

BACTERIOLOGY

Germs Lose and Gain Visibility By Changing Their Diet

Discovery, Hailed as Greatest Since Pasteur, Makes Many Disease Germs Visible For First Time

GIVING germs human proteins to eat is the key to the revolutionary experiments by which Prof. Arthur I. Kendall of Northwestern University Medical School has made invisible germs visible and caused visible ones to vanish into filterable viruses.

This work, hailed as the greatest stride that bacteriology has taken since the days of Pasteur, indicates that many, possibly all, of the germs we know can change from visible to invisible and back again, according to what they feed on.

Feed on Proteins

It has hitherto been impossible to cultivate the invisible germs of such diseases as influenza, smallpox and measles outside living bodies. Prof. Kendall believed this to be due to the fact that all laboratory workers offered them the wrong kind of food. All traditional germ diets were made of such things as beef tea, gelatin, etc., containing the decomposition or breakdown products of proteins. But in human and animal bodies, natural prey of disease-causing germs, there are almost none of these; germs naturally feed on the pure proteins themselves.

Prof. Kendall undertook to get a high-protein ration for his germs. He took pieces of small intestine, human, dog, pig or rabbit, and after treating them chemically to remove the breakdown products, made a culture fluid with what was left. Planted in this, blood from human "flu" patients caused the fluid to become cloudy. A few drops of this cloudy fluid injected into a rabbit's vein gave the animal all the typical symptoms of the "flu." Transferred from this "K medium," as Prof. Kendall calls his fluid, to the old-fashioned germ foods, the germless fluid soon developed thriving colonies of tiny round germs. These appear to be the visible form of the elusive and long sought influenza germ.

Having induced one invisible germ to come out and become visible, Prof. Kendall tried his hand with others. He also took germs that have hitherto been

known only in their microscopically visible form, on old-fashioned culture media, and grew them in his new, high protein cultures. Every one of them turned from visible into invisible form. He filtered the invisible form germs through a porcelain filter so fine that some organic molecules cannot pass through it. He took the fluid that came through and planted it on the old-fashioned germ food again. Colonies of visible germs appeared out of the invisible. He could repeat this process as often as he liked, getting visible germs out of visible virus filtrates, and making the visible forms change back again by planting them in his new form food.

The following germs he lists as having been "put through their paces" from visibility to invisibility and back again: infantile paralysis streptococcus, scarlet fever streptococcus, one



PROF. ARTHUR I. KENDALL

His work means that some of the most menacing diseases may come within man's control.

form of paratyphoid bacillus, typhoid bacillus, the staphylococcus that causes boils, and the crooked germ that the late Dr. Hideyo Noguchi found in yellow fever patients, as well as the little round germ Prof. Kendall himself found in his influenza cultures. He concludes that possibly all bacteria lead this Dr. Jekyll and Mr. Hyde existence.

A sensational by-product of this research is an insight into the nature of the bacteriophage, the mysterious filter-passing something that kills germs as germs kill us. By planting (*Turn page*)

OCEANOGRAPHY

Strange Whirlpool Believed To be Only Play of Tides

THE STRANGE whirlpool reported off Cape Cod was probably not a whirlpool at all but merely the everyday movement of currents which rip and surge over the shoal areas of George's Bank. This is the opinion voiced to Science Service by Commander G. T. Rude, chief of the division of hydrography and topography of the U. S. Coast and Geodetic Survey. Commander Rude has just returned from a two-weeks inspection tour of the four Survey vessels now engaged in the first complete charting of George's Bank.

"Currents passing from ocean depths over shallow areas must necessarily speed up considerably," said Commander Rude in explaining the occurrence, "and the fact that the water sometimes rises up above the surface in 'tide-rips'

may account for the idea of 'whirlpools'".

Commander Rude expressed the belief that such statements as Captain W. E. Parker, of the Coast Survey ship, Hydrographer, who is said to have described the whirlpool, made to the newspapers had been misconstrued.

Commander Rude also said that observation of the "whirlpool" was made at the time of the spring tides when the new moon gives the ocean currents forty per cent. more strength than when the moon is at the quarter. "Thus," he pointed out, "a current of three or four knots moving where the depth is not more than thirty or forty feet is powerful enough to be felt on the side of a Survey vessel but would not, of course, hinder its head-on progress or jeopardize its safety."

Science News Letter, August 1, 1931

filtered "phage" on old type culture media Prof. Kendall obtained good growths of the germs they destroy. Bacteriophage therefore seems to be nothing but the invisible form of the germ it seems to delight in wiping out. Prof. Kendall could produce phage from germs by planting the germs in his new medium.

