

are believed to be outside the Milky Way.

- Indirect evidence that the background radiation pervading the cosmos from the original explosion in which the universe was formed extends to the X-ray region, supporting studies previously made with radio waves.

X-ray astronomy has progressed rapidly during the last five years and has now "come of age," Dr. Friedman believes. By 1963, two discrete sources were detected, Scorpius XR-1 and the Crab Nebula. By 1964, the list had increased to 10 sources; in 1965, to 37.

In all, some 40 sources are now known to emit X-rays. If all of them were the same distance from the solar system, the X-ray emitting quasar would be by far the most powerful emitter so far observed. It is a billion times more luminous in X-rays than the Crab Nebula, a supernova remnant in the Milky Way, and about 500 times as bright in X-rays as the intense radio galaxy, M-87.

X-rays come between ultraviolet (SN: 5/27) and gamma rays in the electromagnetic spectrum of radiation that extends from the longest radio waves through visible light to the extremely short, and very powerful, cosmic rays. Radio waves have an energy of about one-thousandth of an electron volt, while X-rays have energies of some 1,000 billion electron volts.

Even X-rays, however, differ so much in energy that those used in clinical examinations are about 1,000 times more powerful than those detected above the bulk of earth's atmosphere.

Exactly how X-rays are produced is not known, but the energy output of objects radiating in this region is so vast that existing theories are being strained to account for it. This is one reason Dr. Friedman finds X-ray as-

tronomy "so fascinating and exciting." If new discoveries of such powerful sources as quasars and X-ray objects continue at the present rate, fundamentally new theories of the generation of energy would be necessary to account for them.

Because the instrumentation on the May flight worked so well, Dr. Friedman is confident much larger arrays carried on a satellite, or even placed on the moon, would be successful in mapping the heavens in X-rays. He notes that an instrument whose collecting area was nearly 100 square feet would have a sensitivity 1,000 times better than now available, that is, it could detect sources 1,000 times weaker than now possible.

Dr. Friedman has made a proposal for such an experiment to the National Aeronautics and Space Administration, but "it is one among many" under consideration for flights following a planned manned orbiting observatory.

The observatory, called Apollo Telescope Mount, is scheduled to circle earth during the next period of maximum solar activity, expected to begin late in 1968. ATM experiments are aimed primarily at investigating solar-terrestrial relationships, especially in ultraviolet and X-ray radiation.

The proposed sky-survey equipment could be built for a few million dollars, Dr. Friedman says. This would be "a small part of using Apollo-scale hardware" for a launch and earth orbit lasting as long as four weeks, he notes.

Dr. Friedman received the President's Award for Distinguished Federal Civilian Service, the highest accorded a Government career employee, in 1964. He holds more than 50 patents, including an X-ray exposure meter credited with saving more than 50 million man hours during World War II.

before there is enough basic physiology to warrant it, has cut back on that bioengineering work. If figures tell the tale, support of heart research generally has reached a plateau, but other fields are peaking.

Within General Medical Sciences, for example, interest in biomedical engineering is skyrocketing. NIH decision-makers think it makes good sense at this time to push for greater application of sophisticated engineering knowledge to biological problems like miniature implants, medical computers and the like. This is for the good of man as well as the good of NIH, which is responding to the President's call for payoffs from basic research.

The budget Congress approves, and usually increases, is really the fifth in a series of what NIH calls "who-struck-John budgets." After taking a look at its research programs, NIH officials last year wrote a fiscal 1968 budget calling for \$1.6 billion and sent it on to Dr. William H. Stewart, Surgeon General of the parent U.S. Public Health Service. (In a move to free itself from PHS supervision—and cuts—NIH is trying to become a separate department under the Secretary of Health, Education and Welfare (SN: 5/20). Before the first of this year, the Surgeon General lopped off \$100 million—the largest slice his office has ever made in an NIH budget—and passed John along to HEW, where it was cut further, to \$1.4 billion. From there, it traveled to the President's Bureau of the Budget where it was trimmed a third time before the formal request was sent to Congress in January at \$1.2 billion.

Although the trimming and cutting is more-or-less expected, in the past Dr. Shannon could count on Congress to put back what the others had taken away—in special areas, at least. And he could often predict the amounts; Congress always came through.

This year, for the first time, NIH's bonus is likely to be zero.

NIH lost its foremost champion in the House when Representative John E. Fogarty (D-R.I.) died in January. And four of the majority members of Fogarty's Appropriations Subcommittee on Labor, Health, Education and Welfare last year were not returned to the 90th Congress. When the subcommittee met in May to look over NIH's 1968 requests, chairman Daniel J. Flood (D-Pa.) was the only Democrat remaining from the Fogarty days.

Although Flood, who professes much interest in health spending, is considered a liberal Congressman, the four new appointees are "extremely conservative," one official says. Their voting records show them less likely to support new or expanding Federal pro-

#### NIH BUDGET

### 'After all, we're at war': NIH Feels the Pinch

During the last 15 years a combination of scientific expertise and generous Congressional appropriations made the National Institutes of Health one of the world's most prestigious houses of biomedical research.

Each spring, NIH director Dr. James A. Shannon has told Congress what the nine Institutes planned for the following year, and by fall Congress has given them the money to do it—plus a little extra to speed research along. In fiscal 1966, that little extra amounted to \$100 million. Last year, NIH's bonus was \$65 million.

Although NIH's total request this year is for \$1.2 billion, it is not a lump sum; Congress deals with the appropriations Institute by Institute—each one

according to its needs or the mood of the time. Last year, for example, the National Cancer Institute got \$176 million, the Heart Institute \$165 million and the Institute of General Medical Sciences received \$145 million.

