

'Animal Cruelty' Defined

A New Jersey judge's ruling on "animal cruelty" sets a precedent for live animal experimentation in high schools throughout the country—By Patricia McBroom

► **LIVE ANIMALS** can now be used in New Jersey high school biology experiments with the full sanction of the court.

Essex County Court Judge Charles S. Barrett Jr., ruled in favor of animal experimentation in a landmark decision that is expected to have broad impact on education, not only in New Jersey but throughout the nation.

His opinion sets a precedent for the legal interpretation of "animal cruelty." "Cruelty to my mind is the unjustifiable infliction of pain with the act having some malevolent or mischievous motive. There must be something willful or wanton about it," he wrote in his decision.

Act Not Cruel

By this interpretation, Barry Fugere, a former student at East Orange High School in New Jersey, did not commit an act of cruelty when he injected chickens with a cancer virus during the course of his biology studies. The high purpose and educational value of the experiment removed it from New Jersey's prohibition against needless cruelty to animals, the Judge ruled.

Now a pre-medical student at Drew University, Barry Fugere was a high school sophomore when he first became interested in cancer. Because he was an outstanding student and because he had done extensive reading on cancer, the East Orange High School permitted him to conduct a special experiment for its educational and motivational value.

Into four chickens he injected a strain of the Rous cancer virus—harmless to humans but highly active in chickens. Two of the animals developed tumors and died within weeks. Barry dissected these animals and studied their cancerous growths. The others survived with no apparent harm and he exhibited them at the 1964 Newark Science Fair.

There, a member of the Humane Society saw the exhibition and instituted legal proceedings against the school board, charging animal cruelty.

If the suit brought against the East Orange Board of Education by the New Jersey Society for the Prevention of Cruelty to Animals (SPCA) had remained on a strictly local level, it would still have set a precedent.

But the fact is that this one chicken experiment conducted by a 17-year-old boy became the center of a national conflict between the forces for medical research and the humane movement.

On one side was the National Society for Medical Research and the New

Jersey Science Teachers' Association which offered themselves as codefendants with the Board of Education. On the other was the American Humane Association, participating with the state SPCA as *amicus curiae*.

Barry Fugere should not have been allowed to experiment with cancer on chickens, charged SPCA attorney, Nicholas Martini. No matter what the purpose or motive, it was cruel treatment of animals. The educational value is irrelevant and immaterial to the case, stated Mr. Martini during the trial last month.

Beyond that, live animal experimentation in high schools is illegal under New Jersey law, he said.

Only certain research institutions are specifically exempt from New Jersey's anticruelty statute. High schools, of course, are not among them. The exemption clause is duplicated in about ten other states, besides New Jersey.

Against this attack Ralph Rohweder of the National Society for Medical Research brought an army of distinguished biologists, scientists and educators to testify on the exceptional value of living creatures to any life sciences program. They and defense attorneys Frank L. Bate and Edward Stanton apparently convinced Judge Barrett because he wrote:

"I conclude that if there is a truly useful motive, a real and valid purpose, there can, under the statute, be acts done to animals which are ostensibly cruel or which ostensibly cause pain.

". . . Educational and scientific achievements might well represent the redeeming quality that would constitute the justification for inflicting pain or suffering on animals—to render the cruelty not unnecessary or the mutilation not needless.

"To this issue the greater part of the testimony in the case was directed.

Distinguished Witnesses

"For defendants on this vital point were produced many distinguished witnesses, including scientists, educators, writers or collaborators or directors of a new series dealing with "Biological Sciences Curriculum Studies." This project, as developed in the testimony of its director, Dr. Arnold B. Grobman, was a result of certain Federal Government grants of some eight million dollars and involved long effort on the part of leaders in the field. In the books and pamphlets of this project for science teaching in the high schools of the country, there are featured the advan-

tages of living animal experiments to be conducted by students under appropriate supervision. Suffice it to say, that this project has resulted in the production of books and pamphlets which are probably among the most widely used in the country in the teaching of high school science. The blue book in the series was copyrighted in 1963, and I gather the other books and pamphlets appeared around that time.

"The testimony of Dr. Arnold B. Grobman, presently Dean of the College of Arts and Sciences at Rutgers, is illustrative of the views of virtually all of the other expert witnesses produced on the subject by defendants. He said that the use of living animals is essential at the high school level for biological studies in that it:

1. helps students have sympathy for living things.
2. helps make them literate in the scientific field.
3. motivates other students to scientific careers.
4. eliminates study by rote.

"Other witnesses detailed other good purposes.

Encourage Laboratory Work

"The goal, according to Dr. Grobman and the other expert defense witnesses, of present high school science teachers should be to encourage laboratory work with plants and with animals, both dead and alive. Many of the experiments, according to these witnesses, use live chickens and other live animals. They agree that what Barry Fugere did was necessary for his educational development."

Man's use of animals for his own needs has long been an accepted principle, wrote the Judge, and was noted even in the Bible as the edict—man shall have dominion over animals.

". . . An animal can be driven, but not overdriven, can be loaded, but not overloaded, can be worked but not overworked . . .," he stated.

"It is argued by SPCA that the court is a poor place to determine the justification of inflicting pain on animals. While there seems to be some merit to this point, the courts make similar determinations with respect to victims who happen to be people. SPCA does not argue that the courts do not have the exclusive original jurisdiction over acts of cruelty occurring outside of scientific experiments.

