the best affichistes of his time. Savignac worked with Cassandre until about 1945, then struck out on his own. Since then, he has been giving a “vital role” to the commercial products he has illustrated. “A good poster,” he has written, “shatters the wall just as a great actor shatters the screen.”

He now works in a studio in the heart of Paris. When asked why more of his shattering affiches aren’t seen in the United States, he said, “Without complete freedom of expression it is impossible for me to work, and since the American advertising agencies for the most part impose their layouts on the artist, you see very little of my work in America.”

But some of his work has appeared here, in posters he designed for Cheer soap, Tastee bread, for Life Magazine, and for French Fair at the Neiman-Marcus department store in Dallas. For those who have missed them, here are some of his recent efforts.
What Kind of Education for Women?

How can we best prepare American women to be well-informed adults as well as good wives and mothers? Should they get the same education as American men? The president of Vassar, using her own demanding job as a guide, answers the questions with candor and perception.

Until the mid-19th century, women were considered physically unequal to the rigors of higher education. The gentlewoman of the day was expected to be weak and feeble; a mild case of tuberculosis might even add to her charm. She was the swooning, crinoline-swathed heroine of sentimental novels. To suggest that she had the mental capacity to study higher mathematics or logic was almost unthinkable. Why, the poor thing might get brain fever and die. And when sheer masses of evidence compelled a man to concede occasionally that a woman was intelligent, invariably he rushed to seek refuge in the rationalization that she had "a man's brain." But the final count against higher education for women was that, even if they survived it and actually graduated from college, they would surely never marry.

There were, of course, some seminaries at which young women were taught the polite arts and subjects that would help them become "ladies," but there was little that could be called college for them. Even after Oberlin opened its doors to women in 1837, the first authentic instance in which college education, as we now know it, was made available to them, the number entering was small. It was not until 1861, when Matthew Vassar dedicated his fortune to founding the institution I now head, that higher education for women received the mighty boost that has brought their enrollment in this nation's colleges and universities to more than 1,000,000.

Matthew Vassar was a Poughkeepsie, New York, brewer to whom it occurred that "woman, having received from her Creator the same intellectual constitution as man, has the same right as man to intellectual culture and development." Since his time, the college has not once deserted the belief that really rigorous study should be demanded of students, or relaxed its efforts to give them what represents the best of education in the whole country.

Such a goal is not easily achieved — not by wishful thinking, or pedagogical legerdemain, or the mere expenditure of money. To understand just what it takes, nothing provides a more precise and graphic demonstration than an examination of the college president's own job performance.

The attributes he — or she — must bring to the job are, at the least: an iron constitution, a zest for living, a certain flair for organization, a certain competence for dealing with and choosing people, a vision of the importance of the curriculum in relation to the sum total of our social and educational system, a sense of humor, and complete acceptance of the fact that no one is really indispensable.

The last safeguards against pomposity: in my opinion a college president who becomes pompous ought to be washed right down the drain.

As I once explained to a young man being inducted into a college presidency:

"The trustees will expect you, as their white-haired boy, to lead the faculty, balance the budget, increase the endowment, and enhance the prestige of the college.

"The faculty may look askance at your leadership, but its members will expect you to raise their salaries to match those of their physicians.

"The students will expect you to know everything and to be able to call each by her first name at mid-terms.

"The alumnae will demand of you a superb digestion and they will expect you to make speeches that are memorable, informal and witty."

A few pages, lifted almost bodily from my diary, present a functional inventory of my performance:
Day 1: Up at 7:00 a.m.; drive 75 miles to New York; conference with television producer; visit a trustee and check about an assignment on faculty housing; grab a sandwich; rush to see president of world-renowned corporation to ask for money for faculty housing; drive back to Poughkeepsie; attend student assembly; dinner; home to be hostess to five guests who have come to Alumnae Council meeting and are staying at my house.

Day 2: Up at 7:00 a.m.; 8:30, hairdresser, whose ministrations I've had to forego for three weeks; 9:30, attend Vassar-in-Session Community Day, at which Poughkeepsie leaders spend half a day on the campus; 10:30-11:30, conference with proprietor of riding club that uses some of our property and wants to use more; 11:30-12:30, dictate; home to lunch; 1:15 p.m., back for meeting with Trustees Committee on Undergraduate Life; 2:30-4:30, meeting with Trustees Committee on Buildings and Grounds to discuss faculty housing, renovation of library and art department; 4:30, meeting of Trustees Development Committee; 4:45, meeting interrupted by fire alarm; investigate alarm caused by overheated transformer in hi-fi set in student's room; 5:05-5:45, meeting continues; 5:45, to office to sign mail and fold, seal and post same, secretaries' having finished work and departed; 6:15, home to get into dinner dress; 6:30, arrive at Alumnae House for dinner of trustees and faculty members; 8:00-10:00, meeting of Trustees Committee on Business Administration; 10:00-midnight, socializing with trustees, informal conversation; midnight, home to make out diagram of place cards for 30 guests at next day's luncheon; 1:00-2:00 a.m., read S. N. Behrman's Portrait of Max.

Day 3: 7:00 a.m., up to see to last-minute arrangements for luncheon; 8:30, on to work.

A Perilous Pleasure

For me, the rewards of this job are literally beyond the purchasing power of any amount of money. It gives me the opportunity to live and work in a community of dedicated scholars; to be in contact with Vassar alumnae, accomplished and generous women who are outstanding in every community in which they live; to work with other colleges and universities, which means with people who are leaders in my own field; to see things happen at first hand in which I believe devoutly, and, indeed, to help bring some of them about. And it gives me tremendous pleasure to be connected with an institution that represents the very best of education in the whole country.

There is peril in this pleasure, because the minute any person or institution becomes self-satisfied, deterioration sets in. In the 14 years I have been at Vassar, we have guarded against this diligently by constant examination of the education process and of means by which to improve it.

