CHEMISTRY

Cream Separator Technique Used to Separate Isotopes

USING the old principle of the cream separator in whirling materials with great centrifugal force, Prof. J. W. Beams and A. Victor Masket of the University of Virginia reported to the American Association for the Advancement of Science the separation of the isotope of the element chlorine in their high-speed centrifuge apparatus.

A hollow steel rotor containing a small amount of liquid carbon tetrachloride (better known for its cleaning properties) was mounted on a hollow hypodermic needle which served as its axis, and was spun rapidly in a vacuum. Every six and a half minutes a small amount of the fluid was drawn off through the hollow needle and collected in dry-ice traps at a temperature of 70 degrees below zero Fahrenheit. Light, medium and heavy fractions were thus obtained. Each of these was put through the whirling apparatus again. The densities changed gradually until they were roughly in agreement with what they should be if the chlorine in them was one of the several isotopic varieties. The use of this physical method is necessary since it is impossible chemically to separate these chlorine isotopes.

Science News Letter, January 9, 1937

RADIO

Shortest Radio Waves Used at Michigan

THE SHORTEST continuous radio waves ever produced are being used in experiments at the University of Michigan. They are only 6.4 millimeters (about one-quarter inch) in wavelength, report Drs. C. E. Cleeton and N. H. Williams of the department of physics.

So tiny is the tube used to generate the waves that it is assembled under a magnifying glass and its outside dimension is less than one quarter of an inch, state the scientists in their report (*Physical Review,* Dec. 1).

Radio radiation generated by the equipment is being used for studies of the molecular structure of gases, including water vapor. The minute rays have many of the properties of light and travel in straight lines when focused by a concave mirror. Pieces of black paper, hard rubber and wood are transparent to the rays.

The possibility of using them for communication purposes is remote since they are rapidly absorbed by the water vapor in the atmosphere. It is by a study of this absorption, in fact, that scientists are learning new facts about the molecular makeup of water vapor.

The 6.4-millimeters radio waves represent about the limit of radiation which can be produced from vacuum tube sources. To get shorter waves the dimensions of the radio tube must be decreased and ultimately becomes a mechanical impossibility.

For waves shorter than six millimeters it is necessary to use either the radiation from a quartz mercury arc lamp or spark sources in air. The wavelength region from one-tenth millimeter to six millimeter waves is about the last untapped "no man's land" of infra-red research, for only a few isolated measurements have as yet been made in this region.

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ASTRONOMY

Stars in Orion Nebula Double Number Supposed

IN AN obscure corner of the exhibits of the recent Carnegie Institution and not yet officially announced, were three astronomical photographs which revealed that the number of known stars in the great Orion Nebula must now be doubled. They are the work of Prof. W. Baade of Mt. Wilson Observatory and were taken on the great 100-inch telescope using new infra-red sensitive photographic plates.

Orion Nebula, part of the Milky Way, consists of vast clouds of scattered dust particles and gas atoms shining with a blue fluorescent light caused by neighboring high temperature stars. In ordinary photographs taken with blue or green light many of the stars are obscured. Their light cannot come through the dusty regions known as "coal sacks" from their appearance. But just as dust clouds in the earth's atmosphere cut off much blue and green light while continuing to transmit red rays, so do the interstellar dust clouds let through the red light from these hitherto unknown stars.

Prof. Baade, using photographic plates sensitive to the red rays from 8,200 to 9,200 Angstroms, made the pictures which double the number of stars that can be seen. Calculations indicate that the stellar scattering particles are one two-hundred-fifty-thousandth of an inch in diameter.

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IN SCIENC

MEDICINE

New Knowledge of Cancer Growth Chemistry Reported

CANCER tissue, contrary to generally held opinion, requires the same sort of protein nourishment for its growth that normal tissue does.

Experiments showing this are reported by Drs. Carl Voegtlin, J. M. Johnson and J. W. Thompson, of the U. S. Public Health Service's National Institute of Health.

The results of the studies, in which the growth of cancers in mice were checked by certain types of diet, cannot be applied in the treatment of cancer in man, Dr. Voegtlin emphasized.

New fundamental knowledge of the chemistry of cancer growth, however, has been gained. It is from such knowledge that scientists hope eventually to be able to forge a weapon powerful enough to overcome this dreaded disease.

The growth of breast cancer in mice can be checked, Dr. Voegtlin and associates found, by feeding the animals a diet deficient, though not entirely lacking, in cystine. This chemical is an amino acid, one of the essential building stones of all tissue proteins. Cystine is also part of another chemical, glutathione, which is widely distributed in body tissues and which apparently stimulates the multiplication of normal body cells.

After the cancer growth in the mice had been checked for about a month by the diet deficient in cystine, repeated injection of glutathione caused a marked stimulation of the cancer growth. This shows that glutathione is necessary for the rapid growth of cancer tissue just as it is apparently necessary for growth of normal tissue.

Previous studies by Dr. Voegtlin and associates showed that deficiency of another of the body's protein building stones, lysine, also checked the growth of cancer in mice.

By studies such as these the scientists hope to learn in what ways cancer tissue differs from normal tissue in its chemical requirements for growth.