"SPCA further argues that the court

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heat or noxious fumes. In effect, they are batteries that do not wear out, do not need recharging and weigh much less.

While the fuel cells used for power in the two-man Gemini spacecraft weighed less than one astronaut, a conventional battery powerful enough to do the same job would weigh a ton.

Fuel cells come in many varieties. An example of one of the simplest is the hydrogen-oxygen fuel cell containing two electrodes and an electrolyte. Gaseous hydrogen fuel is fed through one porous electrode, and gaseous oxygen fuel is fed through the other porous electrode. The hydrogen and oxygen react to produce water and electric power.

For long space journeys, the water produced would be an essential by-product, not only for the astronauts to drink but for cooling some of the spacecraft's parts. The fuel cell scheduled to provide on-board electrical power and drinking water for the Apollo lunar spacecraft produced 77 gallons of potable water during a simulated space qualification test of 400 hours.

Earth-bound Considerations

However, practical, earth-bound considerations are not being ignored in either basic or applied research and development of fuel cells. First applications will be as electrical power generators for land forces. Household heating, air conditioning and lighting are still in the future.

Hydrogen can be replaced as a fuel by such hydrocarbons as propane and butane, by carbon monoxide or zinc, among other chemicals. Oxygen from the air can be used as the other fuel, rather than pure oxygen from a tank.

Characteristics such as operating temperature, pressure, type of electrode and kind of electrolyte may also vary.

The fuel cells used in Gemini operate on hydrogen and oxygen with an ion-exchange membrane as the electrolyte, having an electrical output of 2,000 watts. The units were built by General Electric Company.

The fuel cells scheduled for the Apollo lunar spacecraft use all-metal electrodes and an alkaline electrolyte. They are being built by Pratt & Whitney Aircraft, East Hartford, Conn.

An experimental fuel cell system that uses coal as a fuel has been developed at Westinghouse Research Laboratories, Pittsburgh. The power generated directly from the powdered coal has operated a television set. The system was developed under a research contract with the Office of Coal Research, U.S. Department of the Interior.

The research is aimed at the eventual development of a practical, large-scale coal-burning fuel cell system for electric power generation.

Newest attention-getter in the field is the biochemical fuel cell, or biocell, in which bacteria and enzymes are involved in the power production. Biocells use biological materials as catalysts. Because they can operate on such substance as sea water, decaying vegetation or human waste, biocells are seen as essential for specialized applications.

These applications include closed systems for spacecraft or civil defense shelter, sewage conversion systems and buoy power sources. Prototype biocells have been used to operate radio receivers and transmitters, as well as other electrical equipment.

One of these prototypes has led to the suggestion that man on a tropical island may just plug his radio into a coconut to turn it on. Bacteria known as *Aeromonas formicans* will break down the palm tree juice into formic acid, as other bacteria will also do to sugar cane, fruits and yams.

Scientists are hoping to be able to tap ordinary leaves and grass as a source of electricity, although the day when this could happen may be far in the future.

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would act after the harm had been inflicted. This is just as regrettable as the situation that the court operates after the harm in a murder trial. There is hope that penal or penalty laws have some deterrent effect, and this presumably occurs before each violation.

SPCA further argues that the result, if defendant Board were successful, would be that the science teacher would determine when the experiment was justified, balancing his evaluation of the pain and cruelty against the educational value to be derived. This indeed would place an awesome responsibility in the hands of the teacher, but then again the minds of our children are also placed in his hands.

"For the reasons expressed there will be judgment entered for defendants."

Judge Barrett's decision is bound to affect scientific research dependent on live animals for new discoveries in disease and the life processes. The definition of "necessary pain" given here is essential to any such experimentation which would otherwise carry the stigma of animal cruelty.

• Science News, 89:261 April 16, 1966

TECHNOLOGY

Computers Recognize Voices Without Help

► A COMPUTER that can identify speakers in a conversation by their voices has been developed at Purdue University, Lafayette, Ind.

Applications of the new pattern recognition system include: distinguishing submarines from fish, detecting and diagnosing disease through brain wave patterns and telling the difference between a missile with a warhead and one without.

Actually the system is not a new type of computer. It is a new method of programming computers to recognize patterns without human help.

Under the direction of Dr. Edward A. Patrick, investigators at the Purdue University's School of Electrical Engineering spent two years searching for the right combination of information with which to "train" the computers in pattern recognition.

The machines need to know what features characterize the human voice, what background noises might exist in the room, how many voices may be involved and whether more than one might be in action at the same time.

Roughly the same type of information is needed before computers can distinguish submarines from fish.

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TECHNOLOGY

Plastics and Paints Made From Pine Gum

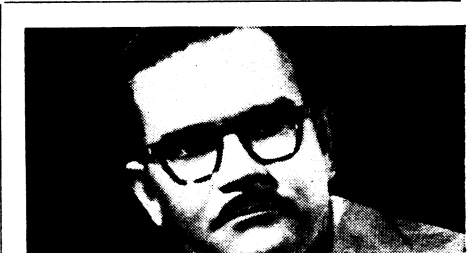
► Amber pine gum of conifers can now be used to make high-quality paints and plastics. The crude pine gum can be converted at low cost into chemicals known as diepoxides, according to the U.S. Department of Agriculture.

The relatively inexpensive chemicals will be used to help produce plastics, adhesives, casting and laminating resins and paints.

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