A full century after the launching of Vassar College as a women's college and a man's college, or whether it should be modified for women in terms of their particular role in what our students refer to as "the after-life." The colleges making up the Seven College Conference have backed stoutly the belief that, for any role in life, a good liberal arts education is the best preparation for the able student, whether male or female. Men, some reluctantly, have now admitted that women, if given the chance, can compete on equal footing in all the professions and business. And women have proved that they can succeed not only in any job, but also in their primary roles as wives and mothers. This is no mean task and calls for sensitivity, imagination, flexibility, ingenuity, resourcefulness, organization, and expert, split-second timing.

In my opinion, much of the dissatisfaction with women's higher education, as voiced by those who contend that it does not concern itself sufficiently with "the home" in the broadest sense of that term, comes from a mistaken idea of what colleges can and should do. Too many parents of college students (and too many college students) expect colleges to teach things that should have been learned in secondary school, and in the home itself. Too many parents also expect college to pass a miracle and turn their daughters into paragons of grace and wisdom without any particular effort on the daughter's part.

After all, colleges do not operate in a vacuum, and the freshman does not emerge from an egg. What has she, herself, been up to before she comes to the campus? What went on at her secondary school, where she should have received the basic equipment of book learning? What has her family been doing the last 17 or 18 years? Since the servantless home is generally taken for granted today, the chances that the average freshman has had no opportunity to master the elements of practical housekeeping are slim indeed; and she has very likely done considerable field work in child psychology — as a baby sitter. If, by 16 or 17 or 18, the young woman herself is not already a responsible member of a social group — family, school, church, friends — it seems a little late to begin.

I believe that a curriculum of liberal arts provides the best possible education for men and women alike, be they professional or non-professional, to give them the tools for making the decisions that confront all thinking Americans.

As to the particular role of women, the psychologists and anthropologists tell us that the traditional values of any culture are conserved by women who, as mothers and teachers of young children, consciously and unconsciously instill in the next generation the values and teachings, good and bad, of the past. They both promote and delimit the development of the future men and women who make up society. Women, therefore, have a double responsibility: to recognize those traditions that are worthy of preservation because they protect enduring values, and to adapt and modify those that changing circumstances have rendered obsolete.

We who are educators of women are obliged to see to it that our colleges provide a climate in which young women will not only have access to knowledge, but will be stimulated to question, to correlate, to think deeply, and to act independently in the light of their own complex needs and the constellation of needs of society.

For a long time, an argument has raged as to whether the liberal arts education itself should be identical at a woman's college and a man's college, or whether it should be modified for women in terms of their particular role in what our students refer to as "the after-life." The colleges making up the Seven College Conference have backed stoutly the belief that, for any role in life, a good liberal arts education is the best preparation for the able student, whether male or female. Men, some reluctantly, have now admitted that women, if given the chance, can compete on equal footing in all the professions and business. And women have proved that they can succeed not only in any job, but also in their primary roles as wives and mothers. This is no mean task and calls for sensitivity, imagination, flexibility, ingenuity, resourcefulness, organization, and expert, split-second timing.

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To my way of thinking, there are certain skills demanded of the modern woman that are her affair, not her college's, and there are other things that the college has to offer that usually only the extraordinary people can get by themselves.

I believe that college is the place where women, and men, too, have a chance to expand their mental powers, to develop tough intellectual muscles, to acquire an historical perspective, an historical imagination, and to get the kind of inexorable intellectual training that develops the ability to think for oneself and to make independent judgments.

And what is the matter with this kind of training for the wife and mother? If she has a mind to, she can get it from courses in history and political science, in chemistry and mathematics, in French and English literature, as well as in courses on the family.

We consider that the teaching of liberal arts as practiced at Vassar is the best preparation that can be devised for women. The central purpose of our curriculum has always been to help the student discover her own powers and to direct these toward meeting the needs of a democratic and free society.

We are dedicated to the proposition that truth is eternal but not static, and we redefine it in the light of expanding knowledge and experience. Truth must be rediscovered, and is different not only for each generation but for each individual, no matter what his or her future calling may be. It is this rediscovery and reinterpretation that makes the Vassar classrooms creative centers for teachers and students.

The greatest single problem that faces any college right now stems from the fact that in the last century knowledge has increased so vastly that the disciplines have grown apart. Today, specialization is rampant.

Recently, I asked a friend on the faculty of another institution what she thought about the situation in the Congo. To my amazement, she replied: “How should I know? I’m a chemist.”

In a former day, the really great thinkers took all knowledge for their province; they may not have been so well informed as to fact, but they did arrive at something approaching a total perspective. Without a clear recognition of the interrelationships existing between science, the humanities and the arts, the light of knowledge is not brought into proper focus. That focus is man himself. The sheer bulk of modern knowledge is the most formidable obstacle to the solution of the problem, but solve it we must or run the risk of intellectual chaos.

Another Problem: Early Marriage

Another major problem in education today, particularly in women's colleges, is the trend to early marriage. The huge increase in the number of women who prefer early marriage to completion of their college careers produces our greatest social waste today. The records of our alumnae prove that they would not suffer a loss if they waited.

This hurry to marry poses a question of timing for the college. Should we make it possible for the young women to graduate in three years rather than four? Perhaps we should for our ablest students. Then there is our special obligation to early-married students, who will be only in their mid-30's scarcely 15 years after their own graduation, when their children are established in school. These young wives and mothers may wish to enter business, a profession, or some useful vocation, and they should. The liberal arts education they received at college should have been such that it enriched the succeeding years of babies and diapers, pots and pans, sufficiently to keep brightly alive their interest in the direct quest for continuing intellectual development.

