



#### COLD-BLOODED MATERNITY

*The joys of motherhood are too often thought of as a monopoly of warm-blooded creatures: we think altogether of the woman in her home, the lioness in her den, the brooding bird on her nest. Yet even the alien creatures in the cold-blooded phyla are not shut out from a knowledge of maternal solicitude. If they cannot keep their offspring warm, and nourish them with milk, many of them jealously guard their eggs, or even attach them to their bodies and laboriously carry them about during the time of incubation. In this picture Cornelia Clarke shows the personal "nursery" of a crayfish.*

worked flints and other artifacts associated with the bones of long-extinct animals has roused much speculation and discussion, said Prof. A. S. Romer, of the University of Chicago. Bones of elephants, ground-sloths, giant bison and other ice-age animals have been found in geological formations belonging to the last days of the glacial period, so that finding these with relics of human occupation presents no special difficulties. But human traces have also been found with the bones of extinct species of camel, horse and other animals, and about these there seem to be difficulties aplenty. For these latter beasts are supposed by some scientists to have been extinct for half a million years at least, while the human bones are like those of modern Indians and the flints and other implements are also "modern" in type.

In Prof. Romer's opinion the apparent discrepancy in age between man and animals whose remains are found together is not to be sought by supposing the men to have been as ancient as 500,000 years, but by adopting the idea that the animals lived on a good deal longer than they were at first supposed to have done. Thus we might have man on this continent hunting humpless camels and giant ground-sloths as recently as 20,000, or perhaps only 10,000 years ago.

#### Gypsum Cane Discussed

The significance of the human and animal remains in the now famous Gypsum Cave in Nevada was discussed by M. R. Harrington, of the Southwest Museum, Los Angeles. Deposits in this

cave indicated successive occupations by ancient men at a time when horses and camels roamed the country, as a den by giant ground-sloths whom other ancient men hunted, by Basket-Maker Indians of some three thousand years ago, by early Pueblos and finally by the modern southern Paiute Indians.

The presence of extinct horses and camels indicates a fairly moist, rainy climate, quite unlike the aridity of the region at present, Mr. Harrington said. This was followed by a drier time, when the region was invaded by the great sloths, and this in turn by the full desert conditions of modern times. The rainy epoch, he believes, coincided with the last days of the glaciers on this continent.

*Science News Letter, June 20, 1931*

#### PHYSICS

## New Slow Electron Compass Points East Instead of North

**A** NEW compass using no magnet has been devised for airplanes by Dr. Ernest Brüche of the Technical University of Dantzig. A stream of electrons scintillating on a screen is used in this device and differences in the way the apparatus is pointed are shown in changes of the trace of the electrons on the screen.

The device is similar to the electric vacuum-discharge tube invented by Sir William Crookes in which the existence

#### MEDICINE

## X-Rays Relieve Baby's Stomach Obstruction

**X**-RAY TREATMENT relieves obstruction of the lower opening of the stomach in new-born infants, Dr. Orville Barbour of Peoria, Ill., told members of the American Medical Association. He reported that the method was successfully used in 33 out of 37 cases during the last five years.

This condition, known by the medical term of pyloric stenosis, is extremely serious. The obstruction prevents the food from passing through the infant's alimentary tract in the normal way and severe vomiting occurs.

Special diets, drugs, and surgical operation to remove the obstruction have all been found effective methods of relieving the condition in many cases. The advantage of the new method which employs X-rays is the saving of time. The radiation takes effect within 24 hours if it is effective at all, whereas if medical treatment is tried it may require a week or two to be effective. By that time, if it is not effective, the child may be so weakened that he cannot stand an operation, if one is considered necessary.

Dr. Barbour and associates discovered the effects of the X-rays accidentally. They were making an X-ray photograph preparatory to an operation when they noticed that after the exposure to the rays, the vomiting ceased. This cessation was temporary at first, but became permanent in response to subsequent application of the X-rays.

*Science News Letter, June 20, 1931*

of the electron was first discovered. It has been known since the time of the German physicist, Wilhelm Hittorf, that a horseshoe magnet placed near such a tube will bend the stream of electrons out of their straight course. However, the magnetic forces of the earth which cause a mariner's magnet to swing towards the north are much too small to show any effect on the electrons of the Crookes tube.

The reason for this is that the elec-

trons are travelling too fast—actually about 30,000 to 100,000 kilometers per second. Brüche and his colleague Mayer decided that if only slow electrons were used under the same circumstances the deflection by the earth's magnetism would be big enough to be seen. This proved to be the case. Using only 200 volts instead of 2,000 volts, electrons of 8,500 kilometers per second were found to be bent towards the east nearly half an inch from their true course. Thus the electron-compass points to the east instead of to the north like the magnetic compass.

