Брайан Хэйр, профессор эволюционной антропологии Duke University (USA), и Франк Альберт, аспирант из Max Planck Institute for Evolutionary Anthropology in Leipzig (Germany), в 2004 году побывали в Академгородке и в Институте цитологии и генетики СО РАН. Они работали на ферме в экспериментальном хозяйстве с ручными и агрессивными лисицами, а также с доместицированными и агрессивными серыми крысами, с которыми Франк Альберт в последующем проводил эксперименты в Германии в Институте эволюционной антропологии в Лейпциге.
Об этой их работе опубликована статья в газете The New-York Times, которая приводится ниже. Также об этом пишет в своей книге Брайан Хэйр.

Nice Rats, Nasty Rats: Maybe It's All in the Genes

By Nicholas Wade
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On an animal-breeding farm in Siberia are cages housing two colonies of rats. In one colony, the rats have been bred for tameness in the hope of mimicking the mysterious process by which Neolithic farmers first domesticated an animal still kept today. When a visitor enters the room where the tame rats are kept, they poke their snouts through the bars to be petted.

The other colony of rats has been bred from exactly the same stock, but for aggressiveness instead. These animals are ferocious. When a visitor appears, the rats hurl themselves screaming toward their bars.

"Imagine the most evil supervillain and the nicest, sweetest cartoon animal, and that's what these two strains of rat are like," said Tecumseh Fitch, an animal behavior expert at the University of St. Andrews in Scotland who several years ago visited the rats at the farm, about six miles from Akademgorodok, near the Siberian city of Novosibirsk. Frank Albert, a graduate student at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, is working with both the tame and the hyperaggressive Siberian strains in the hope of understanding the genetic basis of their behavioral differences.

"The ferocious rats cannot be handled," Mr. Albert said. "They will not tolerate it. They go totally crazy if you try to pick them up."

When the aggressive rats have to be moved, Mr. Albert places two cages side by side with the doors open and lets the rats change cages by themselves. He is taking care that they do not escape to the sewers of Leipzig, he said.

The two strains of rat are part of a remarkable experiment started in the former Soviet Union in 1959 by Dmitri K. Belyaev. Belyaev and his brother were geneticists who

believed in Mendelian theory despite the domination of Soviet science by Trofim Lysenko, who rejected Mendelian genetics.

Belyaev's brother was exiled to a concentration camp, where he died, but Belyaev was able to move to Siberia in 1958 and became director of the Institute of Cytology and Genetics in Novosibirsk. There he was able to study genetics in relative freedom, according to a report prepared by Dr. Fitch after a visit to the institute in 2002.

Belyaev decided to study the genetics of domestication, a problem to which Darwin gave deep attention. Domesticated animals differ in many ways from their wild counterparts, and it has never been clear just which qualities were selected for by the Neolithic farmers who developed most major farm species some 10,000 years ago.

Belyaev's hypothesis was that all domesticated species had been selected for a single criterion: tameness. This quality, in his view, had dragged along with it most of the other features that distinguish domestic animals from their wild forebears, like droopy ears, patches of white in the fur and changes in skull shape.

Belyaev chose to test his theory on the silver fox, a variant of the common red fox, because it is a social animal and is related to the dog. Though fur farmers had kept silver foxes for about 50 years, the foxes remained quite wild. Belyaev began his experiment in 1959 with 130 farm-bred silver foxes, using their tolerance of human contact as the sole criterion for choosing the parents of the next generation.

"The audacity of this experiment is difficult to overestimate," Dr. Fitch has written. "The selection process on dogs, horses, cattle or other species had occurred, mostly unconsciously, over thousands of years, and the idea that Belyaev's experiment might succeed in a human lifetime must have seemed bold indeed."

In fact, after only eight generations, foxes that would tolerate human presence became common in Belyaev's stock. Belyaev died in 1985, but his experiment was continued by his successor, Lyudmila N. Trut. The experiment did not become widely known outside Russia until 1999, when Dr. Trut published an article in American Scientist. She reported that after 40 years of the experiment, and the breeding of 45,000 foxes, a group of animals had emerged that were as tame and as eager to please as a dog.

As Belyaev had predicted, other changes appeared along with the tameness, even though they had not been selected for. The tame silver foxes had begun to show white patches on their fur, floppy ears, rolled tails and smaller skulls.

The tame foxes, Dr. Fitch reported, were also "incredibly endearing." They were clean and quiet and made excellent house pets, though — being highly active — they preferred a house with a yard to an apartment. They did not like leashes, though they tolerated them.

