"Tuesday's Children" display natural grace and rhythm at a University dancing class for six to eleven-year-olds. See Herb Weitman's pictures on Pages 46 and 47.
COVER: Among the many fine examples of primitive art in the University Collections is this hammered gold face mask from the Peruvian Chima culture of A.D. 1300-1500. Back cover shows the “Man-Bird,” a nineteenth century wood carving from New Guinea.

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Photo Credits: Tom Stewart, pages 2, 39; all others by Herb Weitman.
Provost George E. Pake discusses the University’s plans to develop the recently acquired 2,000-acre Tyson Valley tract as a major multidiscipline research center and points out the significance of this acquisition to the future of the University, the community, and the nation.

At a brief ceremony in Washington, D.C., on October 2, 1963, Chancellor Eliot accepted on behalf of Washington University the transfer of approximately 2,060 acres of the former Tyson Valley powder plant site to the University for research purposes. With this event begins a development of major significance to the University, to the St. Louis area, and to the Midwest.

The plans for establishing a Washington University Research Center at Tyson Valley have been greeted most enthusiastically by St. Louis newspapers and by business and government leaders. Great public interest has been generated, and, because both interest and curiosity are especially high among members of the University family and their friends, I am delighted to have an opportunity for a brief discussion of some of the facts about the transfer, about the property itself, and about the plans for the Research Center.

Missourians—and, for that matter, many national travellers passing through the Gateway to the West—have been passing back and forth for years along more than three miles of the southern perimeter of the Tyson Valley property. Yet, I find a surprising number of people who are uncertain about its location or even its existence. The irregularly shaped tract is located about eighteen miles by automobile from the main campus of the University. The entrance gate is reached from U. S. Highway 66 (Interstate 44) by driving about nine miles west on U. S. 66 from its intersection with Lindbergh Boulevard. With the completion of the so-called circumferential highway in a few years, access to the University’s Research Center from the main campus will be over about twenty-one miles of divided highway, greatly reducing travel time.

On the north, the property is bounded by the St. Louis and San Francisco Railroad line, which runs along the Meramec River. A small bone-shaped section between the railroad and the river affords about 1,500 feet of river frontage and there is a railroad spur into the property.

Aerial photograph of the new Research Center site shows Highway 66 (Interstate 44) in foreground, 2,060-acre Tyson tract above. Meramec River is in far background.
At the western end of the tract is West Tyson Park, owned by St. Louis County. The eastern end of the Tyson Valley tract consists of approximately 300 acres which were not sought by the University and which have been applied for by St. Louis County for park use.

During World War II Tyson Valley was used for storage of powder for the small arms production plant in St. Louis, but has not been required for government use in recent years. When it was declared surplus, for disposal by the General Services Administration, members of the faculty and administration quickly sensed that Tyson Valley could help the University solve a number of pressing problems relating to the needs of its growing research program.

It is useful to interject here a few words about research at the University. In addition to its well understood educational function, the modern university serves the nation and its own surrounding region through its increasing involvement in research. The interrelationship of the research program to the educational needs within the university on one hand, and to practical or specific national needs on the other, is the basis for growing participation of top-flight universities in sponsored research programs.

In the past academic year, the total expenditures of Washington University amounted to nearly thirty million dollars, of which nearly ten million was sponsored research. Without this research sponsorship, the University would be unable from its limited income from tuition and endowment to afford the intricate and costly apparatus of modern science and scholarship, including, for example, such facilities as the high-speed computers which are becoming indispensible to many branches of university scholarship.

Without these facilities and associated assistants and technicians, the faculty would be unable to maintain its competence by keeping pace with rapid advances in the various branches of learning and by participating actively in those advances.

In short, the faculty could not maintain the qualifications which now lead increasing numbers of young men and women to apply for the opportunity of studying at Washington University. A Washington University education is valuable because the undergraduate is placed in close association with teachers who are abreast of their specialties and are actively participating in developing the body of knowledge in which they specialize.

To this vital educational need for research one must now add the urgent national need to have the largest possible reservoir of basic knowledge and of people able to tap it in the solution of national problems. Whether the problems are those of the conquest of space, the fight against cancer, or the attack on a growing crime rate, the university represents a reservoir of brain power and competence in research techniques which the nation inevitably must turn for both basic research results and graduating students who have developed knowledge and research competence.

How does this research responsibility of Washington University pose problems that the Tyson Valley land can help to solve? It is clear to those who know the 140-acre main campus west of Forest Park and the 23-acre medical campus east of the park that the University’s land resources are rapidly approaching full commitment. Many ancillary services for the research program do not need to adjoin the classroom, and can equally well be located at an accessible distance, thus avoiding excessive or impossible crowding of the teaching campuses.

Other research needs—for example, in botany or biology—call for use of land for collecting living specimens. In the past, there has usually been relatively idle land “uncontaminated” by general public use at not too great distance. But such land is now found only at greater and greater distances, and the widespread use of insecticides and herbicides has made much of it unusable for collection of biological research materials.

Discussions held by members of the faculty and administration last year culminated in a 91-page proposal to the Department of Health, Education, and Welfare pointing out in detail how the University would use Tyson Valley both to implement more effectively its present research program and to expand the program in the future. These activities serve directly the research programs sponsored by the Department of Health, Education, and Welfare and other government agencies. It then fell to HEW officials to make the case to the General Services Administration that the University’s program would constitute the highest and best use of the land in the public interest.

Perhaps it will be of interest to list a number of projects, selected at random from those covered in the application, to illustrate the kinds of use to which the tract will be put.

Research on population genetics at Washington University has involved field studies of certain insect groups. As was mentioned earlier, intensive insect spray programs in the suburbs have limited the work. The Tyson tract will provide substantial areas of forest which will remain undisturbed from year to year, so that resampling of the same area can measure genetic change. These projects have been supported by the National Science Foundation and by the Office of Naval Research.

The Tyson property contains a large number of powder storage igloos which, with minor modifications, should provide ideal controlled environments for growth of plants and animals. The igloos will also be used as large population cages for observing the effects upon vertebrates of varying conditions of population density.
Three small ponds, of area less than a quarter-acre each, are projected as breeding areas for salamanders. Urbanization of the county makes it increasingly difficult to obtain salamander eggs; the small ponds at Tyson would insure the supply. A similar use is the maintenance of a flock of domestic fowl so that an adequate supply of fertilized eggs will be obtainable from known strains of fowl living under conditions which may be controlled.

A n important research activity of the Department of Earth Sciences for a number of years has been the study of earth magnetism. Investigations of rock magnetism are best carried out away from large industrial installations. An igloo will be ideal for housing equipment for paleomagnetic measurements, and another will house special instrumentation for measuring the earth's magnetic field.

Seismic studies can be carried forward quite effectively in the Tyson area, which offers a number of advantages. In fact, work is already under way on a cooperative basis with a local instrument manufacturing company. Here we see an example of how the University's program of research can help local industry. In pursuing its projects which are of national interest to such agencies as the National Aeronautics and Space Agency and the Advanced Research Projects Agency of the Department of Defense, the University often must fall back on industrial know-how. Through their work for the University in these research projects, the industries in turn gain first-hand knowledge of the research results which can be of great benefit to them in future product development.

With a heightening national interest in the space program and the study of planetary crusts, we can expect Tyson Valley to be a most useful outdoor laboratory. Measurement of telluric currents, examination of bedrock properties for stability, and the effect of earth tides are just a few of the activities which can be profitably pursued.

The environmental engineers concern themselves with research into problems of water resources, air pollution, and waste disposal, all of which are becoming increasingly critical in urban areas and with growing world population.

In experimental lakes and reservoirs studies can be made of the effect of agricultural poisons on aquatic life, on the production and recovery of algae for food value, and of reservoir evaporation.

Environmental engineers are interested in developing means for prevention of localized air pollution, and in the effects of such pollution on animal populations.

Throughout all of this work, these engineers will be developing improved monitoring techniques which can be of benefit to public health programs.

