SCIENCE NEWS

Science Service, Washington, D. C.

THE DOUBLE FUNCTION OF GENES

GENES, the invisible units of heredity, do double duty. They determine the expression of the body's thousands of characters, such as color of hair or eyes, and they also serve a general purpose in merely keeping you alive. If every gene needed for every special purpose were not also present in every cell, even where it is not needed, you just wouldn't be alive at all.

This double function of genes was brought out in discussion by Dr. M. Demerec, of the Carnegie Institution of Washington, speaking at Woods Hole, at the meeting of the Genetics Society of America.

Every cell in the body contains exactly the same set of genes as every other set. The cells in your toes have the same hair-color genes as the cells on the top of your head. But just because you have no hair on your toes is no indication that those particular genes are lacking there. If they were not present the cells themselves would not exist. There would not be any toes. There would not even be any you. And so for all the rest of the genes everywhere.

The discussion was conducted in an endeavor to find out more about the working of genes—how they operate to make our hair blond or brunette, our eyes blue or brown, our legs long or short, our dispositions placid or vehement. Genetics thus met embryology.

Genes act like enzymes, which are chemical agents that change things without themselves being changed. The digestive ferment pepsin is an example of an enzyme. But genes are not enzymes, chemically speaking, most of the speakers contend. They are much more complex in their makeup and they increase and multiply themselves which ordinary enzymes are unable to do. It is considered more likely that they create special enzymes and work through them to produce their effects on body development.

Dr. Calvin Bridges, of the Carnegie Institution of Washington, displayed microscope slides showing the interior of cell nuclei, in illustration of the way in which genes not only reproduce themselves but also may produce entirely new genes. Dr. Bridges has suggested that evolution began with a single gene, and that this, by multiplication and changes in its chemical nature, eventually gave rise to the thousands of diverse genes found in the most advanced animals and plants. These changes may have come about through the impact of radium rays or other active forces of nature.

Dr. Charles B. Davenport, of the Carnegie Institution of Washington, showed a number of large-scale charts of living cells, showing changes in material lying directly on the outside of the nuclei. These, he suggested, indicate how the genes in the nuclei exert chemical influences on events outside themselves, and thus determine the course of bodily development.

FRANK THONE

MALE SEX HORMONES AND THE PREVENTION OF ABNORMALITIES

MALE sex characters will be brought under control in their development, and distressing abnormalities will be subjected to experiments looking toward their elimination from the human stock, as the result of discoveries made in Swiss and Netherlands laboratories, reported at the meeting of the American Chemical Society, by Dr. L. Ruzicka, of Zurich.

The basis of his statement is the definite determination of the chemical composition of a male sex hormone isolated last June by Professor Ernst Laqueur, of Holland. In the opinion of Dr. Ruzicka, the synthetic preparation of this hormone in sufficient quantities to provide ample material for studies of its effect in treating sexual abnormalities of male human beings will be merely a routine matter requiring a few weeks or months.

This hormone is the second chemical messenger having to do with the development of male sex characters upon which Dr. Ruzicka has worked. The first was isolated from kidney secretion in 1931 by the German chemist Dr. M. Butenandt. In 1934 Dr. Ruzicka and his assistants succeeded in producing this hormone in the laboratory from cholesterol, a widley distributed organic substance found abundantly in the yolks of eggs.

Through the experimental material thus provided, it was possible to demonstrate that there must be two male sex hormones, one present in kidney secretion and the other in the sex glands themselves. The isolation of this second hormone proved to be difficult, partly because it occurred in such small quantities, roughly in the ratio of one part in a million of glandular tissue.

Comparison of the effect of the artificially produced hormone with that occurring naturally in the tissue of male sex glands indicated that the difference between them was more a matter of potency than of chemical nature. In the light of this and other findings, Dr. Ruzicka explained, he predicted the empirical formula of the second hormone and prepared some of it in the laboratory.

When Professor Laqueur succeeded in isolating the naturally formed hormone from gland substance he found that it conformed closely to the formula predicted by Dr. Ruzicka, and the natural hormone could be converted into the substance prepared by Dr. Ruzicka by a simple process of oxidation.

As a result of these studies, Dr. Ruzicka stated, it is safe to say that both sex hormones can be manufactured in the laboratory. Both of them, like theelin, the female sex hormone, are derivatives of the widely occurring substance cholesterol. The male hormones differ in formula by two atoms of hydrogen. The female hormone contains six less atoms of hydrogen and one less of carbon, but has not yet been prepared synthetically.

The action of the second male sex hormone is so powerful that it will increase the weight of certain sex organ

tissues in abnormal rats by more than four thousand per cent. Whatever use may be made of it in the treatment of human beings, Dr. Ruzicka warns, will have to await results of long and careful experimenting.

