SCIENCE NEWS

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DESIGNATING COLORS

SCIENTISTS are attacking one of the most difficult of all jobs known to man—the task of bringing some semblance of order out of the chaos of terms designating colors. Baby blue, sky blue, Eleanor blue and other terms much more fantastic may be useful as words, but they tell nothing about actual colors. And yet colors and their proper scientific designation are most important in many fields; in medicine, paper-making, textiles, industry generally, lighting, psychology and fashion.

It was only a few years ago that colorists found there were fifty-nine different colors all designated by the same name on the color charts of manufacturers. And, in another case, there were forty-seven quite similar colors all designated by different color names.

At the meeting of the Inter-Society Color Council reports were made of the newest advances in building up a true simple chart of colors which would replace the hodge-podge of names now used except for advertising purposes.

Dr. E. N. Gathercoal, of the University of Illinois School of Pharmacy, described the usefulness of proper color terms for medicine, particularly the description of drugs by their color. In one U. S. Pharmacopoeia, Dr. Gathercoal said, he had seen the term "blackish white" as a color designation for a drug. The use of so startling and yet meaningless term set scientists to a study of colors indicated in this standard formulary of drugs. About 2,500 color designations were found. Great simplification of color designations has now been found possible until the number of terms needed is only a few and variations of shade are possible by use of a careful list of a few qualifying adjectives.—ROBERT D. POTTER.

X-RAY MACHINES FOR CANCER TREATMENT

THERE has been constructed, at the Massachusetts Institute of Technology, a 1,250,000-volt electrostatic x-ray generator so compact it fits in a small tank three feet in diameter and nine feet high, according to the report to the American Physical Society of Professor John G. Trump.

Only one tenth the size of its million-volt predecessor, built in 1937 for the Huntington Memorial Cancer Hospital in Boston, the new generator will go into the tumor clinic of Massachusetts General Hospital.

Superior insulating qualities of gases under pressure, permitting insulation of very high voltages without loss by spark discharges, were exploited in the development. At present the generator is operated under air pressure of 150 pounds per square inch. Value of other gases as insulating mediums is being explored. Operation of the generator requires only four kilowatts of electric power, costing about eight cents an hour.

A new mercury bath method of directing the piercing 1,000,000-volt x-rays of another powerful machine, to be installed this spring in the new quarters of the Memorial Hospital in New York City, important American center for cancer treatment, was also described to the meeting by Dr. G. Failla, physicist at the hospital.

Small hollow boxes are sunk in a bath of mercury and will serve as exit slits for the powerful x-ray beams, to give angular control of the radiation to radiate hidden tumors within the body of a patient. The heavy mercury around the boxes stops the radiation, which goes through the boxes easily.

THE EINSTEIN THEORY AND THE NUCLEAR STRUCTURE OF ATOMS

DR. NATHAN ROSEN, a young physicist now working on a WPA project at Massachusetts Institute of Technology, has announced modifications of Einstein's general theory of relativity which may make it possible to apply this basic theory to the problems of atomic nuclei.

In a report to the meeting of the American Physical Society, Dr. Rosen explained that the framework of general relativity theory is uniquely determined by arbitrarily set "laws." To adapt the theory to the nucleus, it is necessary to introduce a change into the basic framework of relativity. This change consists of not only working mathematically with a Riemannian, or curved, space, as does present relativity theory, but also adding mathematical symbols common to Euclidean, or flat, space. Dr. Rosen has been able to devise formulae which appear to make gravitation a factor in nuclear problems, something which previously has not appeared in theories about the hearts of atoms.

For one thing, the relativity theory principle of the equivalence of clocks does not apply in the Rosen variety of the theory.

The relativity theory predicts that it is impossible to distinguish between an experiment with clocks performed in a closed room (an elevator) stationary with relation to the field of gravity and an experiment performed in a closed room being accelerated far out in space where gravitational forces are negligible. By Dr. Rosen's equations, however, this situation would no longer exist. Where the clocks come into the picture is that the oscillations of electrons in an atom, which make them emit light, are really just little atomic clocks.

The "red shift" light rays due to the presence of a gravitational field, which is predicted by relativity, occurs also in Dr. Rosen's variation. However, the predicted shift is only half as great as that calculated by Professor Einstein. The red shift due to gravitation should not be confused with the so-called Doppler red shift caused by motions of a source of light (a star) away from the observer. Gravitational red shift is caused by having the source of light in a different gravitational field than is the observer.

Although the gravitational red shift would not work over such short distances, it is like saying that the color of a green light on the top of the Empire State Building

is a little more reddish to an observer at street level than it is to an observer at the observation tower on top of this skyscraper because the gravitational field is different for the two points of observation.

