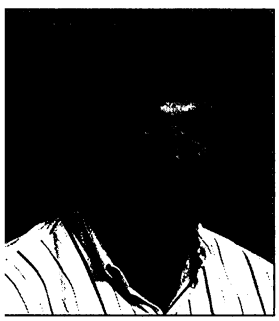
issue introduced by Kirschstein and Baldwin: What should be done when a university owns a piece of a company whose value will be affected by the outcome of a clinical trial? Such situations appear to be growing more numerous, although Kirschstein says no one has much data about the topic, except for "a few anecdotes, I think."

Gene therapist Woo says he knows enough to express his views: "I find it difficult to understand a nonprofit, public university holding equity in a for-profit company," Woo says. Nonprofit universities should be "precluded" from such investments, he says.



Concerned. Koski thinks conflicts are "out of control."

That position is too radical for AAU's Hasselmo. "We shouldn't throw out some valuable babies with the bath water here, because some of these collaborations are very important," he says, noting that an AAU task force is trying to develop principles for managing conflicts. Universities, he adds, see self-policing as preferable to "further rules and regulations" by the government.

Koski noted that the problems facing U.S. clinical research extend beyond federally funded academic medicine. A growing proportion of the work is being performed outside of academic health centers and beyond government oversight, he said. This situation calls for "uniform guidance" at the national level, he added, warning that "if guidance itself is not effective, then it seems to me that rules and regulations and legislation will follow."

Koski, who takes up his new job next month, said that shoring up the protections for human subjects in research involves issues that "go well beyond conflict of interest." Proposals by HHS's Office of Inspector General for redesigning the entire system of protecting clinical research subjects "are very, very much on my mind," Koski said. "Individuals and institutions who fail to truly accept their responsibilities and work to achieve them," Koski said, "simply should not be permitted to engage in" clinical research. "More on that after Labor Day," he promised. But he clearly intends to take a tough line. **–BRUCE AGNEW**

Bruce Agnew lives in Bethesda, Maryland.

GENOMICS

Building a Case for Sequencing the Chimp

First came humans, then mice and, most recently, rats (see next story). And now, a motley queue of other vertebrates—including dogs, chickens, and pufferfish—has formed, each one vying to have its genome sequenced next on the limited budget of the National Human Genome Research Institute (NHGRI).

The most recent entrant is the chimpanzee. In a letter to *Science* on page 1295, an interdisciplinary group—which includes 26 geneticists, anthropologists, and molecular evolutionists—says top priority should be given to a primate. Their first choice is the chimp, whose genome is 98% identical to that of humans.

By finding those few critical genetic differences between humans and chimpanzees, geneticists hope to solve the mystery of what makes humans unique. Specifically, they want to find the genes that underlie the striking differences between humans and chimpanzees in cognition, reproductive biology, and behavior. "Until we understand how we differ genetically from our nearest relatives—the apes—we won't understand the genetic basis for being human," says Edwin McConkey, a molecular biologist at the University of Colorado, Boulder, and one of two co-authors of the letter. "The mouse genome will tell us why we are not mice, but it will never tell us why we are not apes."

The advocates, who include Nobel Prize winners Francis Crick of the Salk Institute and George Palade of the University of California, San Diego, also argue that identifying the differences in the DNA of chimps and humans should explain why humans but not chimps get diseases such as malaria and Alzheimer's, and why chimpanzees rarely get cancer and get a much milder form of HIV. Finally, the group writes that a chimpanzee genome project might raise public awareness of this endangered species.

Those arguments are already well known at NHGRI, where deputy director Elke Jordan says that the chimpanzee is "definitely a strong candidate" to have at least part of its genome sequenced. Jordan even sees a way to reduce the estimated $100 million cost, by focusing not on the entire genome but on areas of suspected differences between humans and chimpanzees. Still, the chimpanzee lobby is up against a host of other organisms. Notes Jordan: "There are all kinds of animals of great interest to somebody."

–ANN GIBBONS

GENOMICS

Rat Genome Off to An Early Start

Assuming that if two mammalian genomes are good, then three would be better, the National Human Genome Research Institute (NHGRI) has jump-started efforts to determine the order of the roughly 3 billion bases in the rat genome. The original plan had been to wait for funding, expected in fiscal year 2001 (*Science*, 26 May, p. 1317). Instead, two of the 10 centers involved in sequencing the mouse genome are now shifting to the rat. If the budget proposal passes, the National Heart, Lung, and Blood Institute (NHLBI) will kick in a total of $58 million, as planned, to be distributed in 2001 and 2002. During that time sequencers will produce a rough draft of the rat genome—in parallel with the rough draft of the mouse.

Having data from two rodent species should speed the discovery of genes and regulatory regions in the human genome and make it easier to determine their functions. Although the mouse is a favorite of geneticists, the rat has captivated physiologists for 150 years and is the animal most often used by pharmaceutical companies for preclinical testing of new drugs. Thus,

NHGRI VERTEBRATE SEQUENCING PROJECTS

Organism	Status
Human	Finished version by 2003
Mouse	Finished version in 3–5 years
Rat	Working draft in 2–3 years
Chicken	Pilot project
Pufferfish	Pilot project
Zebrafish	Pilot project
Primate	Under consideration

with the rat genome in hand, "you can take the power of mouse genetics and the power of rat physiology and link them together," says Howard Jacob, a physiological geneticist at the Medical College of Wisconsin in Milwaukee.

