SCIENCE NEWS

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IRIDESCENT COLORS OF THIN FILMS OF TRANSPARENT MATERIAL FOR THE DETECTION OF DISEASE

DIAGNOSING disease may in future be aided by a new method which makes use of the changes of iridescent colors reflected from very thin films of transparent material. Details of the new method which is expected to detect viruses, toxins, poisons and other tiny and invisible substances were explained in an announcement stating that a patent covering the method had been issued to Dr. Irving Langmuir, of the General Electric Research Laboratory.

It is known that thin films of transparent material such as barium stearate, an insoluble soap, reflect iridescent colors. The color depends on the thickness of the film. A film with a thickness of 47/10,000,000 of an inch reflects a purple color when illuminated by a white light. If the film is made slightly thicker the color changes toward blue. The changes in thickness can thus be measured by observing the changes in color.

To detect viruses or other tiny, invisible substances, slides are first conditioned by applying the thin barium stearate film and then dipping in a 1 per cent. solution of thorium nitrate. Then it is possible to apply to the slide a substance that has a specific reaction toward the particular toxin or virus or poison or other substance for which the test is to be made.

If the suspected substance is present in the solution tested, adsorption of a single layer of uniformly thick atoms or molecules of the substance will take place on the slide surface, producing an increase in film thickness and a corresponding change in color.

Each type of substance in solution is expected to produce a characteristic increase in film thickness and corresponding change in color of the conditioned slide. Once these characteristic thicknesses and colors for known substances have been determined, identification of suspected substances will be a matter of check and comparison. Dr. Katharine B. Blodgett and Vincent J. Schaefer, members of the staff of the Research Laboratory have assisted Dr. Langmuir in the investigations, which started in 1935.

ARTIFICIAL RADIOACTIVE SUBSTANCES

DR. GLENN T. SEABORG, instructor in chemistry at the University of California; Dr. J. J. Livingood, formerly research associate in the Radiation Laboratory, and Gerhart Friedlander, graduate student in chemistry, have announced that they have added four artificial radioactive specimens of germanium, an element similar to lead, to those already known, bringing the known total to about 360. Germanium is one of the last of the 92 elements to be investigated in detail for radioactive species.

An artificial radioactive substance is one which is made to emit rays somewhat as radium does. They are made by smashing atoms in the cyclotron. When the atom of an element is smashed it often changes into another element and emits rays which can be detected by the use of sensitive instruments. More than one hundred of the known artificial radioactive substances have been discovered at the University of California with Professor Ernest O. Lawrence's cyclotron. Some of the radioactive elements have proved invaluable in medical and biological research. Radio phosphorus is being used in experiments on the treatment of leukemia, the dread disease of the blood cells. The growth of teeth and bones are being studied by the use of radioactive strontium, radioactive iodine is revealing valuable facts about the thyroid gland, and several other elements treated by the cyclotron are literally throwing new light on biological processes.

Plant growth and nutrition are being studied also by feeding a solution of radioactive elements and following their course through roots, stems and leaves. The use and value of various basic food elements are being studied in animal and poultry nutrition with "tagged" substances.

HEREDITARY CHANGES IN PLANT-SPECIES CAUSED BY ULTRAVIOLET RAYS

ULTRAVIOLET rays demonstrated their capacity to cause hereditary changes in plant species, in experiments by Dr. Alexander Hollaender, of the National Institute of Health, speaking before the Philosophical Society of Washington.

The plants used were members of the group known as dermatophytes, which are parasitic fungi that attack the skin. Cultures of them were grown in glass dishes, and their one-celled asexual reproductive bodies (spores) were irradiated with ultraviolet light of a dozen different wavelengths. The raying was so conducted that on the average each spore received and absorbed a definite quantity of radiant energy.

A considerable proportion of the spores were killed, for ultraviolet is dangerous to these bodies as it is to other living things. Among the survivors many changes were observed, whereas in more than 3,000 control cultures that were left untreated, no mutations whatever occurred. In addition to the mutations, or inheritable changes, there were other changes in both form and physiology of the molds that soon disappeared.

Certain special wavelengths were found to be more effective than any others, both in killing the fungi and (in lighter doses) in causing the mutations. Most effective of wavelengths was one of 2650 Ångstrom units; second in effectiveness were waves 2380 Ångstrom units in length. (The Ångstrom unit is the physicist's "inch" in measuring wavelengths of light and other radiations. The shortest waves of visible violet are about 3000 Ångstroms long.)

Mutations included changes in color, appearance and size of the growth mass or mycelium, spore production and growth rate. Changes proved to be permanent, through long series of culture transfers. Highest mutation rate was more than 20 per cent.; rates of 10 per cent. were obtained "with greatest regularity."

