Journal of the Optical Society of America

LENSLESS PHOTOGRAPHY—The picture of the little girl was made by shining helium-neon laser light through a transparency of the blurred image on the left. The blurred image, a diffraction pattern, was made by shining a beam of laser light on a photograph of the child and catching the reflected light in a lensless camera-like device.

MILITARY SCIENCE

Submerged Ocean Station

➤ THE NAVY is looking forward to the day when men will live several hundred feet below the ocean surface, manning stations of value both to the military and to industry.

That is the reason for the record-setting, depth-diving experiments in Washington, D. C., in which one of two Navy divers suffered a case of the bends while being returned to normal surface pressure. The condition called bends, a painful result of fast changes in pressure is caused by bubbles of gas, mainly nitrogen, in the tissues.

The two Navy divers set a record when they stayed for 24 hours at the simulated 300-foot depth. Having adjusted to the heavy pressure for this length of time, they could have stayed much longer. However, the aim of the experiment was to see how fast they could safely be brought to the surface.

The next test, on a date still to be decided, will take the divers to a simulated depth of 400 feet. The test tank is a cylindrical steel drum six and a half by 18 feet. It is not actually submerged, but pressure is simulated by pumping in a helium-oxygen gas mixture, much like vapor builds up the pressure in a vacuum-sealed cooking pan.

The mixture is 95% inert helium gas and five percent oxygen, which is enough to support life. The pressure on a person's body is 1.335 pounds per square inch at a 300-foot depth, compared to one pound at the surface.

The stricken Navy diver was James G. Koskimaki, 28, of Kellogg, Idaho. His companion in the test, supervised by Cdr. Robert D. Workman of the U.S. Navy Medical Corps, was Nicholas Simeone, 37, of New York, who was not affected.

No one yet knows why some persons seem to be more susceptible to the bends than others. As soon as Mr. Koskimaki developed the bends, the experiment was stopped.

• Science News Letter, 84:395 Dec. 21, 1963

PUBLIC HEALTH

Cigarette Filters Best With Activated Charcoal

➤ THE CIGARETTE FILTER that filters best—at least for one purpose—contains activated charcoal granules, two researchers reported in the New England Journal of Medicine, 269:1161, 1963.

Dr. C. J. Kensler, pharmacology professor at Boston University, told SCIENCE SERVICE that he knows of one cigarette manufacturer (Liggett and Myers) which has produced a popular brand of cigarettes with a filter containing this substance.

Most smoking stops the ciliary activity in the tracheobronchial tree adjoining the lungs. The cilia, comparable to tiny hairs easily seen in the nose, normally beat 1,200 times a minute. They paddle a healthy stream of mucus to keep out harmful environmental gases, some of which could be cancer-causing. Filters containing activated charcoal granules keep the hairs moving.

Working with Dr. Kensler was S. P. Battista, pharmacologist, life sciences division, Arthur D. Little, Inc., Cambridge, Mass.

• Science News Letter, 84:395 Dec. 21, 1963

PHYSICS

'Camera' Gives Pictures Without Using Lenses

➤ A "CAMERA" without lenses that gives sharp clear pictures has been developed by scientists at the University of Michigan.

The optical system is predicted to make possible building such instruments as lensless microscopes, cameras and photographic enlargers. It could also be used in combination with lenses to change a poor optical system into one of high quality.

The imaging is done by a two-step process. The first produces a negative that appears to be only a smudge. This smudge is then converted into a recognizable image.

Dr. Emmett N. Leith and Juris Upatnieks, research engineers at the University's Institute of Science and Technology, reported development of the optical system in the Journal of the Optical Society of America, 53:1377, 1963.

The light for the picture can come either from a mercury arc lamp or a laser, which forms an intense beam of a very narrow band of light. By shining this light through a transparency of the blurred image, then catching the reflected light after mixing it with a reference beam, the image is formed.

The achievement is based on the earlier, theoretical development of the two-step imaging process by Dr. Dennis Gabor of the Imperial College of Science and Technology, London.

• Science News Letter, 84:395 Dec. 21, 1963

PLANT PHYSIOLOGY

Smog Slows Plant Process Without Lasting Injury

➤ PLANTS PROTECT themselves from smog by slowing down the opening of the pores through which they "breathe."

When a dense fog and unusually high air pollution covered the English town of Shinfield, scientists found that plants opened their pores more slowly than normal, and not so wide.

No permanent injury to the plant pores was observed, T. A. Mansfield and O. V. S. Heath of the University of Reading, Shinfield, reported.

A plant "breathes" through many tiny pores in the outer layer of surface cells. These pores are called stomata by scientists, and each one is bordered by two "guard cells" that often are shaped like sausages.

When these guard cells swell up, like two fat sausages lying side by side with their ends touching, they leave a space in the middle, through which the plant is able to inhale carbon dioxide and other gases of the air and exhale oxygen.

The Shinfield experiments showed that after normal weather returned, stomata of the plant *Xanthium pennsylvanicum* could open normally again. Other scientific experiments have shown that stomata can be permanently damaged by "artificial smog," the scientists reported in Nature, 200:596, 1963.

• Science News Letter, 84:395 Dec. 21, 1963