Medical research requires animal colonies of many kinds. These colonies must be maintained under known conditions, which in turn must be rigidly controlled. Even colonies of such small animals as mice and guinea pigs can occupy a great deal of space when special foods are required, specific environments are necessary, or statistically significant numbers of animals are to be kept and bred through several generations. But these requirements call for much space when larger animals are needed for research purposes, and there are also serums which must be produced with larger animals. The crowded medical campus offers little possibility for large animals and this has seriously hampered the School of Medicine, which has had no facility close enough for practical use as a large animal installation. Indeed, the projected large animal farm at Tyson Valley could well develop into a regional resource for Midwestern medical research, under the sponsorship of the National Institutes of Health.

Physics programs were listed in the application as future plans rather than immediate projects. When the Washington University cyclotron, now being modified for higher energy experiments, is at some future date to be supplanted by a new accelerator, the tract would be ideal.

Radio astronomy might well be pursued with some kind of large antenna installation at the Tyson site. Without substantial acreage available comparably close to the University, expansion into this important branch of science might be foreclosed.

University psychologists have indicated the need for maintaining colonies of older animals in order to study psychological factors in aging. The necessity to keep animals until late in their life span poses difficulties, and the absence of a substantial space in which to keep and study such animals has been a serious obstacle to gerontological research.

The foregoing examples are but a fraction of the projects discussed in the application for the Tyson Valley tract. Naturally, because nearly two years have elapsed since the proposal was drawn up, a number of the projects described may be affected by research developments in the intervening period. The obligation of the University is to carry forward research such as that described in the application which is in the public interest. Doubtless there will be many such projects over the next few years which were not foreseen. As the University carries forth a program consistent with its application, it will, so to speak, "earn" the title to the property at the rate of five per cent each year; after twenty years of activities consistent with the application, the tract will belong to Washington University free and clear.

Long before the twenty-year period elapses, the Washington University Research Center at Tyson Valley will have become a bustling center of research activities serving both the University and urgent national needs.
In the introduction to his recently published Heredity and Human Life, Professor Carson stated, “New information now exists which enables us to probe the deepest scientific question the human mind can raise: the nature and origin of life and man. These new scientific realities provide the most powerful tool ever available for understanding ourselves as individuals and in our relationship to our fellow human beings.” In this article, he discusses some of the implications of these realities, with special reference to the racial theories of Carleton Coon and to the concerns expressed by C. P. Snow in his article Science and the American Dream in the spring issue of this magazine.

HUMANISM AND THE NEW BIOLOGY

The science of life has had a number of quiet revolutions. The greatest of these began a hundred years ago with Charles Darwin and the principle of evolution. Developments in this area continue on a broad front today; the most spectacular new discoveries have to do with the nature of biological inheritance. As a result, we can finally see the major outlines of the answers to the deepest and most fascinating question the human mind can raise: those that deal with the origin and nature of life and man.

We know now that man is indeed a part of nature, akin to the rest of the biological and physical world. He did not arise in a single, miraculous event but is a product, like other living things, of the long slow process of descent with change that evolution entails. The changes have occurred slowly, bit by bit each generation, and for this reason, the individual steps are only barely perceptible.

We know too that each individual person begins from the union of two small bits of living matter contributed by each parent. These bits, the egg and sperm, have written within them much of the history of the lives that have gone before and they confer on the individual the capacity to grow and produce a specific form. They do this by gathering materials and self-building, by directed chemical processes, the completed, whole, personal form.

The basic machinery that makes this possible operates at submicroscopic levels, within the body cells. In the last few years, genetics has come close to solving the problem of how these molecular events are directed. This problem can be most simply stated as a question: How does this bit of matter know how to develop into a precise and non-repeatable human form? Where does it get its “information” from—information which “tells” it what its nature shall be?

Biologists have now shown that this property resides in a very complex chemical substance, deoxyribonucleic acid, or “DNA,” which sits inside each cell and acts as a coding system for all the important chemical activities in the growth and development of the living individual. The science of genetics is built around the study of the behavior of this substance which composes the genes, the stuff of which heredity is made.

DNA in the fertilized egg fixes some things, like eye color, for instance, quite definitely and unchangeably. It is erroneous, however, to assume from this that everything else about living individuals, or a human person, is equally rigidly fixed. The operation of the human brain, for instance, is not rigidly predetermined. From the moment of birth, an individual baby’s reaction to things around him is shaped by those he watches and mimics. But because we may discern a strong aspect of nurture in the way a brain works does not mean that genes do not affect brains. They do indeed. Before the recent clarifications we used to hear arguments as to whether a character was “hereditary” or “environmental.” Now we find that we were asking the wrong question. Almost every character gets influences from both and they are frequently hard to
separate. Now we ask: “How much is due to heredity and how much due to environment?” Furthermore, we must ask the question separately for each character.

Many persons are frightened of the word “hereditary” because it seems to imply unchangeability. This also is not true. Diabetes, for example, develops because of a defect in the genetic code. The disease, however, can be corrected by supplying artificially the substance that the code of that individual cannot make, namely insulin.

To me, the crux of the new biology is not just that we have come to know many important facts about ourselves as biological individuals. Running deeper below this, and even more fascinating, is the information we now have on the origin of the whole human race. We now have a good idea where we and all our forebears came from. We know about how long ago it was that man originated and where these key evolutionary events took place. We do not know this in fine detail, and we probably never will, but the basic outline is both clear and extraordinarily interesting.

All men belong to a single biological species, Homo sapiens; this is another way of saying we are all very closely related historically and biologically. Not very far back in history, we share common ancestors with all men. Practically all authorities agree on this point. I believe further that the fossil evidence indicates that the evolution of our species from a subhuman species occurred only relatively recently, in the neighborhood of 50,000 years ago in a small population somewhere in North Africa or the Middle East. From this point in space and time, discoveries of the remains of Homo sapiens in all parts of the world indicate a rapid spread of populations across the continents and through the islands from the place of origin.

At the dawn of recorded history, man had already colonized all the continents, but as he spread, genetically variable populations were formed precisely in the manner of family lineages. Man was indeed variable from clan to clan and village to village before the great migrations of the ancient and modern eras mixed things up. Those who would divide mankind on the basis of these differences can construct anywhere from five to a hundred subdivisions of mankind. One can almost bring the division down to families, if one is so inclined. Most accept a small number of major geographical subdivisions of pre-historic man, roughly, one to each continent. This, to the biologist, is what is meant by a race; it is simply a population of individuals who inhabited a particular area of the earth during this phase of world population growth.

Races differ not so much in genes as in culture. Culture is that new kind of inheritance that our species alone has. We instruct, we teach, we speak, we initiate, we train, we guide our children from the first moment of consciousness. Each set of parents instructs according to his own traditions—traditions which, like the genes, accumulated differences in isolated communities. But genes are more conservative than culture and in 50,000 years these groups had little chance to incorporate any really basic inborn hereditary differences. They tended to be quite superficial—such things as skin and hair color, stature, hair texture, eye color, and head shape. Really important characters, like the capacity of the brain, give evidence of being extraordinarily similar in all existing races.

A somewhat different view of the origin of races has recently been given by Carleton Coon in his review of the fossil evidence for recent human evolution, called The Origin of Races. Coon accepts the concept that all existing men belong to the same species; he differs over the time at which each major subdivision, or race, arrived at this state. The crux of Coon’s view is that each of the five major races evolved in situ on the separate continents, essentially in only minor contact with each other. The value of his argument, however, is much affected by the fact that he does not make clear how much contact would have had to occur to make his views tenable. In his summation, however, he states categorically:

“... Homo erectus ... evolved into Homo sapiens not once but five times, as each subspecies, living in its own territory, passed a critical threshold from a more brutal to a more sapient state.”

As a student of the evolutionary process, I can only say that I consider such a parallel series of events to be unlikely in the extreme.

Human differences, whether between families or between larger groups, such as races, have for centuries been variously magnified and used as excuses for the perpetration of unspeakable horrors. The most frightful recent version was the Nazi dogma which invoked distorted facts about heredity and environment to “scientifically prove” the racial myth of the superman.
No valid scientific evidence can be brought forth to support racism, the idea that some groups of men are inherently superior to others. We may even go so far as to make a positive statement in the other direction. The very real basic similarity of all men is a fact of life. The brotherhood of man is far more than a noble principle; it is based on firm biological facts. Racist pronouncements should be recognized for what they are: misguided attempts, by the conscious repression of others, to bolster the ego against feelings of insecurity and uncertainty. Basically, the struggle against racism is the age-old moral struggle to replace misunderstanding and prejudice with mutual understanding and respect.

