goat's hearts are alive after a year and a half.

In human transplants, too, surgeons strive for as much genetic similarity between donor and recipient as possible. Blood groups must be compatible; tissue types should match closely to thwart long-term rejection.

But the art of tissue typing is less than four years old. Twelve groups of tissue antigens are known. There are probably more, and until all are identified, tissue matching tests will be somewhat inaccurate.

Assuming the value of genetic similarity, chimps and baboons stand as the most likely candidates for human use. Chimps have the lead in that they come in A and O blood groups. Baboons have A, B and AB blood types but there are no type O baboons; O's are universal donors.

But baboons are available and chimps are not. "At this point, chimps should not be used for transplants," Dr. Reemtsma warns. "They should be saved for breeding. They could be selected for blood type O and raised as universal donors."

Whenever there is talk of choosing animals for heterografts, pigs inevitably get prominent mention. "Why, I don't know," Dr. Reemtsma remarks. "I've seen no biological data showing their closeness to humans, although the size of a pig's heart approaches a man's. Perhaps it comes from Orwell's 'Animal Farm'."

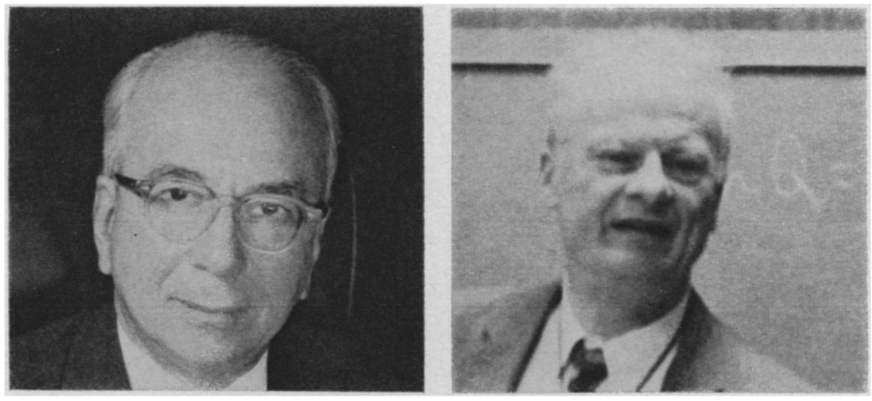
In addition to breaking the supply and demand barrier, animals offer transplanters a way out of the immunological labyrinth. Because a man's donor animal could be selected well in advance, there would be time to alter incompatible tissues. Whether it would be better to prime the animal by injecting it with the potential recipient's tissue or to do it the other way around remains unknown. Either way, it creates a possibility of tampering with the immune system that would be unethical with human donors.

In the heart arena, surgeons split on predictions of whether animal hearts or artificial hearts will dominate the future. They agree that human hearts will not and that perhaps animal hearts will always be best for children because they can grow. Dr. Barnard last week posed another imponderable. If an animal's heart is transplanted to a human, will it adopt a human's life span or will it die its natural death in a few years?

Whatever happens in heart surgery, animal organs clearly hold the key to the future of other organ transplants. The heart is essentially plumbing, a pump. But other organs produce and metabolize chemicals. No one presently envisions a man-made organ which can do that.

POLITICS

Posting the lineups



Cornell University

Strauss vs. Bethe: old tunes.

It is a lineup reminiscent of the political divisions among scientists and engineers 10 years ago and 20 years ago.

On one side are Dr. Jerome B. Wiesner, provost of the Massachusetts Institute of Technology, and Dr. Hans Bethe, Nobelist and Cornell University physicist. Wiesner helped write the nuclear test ban treaty and Bethe helped negotiate it.

On the other side are Adm. Lewis L. Strauss, who headed the Atomic Energy Commission a decade ago, in the critical years of the nuclear arms race, and Dr. Edward Teller, builder of the thermonuclear bomb.

Teller and Strauss, and "eminent academicians, distinguished engineers and non-professional administrators who have been closely associated with the relationship between science, engineering, private enterprise and the Government" announced their support of the Presidential candidacy of Richard M. Nixon several weeks ago.