SYNTHETIC TEXTILE MADE FROM SEAWEED

THE newest raw material from which synthetic textiles can be manufactured is seaweed, according to a report to the American Chemical Society from a British correspondent.

Details have just been reported in England by Professor J. B. Speakman, who has been carrying on researches during the past two years for a British firm. The name of the company is not given, because, it is said, "it has not yet attained large-scale production of the new product and does not wish to be asked for samples at this stage."

In former years, seaweed was collected in the Hebrides to the extent of 400,000 tons annually. Far larger amounts are available from the west coasts of Scotland and Ireland as a whole, so the raw material is abundant and should be very cheap. From the seaweed is extracted alginic acid, which makes up about 20 to 30 per cent. of the dried seaweed. This can be dissolved and then spun in a solution of acid, through spinnerettes like those used in making rayon.

Such fibers, spun in acid, dissolve in soap and soda solutions, and hence are useless as textiles. The alginic acid can, however, be combined with inorganic material in the form of compounds called alginates. These are resistant to alkalies, and constitute the new fibers. They have good luster and strength, and are non-inflammable. In fact, it is said, the fabric can be soaked in gasoline, the latter ignited and burned away, leaving the fabric the same as before this treatment. It costs less to make than viscose rayon.

AIRPLANE MASS PRODUCTION

THE technique of mass production of airplanes "is as far removed from automobile manufacture as the automobile was from carriage building," was pointed out by Henry C. Hill, of the Wright Aeronautical Corporation, at the National Aeronautic Meeting of the Society of Automotive Engineers, meeting in Washington. He said, "We have been used to producing 200 or 300 engines per month, where now we need to produce 2,000 to 3,000 per month. In other words we must increase our rate of production approximately 10 times. To most people this increased production rate is merely a matter of applying the well-known production methods of the automobile industry. This naïve statement has just enough truth in it to confuse the minds of many people both inside and outside of the aviation industry. Between the statement and the actual fact the gulf is very wide indeed. It is true that the principles developed by the automobile people in Detroit must be applied to aircraft and engine production, but we are sure that it is equally true that these principles must be modified and further developed to suit the new set of standards and the new tempo required in the aircraft field."

Mr. Hill stated that civil aviation does not require more than a small fraction of the number of planes used for military purposes. "Diverting our design and construction efforts from commercial to military aircraft is relatively easy compared to the main problem confronting us—which is mass production. There was no mass production in aircraft or aircraft engine manufacture before Germany tried it. It is a striking fact that airlines as we know them now do not need many airplanes to carry on a very substantial traffic. The reason for this is that the airplane completes its trip so quickly that many more trips are possible with the same airplane in a given period of time, than with the train, or the automobile. The trip from New York to Chicago, for example, takes 4¼ hours by air. It is obvious that in a 24-hour day three or four one-way trips can be made with only one airplane. It is significant that the largest domestic airline in this country has all told less than 100 airplanes."

"What most people do not realize," Mr. Hill continued, "is that changes in design are made more or less frequently in mass-producing industries, and most frequently in those which produce the best products." Defining mass production as "a carefully organized and highly integrated process of producing, in relatively short periods, large quantities of parts which are all exactly alike," he emphasized that the parts need to be exactly alike only for a desired production interval. "If the parts are made fast enough a definite proportion of the working time can be allocated to changing tools and fixtures to incorporate changes in design on the part. This new technique of producing good aircraft engines in large quantities is, first of all, recognition of the methods which have made it possible to develop successful modern engines and produce them in small quantities. These methods are the application on a grand scale of research, experiment, and proof-testing under constant pressure to produce practical results. Second, use of the very finest materials and manufacturing processes. Third, and most important, provision of flexibility in the manufacturing scheme for continuous absorption of detail improvements as they become available."

DEFERMENT FROM THE DRAFT OF GRADUATE STUDENTS IN SCIENCE, TECHNOLOGY AND EDUCATION

DRAFT boards are urged to give special consideration to deferment of graduate students in scientific, technological and educational schools and students in engineering and health services, in a resolution passed by the New York Branch of the American Association of Scientific Workers.

After July 1, the group deferment of students expires, and local draft boards must consider the continued deferment of each student individually on its own merits. A student in these nationally important fields is put into the deferred classification if the local board finds him a "necessary man."

The Scientific Workers urge local boards to take advantage of information that might be furnished by the National Roster of Scientific and Specialized Personnel and to judge the usefulness of such a student by standards provided in a report made at the request of Dr. C. A. Dykstra, director of the Selective Service System, by the National Academy of Sciences and the Subcommittee on Military Affairs of the National Committee on Education and Defense.

