they began to investigate phage lambda as an alternative vehicle, and found themselves up against difficult problems. Although only one site normally is used to insert a new gene in a vehicle, phage lambda has five sites where restriction enzymes can attack. The team was able to produce a mutant phage with only two sites, and this made it possible for them to insert a gene for tryptophan biosynthesis. The phage vehicle containing the new gene was then introduced into a strain of *E. coli* cells that lacks the ability to form tryptophan. Some of the cells began to form the amino acid, and thus the successful transfer of the gene through the phage vehicle was demonstrated.

One well-known Cambridge University molecular biologist, G. G. Brownlee, in the same issue of NATURE, calls the Murrays' work a significant development in the field of genetic engineering, and says it may help to reduce the dangers of genetic manipulation. He points out that unlike certain plasmids, phage lambda is sensitive to antibiotics and that there is also some evidence it does not infect the strains of *E. coli* that inhabit the human gut.

A member of the NAS group that urged the research moratorium, microbiologist David Baltimore of the Massachusetts Institute of Technology, approaches the finding with some caution. He told SCIENCE NEWS the Scottish team is not abridging the appeal with their experiments. "They are studying in an area which we consider too valuable to ban on the basis of the knowledge we have now." But, he says, "I do not know, and I suspect no one knows, whether or not this new technique will be safer." Baltimore is suspending judgment until scientists at the February conference in Asilomar, Calif., "can come to a collective judgment about this and other techniques." □

Alpha waves and anxiety: No link?

The alpha wave, one of the several waves produced by the brain in a conscious state, has been exciting psychiatrists, psychologists and the public in recent years. There is now widespread use of alpha feedback machines to modify the level of alpha waves in one's head. Consciously increasing alpha waves purportedly erases anxiety and leads to relaxation (SN: 11/6/71, p. 315).

Research reported in the Nov. 1 SCIENCE now challenges the value of alpha feedback training for controlling anxiety.

A number of investigators have reported that worry results in a lessening of alpha waves. And Martin T. Orne and David A. Paskewitz of the Institute of the Pennsylvania Hospital and the University of Pennsylvania have found that persons can increase their output of alpha waves by feedback. So they reasoned that if alpha waves accompany anxiety, then increasing alpha waves via feedback efforts should reduce anxiety. They set up a study to test this theory.

They selected 25 college students, measured their usual alpha wave production and taught them how to use alpha feedback machines. Twenty-two of the students were then asked whether they would be interested in returning for another alpha experiment involving harmless but painful electrical shock. Ten of the subjects agreed to return for the second session. This time they were again put in command of their alpha waves, and shock electrodes were identified and attached to the lower leg of each subject. Once the subjects had engaged in alpha feedback trials they were told that in addition to the usual alpha tone and no-alpha tone given off by their feedback machines, a third tone would also buzz if they were in danger of being shocked. And this jeopardy tone would sound only if they didn't produce enough alpha waves. So the more alpha waves they were able to produce the less likelihood they would be shocked.

The subjects were then given five feedback trials divided into shock and nonshock segments. Orne and Paskewitz expected that the subject's anxiety over participating in the shock segment would initially lessen their alpha wave production, but once the subjects learned they could escape shock by producing alpha waves, they would increase their alpha waves by feedback control. What happened was just the opposite. Neither the students' initial apprehension, nor their intense concern following shock instructions, nor even their acute fear of being shocked during the shock sessions resulted in any significant drop in alpha waves, so naturally their attempts to increase alpha waves to avoid shock didn't work either.