Dr. Rosen hopes next to apply his new theory to studies of the nucleus and to see if he can not calculate something about the nature of the basic forces within the atoms which hold their nuclei together and which constitute a sort of "cement" that helps hold matter together.—ROBERT D. POTTER.

MAPPING THE PORE PATTERN OF THE HUMAN SKIN

A NEW method of mapping the pore pattern of the human skin, which may some day supplement present fingerprinting methods in establishing human identity, was described at the meetings in New York of the American Physical Society by Dr. Harold A. Abramson, New York physician specializing in biophysics.

When methylene blue is applied to the skin by electrical current the whole area soon turns blue. But if the surface of the skin is rubbed thoroughly, all the color comes off except at the places where pores of the sweat glands show. Thus tiny blue dots show up under a microscope at any places where sweat glands are present, virtually over the entire body.

The significant point, although Dr. Abramson did not describe it at the meeting, and mentioned only the physics of the phenomenon, is that the patterns of the sweat glands from every individual are characteristically different in the same way that fingerprints are characteristically unique. In fact, a close examination of fingerprints shows that along each ridge are pores and that the fingerprints are merely the readily visible patterns of the pores in a particular spot on the body.

Explaining the phenomenon, Dr. Abramson pointed out that electrical currents can carry drugs and dyes into the skin by a process known as electrophoresis. Using dyes like methylene blue, it has now been learned that it is through the pores of the sweat glands that this passage occurs. Previously it was not known whether it was the hair follicles, the skin as a whole or the pores which transmitted the materials electrically.

Drugs like cocaine, novocaine and histamine have long been known to have the ability to penetrate the skin without breaking the skin by injection. The new method of making the pore pattern show up on any part of the body will give new "maps" for every individual that are much more comprehensive than present fingerprints. Human identification in accidents where fingerprints may be obliterated is only one possible application.

Another drug which Dr. Abramson has been able to make penetrate into the body through the skin by electrical action is sodium prontosil, a drug with many of the beneficial aspects of sulfanilamide. Whether the new method will be used in the treatment of infectious diseases for which sodium prontosil is helpful has not yet been studied, but the possibility exists.—ROBERT D. POTTER.

GROWING OLD

THE phrase "growing old" is in part just another way of saying that the capacity of the body to accumulate lactic acid in exercise is lessened, it was indicated in an address before the Northeastern Section of the American Chemical Society by Dr. David Bruce Dill, of the Fatigue Laboratory of Harvard University. Lactic acid is the fuel for muscular contraction, Dr. Dill explained, and the inability to store it as one grows older explains why an old man is unable to sprint 100 yards, although he may be able to walk all day long as well as he could when he was younger. "A man of seventy years may have one half the capacity for carrying on work in a steady state which he had in his prime, but his capacity for anaerobic work (work carried on after supply of free oxygen in blood is depleted) is almost lost. Lactic acid is sometimes spoken of as a fatigue substance that should be eliminated as rapidly as possible, Dr. Dill said. This is not a sound view. Lactic acid is a normal intermediate in the metabolism of carbohydrate and is available as fuel for muscular contraction. In fact lactic acid appears to be the fuel preferred by the heart. Although scientific research has debunked many of the old beliefs about the influence of weather on health, it is clearly not all superstition for man to attribute many of his ills to weather and climate. The time in the marathon is apt to be slow on a hot day and fast on a day considered chilly by spectators. Cold climates favor hard work and hot climates reduce the capacity for exercise of long duration. Many diseases, like pneumonia, are found to vary with the seasons, becoming more prevalent in the winter months.

THE UPPER CAVE OF CHOUKOUTIEN

THE now world-famous caves and clefts of Choukoutien housed not only the very ancient Sinanthropus population but also, though separately in a cave located on top of the hill—known as the "Upper Cave"—quite a different population who lived there at a much later period. This Upper Cave was discovered in 1930 and excavated systematically in 1933 under the supervision of Dr. W. C. Pei, but the results have only now been worked out.

The population of the Upper Cave already represents modern mankind. In accordance with their physical appearance they were the bearers of a relatively advanced culture, as is evident from the discovery of stone implements, a bone needle, a bone implement and necklaces or other ornaments made from beads of perforated teeth, shells, worked stones, fish and bird bones.

The fauna in the cave, composed of thousands of animal skeletons, conforms to the physique and culture of the man under discussion. Bear, hyena and ostrich found there have become entirely extinct since, whereas the tiger and hunting leopard have disappeared completely from this part of China and Asia.

All these facts indicate that the period during which the Upper Cave population lived corresponds to the Late or Upper Palaeolithic time of Europe, determined as the Aurignacian, Solutrean, Magdalenian, implying approximately 100,000 to 20,000 years ago. For the first time, representatives of an Upper Palaeolithic population have been discovered to occur on the soil of Asia, outside of Palestine.

