

species. This is resulting in activities looking toward their protection and preservation.

The koala or "native bear," an animal looking more or less like a bear but really a marsupial related to the kangaroo and the opossum, is an object of special solicitude. In New South Wales and other regions where it has been exterminated, efforts are being made to reintroduce it.

The so-called marsupial wolf or thylacine, not so harmless and good-natured as the koala, has been mercilessly hunted and now survives only in northwest Tasmania. The government of Tasmania has lately taken steps to protect the survivors of the species, and now forbids the exportation of thylacine pelts.

The Australian opossum is another animal that is being over-hunted. In the state of Victoria alone, which has a three-month open season, at least one million are killed annually, and conservationists are becoming concerned lest the fur trade destroy itself through its own over-eagerness for profits. New South Wales is the only state where the opossum is given official protection.

Although there are laws on the books to protect the native animal and plant life of Australia and Tasmania, there are not enough rangers in service to secure proper enforcement. However, voluntary assistance of interested persons is now being enlisted; and there is a movement on foot to establish nature sanctuaries and parks.

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#### GENETICS

### Two-Sexed Corn Strain Obtained By Breeding

**C**ORN PLANTS with male and female flowers on separate individuals instead of in tassel and ear on the same stalk, as in ordinary corn, have been obtained as the result of breeding experiments by Dr. Donald F. Jones of the Connecticut Agricultural Experiment Station. Dr. Jones started with two strains of corn, one of them with silkless, and therefore sterile ears, where the female flowers are borne; the other with the tassels unable to produce the fertilizing pollen. By means of breeding procedure he has been able to make these characters permanent, changing an hermaphrodite or double-sexed organism into a dioecious or single-sexed organism.

Dr. Jones' report appeared in *Science*.

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#### AERONAUTICS

## Four Mile Per Minute Wind Possible in New Tunnel

### Air Speed in New Apparatus at Guggenheim Aeronautical Laboratory, Pasadena, Exceeds Hope of Designers

**A**N ARTIFICIAL windstorm blowing 240 miles per hour has been found possible in the remarkable wind tunnel recently constructed at Pasadena for the California Institute of Technology. The outfit is a feature of the new Guggenheim Aeronautical Laboratory. This velocity exceeds the original hopes of the designers.

A wind tunnel enables airplane investigators to reverse the conditions of normal flying with obvious experimental convenience. One simply runs the air past a stationary plane instead of running the plane through stationary air.

The Pasadena tunnel might be likened to a huge reinforced concrete doughnut, flattened to an oval contour and set on edge. The aeronautical laboratory itself is built around the tunnel. The "doughnut" is of course hollow, and varies from ten to twenty feet in cross section. A striking view of the interior of the tunnel and of the huge fan that drives air through it is shown on the front cover. At this point the tunnel is fifteen feet in diameter.

A large direct current motor, mounted in the lower run of the tunnel, delivers 750 horsepower to a propeller. Air is driven in an endless circle to the upper level, where tests are made, and return. A section about thirty-five feet in length along the upper level is accessible to airplane parts and instruments. The investigator watches the hurricane through a curved window.

The apparatus was designed by Prof. Harry Bateman and Prof. Clark Millikan, in consultation with the European expert, Theodor von Karman. The latter has become director of aeronautical research activities at the Institute.

The air in motion is not seriously retarded by the tunnel walls. Upon its return to the motor after the first round trip it is again accelerated, and its velocity mounts until 200 miles is reached or even exceeded. The smooth interior finish, and polished curved steel baffles on the corners, permit the air to sneak around turns like a snake, without getting stirred up.

In practice the speed is held down to 200 miles to avoid undue strain. Even then the air becomes hot from friction without thermal relief. Velocity tests at numerous places show that the rate is uniform, not varying as much as two per cent. from place to place across the stream. This permits accurate tests of air pressure against airplane wings, fuselages, etc.

Since 200 miles per hour exceeds common flying speeds, the Pasadena experts are enabled to work with small models which can be gotten into the tunnel. It is then practicable to calculate reasonably what a real airplane, which is larger, will do with a proportionally smaller velocity.

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#### PUBLIC HEALTH

### Fluorine in Water Causes Spotted Teeth

**W**HAT IS believed to be definite proof that mottled and corroded teeth in Arizona are caused by the existence of fluorine in drinking water has been announced by Dr. Margaret Cammack Smith, nutrition chemist of the University of Arizona.

Mottled teeth, an endemic developmental imperfection of the enamel of the teeth, first came to the attention of leading dentists in America in 1906. The existence of communities suffering from a disease of the teeth has long been known but a thorough study was not made until 1916.