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E FIELDS

PSYCHOLOGY

Find Babies Do Not Have Instinctive Fear of Noise

SUDDEN loud noise is not an unfailing cause of fear in young babies. Even the sharp, unexpected crack of a revolver shot failed to produce any signs of fright in many of the 60 babies studied by ultra-slow motion pictures taken at Connecticut College for Women.

Some of the infants did turn away from the direction of the sound, as though they would like to get away from it. But many others looked around toward the noise instead. Older babies tried more often to escape, Prof. William A. Hunt told the American Association for the Advancement of Science in reporting this upset of previous teaching of psychologists.

Some of the babies cried after the noise, but this was not a universal response. There were 33 of them who did not cry, and seven who had been crying before the noise stopped when the gun went off.

Although the loud noise failed to scare all the babies, it did make all of them wiggle their toes, Dr. Francis M. Clarke reported. This movement of the toes when startled by loud noise — sometimes a stretching movement, sometimes flexion—is absent in adults, but is shown by apes. Among the babies, the younger the infant the more violent this reaction.

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ZOOLOGY

A Jonah a Day Represents Whale's Rate of Growth

A JONAH a day would be just about right for a young and rapidly growing finner whale. That is, supposing the finner whale could swallow the prophet—which he couldn't. But anyhow, a whale of this kind, which are the ones most hunted for oil nowadays, increases in size by the equivalent of a big man's weight every day, during his period of most rapid growth.

This is among the host of fascinating whale-facts amassed in many voyages to both of the earth's frozen ends, by Prof. Johan Hjort, seagoing scientist of the University of Oslo.

Finner whales mate in early autumn, and their young are "calved" in May. The prenatal period is only a little longer than man's. The whale baby feeds on its mother's milk from May until December, when it is weaned. Adolescence lasts from then until about the beginning of the following August. Thus in two years the blue whale passes from infancy to adulthood, although of course it continues to increase in size for a long time after maturity is reached.

The growth naturally goes on at a tremendous rate. In a single day, during the period of most rapid increase in size, the young whale puts on every day the weight of a full-grown man. A really large finner whale will weigh as much as 1,500 men—real he-men, too, the size of the thick-chested Viking whaler captains who pursue them. Cruising at ten knots, Prof. Hjort has calculated, they must put forth an effort equivalent to 47 horsepower. The Norse biologist added that he has been on ships pursuing such whales at a speed of fourteen knots—and not catching them.

The oily blubber, chief prize in whaling, performs a very important biological function for the whales. It is to these huge sea mammals what the hump is to a camel—a reservoir of energy-food stored up in time of abundance, to be drawn upon in seasons of scarcity. Because of the tremendous quantitative fluctuations in the various forms of sea life on which whales feed, they must often go for long periods without feeding, and often cruise for hundreds of miles without so much as a herring or a shrimp to eat.

A second function of the blubber is protection from the cold. Fat is an excellent non-conductor of heat, so that a whale well wrapped up in his subcutaneous layer of blubber can live for weeks and months in polar water at a temperature near or below freezing.

Whalebone, formerly next in importance only to oil in the whaling industry, is now an object of practically no value, thanks to the radical change in ladies' fashions since the wasp-waisted Late Victorian days. Nowadays the whalebone sieve from the animal's jaws is simply dropped into the sea.

In years of studies of whales, Prof. Hjort has gone on many long voyages into the remotest waters of the world, on all kinds of craft, from the little "catcher" boats scarcely larger than tugs, to the newest "floating factories" of 30,000 tons, which (except for the inescapable whaleoil odor) afforded him all the luxuries of a first-class suite on a modern super-liner.

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BIOPHYSICS

Find Virus Molecules Like Heredity-Carrying Genes

NEW evidence for striking likeness in physical and chemical makeup between viruses, the submicroscopic "living molecules" that transmit diseases, and genes, the invisible somethings that abide in or on the chromosomes of cells and transmit hereditary qualities in humans, animals, and plants, was produced for the consideration of biologists at the meeting of the American Association for the Advancement of Science, by Drs. J. G. Gowen and W. C. Price of the Rockefeller Institute for Medical Research, Princeton, N. J.

Drs. Gowen and Price traced this vital similarity between viruses and genes through ultraviolet and X-ray experiments on the particular virus that causes the mosaic disease of tobacco leaves. First, they took juice pressed out of diseased leaves, known to contain the virus, and rayed that, keeping track of the rate at which the virus was killed off. But they knew that the juice contained plenty of non-virus protein molecules, that absorb the rays; it was as though they were firing at targets that were scattered among sandbags.

So they purified the virus, getting it in crystalline form, and bombarded that with rays. The rate of destruction was greatly increased. Then they mixed more of the purified crystalline virus in juice pressed from undiseased leaves, and rayed the mixture. The rate of destruction of the virus became almost identical with that in the original juice from diseased leaves.

Raying the virus with non-lethal doses of either ultraviolet or X-rays produces "mutations," just as raying the germ-cells of animals and plants brings forth these sudden evolutionary shifts. These mutations in the virus show themselves in the changed character of the injury they do to leaves when they are injected into the plants.

In general, viruses and genes are "hit" by various kinds of rays in a rather similar fashion, and respond in ways that are suggestively alike. The inference therefore seems legitimate that in size at least, and quite possibly in other ways as well, they really are alike.

Science News Letter, January 9, 1937