Last week, as the scientific community finished choosing up sides, Bethe, Wiesner and "a founding group of 141 of the nation's most distinguished leaders in the fields of science and engineering" announced their support of Vice President Hubert H. Humphrey.

Nixon has already made an issue of the recent cutbacks in Federal support of science and technology, linking it, in a speech in Bethpage, N.Y., last week, to "the opening of a research gap" with the Soviet Union, and "the Administration's belief that a static balance of power can be maintained, based on a common 'plateau' of technological achievement. . . ."

Nixon is promising "reasonable and responsible increases in subsidies for basic research . . ." and a policy structure that would replace Washington's influence, except in defense and space, with substantial reliance on increased initiative from private enterprise.

His principal emphasis, however, is on maintaining and increasing the United States' strategic lead over the Soviet Union.

Critical of the cutback in Defense and space agency support of university research, he would put science and technology in full array against the Soviet "panoply of offensive and defensive strategic weapons, including an orbital nuclear delivery capability, ever-improving tactical military equipment, communications facilities, surface naval and merchant vessels and a large number of nuclear powered swift and quiet submarines."

Humphrey will not hold for a reduction in the Federal involvement in support of research and development. But he sees a shift in directions.

Proposing "a high priority and a strong commitment of support from the Federal Government . . . cutting back research is false economy," Humphrey, in a recent statement to the scientific community, maintained:

"Just as science has served our security and economic ends so well, it must now serve our nation's social objectives. We must expand our efforts to bring science and technology to bear on preventing and controlling crime, building new cities and making today's cities livable, improving education and health care for all Americans and managing our physical environment."

It is in terms of the research gap with the Soviet Union and the mobilization of science and technology in the service of a continued arms spiral that the hard lines are being drawn.

Harking back to ancient wars and using words like "the troglodyte or dinosaur wing of the scientific community," Wiesner declares: "Any man who would turn to Lewis Strauss for scientific guidance I don't think is the

man you want heading your country.

"We're listening to old tunes," says the leader of the Humphrey wing, and the Vice President agrees.

"We must proceed," Humphrey believes, "to negotiate a halt in the nuclear arms race in both offensive and defensive weapons. No addition of weapons, either by the Soviets or ourselves, can give either of us one iota more security. Each new weapon only brings us nearer the day when we will be unable to stop the plunge into nuclear war."

He is urging prompt ratification of the nuclear nonproliferation treaty, which Nixon forces have helped block in the Senate.

Humphrey is currently collecting papers from his science advisers on broad science policy. There is a strong possibility he will propose the establishment of a cabinet-level Department of Science to guard the interests of basic research against the inroads of the budget-cutters. Wiesner agrees with Presidential Science Adviser Donald F. Hornig (SN: 9/28, p. 309) that this may now be necessary. But he does not believe it will make the President's Office of Science and Technology any less necessary. ◇

APOLLO

Do it once, do it again

With most of its chips riding on last week's launch of the first manned shot of the Apollo lunar series, the Apollo program has moved into a fall and winter of intense activity. And if all goes according to plan, the space agency's planners find that they may have enough spacecraft and rockets left over to do the whole thing twice.

The equipment has all been paid for, but they may not be able to squeeze the operational money from an economy-minded Congress.

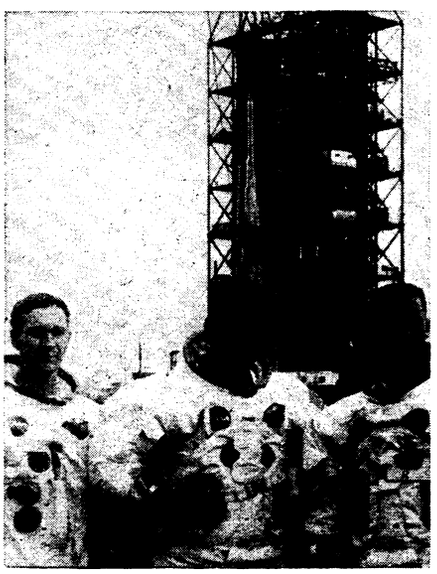
There are pieces of usable hardware scattered from Cape Kennedy to California, in various degrees of readiness, to redo Apollo 7 if necessary, or any of the shots planned to follow.

