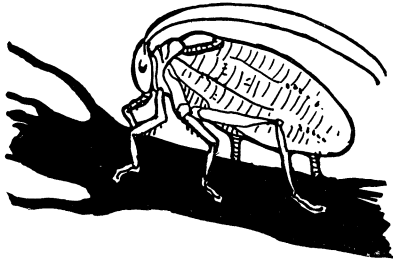




BIOLOGY



Breathing Without Lungs

MAN AND ALL his vertebrate kin above the level of fishes are lung-breathers. They take air into those elaborate sacs in their chest cavities, where the oxygen is transferred to the red blood corpuscles which in turn carry it to the points where it is needed by the laboring muscles, secreting glands, and feeling brain and nerve cells.

Nothing at all like this goes on inside the bodies of insects. They have no oxygen-carrying corpuscles in their blood. Insect blood is simply a medium of food transfer, like the plasma or fluid portion of human blood; the second function of oxygen carriage is entirely lacking.

Insects get the necessary supplies of air to all parts of their body simply by extending their breathing apparatus throughout their bodies. It is as though our lungs had branches that ran out into our fingers and toes, and all points in between.

This highly branched condition of the insects' breathing apparatus is materially helped by having many entrances and exits, instead of only one as in the air-breathing vertebrates. If you will look at the side of a large insect, such as a katydid or grasshopper, you will see a row of dots along it, one to each segment of the abdomen. These are the breathing pores, or spiracles. From each of them a thin-walled set of branching tubes runs to all neighboring parts of the body, carrying the needed air.

This curious system of piping air directly throughout the body has two notable effects on insect physiology. First, it makes the insect body exceedingly light for its bulk, which is a real advantage to an animal group which is primarily a flying and leaping order. The second effect is to limit quite sharply the practicable size of the organism. The biggest insects that have ever lived were the foot-long dragonflies of the Coal Age, the mouse-sized cockroaches that were their contemporaries, and the huge Goliath beetles of the modern tropics. Probably bigger insects cannot exist, because the penetration of air into the body through their peculiar direct-ventilation system would become physiologically ineffective after the first half-inch or so.

Science News Letter, July 1, 1933

Mystery Island in Quebec, the national domain camping site of Canadian Boy Scouts, has been made a bird sanctuary by the Canadian Government.

Plans are under way for building the longest bridge in Europe—a two-mile span to connect the Danish island Zealand with the islands of Lolland and Falster.

BACTERIOLOGY

Fermentation Frees Seed From Bacterial Disease

FERMENTING tomato pulp until the seeds drop out has been found to be an excellent method of freeing the seeds from the destructive disease, bacterial canker, which has presented a problem to growers of tomatoes for canneries.

The value of fermentation in this connection was discovered by accident, though scientific insight played a part in taking advantage of the chance discovery. H. L. Blood, of the U. S. Department of Agriculture, had some canker-infested tomatoes, from which he wanted to extract the seeds, so that he might try on them the effects of various disinfectants.

Lacking a modern power seed extractor, he fell back on the old discarded method of fermenting the seeds out in a vat.

When he planted the seeds from the diseased fruits he nevertheless got healthy plants. The results from untreated seeds were as good or better than those from disinfected seeds.

He repeated the experiment in Utah, where the disease has been destructive. Again the fermented seed from infected fruit proved free from the disease, while mechanically extracted seeds still carried the infection.

A more exact investigation is now under way, to determine if possible the factors in the fermenting vat that kill off the infection, and to determine also the conditions under which fermentation-treated seeds can be produced best.

Science News Letter, July 1, 1933

MEDICINE

Hope For New Treatment Of Addison's Disease

HOPE that Addison's disease may be attacked by a new form of treatment, as a result of recent research on the hormones of the pituitary gland, was expressed by Dr. Herbert M. Evans of the Rockefeller Institute at the recent Congress of American Physicians and Surgeons.

This new treatment would not be mere replacement of the adrenal cortex hormone, lack of which results in Addison's disease. Replacement treatment, like giving insulin for diabetes, is already being used by doctors who give a very powerful extract of adrenal cortex to patients suffering from Addison's

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disease. A number of lives have been prolonged in this way.

The new treatment which Dr. Evans hopes will be possible will be designed to stimulate the vital cortex of the adrenal gland to function anew and itself to produce enough of the necessary cortin to save the lives of Addison's disease patients.

This renewed functioning of the adrenal cortex may possibly be brought about by giving a certain substance from another gland, the pituitary. Recent studies show that the pituitary produces a substance that exerts a profound influence on the activity of the vital cortex of the adrenal gland.

