

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

THE 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 heart. 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

THE 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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