Even as the 224-foot Saturn 1B booster was fueled last week to carry Astronauts Walter Schirra, Donn Eisele and Walter Cunningham on the first U.S. manned space flight since November 1966, looming even taller on its mighty Saturn 5 rocket was the spacecraft destined to be Apollo 8, scheduled to fly perhaps 10 times around the moon in December. And on Oct. 6, only five days before Apollo 7 was due to take off, Apollo 9 arrived from its birthplace at North American Aviation in Downey, Calif. Apollo 9, planned for a flight in February or March, will give astronauts their first opportunity to fly the tricky lunar module that will later carry two of them to the lunar surface.

As the Apollo 7 astronauts underwent their final physical examinations and practice countdowns last week, engineers in Houston, Texas, and Downey were working on no fewer than 16 other spacecraft, while others in other cities assembled and tested the powerful Saturn boosters designed to push the vehicles away from earth and to the moon.

Two spacecraft were in Houston, at the NASA Manned Spaceflight Center. Both are known as block II craft, replicas of the moonbound version as opposed to the more primitive block I model used in past unmanned flights. Neither of them will ever fly; they are being used in vibration, shock and instrumentation tests.

Apollo 10, the next spacecraft due at Cape Kennedy, is now in Downey where engineers recently finished installing its instruments. Now begin the weeks of painstaking checkouts that will precede its departure for the Cape. Apollo 11, a more likely candidate for the moon flight in the event that the preceding missions are anything less than letter perfect, is close on its heels, along with Apollo 12.



NASA

Apollo's Eisele, Schirra, Cunningham.

Two more Apollos are in North American's huge clean room, being checked to see that their life-support, communications and other systems work well together; another pair in the clean room is just being completed. Four more are in various stages of manufacture; the last three spacecraft in the present Apollo program are still collections of parts and blueprints.

But if Apollo 10 or 11 successfully completes the lunar mission, what happens to the rest? "That's a good question," is the standard reply from NASA and industry officials at Cape Kennedy. The space agencies' fiscal 1969 budget is the lowest since 1963, and the number of people working on Apollo has dropped almost a third to only 220,000.

With the Apollo Applications Program already cut to pieces in Congress, at least for the time being, and with the Vietnam War still taking the lion's share of the country's loose money, there could be enough hardware left over after the initial moon landing to run the space program all over again.

The current Apollo flight is the last in the schedule to use a Saturn 1B booster, yet there are nine 1B's left, some of them still incomplete, but all paid for. If Apollo 10 goes to the moon, there will also be nine spacecraft left over, as well as nine Saturn 5 boosters.

Due largely to the poor reception given the Apollo Applications Program for earth-orbital studies, NASA officials indicate that they plan to pursue the possibility of follow-up flights to the moon. There is theoretically enough equipment around for nine such missions without investing in a single additional spacecraft or rocket.

CERN'S ACCELERATOR

Back from the depths

When the British Government announced last June that it would not at present join in building the European 300-billion-electron-volt (Gev) accelerator (SN: 7/13, p. 30), Europe's subnuclear physicists were plunged into gloom. The giant proton syncrotron had been in the study stage for years, and a final go-ahead decision was to have been made by the previous December.

But only three countries—Belgium, Austria and France—had counted themselves in. When Britain turned thumbs down because of her financial squeeze, it looked as though the whole project might die.

Already the Americans with their 200-400 Gev project at Weston, were two years ahead of Europe (SN: 8/17, p. 161).

But in the last few months, the atmosphere has changed. Europe, it seems, will have its big accelerator after all, although at the beginning it will be less powerful and versatile than originally planned.

That, at least, is the spirit and the word that emanated from the latest meeting of the governing council of CERN—the European Organization for Nuclear Research—at its headquarters at Meyrin, outside of Geneva.

Two main reasons underlie the new optimism: The submission by Italy and