SCIENCE NEWS

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AGE OF THE EARTH

THE age of the earth is at least two thousand million years. This is the verdict of a committee of scientific men appointed by the National Research Council who have investigated, for the past four years, this basic problem of science.

The radioactive minerals uranium and thorium, which spontaneously disintegrate into lead, give the best clue to the earth's age. By carefully analyzing the radioactive minerals and their products in a sample of rock, it is possible to tell how long it has been in existence.

The oldest rock in the world, whose age has been determined in this way, is a piece of uranite or uranium-bearing rock from Sinyaya Pala, Carelia, Russia. It is 1,852 million years old and as it occurs in rocks that were intruded into the surrounding rocks, which therefore must be older, it is concluded that the age of the earth must be in round numbers at least two thousand million years.

Estimates of the age of the earth have been multiplied by more than twenty during the last three decades. The idea that the amount of salt in the ocean is an index of the earth's age was found by the National Research Council committee to be unreliable. Only a hundred million years can be accounted for by this method. This was a favorite figure for the earth's age at the turn of the century.

Professor Alois F. Kovarik, physicist of Yale University, and Professor Arthur Holmes, geologist of Durham University, England, explain in the National Research Council report soon to be issued the methods of age-determination based on radioactive disintegration. They are based on the fact that the radioactive elements uranium and thorium disintegrate spontaneously at constant determinable rates and yield lead whose atomic weight varies according to the proportion contributed by its radioactive parents.

The chairman of the committee was Professor Adolph Knopf, of Yale. Professor Charles Schuchert, of Yale, compared the radioactive age results with the evidence from the thickness of layers of the earth. Professor E. W. Brown, Yale, concluded that while there are no known astronomical methods the two-thousand-million-year age is consistent with astronomical probabilities. Professor A. C. Lane, of Tufts College, was also a member of the committee.

BIRDS THE FLIERS

THE ducks that wing their way northward through the March dawn, the hawks that hang and watch for a chance to pick one of them off, even the robins and blackbirds that flit across the lawns, are still more efficient flying machines than the best of man's inventions. They have better design, and they get more mileage out of a calorie of energy than any airplane now in existence or likely to be built.

This is brought out in a number of points in a study of bird flight which has been made by Dr. Lucien H. Warner, of White Plains. His findings will be published in detail in the forthcoming issue of *The Quarterly Review of Biology*.

Birds have so reduced the weight of other body-parts that they can devote from one sixth to one half their total weight to the flying muscles, notably the big ones that form the breast of the bird and pull the wings on the down-stroke. In the pigeon these muscles weigh as much as all other parts of the bird taken together.

The streamlining of birds' bodies has long been noticed. It shares this low-resistance shape with fishes and other swimming animals, but has the advantage of smoothing out hollows and irregularities with almost weightless feathers instead of heavy flesh. Many flying birds tuck up their feet, being prototypes of planes with retractile landing gear, and those that are too long-legged for this trail their legs so as to make the least possible resistance in flight.

Highly efficient also is the utilization of food by birds, and its combustion in the tissues to produce energy. Analysis of food remains after digestion shows that birds assimilate much more of what they eat than do mammals. Their blood carries a higher number of red corpuscles per cubic millimeter, and therefore transports more oxygen to the final burning-places of dissolved foods, which makes for more efficient energy production.

Birds have a system of breathing peculiarly adapted to the needs of flying animals. The active part of respiration is exhalation, or breathing out. This is accomplished by compression of the ribs and breastbone, which surround the lungs. Thus the more rapidly the wings are moved, the greater the amount of air forced in and out of the lungs. A bird is thus less likely to get out of breath than is a mammal, which has a breathing apparatus quite independent of its movement muscles.

Dr. Warner also discusses the different methods of flight used by birds, and offers a new theory regarding the soaring flight of such birds as hawks and buzzards. It is his belief that such birds take advantage principally of the gustiness of the wind, adjusting themselves instantly to changes in its direction or force in such a way as to exploit its energy to gain additional lift.

TROPICAL DISEASE OF CATTLE IN THE UNITED STATES

CATTLE in portions of the United States, notably in the warmer states in the Southwest and along the Gulf Coast, have been dying from a tropical disease that probably invaded this country years ago but which has only recently been recognized.

Researches on the problem by George W. Stiles, Jr., of the U. S. Department of Agriculture, showed that the ailment is anaplasmosis, a disease prevalent in many of the tropical countries of the world. Cases in this country have been found in the following states: Ari-

zona, Florida, Louisiana, Texas, California, Nevada, Kansas, Oklahoma and Missouri. It is considered probable that it exists in other states as well.

