

PHYSIOLOGY

Establishes Amount of Vitamin B Needed in Diet

WHAT is believed to be the first exhaustive study of any of the vitamins from the point of view of how much a human being needs has been made at Yale University by Dr. George R. Cowgill, associate professor of physiological chemistry.

Dr. Cowgill has devoted his research to the vitamin B requirements of man and has established a measure by which nutritionists can determine whether an individual's diet contains enough of this important food factor. The results of Dr. Cowgill's study have been published by the Yale University Press for the Institute of Human Relations.

Deficiency of vitamin B in the diet has long been known to be the cause of beriberi, a disease which constitutes one of the most serious medical problems in the Far East.

The greatest significance attaching to vitamin B for people living in North America is the fact that it may be a cause of various chronic conditions summarized under the vague term "ill-health," according to Dr. Cowgill. In these instances the shortage of the vitamin may not be great enough to result in manifest beriberi but sufficient to produce a complication difficult to recognize and one which therefore escapes treatment, he observes. Various gastrointestinal disorders, such as gastric ulcers and colitis, can be related to vitamin B deficiency; certain heart disorders; and various neurological conditions may have their beginnings in a diet lacking sufficient amounts of this vitamin.

Body weight and vigor of vital processes (metabolism) were found by Dr. Cowgill to be the most important variables determining vitamin B requirement.

In approaching the problem, Dr. Cowgill made studies of diets associated with beriberi and diets not associated with the disease. Among the former were those of families in Labrador, Newfoundland, and Calcutta; prison diets in the Far East, notably in Manila, Selangor, and Singapore; and diets of various seamen and soldiers. A study of limited diets not associated with beriberi included a variety such as those of

American white and Negro families, rations allowed by the German Government for civilians during the winter of 1916-1917, and the dietaries of workers on sugar and cacao plantations in the East and West Indies.

He has established that the ratio of the amount of the vitamin to the energy yielding value of the diet correlated with the body weight and metabolism expresses the adequacy of the diet in vitamin content. Thus the diets associated with beriberi showed an average ratio of 1.74, while in diets where the disease did not occur, the ratio was 2.18.

Men require more vitamin B than women, it appears from Dr. Cowgill's report.

"Students of the beriberi problem have frequently commented on the fact that this disorder is preeminently a disease of young adult males," he says. "As

an explanation of this it has been suggested that beriberi is chiefly an 'institutional disease,' that is to say, a disorder found in jails, asylums, groups of laborers and the like, and that the conditions in society which operate to form these groups affect men more than women. The results of the present study suggest another explanation. The formula derived from the quantitative studies indicates that the two most important variables determining the vitamin B requirement are the body weight and the metabolism.

"Now it is generally known that males have a distinctly higher rate of metabolism than females, and being usually heavier and more active, consequently consume greater quantities of food. Therefore, males have a higher total energy exchange per day. Under conditions where the vitamin B content of the ration proves to be very close to that required by the organism, there is little or no factor of safety against beriberi, and this sex difference in total metabolism may be the chief factor determining whether beriberi shall develop. Under such circumstances it is obvious that the males should be more liable to the disease."

Science News Letter, March 2, 1935

ENGINEERING

Synthetic Gasoline Promises Sixth More Power for Planes

BY using a new "rebuilt" gasoline with ideal 100 octane antiknock rating, the Army has found a way to increase the power output of airplane engines by nearly a sixth to a third without increasing the weight of gasoline used.

Lieut. Frank D. Klein of Wright Field revealed to the Institute of the Aeronautical Sciences meeting at New York that experiments during the past few months with 2000 gallons of a special lead blended iso-octane gasoline have demonstrated the superiority of the new fuel over the 92 octane gasoline that is the present Army Air Corps standard.

This means that with engines designed to take full advantage of the new fuel, the fighting and bombing planes of the Army Air Corps will be able to fly farther and faster without carrying more gasoline weight.

In 1928, a 33 per cent. increase in power output was obtained by redesign of engines to use the now standard 92 octane gasoline instead of a 50 octane gasoline. Thus army airplanes will in the future be delivering about 70 per cent. more power per pound of gasoline than the airplanes used earlier than seven years ago.