The forward motion of a college demands the concentration of huge amounts of time, thought and toil, manpower and money. But if, through some magical circumstance, I could push a button or throw a switch to get things done, these are some of the things I would like to see done immediately at Vassar:

I. Increase Faculty Salaries. We talk a lot about the education of our young people as the most important factor of our society, but we exploit those to whom we entrust the educating job. I would pay faculty salaries of at least twice what they’re getting now. A college is only as good as the quality of its faculty and its students.

II. Enhance Admission of Qualified Students. A fourth of our students are on scholarships now, and good ones, but there are still many students who would contribute much to our college community and gain much from Vassar but financially cannot afford to go there. I would make it possible for any qualified student to be admitted to Vassar.

III. Balance Educational Supply and Demand. It is our obligation to stretch ourselves to the limit to give a high-class education to as many young people as is humanly possible. In the next 10 years, applications for admission will swamp the capacity of good colleges. I believe Vassar can help meet this situation by expanding. With our present faculty, with no additional buildings except one residence hall, we could increase our student body without jeopardizing the quality of education we give.

IV. Increase Foreign Student Enrollment. Foreign students on our campus set the stage for their American colleagues to gain better understanding of the peoples of other lands, and when they themselves go home they take with them the seeds of growth in world understanding. In our student body of 1,450 we now have 40 students from abroad. I would like to see many more on our campus. We are particularly concerned today with international horizons for the educated woman.

These are extremely important things that I want to see done, but I cannot say now just how or when they will be. I can say confidently, however, that at Vassar we shall continue to champion the liberal arts as the soundest foundation for growth in any subsequent pursuit of knowledge or experience, assuming that the student brings certain attributes to bear on the quest for an education:

First, the student wants to think independently.

Second, her opinions are formed on the basis of objective facts.

Third, she is open to the persuasion of more and better facts.

Fourth, she is tenacious in asserting her right to form her own conclusions.

These are the attributes of the educated man or woman. They are direct goals of the liberal arts college.
Alcoholism, among known alcoholics, costs U.S. industry an estimated 22 work days per man and more than a billion dollars annually. To combat it, more and more companies are turning to the organization which, over a period of 25 years, has proved its value in rehabilitation.

It has now been more than a quarter of a century since Alcoholics Anonymous was born, and it is one of its paradoxes that it still cannot altogether explain its remarkable success in rehabilitating hopeless drunks. Not only has no one ever been able to solve the enigma fully, but in the light of past experience there is probably not much use in trying. Some years ago, for instance, AA asked a group of prominent doctors to explain the AA program to a group at the New York Academy of Medicine. To a man, the doctors hastily declined, although each of them was known to be an enthusiastic supporter of Alcoholics Anonymous. Surprised, AA wanted to know the reason for the brusque refusals.

"It is true that we recognize most of the forces at work in AA," the doctors said in substance, "but we cannot explain the speed of the results. AA accomplishes things in weeks or months which ordinarily should take years. On top of that, tremendous changes follow in the personality of the alcoholic. There is something at work here we don't understand. We call it the 'X' factor. You call it God, or at least a higher power. Well, you can't explain God and neither can we, especially at the New York Academy of Medicine."

As a result of its gradual realization that AA means many things to many men and women, AA still prudently refrains from any attempt to pinpoint the particular power that has enabled it to salvage some 300,000 wrecked and sodden lives. About all it knows in terms of the spiritual forces involved is that AA works almost unfailingly if an alcoholic genuinely wants it to work, and that, of course, is all it has to know. Thus has AA come of age, both statistically, in its more than 8,500 groups in approximately 82 countries, and in its working philosophy.

Arriving at fundamental truths is never easy. AA inevitably made mistakes in its early days, and lives were doubtless lost because of them. It is clear enough now in retrospect, but it was even hard for the early members of Alcoholics Anonymous to recognize what it was that was keeping them sober until they suddenly realized they were men and women who not only had discovered their inability to control alcohol, but what was vastly more important, had admitted to themselves they were unable to control it. It was a vital realization.

All of AA's principles, as one of the cofounders, Bill W., a one-time New York stockbroker, has said, had to be "forged on the anvil of group experience." Although Bill W., along with an alcoholic physician, Doctor Bob, of Akron, Ohio, founded AA, no one invented it. Like Topsy, it just grew. And the process was one of bitter trial, and, as often as not, painful error.

Early in its history, AA was tempted to pattern itself after the high-minded Oxford Group, which some years earlier had adopted a set of absolutes revolving around the precepts of total love, honesty, purity and unselfishness. This sounded fine until AA discovered to its dismay that one of the fastest ways to get a sober alcoholic drunk again is to generate guilt and rebellion in him by demanding virtually unattainable standards of behavior. As a result, no one demands anything of anyone in AA. There are no rules whatever. In fact, there is nothing in the entire program any stronger than 12 suggested steps to sobriety.

The futility of trying to force an alcoholic into sobriety was learned in another way from a New York physician, Dr. William D. Silkworth, known affectionately as "the little doctor who loved drunks." Before his death, it was estimated that Dr. Silkworth had worked with great success with over 40,000 alcoholics, and after Bill W. had vainly spent six discouraging months in trying to sober up his first drunk, it was Dr. Silkworth who spotted the trouble.

"Stop preaching," he said. "That won't work. Instead, give them the brutal medical facts about their obsession with alcohol and the physical incapability of handling it. The medical facts alone are enough to frighten anyone. Then maybe you can soften them up enough to make them want to do anything to get well. That is when AA is most likely to succeed."
Dr. Silkworth's advice was well-nigh perfect advice, as medical evidence has since proved. Every alcoholic is emotionally unstable. Defiance and resentment against society are counted among his characteristics, and over the years both medicine and religion had failed to help much, largely because the alcoholic was completely convinced that no doctor or clergyman could adequately understand his problem. Moreover, in many instances, the alcoholic was right. To many medical men and churchmen, the alcoholic's strange obsessions and compulsions were as mysterious as moonbeams, and as Dr. Marvin Block, chairman of the American Medical Association's committee on alcoholism, has said, "An alcoholic's proneness to the disease is a secret between him and the bottle."