A great advantage of the new compass is that the electrons are without inertia and therefore show changes in direction instantaneously. An ordinary magnetic needle, because of its massiveness, takes a definite time to respond to changes in the magnetic force imposed upon it.

On the other hand the position of the glowing spot on the fluorescent screen is difficult to read and the batteries for heating the cathode and speeding up the electrons make the compass as a whole too heavy, in fact about 33 pounds. The invention is still in the stage of development.

*Science News Letter, June 20, 1931*

## SEISMOLOGY

## New Seismograph Records Earthquakes Beneath It

A SEISMOGRAPH designed especially for the job of recording an earthquake going on right underneath it was described before the meeting of the eastern section of the Seismological Society of America at Columbia, S. C., last week, by Arthur J. Weed of the University of Virginia. An instrument of this kind has been long desired by students of earthquakes, because all the existing types of seismographs are designed more for the detection of earthquakes occurring at long distances, and are so delicate that if a quake occurs near at hand their records go clear off the paper; or the instrument may be wrecked outright. They are also usually very costly.

What was wanted was a less sensitive instrument, costing not more than \$50, which would automatically start its record as soon as a strong earth motion disturbed it and keep going for a few minutes, registering amplitude and direction of each movement. These requirements, Mr. Weed stated, are met in the instrument he demonstrated before the society.

*Science News Letter, June 20, 1931*

## ASTRONOMY-PHYSICS

# Death of Universe Required by Physical Law May be Avoided

## Prof. Tolman Explains a Mathematical Universe Which Reverses the Belief That the World is Running Down

THE UNIVERSE may be immortal. The universal truth of one of the greatest laws of all physics, the second law of thermodynamics which requires a dying universe, was seriously questioned by Prof. Richard Tolman of the California Institute of Technology before the American Association for the Advancement of Science at Pasadena.

This law, invulnerable since it was formulated by the great physicists of the last century, Clausius and Kelvin, leaves no escape from the conclusion that the universe must eventually cool down and all its motions slow up until a meaningless inactivity pervades everything. Prof. Tolman, by a detailed analysis, has shown a way out from this unattractive conclusion, which heretofore has been criticized only on the vaguest grounds.

Prof. Tolman has reached this result by incorporating the principles of the relativity theory in classical thermodynamics. It is made all the more acceptable by the fact that his reasoning gives an explanation for one of the greatest of modern astronomical mysteries: the fact that the universe is apparently bursting apart at a tremendous rate.

Prof. Tolman begins by setting up a hypothetical simplified universe of his own, whose behavior he can study with some certainty. He finds that in it an observer provided with a rigid meter stick for making measurements, would make certain deductions about

that part of the phantom universe in which he found himself, but these would be quite wrong for the universe as a whole. Dr. Tolman believes that this is just what may be happening to our scientific men, who, after all, can study only a small part of the whole universe at one time.

### A Simple Universe

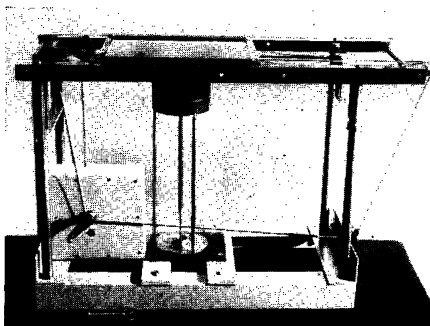
Prof. Tolman's universe is a very simple one in which only a mathematician would be happy. It is filled evenly with a mixture of gas and radiation—something very different from the universe as astronomers know it and yet useful for certain scientific purposes.

The hypothetical observer would conclude that the "entropy" or mixed-upness of his universe was increasing and yet the entropy of the universe would actually be constant, taken as a whole. He would also find that matter in this region was being annihilated, that the energy and temperature of the region was dropping, and that radiation was flowing out of the region into surrounding space, which would thus appear to be at a lower temperature than the material in his own vicinity. It is from just these facts that scientists at present draw their pessimistic conclusions as to the fate of our world.

However, from the standpoint of the relativistic thermodynamics invented by Prof. Tolman himself, all the processes in such a hypothetical system would be taking place reversibly without increase in entropy and no final dissipation of energy would occur within it.

Such a universe, said Prof. Tolman, would continuously expand by the transformation of matter into radiation. As a matter of fact our own universe appears to be doing just this. The distant nebulae are rushing away from us at tremendous speeds and thus the real universe is constantly expanding. This conclusion has been drawn by Dr. Edwin P. Hubble of the Mount Wilson Observatory as a result of the red shift observed in the spectra of light received from these distant outposts of space.

*Science News Letter, June 20, 1931*



**WHEN THE EARTH SHAKES**  
—directly underneath this new seismograph, it will write a record of the occurrence on a moving paper strip.