One might argue that these results are invalid because the subjects really weren't apprehensive. But the subjects said they were, and physiological measurements during the experiments underscored their subjective claim. "Our most striking observation," Orne told SCIENCE NEWS, "is that, contrary to previous research, alpha density is not linked with arousal of anxiety. The fact that they were not able to increase alpha through feedback doesn't really matter anymore once you recognize that alpha and anxiety are not concurrent phenomena." □

Four in a balloon: Short but sweet

For all the current attention being paid to lighter-than-air craft as future sources of transport, free ballooning (unaided by propellers or other driving forces) remains an uncertain endeavor, ever at the mercy of the fickle winds. Yet it is these same weather-linked responses, plus the lack of vibrating, polluting engines, that make the free balloon in many ways an ideal laboratory for studying the subtleties of the atmosphere. Thus, at 8:45 MST on the night of Nov. 1, a 70-foot plastic balloon carrying 150,000 cubic feet of helium gently lifted four people and more than a ton of scientific instrumentation into the air from Las Cruces Municipal Airport in New Mexico.

Known as Project da Vinci (SN: 9/21/74, p. 182), the flight had been delayed four times from its original Oct. 12 launching date—once for technical reasons and three times due to the vicissitudes of the weather. Aloft, the weather continued to leave no doubt about who was in charge, notably outrunning ground crews with winds of more than 45 miles per hour at the balloon's maximum altitude of 13,100 feet and finally blowing in an ominous thunderhead from the West. With that, safety-conscious officials chose to end the mission (formerly envisioned as lasting up to 36 hours), 11 hours 55 minutes after it began.

Yet, says Harold Ballard of the U.S. Army Electronics Command's Atmospheric Sciences Laboratory, chief ground-based scientist for the project, the flight was largely a scientific success. A longer mission would have given larger data samples, including more daylight observations, but at least 20 of the 25 experiments aboard performed exactly as planned, probing temperature, humidity, wind-shear patterns, electrical fields, atmospheric pollutants, and other phenomena.

A plan to release a score of small, helium-filled "tetroons" was abandoned when it turned out that air blowing through the 85-foot gap between the main balloon and the gondola beneath it would whip the tetroons away too fast for their assigned task of following the diffusion of atmospheric turbulence. There were problems with an infrared radiometer intended to measure the thermal brightness of objects on the ground, and a radar altimeter was muzzled when its frequency interfered with work at nearby White Sands Missile Range. Sensors to monitor the balloon's skin temperature were omitted before launch for fear that they might possibly damage the frail polyethelene fabric, and communications problems

eliminated a plan for using ground-based processing of data from the flight to direct the release of ballast.

The other experiments, however, performed just as planned, particularly including a sulfur dioxide pollution sensor sent along by Battelle Pacific Northwest Laboratories in Washington and a group of electrical field detectors provided by Johns Hopkins Applied Physics Laboratory to aid design of remotely piloted aircraft. From the ground, more than 50 radiosondes were released to further probe the atmosphere, as laser beams shone upward to locate temperature inversions.

The da Vinci team will reunite late this month to discuss the mission, while the experimenters begin months of data analysis. Then comes the big decision: whether to do it again. □

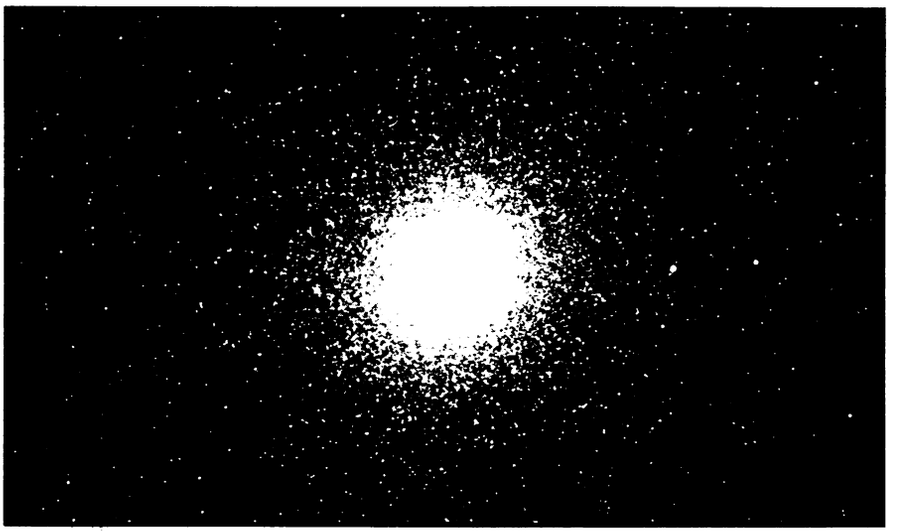
Shuffle changes U.S. energy 'team'

