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SOME OBSTACLES IN THE PATH TOWARDS AN OPTIMUM DIET[1]

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WAR, by interference with agriculture and commerce, as well as by direct destruction of foods, brings on starvation and the hosts of human ailments that sprout on malnutrition. Hence, in a world-wide violence, like our present war, the ancient problems of individual and national diets requisite for health and efficiency become both a national and an international concern of nutrition experts, physicians, statesmen and captains of industry. These imperative problems compel the biologist to re-examine the known and the unknown in the field of food and fitness, food and life, food and victory, so that the obstacles in the path towards an optimum diet for optimum health may not trip us in the dark. Such re-examination of the nutritional history of man (and other mammals), past and present, reveal as of to-day much new and reliable information, much innocent ignorance, many faulty food habits and unwise individual and commercial food practices of to-day, unwise practices in the light of present knowledge and past experience. There appear to be even questionable building stones in our scientific edifice. Such dilemmas as the recent assertion by Surgeon General Dr. Thomas Parran, of the U. S. Public Health Service, that, in our own country with its abundance of excellent foods, and in times of peace, "one third of our people is getting food inadequate to maintain good health, and less than one fourth of the American people are getting a good diet." This is perplexing, especially in view of the more recent assertion (November, 1942) of Sir John

[1] Lecture before the Physiological Society of Detroit, Michigan, November 19, 1942.

SCIENCE NEWS

Science Service, Washington, D. C.

SPIRAL NEBULAE

THE arms of spiral nebulae, those gigantic pinwheels of the universe, have been discovered to be trailing their central region by Dr. Edwin Hubble, of the Mt. Wilson Observatory. His investigation, reported in the *Astrophysical Journal*, is of importance in the study of the origin and development of nebulae, the most familiar of which is the Milky Way.

Spiral nebulae, comparable in size to our stellar system, are millions of light-years away. Billions of stars, luminous gaseous matter, and dark clouds obscuring portions of the brilliant center form this whirlpool of light.

Dr. Hubble slips the missing piece of the puzzle into place by developing a criterion for determining the direction in which these whirling masses are inclined. We see them as images projected against space and whether they are tilted toward us or away would decide, in light of their spiral pattern, if the arms are trailing or leading.

It has been believed for some time that the dark lanes visible only on the slightly tilted nebulae are the key, but dispute arose as to whether they marked the far or near side. Working with the entire collection of Mt. Wilson photographs, including those made with the aid of the famous 100-inch telescope, Dr. Hubble eventually found a spiral nebula which showed both the dark lanes and the spiral pattern. The dark lines were silhouetted against the central or nuclear bulge, showing that the dark bands unmistakably denote the nearer side. Other nebulae studied support his assumption that the arms were trailing.

From the slant of the spectral lines it is known that all spiral nebulae are traveling in the same direction. Having once determined that direction, Dr. Hubble concluded that the arms of the nebulae are trailing in all spirals.

NEW COSMIC RAY THEORY

COSMIC rays are due to protons which plunge into the earth's atmosphere from outer space, and the proton splits into ten mesotrons. This is the latest theory which Dr. W. F. G. Swann, director of the Bartol Research Foundation of the Franklin Institute, proposes in *The Physical Review*.

Dr. Swann has long contended, in company with many other distinguished physicists, that the incoming particles responsible for the rays are protons. Others have contended that they were high-speed electrons. He now adds a further detail to the theory, that the proton splits into ten mesotrons. This theory, he believes, is the only one that satisfactorily accounts for the variation of cosmic ray intensity with the latitude and altitude.

The proton is the positively charged particle found in the central sun or nucleus of an atom. It has about the weight of the hydrogen atom, the nucleus of which is composed of a single proton, around which revolves a single negatively charged electron. The electron has only 1/1800 the weight of a proton.

The mesotron is the elusive and exceedingly short-lived middleweight particle, with a weight about 1/10 that of the proton. Its life span is only one to two millionths of a second. Consequently many are found high up in the atmosphere, but much fewer lower down. Not many live to reach the earth's surface. During its brief flight, the mesotron parts with most of its energy and degenerates to an electron.

COLOR CHANGES IN ANIMALS

WHEN a chameleon flashes from brown to green in a few seconds, or an eel more sluggishly takes several hours to shift from dark to pallid in skin hue, don't seek the cause for this difference in rates in the nerves of the one animal or the gland secretions of the other. Professor G. H. Parker, of Harvard University, spoke on this subject before the Philadelphia meeting of the American Philosophical Society.

Quickness of color change in some animals, slowness in others is determined primarily by the skin's pigment-containing cells themselves. This is contrary to the zoological doctrine most widely held at present, which states that the quick-changing animals do the trick by means of nerve impulses, while the ones that alter their colors slowly depend on hormones or gland secretions.

This opinion, Dr. Parker said, was based on the examination of only a few animals, and falls down when a score or more species, a wide range of color-changing speeds, are examined. As a matter of fact, the quick-changing chameleon depends on hormones, the slow-changing eel on nerves.

Slowness of response by color cells to either hormone or nerve stimulus has an analogy in a similar slowness in muscle cells. A snail's muscles simply can not move otherwise than very deliberately, while a flea's muscles always contract with a lightning-like snap.—FRANK THONE.

ISLANDS IN THE PACIFIC

TRUK, in the mid-Pacific, is a doomed island. Unless geologic processes now going on in the earth's crust beneath that part of the ocean are stopped or reversed, it will eventually be drowned. The only trouble is that this won't happen in 1943 or 1944—geologic processes are slow.

That Truk is sinking, while other islands that are now enemy strongholds are slowly rising, was pointed out in an address by Professor William Herbert Hobbs, of the University of Michigan, before the meeting of the American Philosophical Society. Professor Hobbs has seen Truk and the other Japanese-mandated islands since they passed under the flag of the Rising Sun. He visited there in 1921, when Japan had just taken over and when our relations with that country were on a much more cordial basis than they have been recently. He was shown many courtesies by the officials in charge, who helped him in the geological studies he was making of the basic geology of the Pacific area.

For geologists interested in the story of mountain-building, most unique opportunities for study are offered by the several curving island chains in the Pacific, from