

## PSYCHOLOGY

# Pigeons Lured by Gambling

Just as some humans love to play "one-armed bandits," pigeons fall for gambling's lures. Scientist finds birds work harder when pay-off time is uncertain.

► PIGEONS fall for the lure of the gambling machine, just as some humans love to play the "one-arm bandit."

This human-like weakness of pigeons was reported to the American Philosophical Society meeting in Philadelphia by Prof. B. F. Skinner, Harvard University psychologist.

Birds will work harder when they do not know when or how much the machine will pay off. This is true even though the birds "get the lemon" most of the time.

Prof. Skinner last year taught pigeons to play ping-pong and peck out tunes on a piano. He has now taught them to peck at a key on a machine that pays the birds off with about four or five pecks of bran. The machine can be set to pay off at a regular time, say after five minutes of work, or to pay on a piece-work basis, after 200 pecks by the bird. It can also be set like a gambling machine so that it would pay off on an average of 200 pecks, but so unpredictably that the bird could not guess when his reward would be forthcoming.

The bird works well when he knows it is time for his pay. He works better on piece-work pay than on regular wages. A

bird can be "burned out" by gradually reducing the reward as the bird speeds up his output. This parallels experience with human workers.

But the bird does his best when he has the unpredictable paymaster. He works hard in hope of reward on the next try.

Prof. Skinner said that he could make a gambling machine that would keep up the interest of the victim better than any now in use—but he has no interest in doing so.

The pigeons work better when they are allowed to "watch the clock." Prof. Skinner arranged the work machine so that the birds pecked at a frosted window. A spot of light on this window became largest when it was time to pay off.

Apparently the pigeon has an internal "clock" which tells when it has completed the right number of pecks. The bird works better when it can see the external clock—the growing light spot.

Prof. Skinner is now trying to find out what will happen when the external clock runs fast or slow and so does not agree with the external clock. On which one will the bird rely?

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## ENTOMOLOGY

# Predict Forest Insect Spurts

► BETTER CONTROL over the serious outbreaks of spruce budworm, an insect pest eating its way through a million acres of Pacific Northwest Douglas fir, white fir and spruce, can be gained by prediction of when the surges will occur. Weather conditions and certain biological factors are clues to predicting the outbreaks.

Sunlight and no rainfall are the ideal physical set-up for spruce budworm development, four scientists who have studied the history of past spurts in the ravages of this insect found. Their survey showed several physical and biological factors occurred repeatedly in three- or four-year periods preceding outbreak dates.

Using official records of rainfall to get a rough idea of both the moisture and sunlight, they found that precipitation fell below normal during the pre-outbreak periods, with drought in June and July most common. Sometimes spring or autumn drought also were associated with the summer dry periods.

In areas of Ontario where forests contain much poplar as well as balsam fir, heavy feeding by the forest tent-caterpillar preceded severe spruce budworm outbreaks, the scientists found.

Drs. W. G. Wellington, J. J. Fettes and R. M. Belyea, of the Forest Insect Laboratory in Sault St. Marie and Dr. K. B. Turner of the Ontario Department of Lands and Forests, Toronto, report their findings on spruce budworm outbreaks in the CANADIAN JOURNAL OF RESEARCH (Dec., 1950).

They urge that attempts at controlling the outbreaks of this pest be rejudged in the light of their findings.

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## MEDICINE

# New Disease Due to Form Of Red Blood Molecule

► DISCOVERY of a new disease involving the red color of the blood was announced by Dr. Linus Pauling of California Institute of Technology at the meeting of the American Philosophical Society in Philadelphia.

The disease has not yet been given a name, Dr. Pauling said. It belongs to the newly discovered class of molecular diseases. Sickle cell anemia is the first disease found to be molecular in nature.

Like sickle cell anemia, the new, unnamed disease is also one in which the

molecule of hemoglobin, red coloring matter of the blood, is abnormal.

The hemoglobin molecule has the important job of carrying oxygen throughout the body. How its 10,000 atoms are arranged, however, has never been determined. Enough is known of the structure of this molecule for scientists to be able to detect abnormalities such as exist in sickle cell anemia and in the new molecular disease.

Sickle cell anemia gets its name because the red blood cells in this disease are shaped like a sickle, instead of being round. The hemoglobin molecule in the cell, however, and not the cell itself is the diseased factor in sickle cell anemia, it is now known. The molecular abnormality responsible for this disease is hereditary.

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## GEOLOGY

# Yellowstone Geyser Now Grows in Parking Space

► A GEYSER is growing where visitors park their cars in the Norris Geyser Basin area.

Park Ranger Naturalist M. D. Beal predicts that pronounced changes can be expected in the vicinity of the roadway leading to the parking area. Two years ago he noticed that needles on trees north and south of the parking area were turning brown and dying, although there was no evidence of insect attack or disease. Their condition became even worse last year.

Having spotted steam rising from the roadbank area on a cold day, he took ground temperatures in the vicinity. They showed that a geyser was being born in the area, he reports in YELLOWSTONE NATURE NOTES, (Nov.-Dec., 1950).

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## INVENTION

# Now You Can Open That Bottle With Your Finger

► A HANDY gadget to take on a picnic is a short tube-shaped device to wear on a finger with which caps can be removed from bottled drinks and cans of beverages opened.

This so-called finger-supported bottle opener is one of the inventions awarded a patent by the government. The inventor, Lewis N. Clark of Orange, Va., who received patent 2,548,517, suggests its use at baseball parks by beverage vendors.

On the palm side of this broad ring, which is worn on the base digit of the middle finger, is a cut-out and a lip to enable a bottle cap to be removed in the same manner as in other bottle openers.

On the back-of-the-hand side, which is elongated to cover the knuckle, is a hook to catch under the edge of the can cover when the fist is doubled, and a V-shaped cutting lug similar to those on ordinary beer can openers.

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