

## CYTOLOGY

## Minute Objects in Cells May Be Heredity Carriers

**E**XCEEDINGLY minute objects, smaller than the smallest things hitherto seen in the nuclei of living cells, considered to be possibly the bearers of heredity, have been detected by Dr. John Belling of the Carnegie Institution of Washington, working at the University of California. They were described in connection with the annual exhibition of the results of research work by Carnegie Institution scientists.

Within every cell there is a nucleus, a rounded body that is its center of vital activity. Within the nucleus are chromosomes, small sausage-shaped objects that have long been regarded in a general way as bearers of hereditary traits. Each chromosome is divided up into little bead-like knots or lumps, called chromomeres. Until recently, these chromomeres have been the smallest units of the nuclear contents that have been detected.

Working with new and exceedingly delicate microscopic technique, Dr. Belling has seen within the chromomeres still smaller objects. These are what he thinks are possibly either the hereditary units, or genes themselves, or at least the bearers of the genes.

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## PHYSICS

## Light Color Unchanged By Electric Force

**A**N EXPERIMENT similar to one which first helped confirm the Einstein relativity theory has been carried out at the California Institute of Technology by Dr. Roy J. Kennedy and Dr. Edward M. Thorndike. The experiment was aimed to find out whether a strong electric force could change the wavelength of light rays. The wavelength was measured in this work with an accuracy of two parts in a billion, but no change in wavelength because of the electric field was found.

The gravitational attraction of a dense star, Einstein predicted, should cause a reddening of the light emitted by an atom on the surface of the star. As this guess was brilliantly verified by experiment, it occurred to Dr. Kennedy and Dr. Thorndike that an electrical attraction might cause a similar change in the spectrum frequencies.

The experiment consisted essentially in comparing the frequency of a spectral

line from a light source at zero electric pressure with that of the same source under identical conditions except that the electrical pressure of the source was raised to 50,000 volts above the observing apparatus.

The measuring apparatus consisted of an interferometer like that used in the famous Michelson-Morley experiment—starting point of the relativity theory—but was made almost entirely of fused quartz. This substance has the advantage of being less subject to changes of size with temperature change than almost any other material.

Even a negative result in this experiment, is of great importance for the unified field theory of gravitation, electricity and magnetism, that Einstein and other leading mathematical physicists have been working on.

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## ENGINEERING

## Capacity of Well Tripled By Use of Gravel Wall

**H**OW TO INCREASE the capacity of a well drilled in sandy strata by placing a gravel wall at the bottom end of the well casing, is explained by F. T. Quinn, Jr., in a report to the American Water Works Association.

Mr. Quinn cites among others the case of a New Jersey plant. Ten wells scattered over as many acres in an attempt to secure an adequate water supply, produced a total of only 1,200 gallons of water per minute. With the introduction of the gravel wall, one well produced 2,400 gallons per minute, twice as much as the combined output of the ten ordinary wells.

When wells are drilled in sandy strata, Mr. Quinn explains, it becomes necessary to use a metal screen at the lower end to prevent the entrance of foreign particles. As the water is drawn into the well by the pumping action, fine sand is carried with it and this sand cuts away the screen grating or clogs it up. Such an effect increases with the velocity of the water flow into the well. Consequently, the capacity of the well is limited. By feeding the proper kind of rough gravel into the space between the outer and inner well casings, a circular wall may be built up around the metal screen about three times the diameter of the screen tube. The gravel wall acts as a screen itself and triples the quantity of filtered water which can be drawn into the well at the original velocity.

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# IN SCIENCE

## ARCHAEOLOGY

## Holiday Feasting in Egypt Followed by Castor Oil

**E**VEN in ancient Egypt, when small boys—and maybe big boys, too—sat down to holiday feasting, they sometimes had eyes bigger than their stomachs, with the usual unhappy result.

And even in ancient Egypt, the stomachache medicine was often castor oil.

This thought on feasting, appropriate to the Christmas season, has been brought to public notice by L. E. Warren, in the *Journal of the American Pharmaceutical Association*.

In the famous Ebers papyrus, which contains much information on Egyptian medical practices, Mr. Warren has found eighteen drugs that are still sufficiently important to be included in the United States Pharmacopoeia. Castor oil is one of these. So are peppermint and bicarbonate of soda, two other first aids to the over-enthusiastic feaster. Formula after formula in the Egyptian doctor's book called for castor oil.

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## ORNITHOLOGY

## Rare Birds in Collection Given to Harvard Museum

**T**HIRTY THOUSAND mounted bird specimens, comprising perhaps the finest existing private collection of North American birds, have been given to the Museum of Comparative Zoology at Harvard by the owner and collector, John Eliot Thayer, himself a Harvard alumnus. In addition to the 30,000 skins, the collection contains also many thousands of nests and eggs.

The Thayer collection brings to Harvard a number of priceless specimens of birds now extinct, including the Labrador duck, the passenger pigeon and the Eskimo curlew. There are also ten eggs of the great auk, extinct since 1845, and several California condor eggs. The California condor is not extinct, but is exceedingly rare; and its eggs are rarer still, for the bird lays but one in two years.