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ARCHAEOLOGY

Court For Prehistoric Ball Games Found

DISCOVERY of a prehistoric ball court, where Mayan athletes played their ancient version of the American national sport, is reported by William T. Broughman of Marion, Indiana, who has just returned from explorations in Yucatan.

Mr. Broughman, who is a graduate of Indiana State University and describes himself as a "full fledged amateur" in archaeology, reported the find at Tulane University's Department of Middle American Research. Officials of the department said that the discovery affords new proof of their conviction that the ball game Poktapok was the Mayan national sport.

Mr. Broughman made his discovery while wandering over ruins of the ancient Mayan city of Kabah. Though the court is badly in ruins, he was able to trace the outline well enough to be sure of its identity.

Ball games, played with rubber balls long before Europe heard of rubber, were important events in the daily life of ancient Mexico. Early explorers from Spain observed the games with eager interest and told of honors heaped on the most skilful of the Indian athletes.

Dr. Frans Blom of Tulane has been gathering evidence to trace the origin of the game which Mayas and Aztecs so enjoyed. He is convinced that Mayan Indians who made so many other contributions to native civilization, were inventors of the game, which spread over Mexico.

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ARCHAEOLOGY

Seven Mummies From Texas Cave Brought to Smithsonian

SEVEN mummies preserved apparently by natural dryness of the Texas cave where they were buried, have just been received by the Smithsonian institution. The mummies shed new light on the prehistoric cave dwellers of the Big Bend region of Texas whose cave shelters have been explored in recent years by Dr. Frank Setzler of the Smithsonian.

Among the seven bodies is one almost perfectly preserved. Its expression is almost life-like and the hands are crossed in a peculiar fashion under the head. Even the original method of hair dressing remains. The body was buried upright in a deep deposit of wood ashes, wrapped in a rabbit skin robe. A basket was placed over its head.

Besides the mummy-like remains, some bundle burials also were in the cave. These consist of disarticulated

bones, and represent a fashion of burial known to some groups of Indians.

Nearly all the skeletons had fractured legs or arms which had healed without benefit of setting. Since the cave where the burial was found is on the edge of a steep cliff, some 150 feet above the river plain, it is thought that the ancient people suffered frequent falls with broken bones the result.

The bones, together with basketry, sandals, arrow heads and other objects, are from a cave on the property of Mrs. Fate Bell in the canyon of the Pecos River. It was stated at the Smithsonian that Mrs. Bell's interest and willing cooperation have preserved the cave from looting by amateurs and for study by competent anthropologists. The material has been turned over to Dr. Setzler for intensive study.

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alike both as to numbers and distribution of values. Dr. Millikan sees these experimental results fitting in with his suggestion of a few years ago that the cosmic rays arise from a "clustering of hydrogen atoms into cosmic ray dust" in the depths of space and then an occasional sudden formation of helium atoms, oxygen atoms, an iron atom or even a uranium atom, releasing in these atomic syntheses the penetrating radiations that seem to pervade all space.

Dr. Aston's atomic mass measurements and deductions show that, if helium is made from hydrogen, twenty-seven million volt-electrons in energy are released. For oxygen, iron and uranium formation, the energy releases are figured at one hundred, five hundred and two thousand million volt-electrons, respectively.

Since a few of the cosmic rays have energies of over two thousand million volt-electrons, Dr. Millikan suggests the synthesis of highly unstable and transitory elements heavier than uranium, the heaviest discovered, but that these elements then disintegrate radioactively into the kinds found in the stars and on earth. Thus Dr. Millikan sees synthesis, instead of annihilation, as

playing an important part in the universe, admittedly a happier prospect for those who like to visualize the universe a going concern eons in the future.

Astronomers, as Dr. Millikan observed, are now abandoning the idea that the heat energy of the sun and stars comes from annihilation of the mass of atoms and are beginning to favor the idea that natural upbuilding of atoms within stellar bodies keeps them shining. With the origin of cosmic rays similarly explained by interstellar catastrophic formation of atoms, synthesis instead of disintegration or annihilation would play a major role in the universe.

Of the radiant energy rushing about the universe, the cosmic rays, totally unknown a few decades ago, are by far the most important. For Dr. Millikan deduces with astronomical estimates that the universe's total radiant energy in the form of cosmic rays is from thirty to three hundred times greater than that existing in heat, light and all other forms combined. Of the imports of energy received by the earth, the cosmic rays equal about one-half of the total energy coming in from the stars.

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