New advances in science are hardly ever like the Biblical revelations which burst upon us in a blaze of light and clarification. Rather, their significance blurs and grows as the great minds of their time attempt to deal with them and interpret them. So it is with the new advances in our knowledge of the chemistry of heredity.

In a brilliant attempt to get at the significance of these discoveries, Sir Charles P. Snow, in the pages of this magazine, recently warned of a coming reassessment of human nature, especially in the light of the new molecular biology of heredity. Sir Charles has broadly hinted that some of the consequences may shake us and upset some of the principles that we have taken for granted. If I read him correctly, Sir Charles has purposely left his conclusions only vaguely formulated. It would be intemperate, indeed, to attempt to be a modern-day soothsayer, dealing in specifics.

Whatever the future may bring in the biology of man, certain fundamentals, however, are unlikely to be affected. Sir Charles hints, for example, that in the future we may uncover deep, hereditary, untrainable differences in human minds and that we may have to face up to this fact. On an individual basis, however, we already know that such differences do exist between persons. For years, geneticists have known that, although we may be born equal before the law, we are not biological equals. We differ not only in slight hereditary traits such as skin and eye color, but also in that deeper endowment, the genetic component of the capacity of the human brain. Such differences, however, are a part of our biological nature—a part of the price we pay for being, after all, human.

The tragedy of the mental defective, however, should not blind us to the larger fact that those suffering such defects are not concentrated in any of the subdivisions of mankind. To be blunt, there are no hereditarily defective families, clans, groups, or races. We speak here, it should be emphasized, not of cultural deprivations, but hereditary ones. Every group of men carries hidden genetic factors which may lead to an imperfect or unequal start in life for some unfortunate individual. The compassion of the more fortunate must be extended to them whether the difficulty takes the form of a crippled leg or that more subtle and less easily understood form of human misery, the crippled mind.

That correction of such basic defects could be accomplished by specifically altering the hereditary material of the person concerned before birth is remotely conceivable in the light of present knowledge, but is certainly much too far away to warrant serious consideration now. It will be a very long time, if ever, before we can control the chance events that determine our individual hereditary codes.

Apart from the correction of obvious defects in the code, decision as to what would constitute a desirable hereditary start in life would be a quite agonizing one. Certainly, we would all like to start with a good brain and a strong and well-proportioned body but beyond this any agreement would surely be remarkable and probably nonsensical. The genetic control of specific form such as hair curliness, or skin or eye color would be such a difficult feat of biological engineering as to relegate such control to the realm of utter impracticability. To be slightly facetious, it will always be much easier to use a curling iron than to transform the gene that codes the growth of straight hair for the hair follicles.

To conclude, we may say that the biological nature of man, as we now know it, contains no intrinsic hidden portents or insidious and unpleasant tricks. The probability for normalcy, however we may define it, is always gratifyingly high. The science of human biology will surely never be able to alter the tremendous role of chance events both in our heredity and in our environment. From conception to the grave, this is our legacy, our price of being human. If we will be men, not gods, we will do well to adjust ourselves and our attitudes to these simple facts of life which we now know so well.
THE PACE of university life, like practically everything else these days, is accelerating rapidly. The time-honored picture of the campus as a cloistered retreat from the busy world has fallen to the pressures of the population explosion, the urgent demand for trained people, the proliferation of government and foundation grants, and even an awakened thirst for knowledge. Today's university is humming with activity.

Even the summers provide no letup anymore. There was a time when summer school was a device for making up lost credits, but today it is an active, vital part of the school year. Students go to summer school now, not to catch up, but to forge ahead.

There is one time, however, when the pace slows down even though it's really just a lull before the first semester storm. By mid-August, the summer sessions are over and it's a little early for the first fall students to arrive. This is that rare time when parking lots seem empty, quadrangles silent, and buildings deserted.

Of course, the air of peace and quiet that pervades the campus during this brief interlude is a bit deceptive. There's still plenty going on; it just seems quiet in comparison with the rest of the year. Research activities go on all year around and the lights burn in the laboratories on August nights as they do in December. It's a time when busy professors can work on their books, plan their courses, and polish their lectures. The admissions people are at their busiest, preparing for the first shock wave of students. Still, while there is much going on behind the scenes, August does provide a break in the rhythm and a change of pace. The lazy days of summer may be short on a campus, but they're sweet while they last.

Photographs by Herb Weitman
A university can be regarded as a storehouse of civilization's treasures. Through the years, its role has been to guard these riches, to pass them on from generation to generation, and to add to them constantly. While this wealth is essentially in the priceless but intangible coin of ideas and values, it can take concrete form also in a university's libraries, its research tools, its architecture. The Washington University Collections, a gathering of great works of art spanning the centuries, is a highly visible, most tangible part of those great treasures.

The Collections had their beginning in 1879, when the St. Louis School of Fine Arts was founded as an affiliate of the University. Before the turn of the century, such prominent St. Louisans as Halsey Ives, Wayman Crow, and Samuel Davis had contributed the works of art which formed the nucleus of a University museum. Other citizens, many of whom have chosen to remain anonymous, have followed suit in the years since, contributing both objects from their private collections and funds for the upkeep of the University Collections and for the purchase of additional works.

Today, the University Collections number about 750 outstanding works of art, including 260 paintings, 27 sculptures, 400 drawings and engravings, and representative samples of pre-Colombian art, ceramics, and Greek vases and small sculpture.

In 1959, the Collections received a permanent home and an appropriate setting in Steinberg Hall, made possible by a gift from the Steinberg Charitable Trust. Of contemporary design, Steinberg links the Fine Arts and Architecture buildings and houses galleries, an auditorium, a library, a slide room, and classrooms and offices. A recent gift has permitted enlarging the gallery space substantially.

Since the Steinberg galleries opened in 1960, some twenty exhibitions have been held there, including important circulating exhibitions from the Museum of Modern Art, the Guggenheim, and other museums. Each year, special showings of both faculty and student art are held and every summer works from the Collections and from local private collectors are displayed.

When works from the Collections are not on display in the galleries or on loan to other museums, they circulate throughout the University and can be seen at Brookings Hall, Wohl Center, Olin Library, and the Olin medical residence. Temporary loans have been made in recent years to the Tate Gallery in London, the Boston Museum of Fine Arts, the National Gallery, and other museums throughout the world. Some paintings and numerous other art objects are on temporary loan to the St. Louis City Art Museum.

Shown on the following pages are a few representative works from the University Collections. Space and reproduction costs prohibit showing more—but these few are among the prize treasures in the storehouse.
Burial Mask, Chima (Peru) culture, A.D. 1300-1500.

Construction by Antoine Pevsner, 1926-27.
Presence by
Ibram Lassaw, 1960.

Archaeon by
Barbara Hepworth, 1960.
Bayonets Menacing a Flower,
by Alexander Calder, 1926-27.
The Resurrection
by El Greco, 1595.
The Bridge I
by Lyonel Feininger, 1913.

The Eye of Silence
by Max Ernst, 1944.
Daniel Boone Escorting a Band of Pioneers into the Western Country by George Caleb Bingham, 1851-52.

Still Life with Oysters by Georges Braque, 1937.
Still Life with Oranges
by Henri Matisse, 1899.

Captain Wincell
by Charles Ingham, 1827.

Bottle of Suze
by Pablo Picasso, 1913.

Composition
by Joan Miro, 1933.
Collection of Signs
by Paul Klee, 1924.

Portrait of Lord Grey and Lady West as Children
by William Hogarth, ca. 1740.

Saturday Night
by Willem de Kooning, 1956.
Still Life with Playing Cards
by Juan Gris, 1916.
Max Beckmann's *The King*, 1937, is one of many important works of art from the Morton D. May collection on extended loan to the University.
By ROGER SIGNOR
Office of Information

DR. RITA LEVI-MONTALCINI IS A professor of zoology at Washington University, where she teaches advanced neurology and other related graduate courses. She is also an active research scientist who divides her time between the University's laboratories and the Italian National Institute in Rome.