It is still a medical mystery why one person should be able to tolerate alcohol and another should not. The main thing, however, was that while the early AA's had much to learn from both medicine and religion, they were also realizing that it takes an alcoholic to understand and help another alcoholic. As a result, "fellowship" became an extremely important word in AA, along with "humility" and "sacrifice," all of them qualities, ironically enough, that a troubled world does not seem to be able to assume as well as 250,000 drunks have been able to do.

The basic truths kept emerging from AA's cumulative experience. Will power alone, it quickly appeared, was not enough to keep an alcoholic sober. Whatever it was called, there had to be a stronger force, a higher power to be accepted by—but not forced upon—the alcoholic. If he felt that he was getting the necessary spiritual support from the hissing of a steam radiator in his room, as one perfectly sane member did, AA would encourage him in his belief. Strength from God was vital, but the interpretation of God had to be strictly an individual matter.

AA was impressively hardheaded in its ready acceptance of the fact that alcoholism is an illness which cannot be cured but can only be arrested, and that its byword would have to be, "Once an alcoholic, always an alcoholic." It put great emphasis on the fact that it was the first drink that did the total damage, not the 10th or 12th, and that switching drinks was certainly no answer, a grievous error made by a group of AA's in Richmond, Virginia, who experimented briefly with beer instead of hard liquor, with disastrous results.

The 24-Hour Plan

AA also quickly learned that long-term pledges of sobriety were meaningless in the case of an alcoholic, despite his good intentions and the fact that he might stay on the wagon for a surprisingly long period of time. With too difficult a goal, it was inevitable that he would fall off the wagon at some point, and as a result, the so-called "24-hour plan" was evolved to keep the alcoholic's goal within his reach. The 24-hour plan was a simple but powerful bit of psychology which suggested that the alcoholic relax and merely concentrate on staying sober for 24 hours. "If I feel the urge to take a drink," he could tell himself, "I will neither yield to the temptation nor resist it. I will just defer taking the drink until tomorrow."

By this happy quirk of time, tomorrow never comes. It is always today, a day of sobriety.

At the same time that the personal problems of the alcoholic were being grappled with in AA, there were critical group problems which had to be resolved. Was there, for example, a real need for anonymity?

This was a stickier problem than it first appeared to be. Certainly there was a crying need for publicity to call attention to AA and instill public confidence in it, but when an AA group in Cleveland sobered up a famous major league baseball player and revealed his identity, the newspaper stories were so sensational as to cause deep concern. It was on cofounder Bill W. that the burden of these early decisions fell, and it was he who decided at this point that personal anonymity was absolutely essential to AA's survival.

The Reasons for Anonymity

He had several reasons for so deciding. There were many alcoholics, of course, who desperately wanted the assurance of anonymity because of the social stigma which was then much more strongly associated with the illness than it is now. Other members, however, had become so enthusiastic over their success with AA that they were trumpeting its praises from the rooftops, and it was becoming apparent that they would be doing a great deal of harm should they slip, however briefly, and get drunk again in public, as more than a few did. This was a very real threat to AA's acceptance by a dubious public.

Finally, if anonymity could be sustained, it would go far toward eliminating the spawning of egocentric members who might easily wreck the unity of a group through publicity-grabbing. At the core of every group's survival lay the need for absolute humility and equality on the part of the members, and this could best be safeguarded by adopting a firm policy of principle before personality. Thus, the decision for personal anonymity was reached.

A second decision requiring a great deal of soul-searching in AA was the decision not to accept outside contributions of money but instead to pay its own way through profits from its several publications and through the time-honored method of passing the hat at meetings. In the end, AA simply concluded that it had no use for great sums of money. It needed no temples.

**Alcoholics Anonymous — How It Operates**

Alcoholics Anonymous is, in its own words, a "fellowship of men and women who share their experience, strength and hope with each other," in an effort to stay sober and help others to recover from alcoholism. The only requirement for membership is "a desire to stop drinking." There are no dues, no rules, only 12 suggested steps to sobriety, which resemble the Christian's confession of faith. They indicate the member's willingness to share his troubles with God, as he understands Him, and with at least one other AA member.

The strength of the whole, in AA, is more than the sum of its parts. When an AA feels an overwhelming urge to take a drink, he can hurry to an AA meeting (nightly in big cities, twice a week in smaller towns) to gain support from his fellow members. Or, if the impulse comes at an off hour, as is sometimes the case, a quick phone call to a fellow AAer usually gives him the courage he needs to abstain.
Even more important, it had to guard constantly against becoming a commercial enterprise in which material values might challenge the spiritual values on which AA was founded. Consequently, in the face of countless tempting offers of outside financial help, AA took the oath of poverty, restricting even its own members to $100 in contributions in any one year.

In terms of the many decisions which had to be made, one course had fortunately already been charted for AA, and it saw at the outset the wisdom of never engaging in public controversy or lending itself to any cause other than its own, a lesson which might have saved the Washingtonian Society, a movement among alcoholics in Baltimore a century ago. At first, the Washingtonians saw themselves simply as alcoholics trying to help one another, and at one point their total membership exceeded 100,000. Then it happened. Their egos took command as they made a series of disastrous mistakes by associating themselves with various reform groups, by taking violent sides on the explosive question of abolition, and to cap it all, by taking it upon themselves to reform America's drinking habits.

That was the end of the Washingtonians. Their unity, in which reposed all their effectiveness, was lost for good. AA learned the lesson well. From the beginning it has tried to be neither a debating society nor a temperance society. It is concerned with no other problems than its own.

