SCIENCE NEWS

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PHOTOGRAPHIC PLATES SENSITIVE TO VISIBLE AND INVISIBLE LIGHT

DR. C. E. K. MEES, research director of the Eastman Kodak Company, in accepting the Rumford Medals of the American Academy of Arts and Sciences, Boston, in recognition of his photographic researches, stated that photographic plates that capture any kind of light from the ultraviolet to the farthest reaches of the infra-red are now available for scientific use through the use of sensitizing dyes.

He pointed out that a great variety of photographic plates have been made for the spectroscopist and the astronomer who have made discoveries of considerable importance. The eye is sensitive to the visible spectrum. The brightest colors to the eye are yellow, green and red. Photographic materials are in their nature sensitive only to the blue-violet and ultraviolet regions of the spectrum to which the eye has little or no sensitiveness.

Vogel discovered in 1873 that the addition of dyes to photographic materials would make them sensitive for the region of the spectrum absorbed by the dye. This proved to be the foundation of the change in photography affected by the introduction of orthochromatic and panchromatic materials. In 1904 a series of dyes were made in Germany which sensitized plates for those regions of the spectrum which are bright to the eye. The first commercial panchromatic plates were made in England in 1906 by Wratten and Wainwright, Ltd., of which Dr. Mees was then managing director.

The dyes were derived from quinoline, according to Dr. Mees, but their general structure remained unknown until 1920. It became possible to prepare a great variety of these cyanine dyes, as they are called, many of which were superior for photographic use to those which previously had been available.

By the use of them, supersensitive panchromatic materials were made, and these have effected a great advance in photography, especially in motion pictures. The new dyes made possible fine grain panchromatic film of high speed used in miniature cameras. By the use of the cyanine dyes with especially long chains of carbon atoms, photography by infra-red light has been greatly facilitated.

THE PHOSPHORESCENCE MICROSCOPE

A NEW kind of microscope that promises to open up new fields for exploration in biology and mineralogy has been devised by Dr. E. Newton Harvey and Dr. Aurin M. Chase, of Princeton University. It is called the phosphorescence microscope because it makes use of the short-lived phosphorescent glow given off by many substances just after they have been exposed to the action of ultraviolet radiation.

That many things shine in the dark with peculiarly colored visible light when invisible ultraviolet rays strike them is a well-known phenomenon. This light is called fluorescence; and it has been much used in research during recent years. Special fluorescence microscopes have been devised to aid in this work.

When the ultraviolet irradiation stops, fluorescence stops with it. However, it has frequently been noticed that some of the irradiated substances keep on glowing briefly after the ultraviolet lamp has been turned off. This glow, in many cases lasting for only a fraction of a second, has been termed phosphorescence. Among the substances showing this property are human teeth, wool, coral, dried potato and several other materials of both animal and plant origin.

Because of the short duration of this phosphorescence, ordinary microscopic observation has not been possible. Drs. Harvey and Chase, however, thought of the expedient of getting a large number of intermittent flashes, so close together that they appear to merge into one continuous illumination, like the rapidly succeeding "frames" of a motion picture.

Several different means for achieving this end have been devised. In some, the ultraviolet ray source is an intermittent spark, with a rotating shutter shielding the object-lens of the microscope while it is "on" and opening it for the passage of the phosphorescent flash when the spark is "off." Simpler, however, is a continuous source of ultraviolet with a double rotating shutter having staggered openings that alternately admit the ultraviolet rays and open the path for the phosphorescent light to the lens.

A NEW MICROBE EXTRACT

A DEADLY poison, extracted from a microbe that lives in the soil was discovered in the course of researches by Professor Selman A. Waksman and his associates at Rutgers University and the Merck Institute of Therapeutic Research at Rahway, N. J. The object of this research was to find a chemical agent produced by microbes that would be valuable as a germ-killer.

A germ-killing substance was found which was named actinomycin because the microbe that produced it belongs to the genus Actinomyces. It is similar to those microbes whose infections cause certain lung infections, lumpy jaw in cattle, scabbiness in potatoes and a number of other diseases; but this particular species grew in the soil. When Professor Waksman and his co-workers tried actinomycin on various bacterial cultures in glass vessels they found it had very good germ-killing properties. However, when it was tried on laboratory mice and other animals infected with bacteria, it was not so effective against the germs. Worse still, it killed the animals within fifteen or twenty hours.

Actinomycin produces fatal results in mice, rats and other rodents in doses as small as one part by weight to a million parts of the animal's body weight. It is effective both when injected into the animal and when administered in food. The idea of using it for the treatment of human and animal diseases has been given up. It

looks much more promising now as a rat poison, if enough can be produced at reasonable cost.

As a step toward possible eventual synthetic manufacture, it has been prepared as crystals, and a partial chemical analysis has been made. Actinomycin separates into two parts, designated as actinomycin A and B, respectively. The "A" portion contains carbon, hydrogen, nitrogen and oxygen; one provisional formula for the molecule reads $C_{41}H_{56}N_8O_{11}$. It will be necessary, however, to determine the molecular composition more exactly, and to learn the details of its internal structure, before any attempts at synthetic production can be made.