The symptoms are so much like those of tick fever that cattle afflicted with anaplasmosis have undoubtedly been charged up to the score of the older and better known disease. There is an initial high fever, which does not last long, accompanied by a rapid, tumultuous pulse. The cow "gets poorly," "goes dry," and "loses her cud." There is a great loss of flesh. Severe anemia sets in, the red corpuscle count falling as low as one eighth normal. Between a third and a half of all cases end in death.

There seems to be no danger to human beings in handling anaplasmotic animals; so far as is known at present the disease attacks only cattle. Researches to date incriminate a number of species of tick as carriers of the infection, and point suspiciously, but without conclusive evidence, at a horsefly.

The disease is also transmitted in smears of blood on carelessly handled dehorning saws. It is strongly advised that all veterinary instruments be thoroughly cleaned and sterilized between uses on different animals, to eliminate this source of infection.

Anaplasmosis is caused by the attack of a microscopic animal parasite, known as *Anaplasma marginale*. This germ gets into the blood, multiplies and invades the red corpuscles. In mild cases only one per cent. or so of the corpuscles will show the dark spots that betray the presence of the parasite, but in severe cases from 25 to 50 per cent. will be affected.

Unfortunately, cattle that have had the disease and recovered continue to harbor the germs in their blood for a long time, thus becoming dangerous "carriers" of the infection.

THE FOOD OF PROTOZOA

THE smallest and most primitive of animals, the protozoa, like a balanced diet of mixed foods, no less than larger creatures that arrogate to themselves higher places on the evolutionary ladder. At least, that is what has been learned by three Stanford University investigators—Professor J. Murray Luck, Miss Grace Sheets and John O. Thomas, regarding one of the forms of minute animal life that swarm in stagnant water.

Protozoa, like the higher animals, have very diverse tastes. Some of them feed only on living microscopic plants—cows and sheep of the microscopic world. Others are carnivorous, accepting only other protozoa as food. Still others are carrion feeders, devouring dead microorganisms.

The organism selected by Professor Luck and his associates was a plant-eater, feeding on bacteria, which are a low form of plant life. In order to start "at scratch," the Stanford scientists cleared their protozoa of the bacteria already in them, by a prolonged and difficult washing technique. Then the organisms thus sterilized were offered various kinds of bacteria to eat. It was discovered that they throve little or not at all on several different species taken separately, but when two or three kinds of bacteria were made into a "mixed ration" the protozoa grew fat and waxed very numerous.

It seems to be the living bacteria themselves that the protozoa want. In order to test a theory that they fed on some dissolved product of bacterial action, cultures of the protozoa were tried with broth in which bacteria had been grown and then removed by filtering or otherwise. But in these the protozoa failed to multiply, as they failed also in other kinds of food substances offered to them in solution.

The results of the three Stanford experimenters will be described in detail in the forthcoming issue of *The Quarterly Review of Biology*.

POLAR COLD SEEN AS AN AGENT IN THE DISTRIBUTION OF ANIMALS

ICE and the cold winds and snowstorms that blow from the face of glacial regions have been the great shepherds that arranged the world's present distribution of animal life.

This was the belief of the late Professor W. D. Matthew, of the University of California, as expressed in a contribution sent to the international scientific journal, *Scientia*, just before his death.

Looking at a globe, or at a non-distorted map of the world, Professor Matthew saw that the continents tend to bunch together at the northern "end" of the earth, with their southern tips stuck down prongwise and far apart. During the warm climatic phases which are really the normal state of world weather in the geological time sense, animals can travel about very freely in this great northern land zone, and flourish near the North Pole.

Then, when some hundreds of thousands of years of stiff winters come on, with perhaps an ice age to climax the matter, all but the very hardiest of them must move southward or perish. So long as the barrier of ice or of persistent cold weather stands against them, "East is East, and West is West, and never the twain shall meet." American animals evolve in America, Asiatic in Asia—and there is no intercontinental traffic.

Professor Matthew held that this cycle of free intercourse, followed by blockades of cold, repeated itself several times in the earth's long history. Each time it happened, it started a new series of southward migration waves, and at the same time the disturbances and hard times forced a speeding-up in the evolutionary process. So that the ice was not only a great shepherd but a great animal breeder as well.

THE CORRECTION OF CROSSEYES

A NEW method of correcting crosseyes or squint, scientifically termed strabismus, has been devised by Dr. Ernest E. Maddox, of Bournemouth, England, who recently reported his results to the Royal Society of Medicine. The new method does not claim to replace the old ways of correcting strabismus by glasses, prisms, or operation, but supplements them.

Dr. Maddox suspected that many of the more incurable cases of squint are due to persistence of the infantile

inability to coordinate the movements of the two eyes. He has developed an apparatus designed to discourage the tendency of each eye to do business on its own account instead of in partnership.

