

Science Strives to Conquer Tuberculosis

Tuberculosis is one of the great problems of mankind. These articles summarize the latest and most authentic information about the progress of the warfare against this disease.

Immunity

Despite the fact that there are half as many deaths from tuberculosis as there were twenty years ago, the white plague still remains one of the world's greatest disease problems. The omnipresent bacillus of tuberculosis spreads with the greatest facility through the whole animal kingdom, yet the disease it produces would be the most curable of maladies if only man could find the secret of his own natural immunity.

Medical science has established that practically everyone in the more densely populated parts of the world at some time in his life becomes infected with tuberculosis, but the proportion that actually die is extremely small. Can this natural immunity that enables the bulk of the population to survive infection be supplemented by some artificial means? To produce an attenuated strain of bacteria that would confer the power to resist disease but whose teeth for producing virulent symptoms are drawn has been a goal sought in many diseases and attained in but few. However, Dr. Albert Calmette, of the Pasteur Institute in Paris believes that he has attained such a preventive for tuberculosis in his vaccine BCG.

BCG is a kind of half-starved strain of tubercle bacilli that have been grown for many years in test tubes on the unappetizing diet of beef bile. Somewhere in the succeeding generations grown in this state of semi-starvation the bacilli have theoretically lost their disease-producing power and yet retain a certain amount of their capacity to call forth antibodies when injected into the body.

After a long series of animal experiments the French scientist and his associates felt that they had sufficient ground for trying out their new vaccine on babies born in homes in the Paris slums where tuberculosis in members of the family made their infection with the disease almost inevitable. Records were kept of the inoculated babies and of others who lived under the same bad conditions but were not inoculated. Twenty-five per cent of the unvaccinated control babies, according to the Calmette data, succumbed to the disease within twelve months where-

as the vaccinated ones were all apparently uninjured by the treatment and failed to contract tuberculosis for a year and sometimes longer.

In spite of these impressive results American authorities feel exceedingly cautious about this new way of acquiring immunity to the white plague. The introduction of living tuberculosis germs, no matter how weakened, into the human system is fraught with danger, they maintain. From long years of experience and observation experts in the U. S. Public Health Service say there is no telling when any given strain of tuberculosis bacilli, even a half-starved one, is likely to break out and become capable of producing virulent symptoms. In cattle inoculations it has been found that different animals react very differently to the same dose of the same type of vaccine.

From such observations it is obvious that there are many factors in this work that are not yet completely known or understood. Consequently there will probably have to be much more study of these conditions before very many authorities feel that artificial immunity can safely replace the imperfect sort that man has somehow evolved for himself naturally.

Cures

A specific cure for tuberculosis is a thus far unrealized dream of modern medicine. To be a cure for an infectious disease the proposed remedy must meet the requirement of killing the causative germ while it is in the human body without at the same time doing any harm to the surrounding cells of body tissue. Throughout all the ages medical ingenuity has discovered only two sure enough specifics; quinine that runs down the parasites in the blood of malarial patients and the arsenic compounds that are used to annihilate the trypanosomes of African sleeping sickness and the spirochaetes of syphilis.

About three years ago Dr. Holger Mollgaard of Copenhagen believed that he had found such a specific in a complicated gold compound known as Sanocrysin. This product was new in name only, however. The salts of the heavy metals used in medicine like those of gold, mercury and lead, are two-edged weapons, however; while they sometimes cure, they are also poisonous. To offset

the potential ill effects from the use of the gold compound, he injected into his patients serum from calves and horses that had previously been inoculated with dead tubercle bacilli.

In the combined use of this serum with Sanocrysin it was hoped that a new cure for the white plague had been evolved. Unhappily other workers of high standing both in the United States and Europe failed to duplicate Dr. Mollgaard's results either experimentally or clinically. It is possible after still further experimentation that Sanocrysin may be of some use for certain forms of tuberculosis but at present the medical conclusions with respect to its value are punctuated with question marks.

