



#### THE BLACK WIDOW FOILED

*Dr. Fred D'Amour, University of Denver professor, has perfected a serum that is successful in treating victims of the black widow spider (shown in inset) whose bite is painful and often fatal. These spiders were once found only in rural districts but are now invading the cities. This one caught her grasshopper prey in a web built in a Denver coal bin. The web is characteristic, being entirely without pattern, a loose helter-skelter structure of very coarse strands which crackle when torn.*

#### MATHEMATICS

## New Mathematical Theory May Overthrow Einstein Concepts

**Sir Shah Sulaiman, Indian Justice and Distinguished Mathematician, Links Newton Mechanics With Relativity**

**A** NEW mathematical theory of relativity which may overthrow the world-famous theories of Prof. Albert Einstein has been presented before the United Provinces Academy of Sciences by Sir Shah Sulaiman, Kt., M.A., LL.D. and chief justice of the High Court of Allahabad.

The distinguished Indian justice is an Oxford-trained mathematician with a wide reputation in the field of relativistic mathematics.

Scientists throughout the world are checking through the mathematics of Sir Shah's report because it appears to be a sane borderline between classical mechanics of Sir Isaac Newton and the newer concepts of Prof. Einstein.

The mathematical equations of the Indian justice-scientist reduce to the equations of Newton as a first approximation and likewise to those of Einstein as a second approximation.

Describing such a two-way working of the new theory, Sir Shah reports, "If it can be shown that the ordinary principles of dynamics, when applied to moving bodies, themselves yield modified forms of equations, which as a first approximation reduce themselves to Newton's forms, and as a second approximation to Einstein's forms, the Newtonian mechanics would be restored to the eminent position it occupied before its dethronement by relativity, and there would no longer be an absolute necessity to accept the extraordinary hypotheses on which relativity is founded."

Sir Shah points out that from his new theory, theoretical values derived from equations tally more exactly with observed values. The predicted deflection of star light as it passes close to the sun comes out to be 2.66 times that predicted by New- (Turn to Page 349)

#### MEDICINE

## Develops Anti-Venom Serum For Black Widow

**A** SERUM that counteracts the effect of the often fatal bite of the black widow spider has been perfected by Prof. Fred D'Amour of the University of Denver.

This serum is believed to be the first highly potent anti-venom serum against the bite of these spiders.

Obtained from the blood of rats that had been given regular small injections of venom removed from the spiders' glands, the serum first proved its worth when a vineyard worker was brought to Prof. D'Amour's laboratory suffering from a black widow spider bite. Although three hours elapsed from the time this man was bitten until a small quantity of serum was administered under a physician's guidance, immediate relief was given.

Due to their alarming increase in numbers throughout the country, the black widow spiders are believed likely to become a far greater menace than the rattlesnake. For whereas the rattlesnake is found only in isolated places, these poisonous spiders are invading cities. Lately they have been found in bedrooms and garages, as well as in furnace rooms. Several deaths from their bites have been reported in the United States within the past two years.

While the alleviation of mankind's suffering can not be measured in dollars and cents, the new serum may prove to be worth thousands of dollars to the agricultural world alone. Vineyardists in western Colorado, parts of Utah, and northern California reported several instances where entire crops of grapes were unpicked last year, due to the pickers' refusal to work in vineyards infested by black widow spiders. In some regions throughout the Midwest tomato vines were badly infested too. With a protective serum available, pickers will no longer fear to carry on their work.

Prof. D'Amour first became interested in the black widow spider upon hearing of the work of Dr. Allan Blair of the University of Alabama. This intrepid scientist allowed himself to be bitten by a large specimen of black widow spider and suffered agonizing pain for hours, in order to allow fellow scientists to witness and record every symptom. (Turn to Page 340)

The bite itself is not painful, but within an hour or so after it has been inflicted a numbing pain ascends the extremity bitten and localizes itself in the abdominal muscles, back and chest. Spasms and intense suffering follow. A contraction of the chest muscles also occurs, making it difficult for the victim to breathe. High fever, nausea, vomiting and unconsciousness are other symptoms.

Previous treatment has consisted of narcotic drugs to relieve the pain, hot baths, and a convalescent serum. The latter has not been satisfactory, Prof. D'Amour said.

The new serum gives prompt relief if given as long as three and one-half hours after the bite, an important practical point, since it is often people in rural districts, several hours away from medical aid, who are bitten.