NHLBI has supported rat genome work since 1995, although Jacob notes that "it's been a stealth project" that hasn't received wide notice. The project has generated sequencing tools, such as a physical map of the rat genome and a set of bacterial clones of rat DNA, but full-scale sequencing was on hold. In the past year, however, the big genome-sequencing centers have expanded their capacity so much that NHGRI director Francis Collins became convinced that they could tackle the rat genome as they were finishing the human genome and preparing the mouse draft. In May, the NHLBI advisory council agreed to put aside $32 million in 2001 and another $26 million in 2002 for the rat.

But NHGRI has advanced its troops even before the new year begins, shifting two groups, the Baylor College of Medicine in Houston and Genome Therapeutics Corp. (GTC) in Waltham, Massachusetts, into the rat effort. Baylor's Richard Gibbs will put the remaining $14 million from his mouse grant toward the rat, and GTC's Doug Smith will divert about $10 million from mouse and human sequencing for GTC's initial rat work. Together, they hope to sequence the entire rat genome once over within a year. The two centers are likely to be among those that receive the NHLBI contribution, which will be used to sequence the genome at least four times over to produce a rough draft.

If all goes well, the mouse and rat genomes will be available at the same time. Because the two rodents are separated by about 16 million years of evolution—while the human and mouse are separated by 80 million years—the rat and mouse genomes will share some DNA that is not obviously conserved between either rodent and the human genome. Thus, the rat genome should help to identify regulatory regions that might be missed in a mouse-human comparison.

NHGRI plans to push ahead on the mouse genome to produce a high-quality, complete version. So far, that's not in the cards for the rat. But that suits Jacob just fine, even though he works on the rat. He says: "I think it does not need to be finished at the current cost for finishing."

–ELIZABETH PENNISI

CREDITS: (TOP TO BOTTOM) LEE JAE-WON/AP; U.K. DEPARTMENT OF HEALTH

STEM CELL RESEARCH

U.K. Backs Use of Embryos, Sets Vote

LONDON—The U.K. government leaped into an ethical minefield last week, endorsing a report it had commissioned that calls for an expansion of research on human embryos. The report advocates tapping embryos for their stem cells, unspecialized cells that may ultimately serve as seed material for growing tissues to treat diseases. It also opens the door to cloning human embryos for research—an activity that has triggered sharp debate. Legislation implementing the recommendations will go to Parliament for a vote this fall.

If passed, the new U.K. regulations would likely be more permissive than guidelines expected out shortly from the U.S. National Institutes of Health. With Canada, Germany, and Japan also hammering out guidelines, says stem cell researcher John Gearhart of The Johns Hopkins University School of Medicine, "you'll soon see other players in the field."

Current U.K. rules allow research on human embryos only for studies aimed at improving infertility treatment, devising better contraceptives, and screening for genetic abnormalities before implantation. Nearly all embryos used in such studies are leftovers from in vitro fertilization clinics, and research is limited to embryos less than 2 weeks old, before neural development occurs.

But recent advances in stem cell research prompted the U.K. Department of Health to ask its chief medical officer, Liam Donaldson, to appoint an independent panel to review the science and ethics of human

POSSIBLE USES OF TISSUE DERIVED FROM STEM CELLS TO TREAT DISEASE

Cell type	Target disease
Neural (nerve) cells	Stroke, Parkinson's disease, Alzheimer's disease, spinal cord injury, multiple sclerosis
Heart muscle cells	Heart attacks, congestive heart failure
Insulin-producing cells	Diabetes
Cartilage cells	Osteoarthritis
Blood cells	Cancer, immunodeficiencies, inherited blood diseases, leukemia
Liver cells	Hepatitis, cirrhosis
Skin cells	Burns, wound healing
Bone cells	Osteoporosis
Retinal (eye) cells	Macular degeneration
Skeletal muscle cells	Muscular dystrophy

ScienceScope

DNA Across the DMZ The tears were real last week when members of 200 families torn asunder 50 years ago by the division of the Korean Peninsula were reunited briefly in Seoul and in Pyongyang. But many of the estimated 10,000 South Koreans with offspring in both countries may not live to see their long-lost North Korean children. A new initiative, however, could keep genealogies intact—and perhaps resolve inheritance disputes between North-South siblings.

On 1 September I.D. Gene, a Seoul-based paternity testing firm, plans to start taking saliva samples from any of the 10,000 South Korean parents who are willing. The sampling is free, but I.D. Gene will charge its usual fee (about $400) for typing the 10 nanograms or so of nuclear DNA in each sample. Efforts to get the government involved with the project have so far failed, says I.D. Gene CEO Yeon-Bo Chung, a Harvard-trained biologist. So a group of private benefactors, including the drug firm Korean Green Cross Inc., is bankrolling the estimated $80,000 sampling and storage costs.

Typing DNA from siblings alone may not cement a family connection, as siblings often have fewer DNA sequences in common with each other than with each of their parents. That's why preserving the older generation's DNA is crucial, says Chung. "Unless somebody collects the samples right now, they will not be available when they are desperately needed in the future."

Doubling Double Hit The campaign to double the budget of the National Institutes of Health (NIH) has won a pair of high-profile endorsements. Democratic presidential candidate Al Gore last week promised to "double the federal investment in medical research" in his nomination acceptance speech to the Democratic National Convention in Los Angeles. Not to be outdone, Republican rival George W. Bush's campaign said their candidate also backs the doubling push, begun 4 years ago by biomedical research advocates.

Both Bush and Gore, however, have yet to endorse the more ambitious agenda of Gore's running mate, Senator Joe Leiberman (D–CT). Leiberman is a major backer of bipartisan legislation that recommends doubling the government's entire $35 billion nondefense, nonbiomedical research portfolio by 2010. Many lobbyists say that NIH's rapid growth in the past 2 years has skewed the federal portfolio and that other agencies need to catch up.