The basis of all fundamental curative work on tuberculosis still continues to be what it has always been since the time of Pliny: rest, sunshine, fresh air and the desire to live. Building up the body so that the blood cells and antibodies will do the rest plus a good strong will, constitute the ground structure on which most T.B. recoveries have been made.

Tuberculosis has been cured in many climates but some scientists maintain that the higher altitudes offer conditions peculiarly favorable. They are of the opinion that the winter sunshine is poor in ultra-violet rays and that the intervening water vapor and solid particles of the air of low altitudes filter out an appreciable part of what there are. Though summer sunlight in the plains probably has as much ultra-violet radiation as it does higher up, the warm humid atmosphere of the lowlands is held to have an enervating effect that offsets the very desirable stimulation that comes from sun treatments. Consequently large numbers of the big tuberculosis sanatoria are located in the mountains.

Dr. A. Rollier, who has been called the world's high priest of heliotherapy, asserts that check ups consisting of over 50,000 X-ray plates of T.B. cases received at his clinic at Leysin, Switzerland, prove that no bone lesion escapes the effect of the beneficent rays. They not only kill off the tubercle bacilli, he says, but the vibrating shock that the solar radiations bring about in the nerve endings in the skin tones up

(Just turn the page)

Tuberculosis

(Continued from Page 53)

the whole system to better resistance.

Dr. Rollier has been particularly successful with what he calls his work clinics. The careful combination of sun cure and work cure stimulates the patient's morale both psychologically and physically to the point where the natural forces of defense in the body succeed in defeating the bacilli invaders. The fact that earnings from their work help defray the long costly expense of getting well is a vital factor in the cure of the all too large class of patients with limited financial resources.

Surgery

The resources of science to rescue the sufferer from tuberculosis who is beyond the help of the classical remedies of rest and fresh air have developed to the point where thousands of people today have a new lease on life, who ten or even five years ago would have been given up for lost. Recent adaptations of the branch of surgery known as collapse therapy are among the most helpful advances made in the treatment of lung tuberculosis in the last generation, medical authorities concede.

Collapse therapy means just what its name suggests. Air or nitrogen is let into the pleural cavity around the lung which causes the infected organ to collapse so that it can get a chance to rest and heal. Since the lungs are in a state of continuous expansion and contraction, eighteen times a minute, while breathing goes on, the tubercle-formed lesions and ulcers are kept in a state of constant irritation.

Relieved from the strain of perpetual motion the infected lung picks up new energy to combat the hosts of parasites in its midst and in a large proportion of cases where treatment is begun early enough, returns to normal. This method is followed largely in cases where one lung is left intact. A prominent European authority, however, has recently announced that the collapse of both lungs with only twenty per cent. of normal vital capacity left in them has proved beneficial to his patients.

Of the total number of tuberculosis patients in the world the proportion who can get help from artificial pneumothorax, as it is known technically, is very small, yet the processes that are available to the few today are open to the many tomorrow. During a recent visit to this country, Dr. Edouard Rist, a well known French specialist in tuberculosis, declared that pneumothorax has achieved what no other mode of treatment has done before and with increased use better results still will undoubtedly follow in the future.

When the man with a cough reaches the stage where adhesions have formed between the lung and the chest wall and a pain like a knife blade shoots through his diaphragm every time he draws a breath, science has provided another type of treatment. This method involves the use of a kind of lung periscope that has the difficult name of thoracoscope and finds its chief sponsors in tuberculosis work in the Scandinavian countries. It is inserted between the ribs so that the operator can look down into the pleural cavity surrounding the lungs to see where the string-like adhesions occur. Peering through the eyepiece of the instrument the surgeon works through another incision and burns through these adhesions and severs them with a galvanic cautery.

Sometimes there are so many adhesions that whole sections of ribs have to be cut out before a lung can

be induced to collapse. This process is known as thoracoplasty and is resorted to only in very severe cases, but it saves many lives. It is sometimes necessary for the patient to sacrifice several inches of the ribs surrounding the diseased lung for the chance to survive. Even at the cost of continuous ribs, however, life is exceedingly precious and such operations have enabled many a man or woman to resume old occupations who without aid would be tenants of a grassy plot.

