



NYLON, BUT NOT FOR STOCKINGS—This wheel is part of the original equipment made in 1937 to produce the first nylon for stockings. It is still helping to produce nylon, but now it is for war purposes. Molten nylon comes out of the slot at the upper left and is solidified on the wheel in the form of a plastic ribbon which passes over the smaller guide wheel. Later it is broken into flakes and spun into yarn. (See page 19.)

ASTRONOMY

Ten Quadrillion Stars

That is the census within range of telescopes given in new book. There are about a thousand million in our own Milky Way system.

► TEN QUADRILLIONS of stars: 10,000,000,000,000,000. That's the modest census of the part of the universe within photographing range of our largest existing telescopes, which Prof. Harlow Shapley, director of Harvard College Observatory and vice-president of Science Service, gives in a new book, *Science in Progress*, published by the Yale University Press.

The ten chapters in the book were edited from lectures presented by ten leading American scientists, on tour over the country under the auspices of the scientific honor society, Sigma Xi. Assembling them into book form was the work of Prof. George A. Baitzell of Yale University, secretary of Sigma Xi. They present the highlights of some recent developments in astronomical,

physico-chemical and biological sciences. The volume has been made a science book-of-the-month by the Science Book Club.

Prof. Shapley bases his staggering figure on a conservative estimate of the number of stars in our own galaxy, the Milky Way system—about a thousand millions of them. In the sphere of space which present telescopes can reach there are at least ten million more like it. Ten million times a thousand million multiplies out to ten quadrillion—if that number means anything.

A typical galaxy, like our own "home" mass of stars, is a more or less disk-shaped affair, perhaps 50,000 or 100,000 light-years across, frequently showing a spiral pattern in its organization. We can tell how far away other galaxies

are by spotting certain types of stars in them, giants and super-giants, novae and super-novae, and comparing their known actual brightness with the much lower brightness they present because of the dimming effect of distance.

A second chapter on an astronomical subject, the expanding universe, is contributed by Prof. Edwin Hubble of the Mount Wilson Observatory. All the galaxies we know appear to be receding from our part of space at terrific rates, from 150 miles a second for nearby ones to nearly 25,000 miles a second for those near the limit of telescopic range.

That the universe is expanding (perhaps exploding would be a better word) is the only explanation at present possible for the so-called red shift of light given off by these distant masses of stars. The reddening of their light is apparently caused by a "dragging out" of the light waves as their sources speed away. Other explanations have been attempted, but, says Prof. Hubble, they have all failed. If there is another valid explanation, it involves a principle in nature of which we are still ignorant.

What fuels the terrific energy production of the stars is the cosmic puzzle taken up by Prof. Hans A. Bethe of Cornell University. Earlier theories, as that stellar heat and light are due to the gravitational compression of their substance as they shrink together, would not keep up the fires long enough. Most satisfactory, it appears, is the concept that atomic nuclei within the stars' interiors capture atomic particles (neutrons) and in so doing are transformed into other elements and at the same time give off energy.

Pressures such as those existing in the interior of the earth, if not of the stars, are described by Prof. P. W. Bridgman of Harvard University. In exceedingly massive machines, pressures measurable only in terms of dozens of tons per square inch are applied to various solids and liquids, solidly cased in massive blocks of metal so that they cannot "squeeze away." Under such pressures familiar matter assumes unfamiliar forms: a kind of ice with a temperature far above boiling, and so dense that it would sink in water; a variety of phosphorus that is black instead of yellow, and that conducts electricity instead of resisting it.

In other chapters, Dr. V. K. Zworykin of RCA Research Laboratories tells of the formation of electron images, Prof. Lionel S. Marks of Harvard University

discusses recent developments in power generation, Prof. James Franck gives glimpses of what goes on in a green plant while food is in the making, Prof. John G. Kirkwood of Cornell University presents a picture of the structure of liquids, Prof. Perrin H. Long of the

Johns Hopkins University outlines the mode of action of sulfanilamide, and Prof. H. Mark of the Polytechnic Institute of Brooklyn gives the theoretical basis underlying the manufacture of synthetic rubber.

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surgical clinics and hospitals with good results, after which it began to be manufactured in large quantities for use in hospitals and dressing stations.