GEORGE A. PETTITT

EXPERIMENTS WITH A NEW TREATMENT FOR MEASLES

No suitable measure for dealing with the most infectious of all childhood diseases—measles—had been found until recent experiments with a protein material obtained from the bodies of human mothers have been reported.

New-born babies do not have measles, but the immunity, evidently derived from their mothers, disappears very early. Measles and the complications that follow it are then acknowledged as among the most dangerous of all diseases of infancy and early childhood.

Encouraging evidence regarding the new treatment reaches the medical world through the *Journal* of the American Medical Association. The medical publication devotes a major article, a scientific report from its council on pharmacy and chemistry and an editorial to this important new preparation.

Dr. Irving W. Levitas, a specialist in children's diseases, Westwood, N. J., describes twenty-eight cases of fully developed measles treated with the new substance. Of these twenty-five children were greatly benefitted, particularly in regard to cough and toxicity. When Dr. Levitas gave the new treatment to eighteen other children one or two days after they were exposed to measles, he was able to modify the course of the disease so that in fifteen cases the symptoms were extremely mild. Then the substance, in larger dosage, was given to twelve children exposed to the measles in a hospital ward. After the injection of the substance, none of them "took" the disease.

In a preliminary report, the Council of Pharmacy and Chemistry of the American Medical Association considers the new substance, which is a placental extract first used experimentally by Dr. C. H. McKann and his co-workers. It regards the product as a promising immunizing agent. Both the council and the editor of the *Journal,* however, think it too early for doctors to put the extract in general use, until further evidence of its value is available.

THE PETROLEUM RESERVES OF THE UNITED STATES

FEARS of an imminent gasoline shortage in the United States, with skyrocketing prices, are held exaggerated by government economists, statisticians and petroleum specialists in Washington.

Commenting in response to Science Service inquiries, they said they could not agree with Dr. Benjamin T. Brooks, chemical engineer, and L. C. Snyder, geologist, both of New York, who predicted before the American Chemical Society, meeting in San Francisco, that a serious petroleum shortage will arise some time between 1940 and 1943.

The prevailing opinion among persons conversant with the petroleum industry is that while America will undoubtedly be faced with a shortage of natural petroleum at some time, it will be a great deal further in the future than five years.

According to figures of the U. S. Geological Survey, the known petroleum reserves of the United States, excluding unproven areas and unknown potentials, are about 13¼ billion barrels. Since the normal rate of consumption is roughly one billion barrels a year, this supply would last at least 13 years, if no new fields were discovered.

New oil fields are now being discovered, giving an addition of approximately 600,000,000 barrels each year. This, to be sure, is not enough to supply our demand without tapping our reserves, but it is enough to make our reserves last a great deal longer than 13 years.

Consumption may rise, of course. The estimates of the Petroleum Administrative Board for the months of July and August show that it will probably reach an all-time peak for the history of the United States, with about 42,000,000 barrels consumed each month. Consumption is usually higher in the summer months, however, and there will be a dropping off with the approach of winter.

As for a rise in prices due to shortage of petroleum, and its predicted effect of less consumption of gasoline, and small, low-powered automobiles, government statisticians have not been able to discover any link between gasoline consumption and price, or between petroleum supply and price.

Prices in the gasoline field are strictly competitive prices, and not based directly on supply, demand or anything else. Furthermore, there appears to be no relation between price, including state and federal taxes, and petroleum consumption per car, which is roughly 18½ barrels per car each year. For example, in Alabama, the taxes on gasoline are in the neighborhood of nine cents a gallon, and yet there has been no drop in gasoline consumption in that state.

Undoubtedly, at some time in the future the motor cars of the United States will be driven by a motor fuel that is at least partly the result of chemical skill. "Sooner or later a substitute for natural petroleum as the principal source of motor fuel must be found, but what it is, or when it will be commercially practical we don't know," said a member of the Petroleum Administrative Board who refused to be quoted personally.

Shale oil has been mentioned as a possible substitute for petroleum. The prevailing opinion is, however, that while oil distilled from shale is a great potential source of motor fuel, there is no technical process at present capable of recovering it in sufficient amounts and at a cheap enough cost to be practical.

It is believed in government circles that step number one in providing a substitute for petroleum will be the large-scale synthetic production of gasoline by hydrogenation of coal. A number of successful processes for coal hydrogenation have been developed, notably the Bergius process at present being used on a large scale in Germany, and are now being experimented with in America.

MOSAIC DISEASE OF THE SUGARCANE

SUGARCANE fights mosaic disease, one of the worst of the ills that afflicts it, with a virus-paralyzing substance

it forms in the growing tips of its stalks, a stuff that seems to be somewhat analogous to the germ-fighting "anti-bodies" formed in the bodies of human beings and animals when invaded by disease. This discovery has been made by Drs. E. W. Brandes and Julius Matz, plant pathologists of the U. S. Department of Agriculture.