The behavior of germs in changing from visible to invisible is peculiar. They begin to lose sharpness of outline, growing fuzzy and dim under the microscope. At last nothing but tiny granules remain, which will pass through the fine filters, and grow back

into visible germs again. Other granules, too large to pass through the filter, appear none too anxious to resume full-fledged germ form, but in the new medium will do so.

This new knowledge of the changeability of germs can be found in patients in the early state of the disease, but not in the later, though the patients are sicker than ever. But certain puzzling granules have been found in the spinal fluid of such patients, and it now appears quite possible that these may be the half-transformed germs themselves.

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ASTRONOMY

Comet Discovery Brings Fame To Melon Patch Worker

While Following Hobby at Night, Japanese Foreman Finds New Visitor to Solar System

DISCOVERY of a comet has lifted Masani Nagata out of his daily routine as an obscure melon patch worker in Imperial Valley of California, and caused his name to become known to astronomers throughout the world. In an exclusive interview a Science Service correspondent learned the story of this latest astronomical discoverer.

When Nagata observed the comet, which has been named after him, he notified hopefully and somewhat apologetically the famous Mt. Wilson Observatory at Pasadena. Astronomers immediately turned a telescope at the location given and verified his discovery. They sent out an astronomical telegram announcing the find.

At observatories throughout the world, where Nagata was an unknown name, the question was asked: "Who is Nagata?" None could answer. Further confusion was caused by the assumption that the comet had been discovered in Japan.

It has been found that Nagata is a foreman on a melon ranch ten miles from Brawley, Calif. During the day while Nagata directs the activities of 20 field workers, he dreams of peering into the heavens through his four month old three-inch telescope. The instrument is a portable refractor which he keeps in the house when not in use. He carries it outdoors when observations are to be made. For more than nine years he used a two-inch

telescope. After working under the sun at 110 degrees, he spends the evenings with his telescope.

This 45 year old Japanese has been interested in astronomy since childhood, but not until ten years ago was he able to pursue the study of the stars. His education in astronomy has been only a correspondence school course.

The discovery of the comet came by accident. While searching for the planet Neptune, Nagata found the comet within the field of his telescope. Fear-

ASTRONOMY

Nagata Tells His Own Story

I AM PURELY an amateur astronomer. On July 15 about 8:30 p. m. Pacific Standard Time I was observing the planet Neptune with my three-inch telescope which has a thirty-diameter eyepiece of eighty millimeters and an altazimuth mounting. Near one of the stars in the constellation of Leo I found what seemed to be a nebulous hazy star. As I am very familiar with that area of the heavens I was therefore very puzzled and doubtful about what I had seen. Soon the hazy unfamiliar star faded away under the horizon.

The next evening at about 8 p. m., observing the same point, I found the

same "star" moved about one degree to the northeast. It seemed to be a comet. As I could not believe that a comet of this brilliance, magnitude seven, could have escaped the eyes of thousands of comet seekers with much more improved and more efficient instruments than mine, I inquired at Mt. Wilson Observatory if such a comet were known. They replied in the negative. Then I pointed out to them the position and . . . they answered me that two photographs they had taken showed the comet.

Astronomers at large observatories will observe Nagata's comet, compute its orbit, its future path and its distance from the earth. Because Nagata has only a three-inch telescope, he can not take photographs and carry out the intricate orbit computations. While professional astronomers search the sky from high mountain peaks, M. Nagata will continue his work in a melon patch.

The comet has a tail eight times as long as the moon's diameter. A small telescope is needed at the present time to see this visitor to the solar system. The tail is difficult to see with a small telescope, but can be found on astronomical photographs.

The latest position of Nagata's comet as determined at Mt. Wilson on the evening of July 19 is right ascension 10 hours 49 minutes and 22.3 seconds and declination north 9 degrees 58 minutes 12 seconds. It is between seventh and eighth magnitudes and its tail is reported as four degrees long.

There is no hope that Nagata's comet will become visible to the unaided eye.

Orbit computations made at the University of California's Students Observatory under the direction of Prof. R. T. Crawford show that the comet was nearest the sun on June 15. It was then one hundred million miles from the sun. It is now one hundred and sixty-seven million miles from the earth. It is receding from the earth and the sun.

The orbit shows that the comet will be four degrees south of the star Beta Leonis on August 3 and that it is moving eastward two degrees a day.

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As I am only an amateur astronomer, I have had no special study or courses