With her colleague Dr. Stanley Cohen, she has made one of the most significant discoveries in recent neurological research: the isolation of a protein particle with the ability to produce dramatic growth in sympathetic nerve cells. This substance, known as the nerve growth factor, or "NGF," has opened whole new areas of research throughout the world. In fact, so many biological and clinical experiments have resulted from this discovery that a large pharmaceutical firm is now preparing NGF on a commercial basis.

This nerve growth factor does what its name implies: it increases the size of sympathetic nerve cells which control constriction of blood vessels, gland secretion, heart beat, and other involuntary visceral functions. No other substance is known to evoke such a specific and profound growth effect on cells of any type. In fact, NGF plays a role in the life of the sympathetic nerve cells which has no parallel in such other growth regulators as nutrients, vitamins, or hormones.

When introduced into newborn mice and chickens, NGF seeks out the sympathetic system and causes nerve cell agglomerates, called ganglia, to grow from four to six times their normal size. It also brings about a considerable increase in the size of adult nerve cells, but does not increase their number. The exceptional growth occurs after the basic formation, or differentiation, of the sympathetic system has begun.

The magnitude of the reaction, coupled with other observations, shows that NGF is basic to the life processes of the sympathetic nerve cells of higher vertebrates. A broader role has been indicated with the detection of NGF in man and a variety of mammals. Of even greater interest are biological implications raised by recent evidence that NGF may be one of several protein growth factors which might produce a selective growth effect on a number of cell types. The possibility that other growth factors might have the same potent growth-producing effects as NGF stimulates the imagination of both scientists and laymen.

A prominent researcher became so enthusiastic over these profound implications that he asked Dr. Levi-Montalcini: "Do you realize what you may have started here?"

She admitted that speculation could be rather awesome, but reiterated that multiple-growth factors are still a "working hypothesis," and the search for new factors will be exceedingly complex.

Dr. Levi-Montalcini's cautious scientific approach veils a rich imagination. Her appearance—petite features and softly expressive eyes—disguises her strong determination and energy. She will not give up until she has examined a hunch thoroughly and she refuses to be distracted when once absorbed in a line of research or in guiding a student through a complex experiment.

In her native Italy during the late 1930's Dr. Levi-Montalcini was confronted with vicious political action which easily could have discouraged other less determined individuals. She had received her medical degree and graduate training in medicine and neuropsychiatry at the University of Turin when the Fascist party of Italy became closely associated with the Nazi regime. Mussolini issued racial decrees which prevented those of Jewish back-
ground from practicing medicine and made it impossible for them to be associated with universities. She changed from clinical to basic neurological research, setting up laboratory equipment in her room at home, keeping up her scientific reading, and becoming more and more interested in pure research. Following the liberation of Italy by the Allied forces, she served as a physician with the U. S. Army in Florence, but soon began to devote full time to research at the University of Turin.

After the war, Dr. Viktor Hamburger, chairman of Washington University's Zoology Department, read reports of her experiments. In 1947, he invited her to join the University as a research associate. Eleven years later, she was appointed a full professor.

After arriving at the University, her imagination again provided the spark which led to the exciting search for NGF. "This whole project is similar to a detective story. We've been able to follow up important leads in other fields and we've had our share of good luck to speed up our work," Dr. Levi-Montalcini states.

The initial search for NGF began with a subtle lead. Dr. Levi-Montalcini had been doing general neurological research when she read a report, published in 1948 by Dr. Elmer M. Bueker, a former student at Washington University and now professor of anatomy at the New York University School of Dentistry. Dr. Bueker was interested in studying the effect of rapidly expanding tissue on sensory and motor nerve cells. He had transplanted a fragment of the malignant tumor mouse sarcoma in chick embryos. In his paper, Dr. Bueker reported that the transplant resulted in enlargement of adjacent sensory ganglia. His explanation was that the growth was due to the fact that the expanding tumor provided a larger peripheral field for the growing nerve fibres.

Dr. Levi-Montalcini did not accept this conclusion. On the surface, the author's explanation of the unexpected growth seemed to fit neatly within a logical framework based on past experiments. Dr. Levi-Montalcini's training in embryology and neurology helped her understand the more subtle implications of the experiment; her imagination spurred her to conduct a re-investigation.

She devised a detailed series of tests in which she implanted mouse sarcoma into chick embryos. The tumor tissue was placed in direct contact with the embryonic tissue. At varying intervals of days after the tumor implantation, sections of embryonic tissues and tumor were observed under the microscope. The results were startling. The sympathetic nerve ganglia had grown as much as six times normal size. Viscera, which are not normally innervated until the end of the incubation period, were massively invaded by sympathetic nerve fibres.

Now that the effect of the tumor had been carefully explored and found to be of an exceptional magnitude, she placed the sarcoma tissue on an outer membrane of the fertilized egg and obtained the same result. "Since the tumor and the embryo tissues were not in direct contact, but merely shared a common circulation, we decided that a growth factor was being released by the tumor cells," she concluded.

To verify these findings further, Dr. Levi-Montalcini developed a tissue culture technique which obviated the relatively slow method of implanting tumor tissue into living chick embryos. In the new method, a tumor fragment and nerve ganglion were placed in close proximity in a cultural medium of chicken plasma and embryonic fluid; this yielded the same dramatic outgrowth of nerve fibres from the ganglion. This technique is now virtually a standard method for testing tissue for growth factors in experiments being conducted in various laboratories.

After the tissue culture technique was perfected, the NGF was extracted from the tumors and Dr. Cohen conducted the detailed analysis which identified the substance as a protein particle. The presence and identity of the factor had now been established by Dr. Levi-Montalcini and Dr. Cohen. Although a tremendously important achievement, much analysis and searching remained to determine the broader significance of such a discovery.

An amazing piece of luck then provided the researchers with a second and altogether different source of NGF. Dr. Cohen decided to make use of snake venom in experiments to purify the growth factor in the mouse sarcoma further. He had no way of knowing what remarkable findings would result from this rather routine selection. He added a minute amount of the venom to the tissue culture medium. Instead of neutralizing the growth effect as he had expected, the addition of venom resulted in a sharp increase of nerve fibre outgrowth. Dr. Cohen and Dr. Levi-Montalcini analyzed the snake venom gland and found it to be a potent source of NGF.

This bit of serendipity led to a third source of NGF through normal channels of deduction: The snake gland and mouse salivary gland are homologous; also, mouse tissue had exhibited a mild nerve growth effect in previous tests. Accordingly, Dr. Cohen tested the salivary glands of male, adult mice and found that they were an even greater source of NGF than the venom glands or mouse sarcoma.

This led to tests of other animal salivary glands, but no
significant concentrations of NGF were detected. Subsequent investigation of different tissues did reveal the important fact, however, that NGF is present in a large number of embryonic and adult tissues of all species, and in the blood serum of mammals, including man. Human ganglia taken from abortive embryos react to the NGF in the same way as the ganglia of chick embryos or other vertebrates. Additional proof of the importance of NGF in animal organisms was established with the development of an antiserum or "anti-protein" to NGF.

Dr. Cohen produced the antiserum by injecting NGF into rabbits. When this "anti-protein" was injected into newborn mice, from 95 to 97 per cent of the sympathetic nerve cells immediately disintegrated and disappeared. This effect gave strong supportive evidence to the primary role played by NGF in the development and maintenance of the sympathetic system. The antiserum also made it possible to raise laboratory animals without sympathetic nervous systems. Since the antiserum did not affect any other organs, the animals appear to be normal in all other respects. Hundreds of these animals have been raised to an adult age at Washington University and other universities for research on the function of the sympathetic nervous system. The possibility of a clinical application in the near future cannot be ruled out as overaction of the sympathetic nervous system is thought to play a role in hypertension and other ailments in man.

The functional significance of NGF, says Dr. Levi-Montalcini, "in the growth and developmental processes of the sympathetic nerve cells can hardly be questioned. We have evidence that in the mouse the sympathetic cells remain receptive to NGF throughout life and it is conceivable—but still not proved—that this applies also to the same cells in other mammals."