Curiously enough, many early AA groups made a whopper of a mistake on the simple question of membership. For all their high principles, they were an amazingly intolerant group in their initial determination to restrict membership only to "pure" or "qualified" alcoholics. Convicts, alcoholic inmates in mental institutions, prostitutes, drug addicts who were also alcoholics—all these had to be shunned.

An Alcoholic's Last Chance

Looking back, it is not hard to see why they tried to erect barriers.

The early AA's were afraid. They were grimly trying to keep their lives and their homes intact in the face of tremendous personal pressures, and wide open membership frightened them. Gradually, however, as their confidence increased, they began to realize that, of all groups, AA had no right to take away an alcoholic's last chance. Instead, it was AA which had to give him his last chance. One by one, the various groups abandoned all membership regulations until the one and only requirement for membership became a simple desire to stop drinking.

The decision to open AA to any alcoholic who wanted to stop drinking was more than a step forward in tolerance; it took AA into places it might otherwise never have penetrated. Beginning with San Quentin, in California, AA groups have established themselves in well over 400 prisons and, added to this figure, there are now AA groups in almost 350 mental hospitals.

Moreover, the results have been genuinely spectacular. Where only some 20 percent of the alcoholics paroled from prisons and hospitals used to make the grade on the outside, more than 80 percent now find permanent freedom as members of Alcoholics Anonymous.

In achieving maturity, or what a spokesman for the American Medical Association recently called its "full crystallization," AA has traveled a very long way in a remarkably short time. Except for a dwindling core of diehards with the theory, "If we can't do it, nobody can," both the medical profession and the clergy are convinced of the need for full partnership with AA.

It was an even more difficult wall to scale in some respects, but the importance of AA in industry is also being increasingly appreciated, and with excellent reason. Not long ago, absenteeism among known alcoholics in American industry was estimated by the Yale University Center of Alcohol Studies at 22 days a year—virtually a full work month— with a resultant loss to industry of more than a billion dollars annually.

The Tell-Tale Sign

It was a shocking set of statistics, and many company officials are now being urged to watch for the tell-tale sign of the Monday absence, followed by the Tuesday hangover, and to do something about it.

Many companies are. At Du Pont, for instance, the alcoholic employee is urged to visit the company doctor, who in turn recommends AA (one AA member is on Du Pont's home medical staff in Wilmington, Delaware, and helps start AA groups in other Du Pont communities). Eastman Kodak has spearheaded a community program in Rochester, New York, which involves the closest kind of cooperation between doctors, law enforcement officials, social agencies and Alcoholics Anonymous. North American Aviation, Inc., Allis-Chalmers and scores of other companies have initiated comparable programs, and none has been disappointed. Du Pont, for example, successfully rehabilitated 65 percent of its known alcoholics through AA.

There are still difficulties, of course. Probably it will always be difficult to convince some that carrying the AA message is not a gimmick but is simply the way an alcoholic can best ensure his own continuing sobriety through expanding fellowship with other alcoholics. Unfortunately, the formation of Negro AA groups has inevitably been slow, particularly in the South, with its feeling toward interracial groups.

Moreover, there will always be alcoholics who won't admit it and are therefore tragically unreachable, and there will always be AA members who do admit it and then slip back to the bottle, anyway. All of this is inescapable, and as co-founder Bill W. once said in comparing those alcoholics who catch themselves in time and those who don't, "There is a saying that there are 'high-bottom' drunks and 'low-bottom' drunks. The difference between high-bottom drunks and low-bottom drunks is that both are lying in the gutter, but the high-bottom drunk has his head on the curb. We are all drunks. If you think you are a drunk we invite you to join us."

Certainly the power of AA is clearly proved, if not always fully grasped, and an Episcopal clergyman, Dr. Sam Shoemaker, commenting on the success AA has had in rehabilitating alcoholics, probably paid AA its highest and most realistic compliment: "You can argue the theory of how it happens if you want to," he said, "but you can't deny that it does happen."
If you are in the market for a manufacturing plant, a few thousand pounds of poppy seeds or mineral rights in an old bombing range, you may want to look into the items that the General Services Administration has for sale. You'll not only get fair market value, but you'll help the Government turn a profit.

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**UNCLE SAM'S STRANGE SUPERMARKET**

by Herman E. Krimmel

In these uncertain times it is probably news when an agency of the Federal Government makes money. Almost certainly it is news when it makes money by peddling such zany merchandise as a jail in Alaska, an Indian pow-wow ground in Michigan, floor space in a convent, barren and inaccessible islands, damp caves, lighthouses and abandoned military forts. Yet this is how the unsung General Services Administration returns a profit to Uncle Sam every year.

All these and thousands of other products are part of the multimillion dollar stock of surplus Federal property. Much of it is material and equipment which has been made obsolete, sometimes overnight, by new scientific developments. Small, compact army posts, for example, are now useless for the maneuvers of mechanized troops. Chinese hog bristles, once considered essential because of their superiority for marine paint brushes, have been replaced by cheaper and better synthetic fibers. Nevertheless, it is up to the General Services Administration to dispose of the original items.

Vigorous efforts are first made to find some other Government agency that can use the merchandise. This isn’t too difficult with swivel chairs, field glasses, typewriters and other commonplace items. Countless pounds of feathers, for instance, were taken by the Federal prison system for the manufacture of pillows. But how many agencies can use poppy seeds? There is always on hand an infinite variety of products which no one in the Government wants, so they must be offered for public sale.

The job is not easy, but the working philosophy of GSA salesmen is that there are no unsalable products. In a single day they may sell 15 million pounds of coconut oil, the mineral rights beneath an old bombing range in Arkansas, specialized machinery used in the production of abacá (mabila hemp) in Latin America and a lighthouse on the Jersey shore.

Some items move a little more slowly than others. Curtis Roos, director of the land disposal division, peers moodily from beneath his startling red eyebrows when he discusses old ordnance sites. Not too many people want them, which is understandable, since many are still speckled with live bombs. However, the cost of decontamination is so exorbitant that the Government tries to sell these lots — unexploded bombs and all — to customers who will take their own risks.