Dr. Smith has worked out experiments with white rats and dogs in securing her results. Samples of water from the affected areas revealed abnormal amounts of fluorine in combination with some other substance, usually calcium. This calcium fluoride was found to act on the teeth of children before the teeth erupt. The sulphuric acid test revealed hydrofluoric acid in all of the tests and successfully etched glass.

However, in Dr. Smith's opinion not all of the disease is traced directly to

fluorine. She believes that the condition is in addition caused by unfavorable nutrition. Dr. Smith, assisted by Miss Edith Lantz, research assistant in nutrition at the university, received accurate results in working with animals and secured mottled teeth in animals given the water with fluorine content.

Recent experiments conducted in other parts of the United States reveal that fluorine is also present in other districts where mottled teeth are prevalent.

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## PSYCHOLOGY

## Temperament and Health Possibly Correlated

**C**ERTAIN physical makeups are associated with certain types of temperament, it is indicated by a report made last week to the Association of Consulting Psychologists by Drs. L. P. Herrington and W. R. Miles.

Of a group of 550 Stanford University men, it was found that those classified by psychologists as introverts, or having a self-centered personality, had less athletic ability, had required more medical service, and had undergone more major surgical operations.

The investigation was made by Dr. Herrington at Stanford, under the direction of Dr. Miles, who was then at Stanford, but now spending his sabbatical leave at Yale's Institute of Human Relations.

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## PHYSICS

# Michelson's Last Experiment To be Finished by Associates

## While on Death Bed Famous Scientist Dictates Outline of Paper to Announce Most Precise Value of Speed of Light

**D**R. ALBERT A. MICHELSON'S last and most accurate measurement of the velocity of light, interrupted by his death, will be completed. His associates, Dr. Francis G. Pease of Mt. Wilson Observatory and Dr. Fred Pearson, who was Dr. Michelson's assistant for twenty years, will finish the experiment, still in progress, as originally planned by Dr. Michelson. But the world's most precise determination of the speed of light had progressed sufficiently far before Dr. Michelson's death to allow him and his associates to arrive at a tentative value.

"The tentative value for the velocity of light resulting from this experiment is about the same as that obtained by Dr. Michelson's experiment on Mt. Wilson," Dr. Pease has informed Science Service.

Just four days before his death, Dr. Michelson dictated from his sickbed the outline of the scientific paper which will eventually announce to the scientific world the most precise value of light's velocity, one of the most fundamental values in physics.

The mile-long tube in which the present light experiments are performed is located on Irvine Ranch, near Santa Ana, south of Pasadena. In erecting this unique laboratory, Dr. Michelson had the cooperation and support of, the Mt. Wilson Observatory of the Carnegie Institution.

The long tube in which the tests are made cost \$50,000 and took two years to complete. Its length was accurately measured by experts of the U. S. Coast and Geodetic Survey with an accuracy of one part in a million. It is three feet in diameter and its welded construction made it possible to exhaust practically all of the air within it. To exhaust the thousands of cubic feet of air in the pipe, vacuum pumps are run day and night. Only 125 cubic feet of air, measured on the basis of ordinary atmospheric pressure, are left in the tube during the tests.

The Michelson tube gives science's first opportunity here on earth for measuring light's velocity in vacuo, approximately the condition to which it is subjected as it speeds through outer space. Dr. Michelson's previous light velocity measurements were made by sending a beam of light from a distant mountain peak to a revolving mirror on Mt. Wilson, where the famous Carnegie Institution observatory and world's largest telescope are located.

The 1926 experiments on light traveling twenty-two miles from Mt. San Antonio to Mt. Wilson gave a light velocity of 299,796 kilometers per second, or 186,290 miles per second. This is believed to be accurate to within 4 kilometers per second or about three miles per second. So precisely will the velocity of light be known when the present experiments are completed that it will be possible to use the speed of light as a measuring stick in precise surveying.

Dr. Michelson made his first experiments on the velocity of light shortly after he finished his studies at Annapolis and while he was still in the Navy.

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**ATTACKING THE AIR WITH PICK AND SHOVEL**

The 250 tons of urea shown in this picture, the largest store in the world, at Oppau, Germany, is made in part from the nitrogen of the air. The huge mass suggests the great scale of modern industrial chemical operations. Unbreakable porcelain will shortly be made from a compound of urea and formaldehyde. A plastic material is first formed by the action of formaldehyde on urea, and this can be pressed hot into any desired form.