Several soldiers with head wounds were brought to the neurosurgical clinic. In the case of two of them, shell splinters had penetrated deep into the brain and their removal was fraught with great danger, as they had lodged in the immediate vicinity of blood-carrying sinuses of the brain. The surgeon nevertheless decided to operate. When the splinters were removed, blood began to gush profusely from the sinuses but in both cases swabs steeped in thrombin and inserted into the apertures of the wounds quickly stopped the blood flow. When the swabs were removed bleeding was not resumed and recovery proceeded rapidly. One of the men had his skull shattered in the region of the temple and part of the brain protruded in the form of a large blood-filled swelling. Cutting the swelling would have caused profuse bleeding. The surgeon injected a small quantity of thrombin with a syringe. The protruding part of brain was then opened and the blood removed in the form of a clot. There was no further bleeding and the operation was quite dry.

In the short period thrombin has been in use there have been numerous instances of this kind. It has proved a valuable means not only of saving blood but also lives of wounded men.

The effect of this blood-stopping preparation in no way differs from natural blood clotting. When applied locally thrombin merely accelerates blood clotting, ten and in some cases even 100 times without, moreover, deleterious effects on the wound or on the patient. It is absolutely harmless.

Production of thrombin has now been placed on solid industrial lines on a scale fully adequate to meet the demands of the front.

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GENERAL SCIENCE

Fellowship Announced For Women Scientists

► WOMEN working in science were invited by Dr. Eloise Gerry, of the U. S. Forest Products Laboratory, to apply for the \$1,000 fellowship of Sigma Delta Epsilon, graduate women's scientific fraternity, to be awarded after March 1. This is the second such fellowship intended to help some young woman scientist to get her doctorate in mathematical, physical or biological science.

Science News Letter, January 9, 1943

MEDICINE

Immediate Autopsy Urged

Prompt examination of the unfortunate persons first killed in a catastrophe would greatly help the treatment of survivors, is Boston fire lesson.

► IMMEDIATE examination by competent pathologists of those first killed in catastrophes is urged, as one lesson of the Boston night club fire, in a report from Dr. N. W. Faxon and Dr. E. D. Churchill, director and chief, respectively, of the West Surgical Service of the Massachusetts General Hospital (*Journal, American Medical Association*, Dec. 26).

Information from such examinations of the dead and from expert accident investigators dispatched immediately to the scene would greatly aid in treatment of the surviving victims, the Boston surgeons explain. The first patients reached their hospital at 10:30 p.m. and by 1 a.m. it was clear that the predominant injuries were flesh burns and severe damage to the breathing apparatus but no information regarding the disaster could be obtained from the authorities. Poisonous fumes were suspected but definitive evidence on this is still lacking.

The "superb aid" supplied by the social service department of the hospital and the valuable assistance of other trained volunteer groups such as the Ladies Visiting Committee and War Service, Red Cross nurses' aides, and a group of Harvard undergraduates who had been doing volunteer service as orderlies for six months was both highly praised by the surgeons and cited as showing the value at times of catastrophe of trained volunteer groups familiar with a hospital. People of poise who know the hospital are "essential for most volunteer service in a disaster. This we have proved," the doctors state.

"A standard method of identification for women by bracelet, anklet or some similar method" is also strongly advised on the basis of the Boston fire experience. All but two of the 75 men dead on arrival at the hospital were identi-

fied by 5 a.m. Cards, letters, and the like in their pockets made this easy but for the women, whose coats and purses and bags had mostly been lost, only height, weight, hair color and clothing and jewelry were available. These were of only slight help for identification.

The need for a well planned and organized telephone service to notify hospital administration, staff, nurses, maintenance and department heads is another Boston fire disaster lesson. So also is the need for immediately examining and separating the living and the dead at the very entrance of the hospital. Two medical house officers should be stationed at the emergency ward entrance for this purpose.

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MEDICINE

Use Thrombin to Stop Bleeding in War Wounds

► THROMBIN, natural clotting agent of the blood which is formed when blood is shed, is being widely used in the U. S. S. R. as a means of stopping dangerous bleeding from war wounds and is credited with saving the lives of many wounded men, Prof. Boris Kudryashov, of Moscow University, reports.

In 1941, after long research in the laboratories of Moscow University, a method of obtaining large quantities of sterilized, dissolved thrombin was discovered. When mixed with blood this solution will clot it within three to five seconds.

Experiments on laboratory animals with this preparation confirmed the theoretical assumptions. Parenchymatic bleeding from injured liver, spleen or kidneys rapidly ceased after the wound was irrigated with thrombin solution.

The preparation was then tested in