

First Patent Issued for Engineered Animal

Marking a highly controversial scientific and legal landmark, the U.S. Patent and Trademark Office this week issued the first U.S. patent on a higher animal. The patent — granted to Harvard University for a “transgenic nonhuman eukaryotic animal” designed for use in cancer research — culminates more than a year of debate about the ethical and economic implications of a 1987 Patent Office decision to allow such patents. This week’s action comes as Congress is about to consider two bills that would preclude the issuing of patents on higher animals. It lends support to the biotechnology industry’s claim that the Patent Office is not the proper place to debate the ethics of genetic engineering.

“A patent does not grant any affirmative rights” to create or experiment with genetically engineered animals, said Donald J. Quigg, commissioner of patents, at a Washington, D.C., press conference. A patent precludes others from using or selling a technology for 17 years. Rules for the actual use of that technology “are going to be determined by the regulatory bodies and by the Congress, as they decide where they want to draw the line,” Quigg added. A congressional subcommittee investigating the pros and cons of animal patents is deadlocked on the issue (SN: 4/9/88, p.231).

As might be expected for a first-of-its-kind patent, the Harvard patent appears broad in its claims. The application claims rights to any gene-altered, non-human mammal, “preferably a rodent such as a mouse,” whose cells have been engineered to contain an “activated oncogene sequence.” Oncogenes are pieces of genetic material that are involved in the triggering of many forms of cancer. By splicing an oncogene sequence into a very early animal embryo, researchers can create an animal that is especially susceptible to cancer-causing substances, or carcinogens.

“This sensitivity [to carcinogens] will permit suspect materials to be tested in much smaller amounts than the amounts used in current animal carcinogenicity studies and thus will minimize one source of criticism of current methods, that their validity is questionable because the amounts of the tested material used are greatly in excess of amounts to which humans are likely to be exposed,” the patent documents state. Scientists expect the animals also will be useful for testing the effectiveness of substances thought to protect against the development of cancer, and as a source of cells for experiments related to carcinogenesis. The technique is expected to be commercialized by DuPont Co. of Wilmington,

Del., through a licensing arrangement with Harvard.

Because the oncogene sequence will be contained in all the test animals’ cells, including their sex cells, offspring will contain identical sequences. Therefore, according to the Patent Office, the patent will cover those offspring as well. Indeed, the patent covers all animals whose “an-

cestors” have been altered by the patented technique.

Although initial experiments at Harvard used mouse breast-cancer oncogenes inserted into mice, the patent documents imply that future experiments would use human oncogenes — perhaps injected into rhesus monkeys.

— R. Weiss

Unique island love songs attract flies

While most of us visit the Hawaiian islands for surf and sun, a few are drawn by flies and their tropical romances. These researchers want to hear not the love songs of beach-side steel guitars, but the clicks, purrs and hums of insect courtship in the mountains. Some species of *Drosophila* flies unique to the islands, say the scientists, have developed mating songs radically different from those of related stateside songsters. By studying the sounds, the researchers hope to decipher the evolutionary relationships between the Hawaiian flies and their continental cousins.

Stalking *Drosophila* at 6,000 feet above sea level, Ronald R. Hoy of Cornell University in Ithaca, N.Y., and his colleagues captured on tape some unexpected communiqués from 20 of the 106 species of Hawaiian picture-winged *Drosophila*. Hoy, Anneli Hoikkala of the University of Oulu in Finland and Kenneth Kaneshiro of the University of Hawaii in Honolulu report in the April 8 SCIENCE that the island songs differ from continental songs in either how they sound or how they are produced.

For example, Maui’s *D. fasciculisetae* makes what the scientists call a click-song, described by Hoy as the sound of running a thumbnail across a plastic comb. He said in an interview that these high-frequency clicks have not been reported among continental *Drosophila* or any other flies. Hoy and his co-authors group the island sounds into four song types: the click-song, a complex pattern of short pulses followed by a trill of sound, a purr made of steady sound pulses and a low hum. Some flies use their wings to create their music; others vibrate their abdomens.

The scientists have yet to prove these sounds are true courtship songs, or that they actually are heard by other flies, says Hoy. But based on *Drosophila* behavior elsewhere, he adds, it would be “astounding” if the flies did not use the sounds for mating rituals. Before recording, the scientists kept the sexes

separate for two weeks “to build up motivational levels,” says Hoy. Some of the romantic overtures noted are rather elaborate for a fly: The male of Hawaii’s *D. silvestris* purrs while close in front of the female, then stands behind her with his head under her wing and hums — “until the female accepts him or decamps.” Other species use similar body language, suggesting the flies feel the vibrations of sound rather than hear them, says Hoy.

Despite its *modus operandi*, says Hoy, *D. silvestris* is one of the more primitive island *Drosophila*. He explains the researchers are trying to build “an acoustical phylogeny” of the flies based on sound analyses. In other words, they are matching the song style of a species with its place in evolution.

These *Drosophila* are not the drab *D. melanogaster* all too familiar to genetics students. Instead, says Hoy, the larger Hawaiian cousins are more flamboyant in both appearance and communication skills. Some biologists estimate that more than 500 different *Drosophila* species have evolved on the islands, producing flies not found anywhere else on earth. Hoy says that number may actually be greater than 700 species, with the “younger” flies evolving within the past 400,000 years and others dating back at least 5 million years. “[When they evolved] is a point under contention by biologists,” says Hoy. “Some think there have been flies on the Hawaiian islands for 20 million years.”

“The only way to make it [to Hawaii] was to have your ancestors blown in and then speciate from there,” Hoy says. But it is uncertain whether there was one mother fly from the mainland whose offspring then “island hopped” to start new colonies, or whether an occasional new “founder fly” crossed the ocean and populated the various islands separately. Evidence supports the one-original-fly idea, says Hoy, who adds that “however it happened, it is certainly the case that these *Drosophila* evolved from mainland species.” — D.D. Edwards