Research

The available facilities for scientific research of America have been marshalled into a concerted attack on tuberculosis. The medical sciences have become so specialized that one mind cannot maintain a grasp on the range over which the tuberculosis problem has spread. In consequence a cooperative study by many experts in different special fields of knowledge has been inaugurated by the National Tuberculosis Association and the U. S. Public Health Service, to run down the omnipresent germ.

On account of its extensive spread among animals and men, tuberculosis presents the gravest disease problem economically in the world. Every effort therefore, is being expended both here and abroad to utilize the best brains and laboratory facilities the world possesses to bring it under control. The committee in charge of the program of research that has been instituted in this country consists of Dr. William Charles White of the U. S. Public Health Service, chairman; Dr. Allen K. Krause, professor of medicine at Johns Hopkins University, and Dr. Paul A. Lewis of the department of animal pathology of the Rockefeller Institute at Princeton, N. J.

The angles of attack on the enemy as outlined by Dr. White are four: First, knowledge of the chemistry of the tubercle bacillus itself; second, information with respect to the chemistry of the cells of the body that take part in the formation of the tubercles; third, study of the anatomy of the different animals subject to tuberculosis; fourth, precise standards in the X-ray pictures of tuberculous lesions.

Dr. Treat B. Johnson of the department of organic chemistry at Yale University has undertaken to determine the chemical composition of the *Bacillus tuberculosis*. Pounds of tuberculosis germs, millions upon millions of them, are used in these

(Continued on Page 55)

MODERN SCIENCE AND PEOPLE'S HEALTH

Edited by

BENJAMIN C. GRUENBERG

Director, American Association for Medical Progress

Contributing Authors:

CHARLES R. STOCKARD, M.D.

HUGH S. TAYLOR, PH.D.

WALTER H. EDDY, PH.D.

WILLIAM A. WHITE, M.D.

C. E. A. WINSLOW, DR., P.H.

HAVEN EMERSON, M.D.

This is the Story of what Science is Doing for People's Health

"It is undoubtedly the best single volume which has appeared for the layman that covers the same range of subjects. It is Science as neatly popularized as the material permits."—*Dr. L. C. Johnson in The New York Herald-Tribune.*

Price \$2.50, Illustrated

W. W. Norton & Company, Inc.

70 Fifth Avenue, New York

Tuberculosis

(Continued from Page 54)

analyses, but the composition of all living matter is so complex that it probably will be a matter of years before scientists can say with any degree of certainty that the bacillus that causes the white plague is made up of this or that percentage of carbon, oxygen or hydrogen.

Groups of scientists in different universities and research institutions are working on the knotty problems presented by the cells in the body that react with the germ to form tubercles; but the part played by the different kinds of cells in the blood is still far from plain.

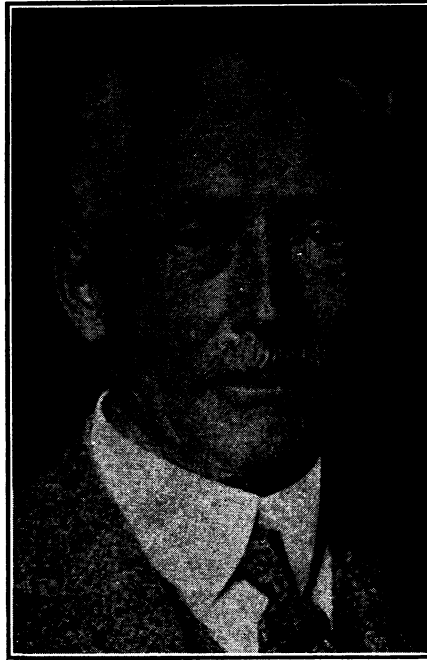
Work with different types of animals has brought to light interesting facts about the susceptibility of different organs in the different species. But as yet no satisfactory explanation has been forthcoming that tells why dogs have tuberculosis chiefly in the liver when guinea pigs under the same conditions almost always develop the disease in the spleen.