So far the origin of NGF has not been determined. Dr. Levi-Montalcini states that various pieces of evidence indicate that the mouse and snake glands may be only storage systems for NGF. As pointed out, the snake venom glands and mouse salivary glands contained large amounts of NGF, but the factor was not detected in the salivary glands of other species. Finding the primary source of NGF would be a breakthrough in the research project. It might also provide new leads in the search for additional growth factors.

The latter possibility is a fascinating hypothesis. New evidence in support of the existence of a family of protein growth factors was advanced a year ago by Dr. Cohen, who isolated another protein particle in the mouse salivary gland. It has been established that the protein evokes striking growth in skin cells when it is supplied to growing or adult mice. If further growth factors are to be found, it is conceivable that they might produce selective and dramatic growth for different cell lines forming the central nervous system, which includes the brain, or for the heart, lungs, kidneys, or other organs.

The excitingly broadened and intense search by Dr. Levi-Montalcini and her associates is continuing in Rome, where she has a laboratory in the Italian National Institute under joint sponsorship of the Italian government and the U. S. National Institutes of Health. By working in Rome from July to January each year, Dr. Levi-Montalcini can be close to her family and at the same time collaborate with Italian and American scientists who are interested in the same research problem. Although Dr. Cohen left Washington University in 1959 to accept a position at Vanderbilt University, he joined Dr. Levi-Montalcini at the Rome laboratory this summer. They were reunited with another former Washington University associate, Dr. Pietro Angeletti, an Italian physician and biologist who is co-director of the laboratory.

While in Italy, Dr. Levi-Montalcini is also reunited with her twin sister, Paola, who has achieved wide recognition in that country for putting her imagination to work in a field unrelated to science. Paola Levi-Montalcini has created many richly imaginative abstract oil paintings. "Possibly, she is the best woman artist in Italy," proudly announces Dr. Levi-Montalcini, who owns several of Paola's works, which are prominently displayed in her apartment in St. Louis.

Dr. Levi-Montalcini can always be counted on to avoid discussing herself; she continually praises the abilities of her sister or respected colleagues such as Dr. Cohen and Dr. Angeletti. Last spring, however, she had to step into the limelight to accept a singular distinction. She was chosen as the first woman scientist to receive the highly regarded Max Weinstein Award, given by the United Cerebral Palsy Association for outstanding contributions in neurological research. The award carried with it a sizeable monetary prize which Dr. Levi-Montalcini gave to a charitable cause. The awards committee cited Dr. Levi-Montalcini for her "most imaginative studies in neuro-embryology, in which she was able specifically and selectively to grow parts of the nervous system. . . ."

It was apparent to the committee that aside from the many scientific skills involved in the NGF research, imagination was a key force in Dr. Levi-Montalcini's work. It is a factor that may well lead to greater discoveries.
Beginning

on the next page

is a
two-part story

about a couple of guys

named Charley...
Charley James on the job: The Washington University alumnus, graduate student, and electronics instructor uncorks a throw from left field.

Charley James at home: Early reporting time for night games pushes the James's dinner hour back to mid-afternoon. From left: Charley, Jo, Sammy, and Shari.
In the early eighteenth century, a Swiss physicist named Daniel Bernoulli formulated a theorem that beginning physics students have had to memorize ever since. Among other things, Bernoulli’s Principle predicts that a moving object will curve in direct proportion to its speed and the direction of its rotation.

Charley James, a Washington University alumnus who divides his time these days teaching, working on a master’s degree in electrical engineering, and playing the outfield for the St. Louis Cardinals, learned all about Bernoulli’s Principle as an undergraduate. However, it wasn’t until he came up against major league pitching that he fully realized what old Bernoulli had been talking about.

James witnessed an impressive demonstration of Bernoulli’s Principle one day last summer at Busch Stadium, home field of the Cardinals. Giving the demonstration was Juan Marichal, star righthander of the San Francisco Giants. The Cardinals and the Giants battled for second place on into the tenth inning that day before 32,000 fans—none of whom was thinking about Bernoulli.

When Marichal unleashed his hundred-mile-an-hour fastball, the natural backspin caused it to trace an upward trajectory. In the vernacular of the dugout, it “jumped.” The righthander was also throwing a “curveball,” which spins away from a righthanded batter, and a “slider,” which spins away on a flatter plane. By the end of the ninth inning, James had failed to get a hit in four times at bat, and most of the other Cardinals were having trouble, too. Bernoulli would have been proud of Marichal.

Then, happily, in the tenth inning, the Giants replaced Marichal with a lefthander, Billy Pierce. The last time James faced Pierce, the lefthander had tried to get him to swing at a bad pitch or two outside the strike zone and then had come in with a curveball. Both times Pierce tried it, James hit a home run. Obviously, Pierce wasn’t going to keep up that pattern forever. “This time, when he has to put the ball over,” James decided, “he’ll probably throw the slider.”

As expected, Pierce’s first two pitches were bad. James got set for the slider and when it came lined it into centerfield. The next batter bunted him to second base, and then Cardinal Manager Johnnie Keane called on a lefthanded pinch-hitter, Stan “The Man” Musial.

Musial had already planned his strategy against Pierce. Deciding to forsake power for finesse, he would play the waiting game, too, and if Pierce got a breaking pitch near the strike zone, he would try to poke it into left field as it curved away from him. The wait was brief. Pierce’s first pitch was the slider Stan wanted. He hit it into left field, James scored, and the Cardinals won.

Afterwards, commenting on this battle of wits, James remarked, “Major league baseball is much more complex than people realize. The pitchers know exactly what they are going to do with each pitch. They all develop several breaking pitches and can get them over the plate. What’s worse is the way they’ve learned to confuse the hitters. Musial has said that this is the secret to successful major league pitching today. The secret of hitting is being able to make educated guesses.”

When he was a boy James didn’t guess. When he first started playing sandlot baseball in the St. Louis suburb of Webster Groves, he decided once and for all he would become a major leaguer. Later on, his father, a radio-television repairman, interested him in electronics. In high school, Charley excelled in both baseball and mathematics; so, he prepared himself for two careers.

Today, he is pursuing both of them. During the winter semester, he instructs a laboratory course and works toward his master’s degree in engineering at Washington University, where he earned his bachelor’s degree last year. In spring and summer, he plays for the Cardinals.

For the present, it is to James’s financial benefit to concentrate on his career in the major leagues. The salary is considerably higher than he could command in industry, and “fringe” benefits such as pension plans and hospitalization insurance are on a par with progressive business firms. By attending Washington University during the winter, he hopes to fulfill requirements for his master’s degree in about four years. “Playing with the Cardinals enables me to support my family and continue my education. Besides, I like to play,” James says.

In St. Louis, a typical work day with the Cardinals begins at 5 p.m. because most of the games are played at night. As the team must report for practice about three hours ahead of game time, the James family sits down for dinner at 3:30 p.m. The conversation rarely concerns baseball, although James’s wife, Jo, is a knowledgeable fan. At the center of attention are two-year-old Sammy James and four-year-old Shari James, who eat only a snack at the 3:30 meal and make the most of their father being at home. James seldom gets to tell them bedtime stories since the night games aren’t over until around 11 o’clock.

Mrs. James has watched her husband work his way to the major leagues from the time he broke into the lineup with “Frailey’s Gang,” a little league team in Webster Groves. Then she watched him make good with the American Legion team, Webster Groves High School, the Missouri University Tigers, for whom he played two years, and three minor league teams owned by the Cardinals in Houston, Rochester, and Charleston. In mid-summer, 1960, while playing for Charleston, James received the phone call he had been waiting for since his Frailey’s Gang days. He was called up to the Cardinals.

James didn’t expect to break into the starting lineup on his first day in the big leagues. Following batting practice that first wonderful day, however, James couldn’t resist a sidelong glance at the lineup card on which the manager was jotting down the starting players’ names. His heart picked up several beats when he saw his name as the first batter in the lineup. Hardly believing his eyes, James took his glove and ran toward left field. He stopped short just past third base. There was already a man in left field—a guy named Stan Musial.

