

disintegrated, giving birth to light mesons.

However, the negatively charged heavy mesons were greedily swallowed by nuclei, resulting in the detonation of the capturing nuclei into showers of particles called "stars". At the end of their course, when nearing capture, the mesons made a wavy track. The wavy track is made because the particle is relatively light, and, at the extremely low energies involved, it takes a severe buffeting from nuclei in the emulsion.

The negative heavy mesons are the type which have been produced in the giant Berkeley cyclotron. The Berkeley research shows they have a mass of 313. The characteristic wavy track and the

"stars" resulting from the detonation of nuclei are also observed. About half the meson tracks observed end in "stars".

Theoretical calculations indicate that mesons were being made from the beginning of the operation of the giant cyclotron over a year ago. The first plate exposed on Feb. 21 of this year for 30 seconds yielded 100 times as many mesons per plate as were obtained in the Andes from cosmic rays in 45 days. This is 10,000,000 times as many mesons per second in the cyclotron as on a mountain top. On the first night one track in 10,000 was a meson, while now the method has been improved so that one track in 10 is a meson.

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A woman's skin differs from a man's by being paler in color, showing less blood and less melanin, Dr. Edwards reported.

Melanin is a brown pigment found in large quantities in the dark races and is a prominent factor in sun tanning. The female skin, though having less of this pigment than the male skin, has more of another pigment, carotene. This is the chemical that gives carrots their color, and that in human skin is derived from vegetables, egg yolk and a few other sources of carotene.

The hormones produced by the sex glands regulate the skin color. Male castrates showed a sallow color, due mainly to lack of blood supply. This could easily be corrected by doses of synthetic male hormone. These patients also had skin that did not tan as much as normal male skin, and which contained more carotene than normal male skin. Their skin was more like that of a woman's in these respects. These differences were also corrected by male hormone treatment.

The effect of hormones on female skin color was found in studies of women whose ovaries had been removed and also in periodic changes in skin color corresponding to stages of the menstrual cycle.

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#### PHYSIOLOGY

## Sex Affects Skin's Color

**Spectrophotometric studies show that a woman's skin is paler in color than a man's. Sex glands produce hormones which regulate the skin color.**

► SEX differences and variations in sex gland activity are reflected in skin color. Spectrophotometric studies showing these were reported by Dr. Edward A. Edwards of Harvard Medical School and Tufts College Medical School at the meeting of the Optical Society of America in New York.

The spectrophotometer is an instrument used to analyze colors in a substance from the light it gives off. Doctors every day look at the skin color of their patients for clues to their state of health. The spectrophotometer gives the same kind of information and much more. It detects not only the quantity of blood present in the skin but also how well it is supplied with oxygen.

With the aid of this instrument, Dr. Edwards and Dr. S. Q. Duntley of Massachusetts Institute of Technology have made an optical reconstruction of human skin. This was done by stripping a piece of skin off a cadaver. After the blood was washed out of it, the skin was mounted against the spectrophotometer window. Backing it was a parallel-sided glass cell filled with oxyhemoglobin solution. Behind this was a second glass cell filled with reduced hemoglobin solution, that is, blood's red color chemical minus oxygen. The "skin" was completed with a block of fat. By varying the concentrations of the two hemoglobin solutions, curves simulating various body

areas were obtained by this method.

The studies with the optically reconstructed skin were confirmed by studying the palm of a normal young man whose arm was bound by a tourniquet.

#### MEDICINE

## Chemical Stops Hormone

**A new principle in the treatment of cancer may result from the discovery that an anti-vitamin can interfere with the action of a female sex hormone.**

► DISCOVERY that an anti-vitamin can interfere with the activity of a hormone, specifically a female sex hormone, was announced by Dr. Roy Hertz of the National Cancer Institute at the meeting of the American Association for Cancer Research in Atlantic City.

A new principle in treatment of disease may result. This new principle could apply not only to treatment of cancer but also treatment of many other diseases in which glands and their hormones are involved.

Dr. Hertz worked with chickens and monkeys. He gave the animals doses of a chemical called aminopterin. This is an antagonist, or anti-vitamin, to folic acid. This anti-vitamin stopped the

growth response of chick tissues to the female hormone, estrogen.

The effect of hormones on the growth of tissues has recently been considered important in connection with cancer, which is a problem of abnormal growth. A relation between sex hormones and cancer of the breast is also known to exist and a number of scientists are working on this phase of the cancer problem. Some of them have been discussing their work at this meeting.

Cancers of the breast and uterus are known to have a certain dependence on stimulation by estrogens. In breast cancer it has been common practice to remove the patient's ovaries, or destroy them by X-ray or radium treatment.

The object of this is to stop their production of estrogen, in the hope of stopping the estrogen-stimulating effect on the cancer.

Dr. Hertz' discovery of the anti-folic acid chemical's effect opens the possibility of using this chemical instead of removing or irradiating the ovaries. It might prove even more effective, because it would also stop the activity of estrogen from sources other than the ovaries.