Roos brightens quickly when the talk turns to islands. People clamor for them, and for every one offered there are scores of bidders. Everyone, it seems, wants to own his private Bali Ha’i even if he can’t get to it. One lady bought an island in the middle of Lake Champlain, knowing full well that topographical quirks make it inaccessible. A man bought one off the coast of California which he might reach at low tide “if he is a...good swimmer.”

Many buy sight unseen, and they seldom complain. A New York investment man bought a rocky, treeless hunk of land named North Dumpling Island, off the coast of Connecticut. It had been used as a Coast Guard beacon station since 1847, and the 3½ acres cost him $18,000. “Looked like an interesting investment,” he commented, “so I put in a bid. There is only one catch. Now that I’ve got it I don’t know what to do with it.” But he seemed happy.

Who Wants Underwater Land?

A few years ago there was a feeling that submerged land off the North Carolina coast might be a problem. After all, who wants underwater land without oil potential? The answer is that lots of people do, and it was promptly snapped up at a fancy price by a sportsman who planned to use it for duck hunting blinds. Nor was there much trouble with a vast tract in Virginia’s appropriately named Dismal Swamp. The GSA carved it into small land parcels and sold more than 200 within a few days. Few customers had seen what they were getting, but no one demanded a refund.
To the highest bidder. At a GSA auction on the West Coast, these bargain-seekers watch and wait for wanted items on the auction block.

Ellis Island for sale. Long a U.S. port of entry, this historic island in New York harbor is one of the biggest items on the auction block. Its 27 1/4 acres, 36 buildings, dock and ferryboat are valued at more than $6,000,000; offers ranging from 50 cents up to $1,000,000 have been rejected.
There are all kinds of people, and some one of them can be counted on to buy almost anything. At present, for example, there is a strip of barren coast land up for sale. The Government man’s report said that it is “the windiest, most Godforsaken place we have ever appraised.” Roos does not be counted on to buy almost anything. At present, for ex-

Government man’s report said that it is “the windiest, most ample, there is a strip of barren coast land up for sale. The moody, intense person who will be delighted to own it.”

A 95-mile helium pipeline running from Petrolia to Fort Worth, Texas, was sold easily, as were a Cadillac, seized from a careless bootlegger, and a few forest ranger stations. The few thousand pounds of poppy seeds mentioned earlier may contemplate the slightest difficulty in selling it to “some moody, intense person who will be delighted to own it.”

Worth, Texas, was sold easily, as were a Cadillac, seized from do-it-yourself opium manufacturers. The seeds were originally stockpiled against the loss of our Far East supply.

One of the most difficult packages to move is historic Ellis Island, which sits in the middle of New York Harbor. For more than 60 years it was the port of entry and a haven for the tired and poor of other lands, but this function ended in 1954. In case you are interested, its 27½ acres are to be sold complete with 36 buildings, water and sewage system, docks and a ferryboat. The maintenance cost is about $140,000 annually. One man offered 50 cents and said he would give it back to the Indians. The Government rejected this, as it did an offer in excess of a million dollars. The island is valued at more than $6,000,000, which limits the potential market.

The salesmen of the GSA face daily problems so formidable as to make the most talented Madison Avenue huckster throw up his hands in despair. For one thing, they are usually offering merchandise that is either well used or obsolete for the purpose for which it was acquired. By the time they place a product on the market, it has been rejected by every major element in Government and has probably been offered to states and municipalities under the generous donable property laws.

In other words, GSA salesmen have to sell what they couldn’t give away.

Crude rubber, anyone? If you can use a supply of rubber in the raw, the U.S. Government will sell these warehouse stacks at a fair price.

Another obstacle is that many of the items are of such a specialized nature that it requires sleuthing of Holmesian caliber to find even one potential buyer. And if, on rare occasions, they have a commodity that might promise wide and immediate sale, they must proceed slowly to avoid depressing the market.

These handicaps are viewed as challenging but never insurmountable. And, above all, GSA officials emphasize that they are not running a bargain basement operation. No salesmen in private industry have more pride in squeezing the last possible dollar from a sale. They accept their obligation to hold out for a reasonable return, but even if this obligation did not exist, the result would be the same. GSA officials are natural-born horse traders, who like nothing better than to ring up a satisfactory sale for Uncle Sam.

They Never Sell for Peanuts

When those Chinese hog bristles failed to bring a satisfactory price under sealed bidding, many pros in the trade argued that the commodity, which had been unavailable to brush manufacturers for six years, lacked sales appeal. The Government, however, felt that the trade was holding back under sealed bidding, hoping for a sacrifice sale so the bristles were reoffered at auction. The trade, forced into open competition, pushed the price to an unexpected high. By holding a number of these auctions, carefully spaced to prevent oversupply, more than $17 million were returned to the Treasury.

“We’re not selling things at 10 cents on the dollar,” growled Roos. “If bids are too low, we reject them. We never sell for peanuts.”

Sales techniques rank with the best. Brochures to advertise such items as large manufacturing plants are elaborate enough to make the Madison Avenue products look like careless handouts. Even closed television circuits have been employed. When the GSA wanted to sell some beach property along the Texas Gulf Coast, a do-it-yourself beach kit was prepared, complete with salt water, sand, miniature pail and shovel, umbrella and bikini. Nevertheless, advertising costs rarely exceed one percent.

Obviously, most products are not sold for original cost, but the measure of success in this operation is something called fair market value. As Roos observed: “People find out that we’ve sold a $30 million plant for $3,000,000, and they think it’s a giveaway. They forget that the plant was built in World War II and that its equipment is obsolete and worn out.”

Actually, sales in recent years have slightly exceeded 100 percent of market value.