Synthetic gasoline must be made to satisfy the very high octane rating demanded, Dr. Graham Edgar of the Ethyl Gasoline Corporation explained. Petroleum will still be used as raw material but the molecules will be broken down into small bits and then rebuilt into new fuels.

Several oil refineries have made in the last two years substantial quantities of iso-octane which is the chemical compound used as the ideal standard in testing the antiknock qualities of tetraethyl



550 B.C. ADVERTISING GAVE ATHENS POTTERY BOOM

Five of the fifty Greek vases in the Albert Gallatin Collection loaned for exhibition to the University Museum. They represent the fifth and sixth centuries B.C., when Athenians advertised their pottery art and "got results."

lead and other gasoline additions. The new experimental army aviation gasoline was composed half of iso-octane and half of good quality ordinary aviation with ethyl addition.

The new superior gasolines will cost more per gallon than present aviation

fuels but since they will contain more power per pound, they promise to be actually more economical. Dr. Edgar urged the consideration of fuel cost per ton-mile of payload carried rather than the cost per gallon.

Science News Letter, March 2, 1935

PHYSICS

Universe Infinite In Particles; Finite In Space

THE universe contains an infinite number of particles but its volume is finite. This is the paradoxical answer given by Prof. E. A. Milne of Oxford to a Science Service representative upon the occasion of his receiving the Royal Astronomical Society gold medal.

"Is the universe infinite?" Prof. Milne was asked.

"It is necessary to distinguish between whether the number of particles in the universe is infinite and whether the amount of space used by one observer is infinite," he answered. "I believe the right answer is that most probably the universe has an infinite number of particles in a finite space."

Imagine an ideal telescope which is infinitely powerful, Prof. Milne suggested. Then one would see that the more distant the nebulae the nearer they would be together. They would be closer and closer, fainter and fainter and ultimately they would shade into a continuous background.

"What would this be like?"

"Picture yourself inside a cloud which was infinitely dense at its circumference," said Prof. Milne.

Prof. Milne is recognized for his mathematical explanation of the expanding universe in terms of ordinary three-dimensional or Euclidean space.

"I don't believe curved space is anything more than a possible method of expression," Prof. Milne said. "I think that my calculations using Euclidean space provide a greatly simplified picture of the universe."

He did not oppose Einstein's work, however, and he explained that Einstein's early work is fundamental to his theory.

Science News Letter, March 2, 1935

It was supposed that garden peas lose sweetness after picking because the sugar turned to starch, but tests indicate that the sugar is apparently used in respiration.

ARCHAEOLOGY

Advertising Stunts Were Practised By Greeks, Too

THE ancient Greeks, too, had clever advertising stunts. In the sixth century B.C. olive oil was given as prizes to foreign athletes competing in the Panathenaic games—and the Athenians packaged the oil prizes in beautiful vases.

As a result there came from Egypt, Africa, Russia, Spain and Gaul, a flood of orders for Athenian vases and Athens obtained a virtual monopoly of the world's pottery trade.

This close attention to making the package attractive, which sold more of the package-vases, is the reverse of what modern advertisers do when they improve the package to sell more of the contents.

Jotham Johnson, archaeologist of the University Museum in Philadelphia, Pa., told of the advertising techniques of the ancient Greeks during a loan exhibition of one of the world's best private collections of the Athenian vases.

In addition to vases, Athenian potters made jars, flasks, pitchers, drinking cups and other utensils, ornamental and practical. So complete was the Athenian monopoly that the best artists from other countries were imported to design the products. Connoisseurs today judge that Athenian vases reached their highest beauty in the fifth century B.C.

Science News Letter, March 2, 1935

ENTOMOLOGY

Bright-Colored Butterflies Avoided by Birds

BIRDS really do avoid butterflies whose bright "warning" coloration advertises their inedibility, Prof. G. D. Hale Carpenter of Oxford University declares (*Nature, Feb. 2*).

Prof. Carpenter received the information on which he bases his communication from a naturalist in Africa, T. H. E. Jackson, of Kitale, Kenya Colony. On an expedition into Uganda, Mr. Jackson noticed birds feeding on butterflies that crowded among the flowers of a blossoming tree. Under the tree he found many wings of the insects, broken off by the birds before they swallowed their prey, some of them with the marks of beaks imprinted plainly on them. By comparing the numbers of these witnesses of insect tragedy with the relative abundance of the various species he