“Where are you going, Charley?” asked the Cardinals’ ace third baseman and captain, Ken Boyer. James ardently
During the past season with the Cardinals, James alternated with Stan Musial in left field, also played right field on occasion.

Against the San Francisco Giants in Busch Stadium, James lines a Billy Pierce slider to center field for a base hit.
wished that there were an underground passage back to the dugout. A few long moments later he retreated to the bench to discover that the manager's hurried scrawl had actually designated the second baseman, "Javier," not James, as the first man up. James settled back and prepared himself for the normal briefing period.

James began his Cardinal career as understudy to Musial, who had won the title "The Man" through his aggressive and awesome assault on National League pitchers since 1941, when James was three years old. But there is a broader implication to the nickname. Musial is known as a gentleman who is given to helping his teammates. Early in the season, James was in a hitting slump and was trying to find out why. When batting practice was over, Musial went over to him. "I noticed that you're swinging slightly up at the ball. Maybe you should try taking a more level cut," he advised. James did just that, and the slump was ended.

"Batting slumps are depressing, particularly towards the end of the season," James commented. "The mental fatigue contributes more to a slump than the physical weariness. If you let it get the best of you, you'll never pull out. I try to remember that even the greatest hitters fail to get a hit in two out of every three times at bat. If you keep trying, you'll correct your mistakes and get your share of base hits eventually."

Another member of the St. Louis Cardinals and alumnus of Washington University, Dal Maxwill, must be philosophical most of the time. This isn't because he's in a batting slump—he hasn't had an opportunity to start one. As utility infielder behind perhaps the best Cardinal infield in history, Maxwill has played in very few games. Maxwill was the regular shortstop from 1957 to 1960 with the Washington University Bears. After taking his bachelor of science degree in electrical engineering, as did James, he also played for three minor league teams in the Cardinal farm system. Maxwill joined the Cardinals in the summer of 1962 and that fall also began work toward a master's degree at Washington University.

James points out that Pitcher Ron Taylor is also an electrical engineering graduate and that, all told, the Cardinals have ten college men on the team. That's a far cry from the old Gas House Gang era.

While old timers are fond of claiming that today's more sophisticated player doesn't have the spirit the old ballplayers showed, the 1963 Cardinals have earned a reputation as a hustling team and James quotes Manager Keane as saying that he has never seen anyone on his squad loafing.

James had a good year this past season, hitting .268 despite a virus attack in September that cut into his average. The team led the majors in hitting with a lusty .271 average against the best pitching seen for many a year. Five National League pitchers were twenty game winners, but unfortunately none of them were Cardinals.

Charley James arrived on campus in time for his classes this fall, but he easily could have had to miss the first week to play in the World Series if the Cardinal pitchers had been more successful in applying Bernoulli's Principle.

Being besieged by autograph seekers is one of the occupational hazards of a ballplayer's life.
\[ \beta = \left( \frac{2n+1}{3n+1} \right)^{\frac{1}{2}} - 1 + \int_0^1 \frac{1}{\left(1 + \gamma^2 \right)^{\frac{1}{2}}} \, d\gamma \]

\[ \beta = \left( \frac{2n+1}{3n+1} \right)^{\frac{1}{2}} - 1 + \left(1 + \gamma^2 \right)^{\frac{1}{2}} \]

If \( t \gg t_0 \) then \( \gamma_0 = \frac{t}{t_0} \)

\[ \beta = \left( \frac{2n+1}{3n+1} \right)^{\frac{1}{2}} - 1 + \left[1 + \left( \frac{2}{3} \right) \left( \frac{2}{3} \right) \right]^{\frac{1}{2}} \]
LIKE HIS FELLOW ALUMNUS Charley James, Charley Johnson is combining a career in professional sports with graduate training in engineering. But in Johnson's case the sport is football and the engineering chemical.

The contrast between the two ways of life seems even more marked in Johnson's case than in James's. Chemical engineering is a field where the language is esoteric and the mathematics higher, in vivid contrast to pro football where, some people say, the language is crude and the highest mathematical ability called for is the ability to count to eleven.

The 24-year-old Charley Johnson seems to span this chasm quite comfortably. He received an M.S. degree from Washington University last year and is now a Ph.D. candidate doing research in polymer plastics. As far as football goes, Charley is an equally bright young man—a third-year quarterback with the St. Louis Football Cardinals who set team records in passing a year ago and is being counted on to lead the Big Red into contention this season.

While chemical engineering is a difficult field, there's nothing simple about today's professional football either. As a typical pro team, the Cardinals use about 100 different plays, plus variations.

The quarterback must know all his team's plays and every man's part in them. It's his job to study films of the opposition, confer with the coaches to determine which plays are most likely to succeed, and then to remember them. His job is further complicated by the fact that there's another team across the line of scrimmage. Charley may call a play, then come out of the huddle and discover that the defense is prepared for just that play. He then has about fifteen seconds to figure out which alternate play has the best chance against the new defense, and to call the signal for it at the line of scrimmage.

Once he's called the play, the quarterback has to take the ball from center, and if he has called a passing play, drop back to take advantage of his blockers, avoid the rush of four or five 250-pound enemy linemen, and throw the ball to one of his receivers.

"I try not to think about those guys rushing me," Charley says, "and usually I don't. I'm conscious only of the pattern that the receiver is running and when I must release the ball to make sure he gets it."

Born in Big Spring, Texas, Johnson was an outstanding high school football and basketball player, but was offered no scholarships. So he enrolled at Schreiner Institute, a junior college, and the school gave up football a year later. "I'm not sure whether it was because of me or in spite of me," Charley says.

After his second year, he was offered a basketball scholarship at New Mexico State University and headed west. Once there, however, he concentrated on football. At New Mexico, Charley won Border Conference honors, was high in the nation in yards gained, played varsity golf, and was drafted by the Cardinals in 1960.

Charley joined the Big Red in 1961 and saw almost no action, playing behind the veterans Sam Etcheverry and Ralph Guglielmi. He stepped into a starting role in the fifth game of the 1962 campaign and has been the No. 1 quarterback ever since. In his ten games as a starter last year, he completed 150 passes for 2440 yards, both Cardinal records.

Despite his leap into the headlines, the blond youngster remains quiet and unassuming. To his neighbors in his modest apartment in suburban Clayton, where he lives with his wife and young son, he describes himself as "a graduate student at Washington University." Charley is serious about his studies and hopes to gain his Ph.D. degree in two years and to go into research or teaching when his football days are over.

Charley really has few worries about getting his Ph.D. After all, he's one of the best passers in the nation.
The quarterback's job in professional football requires brains and brawn. Above, Charley Johnson studies his team's plays; at right, he carries the ball.
Nearly a year ago, when three proposed "states' rights" amendments to the U. S. Constitution began to be approved by state legislators with almost no public notice, Arthur J. Freund, a distinguished law alumnus of Washington University, began a single-handed struggle to alert the public to what he considers "the most serious attack upon our system of constitutional government in our history."

Last month the Bar Association of St. Louis, Senator Paul Douglas of Illinois, and a group of Washington University law alumni paid separate tributes to the St. Louis attorney for his role in bringing the proposed amendments to the attention of public officials, leaders of the bar, newspaper editors, and the public. Arthur Freund's professional competence and civic leadership have been recognized often; he received the St. Louis Award for extraordinary public service in 1937 and the Washington University alumni distinguished service citation in 1955.
There are three proposals before the American people which would destroy the essential form of our government as we have known it since the adoption of our Constitution. These are three proposed amendments to the federal Constitution which, with almost no public notice, have received the approval of many state legislatures. During the crucial period of consideration by state legislatures from December, 1962, to mid-spring, 1963, the proposals were largely unheeded in the news columns of our press—both the daily newspapers and the weekly news magazines—and were wholly without notice or debate in the halls of Congress or in any public forum. The proposals constitute the most serious attack upon our system of constitutional government in our history and their danger presently persists.