The black widow's venom is more poisonous, weight for weight, than the rattlesnake's. The spider, known to scientists as *Latrodectus mactans*, is large and shiny jet-black, with a large bulbous abdomen and long slender legs, covering a span of nearly two inches.

The lower side of its abdomen is

marked with red warning signs, in most cases, by two triangular spots with points touching, roughly resembling an hour glass. This resemblance gives the spider another of its popular names, the hour glass spider. Far more deadly than the male, the female is four to five times as large as her mate, which she kills soon after the breeding season.

These spiders were once found only in rural districts—in grain bins, barns, chicken coops, grape arbors, etc. But within the past two years they have become extremely urban.

Their webs may be recognized immediately. For they are built entirely without pattern or design, a loose helter-skelter structure of very coarse strands which crackle when torn.

The spiders are extremely timid, and like the rattlesnake, they never attack unless molested. But the danger lies in persons, unwittingly disturbing them. Many have been bitten, unknowingly grasping the spider in a cluster of grapes or in taking tomatoes from the vine. Many city dwellers have been bitten while asleep, the spider having fallen from the ceiling to the bed.

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Enrico Fermi of Rome verified this actual transmutation.

The only way that an atomic nucleus can be smashed or disintegrated is for the nucleus coming in as a projectile to be captured, after which the new combined nucleus explodes, Dr. Harkins declared. Scientists have generally believed that it might be possible for the bombarding projectile to disintegrate without being captured, but Dr. Harkins has now proved that only when the projectile gets into the heart of the attacked atom is there sufficient energy for disintegration carried in.

"For producing these gamma rays which are most efficient in the cure of cancer," Dr. Harkins said, "the nucleus of an atom is found to be an extremely efficient machine, transforming kinetic energy into gamma rays. The energy of the gamma rays is found to increase rapidly with increase in the energy of the neutrons used in the bombarding."

Speeds of 126,000,000 miles per hour or 35,000 miles per second were found for some of Dr. Harkins' neutrons. This extremely high velocity corresponds to a kinetic energy of 16,000,000 electron volts.

These high velocity neutrons were used to disintegrate nitrogen, fluorine, neon and possibly carbon. Dr. Harkins found that neutrons of less energy than 1,900,000 electron volts in no case were able to disintegrate a nucleus. In all these disintegrations kinetic energy disappears and is transformed into gamma rays or very penetrating light rays. In certain disintegrations the gamma ray energy emitted has been as high as 12,000,000 volts.

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#### CHEMISTRY

## New Kind of Nitrogen Found; Then Turned into Oxygen

### Neutrons Traveling Millions of Miles per Hour Used In Experiments; Energy Turned to Cancer-Curing Rays

**T**HE discovery of a new variety of nitrogen which radioactively transmutes itself into oxygen was announced by Dr. William D. Harkins of the University of Chicago to the National Academy of Sciences.

Thus for the first time it is known that one of the two principal elements in air can change into the other, the oxygen necessary to our very breath.

By smashing atoms with speeding neutrons and recording the atomic fireworks resulting in some 30,000 photographs, Dr. Harkins and his colleagues obtained these results.

The neutron is the only completely unclothed or "nude" nucleus or atomic core. All other atoms have a central core nucleus and a diffuse aura of negative electrons. Discovered in 1932, neutrons are the smallest atoms known, with less than a millionth of a millionth

the volume of the smallest atom known earlier. By virtue of their small size and the absence of an electrical charge they pass readily through all other atoms and therefore through solids or liquids. Only when a neutron strikes another atom nucleus does it change direction.

The new isotope or variety of nitrogen just discovered has a mass sixteen times that of ordinary hydrogen, the unit used in weighing atoms. It is therefore just the same weight as the ordinary oxygen of air, also mass 16. Ordinary nitrogen is known to be lighter, mass 14. The mass 16 nitrogen was made by Dr. Harkins by flinging neutrons at the element fluorine. It was assumed by Dr. Harkins that this new nitrogen would be radioactive and spontaneously disintegrate, giving off an electron to form ordinary oxygen. Prof.

#### ENGINEERING

## Propellers of "Queen Mary" Move At Touch of Finger

**T**HE cover illustration of SCIENCE NEWS LETTER this week is the striking view of one of the four great propellers which will drive the new British Cunard-White Star liner Queen Mary.

While each propeller weighs 35 tons they are balanced so delicately that the touch of a finger will move them.

The propellers are the largest manganese bronze units ever cast, weighing 55 tons apiece in the rough state. Eight weeks was required to construct each mold and after the pouring it required two weeks for cooling.

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