

mation of heavy atomic hearts from the hearts of lighter atoms. Another theory, stated by Abbé Georges Lemaitre, the Belgian physicist, attributes them to the original explosion of the universe, and he postulates that the original fragments of this explosion that are still flying about may be the cosmic rays.

Balloon flights, both manned and unmanned, study the effects of the cosmic rays and see if they increase with altitude. Physicists have thought that if the primary cosmic rays are photons these effects should reach a maximum intensity and then fall off to zero as the surface of the atmosphere is reached. However if they are electrically charged particles the effects will increase steadily and approach a maximum at the top.

Measurements up to the present have shown definitely that charged particles are present but they do not exclude absolutely the photon hypothesis. It is the hope of scientists that a successful high altitude flight will decide this question and that is the chief reason for all the effort expended on these ventures.

**New Ideas on Reducing**

A champion may lose five pounds in a Davis Cup tennis match but atoms lose very little weight when they dissipate energy. Strangely enough if they move fast enough they appear to gain weight.

Physicists believe that weight or mass and work or energy may be one and the same thing. When atomic hearts are broken down or built up mass may disappear with the emission of enormous amounts of energy. Conversely energy exerted in causing the change may appear in the form of a heavier atom core. First it is work and then it is weight, or perhaps work again.

The simplest relativity theory predicted that if an elementary particle such

as the electron were speeded up to velocities approaching the velocity of light, 186,000 miles per second, it would become heavier and heavier. If it could be made to go at just that speed, which is the maximum speed limit in the universe, it would become infinitely heavy. This is just another way of saying that it is impossible to break that ultimate speed record, more than seven times around the world in less than a second.

**Trick Mountain Climbers**

Why not slip through a mountain instead of climbing over it, and then pull the hole shut after you?

This sounds impossible for any human to do, but physicists struggling with the "new deal" in their science have decided that this is an approximate picture of the way captive particles escape from the valleys that are the centers of all atoms. It would take about 25,000,000,000,000 of these hollows and ridges placed side by side to cover only one inch. The captive particles do not have enough energy to climb over the barrier but they do get out. The only conclusion is that they must have

found a tunnel that existed for only an instant and were clever enough to seize the opportunity.

The cores or hearts of all atoms are pictured by mathematical physicists on the basis of energy considerations and to help visualize their abstract symbols they draw a picture of this nucleus that looks like a valley between two mountain peaks. The constituents of the atom heart are trapped in this depression and are held captive for all time if the atom is stable.

Some atoms, such as radium, do break up and these fragments come flying out of the valleys with enormous speeds. But they have to be shot back at the mountain with much higher speeds in order to return to the core.

This return speed determines the height of the mountain.

These valleys and mountains are called potential energy functions and the new theory interprets the leakage of particles from within as due to a finite probability of escape from the zero energy state at the bottom of the valley to a slightly higher energy state at the outside foot of the potential barrier.

*Science News Letter, October 14, 1933*

OPTICS

# Metallurgist Devises New High Precision Microscope

**A**N AMERICAN metallurgist whose skill with the microscope has won world acclaim has just announced another of his triumphs over the invisible. Francis F. Lucas of Bell Telephone Laboratories has reported on his newest invention, a microscope capable of the highest precision at mag-

nifications of 5,000 times, before a congress of metallurgists.

The microscope and its accessories for the examination of metals required four years to build in the Zeiss works of Germany. The chief feature of the microscope is its rigidity which eliminates vibration. Three long benches suitably mounted on wheels and with shock absorbers galore support the apparatus. Refinements never before attempted are built into the instrument.

Among the refinements which have been made available in this equipment for regular use are: absolutely pure monochromatic light, mono-brom-naphthalene for a principal lens, specially rugged and accurate focusing mechanism, and the suppression of distracting noise from the spark gap.

The equipment is installed in a light-tight laboratory having an enameled interior reflecting only definite wavelengths of light not detrimental to the use of the microscope.

*Science News Letter, October 14, 1933*

**CONVENIENCE COUPON**

*for New or Renewal Subscription to Science News Letter*

---

Send this coupon to Washington while you are thinking of it.

**Science News Letter,**  
**21st and Constitution Avenue,**  
**Washington, D. C.**

Please  start  renew my subscription to SCIENCE NEWS LETTER. I am enclosing remittance as checked:       2 years, \$7       1 year, \$5

Name .....

Street .....

Address .....

City and State .....

If this subscription is a renewal, check here . . . .