Sponsor of the proposed amendments is the Council of State Governments. At its meeting in Chicago in December, 1962, the Council approved resolutions for passage by state legislatures to have Congress call a convention to receive these three proposed amendments to the United States Constitution:

1. A resolution to amend Article V of the Constitution (the amending Article) so as to allow the proposal of amendments to the Constitution upon resolutions by two-thirds of the state legislatures, to be thereafter ratified by three-fourths of the states without action by Congress or by a national convention;

2. An amendment to eliminate federal judicial authority over the apportionment of state legislatures and to eliminate any substantive federal guarantees affecting this subject;

3. An amendment to establish a "Court of the Union," composed of the chief justices of each of the states with the authority to reverse decisions of the Supreme Court of the United States in matters relating to the rights reserved to the states under the Constitution.

In view of the far-reaching effects of these proposals and the profound changes they would create in our form of government, they have received alarming state legislative acceptance throughout the country.

Twelve states have approved the first proposal: Arkansas, Florida, Idaho, Illinois, Kansas, Missouri, New Hampshire, Oklahoma, South Carolina, South Dakota, Texas, and Wyoming. One house has given approval in Maryland, Mississippi, New Jersey (later rescinded), Oregon, and Wisconsin.

Fourteen states have approved the second: Arkansas, Idaho, Kansas, Missouri, Montana, Nebraska (later vetoed by the Governor), Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Washington, and Wyoming.

One house has given approval in Colorado, Illinois, Mississippi, New Jersey (later rescinded), New Mexico, and Oregon. Four states have given approval to the third proposal: Alabama, Arkansas, Florida, and Wyoming. In four other states one house has voted approval, namely, Mississippi, New Mexico, North Carolina, and Wisconsin.

Twenty-two states will have regular legislative sessions in 1964, and it is possible that special sessions will be called in other states.

The proposals have been characterized by Professor Charles L. Black, Jr., of Yale Law School, as "radical in the extreme." He points out that they aim not at the preservation but at the subversion of that balance in federal-state relations which has enabled us to escape "the evils of despotism and totalitarianism." In the words of Professor Black:

"They [the proposals] negate one of the best authenticated master-principles of our American political being, the principle that we are a unified nation. . . . They constitute collectively, one more attempt, so late in the day, at converting the United States into a confederation."

The absence of general public debate has been as shocking as it has been surprising. The lack of public knowledge on what forces are behind these proposals, the extent and character of the organizations which produced them for the Council of State Governments, the nature and sources of the financial and political sponsorship which have given them such great strength before so many of our state legislatures are unknown.

Under Article V of our Constitution, an amendment is for all practical purposes proposed by a two-thirds vote on a resolution of both houses of Congress, thereafter to be submitted to the states for ratification. If ratified by three-fourths of the states, the amendment becomes effective. Under the first proposal of the Council of State Governments, the present method of proposing amendments to the Constitution by Congressional action would be retained, but an alternative power of amendment would be vested in the state legislatures to the exclusion of Congress. It is proposed that two-thirds of the state legislatures by identical resolutions could present any amendment to the Constitution and that when this initial step had been taken, the proposed constitutional amendment would be submitted back to the state legislatures for ratification. If three-fourths of the state legislatures thereafter ratified, the Constitution would be amended.

Under this system, thirty-four of the state legislatures could propose and thirty-eight dispose, so that the legislatures of only four additional states would be required to
act favorably once the proposal had received the sponsorship of two-thirds of the state legislatures.

The danger of this proposal is obvious, as the consideration that state legislatures give to their actions is never one on a national level. The entire sum of discussions by fifty state legislatures does not arise to the point of nationwide knowledge or deliberation. There could be no more striking example of the validity of this view than what has occurred with the proposals here discussed, where not only has there been a lack of general public understanding on this subject but an equally shocking ignorance of citizens even in states where their own legislatures have proposed and adopted one or more of the measures.

This proposal opens the flood gates to those who would eliminate desegregation in the public schools and other public facilities; to those who would pack the Supreme Court or provide different methods for selection of federal judges; to those who would abolish the federal graduated income tax, or social security taxes, or aid to programs relating to health and welfare; to those who would grant federal aid to religious education or deny such aid to any education whatever; to those who would prohibit United States participation in the United Nations. The possibilities for special groups to work quietly and beneath the surface for any fundamental change are without limitation, even including a change that would require the office of President to be occupied by a triumvirate or a committee. As bizarre as these doleful speculations may appear, it is implicit that should the bow of this first proposal be placed within the effective hands of the state legislatures, the first shafts from a taut string will be aimed at the Supreme Court, the Commerce Clause of the Constitution, the Due Process and Equal Protection Clauses of the Fourteenth Amendment, and the blessings of liberty protected and entrenched in the Bill of Rights.

If this proposal were to become a part of our Constitution, changes could be effected by a small minority of our citizens, for the smallest thirty-eight states include less than 40 per cent of our national population. Within those states, 40 per cent of the population elect a majority of the most representative branch of the legislatures; therefore, only 16 per cent of our national population would be able to effect a change in the type of our constitutional structure and the content of our civil liberties.

The second proposal would eradicate the doctrine of Baker v. Carr, (369 U. S. 186), the now famous legislative apportionment case decided by the Supreme Court in 1962. This proposal would amend the Constitution to provide that no provision therein shall restrict or limit any state in its legislature, and would further provide that the federal judicial power shall not extend to any subject matter relating to apportionment of representation in any state legislature.

For the most part malapportionment of state legislatures is the rule. In Baker v. Carr the Court held that the federal district courts have jurisdiction of suits by qualified voters to redress alleged deprivation of their federal constitutional rights arising from malapportionment of seats in the state legislature, on the ground that such voters are thereby denied equal protection of the laws guaranteed by the Fourteenth Amendment. It held in effect that voters' rights in this respect should be of equal weight on the principle of one voter, one vote.

The proposed amendment is designed boldly as a legal sanction for states to use legislative apportionment as a means for any type of rank discrimination to determine the composition of state legislatures. It would permit a state legislature to favor or discriminate against specific geographical areas of the state, rural or urban depending upon the legislative mood at any given time, for whatever motive it may have. Not only would the federal courts be deprived of any judicial voice in such circumstances but the voice of the state courts would be equally silenced in such matters on federal constitutional grounds. The adoption of this proposal would not only solidify the extreme abuses now prevailing; it would make it unlikely that such abuses would be corrected, and it would be a powerful impetus to initiate even more glaring discriminations.

Curiously, the proposal does not touch upon the malapportionment of congressional districts, although the determination of the districts of the members of the lower house of Congress is controlled by the state legislature of each state.

This proposal, if adopted, would constitute the first diminution in our American history of any federal constitutional guarantee of liberty, justice, or equality. It would remove from any federal control, and from state control based upon federal constitutional principles, that abuse of power in state government which is most likely to be self-perpetuating, since its correction, absent judicial control, must come from the members of state legislatures who profit by its continuance. It is a sorry contemplation that any legislator, in his greed to maintain an imbalance of legislative power, would wish to solidify that system not only for his own generation but for all generations to follow. For if this second proposal has any purpose at all, it is to retain and maintain inequality in the right of equal suffrage.

The third proposal, to establish a so-called “Court of the Union,” is a direct attempt to relegate the Supreme Court of the United States to a position far less than supreme. The proposal provides that any judgment of the Supreme Court of the United States “relating to the rights reserved to the states or to the people” by the Constitution may be reviewed by a “Court of the Union,” composed of the chief justices of the highest courts of the fifty states. Such a review would be possible any time within two years after the rendering of a Supreme Court judgment, upon demand of the legislatures of five states, no two of which share a common boundary. The issue before the Court of the Union would be whether the power exercised by the Supreme Court was one granted to the United States under the Constitution. The problems presented in the school desegregation cases, the school prayer cases, and the right to vote cases are only a few of the types of cases which would make of the Supreme Court a mere whistle stop on the way to the final terminus of the Court of the Union.
A majority of that Court, or twenty-six judges representing their states, would have the authority to reverse a Supreme Court decision of general constitutional import, and the decision of the twenty-six judges would be final and could not later be overruled by any court including the Court of the Union itself. While the jurisdiction of the Court of the Union appears to be limited, in effect it would attach to almost any Supreme Court decision interpreting a provision of the Constitution. The Supreme Court of the United States would be forever deprived of its essential vitality. The Court of the Union itself would determine what types of cases were within its jurisdiction and there would be no national tribunal to weigh that authority.