The relation between folic acid and estrogen stimulation was first observed

by putting chicks on diets that contained none of this vitamin. Trial of the anti-folic acid chemical came next. Diets lacking other vitamins, such as riboflavin, pantothenic acid and pyridoxine, were also tested. But they did not have much effect on estrogen stimulation.

The possibility that other hormones may depend on "trace factors" in the diet, such as vitamins, is opened by the discovery.

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#### AERONAUTICS-RADIO

## Calculate Speed by Radio

To measure how fast speedy planes travel, an improved single ground-based radio station has been worked out. Plane must fly directly to or away from station.

► FASTEST-TRAVELING airplanes may have their speeds accurately determined by an improved single ground-based radio-frequency measuring device, Boeing Aircraft Company, Seattle, revealed.

The new system is based on the so-called radio Doppler system which was worked out by the National Advisory Committee for Aeronautics at Langley Field, Va., in 1941. The earlier development made use of two ground stations 14 miles apart and a radio transmitter in the plane. The new system uses only one ground station.

In the new Boeing system, the ground station transmits to the plane. A receiver in the plane picks up this transmission, doubles its frequency and gives it to a transmitter for sending back to the ground station. At the ground station, the original frequency is likewise doubled. When the two doubled frequencies are compared, that is, heterodyned or "beat" against each other, their difference gives data from which the speed of the plane is easily determined.

The principle behind the action is similar to what takes place with sound from a rapidly approaching locomotive. This sound becomes higher-pitched as the train approaches, and becomes lower-pitched as the train goes away from the listener. Reason for the change in pitch is that sound is made up of air waves traveling outward from their source. If the source is approaching, the waves reach the listener more rapidly, making the sound seem higher in pitch.

Radio emissions oscillate, or vibrate.

Although they travel with the speed of light, there is a difference in their frequency coming and going, just as with the sound from a speeding locomotive's whistle. Furthermore, this difference can be measured with great accuracy on an oscillograph in the new instrument.

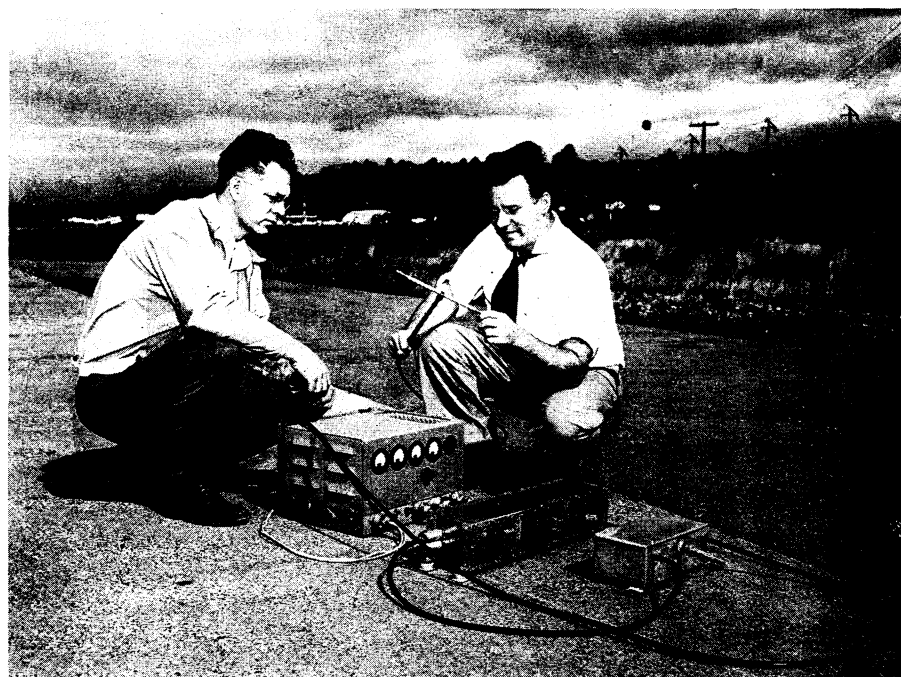
With the new system, the airplane may fly at any altitude and anywhere within a 50-mile radius of one ground

station, but its speed can be measured only when it is flying directly to or away from the station. The oscillograph of the instrument can clock the plane during a flight of several miles, indicating exact speed at every instant.

A slow-moving plane, at speeds up to perhaps 150 miles an hour, can be clocked with a stop watch. For faster speeds this method is inaccurate. In official tests under the sponsorship of the Federation Aeronautique Internationale, speeds are measured by an elaborate high-speed camera installation.

In the radio Doppler system worked out by NACA, the test plane had to fly at low altitude directly on the course between the two ground stations. Receivers at each station were tuned to the transmitter carried by the plane before it left the ground, and also to an auxiliary ground transmitter operating on nearly the same frequency. Thus both receivers got a heterodyne whistle at the same audible frequency. A telephone wire connected the two stations and fed the two whistles into an oscillograph. As the plane flew the course, the station behind it got a lower-pitched note and the one ahead a higher pitched note. The frequency difference showed on the oscillograph.

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**MEASURING SPEED OF FAST PLANES**—This is the equipment used in the plane with the improved Doppler system of measuring speed. It receives a radio beam from a ground station, doubles its frequency, and returns it to the ground.