The General Services Administration, which recently celebrated its 11th birthday, was created on recommendation of the Hoover Commission. It has paid its way many times over. Through the efforts of its supersalesmen in disposing of “obsolete” properties, it pours more than $50 million annually into Federal coffers. This is a bonus that should gladden any taxpayer’s heart.

Recently the GSA, reluctantly, had to disappoint a boy who wanted to buy some land in outer space. But if you are in the market for a grass-grown half acre in Alabama or a $64 million industrial plant in West Virginia, the GSA people would like to hear from you.
The moon is one of the Seven Wonders because it is our nearest planetary neighbor.

The Crab Nebula, discovered by the Chinese in 1054, is actually remnants of an exploding star.

Seven Wonders of the Universe

As man pushes his frontiers toward the infinite horizons of space, his world view has been extended to astronomical vistas. He is no longer content with the wonders of his own planet. Even the seven wonders of his ancient world, all lost, except for the Egyptian pyramids, to the inevitable toll of time, have been succeeded by space-age counterparts. And these wonders, most of which were around long before anyone had even thought of the ancient, man-made wonders, will probably be around for some time to come.

We refer to the Seven Wonders of the Universe, selected by astronomers at the American Museum-Hayden Planetarium in New York City. When we heard about them, we wondered which could have been elected from all the stars above. Dr. Franklyn M. Branley, associate astronomer at the Planetarium, gave us the final tally: the moon, the Andromeda Galaxy, the Milky Way, the Crab Nebula, the globular cluster of Hercules, the constellation of Orion and the rings of Saturn.

Dr. Branley, whose outlook is enthusiastically interplanetary, also introduced us to a few astronomical oddities we hadn’t met before, and made us feel more at home in a universe where man is, after all, an infinitesimal speck.

“The moon,” he said, “is the most obvious choice because it is our nearest planetary neighbor [at times only 221,593 miles away], the one we know most about . . . even though we can see only one face of it. The tantalizing thing about the moon is that although we know a great deal about it, there is so much more we would like to know. We have photographs which are revealing, we have a fairly good idea of its atmosphere and topography, but no really fine details.”

Our astronomer-guide proceeded to a photograph of the Andromeda Galaxy. “Beautiful, isn’t it?” he asked, in happy admiration. It is, anyone would agree, beautiful — and photogenic. “We chose Andromeda because it is the nearest galaxy to our own, the easiest to see, and because it appears somewhat as we believe our own galaxy would appear to us, if we could get outside it, far enough out into space to get an outside look at it.”

While on the subject of galaxies, he moved quickly to the Milky Way and reminded us that earth is in the Milky Way Galaxy. “What we see as the Milky Way,” Dr. Branley explained, “is simply a piece of our own galaxy. Since we are in it, we can’t very well see all of it. Say you lived in a house all your life and had never been outside, had never seen the outside. You might imagine what the outside was like.”
The Milky Way. This wonder “is simply a piece of our own galaxy.”

The rings of Saturn are believed to be millions of particles in orbit.

Globular cluster of Hercules is significant because it consists entirely of stars.

like, you might even have a fair idea of its appearance, but you couldn’t know exactly until you were able to go outside and look. This, I have found in my lectures, is a useful analogy to show the important difference between the terms Milky Way and Milky Way Galaxy. Those dark splotches, by the way, are masses of cosmic dust which are closer to earth than the Milky Way and blot our view of the stars behind them. The ancients,” he added as a postcript, “thought they were holes in the sky.”

From holes in the sky, our astronomer went on to a phenomenon known as the Crab Nebula. “This,” he said, “was discovered by the Chinese in 1054, when it suddenly appeared in the skies, got brighter and brighter, day by day, and could be seen both day and night. Must have been an awesome spectacle in those days.” Dr. Branley explained that the Crab Nebula is actually the remnants of an exploding star, probably caused by some kind of natural nuclear chain-reaction, and that it is still exploding, accelerating particles of cosmic matter up to thousands of miles an hour.

The Crab Nebula’s atomic convulsions were followed by a tidier wonder, the globular cluster of Hercules. This, we found, is significant because it consists entirely of stars, not in combination with cosmic gases. Even the center, which appears to be a solid mass, is made up of thousands of individual stars. It looks, as Dr. Branley pointed out, more like a symmetrically planned painting than it does a photograph.

The constellation chosen as a wonder is a spectacular one: Orion. It is as colorful, Dr. Branley said, as it is brilliant. Its colors include almost every hue of the spectrum, the extensive reds indicating the presence of hydrogen. If you look closely, you can see the head of a horse shaped by dark cosmic dust.

Finally, we came to the rings of Saturn, and to another astronomical revelation. “The rings,” Dr. Branley explained, “were probably created when the gravitational pull of Saturn became too strong for some of its satellites. Then, when the satellites were pulled close enough, they disintegrated and the millions of particles went into orbit around Saturn, creating the rings.
This," he added, "may conceivably happen to our own moon billions of years hence."

We asked, concluding our talk with Dr. Branley, why these were chosen above all the possible cosmic candidates. He gave us two good, simple reasons. They all play important roles on our interstellar stage. And we can see them with the unaided eye; these are seven timeless wonders every earthling may behold as he contemplates the architecture of space.

**New Eye for Sun-Watching**

Forty miles southwest of Tucson, Arizona, scientists have bored a 380-foot hole into a mountain to get a better look at the sun. A paradox? Not for astronomers. The deep tunnel, 15 feet in diameter, will be used for transmitting solar images to an underground observation room. It is part of the world's largest solar telescope, now abuilding at the Kitt Peak National Observatory.

The deep shaft plunges into the mountain at an angle of approximately 32 degrees. Rising nearby is a large steel-and-concrete pillar which will support a heliostat—a flat, motor-driven mirror 80 inches in diameter. The heliostat, 110 feet above ground, will track the sun and reflect images of it down the shaft to a concave mirror at the bottom of the tunnel. The solar images will then be reflected back up to another mirror and projected into an underground observing room. There the images—several times larger and more brilliantly illuminated than any now obtainable—may be photographed or directed to spectroscopes for study. (This explains the reason for the tunnel: the longer the focal length, the larger the image.)

