Postmortem in on Baby Fae

The newborn baby who died three weeks after receiving a baboon heart in October 1984 succumbed to a "potentially avoidable" immune response, her medical team now reports.

Although the baby died because the transplanted heart tissue died, "hyperacute rejection did not occur," Leonard L. Bailey and his colleagues at California's Loma Linda University report in the Dec. 20 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. A cross-species transplant might have worked with closer tissue matching and other changes in procedure, they say.

White blood cell recognition and attack of foreign tissue is the primary problem in human-to-human heart transplants. But in the baboon transplant, the rejection was orchestrated primarily by antibodies, the researchers report. Though they used cyclosporine, the immune suppressant is thought to work best against the white cell response.

The infant, known as Baby Fae, was born with hypoplastic left heart syndrome, a congenital heart malformation that kills most babies within a month of birth. Other options for Baby Fae were a difficult and often unsuccessful two-step surgical procedure or a human heart transplant. The researchers say that while a human heart transplant is the most desirable option, it is "impractical" in infants. Nevertheless, last month Bailey transplanted a human heart to a 4-day-old boy. At press time the boy was off life-support systems and healthy, according to a university spokesperson.

Baby Fae's transplant was not only cross-species, it was cross-blood-type. Baby Fae was type O, which is rare in baboons. Bailey used a heart from an AB baboon selected because of other typing matches and minimal reaction between the baboon's blood and the baby's in culture.

Kidneys, livers and hearts from chimps and baboons have been implanted in humans before, but with little success. The Loma Linda operation (SN: 11/3/84, p. 276; 11/24/84, p. 325) was the first cross-species heart transplant done since the advent of cyclosporine.

The supposition made by the Loma Linda team that a relatively immature immune system would mount less of a rejection response was "wishful thinking," Olga Jonasson of the University of Illinois in Chicago and Mark A. Hardy of Columbia University in New York City claim in an accompanying editorial. But, they say, Bailey has demonstrated that a cross-species heart transplant is technically feasible, and that such a transplant might provide a "bridge" until a human heart is available. — *J. Silberner*

House passes tough Superfund bill

The House on Dec. 10 approved a Superfund extension that calls for $10 billion to be spent on cleaning up toxic-waste dumps over the next five years. This bill, however, is in many ways much tougher than the version passed by the Senate earlier this year. Resolving the differences may take weeks of negotiations between the House and Senate next year. Until then, the Environmental Protection Agency (EPA) has no authority to collect a tax from the petrochemical industry to fund cleanups. The original Superfund law expired at the end of September (SN: 10/5/85, p. 215).

During the final days of the House debate, the biggest battle was over how the cleanup program should be financed. A plan to create a tax that would affect almost all manufacturers was defeated in a close vote. Instead, the oil and chemical industries face a sharply increased tax on crude oil and chemical feedstocks to pay for the program.

The bill that finally emerged from the House was a victory for a coalition of environmentalist groups, including the Sierra Club and the National Audubon Society, which had made reauthorization of Superfund the focus of a major lobbying effort. The groups helped push through a stronger bill than the House's energy and commerce committee had first proposed.

The final House bill would tighten standards and set more strict schedules to ensure faster cleanups. In the program's first five years, EPA lists only six out of hundreds of toxic-waste dumps as being completely cleaned up. The bill also requires extensive reporting of chemical emissions that seriously endanger human health.

The House rejected a controversial amendment that would have allowed victims exposed to hazardous waste to sue for damages in federal court. Nevertheless, the bill does allow citizens to sue EPA to force it to clean up a particular toxic-waste site.

Now environmentalists are urging the Senate to accept the House provisions when they confer to resolve differences. Originally, the Senate approved a $7.5 billion program funded by a broad manufacturers' tax. In either case, the negotiated bill may face a presidential veto. The Reagan administration wants only a $5.3 billion program (SN: 3/2/85, p. 133). — *I. Peterson*

DNA fingerprints to aid sleuths

It's elementary, my dear Watson. The DNA minisatellite probes show that only suspect X could be the rapist. All 15 bands in the DNA fingerprint of the recovered semen match those of his blood sample. The chance of error, Watson, is only 1 in 30 billion.

While DNA patterns have not yet condemned any criminals, forensic applications of molecular biology appear both imminent and powerful. "It is envisaged that DNA fingerprinting will revolutionize forensic biology particularly with regard to the identification of rape suspects," say geneticist Alec J. Jeffreys of the University of Leicester, U.K., and Peter Gill and David J. Werrett of the Home Office Forensic Science Service in Reading, U.K. In the Dec. 12 NATURE, they describe new analyses of blood and semen samples.

Their technique is one of several that are being developed to identify individuals and their relationships by analyzing genes (SN: 8/31/85, p. 140). These methods have promise for more definite determinations of paternity and maternity, as well as forensic applications.

The new techniques take advantage of segments of human DNA that vary among individuals. Jeffreys and his colleagues Victoria Wilson and Swee Lay Thein have described a class of short segments that they call hypervariable minisatellite regions. Each segment contains a core sequence of 10 to 15 DNA subunits, known as base pairs, which is repeated many times. The number of these repeats varies from person to person.

To analyze the hypervariable regions, the scientists enzymatically cut a sample of DNA into pieces and radioactively tag those containing minisatellite regions. This procedure creates a characteristic pattern of bands. Except for identical twins, even close relatives can be distinguished by these DNA "fingerprints." The patterns are inherited: Each parent contributes about half his or her bands to each offspring.

To demonstrate that these patterns can be valuable in forensic work, Gill, Jeffreys and Werrett produced DNA fingerprints from samples that might be available to a detective: 4-year-old bloodstains and semen stains on cloth. They also developed a method that might identify rapists: The investigators separated the nuclei of sperm from other material that is found in vaginal swabs taken more than 6 hours after intercourse. They then produced DNA fingerprints of the semen donor that match the DNA fingerprints produced from a blood sample.

"These preliminary results demonstrate that DNA fingerprints are capable