According to this report, defense needs clearly require

careful consideration of requests for deferment for students in the following fields: Medicine, dentistry and pharmacy; biology, bacteriology and any other branch of biological science which bears directly upon problems of medicine or the public health, safety or interest; chemistry; physics; geology and geophysics, including such specialized fields as meteorology, hydrology and cartography; engineering, including civil, electrical, chemical, mechanical, agricultural, sanitary and mining.

"It is generally recognized," the resolution states, "that American democracy depends upon the welfare of its citizens and that this democracy must be safeguarded by an expansion of economic, social, and physical security. These prime requirements of our freedom in turn depend on the full utilization and expansion of our science and technology, our educational system, and our public health services. Our essential resources and services can be maintained only by assuring continuity in the development and utilization of existing personnel and in the adequate training of new personnel.

"However, the conscription, under the Selective Service Act, of the nation's young men for military training, threatens to create a serious dislocation in the country's welfare by disrupting the continuity of their scientific and technical training and services.

"These activities in specialized fields are so rigorous and require such continuous application to keep abreast of current advances that even a year's absence from their pursuit will cause an enormously disproportionate loss in the effectiveness of the training."

"Such loss means lowering the standards of our specialized personnel and will be reflected for many years in its effect upon the educational and public health services and upon the science and technology of our country.

"One of the primary functions of the administration of the Selective Service Act requires that military personnel be developed with a minimum disruption of those spheres of national activity which are of great social value. It is important, therefore, to protect the continuity of the development of professional and technically trained persons."

The New York Branch of the American Association of Scientific Workers requests information regarding any case in which the decisions of the local draft boards in the case of scientific workers indicate that the drafting of such workers for military service would not be in the best public interest. The New York Headquarters of the Association are at 15 Bank Street.

ITEMS

PATIENTS entered hospitals in the United States at the rate of one for every three and one tenth seconds during the year 1940, according to the latest annual hospital census taken by the American Medical Association. Babies entered hospitals, not by the front door but by the way of the obstetrical department, to the number of 1,214,492. The total number of beds now available in registered hospitals throughout the nation is 1,226,245. This means that just about one out of every hundred persons in the country can be in a hospital at the same time.

THAT grasshoppers will not be as serious a pest during the coming summer as they have been for the past three seasons is indicated by field surveys by U. S. Department of Agriculture entomologists. They will be both fewer in numbers and less wide-spread in area under severe attack. The only large areas shown in black on the grasshopper map comprise the Dakotas and western Minnesota, and western Kansas and parts of adjoining states. There are also smaller threatened spots widely scattered over the West. However, even with the reduction in the menace, something over 45,000 tons in arsenic-poisoned bran-sawdust bait will still be required to hold back the hordes in the threatened areas. Grasshoppers are like weeds, if you let them go unchecked one year they come back at you the next with hundredfold reinforcements.

INVESTIGATORS of the U. S. Bureau of Mines are carefully examining American deposits of tungsten, manganese, nickel, mercury and other strategic metals, with an eye to their use if present overseas sources should be suddenly cut off. Exploratory operations on thirty two sites have been conducted, of which seven have been completed. Dr. R. R. Sayers, director of the Bureau, states that six new ones will be opened up as soon as weather permits. Existence of these ore bodies has long been known, but many of them are too low-grade to be economic under normal conditions. A serious emergency might justify the higher cost of working them. Tin remains the outstanding metal problem, for there is practically none in North America. If we should lose access to overseas sources it would be necessary to rely on accumulated stockpiles and to find substitutes.

COTTON is being grown in blockaded Italy, according to *Die Umschau,* which has just reached this country. Last year's crop was raised on a little under 125,000 acres, and it is planned gradually to increase the acreage to double that figure. Even so, this home-grown cotton can satisfy only about 6 per cent. of Italy's normal needs; yet greater acreage could be devoted to the crop only at the expense of the area now planted in wheat. Italy's present cotton-raising venture repeats the country's experience during the American Civil War, when the supply of American cotton was cut off by the Federal blockade of Southern ports. In 1864, which was peak production year, Italy had well over 200,000 acres in cotton. In subsequent years, interest in cotton production declined to a low of only a little more than 8,000 acres in 1930.

THAT even alligators are in need of protection from over-shooting, is stated by the U. S. Fish and Wildlife Service. The big bull alligators, 12 to 15 feet long, that used to yield hides for large-sized suitcases and other leather goods, are practically never seen any more, even in the deepest recesses of the swamps of the South. Old-time swampmen say there are plenty of five- and six-foot sizes, but no really large ones. However, where the reptiles have received protection, as on government refuges, they are already starting a comeback, and it is hoped that eventually selective hunting (which takes the big ones and leaves the little ones for replacements, will afford the resident hunting population a steady income source. The beginning years will be the hardest, for alligators grow very slowly after they reach about a ten-foot size.