American researchers have suggested that the foxes be made available as pets, partly to ensure their survival should the Novosibirsk colony be wiped out by disease.

“There was a time when Soviet science was in a desperate state and Belyaev’s foxes were endangered,” said Ray Coppinger, a dog biologist at Hampshire College in Massachusetts who tried to obtain some of the foxes to help preserve them. But the animals seem to have left Russia only once, for Finland, in a colony that no longer survives.

There was far more to Belyaev’s experiment than the production of tame foxes. He developed a parallel colony of vicious foxes, and he started domesticating other animals, like river otters and mink. Realizing that genetics can be better studied in smaller animals, Belyaev also started a study of rats, beginning with wild rats caught locally. His rat experiment was continued after his death by Irina Plyusnina. Siberian gray rats caught in the wild, bred separately for tameness and for ferocity, have developed these entirely different behaviors in only 60 or so generations.

The collection of species bred by Belyaev and his successors form an unparalleled resource for studying the process and genetics of domestication. In a recent visit to Novosibirsk, Dr. Brian Hare of the Planck Institute used the silver foxes to probe the unusual ability of dogs to understand human gestures.

If a person hides food and then points to the location with a steady gaze, dogs will instantly pick up on the cue, while animals like chimpanzees, with considerably larger brains, will not. Dr. Hare wanted to know if dogs’ powerful rapport with humans was a quality that the original domesticators of the dog had selected for, or whether it had just come along with the tameness, as implied by Belyaev’s hypothesis.

He found that the fox kits from Belyaev’s domesticated stock did just as well as puppies in picking up cues from people about hidden food, even though they had almost no previous experience with humans. The tame kits performed much better at this task than the wild kits did. When dogs were developed from wolves, selection against fear and aggression “may have been sufficient to produce the unusual ability of dogs to use human communicative gestures,” Dr. Hare wrote last year in the journal Current Biology.

Dr. Hare believes that wolves probably have the same cognitive powers as dogs, but their ability to solve social problems, like picking up human cues to hidden food, is masked by their fear. Dogs, after their fear is removed by domestication, see humans as potential social partners, not as predators, and are ready to interact with them. But though selection for tameness was probably the first step in domesticating dogs, Dr. Hare said, they may well have adapted to human societies in other ways, with the smarter dogs leaving more progeny.

Although most of the tame foxes have stayed in Novosibirsk, Svante Paabo, also of the Planck Institute, recently managed to persuade the Russian researchers to let him have some of both breeds of the rats, after visiting Novosibirsk several times.

“It looked as if it would not work for a long time, but in the end we managed to build enough trust,” Dr. Paabo said. He and his student, Mr. Albert, work closely with Dr. Plyusnina. Mr. Albert hopes to identify which of the rats’ genes were selected for by the domestication process.

His strategy is to cross the tame rats with the ferocious rats and then score the progeny for how much of each trait they inherit. He hopes to identify 200 sites along the genome at which the tame and ferocious rats differ. If one or more of the sites correlate with tameness or fierceness in the progeny, they will probably lie near important genes that underlie one of the two traits.

The genes, if Mr. Albert finds them, would be of great interest because they are presumably the same in all species of domesticated mammal. That may even include humans. Richard Wrangham, a primatologist at Harvard, has proposed that people are a domesticated form of ape, the domestication having been self-administered as human societies penalized or ostracized individuals who were too aggressive.

Dr. Paabo said that if Mr. Albert identified the genes responsible for domestication in rats, “we would also look at those genes in humans and apes to see if they might be involved in human evolution.”

Human self-domestication, if it occurred, would probably not have exactly the same genetic basis as tameness in animals. But Mr. Albert said that if he could pinpoint the genetic difference between the tame and ferocious rats, he would compare the chimp genome and the human genome to see if they showed a similar difference.

One possibility is that a handful of genes — perhaps even just one — underlie all the changes seen in domestication. A structure in the embryo of all vertebrates, known as the neural crest, is the source of cells that constitute much of the face, skull and pigment cells, and many parts of the peripheral nervous system and endocrine system. If the genes in the neural crest cells were delayed just a little in coming into action, a whole range of tissues could be affected, including the maturation of the adrenal glands that underlies the first fear response of young animals, Dr. Fitch has written.

Could a single gene that affects the timing of neural crest cell development underlie the whole phenomenon of animal and human domestication? “There would be one happy science Ph.D. student if that were true,” Mr. Albert said.