Perhaps the most fundamental thing that has been accomplished in this organization and cooperation of brains has been the standardizing of the X-ray pictures of tuberculosis. A few years ago when X-ray pictures first began to come into their own in medical practice it was assumed that shadows thrown on the photographic plate from the lungs indicated tuberculosis. Many a diagnosis reached upon such a basis caused untold needless suffering. Families were broken up and precious possessions given up to send the supposedly afflicted one to a sanatorium. There is no longer any need for these unfortunate contingencies to arise. Due largely to the work of Dr. Henry S. Pancoast of the University of Pennsylvania and a charge of the X-ray work in this committee of co-workers, who are in program of research, an X-ray picture of what constitutes a really healthy lung has been achieved as a standard of comparison. After long and painstaking effort a series of X-ray photographs of tuberculous lungs in all stages up to the point of death has been completed so that when the lungs of a T.B. suspect are X-rayed the diagnosticians have something definite with which to compare them.

Science News-Letter, January 22, 1927

Most lakes are the result of glaciation; and consequently lakes are rare in warm dry climates.

PSYCHOLOGY



CARL EMIL SEASHORE

Voice Photographer

The psychology of music, and the voice in particular, has been one of the chief researches of Dr. Seashore, for which purpose he has developed special apparatus for photographing sound waves. These studies have given some insight into the exact way in which John McCormack, for example, differs from singers of lesser note.

Born in Sweden on January 28, 1866, Dr. Seashore came to the United States at an early age and took his doctor's degree at Yale in 1895. In 1897 he went to the University of Iowa, where he has been ever since, successively holding the posts of assistant professor of philosophy, professor of psychology, head of the department of psychology and philosophy and finally dean of the Graduate College. During this time he developed at his university one of the strongest psychology departments in the Middle West.

He has received many recognitions of his scientific standing. Among them was his appointment during 1921-1922 as chairman of the division of psychology and anthropology of the National Research Council in Washington.

Science News-Letter, January 22, 1927

Some kinds of turtles like to make their nests in muskrat houses.

Bee flies are so like stinging bees that their enemies are often fooled into letting them alone.

PHYSICS

Sunspots Improve Radio

Reception of radio broadcast programs on fairly long waves generally gets worse as spots on the sun increase, but with short waves, of about 34 meters length, it gets better, Greenleaf W. Pickard, Boston radio engineer, told the Institute of Radio Engineers at their New York session.

Mr. Pickard has been studying the relations between activity of the sun, as indicated by the presence of sunspots, magnetic storms on the earth, and radio reception. He began the study in March, 1926, and has continued it to the present, measuring chiefly the reception from station WBBM of Chicago, which operates on a wave length of 226 meters. There is a very close correlation shown between the magnetic character of the days, as determined at the Cheltenham, Md., magnetic observatory of the U. S. Coast and Geodetic Survey, and the radio reception at the time. When the monthly averages are taken, there is no obvious relation between the sunspots and magnetism of radio reception, said Mr. Pickard, but when weekly averages are used "an increase of solar activity is paralleled by an increase in magnetic disturbance and a decrease in reception."

"It is perhaps unlikely that any high correlation between reception and weather elements will be found," he continued. "Solar disturbances and magnetic storms are world-wide events, whereas weather is rather a local matter. Analysis of weather elements over the whole earth indicate that there are areas of positive correlation with sunspots, and also areas of negative correlation. Although I have not yet collected and analyzed reception data from any such collection of receiving points as would fairly represent the earth as a whole, I have found that a bad night for reception in Newton Centre is in general a bad night anywhere in the United States. And I have also found that European reception of distant broadcast stations agrees remarkably well with my measurements of WBBM. I find that, in general, reception is most affected when a spot or group of spots is near the center of the solar disk, that is, when they most nearly face the earth, although there are exceptions."

Science News-Letter, January 22, 1927

Kentucky is the chief source of native asphalt in the United States.