They found that when juice extracted from healthy tissue taken from near the growing tips was mixed with juice from mosaic-sick plants, known to contain the virus, and the mixture then injected into healthy canes, the resulting infection was much less severe than "control" infections caused by unmixed virus-containing juice. The nature of the virus-paralyzing substance is still unknown; as is, indeed, the nature of the virus itself. The latter belongs to the group known to science as "filter-passers," because unlike the true microscopically visible bacteria it can be drawn through fine-grained stone filters without losing its capacity to cause disease.

Recent studies in Louisiana have disclosed that there are at least four varieties or strains of sugarcane mosaic, whereas it used to be thought that there was but one kind. This situation is comparable to that presented by malaria in human beings. Malaria is malaria, but there are three species of microorganisms that cause it, and hence three kinds of malaria.

A report by Drs. Brandes and Matz will be presented at the fifth triennial congress of the International Society of Sugarcane Technologists being held at Brisbane, Australia.

FEDERAL SURVEY OF CHRONIC ILLNESS

THE federal study of chronic illness throughout the country is getting under way and the house-to-house canvass in nineteen states to collect information is scheduled to start on October 15.

The study will be directed by George St. J. Perrott, statistician of the U. S. Public Health Service. In his office workers are preparing and revising charts, tables and forms for collecting data. However, the study, for which $3,450,000 was appropriated two weeks ago, is really a WPA project and 90 per cent. of the personnel will be taken from the work relief rolls of the various states.

Mr. Perrott has explained the objects of the survey as follows: The population of the country is growing older and more and more people are getting past the age for whooping cough, scarlet fever and other childhood and acute diseases and into the age group where heart disease, rheumatism, diabetes, cancer and digestive disturbances form the chief health problem. There is almost no accurate information as to the extent of these illnesses throughout the country and their effect on economic and social conditions. The health inventory is expected to supply this lack.

Some of the information will be obtained from records of hospitals and sick benefit associations. The rest will come from the house-to-house canvasses of 750,000 families selected to be representative of the general population of various income levels. Besides chronic illness, data will be collected on physical disability, such as blindness, deafness and loss of limbs or other crippling.

The U. S. Public Health Service has already been making an intensive study of the importance and effect of chronic ailments on the capacity of the patient and family to remain self-supporting. The health survey will be correlated with this study to obtain further data.

Headquarters for the house-to-house canvass will be in Detroit. The states to be included are Washington, Oregon, California, Utah, Minnesota, Missouri, Illinois, Michigan, Ohio, Pennsylvania, Maryland, Virginia, New York, New Jersey, Massachusetts, Georgia, Alabama, Louisiana and Texas.

ITEMS

A COMET that may be new to our part of the heavens has been discovered by Professor G. Van Biesbroeck, of the Yerkes Observatory. It is a faint diffuse object in the southeastern evening sky between the constellations of Capricornus and Sagittarius. Moving northwestward in the sky, more observations and computations are necessary to tell whether the comet, now 14th magnitude, will become brighter. Report of the discovery is being distributed to observatories through Harvard College Observatory. The comet has a diameter of 20 seconds and there is a star-like nucleus of three quarters of this diameter.

RAPID CITY, S. D., may be the scene of another stratosphere balloon flight this fall. First official intimation that the National Geographic Society and the U. S. Army Air Corps are considering a new flight is contained in an announcement issued by the society. Those serving on the advisory committee of the attempt of last July 12 are now making a study of weather conditions in the Rapid City area for the last fifteen years. The results of the study will determine whether a new flight will occur during October. A special survey committee has just concluded from its study of the accident that failure of the rip-panel of the balloon, *Explorer II*, was the cause of the recent collapse of the balloon's fabric just before take-off. Only the upper half of the fabric was damaged and the entire top is now being rebuilt by the Goodyear Zeppelin Corporation at Akron, Ohio. The gondola and instruments are all intact and with the fabric again in good shape the take-off awaits only a favorable decision from the weather studies.

BUTANE, propane and other petroleum-gas names now unfamiliar may soon become parts of common speech and consciousness. They are now rather neglected by-products of petroleum refining, but when turned into liquids they can be put to a considerable range of uses, according to the report of W. Z. Friend and T. W. Legatski, of the Phillips Petroleum Company, at the San Francisco meeting of the American Chemical Society. These gases are so versatile that a single supply may first be used as a solvent, then as a refrigerant, and finally consumed as a fuel either for heating or in internal combustion engines. It was pointed out that the consumption of liquefied gases increased 71 per cent. during the year 1932–33, and 73 per cent. in the year 1933–34, and prophesy that under the stimulation of further application their use will be increasingly common in the future.