

dential address on "Some Chemical Aspects of Life" before the annual meeting in Leicester of the British Association for the Advancement of Science, of which organization he is also president.

The principal dammer-up of cosmic energy used by living things is chlorophyll, the green coloring matter of common plants. The energy captured from the sun by leaves runs practically all living things on earth today. But the earliest living things, Sir Frederick said, were hardly as complicated as modern higher plants. More probably they built up supplies of energy as some free-living bacteria still do, by the capture and use of wholly inorganic substances such as sulfur, iron and ammonia. A little higher in the scale are bacteria with a purple pigment that enables them to capture sunlight energy for use in building up food-sources of energy.

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## PSYCHOLOGY

## Homesickness Preserves Family More Than Sex

**T**HE INFLUENCE holding the family is more homesickness than it is sexual, Dr. Beardsley Ruml, of the University of Chicago, told the meeting of the American Psychological Association in Chicago this week. And this feeling has other very important effects on society.

Milder forms of homesickness, known to the psychologist as "nostalgic sentiments," have to do not only with the place thought of as home, but with persons, time, and even with abstract symbols.

"They are the foundation of patriotism, nationality," Dr. Ruml said. "They operate to increase vocational and class stability and tend to promote conservatism in all forms.

"Aesthetic sentiments are in large part nostalgic, as is the romantic attitude generally. The large part played by nostalgic sentiments in religious experience is evident."

The longing for home and the familiar is not confined to any particular culture. It is commonly observed among primitive peoples. Even animals are affected, as is the dog.

Failure to properly evaluate the importance of nostalgic sentiments has seriously hampered the social sciences, and their application to statesmanship and social control, Dr. Ruml concluded.

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## BIOCHEMISTRY

# Centrifugal Analysis of Blood Indicates Species Relations

## Rate of Pigment Separation at 75,000 Rotation Per Minute Is Basis of New Method Developed by Swedish Biologist

**U**SING centrifugal force some four hundred thousand times the force of gravity to study the relationship of animals is the latest achievement of Dr. Theodore Svedberg, of the University of Upsala, Sweden. In a lecture at the Woods Hole Marine Biological Laboratory, he described the application of this method to studies of blood of various animals.

The carriers of oxygen in the blood are colored substances called blood pigments. They are different in different animals, possessing differing molecular weights and structures. Therefore, if shaken up with a water solution they tend to fall to the bottom at different rates. To study these different rates at times short enough to be measurable it is necessary, however, to use forces that greatly exceed the force of gravity.

Dr. Svedberg has managed to produce this force by means of what is known as the ultra-centrifuge, a cell that holds the liquid to be tested, and is revolved at the terrific speed of 75,000 rotations per minute. To reduce friction it is necessary to have the entire rotating part of the apparatus in an atmosphere of pure nitrogen at a pressure about one-thirtieth that of the atmosphere.

It is as though an automobile were to keep turning a corner at a speed of about three hundred miles an hour.

Pictures are taken through crystalline quartz windows as the centrifuge revolves, and these pictures are then run through an instrument which measures exactly the density of the image, thus giving a more precise knowledge of where the blood pigment being tested was in the cell at the moment the picture was taken than is possible to the human eye.

From these studies it has been found that the blood pigments of some of the lower organisms are much more complex than man's, having molecular weights of the order of a million, as contrasted with the comparatively low one of 64,000 which is possessed by hemoglobin.

Dr. Svedberg suggests that the method may be used to tell different species apart in cases where the study of the form of the animal does not exactly place it in relation to the other animals of the same group.

Using a centrifuge that revolves at such high speeds is quite dangerous, for should some accident occur, the tremendous speed will result simply in an explosion.

"In the explosions we have experienced, the rotor has stayed inside the casing," Dr. Svedberg said.

This casing is made of special alloys, as are the other parts of the instrument, and is so constructed that the force of an explosion will be distributed partly to the foundation of the building.

Dr. Svedberg has carried back with him to Sweden for further study specimens of blood of several American marine animals, secured at the Oceanographic Research Laboratories, Woods Hole, Mass.

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## PALEONTOLOGY

## Small Saber-Tooth Cat Found In Idaho Fossil Bed

**A**SABER-TOOTH cat species much smaller than the great tiger-sized animals made famous by the California tar-pit finds is represented by a jaw fragment from Idaho described in the current *Journal of Mammalogy* by Dr. C. Lewis Gazin of the U. S. National Museum. Another new species of extinct cat found in the same region resembles the modern puma or mountain lion.

These fossils were found among a mass of bones of extinct species of horses collected by paleontologists of the Museum. The stratum in which the find was made is of Pliocene age, perhaps two or three million years old, and dating before the coming of the great glaciers that once covered most of this continent.

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