This year, Cancer is likely to go up \$7.7 million, once-favored Heart will climb \$3.2 million, while the newer General Medical Sciences will top the field with an increase of \$15.2 million, pressing hard behind the traditional big spenders.

The Heart Institute's drug-study—a three year project to find anti-heart attack pills—continues at a steady but not expanding pace. Dr. Shannon, skeptical of the wisdom of pursuing the development of a totally artificial heart

grams and reluctant to increase Federal spending. And when they turned the NIH budget out of committee, roughly as it had come in, even the President's Regional Medical Program, a popular plan to dot the country with 53 first-rate medical centers, was \$10 million poorer than it had been. The program is not advancing fast enough to spend more than \$75 million next year, they said.

The Congressmen also sliced \$3.7 million from the new environmental health sciences program in North Carolina, set up to seek cures for air pollution and other man-made threats to health. Officials speculate however, that Senator Lister Hill (D-Ala.) will put the \$3 million back as his Senate Appropriations Subcommittee meets on the budget this month.

Senator Hill, NIH's guardian angel on his side of Congress, traditionally raises the requested appropriations for research—last year by \$36 million. He is likely to move in this direction again this year, though more cautiously, NIH and Senate spokesmen predict. "Senator Hill is a practical man, money is tight because of the war, and he won't go whole hog with extra money this time," an NIH observer says. Hill will also have to justify increased spending to the House, in conference on differences between versions.

**It probably will be** September before the NIH appropriations bill passes through both houses in its final form, but chances are 99 to one that this will be the first year NIH gets just about what it asked for and no more.

"The NIH request for \$1.2 billion is an eight percent jump over last year's appropriation, and it really isn't very much," a Congressional spokesman says. "But, on the other hand, a lot of Government agencies won't get any increase this year at all, so comparatively speaking NIH is doing fine."

An NIH economist agrees. "Things aren't as bad as they seem—under the circumstances. After all, we're at war," he says.

Most biomedical research fields will have to make do without a substantial increase, but a chosen few are earmarked for stepped-up activity. NIH asks an additional \$2.5 million to study blindness, a raise of \$1.8 million to investigate drug action in humans, \$1.1 million more to study emphysema, \$2 million for cystic fibrosis research and an extra \$810,000 for family planning. The latter request, though hardly major in terms of dollars and cents, represents a bigger step in the direction of birth control research than NIH has ever taken. Until oral contraceptives became well accepted in the U.S., NIH cautiously avoided the subject.

## ADDISON'S DISEASE

# Pathologist-sleuth Reopens Kennedy Controversy

In the heat of the campaign for the Democratic Presidential nomination in the summer of 1960, supporters of the late John F. Kennedy were capitalizing on a heart attack Kennedy's chief rival, Lyndon B. Johnson of Texas, had had four years before.

**In retaliation**, Addison's disease, for the first time in history, became a political issue.

At a press conference, Johnson's aides announced what had been rumored in Washington for some time—that the adrenal insufficiency Kennedy had known about since shortly after World II was, in fact, the dread-sounding disease named for the English physician Thomas Addison, who identified

and treatment was begun in London.

In response to rumors about Addison's disease which had begun to circulate in the year before the 1960 convention, Senator Kennedy sought a medical evaluation. And in response to the campaign charges, he had ready medical testimony ruling out Addison's disease; he released medical statements to the effect that:

- The meaning of the term has changed over the years until it has come to include all grades of adrenal insufficiency.

- The prognosis, or outlook, in the disease first recognized by Addison has also changed in recent years.

Since the advent of cortisone in the 1940s, the disease has been relatively easy to manage.

Kennedy had been on a regimen of implanted desoxycorticosterone and cortisone for some years, but though he underwent periodic endocrinologic checkups and continued oral doses of other corticosteroids until his death, the specific regimen had been discontinued several years earlier.

The term Addison's disease was never officially employed in describing Kennedy's condition. He never admitted having it in any form.

And his physician, Dr. Janet Travell, never used any term other than "adrenal insufficiency."

She used it again last week, in response to a piece of medical sleuthing by a pathologist, Dr. John Nichols of the University of Kansas Medical Center, who declares, as a result of his research, "it can be strongly presumed that President John F. Kennedy had Addison's disease."

**Dr. Nichols began** with an article on page 737 of the 1955 ARCHIVES OF SURGERY by Dr. James A. Nicholas of Cornell University Medical College, and collaborators including Dr. Philip D. Wilson, who performed surgery on Kennedy's back Oct. 21, 1954.

Dr. Nicholas—a resident orthopedic surgeon on the case—had delivered a paper at the 1955 American Medical Association convention on the back surgery the 37-year-old Senator Kennedy had undergone at the Hospital for Special Surgery in New York. A lumbar spine fusion was attempted by inserting a metal plate. That attempt to correct an old back injury was unsuccessful; other, later methods worked.

**Addison's disease** offers serious, sometimes fatal complications to surgery—a reason Dr. Nicholas discussed the case in the 1955 ARCHIVES.



Kennedy: clues in the Archives

it a century earlier. And Addison's disease, though science had modified the definition and prognosis considerably in the intervening 100 years, was still being commonly described as tuberculosis of the adrenal glands, which destroyed their function and in the end led to emotional instability, nervousness and generally death.

**Addison's disease**, as now defined, is a chronic insufficiency in the production of hormones by the cortex of the adrenal gland. Its cause is unknown; the tubercular form is apparently only one of many.

Kennedy had known of an adrenal insufficiency since shortly after his discharge from the Navy. It apparently followed the extraordinary stress to which he was subjected when his torpedo boat was rammed and sunk during World War II, and a subsequent bout with malaria. It was diagnosed