The great energy agency game of "musical chairs" has gone another round, with Federal Energy Administration head John C. Sawhill winding up odd-man-out. He was replaced in the FEA post last week by Andrew E. Gibson, an oil shipping firm executive, but responsibility for coordinating what President Ford calls his energy "team" goes to Secretary of Interior Rogers C. B. Morton—as chairman of a new Energy Resources Council (ERC).

Sawhill had earned the respect of many Congressmen and environmentalists as a strong advocate of energy conservation. But his independence in openly advocating such conservationist measures as a gasoline tax and mandatory restrictions eventually got him into trouble. Morton is a longtime advocate of opening vast new energy supplies—especially coal—and he disliked Sawhill's "style." Gibson is considered more of a "team player."

The shuffle also answered the questions arising out of the imminent demise of the Atomic Energy Commission (SN: 10/19/74, p. 248). AEC Chairman Dixy Lee Ray will move to the State Department in a newly created post: assistant secretary of state for oceans and international, environmental and scientific affairs. The new Energy Research and Development Administration (ERDA), which will take over control of AEC laboratories, will be headed by Robert C. Seamans, president of the National Academy of Engineering and formerly secretary of the Air Force and an official with NASA. The AEC's regulatory responsibility will pass to a new Nuclear Regulatory Commission (NRC), and Ford appointed former astronaut William A. Anders to be the first NRC chairman. □

Two big telescopes for southern skies



AURA

The brightest star cluster in the sky, 47 Tucanae, is the first object photographed by Cerro Tololo's new 158-inch telescope. The observatory sits on a mountain in northern Chile's ultra-dry desert.

The Southern Hemisphere now has two new large telescopes. The four-meter (158-inch) reflector at the Cerro Tololo Inter-American Observatory in Chile recently took its first pictures, and the 150-inch Anglo-Australian Telescope near Siding Spring, Australia, was dedicated by Prince Charles.

The new telescopes will give astronomers a view of the southern sky comparable to the one they have had of the northern sky for the last few decades. Many objects of importance to astronomers can be seen only from a southern location (the two Magellanic Clouds, the nearest galaxies to ours are just one example). The farther south the better, but there are few places to stand there. The Southern Hemisphere is mostly water. Much of the new construction is in just two countries, Australia and Chile.

Cerro Tololo Inter-American Observatory is located on the mountain of the same name, which is 40 miles inland from the coastal city of La Serena and about 250 miles north of Santiago. The site is in the northern Chilean desert region, where rain is a once-in-a-lifetime event and seeing conditions are among the best in the world. In addition to the big one there are seven smaller telescopes at Cerro Tololo, two of them on long-term loan from other institutions. Cerro Tololo is operated by the Association of Universities for Research in Astronomy, the same organization that operates the Kitt Peak National Observatory in Arizona, and is funded by the U.S. National Science Foundation, but it emphasizes that it is an All-American facility. Victor M. Blanco is director.

The Anglo-Australian Telescope brings joy to the British astronomical community, which for 60 years has seen the best new optical equipment located outside its purview, but according to an article in NATURE, the Australians are a bit touchy about the partnership, evidently fearing that the pommies will turn out to be the senior partners in the long run. The AAT will be operated in conjunction with a British Schmidt camera also at Siding Spring. The Schmidt camera will do sky surveys, and when the survey shows something interesting, the big telescope will look at it.

In both cases about a year more is required for testing and adjustment before actual research can begin. □