GENETICS

Cancer-Resistant Chickens

Both male and female Leghorn chickens can transmit complete resistance to an infectious cancer of the bone marrow when bred from the same line, USDA scientists have found.

➤ CHICKENS resistant to an infectious, leukemia-like cancer of the bone marrow and blood have been developed by the U. S. Department of Agriculture.

This achievement indicates that animals can be bred for resistance to at least one form of cancer.

Geneticist Nelson F. Waters of USDA's Regional Poultry Research Laboratory at East Lansing, Mich., found that both male and female white Leghorns can transmit complete resistance to this particular type of cancer, known as erythroblastosis, to their offspring. Resistance was transmitted even though some of the mates were genetically susceptible to the disease.

The studies suggest that one pair of autosomal (not sex-linked) dominant, heredity-carrying genes may control resistance to erythroblastosis.

In one series of tests, Mr. Waters showed that of two blood brothers, one was capable of transmitting complete resistance to all his offspring, while the other transferred high susceptibility. Results were similar for other inbred lines of white Leghorns.

Mr. Waters also found that some females produced erythroblastosis-resistant progeny, even when mated to sires that produced susceptible chicks when mated to other hens.

Strangely enough, however, this resistance was transmitted only to birds of the same line. When resistant birds from two different lines were crossed, the resistance disappeared. In some cases, nearly 75% of the offspring died after inoculation with the erythroblastosis virus.

There is no satisfactory explanation as yet for this behavior, Mr. Waters reported in Agricultural Research, Nov., 1960. He is still trying to find out why resistance is inherited in certain lines but not in others.

Erythroblastosis is a form of the avian leukosis complex—a group of related cancerous diseases of poultry attacking different parts of the body. Natural occurrence of the disease is quite low, indicating the difficulty of transmission. Sometimes, however, the virus that causes erythroblastosis will also cause lymphomatosis, one of the most common and economically important forms of leukosis.

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GENERAL SCIENCE

Nobel Prize Winners

➤ A TRAIL OF BUBBLES that tells the tale of atomic particles is the idea for which Dr. Donald A. Glaser of the University of California, Berkeley, won the 1960 Nobel Prize in Physics.

Dr. Glaser conceived the idea that the bubbles in a liquid could be photographed to show the fleeting tracks of atomic particles. He perfected a radiation detector, the bubble chamber, based on this idea in 1954.

The bubble chamber made possible the mass production of simple photographs showing what happens in atomic collisions. Bubble chambers filled with various superheated liquids are placed in the beams of atomic "bullets" from virtually every atom-smashing machine in the world.

From the bubble chamber and other photographs of atomic collisions, scientists are learning more about the structure of the nucleus of the atom and how it is held together.

Until invention of the bubble chamber, scientists had only two ways of seeing and measuring the debris from atomic collisions. One was the cloud chamber, the other photographic emulsions. Dr. Glaser began work on the new approach in 1952 that ended in the bubble chamber.

"It occurred to me," he said, "that a superheated liquid, like a supersaturated vapor, might provide a medium that could be triggered by a small stimulus to yield a very large effect.

"Chemists already knew that a very pure liquid may be heated above its usual boiling point without boiling. A bit of broken glass thrown into such a liquid will cause it to erupt in violent boiling.

"I wondered whether a flying atomic particle might, under suitable conditions, trigger microscopic bubbles that start the boiling process. If so, they might make a visible track which could be recorded by means of high-speed photography. I made a simple test. The technique worked!"

The first accurate method for dating ancient objects brought a Nobel Prize in Chemistry to the inventor. Dr. Willard F. Libby, professor of chemistry at the University of California in Los Angeles, received the 1960 award for his use of radioactive carbon-14 to determine the age of plant and animal remains.

The red-headed scientist recognized that since radioactive atoms decompose at a constant rate they could be used as an atomic clock. In 1947 he demonstrated that cosmic rays were converting nitrogen in the upper atmosphere to carbon-14. Carbon dioxide in the atmosphere contains a very constant proportion of carbon-14.

Since plants use carbon dioxide to build their chemical constituents and in turn serve as food for animals, carbon-14 is present in all living animals and plants in a known quantity.

After the death of a plant or an animal, the amount of carbon-14 present decreases as the radioactive decomposition proceeds. One half of the radioactive carbon decomposes in approximately 5,600 years.

Dr. Libby is well-known also for his development of the use of tritium, the radioactive isotope of hydrogen, as a tracer for studying water in various meteorological and geophysical processes.

He was the first chemist to be selected as a member of the United States Atomic Energy Commission.

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DR. DONALD A. GLASER

DR. WILLARD F. LIBBY