The principle which he employs is the use of the hand of the squinter to educate his squinting eye, imitating the natural process of infancy in which the hand and eye mutually perfect their training by trial and error.

This new instrument, the cheiroscope, takes its name from two Greek words meaning "hand" and "look." It is similar to the familiar stereoscope, but whereas the stereoscope is held in the hand and the eyes look straight forward at a picture placed in a carrier opposite the lenses, the cheiroscope is tipped so that the lenses are above a horizontal tray surface which replaces the picture carrier and on which the child can play or draw. The child looks down on the tray and a vertical plane divides the field of vision.

If a bead is placed on the tray beneath one eye, a ring on the other half of the tray seen by the other eye will appear surrounding the bead or may be so placed by the child. On the theory that left hand and left eye work together, as do right hand and right eye, the hand on the side of the poor eye is kept busy.

The eye belonging to the hand is tempted to the spot with which the hand is occupied and does its best to help it, even though it only wakes up to do so gradually, while at the same time the surgeon learns what the child's brain is doing by watching the hand.

It is all a game to the child. A fierce open-mouthed lion on one side can be fed by red beads on the other. The picture of a pretty little girl on one side can have a bead necklace constructed round its neck by the child, one eye all the time seeing the little girl, the other the beads.

There are modifications of this apparatus used for different degrees and types of squint. Dr. Maddox points out that there is no reason why the "hand and eye" principle should not be turned to account with an ordinary stereoscope. Here a finger on the side of the amblyopic eye must point out details of the picture and the trick of this procedure is to prevent the finger from traveling across the mid line to the picture in front of the good eye. Dr. Maddox promised that with perseverance and concentration squint training will bring results.

ITEMS

WHEN caterpillar tractors were introduced recently on Santa Rosa and Don Martin, two islands off the coast of Peru, to take the place of hand guano mining, the bird population welcomed the machines in so whole-hearted a manner that they were operated only with the greatest difficulty. The birds, known as guanayes, marched in such numbers before, behind and alongside the machines that they could scarcely be moved. The guanaye, or Peruvian cormorant, inhabits the islands in the Humboldt Current off the coast of Peru, which islands for a century provided the world with the fertilizer known as guano. In Incaic times, the guanaye was rigidly protected by law from molestation. Until recently no motor vehicle or airplane was permitted on or near the island homes, lest the guanayes be frightened.

THE elk and deer in Platt National Park, Oklahoma, refuse to stay in their paddocks, but, having got out, they also refuse to stay out, according to Superintendent William E. Branch. Part of the park is used as a game preserve by the Biological Survey, and deer, elk and buffalo are kept in fenced-in pastures. Recently all the white-tail deer leaped over their paddock fence and roamed the country for several days. They soon returned, however, of their own account. According to Mr. Branch this happens frequently, as the deer can leave at will. They always come back the way they left, by jumping the pasture fence. The elk also get restless occasionally, and sometimes get out of the paddock. They, too, always come back. The buffalo seem quite contented and never attempt to leave their paddock, although it is fenced with ordinary cow pasture fencing.

INSECTS that survive from one warm season to the next, sleeping through the winter like bears, prepare for the winter very much as bears do, by increasing the body store of fat. They further insure survival by getting rid of as much water as possible, making their body fluids difficult to freeze to the point of crystal formation, which would have fatal effects. Hibernating insects will freeze to death if their environmental conditions are disturbed, whether they are prepared for the cold or not. These are, in skeleton outline, the results of experiments by N. L. Sacharov, of the Agricultural Experiment Station at Saratov, U. S. S. R. They are set forth in a full technical paper in English in the American scientific journal *Ecology*.

STUDIES upon the compositions of the blood of different animals which have just been completed at Cornell University show that the blood of the lower forms such as fish and turtles contain nearly three times as much phosphorus as those of the higher mammals. Fish have long been reputed to be high in phosphorus but the various forms in the blood have not been studied previously. Most of the phosphorus of fish blood is concentrated in the red cells. This high phosphorus value for fish blood is interesting in the light of the meat diets used for rearing trout in most hatcheries. Brook trout grow to maturity upon food that is very rich in phosphorus, such as beef liver. One might expect bloods rich in phosphorus among the carnivorous fish but not among the omnivorous, such as carp. The bloods of both pike and carp were analyzed, however, and found to be equally high.

FOUR years afloat is the record of a bottle tossed overboard by Captain G. Gellanders, of the British steamer *Burmese Prince*, on December 8, 1926, and picked up recently among the Bahamas. The paper in the bottle gave the latitude and longitude of its launching, which showed that it had drifted probably about 6,000 miles. The find was reported by the Hydrographic Office of the U. S. Navy.