MIT

Vannevar Bush, in an old picture, watches his early analog computer work.

logical foresight and a persuasive managerial skill. Over a year before Pearl Harbor, he had convinced President Franklin Roosevelt of the necessity of establishing a National Research Defense Committee to help the nation's armed forces catch up with Hitler's sophisticated war machine. The committee was replaced the next year with a more permanent Office of Scientific Research and Development, which, under Bush's leadership, not only began the push to develop an atom bomb and encouraged development of radar, rocketry and the mass production of antibiotics, but for the first time brought the highest level of scientific advice directly into the White House.

At the war's end, Bush immediately began a campaign to continue Federal support of science for peacetime uses. Arguing that the vast pool of scientific expertise brought together during the war must not now be allowed to dissipate, and that the GI Bill could be used to train the next generation of scientists, Bush declared (SN: 12/22/45, p. 386): "We undoubtedly have a new stock of dammed-up ideas. It will be interesting to watch what happens as the dam breaks." The upshot of his campaign was creation of the National Science Foundation.

Though he invented the forerunner of the analog computer—a great, whirring mechanical and electronic monster with 150 motors—he was modest concerning the impact of his own ideas on the many projects he supervised. "Not a single idea of mine ever amounted to shucks," he once wrote, yet he developed the system of "mission-oriented" research that led to almost a mass production of ideas and inventions. The eventual result was "push-button warfare" (a phrase he hated), and though he was a lifelong supporter of a technologically strong military, toward the end of his life he said they were overdoing things. For his services, he received the Medal of Merit and National Medal of Science. □

Gene therapy: One step more

During 1971, a virus was used to introduce a specific gene into a mammalian cell. The gene provided genetic information that was missing in the cell —information needed to make a particular enzyme. After the gene was provided by the virus, the cell started producing the previously absent enzyme and passed the ability to do so on to succeeding generations of cells. The investigators were Carl R. Merril and John C. Petricciani of the National Institutes of Health and Mark R. Geier of George Washington University (SN: 10/23/71, p. 281).

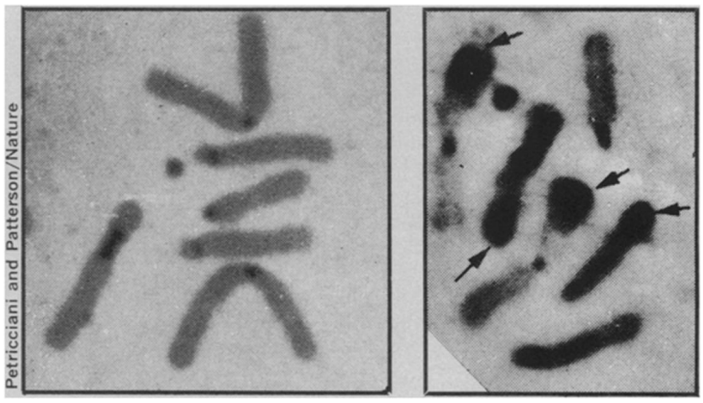
This remarkable step toward human gene therapy was closely followed by another one. Pradman K. Qasba and H. Vasken Aposhian of the University of Maryland School of Medicine showed that not only could a virus deliver missing genes (DNA) to human cells, but that the missing genes indeed ended up in the cells' nuclei (SN: 10/30/71, p. 291).

Petricciani has now found that synthetic DNA, as well as viral DNA, can be incorporated into mammalian chromosomes. This achievement is still further proof that human gene therapy is possible. Or as Petricciani puts it, "It's another little bit of evidence that if you introduce foreign genes into cells, they can interact with the normal DNA of the cells." Petricciani is now with the Food and Drug Administration. He reports the achievement along with his FDA colleague Rosalyn M. Patterson in the June 14 NATURE.

Actually Petricciani and Patterson did not do these experiments on human cells, but on cells from the Indian barking deer. A human cell has 46 chromosomes, the deer cell only seven, so that the latter is a lot easier to work with. They inoculated the deer cells with synthetic DNA, that is, with DNA whose nucleotide composition was entirely known. That way they knew exactly what genetic material they had.

They then looked at the chromosomes to see whether the synthetic DNA had been incorporated into them. Here they used a chromosome staining technique that allows scientists to distinguish the shape of each chromosome distinctly (SN: 9/25/71, p. 202). The technique showed that the synthetic DNA was indeed attached to the chromosomes.

If the deer cells can pass the synthetic DNA on to progeny cells, then, Petricciani and Patterson say, "it should be possible to use synthetic nucleic acids in gene therapy rather than viruses which carry unnecessary and often unwanted genetic information in addition to that which may be therapeutically useful." □



Petricciani and Patterson/Nature

Six normal chromosomes (left). Chromosomes with new DNA on them (arrows).