

**Jeremy Rifkin** Chimeric experimentation is producing animal-human hybrids. This time, science really has gone too far

# Are you a man or a mouse?

**W**hat happens when you cross a human and a mouse? Sounds like the beginning of a bad joke but, in fact, it's a serious experiment recently carried out by a team headed by a distinguished molecular biologist, Irving Weissman, at Stanford University. Scientists injected human brain cells into mouse foetuses, creating a strain of mice that were approximately 1% human. Weissman is considering a follow-up that would produce mice whose brains are 100% human.

What if the mice escaped the lab and began to proliferate? What might be the ecological consequences of mice who think like human beings, let loose in nature? Weissman says that he would keep a tight rein on the mice, and if they showed any signs of

humanness he would kill them. Hardly reassuring.

Experiments like the one that produced a partially humanised mouse stretch the limits of human tinkering with nature to the realm of the pathological.

The new research field at the cutting edge of the biotech revolution is called chimeric experimentation. Researchers around the world are combining human and animal cells and creating chimeric creatures that are part-human, part-animal.

The first chimeric experiment occurred many years ago when scientists in Edinburgh fused a sheep and goat embryo — two unrelated animal species that are incapable of mating and producing a hybrid offspring. The resulting creature, called a geep, was born with the head of a goat and the body of a sheep.

Now, scientists have their

sights trained on breaking the final taboo in the natural world — crossing humans and animals to create new human-animal hybrids. Already, aside from the humanised mouse, scientists have created pigs with human blood and sheep with livers and hearts that are mostly human.

The experiments are designed to advance medical research. Indeed, a growing number of genetic engineers argue that human-animal hybrids will usher in a golden era of medicine. Researchers say that the more humanised they can make research animals, the better able they will be to model the progression of human diseases, test new drugs, and harvest tissues and organs for transplantation. What they fail to mention is that there are equally promising and less invasive alternatives to these bizarre experiments, includ-

ing computer modeling, in vitro tissue culture, nanotechnology, and prostheses to substitute for human tissue and organs.

Some researchers are speculating about human-chimpanzee chimeras — creating a humanzee. This would be the ideal laboratory research animal because chimpanzees are so closely related to us. Chimps share 98% of the human genome, and a fully mature chimp has the equivalent mental abilities and consciousness of a four-year-old human.

Fusing a human and chimpanzee embryo — which researchers say is feasible — could produce a creature so human that questions regarding its moral and legal status would throw 4,000 years of ethics into chaos. Would such a creature enjoy human rights? Would it have to pass some kind of “human-

ness” test to win its freedom? Would it be forced into doing menial labour or be used to perform dangerous activities?

The possibilities are mind-boggling. For example, what if human stem cells — the primordial cells that turn into the body's 200 or so cell types — were to be injected into an animal embryo and spread throughout the animal's body into every organ? Some human cells could migrate to the testes and ovaries where they could grow into human sperm and eggs. If two of the chimeric mice were to mate,

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they could potentially conceive a human embryo. If the human embryo were to be removed and implanted in a human womb, the resulting human baby's biological parents would have been mice.

**P**lease understand that none of this is science fiction. The National Academy of Sciences, America's most august scientific body, is expected to issue guidelines for chimeric research some time next month, anticipating a flurry of new experiments in the burgeoning field of human-animal chimeric experimentation.

Bioethicists are already clearing the moral path for human-animal chimeric experiments, arguing that once society gets past the revulsion factor, the prospect of new, partially human creatures has much to offer the human race. And, of course,

this is exactly the kind of reasoning that has been put forth to justify what is fast becoming a journey into a brave new world in which all of nature can be ruthlessly manipulated. But now, with human-animal chimeric experiments, we risk even undermining our own species' biological integrity in the name of human progress.

With chimeric technology, scientists have the power to rewrite the evolutionary saga — to sprinkle parts of our species into the rest of the animal kingdom as well as fuse parts of other species with our own genome and even to create new human sub-species and super-species. Are we on the cusp of a biological renaissance, or sowing the seeds of our destruction?

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