Associated with Professor Waksman in these researches were Dr. Harry J. Robinson, Dr. H. J. Metzger, Dr. H. Boyd Woodruff and Dr. Max Tishler.

TROPICAL GUAVA SHRUBS

GUAVA powder, obtained from the fruits of a neglected tropical shrub, is now being used by British troops as a rich source of vitamin C, and research in the United States indicates that the fruits may become more popular here. Dried guava is so rich in vitamin C that a little over four ounces would protect an Arctic explorer from scurvy for almost three months. In the forthcoming "Handbook of Nutrition," to be published by the American Medical Association, Dr. Russell M. Wilder and Thomas E. Keys, of the Mayo Clinic, point out that, according to research reports from South African laboratories, the powder is reputed to contain a "rather phenomenal quantity of ascorbic acid (vitamin C), 2,500 to 3,000 milligrams per 100 grams."

Investigators, working at the South African Institute for Medical Research and the Government Chemical Laboratories in Johannesburg, found that the vitamin could be preserved best by blanching the unpeeled quartered guavas after the central pulp and stones have been removed. Then the fruit is dried at 130 degrees Fahrenheit for ten to twelve hours and powdered. The product is pleasantly aromatic but has little taste. Vitamin C was found to be at the high level of 2.5 per cent. to 3 per cent., even exceeding such rich sources as dried rose hips, which are reported to contain about 2 per cent. Others have found that the rich vitamin content is lost rather readily in warm climates. Fresh guavas are little affected by stewing, however, and canned guavas proved stable.

Guavas of different varieties grow wild profusely in the tropics and vary widely in their vitamin C content. Natives remove the seeds of the fruits, add sugar and boil the fruit down to a paste. Guava paste and jelly are made in Florida, too, where the fruits grow fairly well. At the California Experiment Station in Riverside, hundreds of guava trees have been bearing fruit, many since 1918. They are a hardy lot, with what Dr. H. J. Webber, of the Experiment Station, calls the habits of a weed. The plants thrive in almost any type of soil from sterile and coarse to rich and loamy, and from very dry to very wet. California experiments reveal that cold is about the only "limiting hazard." A plant for dehydrating guava fruits is now nearing completion in Cuba.

ITEMS

THE general physical fitness of American college men has improved under war conditions if the men studied by the department of physical education at Syracuse University are typical. The average physical fitness score at the university this year shows a 23-point improvement over last year. This year's score of 114.2 is five points higher than the best for any year during which the record has been kept. Out of every hundred men tested this year eighty-eight are as healthy or healthier than the average of those tested last year. The physical fitness rating is essentially an indication of strength. Final averages consist of scores made on tests of arm, leg and back power, hand grip and lung capacity.

LOW visibility and slippery roads were the primary causes of the high mileage death rate last winter from automobile accidents on highways. This is the conclusion of Professor Amos E. Neyhart, of Pennsylvania State College, who is administrative head of the Institute of Public Safety. He urges that proper protective steps be taken now as the primary use of cars and trucks to-day is directly or indirectly in war work. The mileage death rate last winter was 24 per cent. greater than the summer toll. This figure applies only to the states in the snow-belt; in the snow-free southern states the winter mileage death rate exceeded the summer rate by only 5 per cent. The remedies suggested include proper headlights, necessary because of shorter days; clean, clear windshields equipped with efficient wipers and defrosters and non-skid tires or tires equipped with non-skid devices. Careful driving at low speeds is also essential.

IRON salts may be used in leather tanning while the scarcity of the standard chromium solutions continues, but the resulting leather will probably show less resistance to aging. This conclusion has been reached in the National Bureau of Standards where Dr. Joseph A. Kanagy and Ruth A. Kronstadt have been studying the possible replacement of chromium salts with those of iron in tanning goat and calf skins. The work is continuing. Ferric sulfate may be used satisfactorily if organic acids are added to the tanning solutions to stabilize them. Lactic, citric, gluconic and hydroxyacetic acids were found suitable. Considerably more iron than chrome is required to tan a piece of leather, the amount being about double.

THANKS to a new electric device, better and speedier results are obtained in the process of electric welding of delicate aluminum and alloy steel plates used in warplane construction. This is a high-voltage "trail blazer" that cuts an electric path through the air which is followed by the low current that does the actual welding, making it certain, reliable and constant. Low currents must be used in arc welding thin metals or the metals will burn. Without this it is difficult to start the electric arc and to keep it glowing while the weld is made. The device, a development of the Westinghouse Electric and Manufacturing Company, is built into the arc-welding machine. In use the operator flicks a switch holding the tip of the rod near the work. The high-voltage current leaps across the gap and the welding current follows. Both currents keep flowing until the weld is finished.