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# E FIELDS

## PHYSICS

## Speed Limits Observed By Racing Molecules

A MOLECULAR race in which speed limits were set was described to the meeting of the American Physical Society at Berkeley, Calif., in a paper by Drs. I. Estermann and R. Frisch, and Prof. O. Stern of the University of Hamburg.

At the start of the race, fast and slow molecules mingled in complete confusion. The course of the race led, however, between the teeth of wheels which revolved in a troublesome way. The series of wheels, in fact, was arranged by the experimenters so that only molecules between certain speeds could complete the race. The others were conveniently caught by the teeth.

The object of this scientific handicapping was not to aid betting men but to obtain a new test of the de Broglie theory that moving material particles behave like waves on striking the surface of a suitable crystal.

The direction of scattering of the molecules after striking a crystal of lithium fluoride in this experiment agreed perfectly with the de Broglie formula. Different speeds were then selected by making the toothed wheels revolve at different speeds. A further check was thus made of the Maxwell distribution law of molecular velocities in a body of gas.

Thus a fundamental part of the kinetic theory of matter was subjected to a new kind of direct test.

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## MEDICINE

## Infantile Paralysis Germ May Attack Through Nose

FURTHER EVIDENCE indicating that the infantile paralysis germ probably gets into the body by way of the nose is reported in *Science* by Dr. Simon Flexner of the Rockefeller Institute for Medical Research at New York.

Dr. Flexner calls attention to the regular time interval between exposure to infantile paralysis and development

of the disease. This interval is called the incubation period. When several cases of the disease occur in a family or a group of children, the first symptoms of the disease appear in all the children at the same time or nearly so. The same regularity of incubation is seen in monkeys that have been inoculated by dropping a potent virus in the nose. When the germs are introduced into monkeys in other ways, the animals do not always develop the disease, and when they do, the incubation period is not regular and the animals in the group inoculated at the same time do not all get ill at the same time.

The regularity and simultaneity with which the disease can be produced experimentally in monkeys by inoculating them through the nose gives additional support to the view that the germ gets into the human body by the same route, said Dr. Flexner.

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## AVIATION

## Two Stratosphere Planes Now Under Construction

THE WIDELY held belief that air-planes in the stratosphere would be able to travel at almost limitless speeds and consume little power has been shattered by Prof. Alexander Klemin of the Guggenheim School of Aeronautics at New York University.

"Even if the engine power is fully maintained in rarefied air of great altitude there is a definite limit to the speed at which a plane can fly," he stated at the American Museum of Natural History. "It is entirely premature at this time to talk of speeds of 1,000 miles per hour. It should, however, be quite possible to double the top speed of a transport plane, and instead of cruising at 150 miles per hour it should be possible to fly at 300 or even 500 miles per hour at 60,000 or 65,000 feet. For such flying the engine will have to be supercharged with extreme care and the cabin will have to be made air tight and provided with means for compressing the air and delivering it to the occupants.

"Two stratosphere planes are now in process of construction, one in Germany and one in France. They are being built along these principles and are almost sure to be successful, barring unforeseen accidents. Therefore, high altitude stratosphere flight is within reasonable distance."

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## ENGINEERING

## Find Buried Boundaries of Early American Surveys

JUST AS archaeologists dig up evidences of ancient civilizations in Egypt, Greece and Italy, so civil engineers in this country are now rediscovering lost boundary lines and buried corner stones that were used to mark off the country as it was opened for settlement as much as 125 years ago.

Locating the lost boundaries is a job for a detective as well as an engineer, Prof. J. S. Dodds of Iowa State College declared in an article in *Civil Engineering*. Sometimes the corners can be found from marks blazed on trees as far back as 1785. Digging may also be necessary, for the stone markers are often buried. Again the solution may be written in fence lines, tree rows or building lines which were originally oriented from the section corner.

Hostile Indians, wild animals, dense forests, poor equipment and sometimes poorly qualified and insincere surveyors may be blamed for the many errors found in old surveys, Prof. Dodds said.

Though information found by the resurvey does not necessarily affect ownership of land, neighbors often adjust property lines as suggested by the original survey, swapping a few acres here and there.

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## ASTRONOMY

## Great Meteor Shower Expected Next November

THOUGH the display of Leonid meteors, or shooting stars, last month was the finest seen since 1866, according to many observers, next November is likely to bring a display even greater, perhaps as fine as the great showers of 1799 and 1833, when the whole sky was covered with the flashing bodies. Calculations made by members of the Computing Section of the British Astronomical Association indicate that Temple's comet, whose path the meteors follows, will be closest to the sun next November 1, and that it will make a close approach to the earth about the middle of the month. It appears that the greatest display will occur in the night of November 16 and early morning of November 17, which is the same time that it was observed this year and in 1930. The richest part of the shower may occur after dawn in England.

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