The ultimate judicial power of the United States would thereby be transferred from the Court whose members are responsible to the nation at large to a tribunal whose members would be responsible only to, and partisans for, their own individual states. The chief justices of the states now come to their position by a variety of methods; many are elected by popular vote. Many serve for terms of less than two years; many have no life tenure that would permit them to be immune from political pressures of a transient majority in their states; many are unaccustomed to viewing national problems in their total national aspects; and many are hostile by local tradition to the individual members of the Supreme Court.

It is a matter of astonishment that these proposals, characterized by Professor Paul A. Freund as constituting "the greatest threat to the existence of our Republic as we know it in our entire history," could have made their way through so many of our state legislatures without public comment and without general notice. Though these measures were introduced in so many of the state legislatures early in January of their 1963 sessions, not even the bar of our country was generally aware of their existence. To be sure, there were forceful and perceptive editorial discussions in the St. Louis Post-Dispatch, in Irving Dillard's Chicago American column, and in a few other daily newspapers, but not a single comprehensive news article on the subject appeared in the daily press until mid-April of 1963. In the meantime, twenty or more of the states (including Missouri and Illinois) had approved one or more of the proposals in one or both of the branches of their legislatures.

On April 14, the first comprehensive news article on the subject, the beginning of a series written by Anthony Lewis, appeared in The New York Times. On May 6, the Louisville Courier-Journal published an extensive article by Robert L. Riggs on the proposals and their alarming progress. This article was widely reprinted in the daily press throughout the country and appeared in the St. Louis Post-Dispatch on May 8. To the knowledge of this writer, these are the only news articles on the subject of such great national significance which have yet appeared in our general press. By early April, the Bar Association of St. Louis was the only professional body which had taken notice of the proposals and condemned them.

The pall of silence and public and professional apathy was broken in an address by Chief Justice Earl Warren at Duke University on April 27. Up to that time, no national officer in the executive branch of our national government or any member of Congress in either the Senate or the House of Representatives had expressed any view on the proposals. In his address, the Chief Justice did not argue the merits or demerits of any of the proposals, but he did point out that, if adopted, they would make profound changes in the judiciary, the relationship between the federal and state governments, and even the stability of the United States Constitution. He called attention to the adoption of the proposals by so many of the states "with little or no debate and with practically no recognition by the Bar of America." He then said:

"If proposals of this magnitude had been made in the early days of the Republic, the voices of the lawyers of that time would have been heard from one end of our land to the other. The great debate would be resounding in every legislative hall and in every place where scholars and statesmen gather. Surely the problems of America today are as great as they were in those days. Surely the Constitution should be as precious to us now as it was then. If lawyers are not to be the watchmen for the Constitution, on whom are we to rely?"

The Chief Justice repeated the substance of these remarks in an address before the American Law Institute in Washington on May 29. The Institute is composed of many leading lawyers, ranking judges of both federal and state courts, and members of the legal teaching profession, and it was a matter of surprise that within the audience there were many who had never previously heard of the proposals, even when they had received approval in their own states.

However, the wall of silence and apathy had been pierced. President John F. Kennedy expressed his disapproval of the proposals, officials in the Department of Justice were quick to follow, and many members of Congress gave them extended attention and severe condemnation. Several governors also expressed personal and official disapproval and no federal or state official of major consequence has openly expressed his support of them.

Recently, many legal scholars have written and spoken adversely of the proposals, and several bar associations have taken action against them, including the American and Missouri Bar Associations.

We must look upon these proposals for what they are: a clear reaction against recent decisions of the Supreme Court, reflecting a spirit of dissidence and localism which has not appeared since the struggles between the states before the Civil War and the antagonisms of state against state under the Articles of Confederation.

This is not the occasion to defend the Supreme Court from its detractors, but we should be constantly aware that there are many among us who, for selfish ends, would destroy the functions of the Court and the constitutional guarantees it enforces.

The three proposals to amend our Constitution strike at the most vital essentials of our liberty and our freedoms. Let us preserve our blessings of liberty and defeat each of these proposals aimed to destroy them.
TUESDAY'S CHILDREN—"All the actions and attitudes of children are graceful," the Swiss painter Henry Fuseli once declared, disposing in a phrase of the old adage that only "Tuesday's child is full of grace." This past summer Photographer Herb Weitman followed his six-year-old son to a special dancing class at the University and came up with some pictures that document Fuseli's generous statement. At the class for six to eleven-year-olds, there was none of the formality and drill normally associated with dancing school. Instead the children were exposed to basic rhythms and encouraged to express their natural grace. While some of the children were boisterous and others shy, some plump and others thin, some alert and others confused, together they prove Fuseli's point.
Selecting the works of art to include in the article about the University Collections in this issue was a difficult task. After all, the Collections number several hundred objects—all of them excellent, some superb.

When the article was first being planned last summer, the editor wrote William N. Eisendrath, Jr., curator of the Collections, at his summer home in Michigan, asking for suggestions on which works to include. It was explained that space was limited and that the selections should reflect the wide range of cultures, ages, and schools of art represented in the Collections. Mr. Eisendrath’s first list numbered 37 objects. From that base, we gradually arrived at the final list of objects to illustrate.

Many outstanding works had to be left out, but there was simply no room. More could have been included by crowding additional illustrations on to each page or by running the pictures smaller. We felt, however, that each object had to be reproduced large enough to give some idea of what the original is really like.

Bill Eisendrath, as curator of the University Collections, acts as liaison between the University and art museums, galleries, and collectors everywhere. Throughout the year, he furnishes a variety of information to alumni and other interested citizens, in and out of the University, about works of art, art dealers, collectors, collections, and the proper care of valuable art objects.

Selecting the works of art was no more difficult than choosing the few beneficiaries space permitted us to mention from among the many alumni and other University friends who have given art objects to the Collections or contributed funds for the purchase of art. In addition to the founding fathers of the Collections named in the article, William K. Bixby, James G. Yeatsman, Eliza McMillan, and Charles P. Parsons are certainly among the important donors who have put it well on its way to becoming one of the major university collections in the country. Among the truly significant additions to the Collections were the gifts in memory of Mr. and Mrs. Edward A. Faust by Leicester Busch Faust and Audrey Faust Wallace of important paintings by Rubens and Murillo.

In many ways, the gift of a work of art to a University collection is an exceptionally happy one. Not only will it be exhibited to the public, as in any other museum, but it will also be available day in and day out for study by the students and for the inspiration of future artists.

The two-thousand acre Tyson Valley tract on which Washington University plans to develop a major research center, was officially transferred to the University on October 2, in ceremonies at the Department of Health, Education, and Welfare in Washington. In a manner quite appropriate for the first day of the World Series, the deed went to Chancellor Eliot in a triple play from Robert Griffin of the General Services Administration to Secretary Anthony J. Celebrezze to Senator Stuart Symington. The Senator, who has had an enthusiastic and helpful interest in the project since its inception, made a final and formal presentation to the Chancellor.

Three days after the ceremony in Washington, it was announced that a gift of $500,000 to launch the development of the Research Center had been made to the University by the Stupp Bros. Bridge and Iron Company Foundation. Erwin P. Stupp, president of the company, has been a member of the University’s board since 1938. He and his brother, Norman J. Stupp, executive vice president of the company, received citations from Washington University as outstanding alumni in 1955.

“This is an inspiring gift,” Chancellor Eliot said in making the announcement. “The great research center that we envision can now move forward rapidly. The medical and technological research that will be carried on there will be of immense value to the nation, as well as to the St. Louis community and the Middle West.”

It is a little known fact that the editor of this magazine was doing research in the Tyson Valley area some thirty years ago. Our family used to own a summer cottage on the Meramec River adjoining what is now the site of the Washington University Research Center and we spent many happy hours in those wooded hills.

Back in those days, we carried on all sorts of important research projects in the Tyson area—on squirrels and rabbits and possum, and on tree-climbing, cliff-scaling, and cave-exploring. Our real specialty, however, was snakes—in which the area abounded. In fact, when the powder dump was being built, the construction workers ran a “snake derby,” with each crew competing to see which could bag the largest number of rattlesnakes and copperheads.

We hope they caught them all.

F.O.B.