

## GENERAL SCIENCE

# "Clocks" and Fossils

The daily rhythm of activity and rest that is characteristic of animals appears to be determined by an "internal clock" located in the brain.

► THE INTERNAL "clock" that governs an animal's daily rhythm of activity and rest is in the brain, study of rats indicates.

The effect of brain surgery in changing the daily rhythm of rats was reported to the National Academy of Sciences meeting in Berkeley, Calif., by Dr. Curt P. Richter of Johns Hopkins Hospital, Baltimore.

The length of the daily activity cycle, Dr. Richter found, is independent of the effects of various drugs or of outside influences such as temperature. But apparently it can be influenced by unknown cosmic agents or by removal of the organs of smell and by thyroxin, as well as by operations on the brain.

After brain surgery, an individual rat may start its daily period of activity as much as an hour earlier each day. Another rat may start as much as 40 minutes later each day. This means such a change in the activity period that eventually the animal may change from a nocturnal animal to an animal that is active during the whole day.

One rat, after surgery, has for months started running almost exactly 26 minutes earlier each day regardless of the noise and other disturbances caused by other rats and by laboratory workers.

Such studies of animals, Dr. Richter said, may help to explain the mystery of the inverted sleeping-waking rhythm of some human patients suffering from sleeping sickness.

## Fossil Marine Animals

► MUCH of the earth now described as temperate in climate was probably tropical just a few million years ago.

Studies of fossil marine invertebrates, animals without backbones, indicate that some

60,000,000 years ago tropical temperatures extended up above the middle latitudes, Dr. J. Wyatt Durham of the University of California reported.

The fossils appear to be closely related to modern warm water animals, Dr. Durham told scientists at the Academy of Sciences meeting. This also appears to support theories that continents and the geographic poles were in their present position 60,000,000 years ago and that they probably had not changed position since even 500,000,000 years ago.

During this time it appears the tropical zone was more widespread than now, Dr. Durham concluded. Restricted tropics, including those of the present time, are probably abnormal, he said.

## Hypnosis Susceptibility

► THE MOST easily hypnotized persons are those who are well-adjusted and outgoing, Dr. Ernest R. Hilgard, psychologist of Stanford University, reported to the Academy.

They are not especially the submissive, "follower" type, he said, but are capable of taking the role of leader as well as that of follower.

Dr. Hilgard learned of the characteristics of especially hypnotizable persons by study of a group of 74 students. Attempts were made to hypnotize the students individually by a standard procedure. Those who were most susceptible to hypnosis and those who resisted it most strongly were interviewed by a psychiatrist.

It is planned to construct a personality inventory that will predict susceptibility to hypnosis.

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## METALLURGY

# Study Metal Extraction

► HOW TO EXTRACT the metals contained in the billions of tons of nodules on the ocean's floor is being studied by two University of California engineers.

Nodules are small, brown-black stones, usually less than six inches in diameter, that dot some 40,000,000 square miles of the floors of the world's oceans. Millions of years ago they began growing around bits of volcanic glass, pumice, clay and such oddities as sharks' teeth.

It is believed the nodules could be recovered with present technology, using such equipment as a huge dredge resembling a vacuum cleaner, artificial light sources and television cameras.

The problem Dr. Herbert E. Hawkes and

John Mero are studying is how to process the nodules and separate them into metals at competitive prices.

Mining nodules could be especially important in giving the United States a source of the important minerals, manganese. Almost all manganese used in the United States is imported.

Recently scientists at the University of California's Scripps Institution of Oceanography, La Jolla, discovered and explored a huge store of nodules in relatively shallow waters off the French-owned Tuamotu Islands in the South Pacific.

Nodules recovered from this area during Scripps's Downwind Expedition contained approximately 25% manganese, 15% iron,

and lesser amounts of nickel, copper and cobalt, as well as a number of rare earth metals.

A new mineral processing technique for nodule mining is needed since no suitable processing method exists.

Studies of nodule distribution suggest that "vacuuming" one square mile of ocean bottom in a good location would yield approximately 6,000 tons of manganese, 4,000 tons of iron, and 125 tons each of nickel, copper and cobalt. Converted to dollars and cents, this would amount at present values to about \$750,000 worth of manganese ore, \$40,000 worth of iron ore, \$180,000 worth of nickel, \$60,000 worth of copper and \$500,000 worth of cobalt.

Since all the nodules lie in areas beyond the three-mile limit, a legal claim is not recognized and competition between countries could become intense.

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## ZOOLOGY

## Prairie Dog Population Declining Fast

► IN ABOUT ten years the prairie dog may join the growing list of extinct animals.

Today the prairie dog population in Kansas is being severely reduced. While the small rodents had some 2,500,000 Kansas acres to roam on in 1903, now they have about 57,000 acres or less than one-fiftieth of that land. In 1958 it is expected the prairie dogs will lose another one-fourth of their Kansas living space, Ronald E. Smith of the University of Kansas Museum of Natural History and State Biology Survey said.

Grazing and cultivation of the land has been largely responsible for the animal's decline, Mr. Smith said. The prairie dog, which is a plant eater, is sometimes responsible for damage to crops.

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## PALEONTOLOGY

## Fossil of Canada Goose Points to Long History

► THE CANADA goose has been around for a long time and in many different parts of the country.

New fossil remains found in St. Paul now place the bird in Minnesota as well as Oregon, California, Florida and Nevada, Dr. Alexander Wetmore, research associate at the Smithsonian Institution, reports.

Apparently, Dr. Wetmore explained, the goose maintained itself as a species throughout the great glacial period that preceded modern times. The St. Paul fossil, a fragment of wing bone, marks a new point for Pleistocene records of the Canada goose; it can be dated as belonging to the early Pleistocene which began approximately 1,000,000 years ago.

Scott K. Wright of St. Paul found the wing bone fragment at the bottom of a large trench being dug in an ancient peat bog by the city water department. Remains of an ice-age species of bison were also found in the same trench.

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