The Upper Cave population possibly consisted of one family only: an old man, a younger man of indeterminable

age, two relatively young women, an adolescent, a child of five years and a newborn baby—perhaps even a fetus. The condition of the preserved skulls proves that all of them were killed by heavy blows with pointed and blunt weapons, possibly while being attacked by hostile tribes.

Three of the skulls, however, are sufficiently well preserved as to permit a determination of their special character. Though all three show certain features of the face in common, nevertheless they differ in others, thus giving the impression that they belong to three different racial groups. One of the women looks like a modern Melanesian of New Guinea, the other like an Eskimo.

The old man is of special interest in several respects. According to the form of his braincase he has to be considered a very primitive type, not too far removed from the stage of the Neanderthal Man. Again in other features he recalls the European Man of the Upper Palaeolithic, whereas the face points more to recent Mongolian types, though not actually identical with any one of them.

The skull of the Melanesian-like woman also shows a deformed forehead such as is found in consequence of artificial deformation among American Indians and other Eastern people of later times.

FRANZ WEIDENREICH
W. C. PEI

THE REFUGEE PHYSICIAN PROBLEM

THE American Medical Association has been asked to establish a special committee to aid the refugee physician. The request has come from six distinguished leaders of American medicine: Drs. David L. Edsall and George R. Minot, of Boston; John A. Hartwell, of New York; Warfield T. Longcope, of Baltimore; Howard C. Naffziger, of San Francisco, and Dallas B. Phemister, of Chicago.

Thus far the only action taken by the House of Delegates of the American Medical Association has been a recommendation to the state boards of medical registration that citizenship be the requirement for license to practice. The right to regulate the practice of medicine rests with individual states.

Requesting American Medical Association cooperation with the Emergency Committee in Aid of Displaced Foreign Physicians, the National Coordinating Committee for Aid to Refugees and Emigrants Coming from Germany and the Boston Committee on Medical Emigrés, the six physicians point out that "in the field of general practice and in the specialties also numerous openings exist for which it is difficult to find qualified American physicians; for example, poorly paid full-time physicians and practices in rural communities."

The *Journal* of the association in commenting on the subject in its current issue writes that: "If any of the committees can undertake to make a survey to locate such openings, a certain number of refugees can be absorbed with a minimum amount of disturbance to the rights of American physicians. The chief difficulties that have arisen in this situation come from the fact that some of the refugees are poorly trained or of low ethical standing, that some find it difficult to adapt themselves to American ways in the practice of medicine, and that many tend to settle in large cities already overcrowded with physicians. Perhaps the difficulties of adaptation can be overcome by well-planned instruction. Only the coordinating committees already mentioned or groups of a similar character can aid in solving properly the problem of suitable distribution of refugees to places where they may be useful rather than a foreign body setting up irritation and forcing extrusion."

ITEMS

A "WALLS OF GLASS" building dedicated exclusively to the fight against disease *via* the medical research route will be erected in San Francisco by Stanford University. A gift of Mrs. Louis Stern, of Palo Alto, it will become a unit of the Stanford University School of Medicine. Unusual cantilever design eliminates columns in the outer walls and allows use of large glass panels admitting sunshine.

A NEW and superior method for determining the number of coats of paint on a surface is announced by the National Bureau of Standards. A two-inch square area is abraded off the surface until the basic surface is reached. The boundary lines between distinct coats of paint or lacquer show up as distinct lines looking like isobars (lines of equal pressure) on a weather map, or like the contour lines on a geographical map. A previous method was the examination of a small section at the edge of the paint film with a microscope. It was slower and less certain.

A NEW use for a microphone and electrical circuit, which makes the roar of a grinding mill regulate the flow of material into the mill, was described at a recent meeting of the American Institute of Mining and Metallurgical Engineers. The device, known as an electric ear, makes the minerals feed into the crusher mill more rapidly if the mill is making too much noise. And if the mill is running too silently the device knows that it is feeding too rapidly and shuts down the intake of uncrushed materials. Just enough material is provided, at all times, to give the highest efficiency. The control of mill operations by the sound produced was described by Harlowe Hardinge, of the Hardinge Company, York, Pa.

W. L. BOND, an American who is operations manager of the China National Aviation Company, states that he has been advised by cable that his airline has been granted permission to operate a service between Kunming, capital of the province of Yunnan in southwestern China, and Rangoon, Burma. The airline, which will generally parallel the new highway linking the two cities, will cover some of the world's least known and most difficult territory. The aviation company, which serves the principal cities still under Chinese control, is owned jointly by the Chinese Government and Pan-American Airways, but Panair stepped out of the management upon the outbreak of war. Mr. Bond is in the United States on vacation.