The new telescope is being built for the National Science Foundation by the Association of Universities for Research in Astronomy, Inc., operator of the Kitt Peak observatory. Dr. Alan T. Waterman, NSF director, points out that "the huge instrument will give us a view of the sun than have ever been possible from the earth. Such observations will increase substantially man's meager knowledge of the star that keeps our planet alive." The telescope is scheduled to be in operation next year.

**Ultrasonic Beef**

Technology has now given us a new way of telling which steer will give the best beef. And the method is simple. A small probe, which beams harmless ultrasonic waves into the animal's body, is held against the back of the live steer. These waves, which operate much like those of a submarine's sound detection apparatus, strike the boundaries between fat and lean and bounce back. Fed into an electronic circuit, the signals are changed to a visible pattern on a cathode ray tube (similar to but smaller than those used in TV sets). Depending on the depth of the fat-lean boundary, the distance between "going" and "coming" signals on the screen will vary and permit direct interpretation.

The device is the Model 6A Sonoray, an ultrasonic instrument built by Branson Instruments, Inc., of Stamford, Connecticut. It was originally developed for detecting flaws in metals, plastics and other hard materials. In its new role, it was displayed at a live-stock exposition in Chicago, under the direction of Professor James R. Stouffer, of Cornell University.

**Vocabulary for Synthetics**

Synthetics have created a communications problem. We refer, not to the materials used in our clothing, buildings and cars, but to the artificial lungs, hearts and kidneys now used in hospitals, to the synthetic nervous systems and sensory elements being built by electronic engineers. Unless the term "artificial" or "synthetic" is used, there are no specific words to describe the new devices.

Willem van Bergeijk of Bell Telephone Laboratories, Murray Hill, New Jersey, whose field is artificial nerve networks, proposes a solution to the problem. He suggests adding the suffix "-mise" (from the Greek stem meaning to imitate) to the medical root for a given organ of the body. An artificial heart would thus be called a cardiomime, an artificial kidney a nephromime; artificial nerves would become neuronomises, hearing devices would be auromises or otomimes, and seeing devices would be oculomimes. This could also cover machines (when they are developed) that taste (gustomises), that touch (tactomimes) and smell (olfactomimes).
THOUGHTS

Spring to the world, and strength to me returns.

Robert Bulwer Lytton

Change is one thing, progress is another. "Change" is scientific, "progress" is ethical; change is indubitable, whereas progress is a matter of controversy.

Bertrand Russell

A highbrow is the kind of person who looks at a sausage and thinks of Picasso.

Alan Patrick Herbert

There are no gains without pains.

Benjamin Franklin

Science has put man in his place; one among the millions of kinds of living things crawling around on . . . a minor planet circling a trivial star. We can't really face the implications of this . . . A billion years into the past and a billion light-years into space remain abstractions that we can handle glibly, but hardly realize.

Marston Bates

When man at the end of the road casts up his accounts, he finds that, at best, he has used only half his life, for good or bad purposes. The other half was lost inadvertently, like money dropped through a hole in the pocket.

Alfred Polgar

I think what has chiefly struck me in human beings is their lack of consistency. I have never seen people all of a piece. It has amazed me that the most incongruous traits should exist in the same person and, for all that, yield a plausible harmony.

Somerset Maugham

We judge of man's wisdom by his hope.

Ralph Waldo Emerson

Don't accustom yourself to use big words for little matters.

Samuel Johnson

War is an invention of the human mind. The human mind can invent peace with justice.

Norman Cousins

Life is easier to take than you'd think; all that is necessary is to accept the impossible, do without the indispensable and bear the intolerable.

Kathleen Norris

To be nobody-but-myself—in a world which is doing its best, night and day, to make you everybody else—means to fight the hardest battle which any human being can fight, and never stop fighting.

E. E. Cummings

When the last Puritan has disappeared from the earth, the man of science will take his place as a killjoy, and we shall be given all the same old advice but for different reasons.

Robert Lynd

As for social pleasures, one of the highest enjoyments is agreeable company and good conversation, and I especially like men, women and children.

William Lyon Phelps

Every time I paint a portrait I lose a friend.

John Singer Sargent

People will buy anything that's one to a customer.

Sinclair Lewis

I've been in the inventor business for many years, and my experience is that for every problem the Lord has made He has also made a solution. If you and I can't find the solution, then let's honestly admit that you and I are damned fools, but why blame it on the Lord and say He created something "impossible"?

Thomas A. Edison

The years of youth, when there is less responsibility, are enjoyable—but the anxieties of youth are also very marked, and there are few young people who escape them.

Eleanor Roosevelt

Our faith and our friendships are not shattered by one big act but by many small neglects.

J. Gustav White

Some people are always grumbling because roses have thorns: I am thankful that thorns have roses.

Alphonse Karr

An income tax form is like a laundry list—either way you lose your shirt.

Fred Allen

In these days of nuclear energy, can the earthenware lamp of the poet still suffice? Yes, if its clay reminds us of our own. And it is sufficient mission for the poet to be the guilt conscience of his time.

Alexis Léger

We are all tattooed in our cradles with the beliefs of our tribe; the record may seem superficial, but it is indelible. You cannot educate a man wholly out of the superstitious fears which were implanted in his imagination, no matter how utterly his reason may reject them.

Oliver Wendell Holmes
Welcome to Copenhagen: A city's hospitality consists of many things. Above, in a gesture familiar to many a tourist, a Danish politibetjent extends a helping hand.

Back cover: Old World charm and modern conveniences blend in striking air view of Copenhagen's Raadhus (town hall) and town square.